



## **Item 3: Committee Education on Congestion Revenue Right (CRR) Processes**

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Finance & Audit Committee Meeting

ERCOT Public

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# Agenda

- CRR team
- CRR basics
  - Definition
  - Types
  - Auctions
- Congestion hedging example
- CRR model
- CRR funding
  - Including a discussion on recent imbalances

# Congestion Revenue Rights

The primary goals of the CRR team are:

- Ensuring Market Participants have a fair and equal opportunity to participate in CRR auctions
- Providing an efficient and transparent market in regards to both process and design
- Working to ensure that the CRR auctions are as consistent as possible, both over time and with the Day-Ahead and Real-time Markets

Tasks for the team include:

- Constructing models for the Pre-assigned CRR (PCRR) allocation for Non-Opt-In Entities (NOIEs) and all of the CRR auctions, and ensuring those models are as accurate as possible
- Executing the auctions and confirming that the results are consistent and make sense
- Allocating and managing the eligibility of PCRRs
- Developing and reviewing proposed changes to the CRR market design, including changes to the ERCOT Protocols
- Designing and testing of improvements to the CRR-related software and tools

# Congestion Revenue Rights

CRR auction activities for a typical month:

- Monthly and long-term auctions overlap
- Team completes both model build and market operator functions

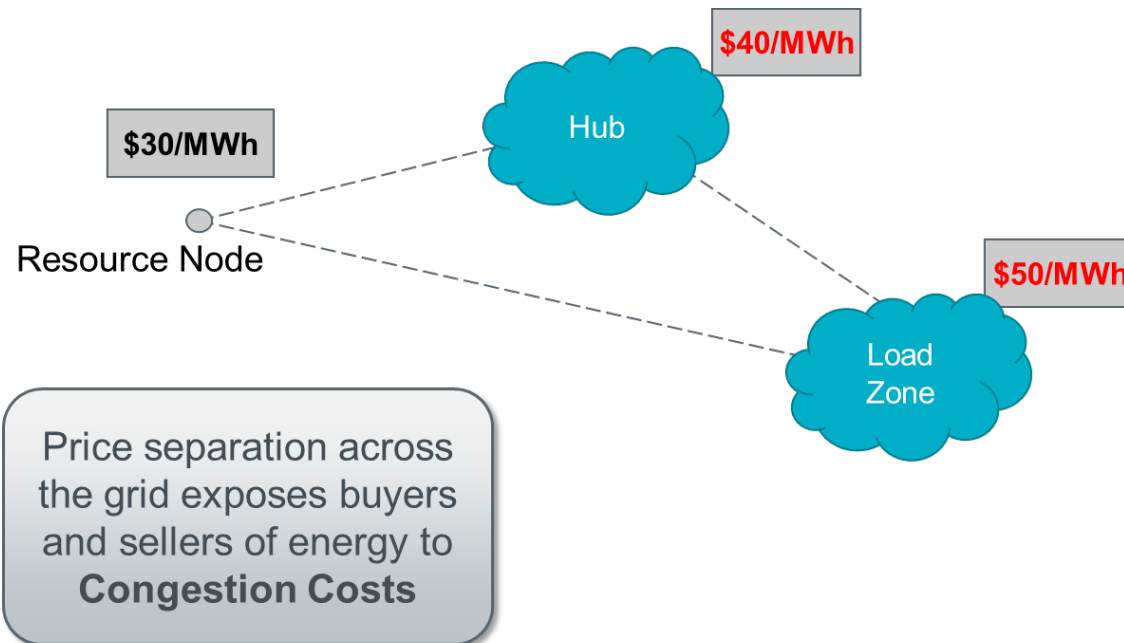
CRR Auction Activities - July 2018

	Mon	Tue	Wed	Thu	Fri	Mon	Tue	Wed	Thu	Fri	Mon	Tue	Wed	Thu	Fri	Mon	Tue	Wed	Thu	Fri	Mon	Tue
	2	3	4	5	6	9	10	11	12	13	16	17	18	19	20	23	24	25	26	27	30	31
2019.2nd6.Seq3		validate results		post results					confirm ownership													
2018.AUG.Monthly				post adders report			bid window opens		bid window closes	run auction		validate results		post results						confirm ownership		
2020.1st6.Seq4									post adders report			bid window opens		bid window closes	run auction	validate results						
2018.SEP.Monthly											build and validate network model										post model	
2020.2nd6.Seq5		build and validate network model														post model						



