Detailed Design

Market Renewal Program:
Energy

Overview

Detailed Design

Issue 2.0

Disclaimer

This document provides an overview of the proposed detailed design for the Ontario Market Renewal Program (MRP) and must be read in the context of the related MRP detailed design documents. As such, the narratives included in this document are subject to on-going revision. The posting of this design document is made exclusively for the convenience of *market participants* and other interested parties.

The information contained in this design document and related detailed design documents shall not be relied upon as a basis for any commitment, expectation, interpretation and/or design decision made by any *market participant* or other interested party.

The *market rules*, *market manuals*, applicable laws, and other related documents will govern the future market.

Table of Contents

List of Figures ii
Purpose of Thiscument 1
Background 1
Market Renewal Program 2
Detailed Design of Ontario's Energy Market 3
Purpose 3
Scope 3
Market Registration 4
Market Inputs 5
Market Scheduling and Optimization 5
Market Outputs 6
Other Ongoing Initiatives 6
Detailed Design Documents 6
Authorization and Participation 7
Prudential Security 7
Facility Registration 8
Revenue Meter Registration 8
Offers, Bids and Data Inputs 9
Grid and Market Operations Integration 9
Calculation Engine Documents 10
Day-Ahead Market Calculation Engine 10
Pre–Dispatch Calculation Engine 10
Real-Time Calculation Engine 11
Market Power Mitigation 11
Publishing and Reporting Market Information 11
Market Settlement 12
Market Billing and Funds Administration 12
Navigating the Detailed Design 13
Section 1: Introduction 13
Section 2: Summary of the Current and Future State 13
Section 3: Detailed Functional Design 13
Section 4: Market Rule Requirements 13
Section 5: Procedural Requirements 14
Section 6: Business Process and Information Flow Overview 14
Appendix A: Market Participant Interfaces 14

Appendix B: Internal-Facing Procedural Requirements [Internal to the IESO only]..... 14
Appendix C: Business Process and Information Requirements [Internal to the IESO only]14
Appendix D and E: (Various – as required)..... 15
Enabling the Future..... 16
Engaging Stakeholders..... 16

List of Figures

Figure 1:Future Market Design by Major Functional Area and Associated Design Documents 4

Purpose of This Document

This overview document is intended as a guide to understanding the detailed design of Ontario's future *energy* market. It provides background information on the Independent Electricity System Operator's (*IESO*) Market Renewal Program (MRP) and the objectives it seeks to achieve through the implementation of its three key initiatives: a single-schedule market, a day-ahead market and an enhanced real-time unit commitment process. This overview describes the future market's 13 design documents, each document's areas of focus, their chronological sequencing and how they interrelate. It also identifies and describes the common structure used in all the design documents and for whom they are intended.

This overview is recommended pre-reading for those who have a need to understand one or more of the detailed design documents.

Background

In May 2002, the *IESO* opened a competitive wholesale electricity market in Ontario. This event marked a shift from large, centralized generators supplying passive customers to a marketplace that facilitated competition among generators and loads producing or consuming electricity. This market produced a price for electricity every five minutes, enabling more efficient scheduling of resources that reflected general power system conditions.

The opening of the market introduced many benefits to Ontario's electricity sector and by extension, the province's ratepayers. Competition drove existing suppliers to find ways to reduce production costs and improve operational efficiencies. It attracted new *market participants*, who sought to compete with traditional players, resulting in more efficient market outcomes and stronger price signals. It also facilitated more active participation in the market from resources who could respond to a fluctuating five-minute price. Ultimately, the market had the effect of leveling the playing field for a greater number and more diverse set of *market participants* to compete for the opportunity to help the province meet its *demand* for electricity.

Since the market opening over 18 years ago, Ontario's *energy* landscape has undergone significant change. The retirement of coal-fired *facilities*, the growth of renewable *energy* from *variable generation*, the increase in small-scale, distribution-connected generation and the emergence of new technologies have dramatically – and permanently – changed the dynamics of Ontario's electricity sector in many ways.

