
NOVEMBER 20, 2023

Market Renewal Program Impact on Solar and Wind Contracts (Overview and Update)

Presented to: FIT, RES and LRP solar and wind contract counterparties
Presented by: IESO's Contract Management Team

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Purpose

1. To provide an overview of the impacts of MRP on solar and wind contracts, as well as the IESO's previously proposed solutions for Suppliers that participate in the IESO Administered Markets.
2. To present proposed changes to the MRP contract amendment term sheets to reflect the market rule amendments that are now provisionally approved.

Agenda

Through this presentation the IESO plans to discuss:

- MRP Background
- Approach to amending contracts
- Summary of engagement to date
- Impact on contracts with Market Participants
- Approach for solar and wind contracts
- Recent feedback and responses on term sheets
- Term sheet and settlement formula updates
- Next Steps

MRP Background

- MRP is on schedule to 'go live' in May 2025 with a new design of Ontario's wholesale electricity market.
- Provisionally approved amendments to the [Market Rules and Market Manuals](#) have been published throughout 2023.
- MRP implementation resources such as training modules, webinars recordings, design documentation and implementation plans are available on the MRP webpage.
- Any questions related to MRP in general can be directed to customer.relations@ieso.ca.



IESO's Approach to Amending Contracts for MRP

Principles



1. Contractual implications are addressed in a manner consistent with the terms of the applicable contracts to maximize consistency, administrative simplicity, and transparency by treating similar contracts in a similar manner.
2. Contract incentives should be aligned with market incentives to not impede efficient market operations and to benefit all parties.
3. Ensure timely contract amendments ahead of the MRP implementation date.

Supplier Engagement

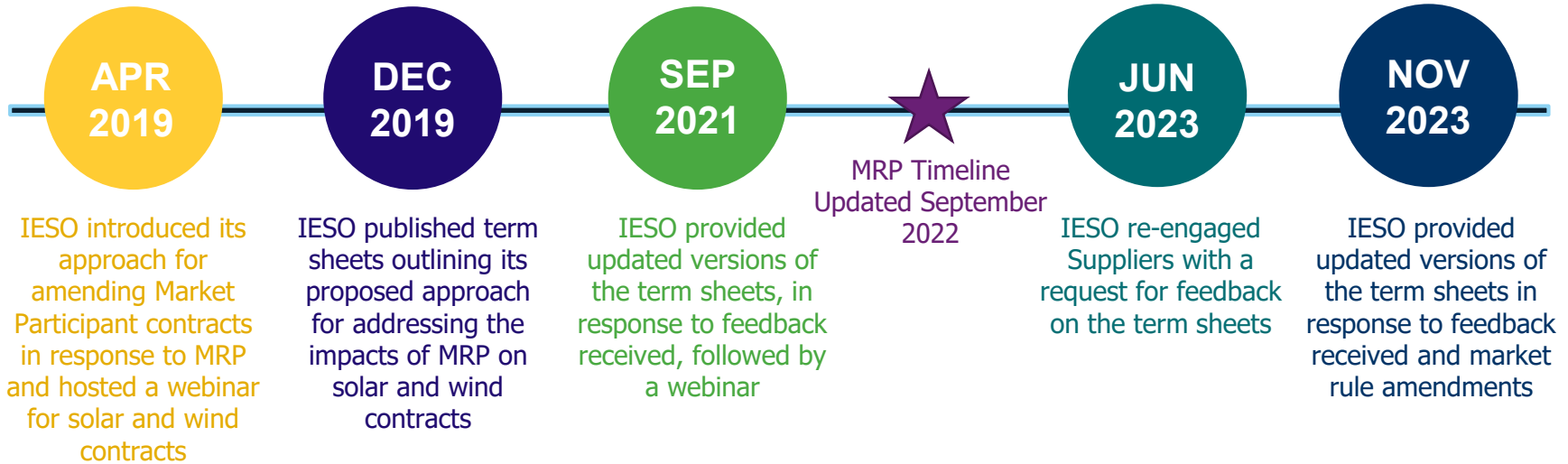


The IESO's Contract Management team is re-engaging with Suppliers to focus specifically on contractual implications. The IESO is proposing solutions to achieve the principles for amending contracts. Suppliers are encouraged to familiarize themselves with MRP.

