



# Storage Bid Cost Recovery (BCR) and Default Energy Bid (DEB) Enhancements

Second Workshop  
July 22, 2024

# Reminders

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- If you need technical assistance during the meeting, please send a chat to the event producer.

## Instructions for raising your hand to ask a question

- If you are connected to audio through your computer or used the “call me” option, select the raise hand icon located  on the bottom of your screen.
  - **Note:** \*3 only works if you dialed into the meeting.
- Please remember to state your name and affiliation before making your comment
- You may also send your questions via chat to either **Christina Guimera** or to all panelists.

# Today's Agenda

Time	Topic	Presenter
1:00 – 1:05	Welcome and today's agenda	Christina Guimera
1:05 – 1:35	Overview of Initial Stakeholder Feedback and Schedule Updates	Sergio Dueñas Melendez
1:35 – 3:05	Additional Background and Examples on Storage BCR	Sergio Dueñas Melendez
3:05 – 3:35	Initiative Workshop	
3:35 – 3:55	Open stakeholder discussion	
3:55 – 4:00	Next steps	Christina Guimera

# CAISO Policy Initiative Stakeholder Process



We are here

# Overview of Initial Stakeholder Feedback and Schedule Updates

## Initial Stakeholder Feedback (1/2)

- Some stakeholders asked the ISO for additional clarity regarding the problem statement, specifically requesting numerical examples
- Some stakeholders asked the ISO for more time and materials to understand the problems at hand prior to the posting of an Issue Paper & Straw Proposal (IPSP)
- Some stakeholders recommended fewer versions/revisions of the Issue Paper & Straw Proposal to allow for more robust stakeholder feedback

## Initial Stakeholder Feedback (2/2)

- Some stakeholders noted that some features and limitations of the ISO's markets could result in the state of charge being binding and BCR being warranted
- Some stakeholders believe a holistic approach to BCR may avoid unintended consequences from a narrow fix
- Some stakeholders request the ISO prioritize enhancements to the Storage DEB, with some requesting evaluation prior to BCR topic

# Updated Initiative Schedule

- Considering initial verbal and written stakeholder feedback, the ISO has updated the schedule for this initiative
- The ISO extended first deadline for comments to allow for more robust feedback
- The ISO modified the schedule to accommodate further discussion of the issue prior to advancing to a IPSP
- The ISO revised the schedule to include three, not four, iterations of the straw proposal
  - This allows for more time for comments while retaining the goal of a September Joint BOG and Governing Body meeting

# Initial Track 1 Timeline \*

Milestone	Date
Workshop issue slides posted	July 1, 2024
Stakeholder workshop on issue	July 8, 2024
Workshop stakeholder comments due	July 11, 2024
Issue Paper/Straw Proposal posted	July 17, 2024
Stakeholder meeting on Issue Paper/Straw Proposal	July 22, 2024
Issue Paper/Straw Proposal stakeholder comments due	July 25, 2024
Revised straw proposal (RSP) posted	July 31, 2024
Stakeholder meeting on RSP	August 5, 2024
RSP stakeholder comments due	August 8, 2025
Draft Final Proposal (DFP) posted	August 14, 2024
Stakeholder meeting on DFP	August 19, 2024
DFP stakeholder comments due	August 22, 2024
Final Proposal (FP) published	August 29, 2024
FP comments due	September 5, 2024
Joint Board of Governors and Governing Body Meeting	September 26, 2024

*\*All dates are tentative until confirmed through a notice in the ISO's Daily Briefing.*

# Updated Track 1 Timeline \*

Milestone	Date
Workshop issue slides posted	July 1, 2024
Stakeholder workshop on issue	July 8, 2024
<b>Workshop stakeholder comments due</b>	<b>July 18, 2024</b>
<b>Second Stakeholder workshop on issue</b>	<b>July 22, 2024</b>
<b>Issue Paper &amp; Straw Proposal (IPSP) posted</b>	<b>July 25, 2024</b>
<b>Stakeholder meeting on IPSP</b>	<b>August 5, 2024</b>
<b>IPSP stakeholder comments due</b>	<b>August 8, 2025</b>
<b>Revised Straw Proposal (RSP) posted</b>	<b>August 14, 2024</b>
<b>Stakeholder meeting on RSP</b>	<b>August 19, 2024</b>
<b>RSP stakeholder comments due</b>	<b>August 23, 2024</b>
<b>Final Proposal (FP) published</b>	<b>August 30, 2024</b>
<b>FP comments due</b>	<b>September 6, 2024</b>
Joint Board of Governors and Governing Body Meeting	September 26, 2024

*\*All dates are tentative until confirmed through a notice in the ISO's Daily Briefing.*

# **Additional Background and Simplified Examples on Storage BCR**

# Initiative Motivation

- Concerns have been raised about storage BCR provisions generally, and in relation to recent pending changes relative to FERC Order No. 831, which allow for higher bids by storage resources
- In the Tariff Amendment to Prevent Unwarranted Bid Cost Recovery Payments to Storage Resources pursuant to the Ancillary Services State-of-Charge Constraint ([the ASSOC filing](#)), the ISO stated it would initiate a stakeholder process to discuss other longer-term enhancements to address BCR concerns
- This is aligned with recommendations from stakeholders to enhance bid cost recovery rules for storage resources to consider state-of-charge limitations and other attributes unique to storage resources

# BCR Background

- Bid Cost Recovery (BCR) is the CAISO settlements process through which Eligible Resources recover their bid costs
  - Bid costs include Start-Up Bid Cost, Minimum Load Bid Cost, Energy Bid Cost, Transition Bid Cost, Pump Shut-Down Cost, Pumping Cost, Ancillary Services Bid Cost, and RUC Availability Payment
- BCR was initially designed around conventional assets whose bids are purely reflective of their costs to produce energy in a given interval

# BCR Background

- In the order accepting the ASSOC filing, FERC acknowledged that storage resources have neither start-up costs nor minimum load costs and generally have fast ramp rates, thus lacking the conventional drivers for BCR, although they may have other opportunity costs
  - With regards to ASSOC, FERC agreed that the bids of storage resources may not represent the resources' actual bid costs and that, in the case of AS, the opportunity to receive BCR payments drove the incentive for high bids that undermine market efficiency
- Energy storage resources' bids do not result merely from their costs to produce energy in a given interval, they also reflect storage resources' desire to be dispatched at a given time based on their opportunity costs in future intervals

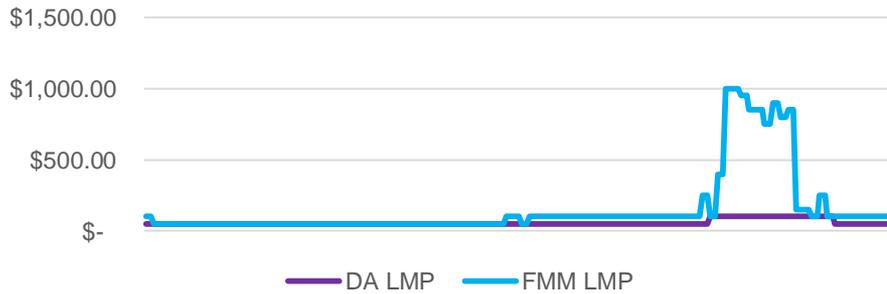
# Storage BCR Issues

- It has been noted that some BCR payments to storage resources have materialized despite not being aligned with the intent of BCR, specifically those related to the buy- and sell-back of Day-Ahead schedules
  - A buy-back of a discharge DA schedule can occur when a storage asset's real-time SOC is too low to support it.
  - A sell-back of a charge DA schedule can occur when a storage asset's real-time SOC is too high to support it.
- This dynamic creates incentives that are not aligned with the intent of BCR, as assets might be incented to bid and operate in the RT market in a manner that would trigger buy or sell backs of their DA energy schedules in order to capture outsized BCR payments

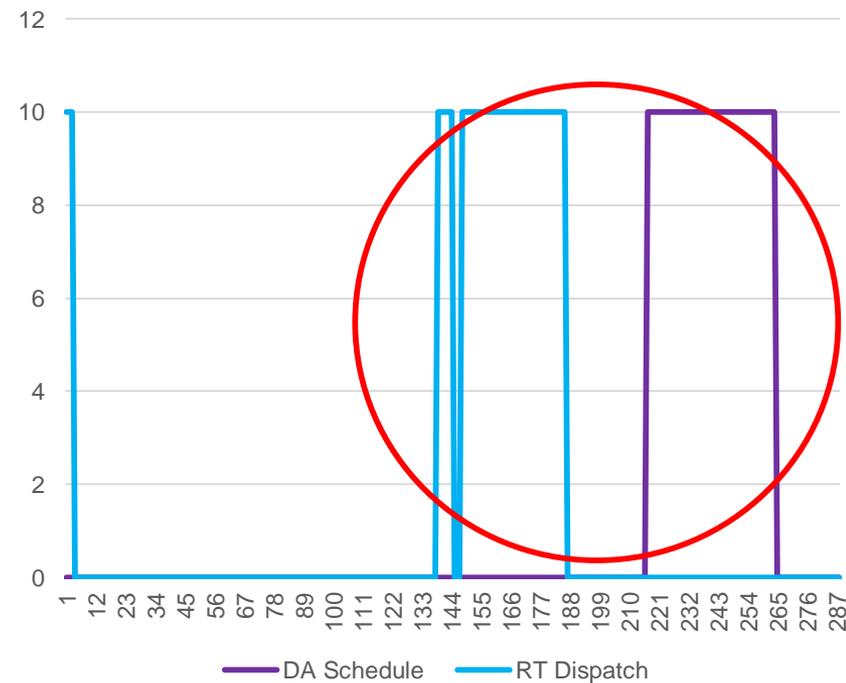
# Simple Buy-Back Examples – Static Bids

- Bids that do not reflect RT conditions result in the resource being depleted ahead of DA schedule, triggering a buy-back

