
Revisions to the energy stream high-level design documents

Independent Electricity System Operator

In the fall of 2018, the Independent Electricity System Operator (IESO) released high-level designs for the three energy stream initiatives, the single schedule market (SSM), day-ahead market (DAM) and enhanced real-time unit commitment (ERUC) and requested stakeholder feedback.

We appreciate the comments and questions submitted. The feedback received has been noted with our responses in a separate document. As a result of some of the feedback, as well as recent changes to the Incremental Capacity Auction, the IESO has made some minor updates to the high-level designs.

Below, the IESO has provided a table that illustrates the revisions and the rationale for the change.

The final high-level design documents are available: <http://ieso.ca/en/Market-Renewal/High-Level-Designs/Energy-Stream-High-Level-Designs>.

MRP Initiative	Page	Section	Original content	Revised content	Rationale for change
DAM	3	Day-Ahead Market Increasing Financial and Operational Certainty	In fact, all other North American electricity markets include DAMs within their design.	In fact, almost all other North American electricity markets include DAMs within their design.	Clarification recommended by IESO
DAM	6	ES: Execution, Timing, Real-Time Integration and Price Formation at a Glance	If the tests fail, offer prices will be adjusted to reference values, which will then be used to produce schedules.	Add footnote after "offer prices", " For the purposes of market power mitigation, offer prices refer to prices associated with either offers or bids. "	Clarification recommended by stakeholders
DAM	7	ES: Execution, Timing, Real-Time Integration and Price Formation at a Glance	The DAM will run between 10:00 and 13:30 EPT after the 06:00 to 10:00 EPT submission window for bids and offers closes.	Add footnote after "13:30 EPT", " The 10:00 to 13:30 EPT DAM run time may be subject to change during detailed design. See Detailed Design Considerations under DAM design element 10 (Submission and Posting Deadlines) for more information. "	Clarification recommended by IESO
DAM	11	2.1.2 Decisions	It is anticipated that resources that clear in the incremental capacity auction will have obligations that require participation in the wholesale energy market.	It is anticipated that if resources clear in a capacity auction they would have obligations that require participation in the wholesale energy market.	Clarification recommended by IESO
DAM	11	2.1.2 Decisions	In addition, contracted and regulated resources should have the right incentives for participating in the DAM.	In addition, contracted and regulated resources should have the incentive to offer the energy quantities into the DAM that they have reasonable assurance of delivering in the real-time market.	Clarification recommended by stakeholders
DAM	11	2.1.2 Decisions	In the event that the right incentives are not in place before the renewed market goes live, the IESO proposes that the ADE offer obligation would be retained as a transitional measure.	In the event that such incentives are not in place before the renewed market goes live, the IESO proposes that the ADE offer obligation would be retained as a transitional measure.	Clarification recommended by IESO

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DAM	11	2.1.3 Detailed Design Considerations	The IESO will facilitate discussions and monitor progress of contracted and rate-regulated resources having incentives to participate in the DAM.	The IESO will facilitate discussions and monitor progress of contracted and rate-regulated resources having incentives to offer energy quantities into the DAM they have reasonable assurance of delivering in real-time.	Clarification recommended by stakeholders
DAM	13	2.2.2 Decisions	To facilitate a smoother transition, the IESO will provide VG resources with an option to elect the IESO's centralized forecast quantity as their own offer quantity on an hourly basis.	To reduce administrative burden , the IESO will provide VG resources with an option to elect the IESO's centralized forecast quantity as their own offer quantity on an hourly basis.	Clarification recommended by stakeholders
DAM	16	2.3.3 Detailed Design Considerations	Adding new paragraph after "the IESO's zonal demand forecast takes this into account, will also be determined."	The IESO will also need to consider whether and, if so, how price responsive loads can coexist with non-dispatchable loads under the same aggregated HDR portfolio. Currently, aggregated HDR resources can only satisfy their DR obligations through non-dispatchable load contributors.	Clarification recommended by stakeholders
DAM	19	2.4.2 Decisions	The following measures will be put in place in to maximize DAM efficiency while minimizing any adverse impacts on DAM engine performance.	One or more of the following measures will be put in place in to maximize DAM efficiency while minimizing any adverse impacts on DAM engine performance.	Clarification recommended by IESO
DAM	20	2.4.3 Detailed Design Considerations	The measures noted in section in 2.4.2 will need to be further defined during detailed design as follows:	The IESO will need to establish which of the following measures will be put in place and further define the chosen measures during detailed design:	Clarification recommended by IESO
DAM	26	3.1.3 Detailed Design Considerations	Determining the set of conduct and impact thresholds will be done on a market-wide basis.	[Delete sentence]	Clarification recommended by stakeholders
DAM	26	3.1.3 Detailed Design Considerations	While there will be different conduct and impact thresholds depending on the degree to which competition is restricted, the same set of conduct and impact thresholds will be common to all participants.	While there will be different conduct and impact thresholds depending on the degree to which competition is restricted within different areas of the system , the same set of conduct and impact thresholds will be common to all participants in each area.	Clarification recommended by stakeholders
DAM	29	3.3.2 Decisions	<ul style="list-style-type: none"> Dispatchable load bids, HDR bids, and PRL bids; 	<ul style="list-style-type: none"> Dispatchable load bids and PRL bids; HDR bids; 	Clarification recommended by stakeholders
DAM	30	3.3.2 Decisions	Pass 3 will perform final scheduling and calculate zonal prices and locational prices that include loss and congestion components.	Pass 3 will perform final scheduling and calculate an Ontario Zonal Price and locational prices that include loss and congestion components.	Design change as a result of stakeholder discussion

