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

Stakeholder Meeting on Issue Paper & Straw Proposal (IPSP)

August 5, 2024

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- You may also send your question via chat to either **Brenda Corona** or to all panelists.

Today's Agenda

Time	Topic	Presenter
1:00 – 1:05	Welcome and today's agenda	Brenda Corona
1:05 – 1:20	Overview of Feedback and Ongoing Work	Sergio Dueñas Melendez
1:20 – 2:00	Issues within Track 1	Sergio Dueñas Melendez
2:00 – 2:15	Q&A	
2:15 – 2:35	Proposed Solution for Track 1	Sergio Dueñas Melendez
2:35 – 2:50	Q&A	
2:50 – 3:20	Issues within Track 2	Sergio Dueñas Melendez
3:20 – 3:35	Q&A	
3:35 – 3:55	Open Stakeholder Discussion	
3:55 – 4:00	Next Steps	Brenda Corona

CAISO Policy Initiative Stakeholder Process

We are here

Overview of Feedback and Ongoing Work

Feedback to Date

- Some stakeholders asked the ISO for additional clarity regarding the problem statement, specifically requesting numerical examples
- Some stakeholders believe the current timeline of the initiative is insufficient to develop a holistic revision to BCR provisions
- Some stakeholders have noted that instances in which resources were mitigated in intervals prior to a buy- or sell-back may merit specific BCR provisions
- Some stakeholders asked the ISO for additional clarity on the drivers and factors behind buy- and sell-backs, specifically asking for statistics on the prevalence of the issue

Overview of Ongoing Work

- The ISO has provided simplified and complex numerical examples that reflect how buy- and sell-backs of DA schedules can occur
  - The ISO included examples in the workshop materials and the IPSP
    - One example included in the workshop materials for 7/22 relative to upward movement capability to deliver Reg Up awards was not included in the IPSP because the issue reflected therein, specifically regarding Reg Up awards, has been resolved
  - In this presentation, the ISO also includes an example that shows how the netting of surpluses and shortfalls is done across the RT Trading Day, highlighting the role of DA-RT imbalance and the impact of bidding strategies
  - The ISO is developing examples to illustrate how the proposed solution would minimize unwarranted BCR under the scenarios shared within the IPSP

Overview of Ongoing Work

- The ISO continues to believe an expedited schedule for Track 1 of this initiative is warranted given the sensitive nature of the issues at hand and the potential for financial consequences resultant from any delay

- The ISO encourages stakeholders to provide examples of situations or conditions that may warrant RT BCR
  - As of now, only mitigation has been underscored as such a circumstance, the ISO is working on developing data analysis to better understand the frequency and magnitude of the impact of mitigation with regards to the buy- and sell-back of DA schedules

Overview of Ongoing Work

- Regarding the drivers and factors behind buy- and sell-backs, the ISO encourages stakeholders to review the materials provided by the Department of Market Monitoring (DMM) during the 7/8 Workshop, as well as DMM's Special Battery Storage Report, published 7/16
  - It is important to note that buy- and sell-backs can be the result of more than one driver or factor
  - Regardless of whether a buy- or sell-back resulted from bidding strategies, the submission of biddable parameters that unduly limit the availability of an asset, or any other driver, the current application of RT BCR for storage resources generally results in inefficient participation and creates incentives to pursue outsized RT BCR payments

Issues within Track 1

Motivation

- In 2022, the ISO noted that the then-applicable provisions related to bid cost recovery (BCR) for energy storage did not align with the overall objectives and intent of the BCR construct, specifically underscoring the potential for unusually high BCR payments to storage resources (*see* the Ancillary Services State of Charge [ASSOC] Constraint filing)

- As the penetration of energy storage resources continued to grow within the ISO's footprint, additional concerns related to how BCR provisions apply to energy storage resources were raised by stakeholders, including the Department of Market Monitoring (DMM) and the MSC

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
  - For purposes of determining BCR eligibility, the ISO uses a concept called Commitment Period, which consists of the consecutive time periods within a Trading Day when a resource is on-line, synchronized to the grid, and available for dispatch
  - To calculate BCR, the commitment costs and the energy and AS bid costs are used as inputs to calculate a resource's net difference between costs and revenues in separate pre-calculations for the Integrated Forward Market (IFM), the Residual Unit Commitment (RUC) process, and the Real-Time Market (RTM)

BCR Background

- Bid Cost Recovery (BCR) is the CAISO settlements process through which Eligible Resources recover their bid costs
  - If the difference between the total costs and the market revenues is positive in the relevant market, then the net amount represents a Shortfall; if the difference is negative, the net amount represents a Surplus
  - Shortfalls and Surpluses are then netted over all hours of a Trading Day, with the IFM Shortfalls and Surpluses netted separately from the RUC and RTM Shortfalls and Surpluses
  - If the net amount over the Trading Day is positive (a Shortfall), then the resource receives a BCR Uplift Payment equal to the net Trading Day amount.

BCR Background

- BCR is designed to provide "uplift payments" to a resource when revenues from the sale of energy and AS do not cover the resource's bid costs over the course of a day

- Without BCR, resources would have an incentive to add a risk premium to their offers, leading to inefficient market outcomes, with higher overall costs for energy

- BCR was initially designed with conventional thermal assets in mind
  - When a thermal power plant starts up, it incurs certain costs such as fuel costs to reach the desired output level
  - Since conventional resources with a DA schedule may incur in some costs prior to the intervals when they are expected to generate electricity (*i.e.*, during the Commitment Period), BCR is a necessary mechanism to recover those costs over the Trading Day

BCR Background – Simplified RT Netting Example

- A given resource has a DA schedule to inject 10 MW during HE 17
- In the RT market, the resource injects 10 MW during HE 13, leaving it unable to inject power during HE 17
- The RT BCR calculation uses the following formula per interval:

  (RT dispatch – DA schedule) * (RT bid - RT LMP)

BCR Background – Simplified RT Netting Example

- Assuming:
  RT Bid = $25; RT LMP at HE 13 = $35; RT LMP at HE 17 = $100

- The calculation for HE 13 results in a surplus of $100
  (10 – 0)*($25 – $35) = (10)*(-$10) = -$100

- The calculation for HE 17 results in a shortfall of $750
  (0 – 10)*($25 – $100) = (-10)*(-$75) = $750

- Assuming no other awards or schedules for simplicity, the calculations above result in a net shortfall over the trading day of $650

BCR Background – Simplified RT Netting Example

- Now let's assume the resource bids strategically to maximize the shortfall:

  RT Bid at HE 13 = $25; RT LMP at HE 13 = $35;
  RT Bid at HE 17 = -$150; RT LMP at HE 17 = $100

- The calculation for HE 13 results in a surplus of $100

  (10 – 0)*($25 – $35) = (10)*(-$10) = -$100

- The calculation for HE 17 results in a shortfall of $2,500

  (0 – 10)*(-$150 – $100) = (-10)*(-$250) = $2,500

- Assuming no other awards or schedules for simplicity, the calculations above result in a net shortfall over the trading day of $2,400

Storage BCR Issues

- As recognized by FERC in its Order Accepting the ASSOC Constraint filing, storage resources have neither start-up nor minimum load costs, and generally have fast ramp rates, thus lacking the conventional drivers for BCR (*i.e.*, commitment)

- Energy storage resources' bids do not result merely from their costs to produce energy in a given interval; instead, they also reflect storage resources' desire to be dispatched at a given time based on their opportunity costs in future intervals
  - The bids submitted by storage resources are not equivalent to those submitted by conventional thermal assets as they do not only represent actual bid costs but also include an implied opportunity cost

Storage BCR Issues

- The BCR construct does not adequately consider attributes such as state of charge (SOC) constraints, which determine whether an asset can support its awards and schedules

- This results in materially different treatment with regards to conventional generators
  - If a conventional thermal asset is unable to perform and fulfill its DA schedule due to unavailability (*i.e.*, an outage), the expected energy from that asset is categorized as SLIC energy, thus making it ineligible for BCR
  - In contrast, when a storage resource is unable to meet its DA schedule due to physical limitations, like having a SOC that cannot support the schedule, the market instructs the storage asset to a 0 MW dispatch due to the SOC being binding, resulting in the energy to be categorized as Optimal Energy (OE) which is eligible for BCR

Storage BCR Issues

- This differentiated treatment of unavailable energy between conventional and storage assets creates two concerns:
  - Storage assets are not exposed to RT prices for deviating from DA schedules
  - Storage assets may be incentivized to bid inefficiently to maximize the combined BCR and market payment

- Given these conditions, some BCR payments to storage resources have materialized despite not being aligned with the intent of BCR, particularly those related to the buy- and sell-back of day-ahead (DA) schedules when SOC constraints are binding

Storage BCR Issues

- 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
- For examples reflecting these circumstances, please refer to the IPSP and the Appendix herein

Proposed Solution for Track 1

Track 1 proposes refining BCR provisions for standalone storage resources

- If a storage resource is unable to meet its DA schedule due to physical limitations, like having a SOC that cannot support the schedule, the market instructs the storage asset to a 0 MW dispatch due to the SOC being binding, resulting in the energy to be categorized as Optimal Energy (OE), which is eligible for BCR

- The ISO's proposed solution is to redefine dispatch unavailable due to SOC constraints in the binding interval as “non-optimal energy,” which would be ineligible for BCR

- The ISO proposes to identify whether storage resources can support their awards and schedules in the real-time binding interval on a resource-by-resource basis

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
  - This would be done in the post-market process when expected energy is calculated and the expected energy allocation results are generated from market results
  - The proposed solution would work in conjunction with the ASSOC constraint, the End-of-Hour SOC constraint, upper and lower charge limits, and the attenuated SOC constraint

- The proposed solution 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, excluding it from the BCR calculation

Track 1 proposes refining BCR provisions for standalone storage resources

- The proposed solution would materially limit the chances of unwarranted BCR derived from DA schedule buy- and sell-backs

- The proposed solution would align the treatment of unavailable energy from a storage asset to that of a conventional thermal asset, which has its expected energy categorized as SLIC when it is unable to perform and fulfill its DA schedule due to unavailability (i.e., an outage), thus making it ineligible for BCR

Issues within Track 2

BCR Provisions for Energy Storage in Co-Located Configurations

- Under a co-located configuration, different assets, usually a storage and a VER, are located behind a single Point of Interconnection (POI)
  - To flexibly maximize the utilization of the POI, many co-located resources use an Aggregate Capability Constraint (ACC)
  - Sub-ACCs also may be used if the co-located resource has multiple off-takers and SCs
  - Co-located resources may also use the Off-Grid Charging Indicator (OGCI) to restrict their charging to the co-located VER

BCR Provisions for Energy Storage in Co-Located Configurations

- The ISO has identified instances in which the current construct does not properly recognize the interactions between these constraints and BCR provisions for energy storage assets

- Given the sensitive nature of this issue, more detailed information will be provided as part of Track 2

