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Enabling Resources Program (ERP)
Storage and Co-located Hybrid Integration Project

Phase 1, Batch 2 Market Design – Settlements and Economic Operating Point

Independent Electricity System Operator (IESO)

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Territory Acknowledgement

The IESO acknowledges the land from where we are delivering today's webinar is the traditional territory of many nations including the Mississaugas of the Credit, the Anishnabeg, the Haudenosaunee and the Wendat peoples, and is now home to many diverse First Nations, Inuit and Métis peoples. We also acknowledge that Toronto is covered by Treaty 13 with the Mississaugas of the Credit First Nation.

As we have attendees from across Ontario, the IESO would also like to acknowledge all the traditional territories across the province, which include those of the Algonquin, Anishnabeg, Ojibwe, Cree, Oji-Cree, Huron-Wendat, Haudenosaunee, Métis, and Inuit peoples.

Engagement Principles

This engagement is conducted in accordance with the IESO's External Engagement Framework, which includes the following principles:

- **Purposeful** – Initiate meaningful conversations that move the sector forward
- **Inclusive** – Invite many voices and diverse perspectives to the table
- **Timely** – Seek input and insight when it can have the most impact
- **Accessible** – Ensure we meet people where they are on their energy journey
- **Traceable** – Allow everyone to follow the path that is being taken
- **Transparent** – Show how engagement helped shape the final outcome

Shared Commitment to Respectful Participation

To support a focused and constructive discussion:

- We will take questions one at a time; please use the raise-hand feature to enter the speaking queue
- We encourage concise and focused comments to allow time for multiple perspectives
- Participants are encouraged to raise relevant points during the discussion and provide more detailed feedback through the written submission process
- We ask that all participants maintain a respectful and professional tone throughout the session
- Facilitators will guide the discussion and manage participation to stay aligned with today's focus and agenda
- Where necessary, we may disable a participant's microphone to manage participation

Information Session Recording and Webpage

- Today’s session will be **recorded** and available for viewing online
- **Meeting materials** are posted on the Public Information Session webpage created for this topic
- Please visit the Public Information Session's webpage here

Agenda

- Summary of Stakeholder Feedback and IESO Responses
- Update on Day-Ahead Make-Whole Payment (DAM MWP) design
- Real-Time Make-Whole Payment Recap, Formula Correction and Examples
- Next Steps

Enabling Resources Program Scope

The Enabling Resources Program is a set of projects that will further enable key emerging resources, specifically electricity storage ("storage"), hybrid generation-storage pairings ("hybrids") and aggregations of Distributed Energy Resources ("DERs") into the IESO-administered markets, tools, and processes to provide required system services and contribute to the safe and reliable operation of the bulk power system in Ontario.

Enabling Resources Program Scope

- The IESO will be implementing storage design through a phased approach.
- The intention of Phase 1 is to implement a fundamental design enabling storage participation in **Energy** and **Operating Reserves (OR)** from both the injection and withdrawal ranges.
- The IESO will continue to monitor storage operations and seek to evolve where appropriate.

Outcomes of Optimization Phase 1 Design

1. Single resource model
2. State of Charge (SoC) modelling

ERP Phase 2 Scope Update

- Phase 2 scope includes enabling regulation service from battery storage resources and implementing uplift exemptions for storage resources.
- Phase 2 planning and design has started and is expected to complete by Q2 2027.
- IESO has started work on the market design for regulation service from battery storage resources and is planning on discussing the design and requesting feedback at an engagement in Q4 2026.
- Uplift exemptions for storage resources work is planned to start in Q4 2026, and the design is planned to be discussed at an engagement in Q1 2027.

Stakeholder Feedback and IESO Response

Summary of May 22nd Feedback and Response

- Response to stakeholder feedback on key topics from the May 22nd engagement on Settlements and EOP market design is summarized here. For detailed feedback and response, refer to the engagement page.

