

# MRP Energy - Integrated Project Plan

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# 1 Project Overview

## 1.1 Overview

The current electricity market was designed in the late 1990s and launched in 2002. Over the years, various inefficiencies with the market design have been identified and extensively studied through the work of the Market Surveillance Panel, the Electricity Market Forum, the IESO, and stakeholders.

The IESO's current energy market relies on a two-schedule system: one for pricing and one for resource dispatch. To calculate energy prices, the market clears using "unconstrained" resource schedules which ignore many physical system constraints such as transmission limitations and resource ramp rates. The lack of a financially-binding day-ahead market contributes to the existing inefficiencies. The non-binding day-ahead commitment process does not incorporate appropriate incentives for exports to be scheduled on a day-ahead basis.

The IESO has launched energy market improvements through a number of reforms aimed at improving price formation and the commitment and dispatch of Ontario's supply resources. Improved pricing, commitment, and dispatch create efficiency benefits by ensuring electricity demand is served by the lowest-cost supply possible while meeting system reliability needs.

Market Renewal Program Energy ("MRP Energy") will renew the foundations of Ontario's electricity market. The initiatives within MRP Energy will address known issues with the current market design and prepare the province for the electricity sector of tomorrow. Enhancements made as a result of MRP Energy will lead to lower costs for consumers and new opportunities for market participants.

MRP Energy includes three concepts that will enable the province to more efficiently meet demand over the near and longer terms:

- Introduction of a **Day-Ahead Market (DAM)** based on the implementation of a **Single Schedule Market (SSM)** to provide greater certainty to market participants and lower the cost of producing electricity.
- Reduction in the cost of scheduling and dispatching resources to meet demand as it changes from hour to hour and minute to minute through **Enhanced Real-Time Unit Commitment (ERUC)**.

## 1.2 Business Objectives

1. Improve the alignment between energy price signals and system needs.
2. Improve real-time operational certainty for market participants and the IESO.
3. Improve price certainty for market participants ahead of real-time.
4. Reduce out-of-market payments.
5. Reduce the frequency of operator interventions for unit commitments.

6. Eliminate gaming opportunities associated with Congestion Management Settlement Credits (CMSC).



### 1.3 Measurements for Business Objectives

The **MRP Energy Reference Year** is the one-year period starting six months after Go-Live to allow for system steady state to be achieved. The **Baseline Year** is the 2018 Calendar Year.

Table 1: Measurements for Business Objectives

Business Objective Ref #	Procedure for Measures (identify how the performance will be measured)	Measured when and by whom?
1	<p>I. The settlement price of energy at three buses experiencing local congestion, identified by low demand or bottled supply at the bus, on the system is lower than the settlement price of energy at the system reference bus in the MRP Energy Reference Year.</p> <p>II. The settlement price of energy at three high demand buses, identified by high demand or low access to supply at the bus, on the system is higher than the settlement price of energy at the system reference bus in the MRP Energy Reference Year.</p>	<p>I) Measured at the end of the MRP Energy Reference Year by the Director of Market Development and Resource Procurement</p> <p>II) Measured at the end of the MRP Energy Reference Year by the Director of Market Development and Resource Procurement</p>
2	<p>I. The total difference in the quantity of energy offered and bid, calculated as the sum over all physical and trade resources, between the day-ahead (DA) and real-time (RT) energy and operating reserve offers and bids, is reduced in the MRP Energy Reference Year from the Baseline Year levels.</p> <p>II. The total difference in the quantity of energy offered and bid, calculated as the sum over all physical and trade resources, between pre-dispatch and real-time energy and operating reserve offers and bids is reduced in the MRP Energy Reference Year from the Baseline Year levels.</p>	<p>I) Measured at the end of the MRP Energy Reference Year by the Director of Market Development and Resource Procurement</p> <p>II) Measured at the end of the MRP Energy Reference Year by the Director of Market Development and</p>

