



ISO Congestion Revenue Rights (CRR) California ISO

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Purpose & definition of congestion revenue rights (CRRs)

- A CRR is a financial instrument that enables its holder to manage variability in congestion costs that occur under congestion management protocol in a standard energy market
- CRRs are acquired by qualified entities primarily for the purpose of offsetting costs associated with day-ahead congestion costs
- When CRRs are acquired the ISO will calculate estimated value of the CRRs to determine if any additional collateral is needed (CRR credit holding requirement)

CRR allocation and auction

- CRRs are allocated to entities that provide for the upkeep of the transmission system and are provided at no cost:
 - Internal load-serving entities (LSEs)
 - Out of balancing authority area LSEs
 - Project sponsors of merchant transmission facilities
- CRR auction is available to candidate CRR holders subject to creditworthiness requirements

How are congestion revenue rights defined?

CRRs are defined by these elements:

- Type of CRR
- Life term
- Time-of-use
- Megawatt quantity
- Sink
- Source

CRR obligation vs. CRR option

CRR obligation

- Entitles CRR holder to a CRR payment if congestion is in the same direction of the CRR and requires a charge if congestion is in the opposite direction of the CRR
- Acquired via allocation or auction

CRR option

- Entitles CRR Holder to a CRR payment if congestion is in the same direction as the CRR, but requires no payment if congestion is in the opposite direction of the CRR
- Only available to project sponsors of a merchant transmission facility that do not elect some form of regulatory cost recovery, or converted merchant transmission facilities