Estimation of Opportunity Costs within Storage DEB

- Although stakeholders unanimously supported the storage DEB when developed, some recently have advocated for revisions to the storage DEB

- In the Price Formation Enhancements (PFE) initiative, the ISO noted that even if the storage DEB is not capped at $1,000, the opportunity cost used to calculate the storage DEB may not be a sufficient proxy for RT opportunity costs on days that differ significantly from what was considered when the DA market was run

- Given the ISO's commitment to monitoring the effects of modifying the bid cap applicable to storage, evaluating changes to the formulation of the storage DEB to more accurately estimate intra-day opportunity costs is timely and warranted

DEB for Hybrid Resources

- In the context of the PFE initiative, stakeholders argued that hybrid resources also should be allowed incremental bidding flexibility in order to preserve their position in the supply stack
  - In response to these arguments, the ISO noted that the modifications sought for energy storage assets were based on the existence and utilization of the storage DEB

- Because hybrid resources have different costs than those reflected in the storage DEB, and because hybrids do not have their own bespoke DEB at this time, the modifications developed as part of PFE could not be readily extended to hybrid assets

- The present initiative seeks to develop a DEB for hybrid assets

Open Stakeholder Discussion

Next Steps

Next steps

- Upcoming milestones:*
  - 08/08: IPSP stakeholder comments due
  - 08/14: Draft Final Proposal (DFP) posting
  - 08/19: Stakeholder Meeting on DFP

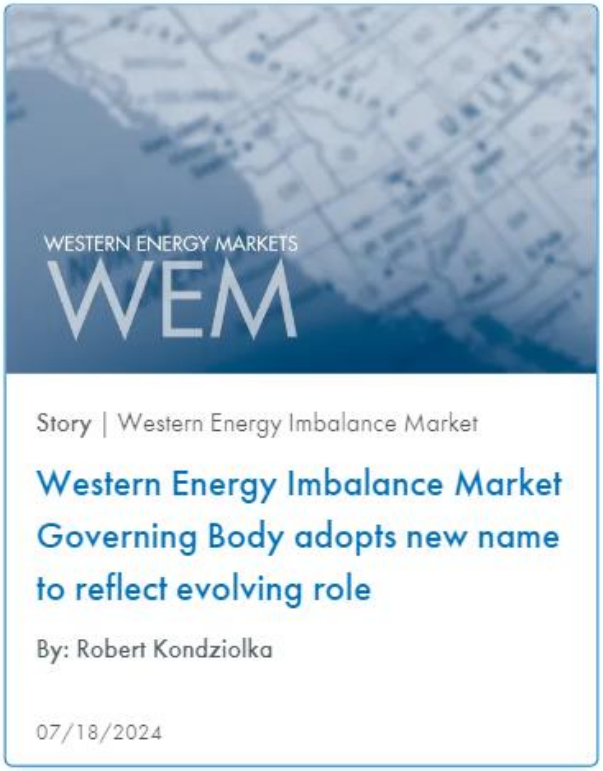
**All dates are tentative until confirmed through a notice in the ISO's Daily Briefing.*

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

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.

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

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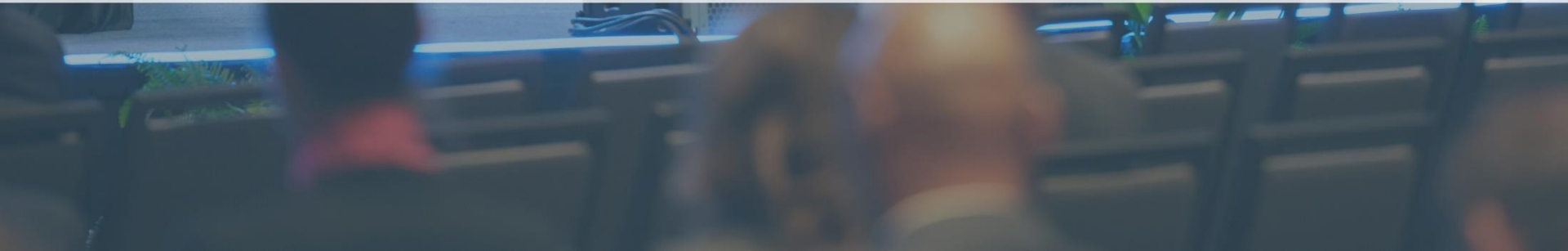
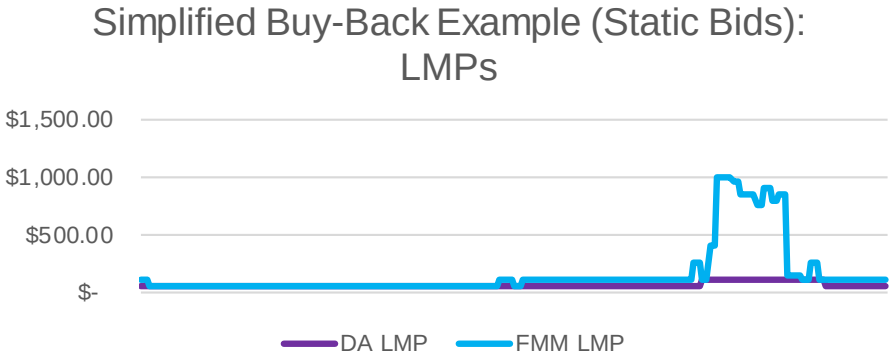
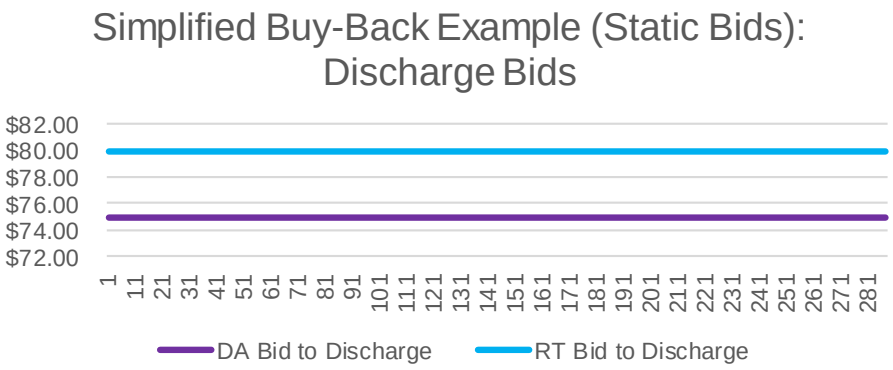


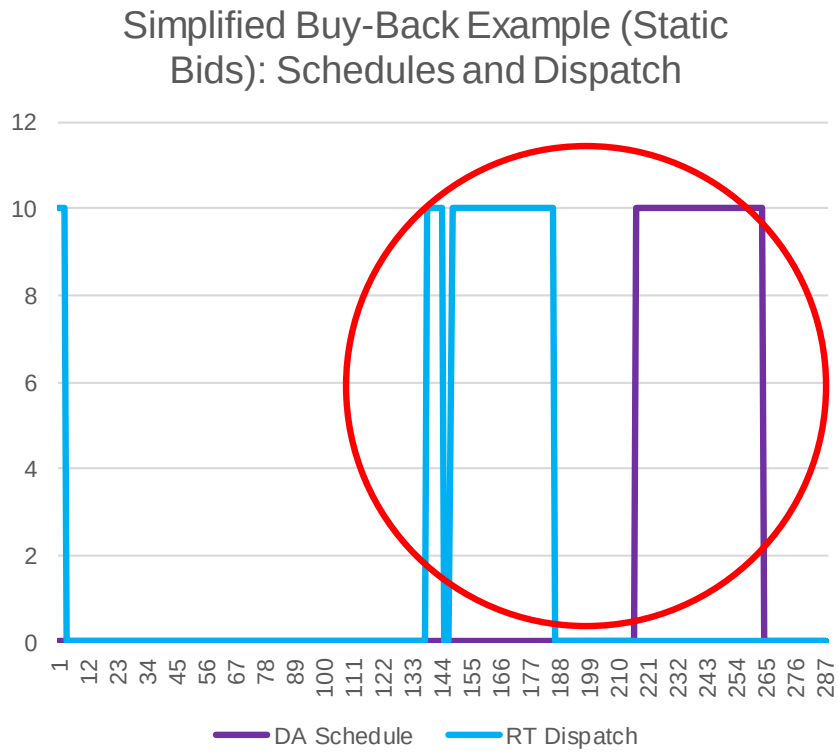
Appendix:
Simplified and Complex Storage Buy- and Sell-Back Examples