Business Objective Ref #	Procedure for Measures (identify how the performance will be measured)	Measured when and by whom?
		Resource Procurement
3	<p>I. The ratio of market demand cleared in DA versus market demand cleared in RT is increased in the MRP Energy Reference Year from the Baseline Year levels. The closer the DA market demand is to RT market demand helps the IESO better plan its operations and achieve reliability. The reference year is pre-MRP Energy.</p>	Measured at the end of the MRP Energy Reference Year by the Director of Market Development and Resource Procurement
4	<p>I. The annual ratio of out-of-market payments for energy to in-market payments for energy is reduced in the MRP Energy Reference Year from the Baseline Year levels.</p> <ul style="list-style-type: none"> <li>• Out of Market Payments in the Baseline Year include: CMSC, Real-Time Generation Cost Guarantee (RT-GCG), Production Cost Guarantee (PCG), generator withdrawal charges, and any corresponding reversals to these charge types.</li> <li>• Out of Market Payments in the MRP Energy Reference Year include: RT Make-whole, Non-Quick-Start (NQS) Cost Guarantee, DAM Make-whole Payments for NQS resources, NQS Failure charge, and any corresponding reversals to these charge types</li> </ul>	Measured at the end of the MRP Energy Reference Year by the Director of Market Development and Resource Procurement
5	<p>I. The annual ratio of operator interventions for manual input of unit commitments to automated input of unit commitments is reduced in the MRP Energy Reference Year from the Baseline Year levels.</p>	Measured at the end of the MRP Energy Reference Year by the Senior Director, Power System Assessments
6	<p>I. The two schedule system is no longer used to settle the Ontario market in the MRP Energy Reference Year.</p>	I) Measured at the start of the MRP Energy Reference Year

Business Objective Ref #	Procedure for Measures (identify how the performance will be measured)	Measured when and by whom?
	<p>II. Constrained payments due to 'pay as bid' conditions are eliminated in the MRP Energy Reference Year.</p> <p>a. Pay as bid refers to scenarios where known constraints (e.g. transmission or ramp) allow a market participant to submit a non-marginal cost offer (or non-marginal benefit bid) that aims to maximize a settlement outcome by being made-whole to the as offered prices.</p>	<p>II) Measured at the end of the MRP Energy Reference Year by the Director of Market Development and Resource Procurement</p>

## 1.4 Roadmap

The MRP Energy roadmap has been divided into three major phases, with a total estimated duration of eight years (2017 to 2024). The duration and timing of each phase is as follows:

Phase:	FY Period
1. High Level Design ( <i>Completed</i> )	2017 to 2019
2. Detailed Design & Implementation	2019 to November 2023
3. Contingency & Post-Production Support	December 2023 to May 2024

A more detailed project schedule can be found within the Schedule folder.

– End of Section –

## **2 Project Governance**

### **2.1 Project Governance**

Oversight and guidance of MRP Energy is provided by the Market Renewal Program – Replacement of Settlement Systems Program Steering Committee (MRP-RSS PSC) and the Market Renewal Program – Replacement of Settlement System Executive Steering Committee (MRP-RSS ESC). These committees are governed by their applicable Terms of Reference [REDACTED] respectively).

### **2.2 Project Management Controls**

Responsibility on establishing the appropriate level of project management controls is delegated to the Program Delivery Executive. The MRP Energy Project Management Plan [REDACTED] details how MRP Energy is monitored and controlled. Supporting deliverables within this plan include, but are not limited to: Change Management Plan, Resource Plan, Project Interdependences and Project Schedule.

– End of Section –

### 3 Project Plan

#### 3.1 In-Scope Deliverables and Acceptance Criteria

This section defines the deliverables, the acceptance criteria and the acceptors.

Process and Solution Stewards and Owners are as identified in the MRP Energy Project Management Plan (██████████).