The competitive electricity market was key to enabling this transformation, but it was not without its shortcomings. Some elements of the market's initial design and additions that came later to ensure *reliability* created inefficient market outcomes and additional expense, such as:

1. Congestion management *settlement* credits (CMSC) were introduced to compensate *market participants* who are constrained on or off at the *IESO*'s direction, in order to respect

transmission and other *reliability* constraints on the power grid. But as an out-of-market payment, these additional costs are not transparently reflected in the price of electricity.

2. The day-ahead commitment process (DACP) was added in 2006 and later updated in 2011 to provide the *IESO* and *market participants* with a better view into the next day's available supply and anticipated *demand*. This commitment process provides payment guarantees for some *resource* types but not others. As a result, it doesn't incent participation from all *market participants*, resulting in an incomplete view of the next day's operations.

3. The real-time generator cost guarantee (RT-GCG) was introduced as a *reliability* mechanism. To ensure generators that are needed to meet *demand*, but which have certain operational restrictions, are compensated for being online should the market price drop below their production costs. While the program provided financial protection to generators to ensure they are available when they're needed, it is not the most efficient or effective way to ensure *reliability* and drew criticism over the years for its lack of transparency and clarity around eligible costs.

Other shifts in the electricity landscape stem from emerging technologies that are increasingly cost-competitive, consumers that are increasingly engaged and changes to traditional supply and *demand* patterns will necessitate further changes to the market in the future. Therefore, foundational market enhancements are now required to enable the *IESO* to continue to maintain *reliability* today, while preparing for tomorrow.

Market Renewal Program

In its mission to enhance the efficiency of Ontario's electricity markets, the *IESO* initiated the Market Renewal Program (MRP) with the following three initiatives for the *energy* work stream:

- Replace the two-schedule market with a **single schedule market (SSM)** to address current misalignments between price and *dispatch* and to better reflect the true cost of dispatching resources.
- Introduce a **day-ahead market (DAM)** to provide greater operational certainty to the *IESO* and greater financial certainty to *market participants*, ensuring more efficient scheduling of resources to meet anticipated system needs.
- Reduce the cost of scheduling resources to meet *demand* as it changes from the day-ahead to real-time through the **enhanced real-time unit commitment (ERUC)** initiative.

This redesign will address inefficiencies in the current market, implement best practices that have emerged over the past decade and prepare the *IESO* to more effectively manage future change. In the end, MRP will deliver a more efficient, stable marketplace with competitive and transparent mechanisms that meet Ontario's electricity needs at the lowest cost possible.

Detailed Design of Ontario's Energy Market

Purpose

The purpose of the detailed design is to document the intended form of the future market at the level of detail required to support the development of governing documents, processes, procedures and tools. The governing documents, which include *market rules*, *market manuals* and internal procedures will dictate the design and operation of the market, including the roles and responsibilities of the *IESO* and *market participants*.

The intended audience for the detailed design is current and prospective *market participants*, relevant *IESO* staff and other market stakeholders.

Scope

The scope of the detailed design is an end-to-end functional design for the future *energy* market. The detailed design covers the entire range of *physical market* processes and activities, starting with the authorization of a *market participant* and ending with invoicing for market transactions.

The detailed design will guide the changes that need to be implemented in the governing documents, processes, procedures and tools but will not necessarily represent the final specifications or equations that will be used.

Figure 1 depicts the design of the future market, chronologically, by major functional areas of the market and indicates how each of the design documents correspond to various components of the market.