Topic	Feedback	Response
Initial State of Charge (ISoC) Divergence and Settlement Exposure	While differences between the Dispatch Scheduling Optimizer (DSO) and Economic Operating Point (EOP) tool's State of Charge (SoC) are acknowledged, no settlement mechanism to mitigate this exposure is proposed; consideration of tolerance bands or safeguards is recommended to avoid penalizing forecasting error.	Differences in the evolution of SoC between the DSO and EOP calculations arise because energy schedules and energy EOPs may not align, which is the basis for Make Whole Payments (MWP) calculations.
	The IESO is requested to provide a clear explanation of how it intends to address the financial exposure from divergence between submitted ISoC in DAM (Day Ahead Market) and actual SoC at the start of real-time operations, and what recourse is available where the actual SoC deviates from the submitted ISoC.	The IESO has reviewed alternative approaches, such as removing an ISoC, and believe this is the more prudent approach for SMSRs and the overall market. SoC forecasting is necessary to support day-ahead commitment certainty. While it introduces some uncertainty, it presents both risks and opportunities for Market Participants (MPs) and MPs can manage this uncertainty through the flexibility provided by their bi-directional offers and dispatch data submissions.

Summary of May 22nd Feedback and Response

Topic	Feedback	Response
Profits clawed back to offset MWPs	**Issue:** The design nets profits and losses across different DAM hours and Real Time (RT) intervals, respectively. Apparent profits may simply reflect risk management actions, making true profitability difficult to assess.	MWPs are intended to compensate for payment shortfalls from uneconomic dispatch, not guarantee profits. Because storage operations are intertemporal, DAM and RT MWP calculations assess injections and withdrawals across the full scheduling horizon, not by individual hour or interval.
	Impact: Storage resources may lose legitimate profit opportunities due to uneconomic dispatch in other periods. The approach could discourage participation and compliance with dispatch instructions, undermining market efficiency and reliability. It weakens the purpose of MWPs by reducing compensation for uneconomic dispatch.	Evaluating each hour/interval independently could overcompensate storage resources and increase ratepayer costs to ratepayers. Multi-period netting better reflects how dispatch decisions affect future operating capability and SoC.
	Fairness: Storage participants face profit clawback without a corresponding mechanism to recover losses. No other resource type is treated this way, raising concerns about unequal treatment. Clawing back revenues could undermine storage project economics and set a precedent for broader future offsets.	• Similar offsetting concepts already exist for hydro and RT Generator Offer Guarantee (GOG) calculations. • ERP will explore, as part of a dedicated engagement, whether a similar approach to Single Model Storage Resources (SMSRs), for calculating DAM MWP, should apply to other energy-limited resources to ensure consistent treatment. • ERP will pause changes related to this design element until further engagements are completed.

Summary of May 22nd Feedback and Response

Topic	Feedback	Response
Forced Discharge & Lost Cost (LC) / Lost Opportunity Cost (LOC) Treatment	Requested clarity on how Dispatch Scheduling Optimizer (DSO) driven forced discharge, particularly due to reduced Maximum State of Charge (MaxSoC) will affect Lost Cost (LC) and Lost Opportunity Cost (LOC) calculations and how it will be distinguished from operator-directed dispatch.	When participant-submitted MinSoC or MaxSoC constraints become binding, resulting dispatch outcomes are attributable to participant operating parameters. Therefore, the SMSR is not eligible for RT MWP compensation in that hour.
RT MWP adjustment charge calculation period	Stakeholders requested clarification on the period used to determine RT MWP adjustment ineligibility and whether it will be shown in market files or settlement statements.	The RT MWP adjustment reflects intertemporal impacts of dispatch-EOP deviations. This request will be considered during implementation.
Settlement Design Impacts on Existing Resources	Stakeholders requested that changes to operating profit calculations, inaccessible Operating Reserve (OR), internal congestion and loss residual equations be limited to SMSRs and not affect other resource types.	The IESO confirms that operating profit and Total Accessible Operating Reserve (TAOR) changes are SMSR-specific. Internal congestion and loss residual updates add a new SMSR-specific component only.
Transparency & Implementation Readiness	Stakeholders requested visibility into RT MWP adjustment periods, confirmation of timely EOP publication, implementation guidance, examples, testing opportunities, and enhanced transparency of settlement inputs.	The IESO will consider visibility enhancements & participant testing approaches during implementation, publish DSO and EOP data via existing settlement schedules, update reports for ERP changes, develop practical examples and conduct market trials with MPs. Expanded dispatch and pricing transparency remains outside ERP scope.

Day-Ahead Make-Whole-Payment

Day-Ahead Make-Whole Payment (Recap)

- DAM MWP is intended to encourage generators and storage providers to follow dispatch instructions without fearing a financial loss
- This is accomplished by seeking to cover losses when the resource is scheduled uneconomically in the day-ahead market.
- It does not guarantee profit.
- Given that the DAM calculation engine optimizes over the entire day, DAM MWP will be paid only if there is a shortfall in payment over the entire day.