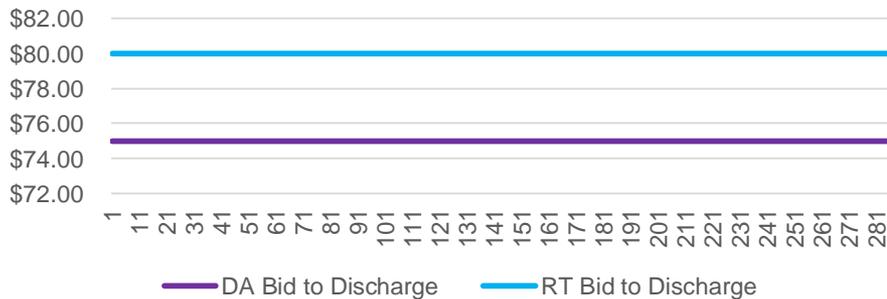
LMPs



Schedules and Dispatch

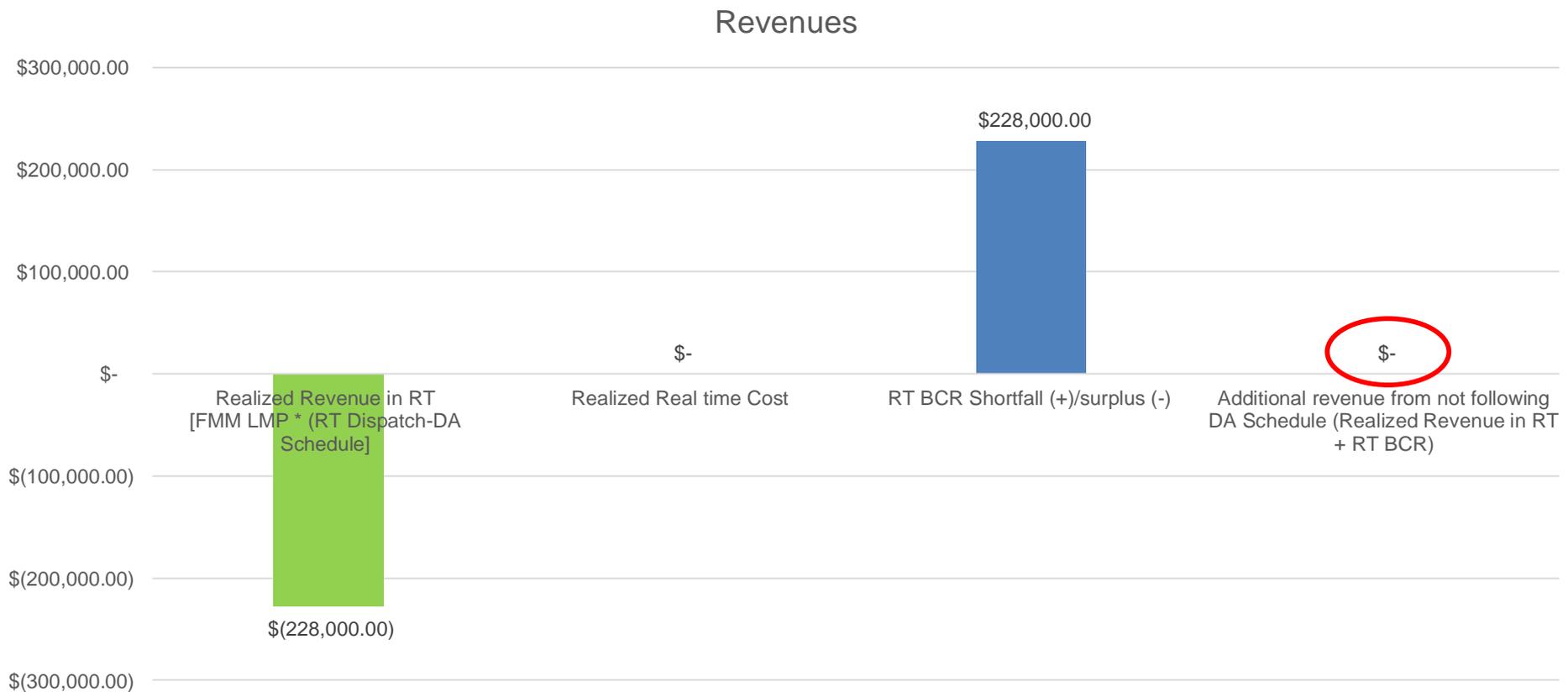


Discharge Bids



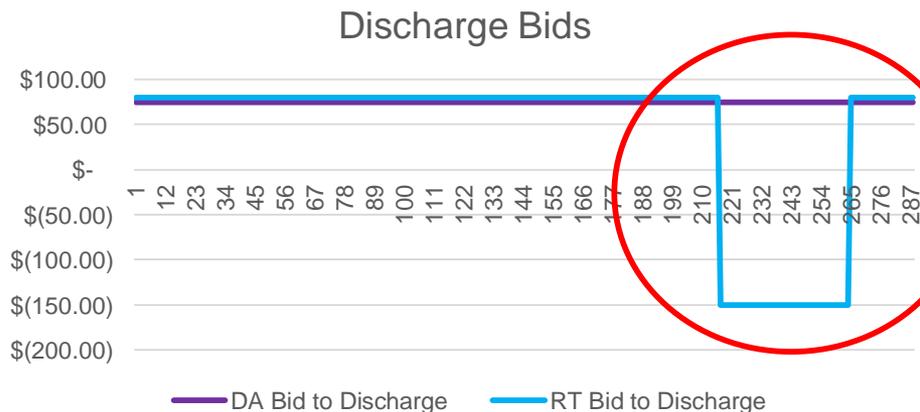
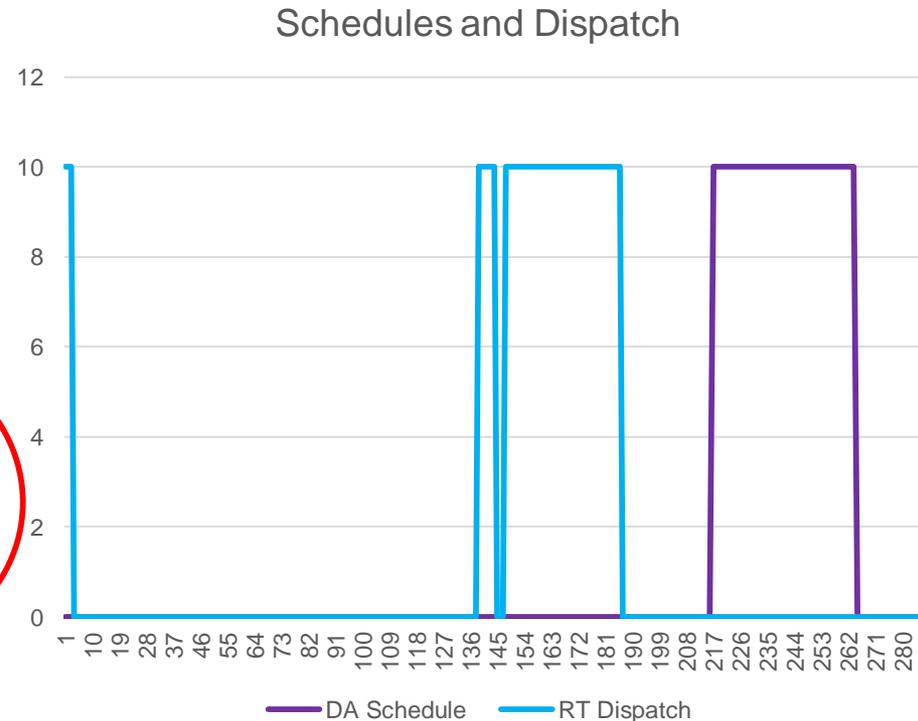
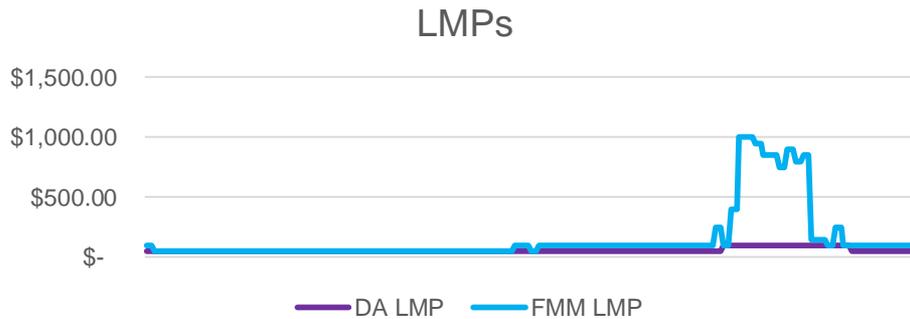
# Simple Buy-Back Examples – Static Bids

- As bids remain static, asset does not make additional revenue from RT BCR, but BCR eliminates exposure to RT LMPs



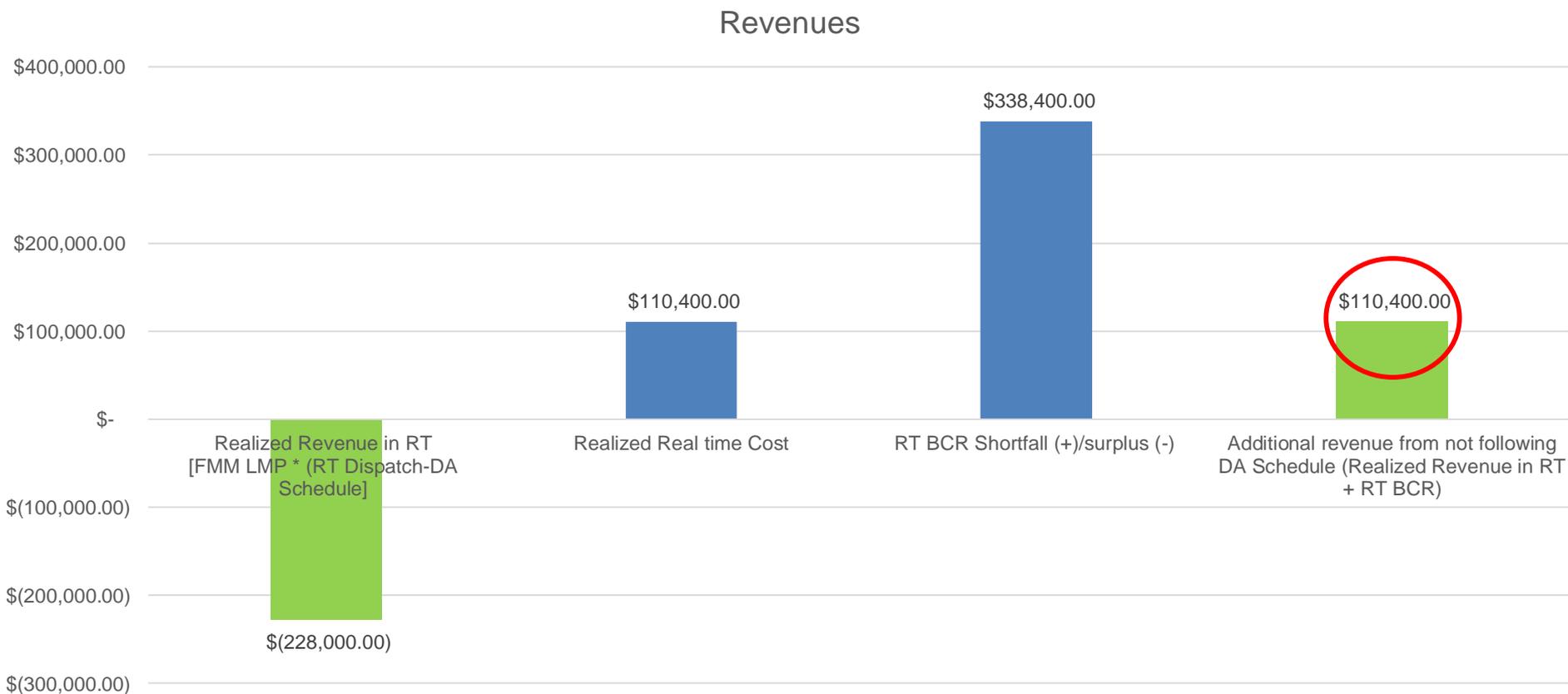
# Simple Buy-Back Examples – Bids to -\$150