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

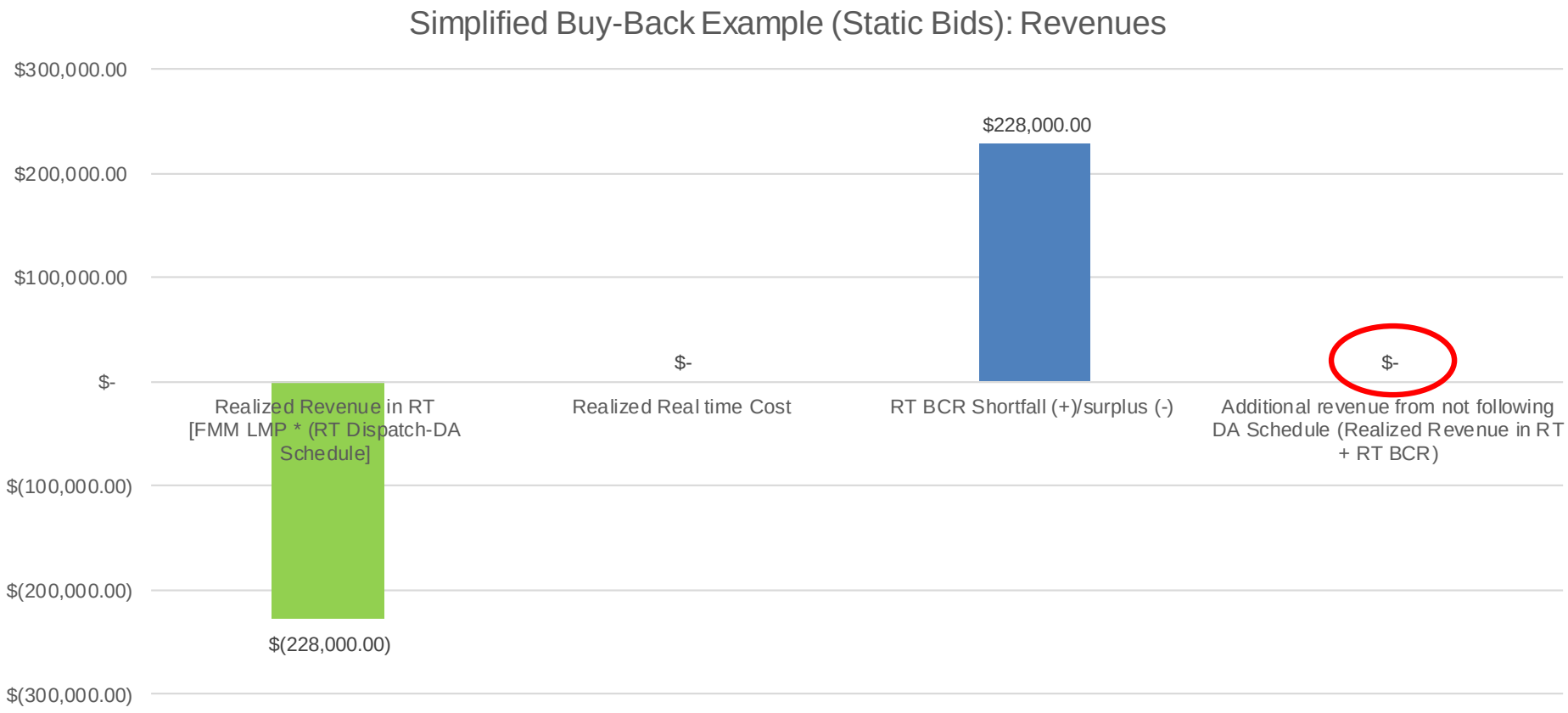






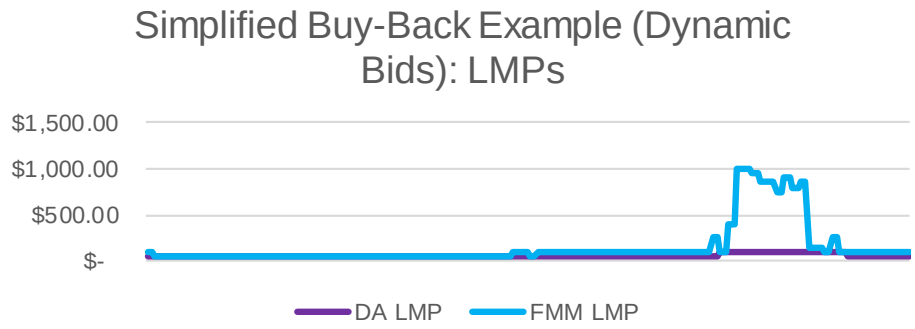
Simple Buy-Back Examples – Static Bids

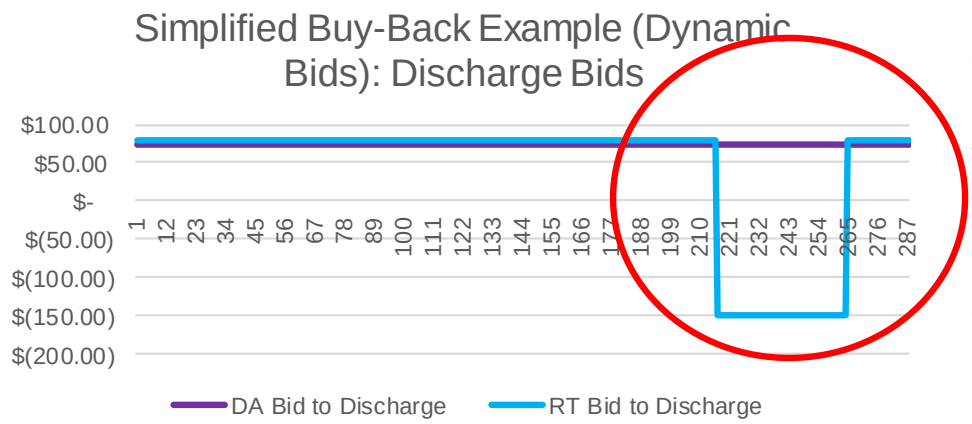
- As bids remain static, asset does not make additional revenue from RT BCR, but BCR eliminates exposure to RT LMPs

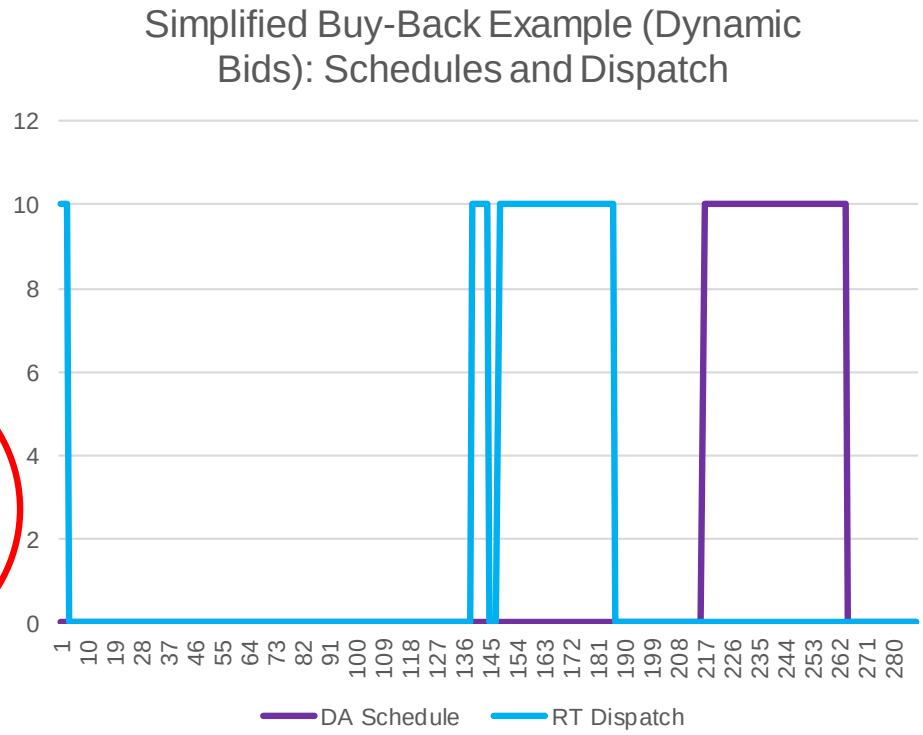


Simple Buy-Back Examples – Bids to -$150

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

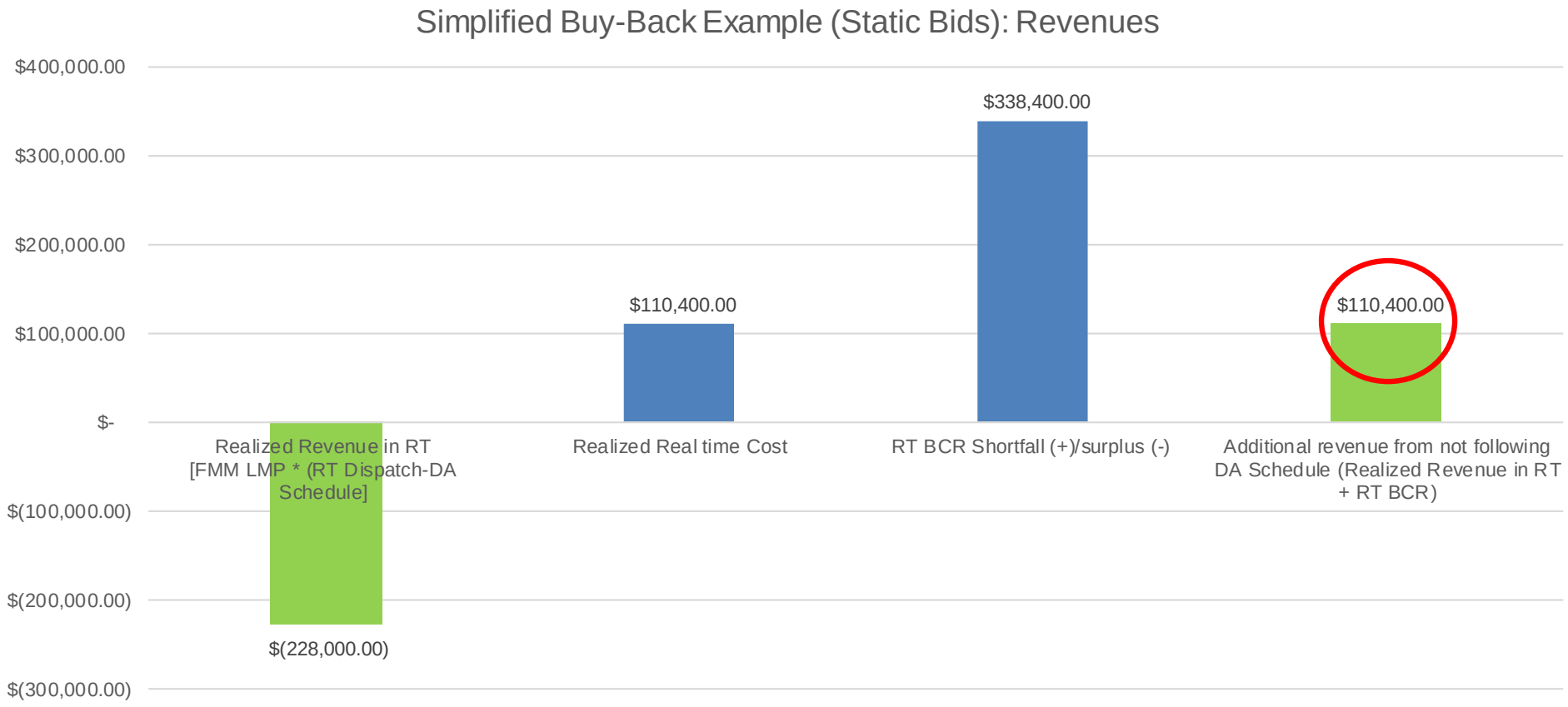






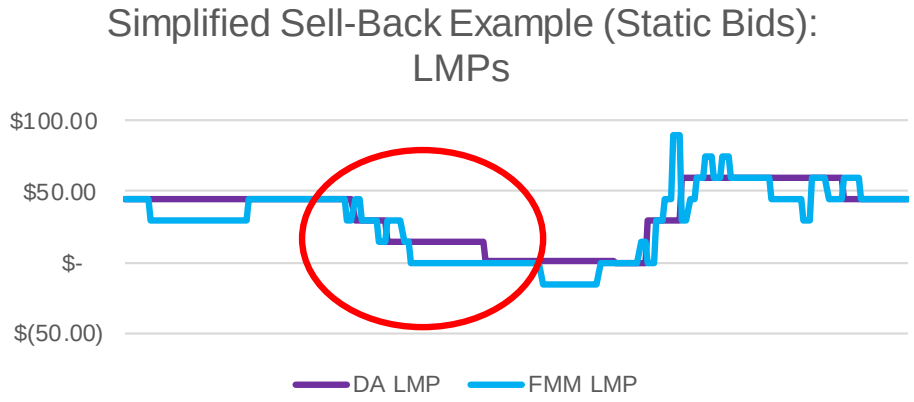
Simple Buy-Back Examples – Bids to -$150