Day-Ahead Make-Whole Payment (Recap)

Rationale:

- DAM calculation engine optimizes over the entire day and considers intertemporal characteristic of energy-limited resources
- DAM MWP needs to align with DAM calculation engine decisions
- Avoid overcompensation and reduce unnecessary uplifts paid by ratepayers

Engagement for DAM MWP discussions

- DAM MWP design, as presented at the May 22 engagement session, will be retained for storage resources. ERP will pause changes related to this design until further engagements are completed.
- To ensure consistent treatment, the IESO will explore extending this design to other energy-limited resources through a dedicated engagement session under ERP.
- Therefore, this engagement will be expanded to include additional stakeholders, especially those who are MPs with energy limited resources.

Real-Time Make-Whole Payment

Real-Time Make-Whole Payment (Recap)

- RT MWPs ensures that MPs are not financially worse off as a result of following IESO dispatch instructions by providing compensation for Lost Cost (LC) and Lost Opportunity Cost (LOC).
- RT MWPs compensate SMSRs for the net financial impact of following IESO dispatch instructions, considering the intertemporal characteristics of the resource.
- Dispatch instructions in one interval can impact SMSR SoC and its ability to operate and earn revenue in future intervals.

Real-Time Make-Whole Payment Assessment

- When the DSO SoC and EOP SoC are moving in parallel, i.e., no divergence, RT MWPs will be assessed separately.
- When DSO SoC and EOP SoC are diverging, RT MWPs will be assessed over an assessment period starting at the first interval of the divergence and ends when the SoCs converge or at the end of the trade day.
- The assessment period is limited to a single trade date.

Real-Time Make-Whole Payment Assessment (con't.)

- Losses incurred are offset against profits earned over the assessment period to determine the final make-whole payment.
- Any resulting offset will be settled as an adjustment to RT MWPs under a new RT MWP adjustment charge.

Real-Time Make-Whole Payment Formula - Correction

When SMSR is dispatched to generate, RT_ELC and RT_ELOC will be calculated as follows:

$$RT\_ELC_{k,h}^{m,t} = -1\ x\ [[OP(RT\_LMP_h^{m,t}, Max(DAM\_QSI_{k,h}^{m}, Min(RT\_QSI_{k,h}^{m,t}, AQEI_{k,h}^{m,t})), BES_{k,h}^{m,t}) - OP(RT\_LMP_h^{m,t}, Max(RT\_LC\_EOP_{k,h}^{m,t}, DAM\_QSI_{k,h}^{m}), BES_{k,h}^{m,t})]]/12$$

$$RT\_ELOC_{k,h}^{m,t} = \{Max[0, OP(RT\_LMP_h^{m,t}, RT\_LOC\_EOP_{k,h}^{m,t}, BES_{k,h}^{m,t})] - Max[0, OP(RT\_LMP_h^{m,t}, (Max(RT\_QSI_{k,h}^{m,t}, AQEI_{k,h}^{m,t})), BES_{k,h}^{m,t})]\}/12$$

If the SMSR is dispatched to generate but is economic to withdraw, RT_ELOC will be calculated as follows:

$$RT\_ELOC_{k,h}^{m,t} = \{OP(RT\_LMP_h^{m,t}, RT\_LOC\_EOP_{k,h}^{m,t}, BES_{k,h}^{m,t}) - OP(RT_{LMP}{}_h^{m,t}, Min(0, AQEW\ x - 1_{k,h}^{m,t}), BES_{k,h}^{m,t})\}/12$$

Real-Time Make-Whole Payment Formula - Correction

When SMSR is dispatched to withdraw, RT_ELC and RT_ELOC will be calculated as follows:

$$RT\_ELC_{k,h}^{m,t} = -1\ x\left[OP\left(RT\_LMP_{h}^{m,t}, Min\left(DAM\_QSW_{k,h}^{m}, Max\left(RT\_QSW_{k,h}^{m,t}, AQEW_{k,h}^{m,t}\ x\ -1\right)\right), BES_{k,h}^{m,t}\right)\right.$$
$$\left. - OP\left(RT\_LMP_{h}^{m,t}, Min\left(RT\_LC\_EOP_{k,h}^{m,t}, DAM\_QSW_{k,h}^{m}\right), BES_{k,h}^{m,t}\right)\right]/12$$

$$RT\_ELOC_{k,h}^{m,t} = \left\{OP\left(RT\_LMP_{h}^{m,t}, RT\_LOC\_EOP_{k,h}^{m,t}, BES_{k,h}^{m,t}\right)\right.$$
$$\left. - OP\left(RT\_LMP_{h}^{m,t}, Min\left(RT\_QSW_{k,h}^{m,t}, AQEW_{k,h}^{m,t}\ \mathrm{x}\ -1\right), BES_{k,h}^{m,t}\right)\right\}/12$$