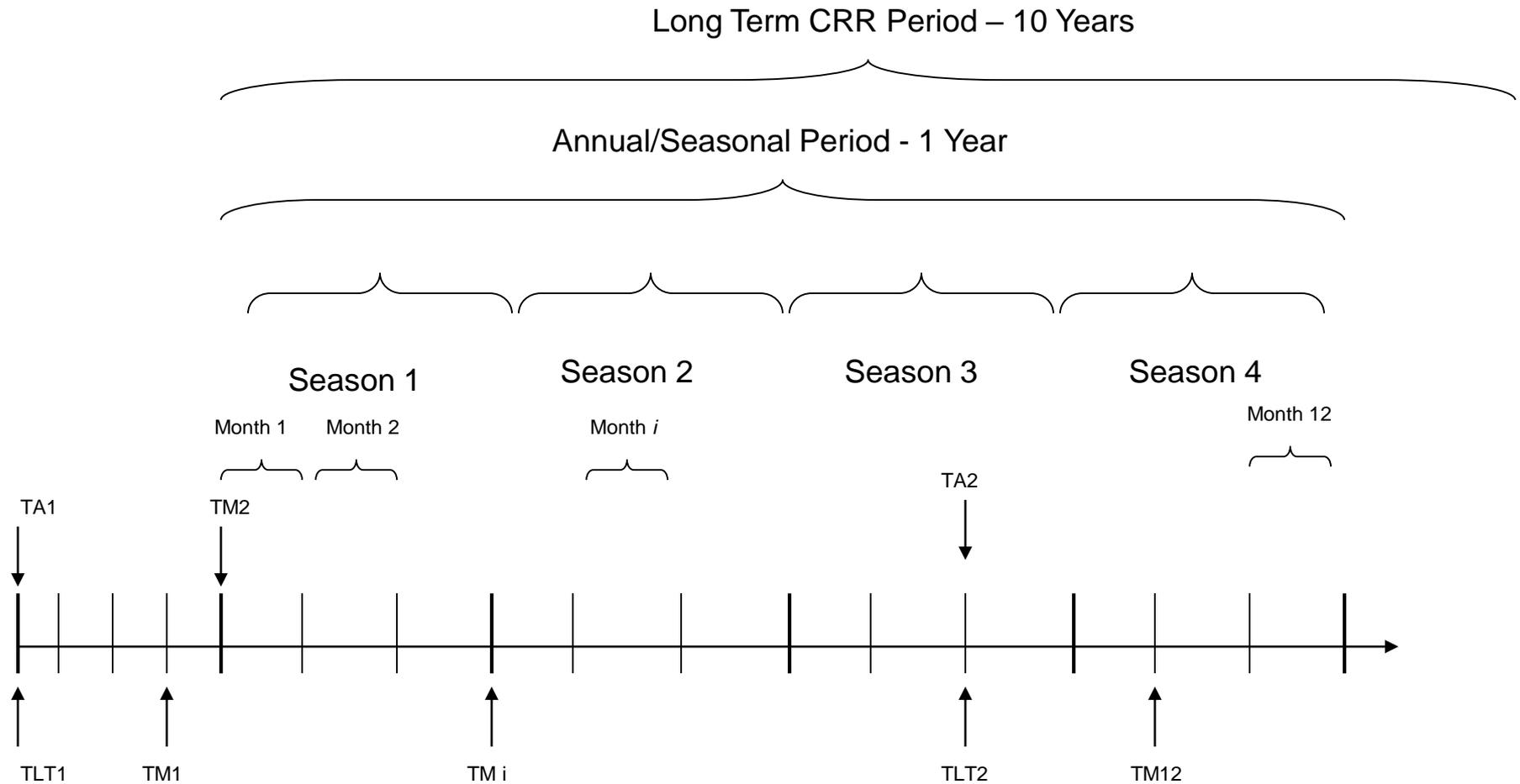
CRR terms

- Seasons are defined on a quarterly basis
 - Season 1 (Jan, Feb, Mar)
 - Season 2 (Apr, May, June)
 - Season 3 (Jul, Aug, Sep)
 - Season 4 (Oct, Nov, Dec)
- Long Term CRRs extend nine years after annual term for a total of ten years (allocation only)
- Months are calendar months (January, February, etc.)

CRRs are financial rights

- A market participant does not need a CRR to bid into the day-ahead market
- If a market participant has a CRR and bids in energy, the energy bid does not need to be consistent with the CRR in terms of CRR sink or CRR source locations or MW quantities
- On the flip-side, a market participant does not need to bid to hold a CRR
- The CRR only settles on the marginal cost of congestion (MCC) of the day-ahead locational marginal price (LMP) for each respective hour

CRR allocation and auction timeline



CRR allocation and auction timeline

- 65% of the FNM capacity will be made available during the annual process
- T_{A1} & T_{LT1} : Approximately 4 months before the start of the CRR year, the annual allocation/auction process will begin, which will produce seasonal/TOU CRRs for Seasons 1, 2, 3 and 4
- Tier LT of the annual allocation process will produce seasonal/TOU long term CRRs that will be allocated for the duration of 10 years (one year from the annual allocation and a nine-year extension through the long-term tier) using 60% of the FNM capacity

CRR allocation and auction timeline

- The CAISO market design for CRRs was focused on the allocation process as opposed to auction-only
- Load-serving entities participate in the allocation first
 - Long term – 10 years (60% system capacity)
 - Annual (3 tiers) – 65% system capacity
 - Monthly (2 tiers) – 100% system capacity with planned outages modeled

CRR allocation and auction timeline

- With the annual process all lines are assumed to be in-service unless a long-term outage is known prior to the running of the annual process
- Outages are modeled in the monthly processes
- After each allocation process there is an auction for the remaining capacity, subject to the simultaneous feasibility test
 - Annual
 - Monthly

Simultaneous feasibility test (SFT)

- The CRR FNM is a DC model such that 1 MW of injection equates to 1 MW of withdrawal
- ISO provides market participants with access to FNM used in CRR processes to assist with analysis
- Non-disclosure agreement required to obtain access
- If infeasibility occurs (all nominations or bids cannot clear simultaneously), a process is applied that reduces the nomination or bid MW quantities until feasibility is achieved

Simultaneous feasibility test (SFT)

An optimization formula is used in both the CRR Allocation and CRR Auction process

- The topology and constraints are the same
- The objective function is slightly different in each

CRR Allocation

- Objective function utilizes the weighted least squares (WLS)

CRR Auction

- Objective function is to maximize the bid-based value of the awarded CRRs

CRR auction – auction eligibility

All entities can participate in the auction that have:

- Registered as a candidate CRR holder with the ISO
- Posted minimum required collateral for participation
 - \$500,000 (annual auction)
 - \$100,000 (monthly auction)