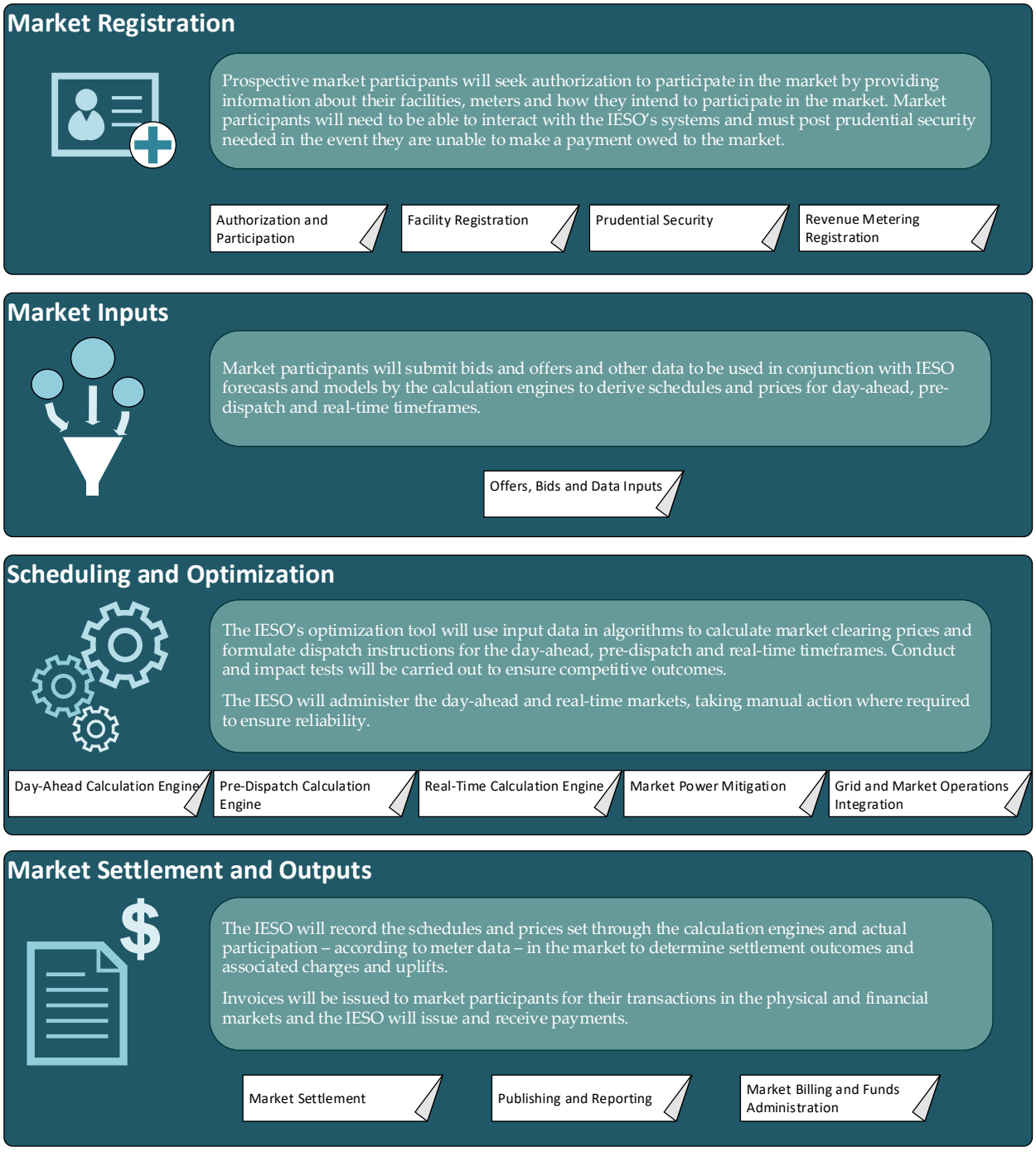

Figure 1:Future Market Design by Major Functional Area and Associated Design Documents

Market Registration

Anyone wishing to participate in the market will need to first apply to the *IESO* for authorization. The authorization process will allow applicants to declare how they intend to participate in the market (e.g. as a *generator* or load). This process will also determine whether the applicants satisfy the market's financial obligations, such as meeting *prudential support*

requirements, and will establish their ability to interact with the *IESO*'s online systems. Once an applicant is authorized, they will complete the registration of their *metering installations* and *facilities* by providing information about their *facility*, where they intend to physically connect to the grid and other relevant details.

Registration will continue to be a one-time process, though there may be some instances where registration data may need to be updated later on.

Market Inputs

On a regular basis, the *IESO* and *market participants* will provide data inputs to the market. *IESO* inputs will include *demand* forecasts, the *IESO-controlled grid* network model, approved outage events and other requirements for meeting *reliability* requirements and obligations including those mandated by North American Electric Reliability Corporation (*NERC*), Northeast Power Coordinating Council (*NPCC*) and *IESO* policies. *Market participant dispatch data* parameters will include identification data, such as *resource* name and type; hourly data, including *energy offer* and start-up *offer*; and daily data, such as *minimum loading point* and daily *energy* limit.