- The asset modifies its RT bids to discharge to -\$150 to increase the BCR related to the buy-back



# Simple Buy-Back Examples – Bids to -\$150

- By modifying its bids to the bid floor, the asset gets \$110,400 of additional revenue for triggering buy-back and bidding strategically



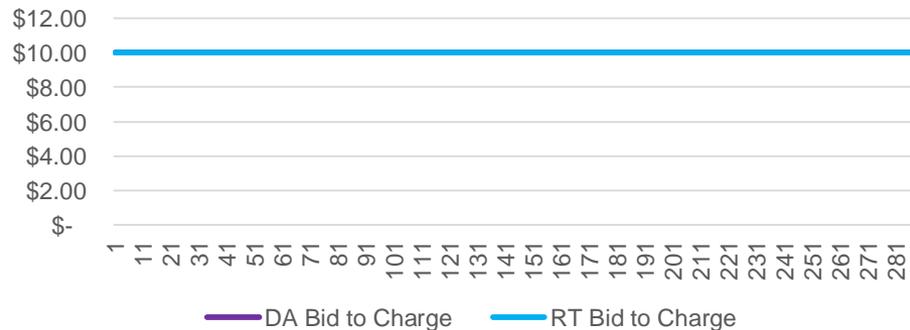
# Simple Sell-Back Examples – Static Bids

- Bids that do not reflect RT conditions result in the resource being fully charged ahead of DA schedule, resulting in a sell-back

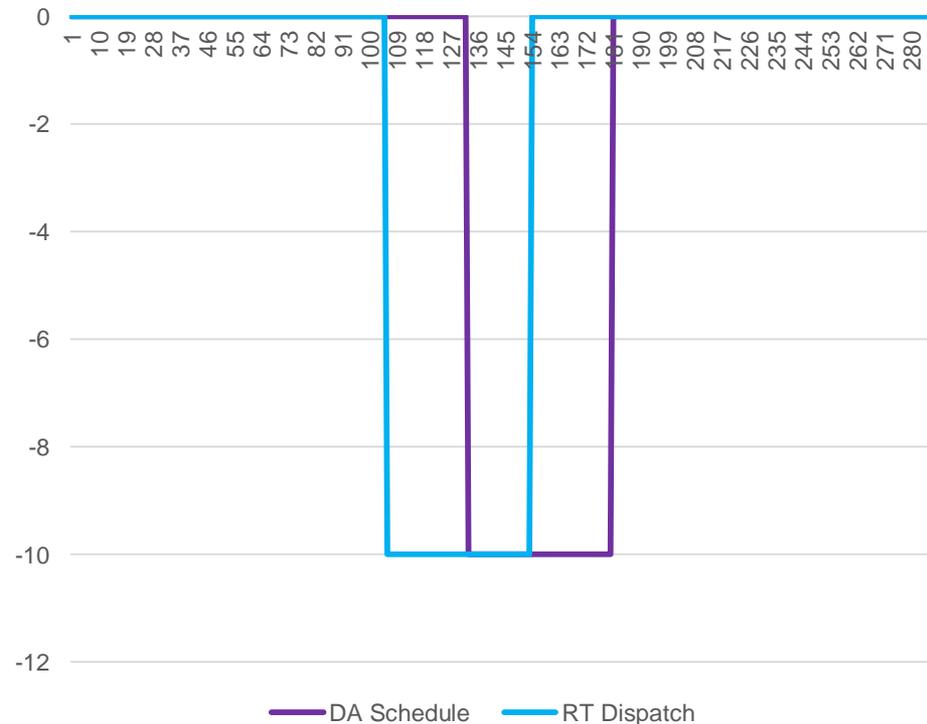
LMPs



Discharge Bids

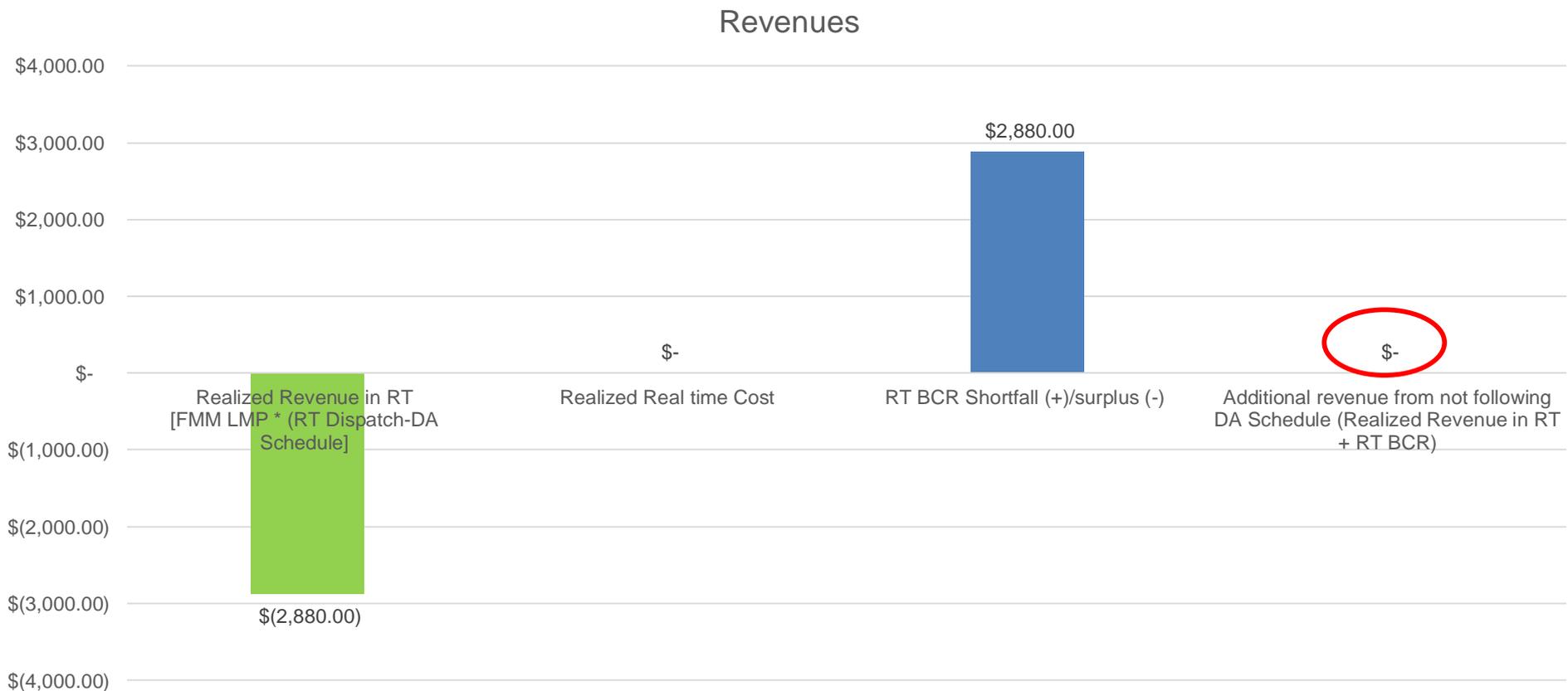


Schedules and Dispatch



# Simple Sell-Back Examples – Static Bids

- As bids remain static, asset does not make additional revenue from RT BCR, but BCR eliminates exposure to RT LMPs



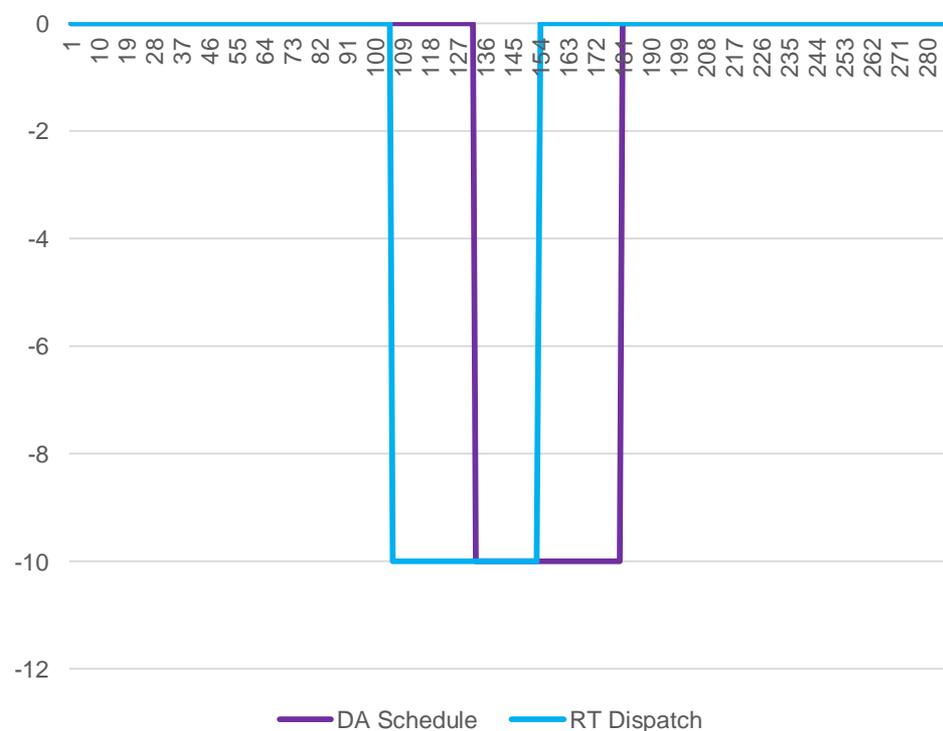
# Simple Sell-Back Examples – Bids to \$2,000

- The asset modifies its RT bids to charge to \$2,000 to increase the BCR related to the sell-back