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DAM	33	3.4.2 Decisions	Improved hydroelectric resource optimization is important to the efficiency of the wholesale market since hydro units are frequently dispatched as the marginal resource.	Modelling additional hydroelectric operating characteristics is important to the efficiency of the wholesale market since hydro units are frequently dispatched as the marginal resource.	Clarification recommended by IESO
DAM	33	3.4.2 Decisions	In the absence of any existing functionality, the IESO recognizes that incorporating hydroelectric modelling within its optimization may present implementation challenges.	In the absence of any existing functionality, the IESO recognizes that incorporating additional hydroelectric operation characteristics within its optimization may present implementation challenges.	Clarification recommended by IESO
DAM	38	3.5.3 Detailed Design Considerations	The IESO will need to determine the potential for the DAM submission deadline to be adjusted depending on the impact that improved hydroelectric modelling will have on software execution times.	The IESO will need to determine the potential for the DAM posting deadline to be adjusted from 13:30 EPT to 13:00 EPT depending on the impact that other proposed DAM features will have on software execution times. An earlier posting deadline of 13:00 EPT would potentially allow gas resources to procure fuel before the next-day's gas market liquidity diminishes.	Clarification recommended by stakeholders
DAM	38	3.5.3 Detailed Design Considerations	This decision will also inform whether the start of the submission window should be adjusted accordingly.	This decision may also inform whether the start of the submission window should be adjusted accordingly.	This decision may also inform whether the start of the submission window should be adjusted accordingly.
DAM	44	4.1.2 Decisions	The IESO has determined that all resources that offer and bid into the DAM for themselves be settled using the standard two-settlement system. This is based on the sum of equations 1 and 2 below:	The IESO has determined that, with the exception of NDLS with HDR resource obligations, all other resources that offer and bid into the DAM for themselves be settled using the standard two-settlement system. NDLS with HDR resource obligations that bid into the DAM will continue to receive day-ahead standby notifications rather than financially binding DAM schedules. The standard two-settlement system is based on the sum of equations 1 and 2 below:	Clarification recommended by stakeholders
DAM	45	4.1.2 Decisions	NDLS will have a modified settlement equation.	NDLS with or without HDR resource obligations will have a modified settlement equation.	Clarification recommended by stakeholders
DAM	45	4.1.2 Decisions	is the real-time quantity of energy generated or consumed, or operating reserve scheduled at wholesale meter or intertie metering point 'm' for a given settlement hour,	is the real-time quantity of energy consumed at wholesale meter point 'm' for a given settlement hour,	Design change as a result of stakeholder discussion