# What is a CRR?

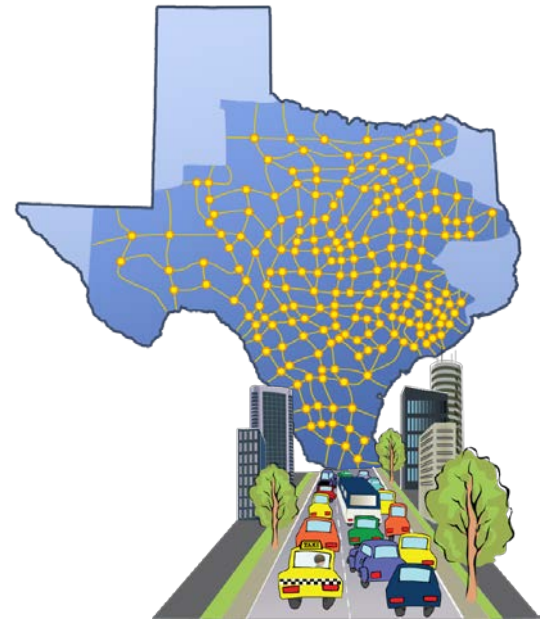
- A financial instrument that entitles the owner to be paid or charged for congestion rents that arise when the ERCOT Transmission Grid is congested in the Day-Ahead Market (DAM).
  - The price difference between any two Settlement Points: Hub → Load Zone, Resource Node → Resource Node, Load Zone → Load Zone, etc.



## What is a CRR? (cont'd)

### CRRs:

- Do not represent a right to receive, or obligation to deliver, physical energy.
  - Modeled as a simultaneous injection and withdrawal at two different locations
- Can be bought to hedge a physical asset or contract, locking in the cost of congestion at the cost of purchasing the CRR
- Can be bought as a financial investment, a wager that the congestion in DAM will differ from that in the CRR auction

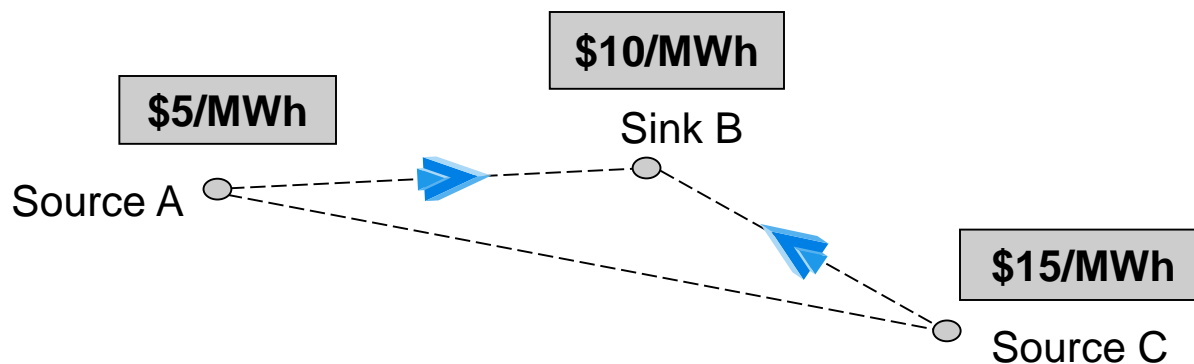


# Types of CRRs

CRRs are purchased by registered CRR Account Holders (CRRAHs). There are two types of CRRs: Point-to-Point (PTP) **Options** and PTP Obligations