This data will be used by the *IESO*'s calculation engines to deliver optimized schedules and prices.

Market Scheduling and Optimization

The *IESO*'s calculation engines will take the inputs provided by the *IESO* and *market participants*, apply a series of complex calculations and solve for the most efficient *dispatch* solution. At the same time, they will test *offers* and *offer* components for their potential to result in the exercise of market power. If the *offers* or *offer* components are found to have impacted prices by a certain amount, the calculation engines will take action by modifying inputs before the *dispatch* and locational prices are determined. This process will mitigate the exercise of market power and the potential price impact, before it occurs.

The calculation engines will have distinct functionalities in the three different timeframes to co-optimize *energy* and *operating reserve*.

1. The day-ahead market (DAM) calculation engine will perform multi-hour optimization once per day over all hours of the following day, producing financially-binding schedules and prices for each hour.
2. The pre-dispatch (PD) calculation engine will refine schedules that were established by the day-ahead optimization, based on updated data inputs, such as load forecasts and, where applicable, supplier *offers*. It will operate hourly, beginning at 20:00 EST of the *pre-dispatch day*, and will perform a multi-hour optimization. Its initial run will optimize over the following 27 hours. Its final run of the day occurs at 19:00 EST, and will optimize for the remaining 4 hours of that day. It will produce a set of results which include commitments, advisory schedules and advisory prices.

3. In real-time, the *IESO* will account for any deviations that occur between pre-*dispatch* and real-time. The real-time (RT) calculation engine will run every five minutes, performing multi-interval optimization over the next 11 five-minute intervals. It will produce optimized *dispatch instructions* and set the price for the next five-minute interval and advisory schedules for the remaining 10 intervals.

During the course of an operating day, changing system conditions can in turn change the parameters associated with the *reliability* and *security* of the grid. Set operational procedures and control actions will be used in real-time to ensure reliable operations.

Market Outputs

The *IESO* will record the schedules and prices produced by the calculation engines along with the actual participation in the market to produce a detailed breakdown of a *market participant's* activity in the market. This data will be used by the *settlement process* and provided to *market participants* along with *settlement amounts* and supporting data in *settlement* reports. This information will then be used to *invoice market participants* for their activity in the market. Finally, the *IESO* will issue or receive payments to or from *market participants* to clear the market.

In its role as the market administrator, the *IESO* will produce a variety of reports pertaining to market activity and outcomes. These reports will include public reports that are posted to the *IESO* website, confidential reports that are shared only with the relevant *market participants* and internal reports that are available only to the *IESO* staff. These reports will capture different aspects of the market, including, but not limited to: *demand*, system *adequacy*, prices, scheduling and commitments in different timeframes and market power mitigation.

Other Ongoing Initiatives

The detailed design documents represent the plan for a future market based on what's known at the time of their approval. They are not intended to be living or evolving documents, nor will they be updated to reflect the changing current state of the market. At the time of this document's publication, there are several ongoing initiatives that could introduce further change to the market should they be realized. These initiatives are being advanced in parallel to MRP but are out of this project's scope. These initiatives are not explicitly identified in the detailed design documents, but MRP will coordinate and maintain alignment with other parallel initiatives as market documentation is developed.

Detailed Design Documents

In high-level design, the scope of the *energy market's* design was divided into three initiatives: SSM, DAM, and ERUC. In detailed design, the plan for these initiatives is captured in 13 detailed

design documents. Each document describes the design for a specific function of the future market. The documents are not numbered, though there are identified linkages between them. Together, they represent the end-to-end functional design of the future *energy* market.

The following sections provide a description of the functions and processes covered by each design document, as well as a high-level description of the changes under the future market.

Authorization and Participation

The Authorization and Participation design document outlines the initial steps required to register participants in the market.

Market applicants will first register their organization by submitting organizational, contact, financial, and market information to the *IESO*. The applicant must also sign and submit a *participation agreement*. The *participation agreement* formally binds the applicant to the *market rules*.