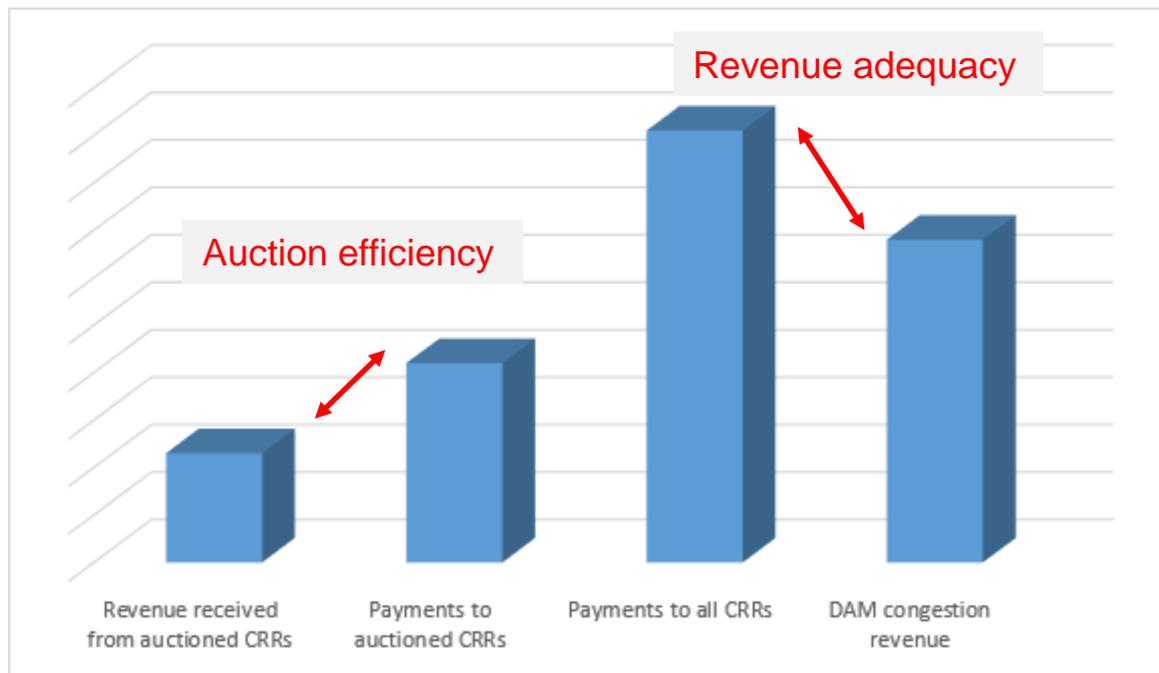
CRR auction – auction overview

- All bids submitted into the auction process are subject to:
 - Initial validations of maximum portfolio credit exposure against aggregate credit limit
 - A simultaneous feasibility test with all previously allocated CRRs for the same period and TOU modeled as fixed injections and withdrawals

2019 Roadmap for addressing congestion revenue rights auction efficiency

- **Track 1A:** Implement measures in time for annual 2019 congestion revenue rights process
 - Limited source/sink combinations
 - Implement sell feature
 - Receive annual/long range outage data sooner from PTOs
- **Track 1B:** Implement measures in time for 2019 congestion revenue rights settlement
 - Reduce annual release to 65%
 - Partial funding methodology – Based on contribution to binding constraint

Track 1A specifically aims to improve auction efficiency, Track 1B achieves equitable allocation of revenue inadequacy while also improving auction efficiency