If the SMSR is dispatched to withdraw energy but is economic to generate, RT_ELOC will be calculated as follows:

$$RT\_ELOC_{k,h}^{m,t} = \left\{OP\left(RT\_LMP_{h}^{m,t}, RT\_LOC\_EOP_{k,h}^{m,t}, BES_{k,h}^{m,t}\right)\right.$$
$$\left. - OP\left(RT_{LMP}{}_{h}^{m,t}, Max\left(0, AQEI_{k,h}^{m,t}\right), BES_{k,h}^{m,t}\right)\right\}/12$$

Example 1: SMSR is constrained-off in DAM and RT to optimize SOC for optimal use of the resource to meet system needs

PMAX	200
PMIN	-200
MaxSoC	900
MinSoC	100
Cycle Efficiency	0.95
CycleDEL	800

P/Q Pair	Price ($/MW)	Quantity (MW)	Price to Schedule ($/MW)
Pair 1	1	-200	1 or less
Pair 2	2.5	-100	1.01 to 2.50
Pair 3	6	-80	2.51 to 6
Pair 4	10	-50	6.01 to 10
Pair 5	25	0	10.01 to 24.99
Pair 6	25	50	25 to 49.99
Pair 7	50	100	50 to 74.99
Pair 8	75	150	75 to 99.99
Pair 9	100	200	100 or more

$$RT\_MWP_{k,h}^{m} = \sum^{T} Max\left(0, RT\_ELC_{k,h}^{m,t} + RT\_OLC_{k,h}^{m,t}\right) + Max\left(0, RT\_ELOC_{k,h}^{m,t} + RT\_OLOC_{k,h}^{m,t}\right)$$

Example 1 – DAM MWP Assessment

MP is not scheduled to inject for these hours even though they are economic. The available SoC is optimized to be available for other hours of higher need.

Resource is scheduled to inject above its EOP.

Day-Ahead Market

Hour Ending	HE1	HE2	HE3	HE4	HE5	HE6	HE7	HE8	HE9	HE10	HE11	HE12	HE13	HE14	HE15	HE16	HE17	HE18	HE19	HE20	HE21	HE22	HE23	HE24
DAM LMP	$ 4.50	$ 2.00	$ 1.00	$ 1.00	$ 5.00	$ 5.00	$ 6.00	$ 8.00	$ 9.00	$ 15.00	$ 17.00	$ 30.00	$ 50.00	$ 65.00	$ 80.00	$ 95.00	$ 103.00	$ 125.00	$ 35.00	$ 23.00	$ 23.00	$ 7.00	$ 5.00	$ 0.01
DAM ENERGY SCHEDULE	-80.0	-100.0	-200.0	-200.0	-80.0	-80.0	-80.0	-22.1	0.0	0.0	0.0	0.0	0.0	0.0	150.0	150.0	200.0	200.0	100.0	0.0	0.0	-50.0	-50.0	-50.0
DAM Lost Cost EOP	-80.0	-100.0	-200.0	-200.0	-80.0	-80.0	-80.0	-22.1	0.0	0.0	0.0	0.0	0.0	0.0	150.0	150.0	200.0	200.0	50.0	0.0	0.0	-50.0	-50.0	-50.0
DSO SoC (beginning of hour)	100.0	176.0	271.0	461.0	651.0	727.0	803.0	879.0	900.0	900.0	900.0	900.0	900.0	900.0	900.0	750.0	600.0	400.0	200.0	100.0	100.0	100.0	147.5	195.0
Available DSO SoC (beginning of hour)	0.0	76.0	171.0	361.0	551.0	627.0	703.0	779.0	800.0	800.0	800.0	800.0	800.0	800.0	800.0	650.0	500.0	300.0	100.0	0.0	0.0	0.0	47.5	95.0
Lost Cost SoC (beginning of hour)	100.0	176.0	271.0	461.0	651.0	727.0	803.0	879.0	900.0	900.0	900.0	900.0	900.0	900.0	900.0	750.0	600.0	400.0	200.0	150.0	150.0	150.0	197.5	245.0
Available Lost Cost SoC (beginning of hour)	0.0	76.0	171.0	361.0	551.0	627.0	703.0	779.0	800.0	800.0	800.0	800.0	800.0	800.0	800.0	650.0	500.0	300.0	100.0	50.0	50.0	50.0	97.5	145.0
SETTLEMENT																								
Revenue(DAM Schedule)	-$360.00	-$200.00	-$200.00	-$200.00	-$400.00	-$400.00	-$480.00	-$176.80	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$12,000.00	$14,250.00	$20,600.00	$25,000.00	$3,500.00	$0.00	$0.00	-$350.00	-$250.00	-$0.50
Cost(DAM Schedule)	-$680.00	-$730.00	-$830.00	-$830.00	-$680.00	-$680.00	-$680.00	-$221.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7,500.00	$7,500.00	$12,500.00	$12,500.00	$3,750.00	$0.00	$0.00	-$500.00	-$500.00	-$500.00
OP(Schedule)	$320.00	$ 530.00	$ 630.00	$ 630.00	$ 280.00	$ 280.00	$ 200.00	$ 44.20	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,500.00	$ 6,750.00	$ 8,100.00	$ 12,500.00	$ 250.00	$ -	$ -	$ 150.00	$ 250.00	$ 499.50
Revenue(LC EOP)																			$ 1,750.00					
Cost(LC EOP)																			$1,250.00					
OP(LC EOP)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 500.00					