**Table 2: In-Scope Deliverables**

#	Deliverable	Description	Acceptance Criteria	Acceptor(s)
1	High-Level Design documents	High-level description of elements required to develop and execute the new Energy Market	Internal stakeholders have reviewed the High-Level Design External stakeholders have reviewed the High-Level Design Project Sponsor and Executive Leadership Team accept the High-Level Design IESO Board approves the High-Level Design	Project Sponsor Executive Leadership Team IESO Board
2	Detailed Design documents	Detailed description of processes and elements, sufficient to develop software solution requirements and identify Market Rules changes required to execute the new Energy Market	Process and Solution Stewards and Owners accept the respective chapters of the Detailed Design Detailed Design documents have been issued for external review and the IESO has responded to any comments received Project Sponsor and Executive Leadership	Process and Solution Stewards and Owners Project Sponsor Executive Leadership Team

#	Deliverable	Description	Acceptance Criteria	Acceptor(s)
			Team approves all chapters of the Detailed Design	
3	Authorization processes	New and/or updated processes to authorize Energy Market participants	Process Steward and Owner approves the new w/updated processes	Process Steward and Owner
4	Registration processes	New and/or updated processes to support resource registration	Process Steward and Owner approves the new/updated processes	Process Steward and Owner
5	Real-time operations processes	New and/or updated processes to support real-time operation of the IESO-Controlled Grid (ICG)	Process Steward and Owner approves the new/updated processes	Process Steward and Owner
6	Settlements processes	New and/or updated processes required to settle the wholesale electricity markets	Process Steward and Owner approves the new/updated processes	Process Steward and Owner
7	Compliance processes	New and/or updated processes required to identify and enforce compliance with the Market Rules	Process Steward and Owner approves the new/updated processes	Process Steward and Owner
8	CFS (Centralized Forecast Service)	Interface with new Dispatch Scheduling and Optimization (DSO) engine	Process and Solution Steward and Owner approves the software solution	Process and Solution Steward and Owner

#	Deliverable	Description	Acceptance Criteria	Acceptor(s)
9	OSL (Operating Security Limits)	1. Interface with new DSO 2. Reassessment of limit definitions as a result of virtual transactions	Process and Solution Steward and Owner approves the software solution	Process and Solution Steward and Owner
10	OCSS (Outage Coordination and Scheduling System)	1. Interface with new DSO 2. Data transfers may need to take into account new resource types	Process and Solution Steward and Owner approves the software solution	Process and Solution Steward and Owner
11	EMS (Energy Management System)	1. Interface with new DSO 2. Market information displays 3. Load pattern (distribution pattern) involving weather data	Process and Solution Steward and Owner approves the software solution	Process and Solution Steward and Owner
12	DE (Data Engineering)	1. Interface with new DSO 2. Network model changes as a result of new resource types	Process and Solution Steward and Owner approves the software solution	Process and Solution Steward and Owner
13	Adequacy Report	Re-work of report logic due to change to zonal forecasts and addition of virtual resources	Process and Solution Steward and Owner approves the software solution	Process and Solution Steward and Owner
14	DSO (Dispatch Scheduling and Optimization)	Market Interface System (MIS) & Day-Ahead Optimization System (DAOS) replacement	Process and Solution Steward and Owner approves the software solution	Process and Solution Steward and Owner

#	Deliverable	Description	Acceptance Criteria	Acceptor(s)
15	DFS (Demand Forecast System)	1. Interface with new DSO 2. Zonal forecasts 3. Potentially replace operational demand data with revenue metering data 4. Several data transfers will need to change to accommodate zonal forecasts	Process and Solution Steward and Owner approves the software solution	Process and Solution Steward and Owner
16	DDMS IS (Dispatch Data Management System Interchange Scheduler)	1. Interface with new DSO 2. Predispatch completion timing & associated processes logic change 3. Obsolete transaction codes due to the phase-out of unconstrained results in the new market 4. Potential for interchange transaction check-out in the day-ahead timeframe	Process and Solution Steward and Owner approve accept the software solution	Process and Solution Steward and Owner
17	DDMS RDISP (Resource Dispatch)	1. Interface with new DSO 2. Change from static loss factors to dynamic loss factors in creating Operating Reserve stacks	Process and Solution Steward and Owner approve accept the software solution	Process and Solution Steward and Owner