In addition to written feedback and webinars, the IESO is open to smaller group meetings or individual meetings to collaboratively work through the process of finalizing amending agreements.

Summary of Engagement to Date

Resources related to IESO's engagement with Market Participants on their contracts can be found on IESO's website including draft term sheets, feedback & responses, as well as webinar presentations.



Impact of MRP on Market Participant Contracts

Based on the changes introduced by MRP, the IESO has identified impacts on solar and wind facilities that require to be addressed in IESO contracts with Market Participants, including:

The Hourly Ontario Electricity Price “HOEP” will be replaced by day ahead and real time locational marginal pricing “LMP”

A financially binding day-ahead-market “DAM” will be introduced to provide greater operational and financial certainty in the market

Consequential changes will be made with respect to CMSC and Make Whole Payments

- HOEP will no longer be available and, in absence of executing an amendment, contracts would be settled on real time pricing and quantities.
- Contracts with non-Market Participants will be addressed separately.

IESO's Approach for Solar and Wind Contracts

The IESO has focused on FIT contracts as a representative agreement for preparing the term sheets for wind and solar contracts with the intent to customize by contract-type at the stage of drafting amending agreements.

Key Takeaway #1



Provide for MPs' participation in the DAM with ability to:

- Achieve the same outcome as present-day settlement when offering the IESO forecasted quantity at a price of \$0/MWh
- Realize different market outcomes by choosing to deviate from the IESO forecast and/or bidding a non-zero \$/MWh value

Key Takeaway #2



Preserve the economics of the curtailment amendment under which resources receive foregone energy payments when curtailed based on IESO's real time dispatch instructions once certain thresholds have been exceeded, as outlined in contracts

Terms and Variables – Presented in April 2019

The following table outlines the terms that were previously used in the present-day and post-MRP revenue calculations:

Forecast Quantities	
F_{DA}	IESO DA forecast quantity
F_{RT}	IESO RT forecast quantity
Offer Prices	
P_{DA}	Generator's DA offer price
P_{RT}	Generator's RT offer price
Quantities	
Q_{OFFER}	Generator's DA forecast production as submitted in dispatch data
Q_{DA}^*	DA scheduled quantity consistent with the IESO centralized forecast associated with a zero priced generator offer
Q_{DA}	Actual DA schedule based on generator's dispatch data
Q_{RT}	Actual RT production
Q_X	Quantity for curtailment compensation if past cap
Market Prices	
$\$_{DA}$	Day Ahead LMP
$\$_{RT}$	Real Time LMP
$\$_{RT}^*$	Real Time LMP adjusted to not less than zero

General Formulas – Present Day

Equation shown in Previous Presentation in **April 2019**:

Market Revenue

$$Q_{RT} \times \$_{RT}$$

+

Contract Revenue

$$Q_{RT} \times \$_{con} - Q_{RT} \times \$_{RT}$$

+

Add Curtailment Compensation

Modified to reflect settlement for production with negative RT price

Contract Revenue

$$Q_{RT} \times \$_{con} - Q_{RT} \times \$_{RT}^*$$

Collect like terms to show difference in Contract and RT Market Price



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Real Time

$$Q_{RT} \times \$_{RT}$$

+

Contract Revenue

$$Q_{RT} \times (\$_{con} - \$_{RT}^*)$$

+

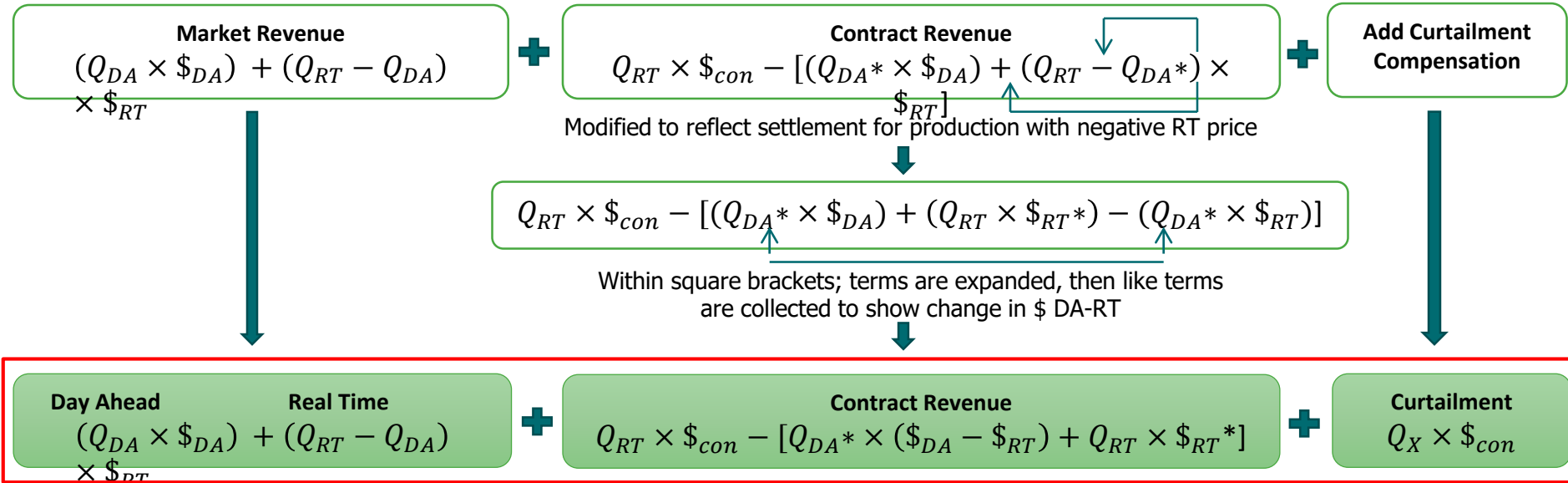
Curtailment

$$Q_X \times \$_{con}$$

Equation with **negative pricing** accounted for per existing contract terms.

General Formulas – Post MRP

Equation shown in Previous Presentation in **April 2019**:



Equation with **negative pricing** accounted for per existing contract terms.

Summary of Recent Feedback – Part 1

Below is a summary of feedback received and responses provided through the IESO's request for feedback on the FIT/RES/LRP draft term sheets for solar and wind contracts in Summer, 2023.

Feedback Type	Summarized Feedback	Summary of IESO's Response
Engagement Process	A webinar would be helpful to provide an overview of the concepts in the term sheet and to address any changes.	The IESO will conduct a webinar to provide an overview of the term sheets and to discuss the proposed changes to address the market rule amendments that are now provisionally approved.
Engagement Process	Further comments are reserved until the final market rules and proposed contract amendment language are available.	The IESO has updated the term sheets based on the provisionally approved market rules and has made other changes to the term sheet to be representative of what an amendment would look like.
Engagement Process	Provide update on IESO's plan to address other affected contract types.	The IESO plans to re-engage or initiate engagement with Suppliers for other affected contracts in the coming months in order to provide sufficient time to address the implications of MRP.
Go-live Readiness	Provide opportunity for testing before executing contracts and 'go live'.	The IESO will conduct testing of the contract settlement models to ensure they produce accurate results as part of the implementation of the finalized contract amendments. This testing will be done in addition to MRP's market trials under a separate scope.