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DAM	45	4.1.2 Decisions	is the day-ahead LMP of energy or operating reserve at <i>wholesale meter or inertia metering point</i> 'm' for a given settlement hour, and	is the day-ahead Ontario Zonal Price for a given settlement hour, and	Design change as a result of stakeholder discussion
DAM	45		<p>The IESO will need to determine who should bear the financial responsibilities of HDR bids that clear the DAM. HDR resources can currently represent embedded loads that are neither settled nor metered with the IESO. These loads' lack of metering with the IESO presents a settlement challenge because net settlement between the DAM and real-time balancing market cannot be accurately determined without actual metered quantities. Coordination with the DR Working Group and the Incremental Capacity Auction (ICA) initiative is required to determine whether changes to DR participation rules must be in place for the opening of the DAM or if this can wait until DR is integrated into the ICA.</p> <p>Another consideration is whether the value of IESO forecast deviations will be distributed to NDLS on a global or zonal level. The IESO will need to assess how the locational prices and behaviour of NDLS in one zone may impact the value of IESO forecast deviations distributed to another zone to determine whether a zonal level of distribution should be used.</p>	<p>[Delete two paragraphs and replace with]</p> <p>At this time, the IESO has not identified any further considerations for detailed design.</p>	Clarification recommended by stakeholders
DAM	51	4.3.2 Decisions	These residual costs will be recovered proportionately from real-time loads and exports based on their real-time consumption.	These residual costs will be recovered proportionately from real-time loads and exports as they are today based on their real-time consumption.	Clarification recommended by IESO
DAM	51	4.4.1 Design Element Description	Through the SSM initiative, the IESO has determined that internal congestion rents and loss residuals (the residuals) will be returned to Ontario consumers according to the degree to which they are impacted by congestion and losses on the IESO-controlled grid. This methodology is simpler than an internal FTR approach and provides reasonably efficient incentives for consumers to respond to a nodal/ zonal price signals.	Through the SSM initiative, the IESO has determined that internal congestion rents and loss residuals (the residuals) will be returned to Ontario consumers each month according to their share of consumption in that month. This methodology provides reasonably efficient incentives for consumers to respond to price signals and returns the residuals to Ontario consumers in a manner that is aligned with the IESO's current monthly billing cycle.	Clarification recommended by IESO
ERUC	6	ES: Engine Parameters and Output at a Glance	These dependencies can be recognized by using "pseudo-units" that model the relationships between resources, as currently done in the Day-Ahead Commitment Process (DACP). Hydroelectric resources.	These dependencies can be recognized by using "pseudo-units" that model the relationships between resources, as currently done in the Day-Ahead Commitment Process (DACP). [Add new sentence] The IESO is also committed to modelling additional hydroelectric operating characteristics to the extent feasible within the DAM and pre-dispatch engines, as outlined in the DAM high-level design document. Hydroelectric resources.	Clarification recommended by stakeholders

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ERUC	9	2.0 Engine Parameters and Engine Output	Improved modelling of both NQS and hydroelectric resources will be incorporated into PD + ERUC, and this will be consistent across all timeframes, day-ahead to real-time.	Improved modelling of NQS resources will be incorporated into PD + ERUC, and this will be consistent across all timeframes, day-ahead to real-time.	Clarification recommended by stakeholders
ERUC	9	2.0 Engine Parameters and Engine Output	Improved modelling will recognize that NQS resources and hydroelectric resources have operational restrictions that limit their ability to generate, and will optimize the scheduling of these resources in all timeframes.	Improved modelling of hydroelectric resources will also be incorporated in day-ahead and PD timeframes. This will recognize that NQS resources and hydroelectric resources have operational restrictions that limit their ability to generate, and will optimize the scheduling of these resources in all timeframes.	Clarification recommended by stakeholders
ERUC	35	3.2.2. Incremental Energy Offer Prices for PD + ERUC Commitments	Therefore, NQS resources will not be allowed to increase their offer prices for energy above MLP up to their full capacity, i.e., maximum offered quantity, during hours when they have a PD + ERUC commitment.	Therefore, NQS resources will not be allowed to increase their offer prices for energy above MLP up to their full capacity, i.e., maximum offered quantity, during the hours of the advisory schedule provided at the time of commitment. This advisory schedule may include hours beyond MGBRT.	Clarification recommended by IESO
ERUC	42	4.2.2 Decisions, Operational Data	Lead time curve data is used only in PD + ERUC and is not needed for running the DAM.	[Delete] Lead time curve data is used only in PD + ERUC and is not needed for running the DAM. [Add new sentence] It is acceptable for generators to update lead time DGD for the next day prior to the initial PD + ERUC run including all hours of the next day, which occurs at 20:00 of the day-ahead.	Clarification recommended by IESO
ERUC	42	4.2.3 Detailed Design Considerations	The IESO will determine whether bids/offers will be passed from DAM to PD + ERUC, or if new bids/offers are required for PD + ERUC.	The IESO will determine whether bids/offers will be passed from DAM to PD + ERUC, or if new bids/offers are required for PD + ERUC. [Add new sentence] The IESO will also determine whether lead time data is utilized in the DAM.	Clarification recommended by IESO
SSM	5	ES: Market power mitigation at a glance	The IESO has always had a framework to prevent participants from exercising market power and protect consumers from higher costs.	The IESO has always had a framework to address the potential exercise of market power.	Clarification recommended by IESO
SSM	6	ES: Load pricing at a glance	See original	New section	Design change as a result of stakeholder discussion
SSM	24	2.9.2 Decisions	<ul style="list-style-type: none"> For non-reliability based constraints, apply a new set of penalty prices that are the same in both dispatch and pricing. 	For non-reliability based constraints, aim to apply a new set of penalty prices that are the same in both dispatch and pricing.	Clarification recommended by IESO