## Point-to-Point Options

Provide a hedge that can only result in a payment



Option  $_{AB}$  Payment = \$5.00

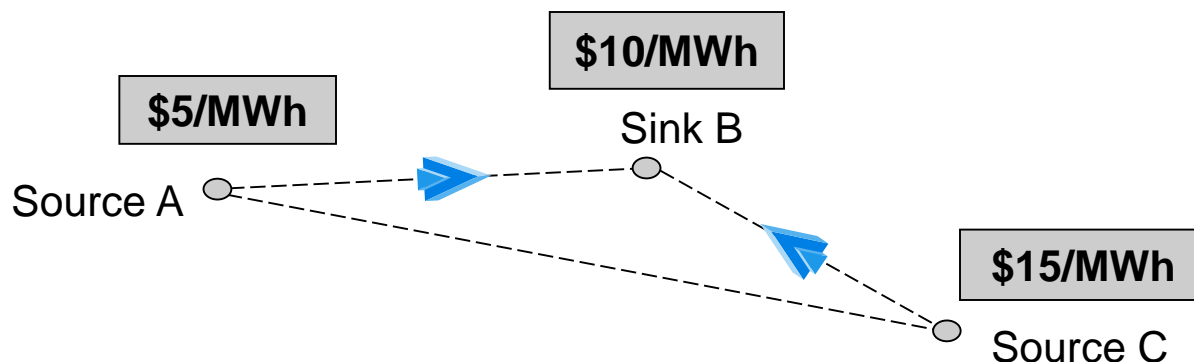
Option  $_{CB}$  Payment = \$0.00

# Types of CRRs

CRRs are purchased by registered CRR Account Holders (CRRAHs). There are two types of CRRs: Point-to-Point (PTP) Options and PTP **Obligations**

## Point-to-Point Obligations

Provide a hedge that may result in a payment or a charge



Obligation<sub>AB</sub> Payment = \$5.00

Obligation<sub>CB</sub> Charge = (\$5.00)



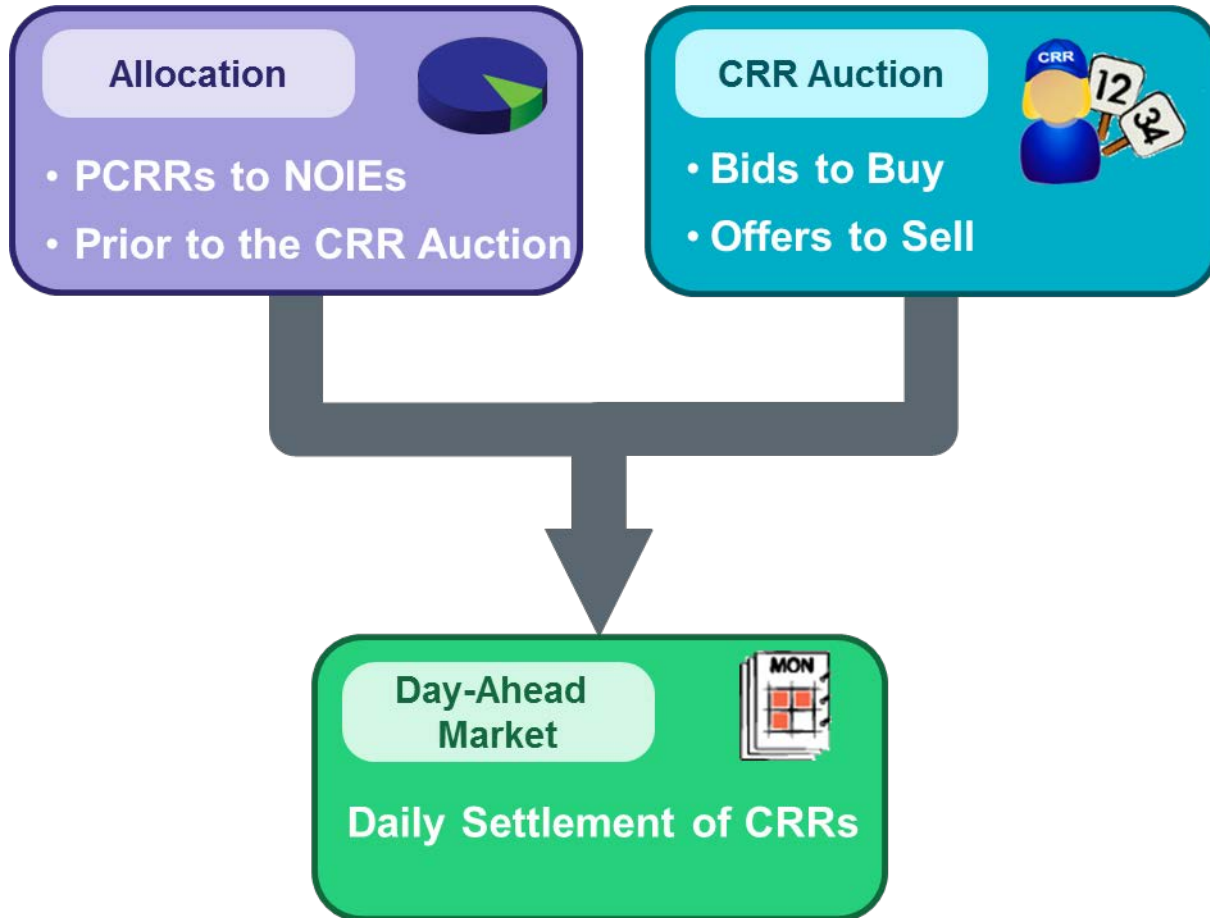
# Congestion Revenue Rights

CRRs are auctioned or allocated in:

- One-month strips
  - In multi-month auctions, can link bids across contiguous months
- Time-of-use blocks
  - Definitions coincide with standard electricity contracts in ERCOT region

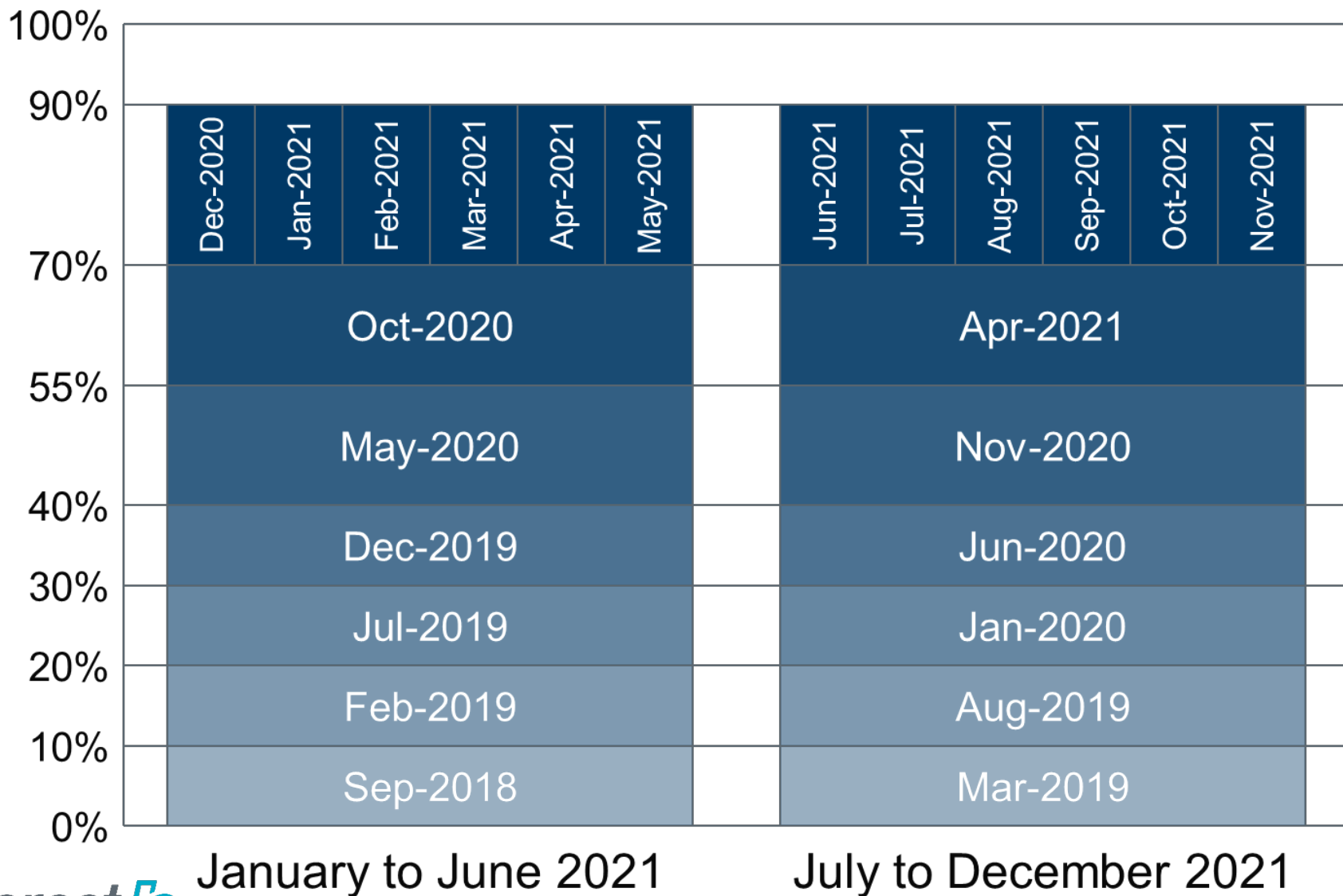
Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.
		Off-Peak (0100 – 0600)				
	Peak Weekday (0700 – 2200)				Peak Weekend (0700-2200)	
		Off-Peak (2300 – 2400)				