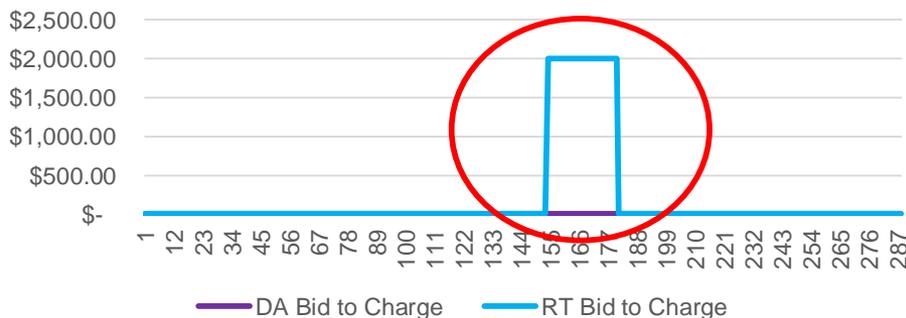
LMPs



Schedules and Dispatch

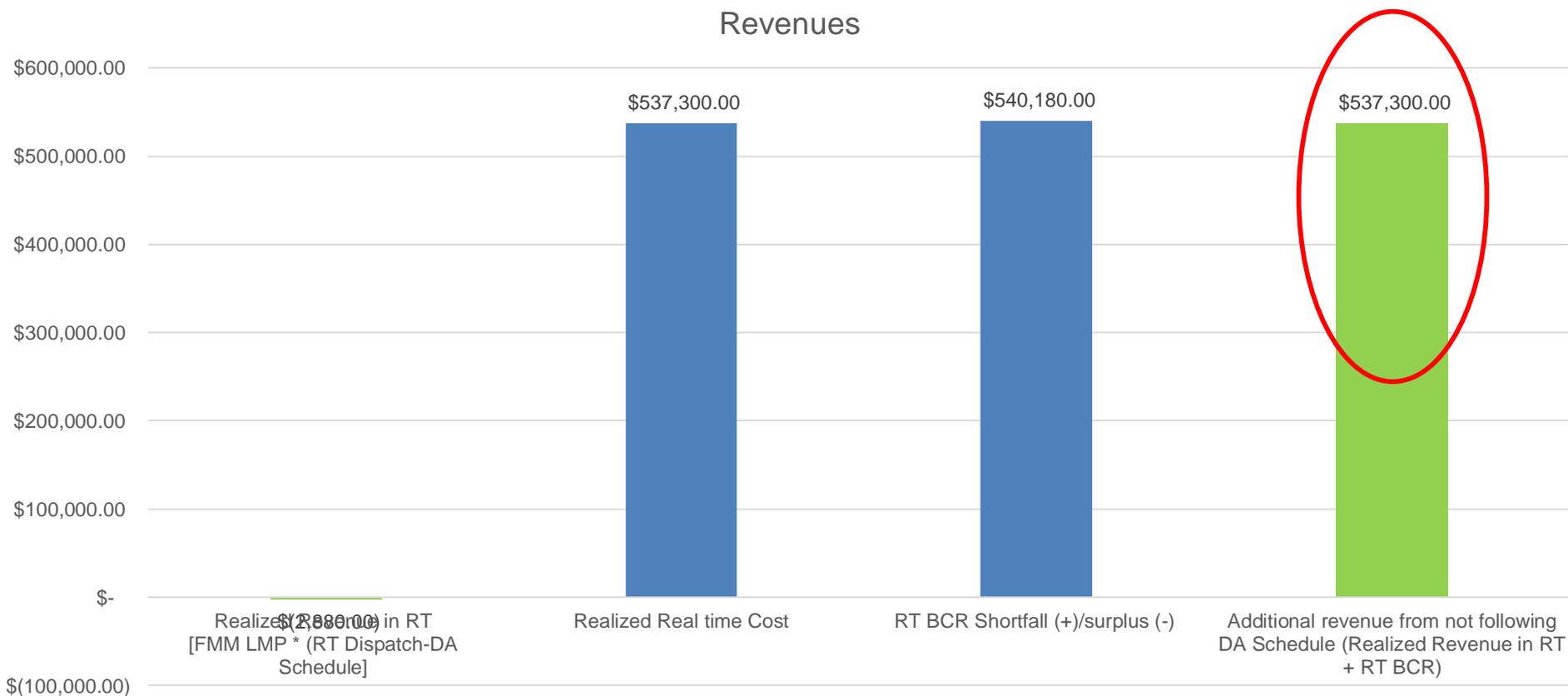


Discharge Bids



# Simple Sell-Back Examples – Bids to \$2,000

- By modifying its bids to the bid cap, the asset gets \$537,300 of additional revenue from triggering sell-back and bidding strategically



# More Complex Examples on Storage BCR

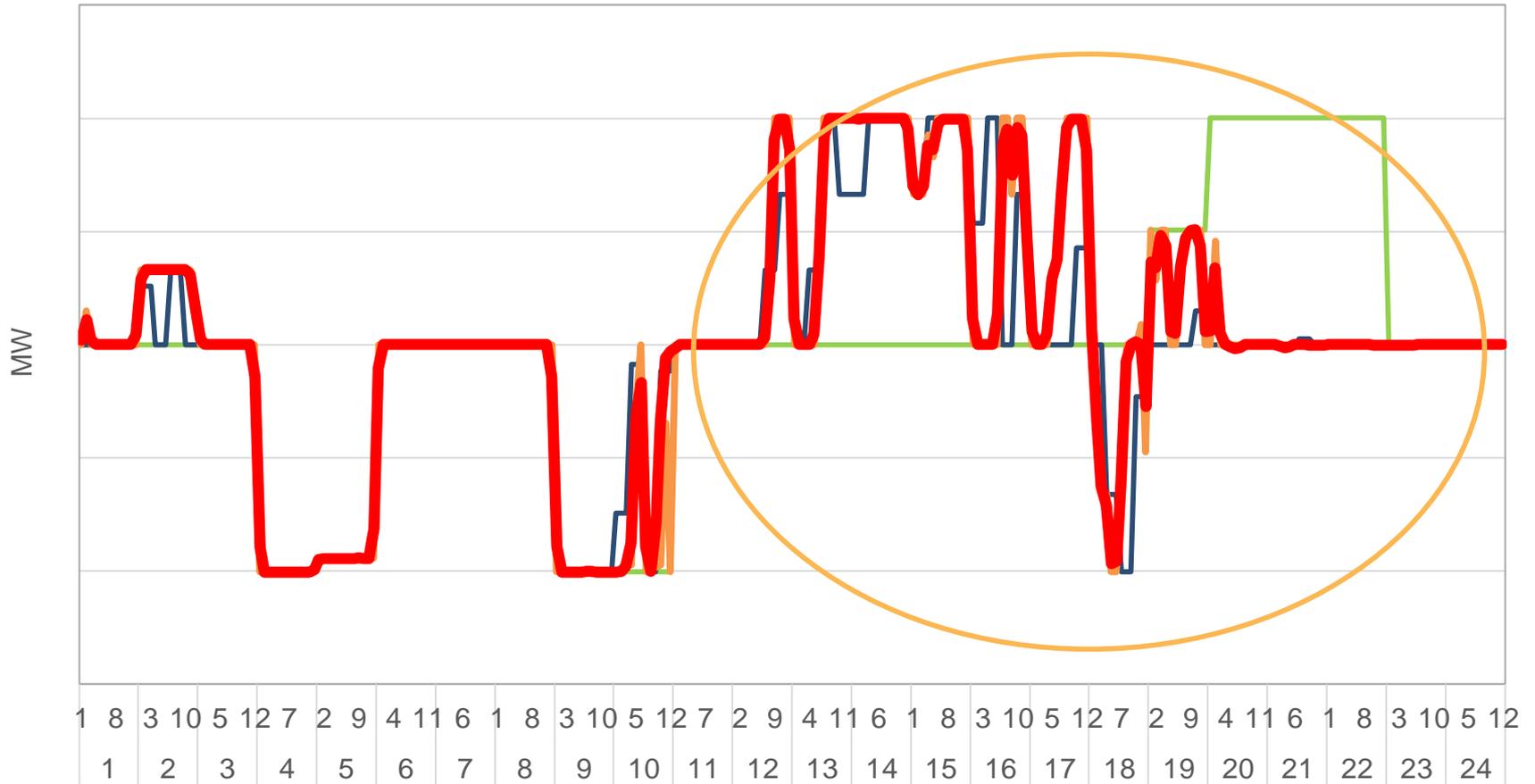
# Example 1

- Example 1 illustrates how BCR can be paid out as a result of discharge prior to the DA schedule given the current lack of incentives to consider/reflect real-time conditions in bids
- Consider a resource with a DA discharge schedule over the net load peak hours of HE 19 through HE 22
- In real-time, the resource submits discharge bids in a manner generally aligned with the peak net load hour price from DA; however, real-time conditions indicate that real-time prices may be much higher than in day-ahead in the net load peak hours
- The asset has no incentive to reflect updated expectations in real-time energy bids given the current BCR provisions; as a result, the resource is discharged economically in HE 13 through HE 17, thus leaving the resource with limited recharge opportunities before reaching the peak net load hours with the aforementioned DA discharge schedules

# Example 1 – Asset Discharges Prior to DA Schedule

Example 1: Market awards and telemetered output

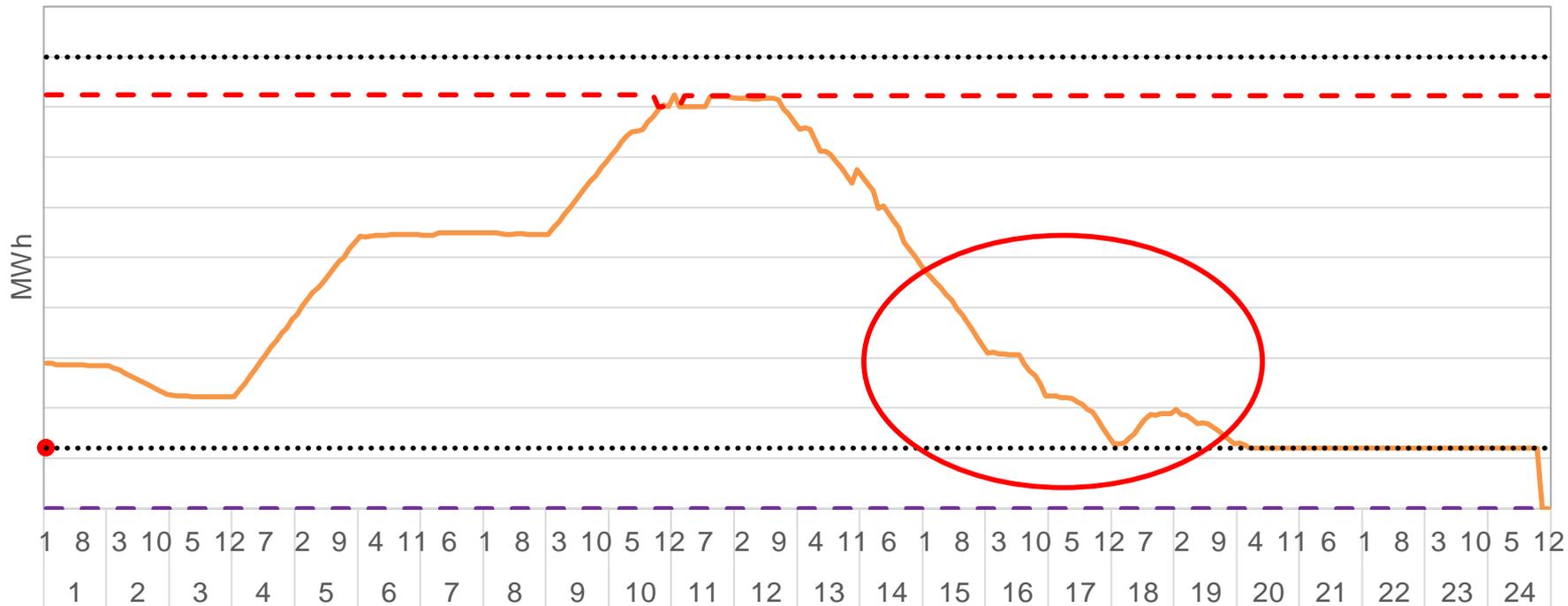
— DA Schedule    — FMM Schedule    — DOT    — Metered MW