DAM MWP -1 x (OP(Schedule) - OP(LC EOP)) = **$ 750.00** ← Profit earned is greater than DAM MWP therefore MP will not receive $750

Example 1 – SOC Divergence Assessment

Resource is not scheduled to inject for these intervals even though they are economic. The available SoC is optimized to be available for other intervals of higher need.

	Real-Time												
	HE13		HE14										
Hour Ending	INT11	INT12	INT1	INT2	INT3	INT4	INT5	INT6	INT7	INT8	INT9	INT10	INT11	INT12
RT LMP	$ 110.00	$ 110.00	$ 105.00	$ 104.00	$ 103.00	$ 103.00	$ 103.00	$ 103.00	$ 165.00	$ 225.00	$ 300.00	$ 103.00	$ 103.00	$ 103.00
	INT11	INT12	INT1	INT2	INT3	INT4	INT5	INT6	INT7	INT8	INT9	INT10	INT11	INT12
ENERGY SCHEDULE	200.0	200.0	200.0	148.0	0.0	0.0	0.0	0.0	200.0	200.0	200.0	0.0	0.0	0.0
DSO SOC(beginning of hour)	212.3	195.7	179.0	162.3	150.0	150.0	150.0	150.0	150.0	133.3	116.7	100.0	100.0	100.0
DSO Available SOC(beginning of hour)	112.3	95.7	79.0	62.3	50.0	50.0	50.0	50.0	50.0	33.3	16.7	0.0	0.0	0.0
DSO SOC(end of hour)	195.7	179.0	162.3	150.0	150.0	150.0	150.0	150.0	133.3	116.7	100.0	100.0	100.0	100.0
LC EOP	200.0	200.0	200.0	200.0	0.0	0.0	0.0	0.0	200.0	200.0	147.5	0.0	0.0	0.0
LC SOC(beginning of hour)	212.3	195.7	179.0	162.3	145.7	145.7	145.7	145.7	145.7	129.0	112.3	100.0	100.0	100.0
LC Available SOC(beginning of hour)	112.3	95.7	79.0	62.3	45.7	45.7	45.7	45.7	45.7	29.0	12.3	0.0	0.0	0.0
DSO SOC(end of hour)	195.7	179.0	162.3	145.7	145.7	145.7	145.7	145.7	129.0	112.3	100.0	100.0	100.0	100.0
LOC EOP	200.0	200.0	200.0	200.0	200.0	200.0	147.6	0.0	0.0	0.0	0.0	0.0	0.0	
LOC SOC(beginning of hour)	212.3	195.7	179.0	162.3	145.7	129.0	112.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0
LOC Available SOC(beginning of hour)	112.3	95.7	79.0	62.3	45.7	29.0	12.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOC SOC(end of hour)	195.7	179.0	162.3	145.7	129.0	112.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