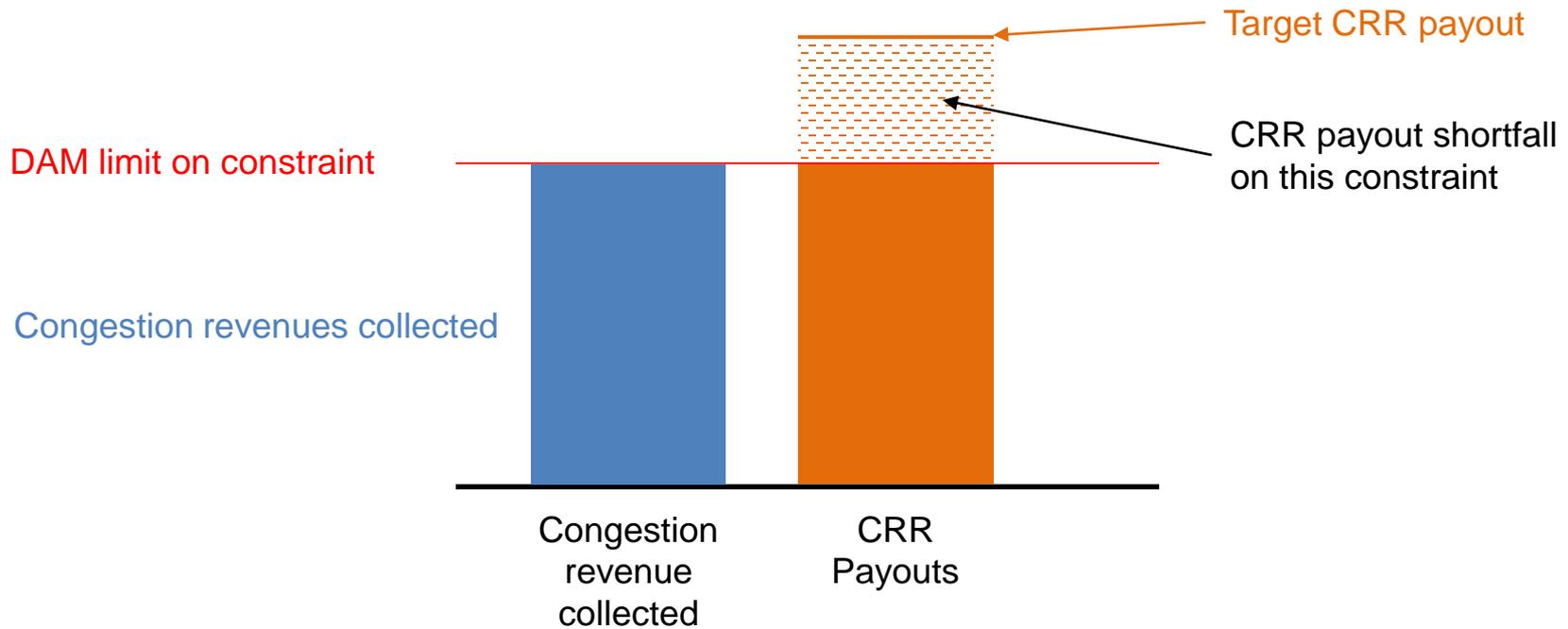


CRR auction – auction overview

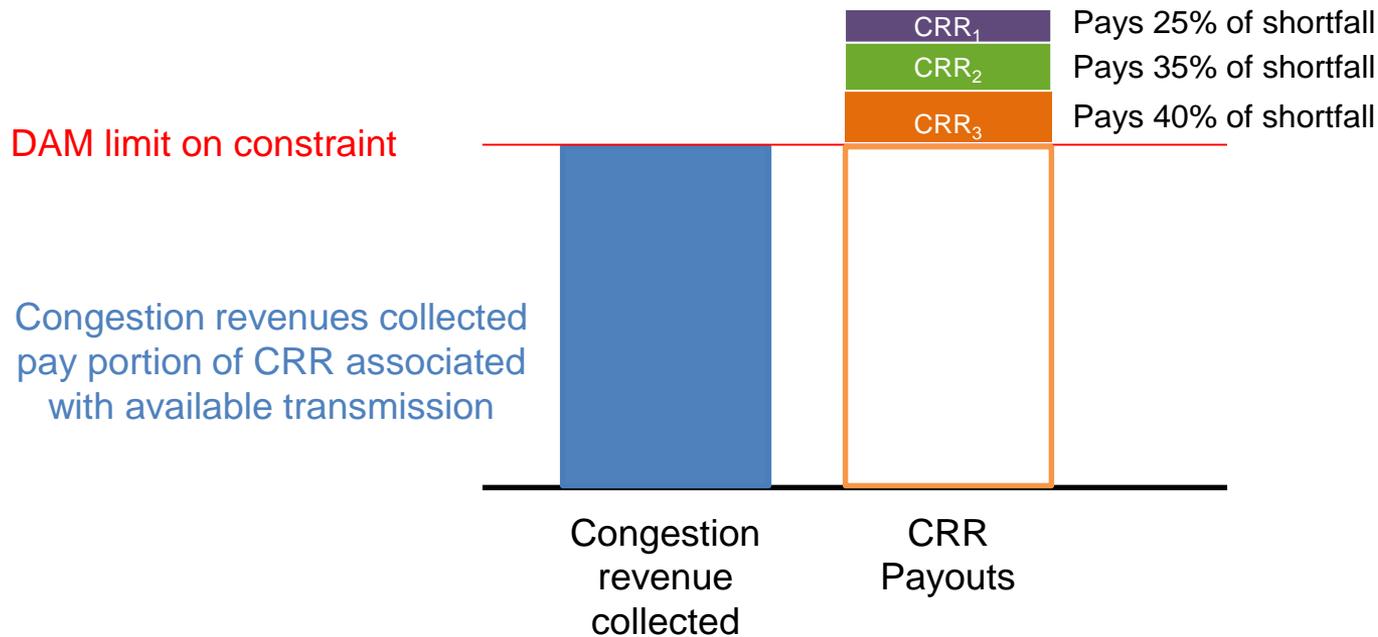
Allowable CRR auction injections (sources) and withdrawals (sinks) combinations