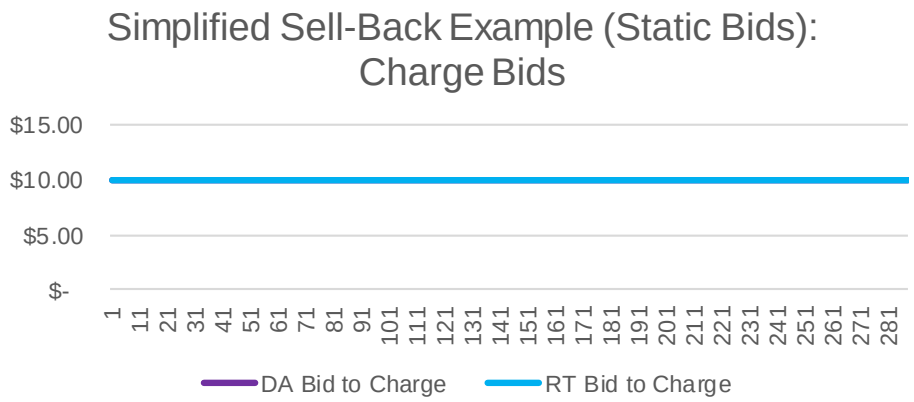
- By modifying its bids to the bid floor, the asset gets $110,400 of additional revenue for triggering buy-back and bidding strategically

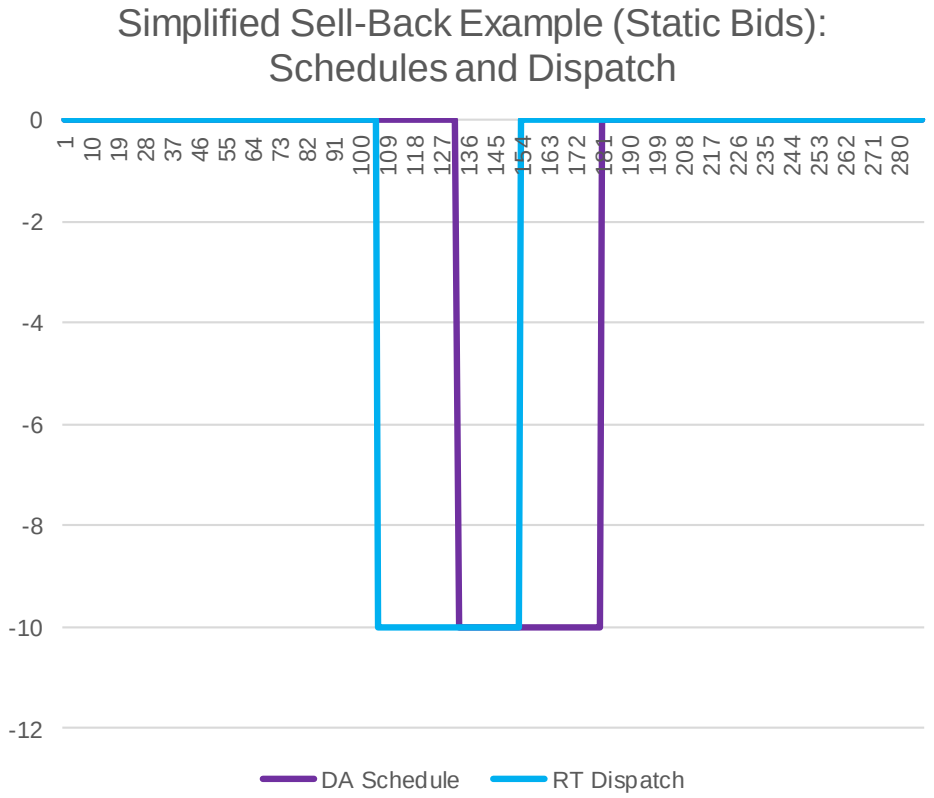


Simple Sell-Back Examples – Static Bids

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





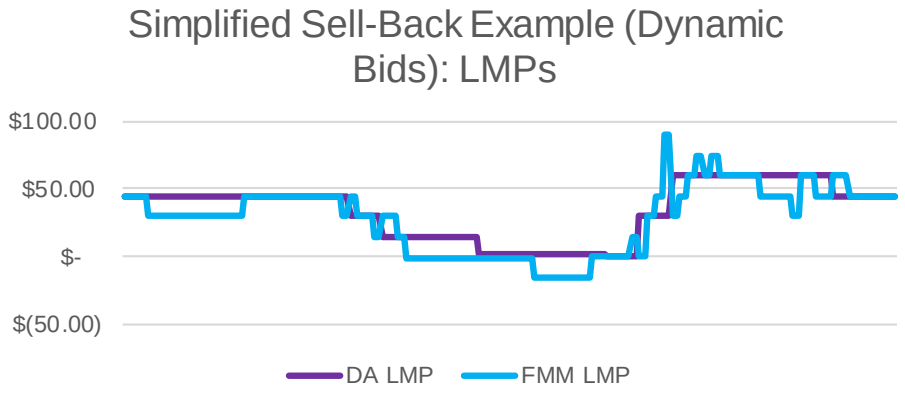


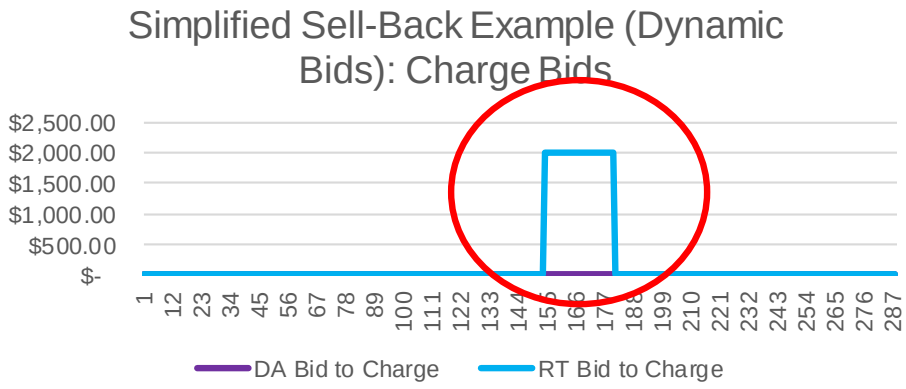
Simple Sell-Back Examples – Static Bids

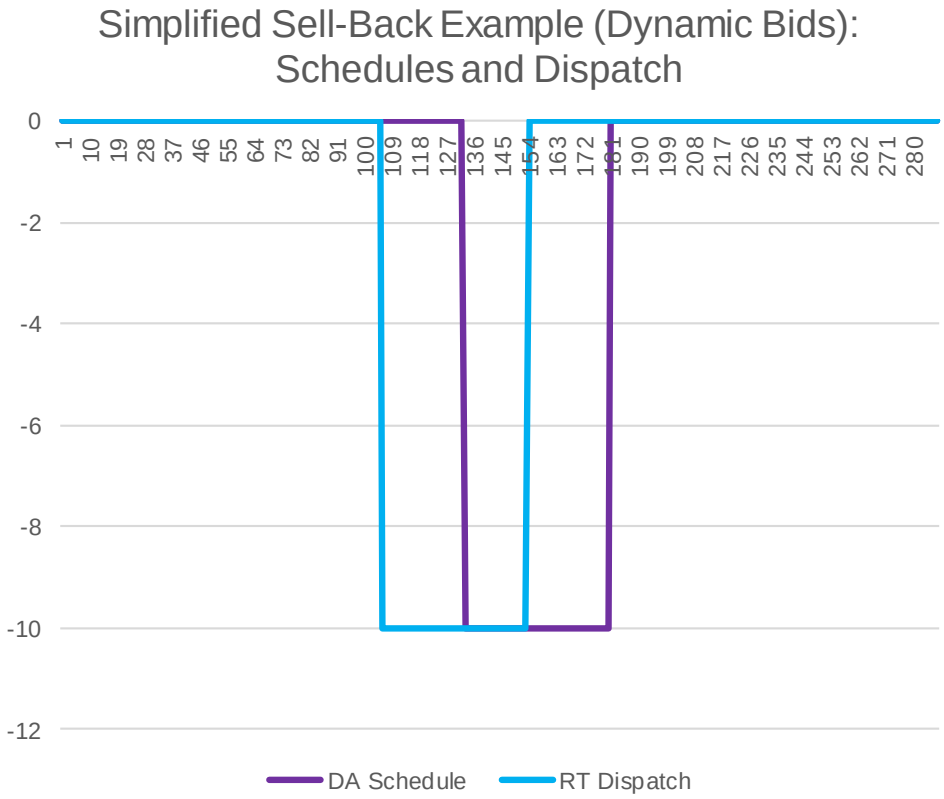
- As bids remain static, asset does not make additional revenue from RT BCR, but BCR eliminates exposure to RT LMPs