Summary of Recent Feedback – Part 2

Feedback Type	Summarized Feedback	Summary of IESO's Response
DAM Participation and LMP	Concern raised with the impact of negative locational marginal pricing on the economics of the contract in certain zones.	The concepts proposed in the draft term sheets preserve Market Participant Suppliers' revenues without impact by the frequency and magnitude of negative LMP prices by zone.
IESO as Metered Market Participant	Clarify any differences in the approach where IESO acts as the metered market participant (MMP).	For contracts where the IESO acts as MMP, the approach, in principle, is intended to be the same as for contracts where the Supplier acts as MMP. There are differences in term sheet language which reflect the differences in roles with respect to metering responsibilities.
Make Whole Payments and Curtailment	Clarify the impact of MRP on CMSC payments, as well as the interactions between Make Whole Payments and the Curtailment Amendment.	Please see subsequent slides regarding the term sheet updates for further details.
Distribution-connected facilities	Provide further clarity on the impact of MRP on distribution-connected assets.	For contracts with non-Market Participants, which includes most distribution-connected facilities, the OEB will determine the successor to HOEP through an update to the Retail Settlement Code.

Term Sheet Updates – Summary

- After reviewing the provisionally approved market rules, the term sheet settlement algorithm was tested for base case and curtailment scenarios.
- With the additional resolution provided in the market rules, particularly with Make Whole Payments (MWP) and the removal of Congestion Management Settlement Credits (CMSC), the settlement formula was in need of adjustment.
- For contracts where the IESO acts as MMP, the approach continues to be the same in principle with differences reflected in the term sheet language.
- The following slides describe the updates made to the term sheets posted on the IESO's website on Nov. 8, 2023.



Term Sheet Updates – Day Ahead Grid Incapability Events

Context	Previous Term Sheet	Updated Term Sheets
<p>Grid incapability events, such as transmission outages, may arise in the day ahead or real time.</p> <p>Grid incapability events are not eligible for foregone energy payments. This has not changed.</p>	<p>In cases of day ahead grid incapability a reference day-ahead quantity (RDAQ) value could be generated. This does not reflect the actual day ahead market outcome.</p>	<p>In cases of day ahead grid incapability, the RDAQ = 0.</p>

Term Sheet Updates – Rare Uneconomic Day Ahead Schedule Events

Context	Previous Term Sheet	Updated Term Sheets
<p><u>Rare uneconomic day ahead scheduling</u> events may occur including under administrative pricing or manual intervention which may result in a Day Ahead Make Whole Payment (DA_MWP).</p>	<ol style="list-style-type: none">1. The Reference Day-Ahead Quantity (RDAQ) was still calculated the same as for economic scheduling. This resulted in a contract day ahead adjustment that did not reflect the actual day ahead market outcome.2. DA_MWP would be retained by the Supplier.	<ol style="list-style-type: none">1. In cases of day ahead uneconomic scheduling, the RDAQ = Actual Day Ahead Quantity (ADAQ) to reflect the day ahead market outcome.2. The Day Ahead Make Whole Payment Adjustment (DAMWPA) flows any DA_MWP to the IESO since the contract compensates for uneconomic day ahead scheduling.

Term Sheet Updates – Rare Uneconomic Real Time Schedule Events

Context	Previous Term Sheet	Updated Term Sheets
<p>Rare uneconomic Real Time “constrained on” dispatch events above the economic operating point (but not on “release”) may occur including under administrative pricing or manual intervention. This may result in a Real-Time Energy Lost Cost (RT_ELC) payment.</p> <p>RT_ELC is only calculated on the MW “constrained on” in excess of the electricity scheduled for Actual Day Ahead Quantity (ADAQ).</p>	<p>As a result of having a day ahead schedule, the Supplier would be not be eligible for “constrained on” RT_ELC payments for MW up to the ADAQ.</p>	<p>The Day Ahead Offset Adjustment (DAOA) compensates for the exclusion of uneconomic dispatch up to ADAQ from RT_ELC eligibility. For this situation to arise, Applicable Real-Time Locational Marginal Price (ARTLMP) must be negative. As a result the Day Ahead Offset Adjustment (DAOA) has a negative value and needs to be subtracted in the Contract Revenue formula to achieve the desired result.</p>