# Congestion Revenue Rights



*Auctions take place twice per month (one Monthly, one Long-Term)*

# Availability of 2021 CRRs – network model scaling



# CRR Activity Calendar

CRR Activity Calendar												
Auction Name	Auction Type	Post Network Model	Post Auction Notice and Credit Window Opens	Post Path Specific Adders Report	Auction Bid Window Opens 12:01am	Credit Lock Date and Auction Bid Window Closes 5:00pm	Post Auction Results On or Before This Date	Auction Invoice Posted and Credit Released On or Before This Date	CRR Ownership Assigned On or Before This Date 7:30pm	CRR Effective Start Date	CRR Effective End Date	Auction Capacity %
2020.1st6.AnnualAuction.Seq4	Annual	6/18/2018	6/27/2018	7/12/2018	7/17/2018	7/19/2018	8/2/2018	8/3/2018	8/9/2018	1/1/2020	6/30/2020	30
2018.SEP.Monthly.Auction	Monthly	7/31/2018	8/3/2018	8/9/2018	8/14/2018	8/16/2018	8/23/2018	8/24/2018	8/30/2018	9/1/2018	9/30/2018	90
2020.2nd6.AnnualAuction.Seq5	Annual	7/24/2018	8/1/2018	8/16/2018	8/21/2018	8/23/2018	9/6/2018	9/7/2018	9/13/2018	7/1/2020	12/31/2020	20
2018.OCT.Monthly.Auction	Monthly	8/27/2018	8/31/2018	9/6/2018	9/11/2018	9/13/2018	9/20/2018	9/21/2018	9/27/2018	10/1/2018	10/31/2018	90
2021.1st6.AnnualAuction.Seq6	Annual	8/20/2018	8/29/2018	9/13/2018	9/18/2018	9/20/2018	10/4/2018	10/5/2018	10/12/2018	1/1/2021	6/30/2021	10
2018.NOV.Monthly.Auction	Monthly	9/25/2018	9/28/2018	10/4/2018	10/9/2018	10/11/2018	10/18/2018	10/19/2018	10/25/2018	11/1/2018	11/30/2018	90
2019.1st6.AnnualAuction.Seq1	Annual	9/18/2018	9/26/2018	10/11/2018	10/16/2018	10/18/2018	11/1/2018	11/2/2018	11/8/2018	1/1/2019	6/30/2019	70
2018.DEC.Monthly.Auction	Monthly	10/23/2018	10/26/2018	11/1/2018	11/6/2018	11/8/2018	11/15/2018	11/16/2018	11/26/2018	12/1/2018	12/31/2018	90
2019.2nd6.AnnualAuction.Seq2	Annual	10/16/2018	10/24/2018	11/8/2018	11/13/2018	11/15/2018	11/29/2018	11/30/2018	12/6/2018	7/1/2019	12/31/2019	55
2019.JAN.Monthly.Auction	Monthly	11/16/2018	11/21/2018	11/29/2018	12/4/2018	12/6/2018	12/13/2018	12/14/2018	12/20/2018	1/1/2019	1/31/2019	90
2020.1st6.AnnualAuction.Seq3	Annual	11/16/2018	11/28/2018	12/13/2018	12/18/2018	12/20/2018	1/3/2019	1/4/2019	1/10/2019	1/1/2020	6/30/2020	40
2019.FEB.Monthly.Auction	Monthly	12/20/2018	12/28/2018	1/3/2019	1/8/2019	1/10/2019	1/17/2019	1/18/2019	1/25/2019	2/1/2019	2/28/2019	90
2020.2nd6.AnnualAuction.Seq4	Annual	12/13/2018	12/26/2018	1/10/2019	1/15/2019	1/17/2019	1/31/2019	2/1/2019	2/7/2019	7/1/2020	12/31/2020	30



# Congestion hedging example

Market Participant has Load in LZ\_NORTH and a contract for 100 MW of generation delivered in real-time to HB\_WEST weekdays on peak for the month of June.