# Example 1 – Asset Discharges Prior to DA Schedule

**Example 1: State of Charge**

- DA Initial SOC
- ..... Maximum Charge Limit
- - - RTPD Maximum Stored Energy (OMS)
- RTD Initial SOC
- ..... Minimum Charge Limit
- - - RTPD Minimum Stored Energy (OMS)

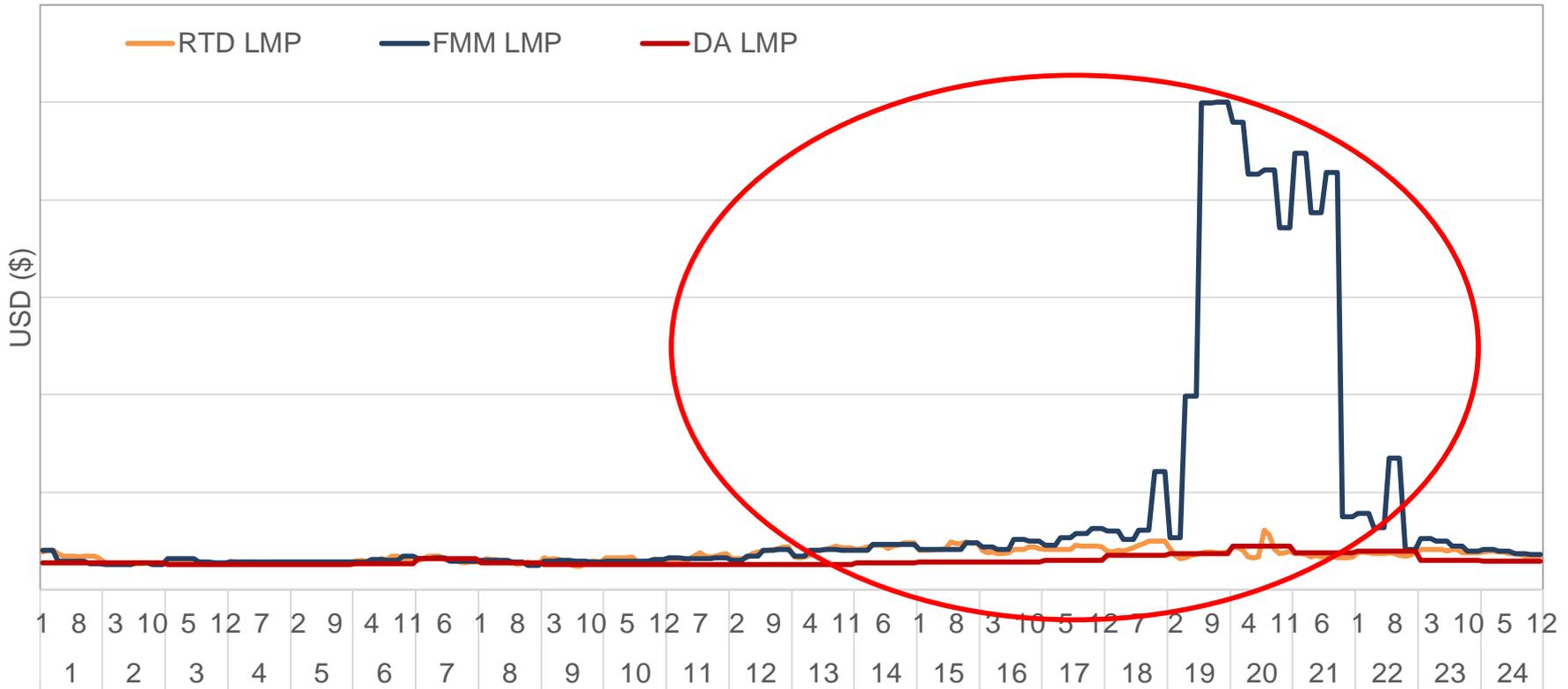


## Example 1

- Example 1 illustrates how BCR can be paid out as a result of discharge prior to the DA schedule given the current lack of incentives to consider/reflect real-time conditions in bids
- Because the resource submits discharge bids in a manner generally aligned with the peak net load hour price from DA, the SOC of the resource has been depleted before the DA schedule, triggering a buy-back for most of the DA discharge schedule at higher LMPs during tight supply conditions

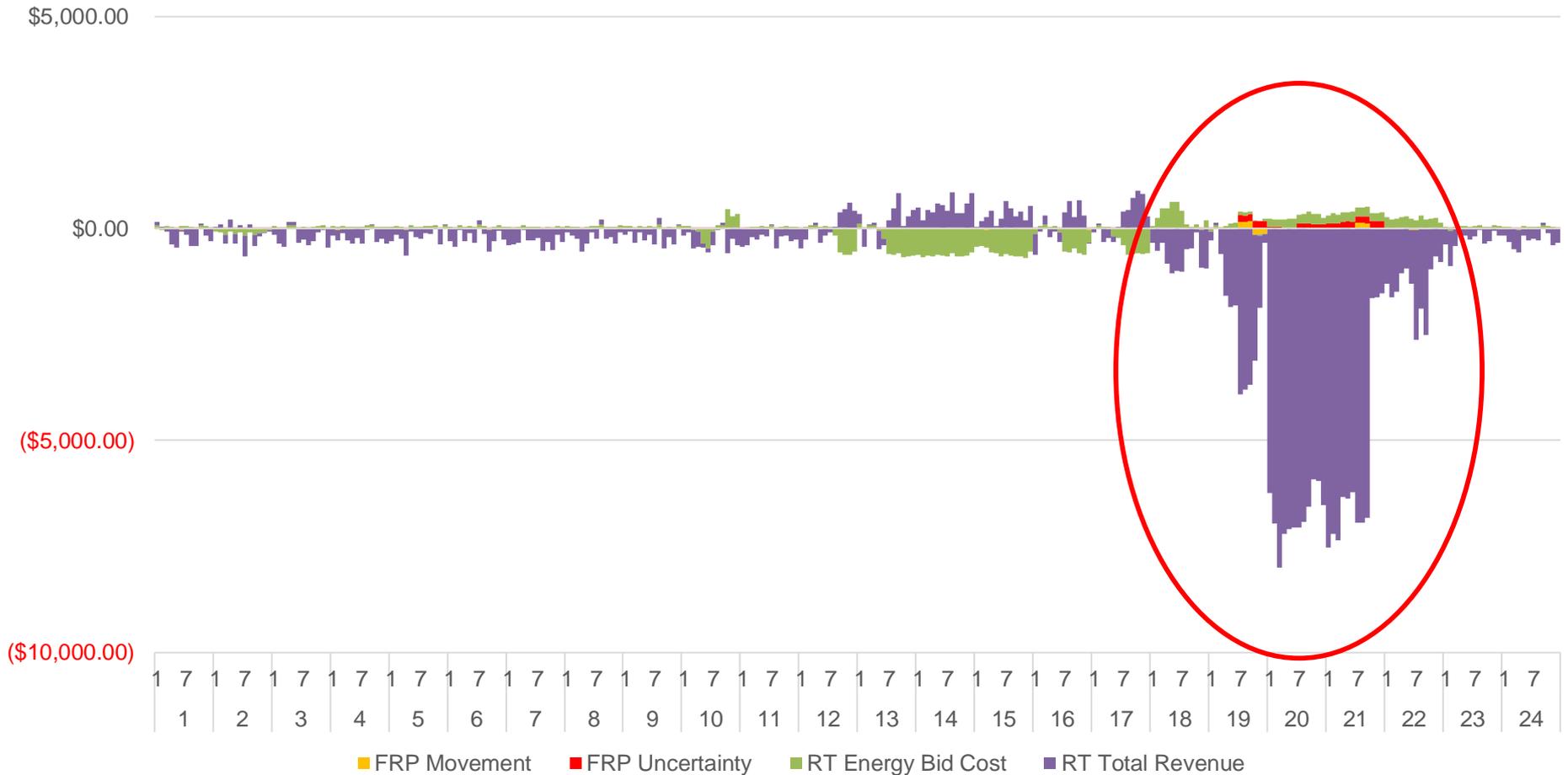
# Example 1 – $\approx$ \$200,000 in RT BCR due to high LMPs

## Example 1: Locational Marginal Prices



# Example 1 – ≈ \$200,000 in RT BCR due to high LMPs

Example 1: Daily RT BCR Components

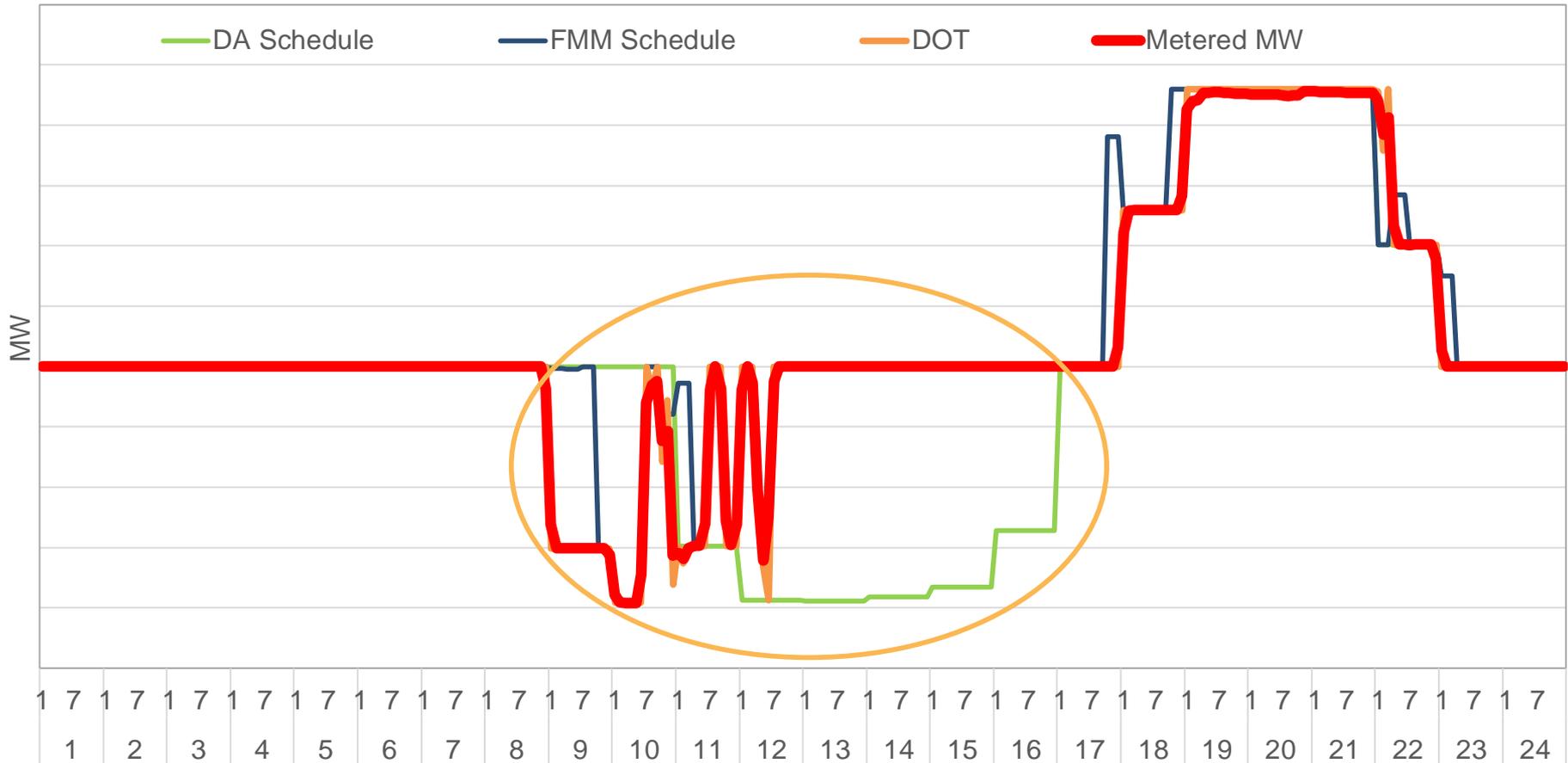


## Example 2

- Example 2 illustrates how BCR can be paid out as a result of charging prior to the DA schedule given the current lack of incentives to consider/reflect real-time conditions in bids
- In this example, the energy storage resource enters the real-time market with SOC significantly higher than what was specified for the beginning of the DA market
- The resource then conducts additional charging as a result of real-time market awards, before reaching the hours of DA charging awards
- By the time day-ahead charging awards are reached, the resource is at 100% SOC and further charging is not possible, leading to the buyback of DA charging awards