	Sink					
		LAPs	GEN	PNODE	TIE	TH
Source	LAPs					
	GEN	Y			Y	Y
	PNODE					
	TIE	Y				Y
	TH	Y				Y

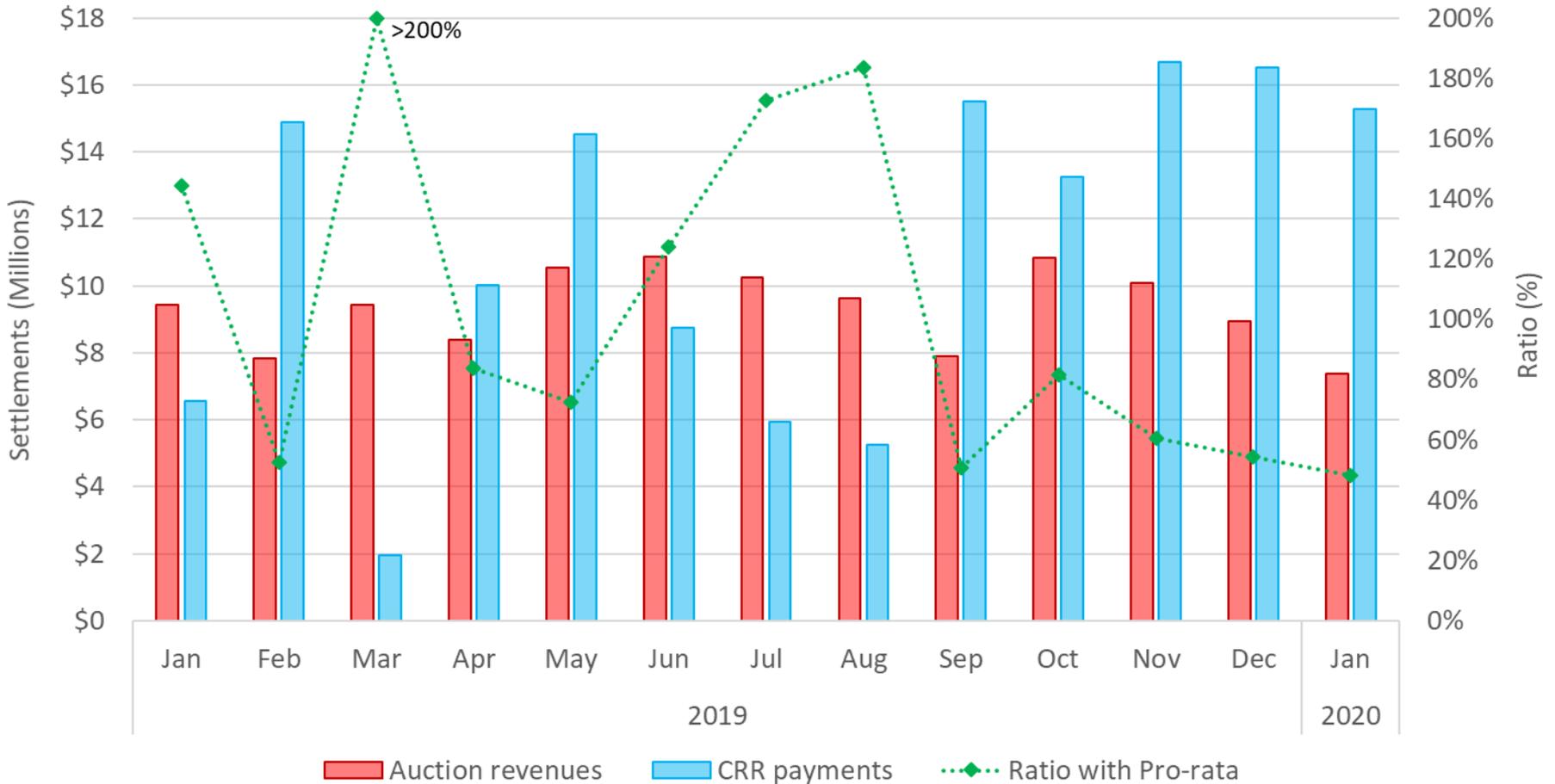
Proposal evaluates day-ahead constraints that do not collect enough revenues each hour