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

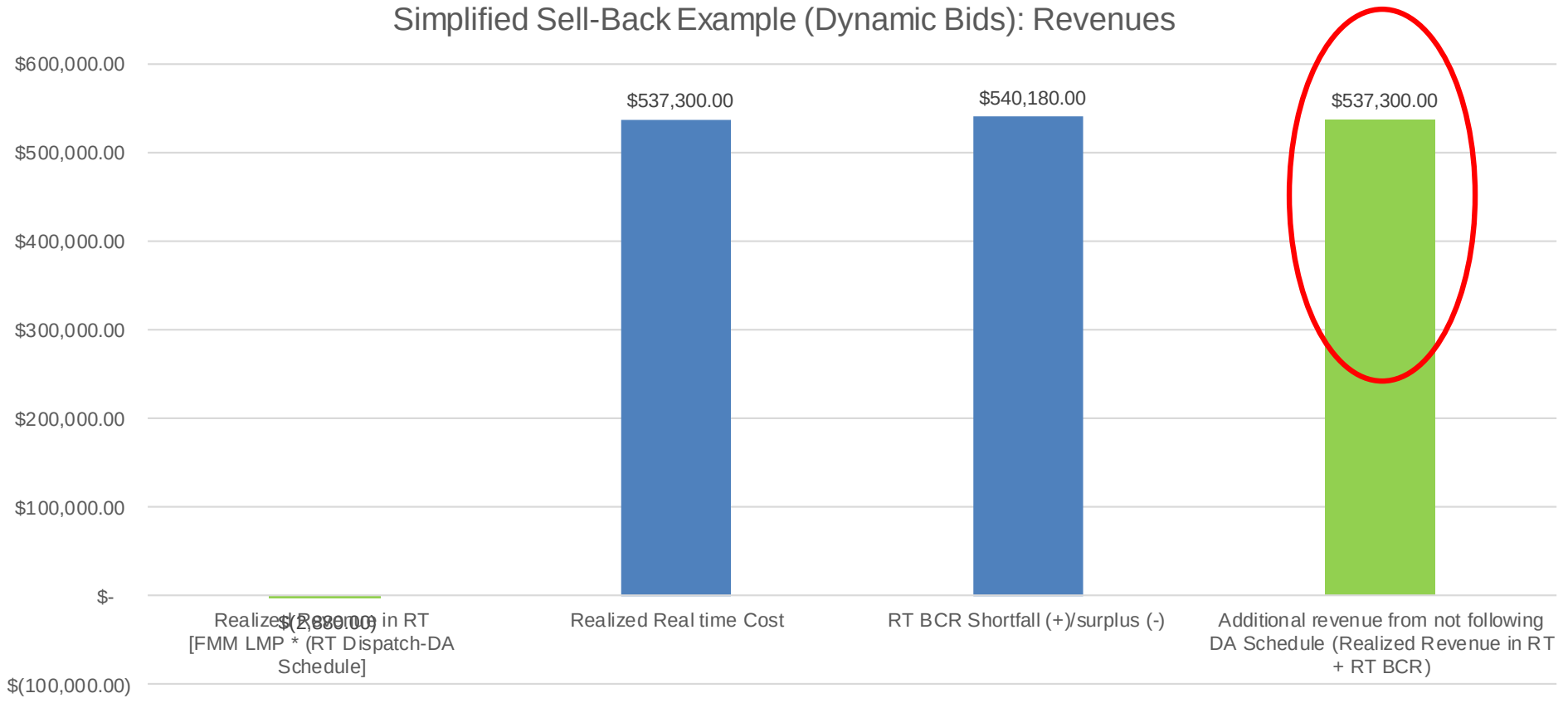






Simple Sell-Back Examples – Bids to $2,000

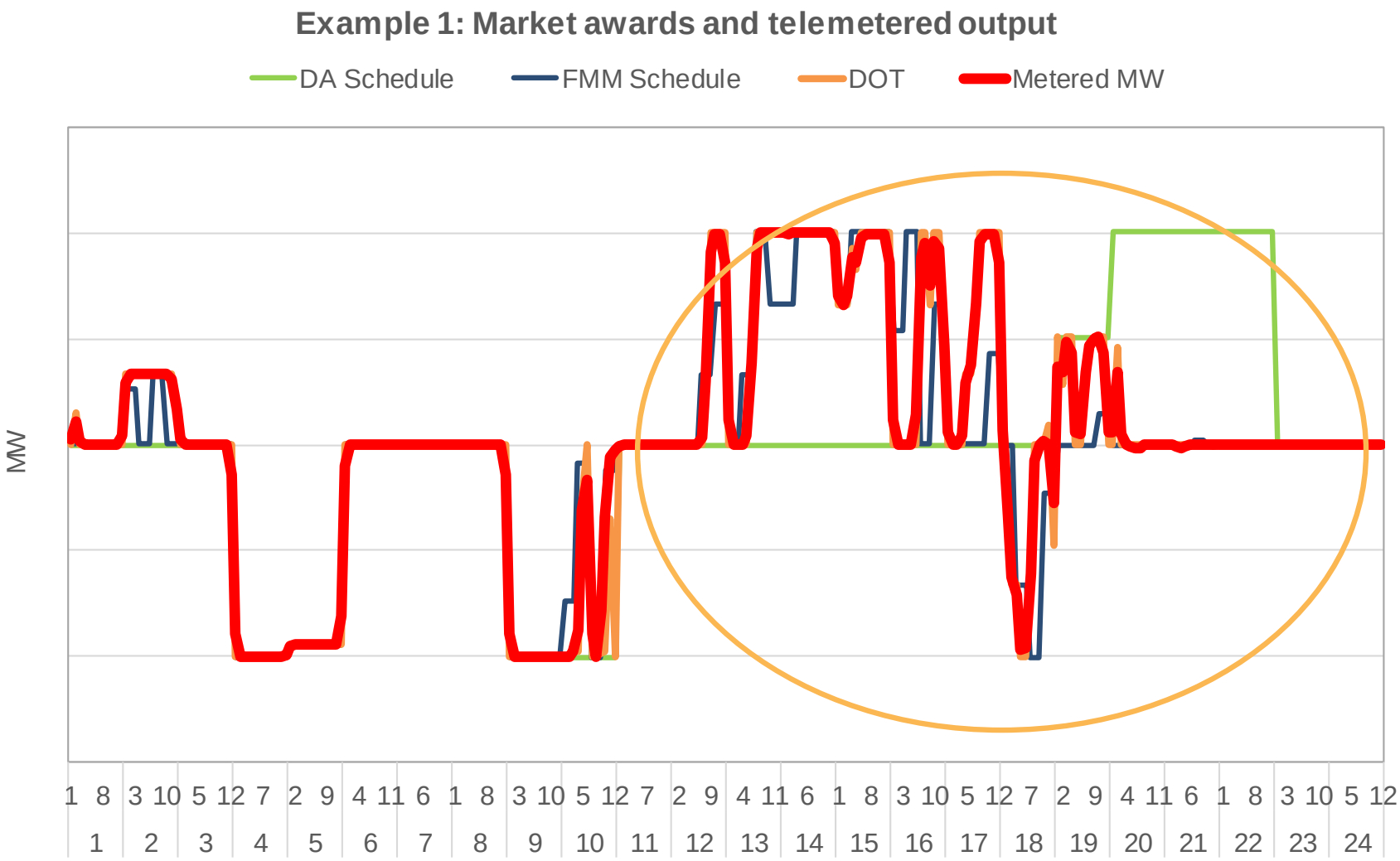
- By modifying its bids to the bid cap, the asset gets $537,300 of additional revenue from triggering sell-back and bidding strategically



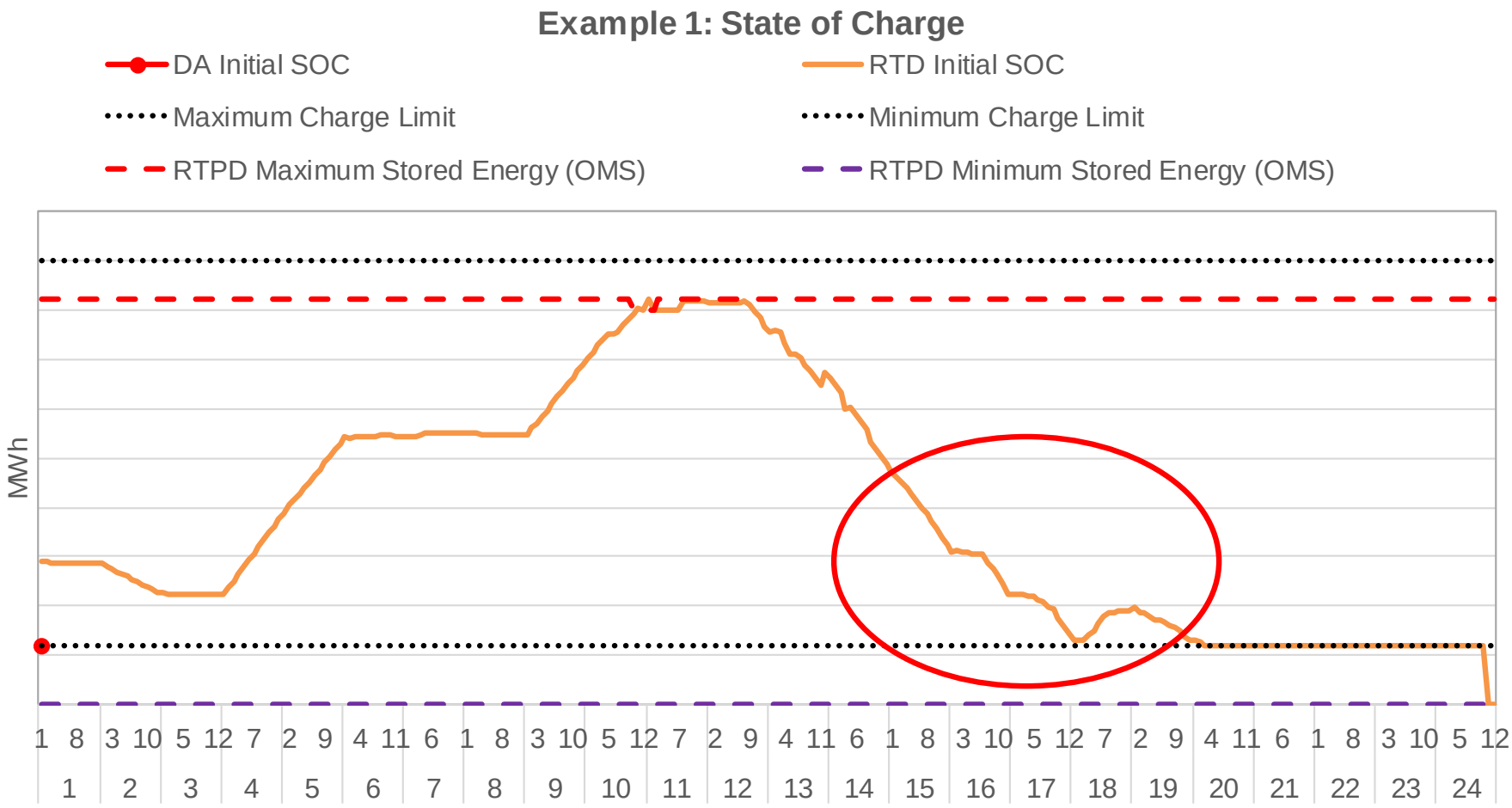
Example 1

- 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 – Asset Discharges Prior to DA Schedule