SOCs diverge

SOCs converge

Example 1 – RT MWP Settlement Calculation

RT MWP Calculations								
	HE14							
	INT2	INT3	INT4	INT5	INT6	INT7	INT8	INT9
RT LMP	$104.00	$103.00	$103.00	$103.00	$103.00	$165.00	$225.00	$300.00
Energy Schedule	148	0	0	0	0	200	200	200
LOC EOP	200	200	200	147.6	0	0	0	0
LC EOP	200	0	0	0	0	200	200	147.6
RT MWP Calculation								
Revenue(Energy Schedule)	$15,392.00	$0.00	$0.00	$0.00	$0.00	$33,000.00	$45,000.00	$60,000.00
Cost (Energy Schedule)	$12,500.00	0	0	0	0	$12,500.00	$12,500.00	$12,500.00
OP(Energy Schedule)	$2,892.00	$0.00	$0.00	$0.00	$0.00	$20,500.00	$32,500.00	$47,500.00
Revenue(LOC EOP)	$20,800.00	$20,600.00	$20,600.00	$15,202.80	$0.00	$0.00	$0.00	$0.00
Cost (LOC EOP)	$12,500.00	$12,500.00	$12,500.00	$7,320.00	0	0	0	0
OP(LOC EOP)	$8,300.00	$8,100.00	$8,100.00	$7,882.80	$0.00	$0.00	$0.00	$0.00
Loss Opportunity Cost MWP	$5,408.00	$8,100.00	$8,100.00	$7,882.80				

For INT 2-9:	
Total Profit	$100,500.00
Net RT MWP	$29,490.80
RT MWP Adjustment	$29,490.80

Example 1 – Two Settlement Calculation

	DAM Schedule
Hour Ending	HE19
DAM LMP	$ 35.00
DAM ENERGY SCHEDULE	100.0

**Assumes Actual MW = Energy Schedule

RT MWP is not calculated for INT 6 &7 because the resource was scheduled at DAM schedule

	HE19											
Hour Ending	INT1	INT2	INT3	INT4	INT5	INT6	INT7	INT8	INT9	INT10	INT11	INT12
RT LMP	$ 30.00	$ 23.00	$ 23.00	$ 23.00	$ 40.00	$ 35.00	$	$ 35.00	$ 21.00	$ 23.00	$ 23.00	$ 23.00
	INT1	INT2	INT3	INT4	INT5	INT6	INT7	INT8	INT9	INT10	INT10	INT10
ENERGY SCHEDULE	50.0	0.0	0.0	0.0	50.0	100.0	100.0	0.0	0.0	0.0	0.0	0.0
**STATE OF CHARGE (DSO SoC)	479.0	429.0	429.0	429.0	429.0	379.0	279.0	179.0	179.0	179.0	179.0	179.0
*AVAILABLE DSO SoC (beginning of Interval)	379.0	329.0	329.0	329.0	329.0	279.0	179.0	79.0	79.0	79.0	79.0	79.0
LC EOP	50.0	0.0	0.0	0.0	50.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0
**Start of Charge (LC EOP SOC)	479.0	429.0	429.0	429.0	429.0	379.0	329.0	279.0	279.0	279.0	279.0	279.0
*AVAILABLE LC EOP SoC (beginning of Interval)	379.0	329.0	329.0	329.0	329.0	279.0	229.0	179.0	179.0	179.0	179.0	179.0
LOC EOP	50.0	0.0	0.0	0.0	50.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0
**Start of Charge (LOC EOP SOC)	379.0	329.0	329.0	329.0	329.0	279.0	229.0	179.0	179.0	179.0	179.0	179.0
*AVAILABLE LOC EOP SoC (beginning of Interval)	279.0	229.0	229.0	229.0	229.0	179.0	129.0	79.0	79.0	79.0	79.0	79.0

Two-Settlement													Total
Day-Ahead Payment	$ 3,500.00												$ 3,500.00
RT Balancing Payment	-$ 125.00	-$ 191.67	-$ 191.67	-$ 191.67	-$166.67	$ -	$ -	-$ 291.67	-$ 175.00	-$ 191.67	-$ 191.67	-$ 191.67	-$ 1,908.33
													$ 1,591.67

Example 2: Multi-day MWP - SMSR is constrained-on uneconomically in RT at the end of the current day to meet a potential reliability need in HE 8 and HE 9 of the next day