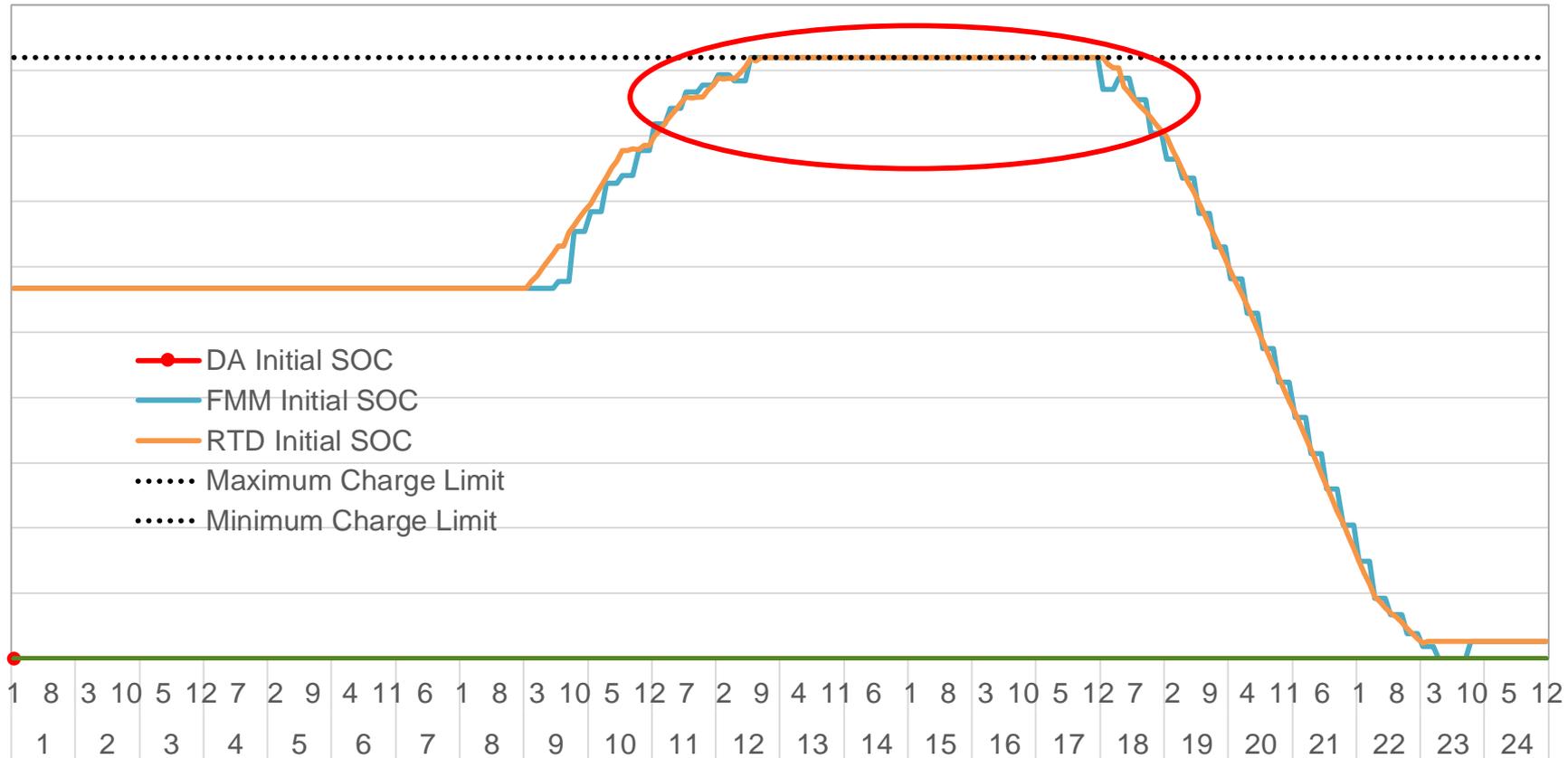
# Example 2 – Asset Charges Prior to DA Schedule

## Example 2: Schedules, DOT, and Metered MW



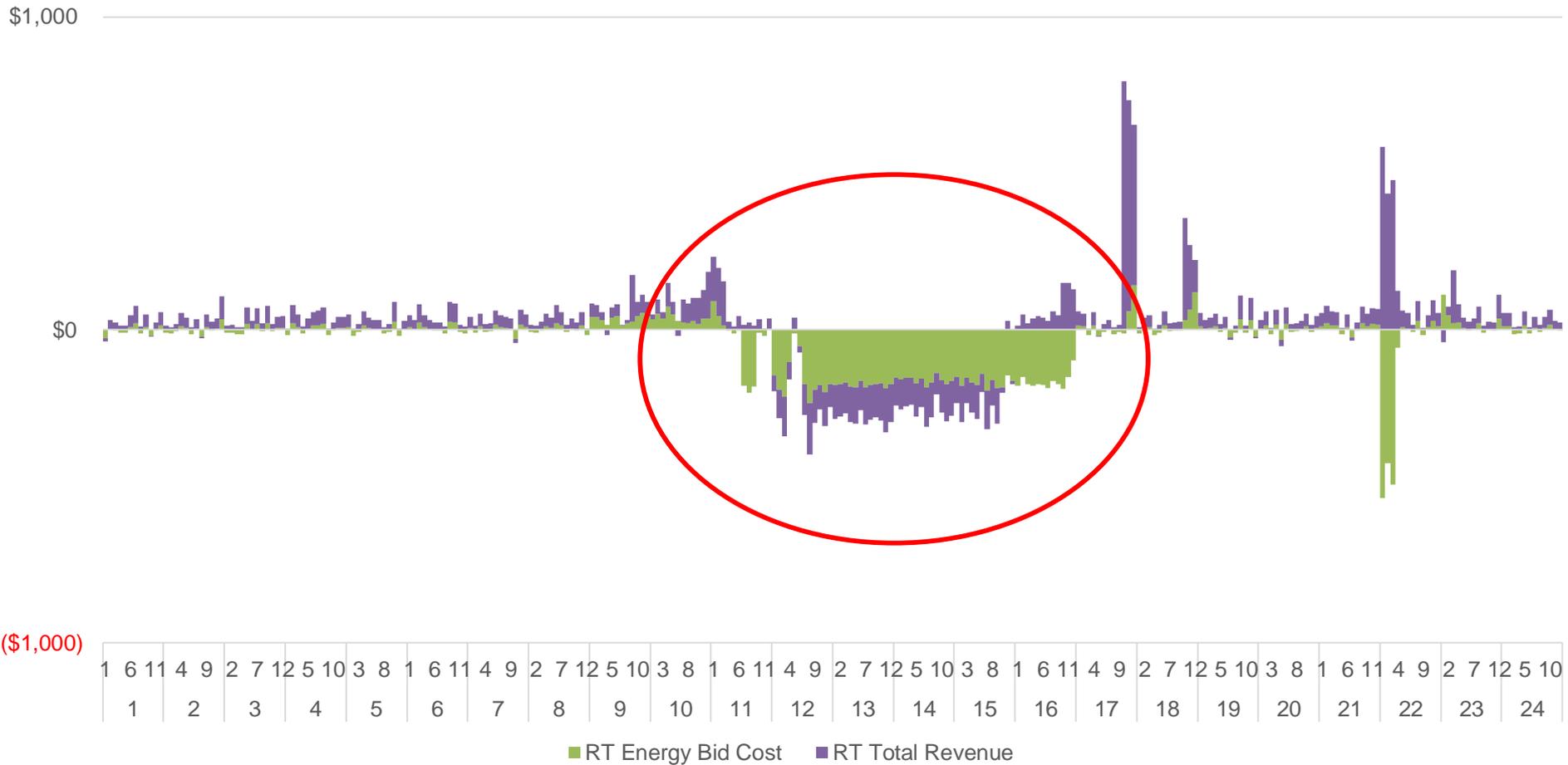
# Example 2 – Asset Charges Prior to DA Schedule