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SSM	25	2.9.3 Detailed Design Considerations	The IESO will need to create a new set of penalty prices for pricing reliability-based constraints and for dispatching and pricing non-reliability based constraints.	The IESO will need to create a new set of penalty prices for pricing reliability-based constraints. It will also need to determine an appropriate pricing methodology for the dispatch and pricing of non-reliability based constraints.	Clarification recommended by IESO
SSM	25	2.9.3 Detailed Design Considerations	The IESO will need to develop a process to define NISL limits and corresponding violation magnitudes that are applicable to a given timeframe.	The IESO may need to develop a process to define NISL limits and corresponding violation magnitudes that are applicable to a given timeframe.	Clarification recommended by IESO
SSM	42	3.3.3 Secondary Decisions	<p>Secondary design decisions have been made by the IESO with respect to reference levels. They will be based on one of the following data sets:</p> <ul style="list-style-type: none"> ▪ Recent offers ▪ Recent LMPs at the resource ▪ Estimates of a resource's short-run marginal cost (cost-based reference levels). <p>The IESO will determine cost-based reference levels daily on the basis of short-run marginal cost, and make reference levels known to market participants ahead of time.</p> <p>This approach will ensure the cost-based reference levels used in the market power mitigation framework are consistent with the methodology for determining the short-run marginal costs that will be established during detailed design.</p> <p>After the market renewal program has been implemented, cost-based reference levels will be used to calibrate the process. Following the calibration period, cost-based reference levels will be applicable only when resources are infrequently scheduled. Reference levels will more frequently be determined by recent offers or LMPs at specific resources. Such information provides useful proxies for competitive outcomes.</p>	<p>Secondary design decisions have been made by the IESO with respect to reference levels. The IESO will use reference levels that are determined using short-run marginal costs (cost-based methodology). The IESO will determine cost-based reference levels daily and make reference levels known to market participants ahead of time.</p> <p>This approach will ensure that the reference levels used in the market power mitigation framework are consistent with the methodology for determining the short-run marginal costs that will be established during detailed design.</p>	Design change as a result of stakeholder discussion
SSM	43	4.1 Pricing for Loads	See original	New section	Design change as a result of stakeholder discussion
SSM	46	4.2 Congestion Rents and Loss Residuals	See original	New section	Design change as a result of stakeholder discussion

SSM	57	How stakeholder input was used	How stakeholder input was used	Load Pricing	Design change as a result of stakeholder discussion
			<p>Load Pricing (Residuals)</p> <p>The IESO received stakeholder feedback questioning how congestion rents and loss residuals will be allocated and if disbursement will be temporary. As a result, the IESO performed a sensitivity analysis of the proposed zonal pricing under various scenarios and demonstrated that the benefits to customers of zonal pricing are robust under a range of system conditions.</p> <p>Feedback from stakeholders, in particular from the load community, resulted in changes to the preliminary decision on load pricing with respect to the distribution of residuals. The amended decision will return residuals to eligible loads on a quarterly basis while not distorting the incentives of the Locational Marginal Pricing signal.</p> <p>The zonal pricing decision made on load pricing incorporates feedback, and is aligned with the agreed upon mission and principles of market renewal. However, the IESO recognizes that additional dialogue with affected market participants and stakeholders will be needed throughout the HLD engagement period.</p>	<p>The IESO's original proposal for pricing market participant loads was to apply zonal pricing (based on the IESO's 10 electrical zones) for non-dispatchable ("passive") loads and nodal pricing for dispatchable ("active") consumers. The stakeholder feedback received for the original proposal highlighted concerns regarding the potential for zonal price variability leading to a risk of high prices in a single zone and implementation challenges for local distribution companies (LDCs) associated with settling at multiple zonal prices.</p> <p>As a result of this stakeholder feedback the IESO revised its original load pricing decision. Active loads, which are loads that receive schedules and/or dispatch instructions from the IESO, will be settled on nodal prices. This will ensure efficient bids and grid reliability without the need for a separate set of out-of-market payments, which would increase system costs. Passive consumers, who do not receive schedules or dispatch instructions, will be settled at the province-wide Ontario Zonal Price. While this decision change may somewhat reduce efficiency, it will increase price certainty for passive consumers and improve the overall implementability of the design.</p> <p>The decisions related to load pricing incorporate feedback from several stakeholders, including market participant loads and LDCs, and are aligned with the agreed upon mission and principles of market renewal.</p>	

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