#	Deliverable	Description	Acceptance Criteria	Acceptor(s)
18	DDMS INP ARM (Input Parameters)	1. Interface with new DSO 2. Potential new system limits and requirements in the Day-Ahead Market	Process and Solution Steward and Owner approve accept the software solution	Process and Solution Steward and Owner
19	DDMS CM (Contract Manager)	1. Interface with new DSO 2. Disable/change Production Cost Guarantee (PCG) contract creation logic	Process and Solution Steward and Owner approve accept the software solution	Process and Solution Steward and Owner
20	DDMS SEM (Spare Energy Monitor)	1. Interface with new DSO - possible that the information source used in the calculation logic of the application will change and major rework will be required	Process and Solution Steward and Owner approve accept the software solution	Process and Solution Steward and Owner
21	DDMS UCM (Unit Commitment Manager)	Notifications for Non-Quick-Start unit startups and shutdowns	Process and Solution Steward and Owner approve accept the software solution	Process and Solution Steward and Owner
22	FCO (Facilitated Check Out)	1. Potential for interchange transaction check-out in the Day-Ahead timeframe	Process and Solution Steward and Owner approve accept the software solution	Process and Solution Steward and Owner

#	Deliverable	Description	Acceptance Criteria	Acceptor(s)
23	MIM Back End (Market Information Management)	1. Interface with new DSO 2. New resource types 3. New submission data 4. New submission & validation rules 5. Database object changes 6. MIM web service change	Process and Solution Steward and Owner approve accept the software solution	Process and Solution Steward and Owner
24	MIM EMI (Energy Market Interface)	1. New resource types 2. New submission data 3. New submission & validation rules	Process and Solution Steward and Owner approve accept the software solution	Process and Solution Steward and Owner
25	MIM EMAT (Energy Market Administration Tool)	1. New resource types 2. New submission data 3. New submission & validation rules 4. Database object changes in MIM database 5. New Admin functions	Process and Solution Steward and Owner approve accept the software solution	Process and Solution Steward and Owner
26	Morning Report	Changes to market data	Process and Solution Steward and Owner approve accept the software solution	Process and Solution Steward and Owner
27	Solution for Authorize Markets and Programs Participation	1. New resource types and additional parameters 2. Workflow updates	Process and Solution Steward and Owner approve the software solution	Process and Solution Steward and Owner

#	Deliverable	Description	Acceptance Criteria	Acceptor(s)
28	Solution for Register Facility	1. New resource types and additional parameters 2. Workflow updates 3. Reassessment of database transfer jobs	Process and Solution Steward and Owner approve accept the software solution	Process and Solution Steward and Owner
29	Solution for MPMIS (Market Power Mitigation Information System)	New solution to support Market Power Mitigation (MPM) functions	Process and Solution Steward and Owner approve accept the software solution	Process and Solution Steward and Owner
30	CRS (Commercial Reconciliation System) – <i>Delivered through the RSS Project (funded through MRP Energy)</i>	1. New charge types on new CRS 2. Maintain pre-MRP Energy market information for auditability and recalculation for Notices of Disagreement	Process and Solution Steward and Owner approve the software solution	Process and Solution Steward and Owner
31	MPPS (Market Participant Prudential System) Calculation Modules	Prudential calculation and logic changes due to introduction of new resource types and changes to data inputs	Process and Solution Steward and Owner approve the software solution	Process and Solution Steward and Owner
32	MDMS (Meter Data Management System)	Meter data to node/zone association as a result of moving from uniform pricing to nodal/zonal pricing	Process and Solution Steward and Owner approve the software solution	Process and Solution Steward and Owner
33	NOD (Notice of Disagreement) <i>Delivered through</i>	1. Business logic changes due to introduction of new charge types	Process and Solution Steward and Owner approve the software solution	Process and Solution Steward and Owner