Term Sheet Updates – Curtailment Amendment

Context	Updated Term Sheets
Updates to the market rules provided further clarity on terminology related to the curtailment amendment. Certain terms were referenced in the term sheet but do not affect the settlement formula.	The Interval Negative Price Amount has been deleted based on redundancy with the market rules
	Constrained off Congestion Management Settlement Credits (CMSC) have been replaced by Energy Lost Opportunity Cost (ELOC).

Updated Term Sheet Acronyms

The term sheet updates have no impact on the settlement scenarios presented in April, 2019. The table below addresses the acronyms used within the updated term sheet and settlement formula.

Term Name	April 2019 Formula Acronym	Term Sheet Acronym
Applicable Day-Ahead Locational Marginal Price	\$DA	ADALMP
Applicable Real-Time Locational Marginal Price	\$RT	ARTLMP
Adjusted Indexed Contract Price	\$con	AICP
Dispatch Interval Delivered Electricity	QRT	DIDE
Reference Day-Ahead Quantity	QDA*	RDAQ
Actual Day-Ahead Quantity	QDA	ADAQ
Real Time Locational Marginal Price adjusted to not less than zero	\$RT*	max (ARTLMP, 0)
Day Ahead Make Whole Payment Adjustment	*NEW TERM*	DAMWPA
Day Ahead Offset Adjustment	*NEW TERM*	DAOA

The Day Ahead Make Whole Payment (DA_MWP) and Real Time Energy Lost Cost (RT_ELC) are market rules terms which are now captured under the market revenue calculation.

Updated Formula – Nov. 8, 2023 Term Sheet

- The formula has been updated to achieve the same outcome as present-day settlement when offering the IESO forecast at \$0/MWh.
- Two additional scenarios have been included in the Appendix to test the formula under uneconomic scheduling events.

September 2021 Term Sheet formula:

$$\text{Market Revenue} \\ (\text{ADAQ} \times \text{ADALMP}) + (\text{DIDE} - \text{ADAQ}) \times \text{ARTLMP}$$

+

$$\text{Contract Revenue} \\ \text{DIDE} \times \text{AICP} - [\text{RDAQ} \times (\text{ADALMP} - \text{ARTLMP}) + \text{DIDE} \times \\ \max(\text{ARTLMP}, 0)]$$

+

$$\text{Curtailment} \\ Q_X \times \text{AICP}$$



November 2023 Term Sheet formula:

$$\text{Market Revenue} \\ [(\text{ADAQ} \times \text{ADALMP}) + (\text{DIDE} - \text{ADAQ}) \times \\ \text{ARTLMP}] + \text{DA_MWP} + \text{RT_ELC}$$

+

$$\text{Contract Revenue} \\ \text{DIDE} \times \text{AICP} - [\text{RDAQ} \times (\text{ADALMP} - \text{ARTLMP}) + \text{DIDE} \times \max(\text{ARTLMP}, 0)] - \\ \text{DAMWPA} - \text{DAOA}$$

+

$$\text{Curtailment} \\ Q_X \times \text{AICP}$$

NEW

NEW

Next Steps

- The IESO invites specific feedback on the updated draft term sheets to be submitted to mr.contractmanagement@ieso.ca by December 1, 2023.
- The IESO will post responses to feedback received and, provided no material concerns with the term sheets are identified, prepare draft pro forma amending agreements for each contract type (e.g. FIT 1.3, FIT 1.5, RES I, RES II, RES III, LRP) for review and comment.
- The IESO will plan to engage non-Market Participant Suppliers once the OEB has determined the successor to HOEP through the Retail Settlement Code.