PMAX	200
PMIN	-200
MaxSoC	900
MinSoC	100
Cycle Efficiency	0.95
CycleDEL	800

P/Q Pair	Price ($/MW)	Quantity (MW)	Price to Schedule ($/MW)
Pair 1	1	-200	1 or less
Pair 2	2.5	-100	1.01 to 2.50
Pair 3	6	-80	2.51 to 6
Pair 4	10	-50	6.01 to 10
Pair 5	25	0	10.01 to 24.99
Pair 6	25	50	25 to 49.99
Pair 7	50	100	50 to 74.99
Pair 8	75	150	75 to 99.99
Pair 9	100	200	100 or more

Example 2 – Multi-day MWP Assessment

CRO charges the batteries to meet an immediate system need in HE 23 and 24 and precharge the resource during "lower" price hours to make it available for the next day high need hours (HE 8 and 9).

CRO must constrain off the resource for these hours to ensure that it can be utilized in HE 8 and 9.

Resource is utilized for the 2 needed hours.

	Real-Time																
Trade date	July 5, 2026							July 6, 2026									
Hour Ending	HE 18	HE 19	HE 20	HE 21	HE 22	HE 23	HE 24	HE 1	HE 2	HE 3	HE 4	HE 5	HE 6	HE 7	HE 8	HE 9	HE 10
RT LMP	$ 200.00	$ 10.00	$ 10.00	$ 50.00	$ 100.00	$ 400.00	$ 400.00	$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 200.00	$250.00	$ 250.00	$ 500.00	$ 500.00	$ 300.00
RT ENERGY SCHEDULE	200.0	-200.0	-200.0	-200.0	-200.0	200.0	200.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	200.0	160.0	0.0
DSO SoC (beginning of hour)	300.0	100.0	290.0	480.0	670.0	860.0	660.0	460.0	460.0	460.0	460.0	460.0	460.0	460.0	460.0	260.0	100.0
DSO AVAILABLE SoC (beginning of hour)	200.0	0.0	190.0	380.0	570.0	760.0	560.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	160.0	0.0
DSO SoC (end of hour)	100.0	290.0	480.0	670.0	860.0	660.0	460.0	460.0	460.0	460.0	460.0	460.0	460.0	460.0	260.0	100.0	100.0
LC EOP	200.0	-50.0	-50.0	0.0	0.0	95.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	200.0	160.0	0.0
LC EOP SoC (beginning of hour)	300.0	100.0	147.5	195.0	195.0	195.0	100.0	460.0	460.0	460.0	460.0	460.0	460.0	460.0	460.0	260.0	100.0
LC EOP Available SOC(beginning of hour)	200.0	0.0	47.5	95.0	95.0	95.0	0.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	160.0	0.0
LC EOP SOC (end of hour)	100.0	147.5	195.0	195.0	195.0	100.0	100.0	460.0	460.0	460.0	460.0	460.0	460.0	460.0	260.0	100.0	100.0
LOC EOP	200.0	-50.0	-50.0	95.0	0.0	0.0	0.0	200.0	160.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOC EOP SoC (beginning of hour)	300.0	100.0	147.5	195.0	100.0	100.0	100.0	460.0	260.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
LOC EOP Available SOC(beginning of hour)	200.0	0.0	47.5	95.0	0.0	0.0	0.0	360.0	160.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOC EOP SOC (end of hour)	100.0	147.5	195.0	100.0	100.0	100.0	100.0	260.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Example 2 – SOC Divergence Assessment for Day 1

CRO charges the batteries to meet an immediate system need in HE 23 and 24 and precharge the resource during "lower" price hours to make it avaialble for the next day high need hours (HE 8 and 9).

Trade date	July 5, 2026						
Hour Ending	HE 18	HE 19	HE 20	HE 21	HE 22	HE 23	HE 24
RT LMP	$ 200.00	$ 10.00	$ 10.00	$ 50.00	$ 100.00	$ 400.00	$ 400.00
RT ENERGY SCHEDULE	200.0	-200.0	-200.0	-200.0	-200.0	200.0	200.0
DSO SoC (end of hour)	100.0	290.0	480.0	670.0	860.0	660.0	460.0
LC EOP	200.0	-50.0	-50.0	0.0	0.0	95.0	0.0
LOC EOP	200.0	-50.0	-50.0	95.0	0.0	0.0	0.0
LC EOP SOC (end of hour)	100.0	147.5	195.0	195.0	195.0	100.0	100.0
LOC EOP SOC (end of hour)	100.0	147.5	195.0	100.0	100.0	100.0	100.0
SOC divergence	N	Y	Y	Y	Y	Y	Y
MWP Calculation Required		LC	LC	LC & LOC	LC	LC	