#	Deliverable	Description	Acceptance Criteria	Acceptor(s)
	<i>the RSS Project, refer to [REDACTED]</i>	2. Potential to include Market Power Mitigation (MPM) disagreements in scope of On-Line Settlement Forms (ONSLF)		
34	ONSLF (On-Line Settlement Forms)- <i>Delivered through the RSS Project, refer to [REDACTED]</i>	1. New form design due to settlement changes 2. Generator Cost Guarantee (GCG) submissions no longer required	Process and Solution Steward and Owner approve the software solution	Process and Solution Steward and Owner
35	CAMS (Centralized Alarm Management System)	1. Interface to new DSO 2. Update all existing MIS & DAOS related alarms + new market related alarms	Process and Solution Steward and Owner approve the software solution	Process and Solution Steward and Owner
36	Corporate Internet - Public Website	Update all market related documents and content	Process and Solution Steward and Owner approve the software solution	Process and Solution Steward and Owner
37	Data Warehouse (SDR)	1. Update existing archival for updated DB objects in source 2. New archival requirements	Process and Solution Steward and Owner approve the software solution	Process and Solution Steward and Owner
38	ODS (Operational Data Store)	1. Update existing transfers for updated database objects in source 2. New transfer requirements	Process and Solution Steward and Owner approve the software solution	Process and Solution Steward and Owner

#	Deliverable	Description	Acceptance Criteria	Acceptor(s)
39	Report Generation	1. Many existing reports will change 2. Addition of new reports	Process and Solution Steward and Owner approve the software solution	Process and Solution Steward and Owner
40	BPMS (Business Process Management Suite)	Existing workflows may change	Process and Solution Steward and Owner approve the software solution	Process and Solution Steward and Owner
41	ETL (Extract Transform Load – database transfers)	Many existing ETLs will change, but solution itself will not change	Process and Solution Steward and Owner approve the software solution	Process and Solution Steward and Owner
42	Control Room Pre-dispatch Report (website)	Many changes to market data, assume similar to Morning Report	Process and Solution Steward and Owner approve the software solution	Process and Solution Steward and Owner
43	MPPS GUI (Market Participant Prudential System Graphical User Interface)	GUI data representation changes	Process and Solution Steward and Owner approve the software solution	Process and Solution Steward and Owner
44	MPPS Web Service	Prudential inputs, prudential support obligation retrieval, calculate prudential support obligation on market participant input scenarios	Process and Solution Steward and Owner approve the software solution	Process and Solution Steward and Owner
45	Market Rules	New and updated Market Rules required to execute the new Energy Market	IESO Board approves the Market Rules	IESO Board

#	Deliverable	Description	Acceptance Criteria	Acceptor(s)
46	Market Manuals	New and updated Market Manuals required to execute the new Energy Market	Project Steward approves the Market Manuals, with External stakeholder review and approval through the IESO Baseline Management Process.	Project Steward
47	Internal Manuals	New and updated Internal Manuals required to execute the new Energy Market	Project Steward approves the Internal Manuals	Project Steward
48	Internal Procedures	<p>New and updated Internal Procedures required to execute the new Energy Market, including but not limited to:</p> <ul style="list-style-type: none"> <li>• Line of Business procedures required to execute new and updated processes</li> <li>• Control Room operations procedures required to execute updated processes</li> <li>• IT procedures required to support infrastructure and software solutions introduced or</li> </ul>	Project Steward approves the Internal Procedures	Project Steward

#	Deliverable	Description	Acceptance Criteria	Acceptor(s)
		updated by the new Energy Market <ul style="list-style-type: none"> <li>Updated failover/fallback procedures</li> </ul>		
49	Benefits Realization Plan	Development of a benefits realization framework to ensure mechanisms are in place to monitor the achievement of business objectives and the realization of stated program benefits.	A benefits realization framework, tools and methodologies are in place for the Program and a documented benefits realization plan is prepared, reviewed by key internal stakeholders and is monitored and managed by the Change Management, Adoption and Benefits Realization team.	Program Delivery Executive

### 3.2 Out of Scope

The following are not considered in scope of MRP Energy:

1. Market Analysis Simulation Toolset (MAST)

### 3.3 Risk Management

Risk Management within the MRP-RSS Program is managed utilizing the Risk Management Process, a process which is in alignment with IESO Enterprise Risk Management (ERM)'s COSO framework. This process ensures the following efforts are executed on a periodic basis (i.e. monthly at minimum), working alongside the MRP-RSS program leaders, team members, and vendors:

- **Objective Setting**  
What is the goal/target/context that we are aiming to achieve? What would prevent us from achieving our operational, project, and strategic objectives? Who is responsible for ensuring objectives are met?
- **Risk Identification**  
What risks, if any, are preventing us from reaching our objective? How can we describe the risk in one statement which defines the impact, likelihood, consequence, and stakeholders such that risk can be easily assessed, monitored, and reported on?
- **Risk Assessment & Analysis**  
What is the Inherent Risk (risk without controls)? How is the risk being managed today? What is the remaining or Residual Risk?
- **Risk Response or Mitigation**  
Can you respond or mitigate the risk and if so, how? Can you mitigate or transfer the risk? Do you need to accept the risk? How will you manage the risks that share controls with others?
- **Risk Monitoring & Reporting**  
How often should the risk need to be re-assessed? Who should be responsible for re-assessing the risk? Who will manage the risk management process? Who are the risk owners, control owners, and/or mitigation owners? To whom should the risk be reported to and how often?

Risks are first raised by the team members, team leads, vendors and sometimes executives. Risks are submitted via the Risk Intake Form to the Risk Management Lead, who reviews the risk, populates the risk in the risk log, and schedules a risk review/assessment session with the appropriate member of the team that has raised the risk. Should the risk be a valid risk, the risk continues to be managed by the risk owner with oversight from Risk Management Lead via risk log monthly reviews and/or project-driven discussions focused on the respective risk.

Risks are assessed against the Project, Program and Operational/ERM risk impact and likelihood metrics which were approved by the IESO Board of Directors. Each risk is assessed for: Inherent Risk (risk without controls), Residual Risk (risk with controls), and Target Risk (risk post-execution of mitigation/acceptance of residual risk).

Risks are re-assessed as the controls, mitigation, and project efforts change. Risks are then monitored by a Risk Status as either: Initiated, Mitigating, Mitigated & Monitoring, or Accepted Risk Trend.

Risks are reported based to the MRP-RSS PSC and the MRP-RSS ESC as per their respective terms of reference.

For the complete list of project risks, please refer to the current MRP Energy Risk Assessment.

### 3.4 Cost

As per the approved MRP Energy Business Case (██████████) and updated by Project Exception Report (PER ██████████) the project budget totals \$177.7 million (including \$10 million contingency) in capital and operating funds.

**Table 3: Project Budget**

Capital	Operating	Total
\$150.4 M (including \$10M contingency)	\$27.3 M	\$177.7M

### 3.5 Project Activity Charge Codes

All project costs will be charged according to the following table:

**Table 4: Project Activity Charge Codes**

Expenditure Type	Activity Charge Code
Capital	67000100
Operating	89000100

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## 4 Document Control

### *Authors*

Prepared By	Role
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### *Project Management Adherence Review*

Reviewed By	Role
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### *Approvals*

Approved By	Role
██████████	Program Sponsor, Interim President and CEO

***Distribution List***

<b>Name</b>	<b>Organization</b>
Citadel	IESO
PMO	IESO
Finance	IESO

## 5 Document Change History

Issue	Reason for Issue	Date
0.1	Draft for internal review	December 14, 2019
0.2	Draft for PMO and PDO review	March 04, 2020
0.3	Issued for PDE and MRP Director review	April 14, 2020
0.4	Issued for MRP-RSS SC for review	June 16, 2020
1.0	Issued for MRP-RSS SC for approval	July 07, 2020
2.0	Issued for CEO approval	May 20, 2021

## 6 References

Document Title	Document ID
MRP-RSS Project Steering Committee Terms of Reference	██████
MRP-RSS Executive Steering Committee Terms of Reference	██████
MRP Energy Business Case	██████
Project Exception Report (PER) ██████	██████

## 7 Related Documents

Document Title	Document ID
MRP Program Charter	██████
MRP Energy - Project Management Plan	██████

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