Thank You

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Appendix – Additional Settlement Scenarios

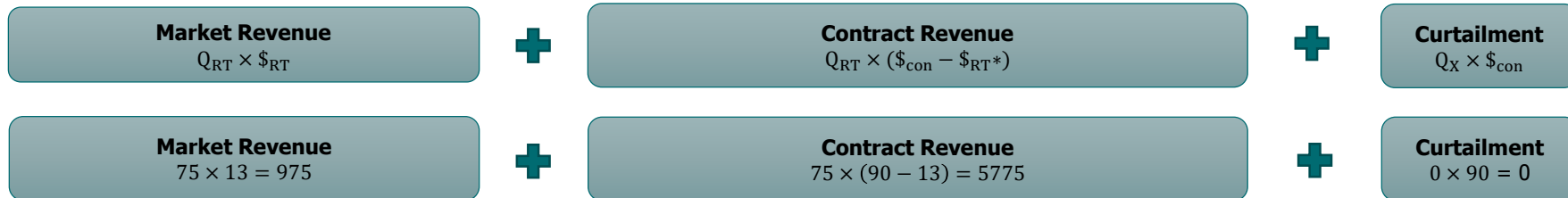
Scenario 1 – Uneconomic Day Ahead Scheduling Event

- The Day Ahead LMP is not economic but a manual intervention causes the resource to be scheduled in the DAM for 20MW at \$ -7/MWh, a loss of \$ 140/hr.
- The Supplier receives a Day Ahead Make Whole Payment to compensate for the loss, calculated as: $DA_MWP = (ADAQ-0)MW * (\$offer-ADALMP)/MWh = 20MW * (\$0-(-\$7))/MWh = \$140/hr$
- The settlement formula recognizes the ADAQ loss at negative market price, and the Day Ahead Make Whole Payment Adjustment (DAMWPA) redirects the DA_MWP value to the IESO.

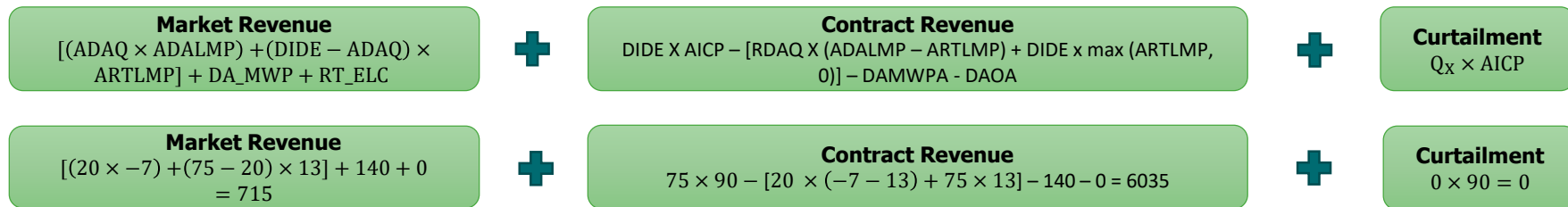
Real Time Values		Day Ahead Values	
Term Sheet Acronym	Value	Term Sheet Acronym	Value
ARTLMP	\$13/MWh	Day Ahead Offer	\$0/MWh
max (ARTLMP, 0)	\$13/MWh	AICP	\$90/MWh
DIDE	75 MW	ADALMP	-\$7/MWh
Q_x	0 MW	FDAQ	50 MW
HOEP	\$13/MWh	ADAQ	20 MW
RT dispatch instruction	Release	RDAQ (adjusted to ADAQ)	20 MW
		DA_MWP	\$140
		DAMWPA	-\$140

Scenario 1 – Calculations

Using Present Day formula:



Using November 2023 Term Sheet formula:



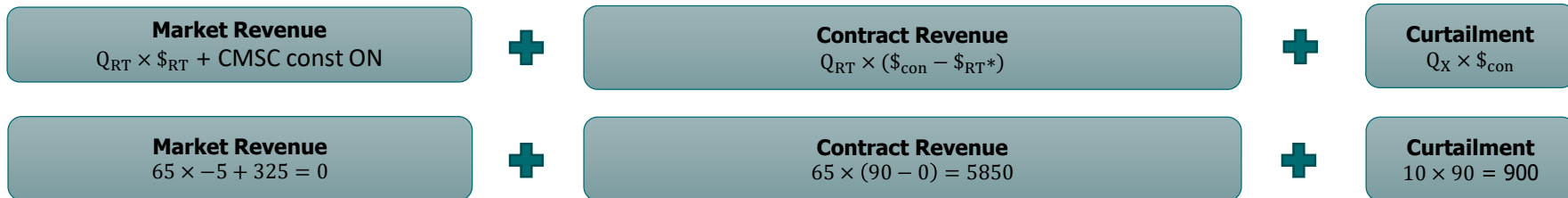
Scenario 2 – Uneconomic Real Time Scheduling Event

- The ARTLMP is \$-5/MWh and Supplier is dispatched uneconomically to 65MW (not a “release”), at a loss of \$325/hr (ignoring DAM). This is addressed in the present day market with CMSC.
- For post-MRP, the market compensates for the loss on the 15 MW increment above the ADAQ with Real Time Energy Lost Cost calculated as: $RT_ELC = (DIDE - ADAQ) * (\$offer - ARTLMP) = (65 - 50) * (\$0 - (-\$5)) = \$75/hr.$
- The Day Ahead Offset Adjustment compensates for the loss up to the ADAQ and is calculated as: $DAOA = ADAQ * ARTLMP = 50MW \times \$-5/MWh = \$-250/hr.$
- Foregone energy payments are made on the differential between the RT forecast and the Dispatch Interval Delivered Electricity at the Adjusted Indexed Contract Price calculated as: $Q_x = (75MW - 65MW) * 90MWh = \$900/hr.$ Curtailment is assumed to have exceeded the cap.

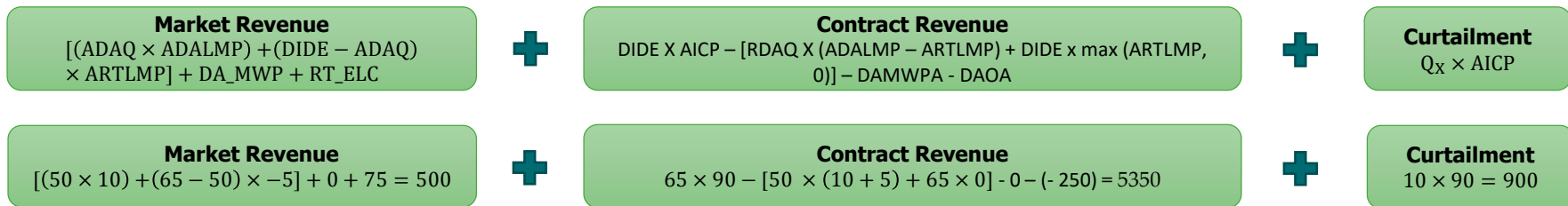
Real Time Values		Day Ahead Values	
Term Sheet Acronym	Value	Term Sheet Acronym	Value
ARTLMP	\$-5/MWh	Day Ahead Offer	\$0/MWh
$\max(ARTLMP, 0)$	\$0/MWh	AICP	\$90/MWh
DIDE	65 MW	ADALMP	\$10/MWh
Q_x	10 MW	FDAQ	50 MW
HOEP	\$-5/MWh	ADAQ	50 MW
RT forecast	75 MW	RDAQ	50 MW
CMSC	\$325/hr	DAOA	\$-250/hr
RT_ELC	\$75/hr		

Scenario 2 – Calculations

Using Present Day formula:



Using November 2023 Term Sheet formula:



Pre-MRP Total Revenue
 \$6750

=

Post-MRP Total Revenue
 \$6750