Example 2: State of Charge



# Example 2 – ≈ \$15,000 in RT BCR due to sell-back

## Example 2: Daily RT BCR Components



## Example 3

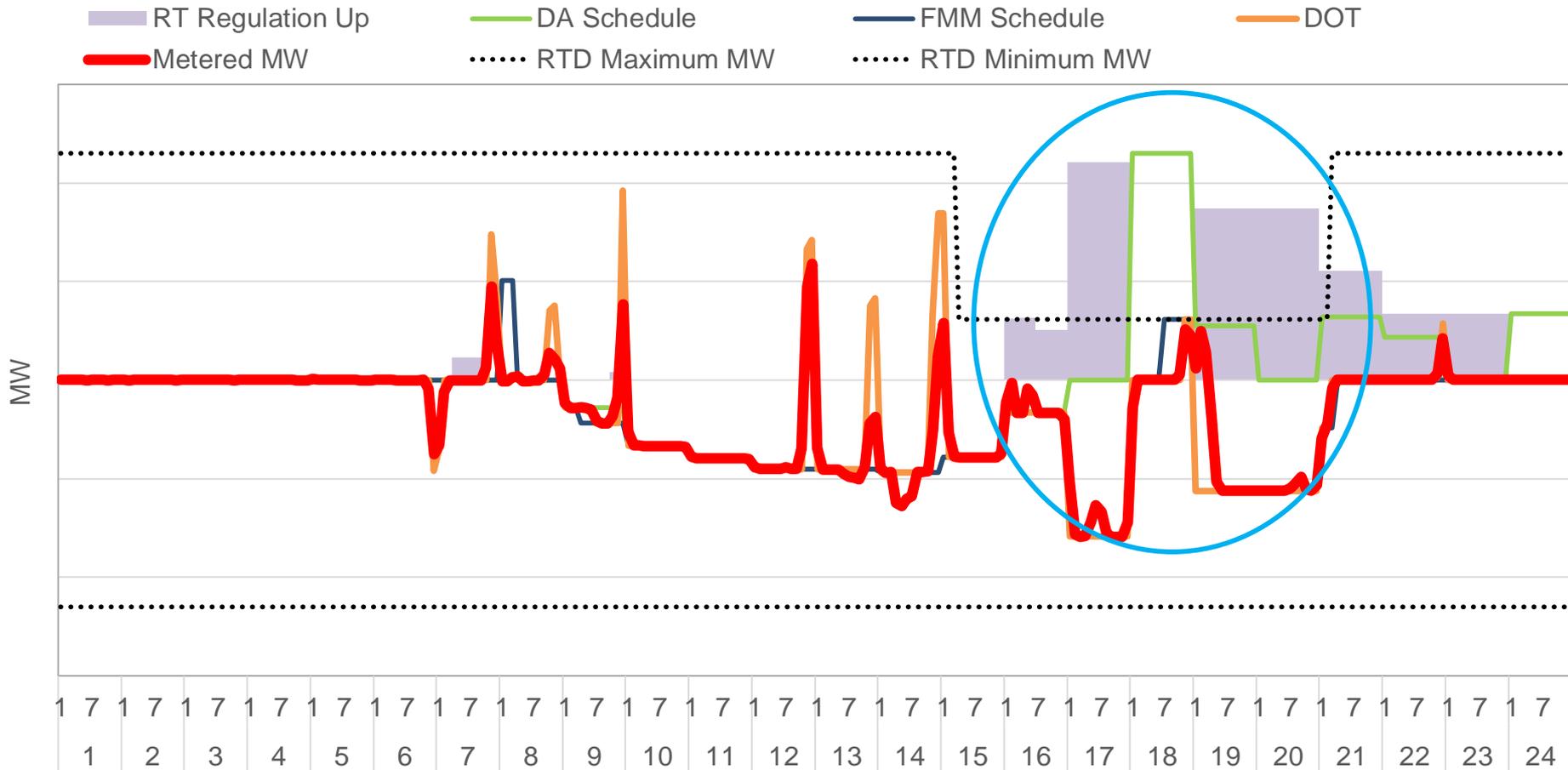
- Example 3 illustrates how BCR can be paid as a consequence of actions taken by the Scheduling Coordinator (SC); specifically, the submission of a real-time derate
- Consider a resource with DA regulation up awards in HE 16-17 and HE 19-23
- In real-time, the resource's SC submits a real-time derate for HE 15-20 such that there is no longer sufficient upward movement capability from the IFM energy awards in HE 17 and HE 19-20 to be able to deliver the regulation up awards

## Example 3

- The derate leads to the real-time market dispatching the resource into the charging range to maintain the upward movement capability needed for the regulation up awards, even though it is uneconomic based on the resource's submitted charging bids of  $-\$150/\text{MWh}$
- Even though this uneconomic dispatch is driven by the SC's submission of a real-time derate, the resource receives BCR payments associated with these hours of uneconomic dispatch

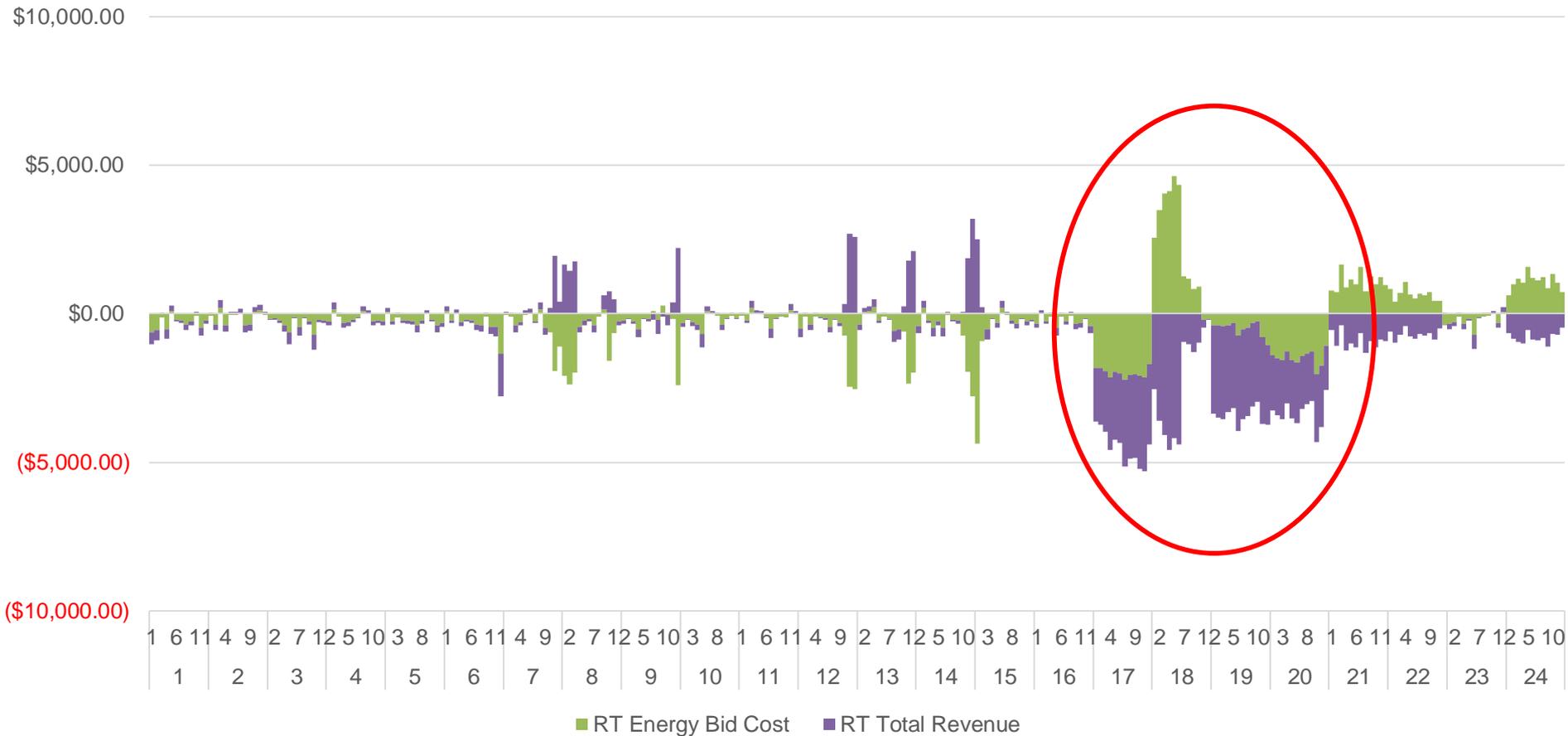
# Example 3

## Example 3: Schedules, DOT, and Metered MW



# Example 3 – ≈ \$140,000 in RT BCR during HE 16-20

Example 3: Daily RT BCR Components

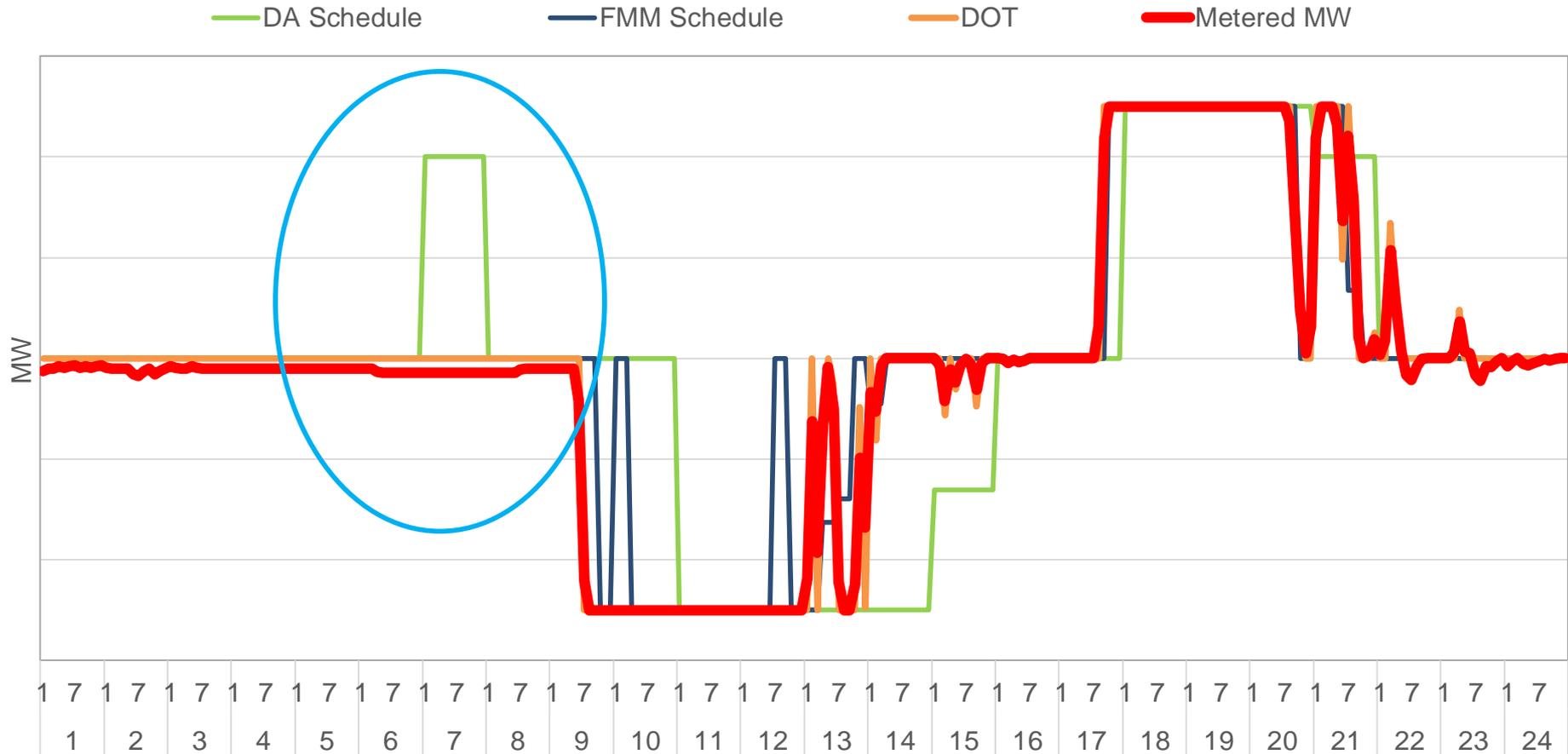


## Example 4

- Example 4 illustrates how BCR can be paid as a result of Day-Ahead SOC submissions that differ from what's realized in RT
- In this example, the scheduling coordinator submits an initial DA SOC at approximately 25% of the battery's capacity, allowing a DA discharge schedule for one hour in the morning before any charging occurs in the day
- In real-time, the battery started the operating day with much lower SOC, leading to the energy discharge award in the morning hours to be infeasible in real-time and contributing to real-time bid cost recovery payments, a strategy that could be replicated across multiple days thus accruing significant BCR