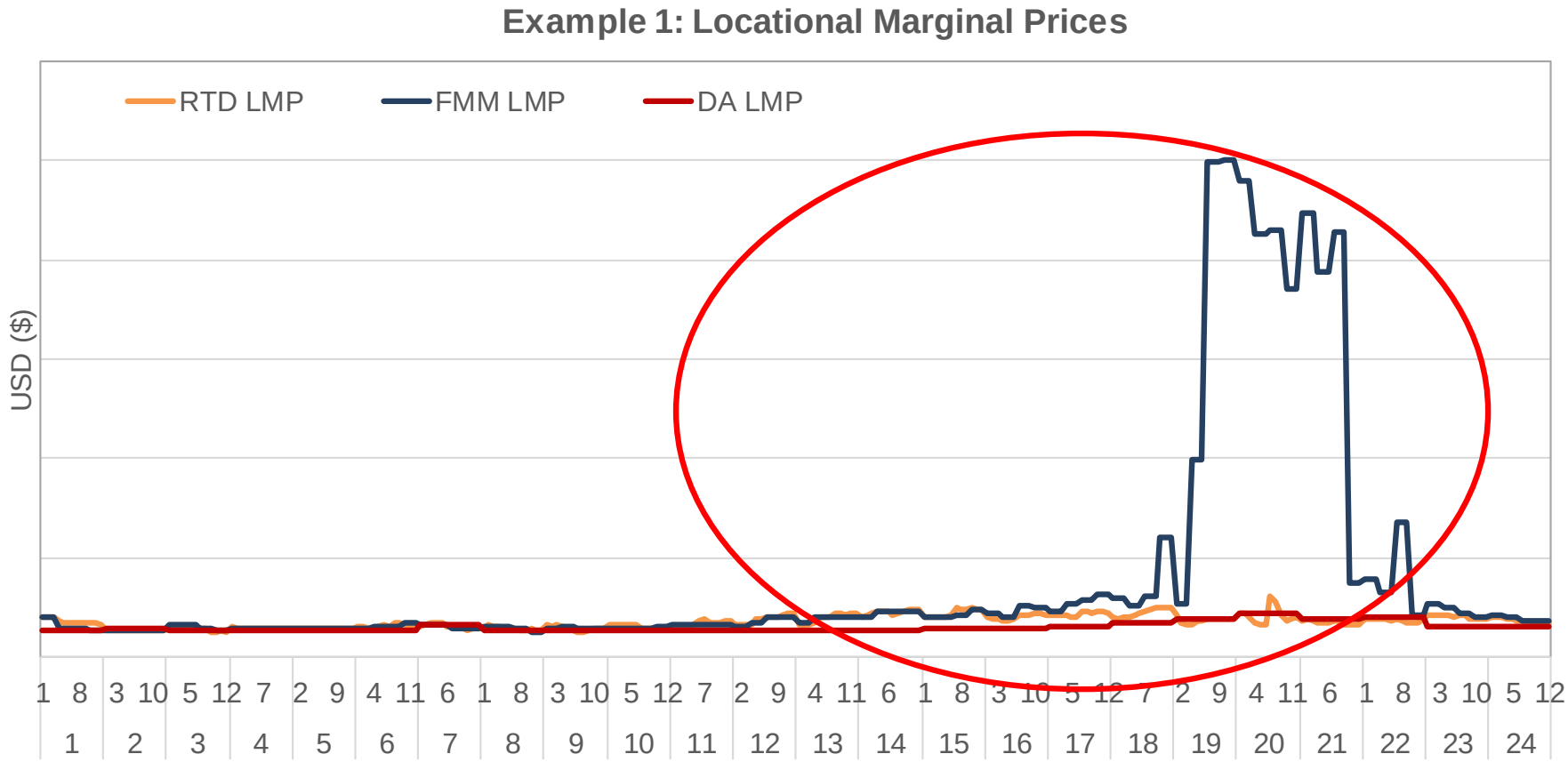


Example 1

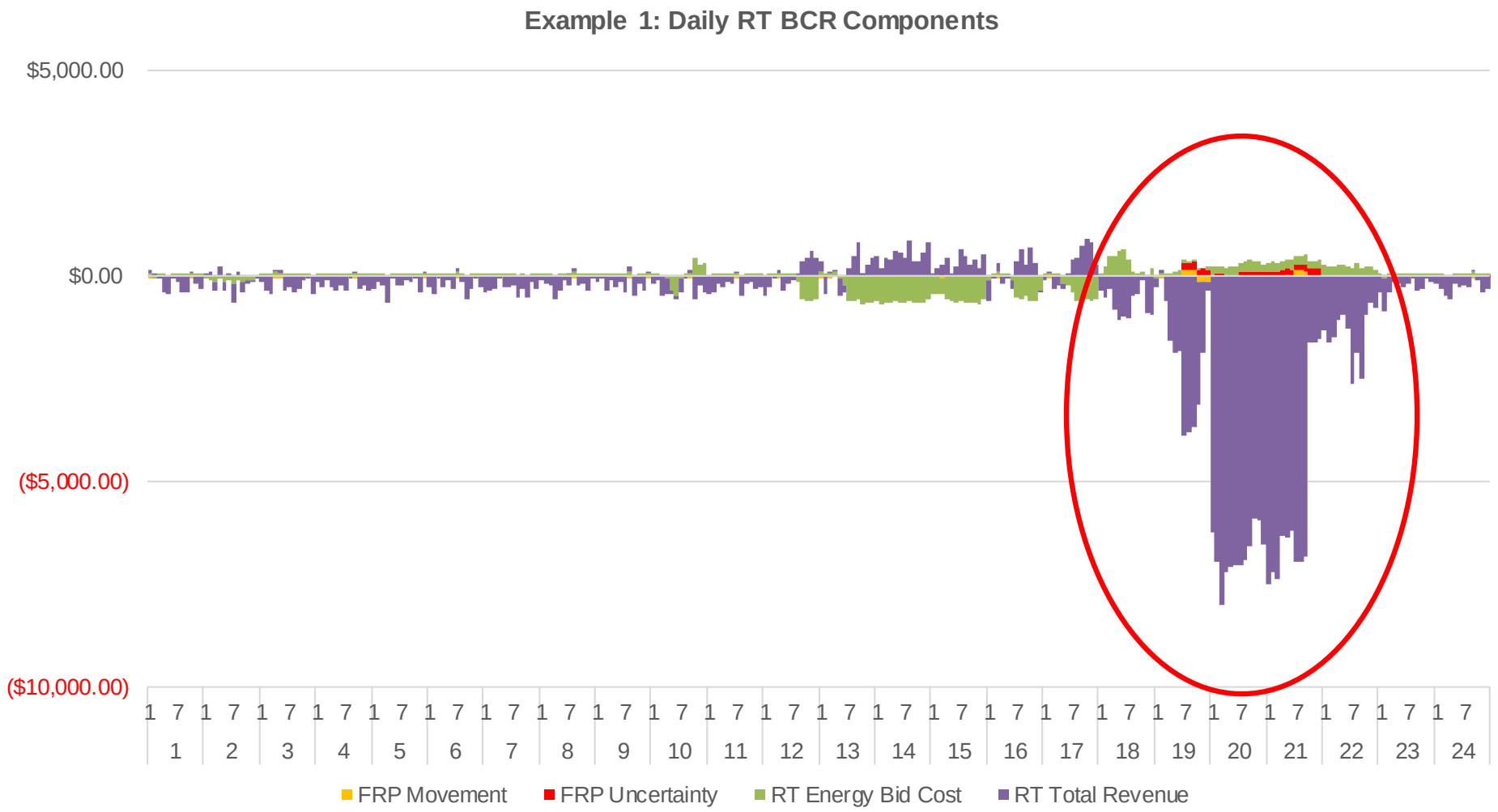
- Example 1 illustrates how BCR can be paid out as a result of discharge prior to the DA schedule given the current lack of incentives to consider/reflect real-time conditions in bids

- 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 – ≈ $200,000 in RT BCR due to high LMPs



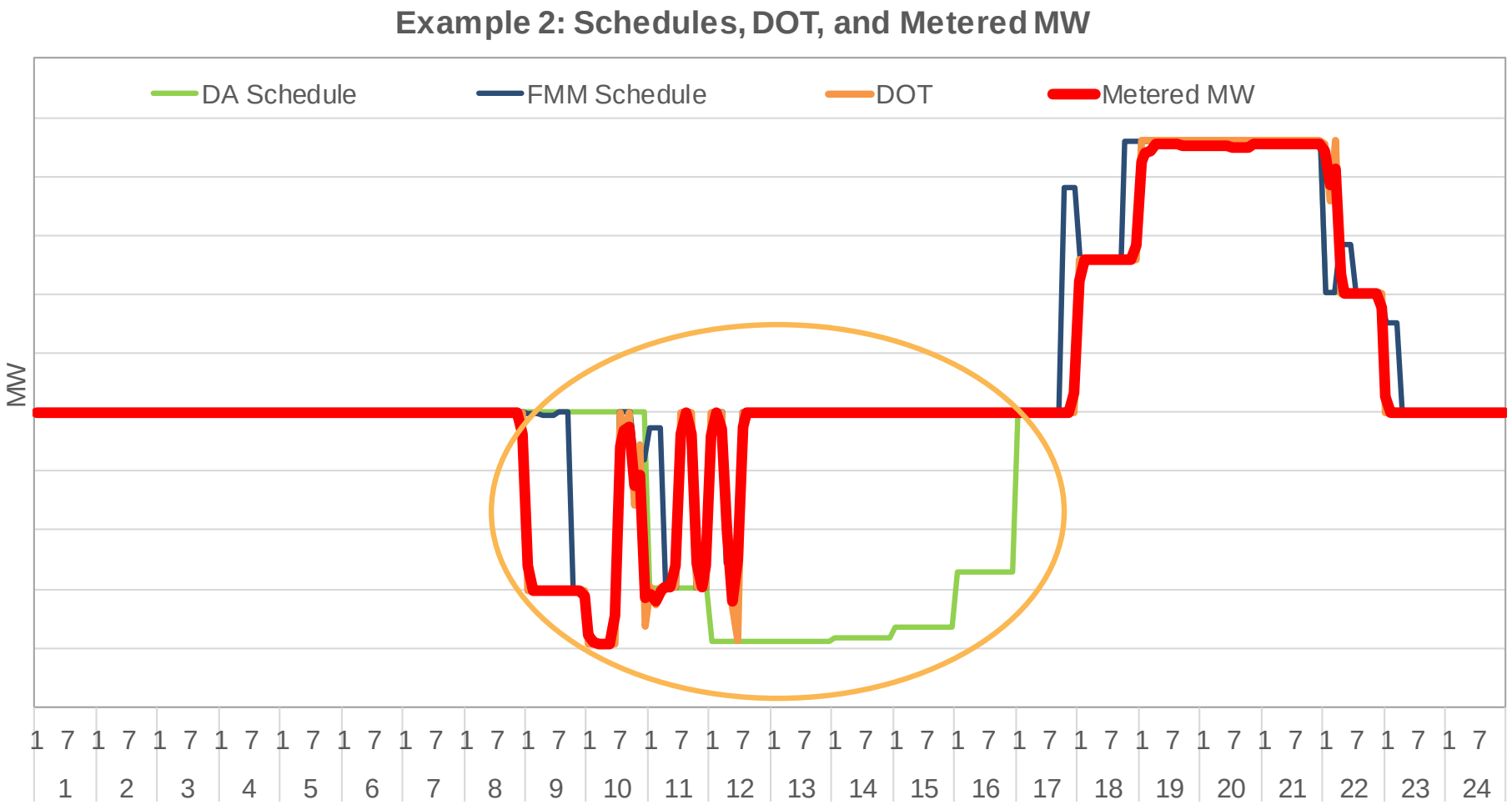
Example 1 – ≈ $200,000 in RT BCR due to high LMPs