Once the *IESO* has registered the organization, the applicant must indicate how they would like to participate in the market. Participation can be as a generator, load, *transmitter*, virtual transaction *energy* trader, etc. Details on the different types of participation, including new participation types, are outlined in the document.

The type(s) of participation that the applicant is seeking authorization for determines a number of other requirements that must be met. For example, some applicants must obtain *Ontario Energy Board* licenses for participation in the *physical market* and a National *Energy* Board permit if they will be exporting *energy*. Some applicants may also need to submit *prudential support*. *Prudential support* is the collateral required in the event that a *market participant* fails to make a required payment. The amount of *prudential support* required will be a function of the participation type and how much the participant could potentially owe the market. The Prudential Security design document includes further details on how *prudential support obligations* will be calculated.

The applicant can begin registering a *facility* at this point, but the *facility* registration cannot be completed until the applicant has been authorized by the *IESO*. After the *IESO* has authorized the applicant in one or more roles or participation types identified above, they become a *market participant* and are granted access to relevant *IESO* systems, for the purpose of participating in the market.

Prudential Security

The Prudential Security design document defines the *prudential support obligation* in the future market, as well as the ongoing monitoring of estimated exposure for margin calls.

When an applicant requests authorization to participate in the market, the *IESO* will calculate the applicable *prudential support obligation*. *Prudential support* is required in the event that a

market participant fails to make a required payment. The *IESO* will not authorize an applicant until the required *prudential support* has been provided.

With the introduction of a day-ahead market, changes to the *prudential support obligation* processes are minimal and mostly additive in nature. For example, *prudential support* will be required to account for participants' exposure in the day-ahead and *real-time markets*. The introduction of virtual transactions however, requires additional prudential considerations based on the unique risk profile of virtual *energy* transactions.

Facility Registration

The *Facility* Registration design document describes the process for registering a *facility* in the market. It also captures the processes for transferring and deregistering existing *facilities*.

After registering an organization with the *IESO*, participants will be able to initiate *facility* registration for one or more *facilities*. *Facilities* can currently be registered as one of the following types: generation, load, *boundary entity*, transmission or distribution. The introduction of a day-ahead market will allow new types of registered *facilities*, namely price-responsive loads and virtual transaction zonal trading entities.

In order to register a *facility*, *market participants* will be required to submit data about their *facility* to the *IESO*. The required data will vary based on the *facility* type and will be used as an input to many downstream processes, such as scheduling and market power mitigation. The *IESO* will assess registration data for physical *facilities* and transmission resources to ensure that the resource meets established *reliability*, performance, and technical standards before authorization is granted to connect to the grid. *Facility* registration will not be completed until the *IESO* has authorized the *market participant* and the participant has met the metering requirements for each resource at its *facility*. Details on authorization and metering requirements can be found in the Authorization and Participation and Revenue Meter Registration documents, respectively.

In the future market, there will be a number of changes to the data that *market participants* will need to submit during *facility* registration and how that data will be used by the *IESO*. For example, certain *generation facilities* will be required to register additional information to support enhanced day-ahead and *pre-dispatch scheduling* and unit commitment decisions. Additional registration information will also be needed to support market power mitigation functions.

Revenue Meter Registration

The *Revenue Meter* Registration design document describes the requirements for registering a new *revenue meter* installation and collecting *revenue meter* data. It also addresses metering requirements for new resource types, metering requirement changes for existing resource types, and the collection, totalization, and validation of *revenue meter* data.

Before a *market participant* can complete the *facility* registration process they must meet the applicable metering requirements, which may include registering a *revenue meter* installation. Metering data will be required in order to derive *settlement* outcomes for their market transactions. During *revenue meter* registration, the *market participant* who owns the *facility* will be responsible for assigning roles that should be associated with the *facility* and ensuring that the *metering service provider* submits the necessary meter installation information.

The *revenue meter* installation registration process will continue to require the same types of information from *market participants* as it does today. The minor changes required to account for *non-dispatchable loads* electing to re-register as price-responsive loads are detailed in this document.