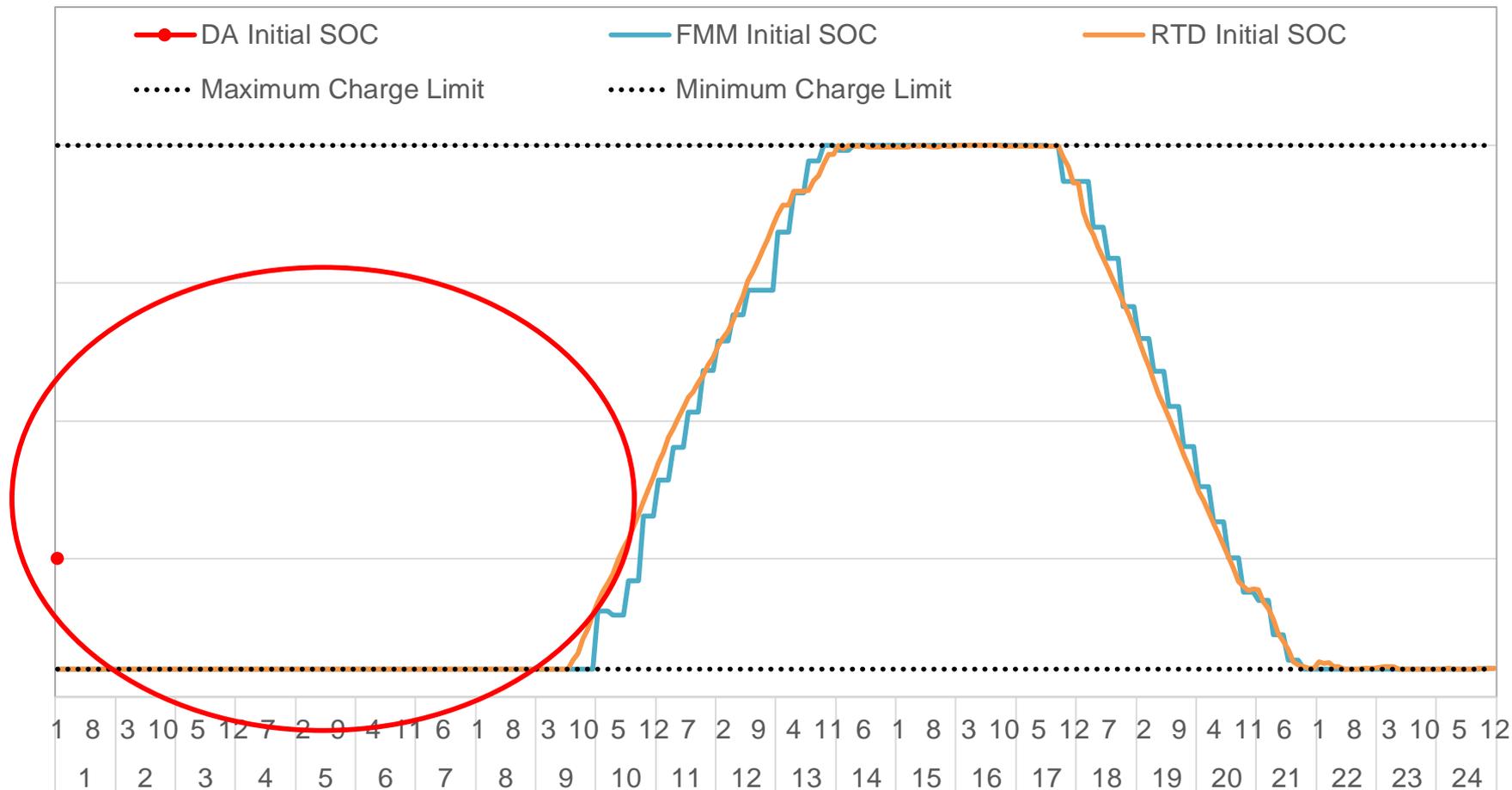
# Example 4 – BCR is Paid Because Discharge is Infeasible

## Example 4: Schedules, DOT, and Metered MW



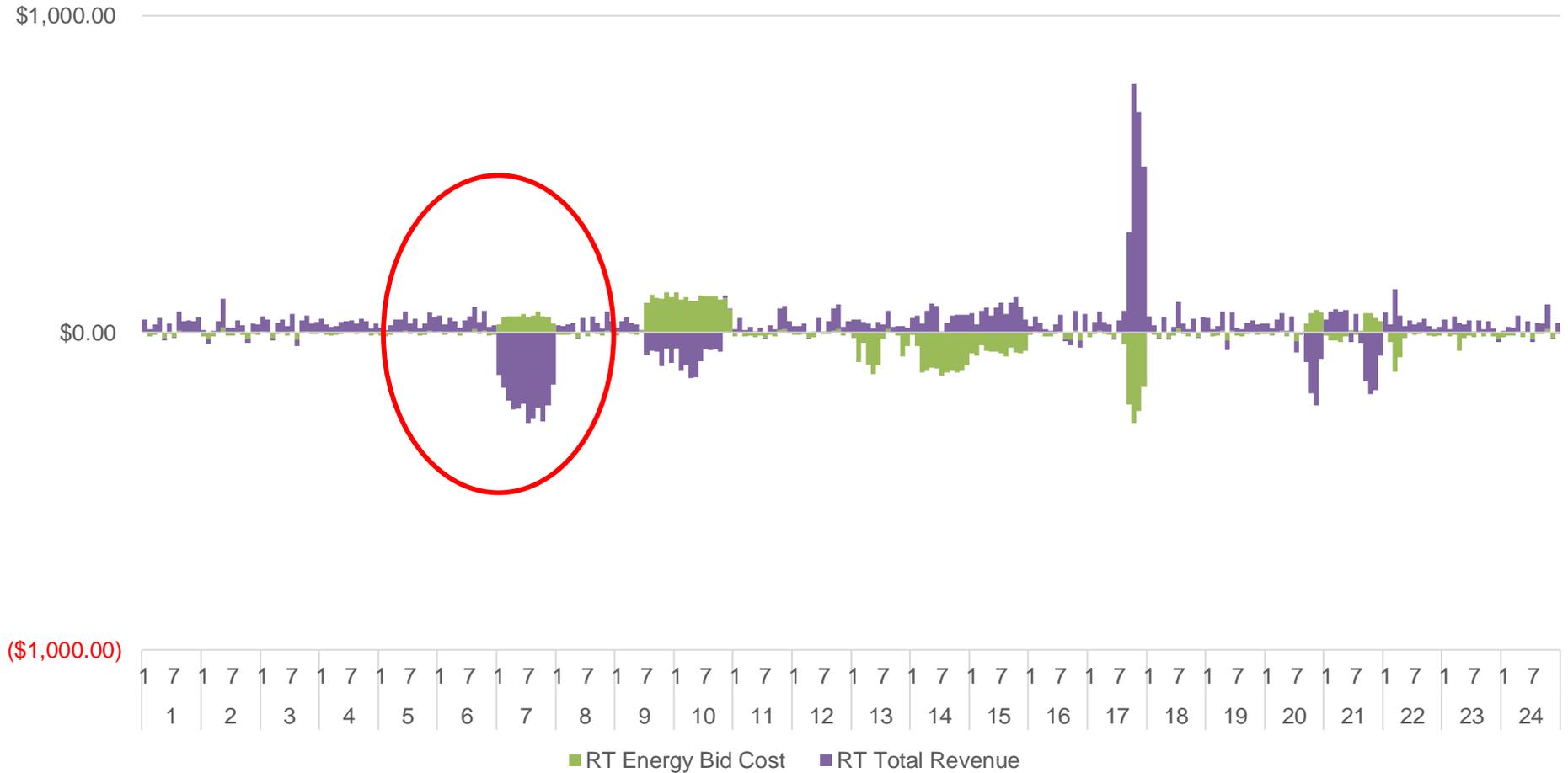
# Example 4 – BCR is Paid Because Discharge is Infeasible

Example 4: State of Charge



# Example 4 – BCR is Paid Because Discharge is Infeasible

Example 4: Daily RT BCR Components



# Workshop Topics & Open Discussion

## Track 1 proposes refining BCR provisions for standalone storage resources

- The ISO proposes to redefine dispatch unavailable due to SOC constraints in the binding interval as “non-optimal energy,” which would be ineligible for bid cost recovery
- The ISO proposes to identify whether storage resources, at the individual resource level, can support their awards and schedules in the real-time binding interval

## Track 1 proposes refining BCR provisions for standalone storage resources

- If a given storage resource's SOC at the start of the binding interval is equal to its minimum or maximum value, then the market would rerate or derate the PMax or PMin to 0 in order to capture that the asset is completely full or empty, also considering:
  - The ASSOC constraint
  - Upper and lower charge limits
  - Attenuated SOC constraint
- This, in turn, would lead to the reclassifying any energy associated with buy-backs or sell-backs in that binding interval as non-optimal due to physical limitations as it is not available for dispatch, thus excluding the energy from BCR

# Next Steps

## Next steps

- Upcoming milestones:
  - 07/25: ISO publishes Issue Paper & Straw Proposal (IPSP)
  - 08/05: Stakeholder meeting on IPSP
  - 08/08: IPSP stakeholder comments due

*\*All dates are tentative until confirmed through a notice in the ISO's Daily Briefing.*

## For reference

- Visit initiative webpage for more information:  
<https://stakeholdercenter.caiso.com/StakeholderInitiatives/storage-bid-cost-recovery-and-default-energy-bids-enhancements>
- If you have any questions, please contact  
[ISOSTakeholderaffairs@caiso.com](mailto:ISOSTakeholderaffairs@caiso.com)

# ENERGY matters

The California ISO's blog highlights its most recent news releases, and includes information about ISO issues, reports, and initiatives.



*Energy Matters* blog provides timely insights into ISO grid and market operations as well as other industry-related news.

<https://www.caiso.com/about/news/energy-matters-blog>



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# New Policy Initiatives Timeline

The California ISO has launched the Policy Initiatives Timeline to offer stakeholders a concise overview of ongoing policy initiatives. At a glance, it offers a snapshot view of key details such as the status of each initiative, projected timelines, and the current phase of the stakeholder engagement process. Updates to this timeline will be made weekly and posted on the [policy initiatives landing page](#). For more information, stakeholders are encouraged to reach out to [ISOStakeholderAffairs@caiso.com](mailto:ISOStakeholderAffairs@caiso.com).





**REGISTRATION IS OPEN**

# 2024 STAKEHOLDER SYMPOSIUM

**Welcome reception - Oct. 29**  
at Kimpton Sawyer Hotel, Sacramento, CA

**Symposium program - Oct. 30**  
SAFE Credit Union Convention Center  
Sacramento, CA

Visit the event website: [www.reg.eventmobi.com/2024stakeholdersymposium](http://www.reg.eventmobi.com/2024stakeholdersymposium)

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