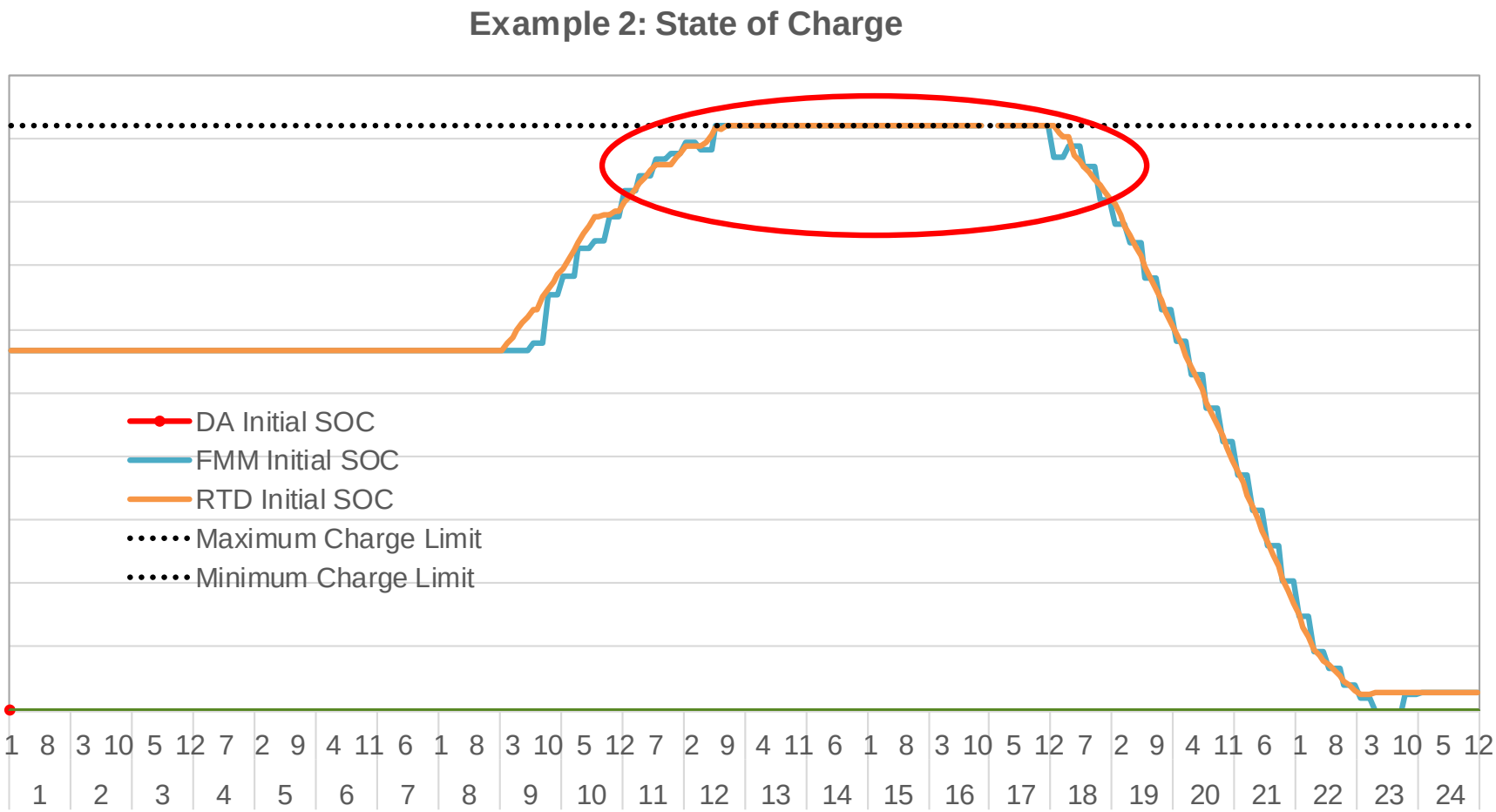
Example 2

- 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

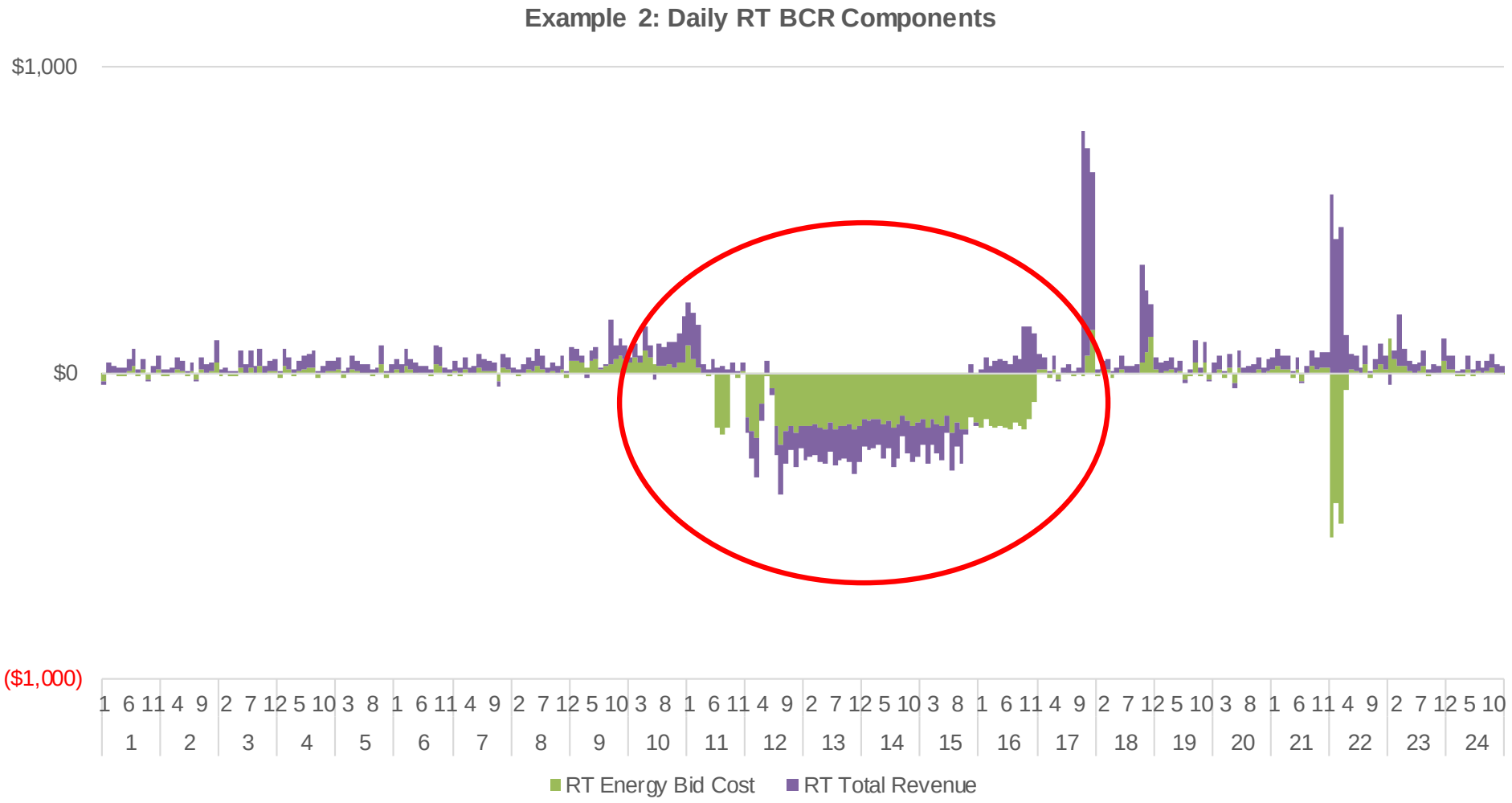
Example 2 – Asset Charges Prior to DA Schedule



Example 2 – Asset Charges Prior to DA Schedule



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



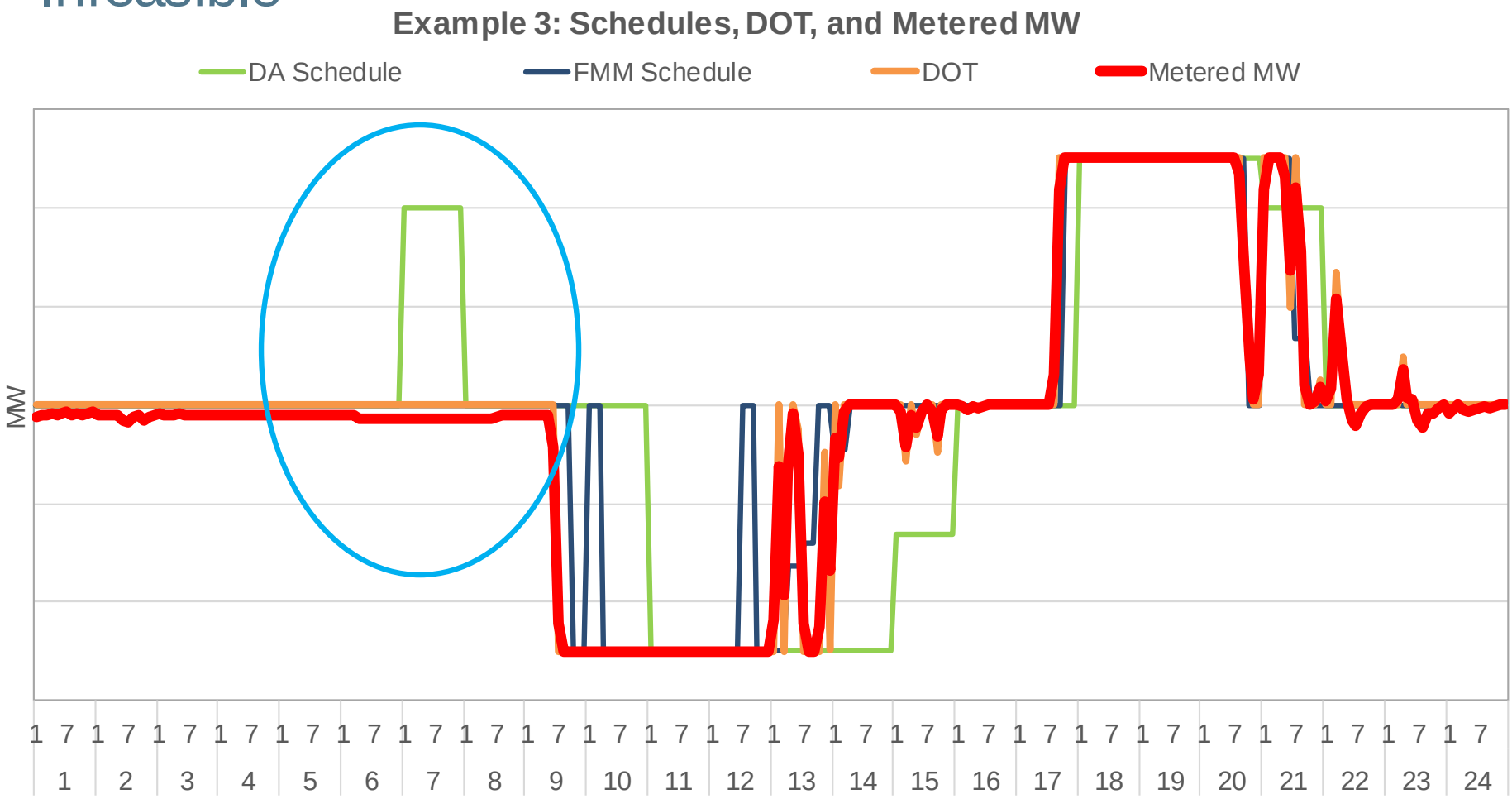
Example 3

- Example 3 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 3 – BCR is Paid Because Discharge is Infeasible