## Initiate the hedge in a CRR Auction

- ✓ Purchase 100 MW CRR from HB\_WEST -> LZ\_NORTH Peak Weekday
- ✓ Pay \$0.75/MWh

## Purchase a DAM PTP Obligation

- ✓ CRR settles automatically (receive payment based on DAM prices)
- ✓ Daily purchase 100 MW PTP Obligation from HB\_WEST -> LZ\_NORTH (Hours 7-22)

*These two actions net out\**

## Delivery in Real-Time

- ✓ Receive payment for any price spread between LZ\_NORTH and HB\_WEST
- ✓ Incur same congestion cost

**Net effect: real-time congestion hedge procured from ERCOT at a cost of \$0.75/MWh**

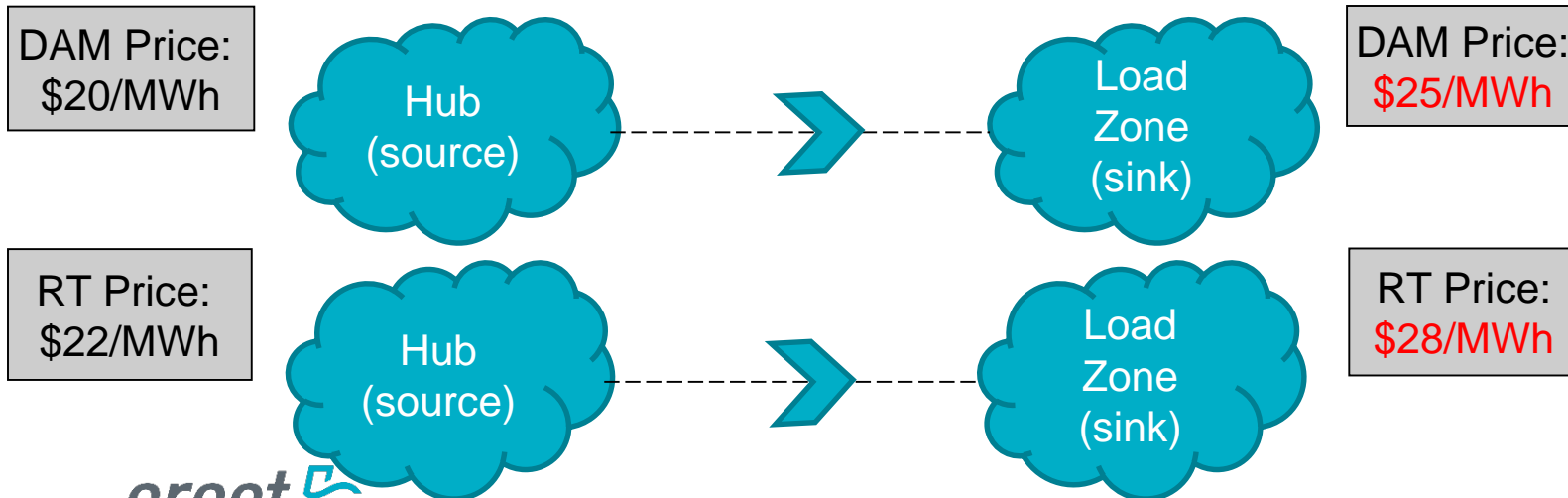


\*at the Counterparty level; assumes no shortpay or deration

# Congestion hedging example

Simplified example for one hour:

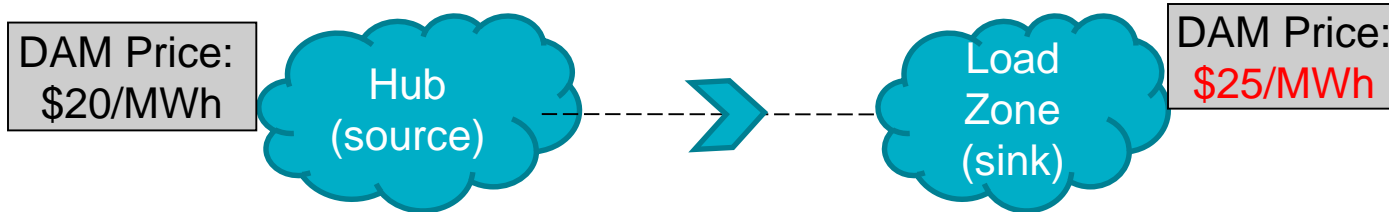
<b>CRR auction</b> purchase cost = $-\$0.75/\text{MWh} \times 100\text{MW} =$	(\$75)
<b>CRR</b> payout in <b>DAM</b> = $(\$25/\text{MWh} - \$20/\text{MWh}) \times 1 \text{ hr} \times 100 \text{ MW} =$	\$500
<b>DAM</b> PTP bid purchase = $-(\$25/\text{MWh} - \$20/\text{MWh}) \times 1 \text{ hr} \times 100 \text{ MW} =$	(\$500)
<b>Real-Time</b> cost at LZ = $\$28/\text{MWh} \times 1 \text{ hr} \times 100 \text{ MW} =$	(\$2,800)
<b>Real-Time</b> trade/contract at HB = $\$22/\text{MWh} \times 1 \text{ hr} \times 100 \text{ MW} =$	\$2,200
<b>Real-Time</b> payout for DAM PTP = $-(\$28/\text{MWh} - \$22/\text{MWh}) \times 1 \text{ hr} \times 100 \text{ MW} =$	<u>\$600</u>
	<b>(\$75)</b>