Offers, Bids and Data Inputs

The Offers, Bids and Data Inputs design document describes the information that *market participants* and the *IESO* provide into the market to be used by the DAM, PD and RT calculation engines for *dispatch* scheduling and optimization. The engines use this information to determine commitments, schedules, and prices.

Market participants will provide hourly *dispatch data* in the form of *offers* and *bids* for *energy* and *operating reserve* into the day-ahead and *real-time markets*. Technical parameters such as lead-time, *minimum loading point* and daily *energy* limit may be updated on a regular basis, if required.

The *IESO* will also provide a number of data inputs to the calculation engines that reflect the anticipated system conditions for the *dispatch day* and any *reliability* measures that must be respected. They will include: *demand* forecasts, *variable generation* forecasts, anticipated *transmission system* flows, and a network model of the *IESO-controlled grid* and *reliability* requirements.

In the future market, changes to *market participant* inputs arise from the introduction of price-responsive loads and virtual transactions, and physical operating constraints for dispatchable hydroelectric and non-quick start facilities.

The timelines for the submission and revision of data is detailed in the Grid and Market Operations Integration design document.

Grid and Market Operations Integration

The Grid and Market Operations Integration design document describes the processes to schedule, commit and *dispatch* resources in the day-ahead and *real-time markets*. This document also explains how these processes are integrated across all three operating timeframes to ensure system *reliability*.

Whereas the *Offers*, *Bids* and Data Inputs design document focuses on what data is provided by the *IESO* and *market participants*, this design document describes when data is submitted for

each timeframe and how that data is used by the calculation engines to produce schedules, commitments and prices. The design document defines the timelines for each of the three operating timeframes and explains how data is transferred across timeframes. Grid and Market Operations Integration also identifies the control actions that the *IESO* may use in the event that a manual operator intervention is required to maintain *reliable* system operations. The formulas and logic that are used to determine schedules and prices within each timeframe are contained within the corresponding calculation engine document.

Calculation Engine Documents

The three calculation engine documents describe how *market participant* and *IESO* inputs will be utilized to determine optimized schedules and locational prices in the day-ahead, pre-dispatch and real-time timeframes. Each engine will involve functional 'passes' that apply slightly different calculation logic to meet the goal of the specific pass and timeframe.

Details on the pass structure, inputs, outputs and constraints used in each engine are provided in the respective design document.

Day-Ahead Market Calculation Engine

The DAM Calculation Engine design document describes the schedule and price evaluation occurring in the day-ahead timeframe that will jointly optimize *energy* and *operating reserves* for all hours of the next day. The DAM calculation engine will involve multiple passes, where each subsequent pass will build upon the results of the previous one until the engine arrives at a final set of prices and schedules. This evaluation will determine *reliability*-based schedules while maximizing the gains from trade. The DAM calculation engine will run mid-morning daily, and determine operational commitments of non-quick start-resources, and financially-binding hourly schedules and locational prices for all resources for which *offers* or *bids* have been submitted into the day-ahead market for all 24 hours of the next day.

Pre-Dispatch Calculation Engine

The PD Calculation Engine design document describes how outputs from the DAM calculation engine, such as operational commitments of non-quick start-resources in addition to revised *market participant* and *IESO* data inputs, will be utilized to determine hourly locational prices, schedules and commitments for the pre-dispatch timeframe. It will also set binding schedules for *intertie* transactions in the near-term. Like the DAM Calculation Engine, this engine will perform multi-hour optimization while jointly optimizing *energy* and *operating reserves*, but will optimize over a different timeframe and will run more frequently. The PD calculation engine will run hourly and optimize over the remaining number of hours of the current day, until the evening when it will begin also including all 24 hours of the following day into its look-ahead period.

Real-Time Calculation Engine

The RT Calculation Engine design document describes the optimization that will establish *dispatch*, advisory schedules and RT locational prices for the current *dispatch hour*.

The RT calculation engine will use some outputs from the DAM and PD calculation engines, plus revised *market participant* and *IESO* data inputs to determine real-time five-minute locational prices and schedules. This engine will run every five minutes, providing *dispatch* instructions and locational prices for the next five-minute interval and advisory schedules for the following 10 five-minute intervals.

Market Power Mitigation

The Market Power Mitigation design document describes how the *IESO* will assess and respond to potential exercises of market power under its new market power mitigation framework.