Example 2 - RT Settlement Calculations for Day 1

Trade date	July 5, 2026						
Hour Ending	HE 18	HE 19	HE 20	HE 21	HE 22	HE 23	HE 24
Revenue (RT Schedule)	$40,000.00	-$2,000.00	-$2,000.00	-$10,000.00	-$20,000.00	$80,000.00	$80,000.00
Cost (RT Schedule)	$12,500.00	-$830.00	-$830.00	-$830.00	-$830.00	$12,500.00	$12,500.00
OP(RT Schedule)	$27,500.00	-$1,170.00	-$1,170.00	-$9,170.00	-$19,170.00	$67,500.00	$67,500.00
Revenue (LC EOP)		-$500.00	-$500.00	$0.00	$0.00	$38,000.00	
Cost (LC EOP)		-$500.00	-$500.00	$0.00	$0.00	$3,500.00	
OP(LC EOP)		$0.00	$0.00	$0.00		$34,500.00	
Revenue (LOC EOP)				$ 4,750.00			
Cost (LOC EOP)				$ 3,500.00			
OP(LOC EOP)				$ 1,250.00			

								TOTAL
RT MWP				$10,420.00	$19,170.00			$29,590.00
Profit	$27,500.00	$1,170.00	$1,170.00			$33,000.00	$67,500.00	$102,840.00

HE 18 is excluded from offset

RT MWP of $29,590 will be reversed

Example 2 – SOC Divergence Assessment for Day 2

CRO must constrain off the resource for these hours to ensure that it can be utilized in HE 8 and 9.

Resource is utilized for the 2 needed hours.

Trade date	July 6, 2026									
Hour Ending	HE 1	HE 2	HE 3	HE 4	HE 5	HE 6	HE 7	HE 8	HE 9	HE 10
RT LMP	$ 200.00	$ 200.00	$ 200.00	$200.00	$ 200.00	$ 250.00	$ 250.00	$ 500.00	$ 500.00	$ 300.00
RT ENERGY SCHEDULE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	200.0	160.0	0.0
DSO SoC (end of hour)	460.0	460.0	460.0	460.0	460.0	460.0	460.0	260.0	100.0	100.0
LC EOP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	200.0	160.0	0.0
LOC EOP	200.0	160.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LC EOP SOC (end of hour)	460.0	460.0	460.0	460.0	460.0	460.0	460.0	260.0	100.0	100.0
LOC EOP SOC (end of hour)	260.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SOC divergence	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
MWP Calculation Required	LOC	LOC								

Example 2 - RT Settlement Calculations for Day 2

Trade date	July 6, 2026									
Hour Ending	HE 1	HE 2	HE 3	HE 4	HE 5	HE 6	HE 7	HE 8	HE 9	HE 10
Revenue (RT Schedule)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 100,000.00	$ 80,000.00	$ -
Cost (RT Schedule)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$12,500.00	$8,500.00	$ -
OP(RT Schedule)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$87,500.00	$71,500.00	

Revenue (LOC EOP)	$40,000.00	$ 32,000.00								
Cost (LOC EOP)	$12,500.00	$8,500.00								
OP(LOC EOP)	$27,500.00	$23,500.00								

											TOTAL
RT MWP	$27,500.00	$23,500.00									$51,000.00
Profit								$87,500.00	$71,500.00		$159,000.00

RT MWP of $51000 will be offset against the profit earned in HE 8 & 9

Next Steps

Next Steps

- Additional engagement on the DAM MWP for other energy-limited resources is being scheduled.
    - This engagement will commence in Q3/Q4 2026.
- The drafting and engagement on IESO Market Rules and Market Manuals will commence in Q1/Q2 2027.
    - Outcomes of the additional engagement including other energy-limited resources will also be integrated into ERP's market rule amendment process.

Feedback

- For any feedback on today's session, please submit using the feedback form on the ERP Storage Project engagement webpage by **August 20, 2026**, to IESO Engagement at engagement@ieso.ca

Thank You

ieso.ca

1.888.448.7777

customer.relations@ieso.ca

engagement@ieso.ca

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