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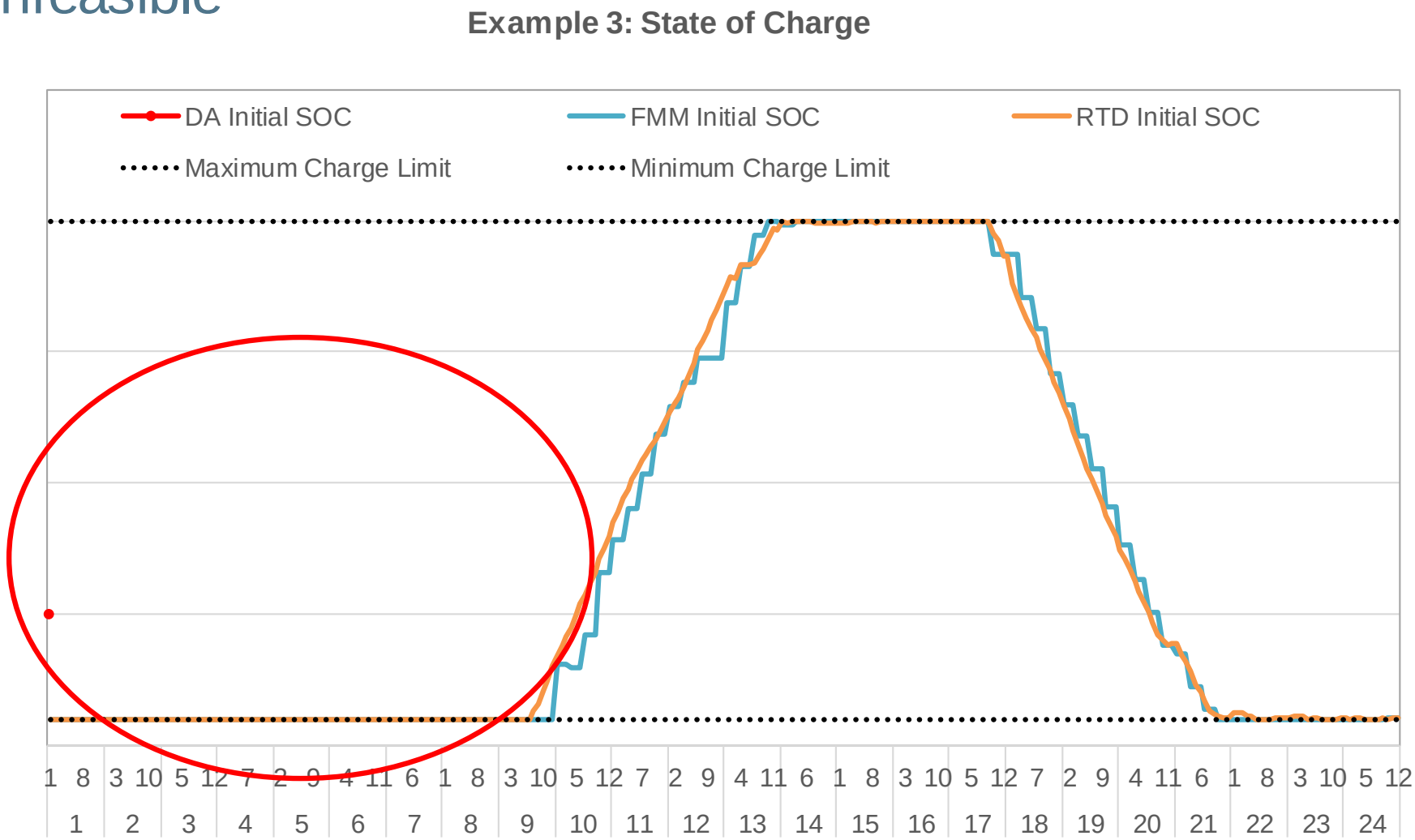

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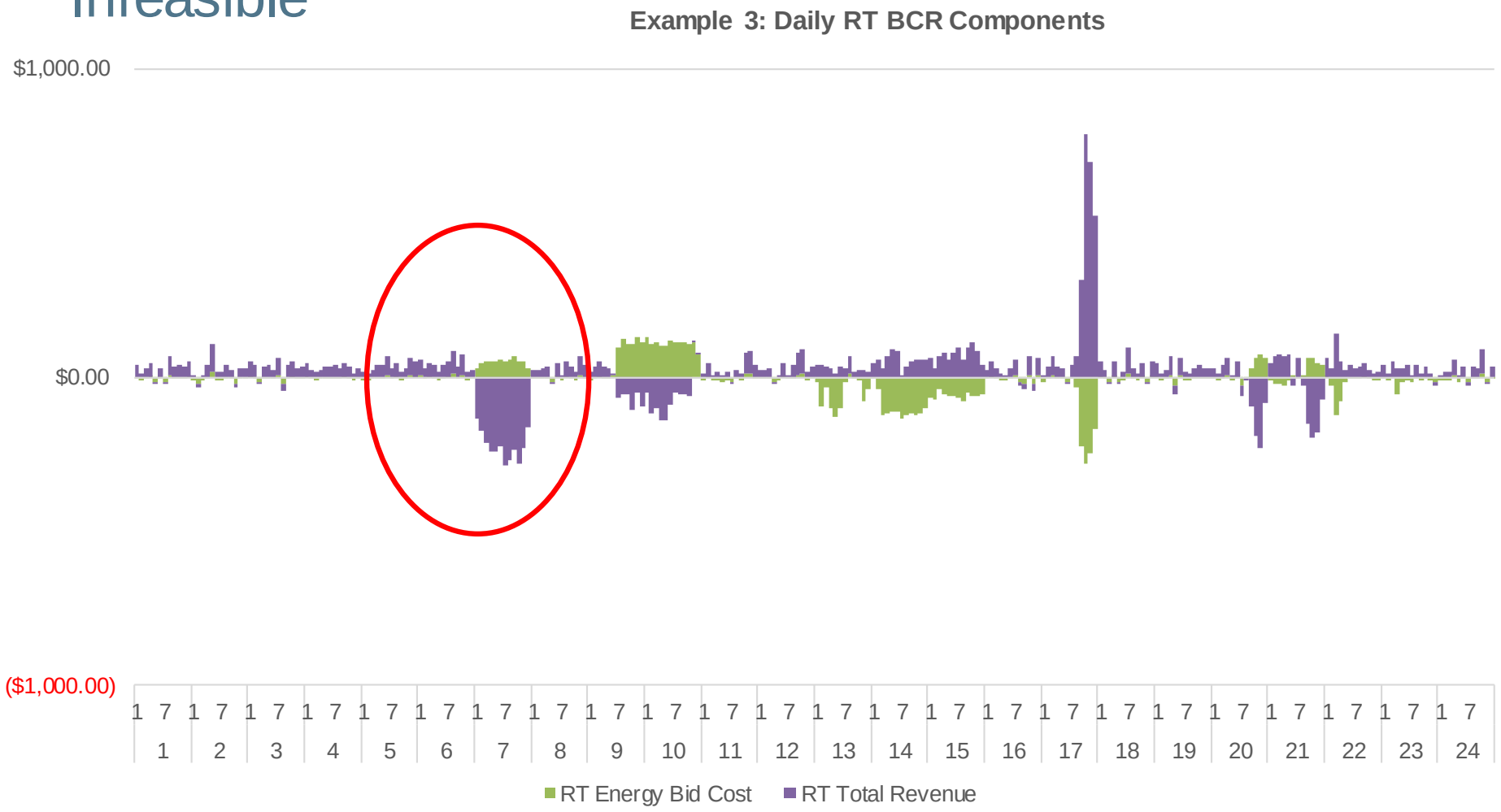

Next Steps

August						
Su	Mo	Tu	We	Th	Fr	Sa
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

September						
Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

Posting
Comments due
Stakeholder call
Joint Board of Governors and WEM Governing Body meeting

Please note the dates is tentative until confirmed through a notice in the ISO's Daily Briefing

For reference

- Visit Storage Bid Cost Recovery (BCR) and Default Energy Bid (DEB) Enhancements initiative webpage for more information: https://stakeholdercenter.caiso.com/StakeholderInitiatives/storage-bid-cost-recovery-and-default-energy-bids-enhancements
- Aug 08, 2024 Comments due on issue paper and straw proposal

- If you have any questions, please contact Brenda Corona at bcorona@caiso.com or isostakeholderaffairs@caiso.com

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

Story | Transmission

The ISO posts an updated 20-Year Transmission Outlook

By: Neil Millar

07/31/2024

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A new Energy Matters Conversations podcast spotlights changes to the ISO's interconnections process

07/29/2024

Story | Operations

RC West – Reliability Coordinator for much of the West

By: Tim Beach

07/25/2024

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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.

REGISTRATION IS OPEN

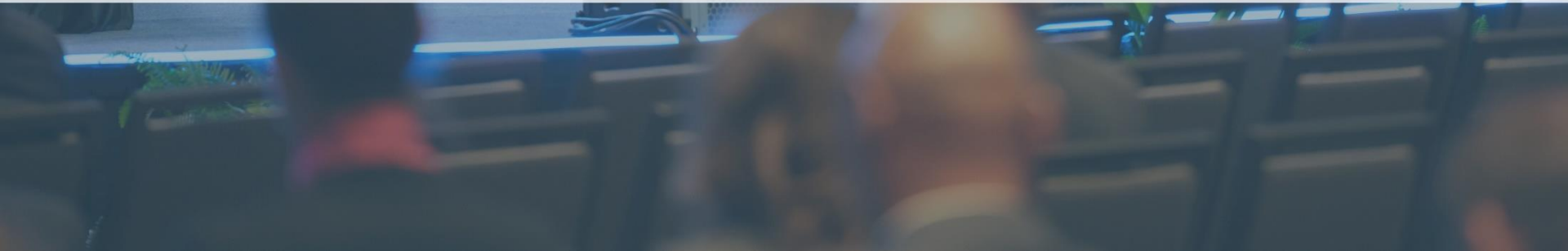
2024 STAKEHOLDER SYMPOSIUM

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

SPONSORSHIP OPPORTUNITIES AVAILABLE



Save the Date - Resource Interconnection Standards Fair on 9/17/24

The objective of this educational forum is to provide stakeholders with an opportunity to learn more about the ISO's interconnection process and recent changes affecting Cluster 15. If you plan to attend the meeting in person, please register by end of day Sept. 13, 2024.

The forum will include a series of presentations and discussions that outline the interconnection requirements for a new resource to connect to the ISO grid. Presentations will cover topics such as submitting an interconnection request application and declaration of commercial operation.

The following stakeholders are encouraged to participate:

- Submitted an interconnection request application for Cluster 15
- New and existing interconnection customers
- Regulatory agencies
- Consultants
- Trade associations
- Participating Transmission Owners

Stakeholders are invited to submit questions in advance to be addressed during the meeting. Please send questions to isostakeholderaffairs@caiso.com.

The final agenda and presentations will be posted prior on the meetings webpage.