In a single-schedule market, market power mitigation will occur before-the-fact where possible, in order to prevent impacts to locational prices used for *settlement*. Exercise of market power can involve increasing *offer* prices (economic withholding) or not *offering* supply (physical withholding), in order to increase prices when competition is restricted.

This design document describes the tests that will be used to assess potential exercises of market power, many of which are incorporated into the three calculation engines. It also describes how the *IESO* will assess and respond to mitigate any impact on price through the use of reference levels. This design document describes the methodology for setting and revising those reference levels with *market participants*.

Publishing and Reporting Market Information

The Publishing and Reporting Market Information design document describes the *IESO*'s responsibilities to produce internal and external reports on market data.

The overall process for providing reports is not changing in the future market, but there are a number of changes in terms of the types of reports that will be produced. The design document identifies new reports that will be added, existing reports that will be modified, and reports that are no longer required.

The *IESO* is responsible for producing three categories of reports: public, confidential, and internal reports for the *IESO*. Public reports will be published on the *IESO* website and provide *market participants* with access to data such as day-ahead market, pre-*dispatch* advisory and *real-time market* locational prices for *energy* and *operating reserve*. Confidential reports will be based on data specific to a *market participant* and shared only with that *market participant*, such as their day-ahead market schedules. Internal reports will stay within the *IESO* to support

monitoring of the grid and market conditions, such as hourly reports of all resources and *intertie* transactions scheduled in the pre-*dispatch* engine.

Market Settlement

The Market Settlement design document outlines how the *IESO* will calculate *market participant settlement amount*s for the day-ahead and *real-time market*s, including uplifts and credits.

At the end of each trading day the *IESO* will perform a series of calculations to determine the *settlement* outcome for *market participants*' activities. These calculations will use data from the calculation engines, *revenue meters*, and other sources. The *IESO* will provide each *market participant* with information to support each *settlement amount*, known as a *settlement statement*. *Market participants* will have the opportunity to review their *preliminary settlement statement* and raise any disagreements before the statement is finalized by the *IESO*.

The services provided by the *settlement process* will be largely unchanged in the future market, though there are numerous changes to the data sources that the process relies upon to calculate *settlement amount*s. The most significant change to market *settlement* in the new market will come from the introduction of new, amended or deleted *settlement amount*s. For example, new *settlement amount*s stemming from the financially-binding day-ahead market will be reconciled with actual participation in the *real-time market*.

Market Billing and Funds Administration

The Market Billing and Funds Administration detailed design document describes the process for invoicing *market participants* and receiving and distributing funds. Invoicing is based on charges represented on the *preliminary* and *final settlement statements.*

At the end of each *billing period*, the *IESO* will create invoices for *market participants* based on final *settlement statements* from the *billing period*. There will be separate *invoices* and *billing period*s for the physical and financial markets. The physical *settlement invoice* will be issued ten *business days* after the end of the calendar month. The financial *settlement invoice* will be issued six *business days* after the end of the *trading week*.

The day-ahead market will introduce new transaction types to be incorporated into existing processes. Day-ahead market physical and virtual transactions will be included in the monthly physical *invoice* along with *real-time market* transactions. Transactions that occur as a result of the *transmission rights* auction will continue to be included in the weekly financial *invoice*.

Market participants and the *IESO* will continue to be responsible for paying *invoice* amounts according to established timelines. The *IESO* will also provide *market participants* with a statement of activity on the first *business day* of each calendar month to identify issued invoices, payments received or issued, past due summaries and other balances for the previous month.

Navigating the Detailed Design

Each of the detailed design documents follow the same structure and contain the following sections and appendices.

Section 1: Introduction

Section 1 provides an introduction to the detailed design document and is similar across all detailed design documents. A figure illustrates the relationship between the reference materials that inform the design, the documentation of design decision rationale, and the downstream documents that are impacted as a result of the new market design. Section 1 describes the scope, purpose and structure of the document, for whom it is intended and the level of detail contained within. The section identifies any assumptions and limitations and the standard formatting conventions used in the document.