# Financial investment example

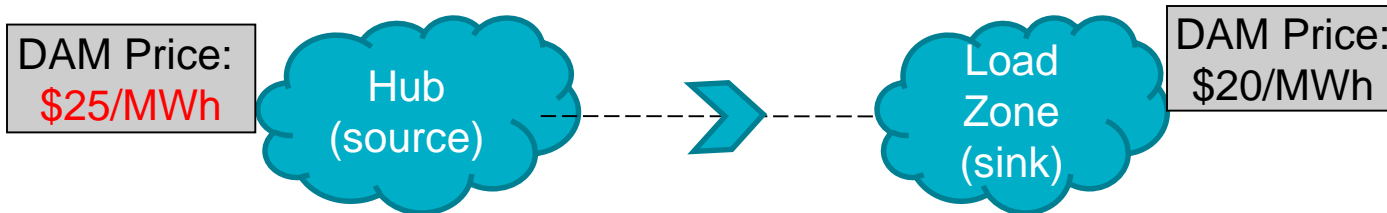
Example of a profitable investment in 100 MW of OBLs from HB\_WEST to LZ\_WEST:

CRR **auction** purchase cost =  $\$0.75/\text{MWh} * 100\text{MW} =$  (\$75)  
 CRR settling in **DAM** =  $(\$25/\text{MWh} - \$20/\text{MWh}) * 1 \text{ hr} * 100 \text{ MW} =$  \$600  
\$525



Example of an unprofitable investment in 100 MW of OBLs from HB\_WEST to LZ\_WEST:

CRR **auction** purchase cost =  $\$0.75/\text{MWh} * 100\text{MW} =$  (\$75)  
 CRR settling in **DAM** =  $(\$20/\text{MWh} - \$25/\text{MWh}) * 1 \text{ hr} * 100 \text{ MW} =$  (\$600)  
(\$675)

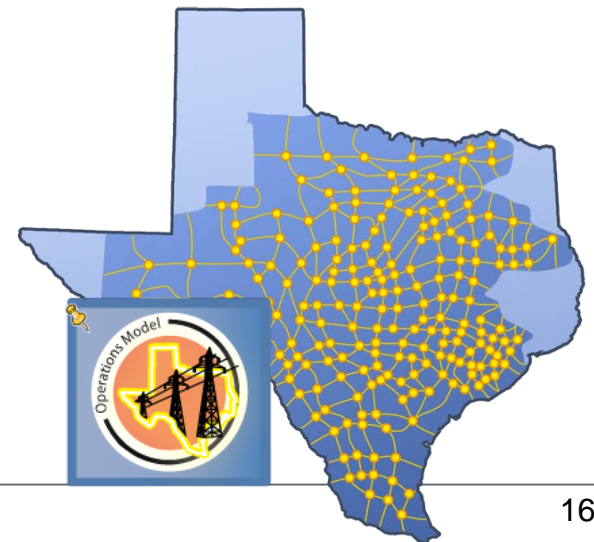


# CRR Model

The amount of available system capacity that can be purchased is determined based on a future version of the Network Operations Model.