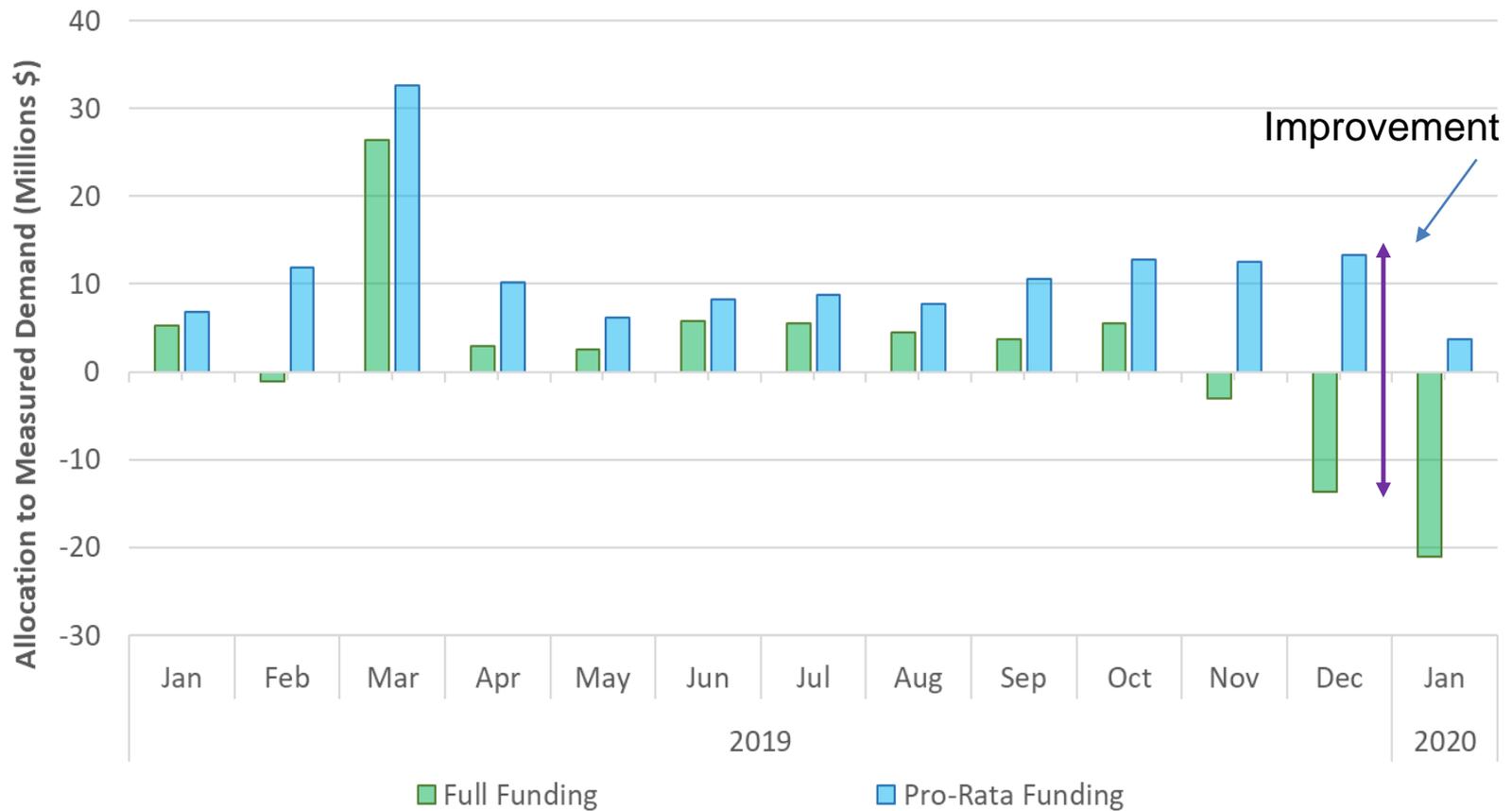
Proposal scales back payment to those effective CRRs by allocating each CRR its portion of the shortfall



An auction efficiency for 2019 is about 83%



Implementation of pro-rata funding has eliminated CRR revenue shortfall and increased revenues to LSEs by \$122 Million.



CRR deficits has impacted all type of CRRs in the market, with the largest impact on the monthly auction CRRs