Section 2: Summary of the Current and Future State

Section 2 describes at a high level how the particular area of the market works today and how it will work in the future *energy* market. It provides a high-level overview of the process flows, as well as roles, responsibilities and how key functions of the *IESO* and *market participants* are carried out today and how they may change in the future.

Section 3: Detailed Functional Design

Section 3 contains the functional design of the future market for the area of the market covered by the detailed design document. It describes in more depth the changes to the market and the aspects that will remain unchanged. It identifies any new, modified, or existing obligations the design imposes on the *IESO* and *market participants*, and changes to how the *IESO* and *market participants* interact. Section 3 is structured to provide the necessary level of detail to inform the development of the future market's governing documents (including *market rules* and *market manuals*), user requirements and business processes.

Section 4: Market Rule Requirements

Section 4 is an inventory of market rule requirements for the future market. It identifies where existing *market rules* will suffice to enact the designs and where the *market rules* require amendment. It also identifies where new *market rules* will be needed to support design requirements of the future market. Section 4 does not include draft language for *market rule* amendments.

Section 5: Procedural Requirements

Section 5 provides a high-level description of the existing, new and modified market-facing and the *IESO*'s internal procedural materials that are required to support the document's area of design for the future *energy* market. Market-facing materials will include *market manuals* and *market participant* user guides. Section 5 will not include draft language for those documents.

Reference will also be made to Appendix B that contains similar descriptions of changes to *IESO* internal processes and information flow but due to either the confidentiality of this material, or the fact that it may only be relevant to the *IESO*'s internal audience, the contents of Appendix B will not be made public.

Section 6: Business Process and Information Flow Overview

Section 6 provides a description of the business processes and the data flows between the processes that are required to support the document's area of design in the future *energy* market. It will include *IESO-market participant* interactions and information exchanges, and a description of what data will be used for these information exchanges.

Reference will also be made to Appendix C that contains similar descriptions of changes to *IESO* internal processes and information flow but due to the confidentiality of this material, or due to the fact that it may only be relevant to the *IESO*'s internal audience, the contents of Appendix C will not be made public.

Appendix A: Market Participant Interfaces

Appendix A is an inventory of the *IESO* technical interfaces with *market participants* that support the future *energy* market. It lists the existing, modified and new technical interfaces such as data submission forms, but does not include details of the change.

Appendix B: Internal-Facing Procedural Requirements [Internal to the IESO only]

Appendix B describes existing and modified or new *IESO* internal manuals and user guides that will support the future *energy* market. This appendix does not include draft language for those documents.

Appendix C: Business Process and Information Requirements [Internal to the IESO only]

This appendix provides a description of the changes to *IESO* business process activities and information flows that will be required in the future *energy market*. This appendix describes the impacts on existing, modified, and new process activities and information flows. It will include activity maps and information flow diagrams with supporting tables to identify roles and

responsibilities, triggers and the flow of information. For the new processes and existing processes which lack detailed process models, the details within this appendix will be the expected activity level in future state of the process models, with detailed process models where necessary to describe the change and impact to the line of business. For existing processes with detailed models, this appendix will contain the annotated detailed process models.

Appendix D and E: (Various – as required)

These appendices may be used to provide public information specific to a particular detailed design document. Examples of such appendices include:

- Appendix D of the Market Settlement detailed design document identifies the *settlement amounts* anticipated for the *settlement* of the future market.
- Appendices D and E in the calculation engine detailed design documents provide the mathematical notation and conventions, and conduct and impact thresholds and parameters.

Enabling the Future

Policy and technological change have transformed Ontario's electricity landscape since market opening. With further change on the horizon from the growth of new emerging and distributed resources, the current market design with its well-documented inefficiencies is inadequate to support this evolution. Changes introduced by the new *energy* market design will provide a robust platform to meet the uncertainty of future needs regardless of how those needs evolve.

Engaging Stakeholders

The *IESO* is committed to giving stakeholders access to engagement opportunities in order to provide input into the review and decision-making process related to market design. Further information and updates on the *IESO*'s market renewal efforts, the MRP high-level design documents and opportunities for stakeholder engagement sessions on *energy market* design can be located on the *IESO*'s corporate website: www.ieso.ca/market-renewal.