The CRR Model will reflect:

- All of the transmission facilities that are expected to be in-service on the first day of the specified month
- Outages applied based on specific criteria (see Appendix for details)
- Dynamic Ratings determined based on max forecasted or historical temperatures, depending on auction type
- List of elements that will not be subject to constraints (some limits are not enforced due to existing Congestion Management Plans, etc.)
- List of all enforced contingencies
- Biddable Settlement Points

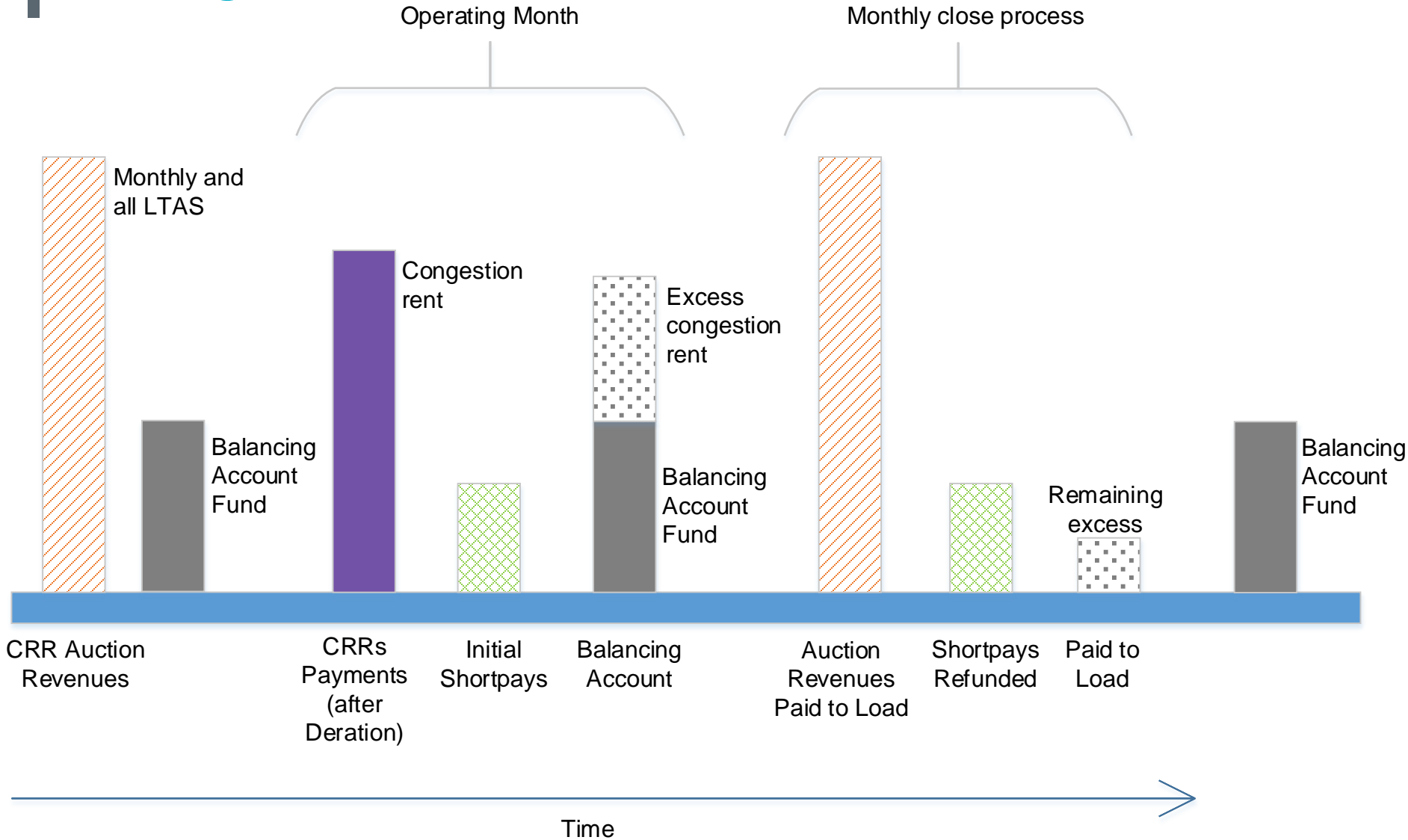




# Funding

- Congestion rent that is collected in the DAM is used to fund CRRs.
  - Congestion rent can generally be thought of as the difference between the amount that buyers pay and that sellers are paid.
- If excess congestion rent is collected in any hour, it is put into the Balancing Account.
- If an insufficient amount of congestion rent is collected in any hour, CRRAHs will be “short-paid.”
  - The shortage is allocated proportionately to all CRRAHs.
- There is a separate process for reducing payments on CRRs containing Resource Nodes that impact oversold transmission elements, which is referred to as CRR derating.
  - Derations are not eligible for refunds from the Balancing Account.
  - NPRR821, implementation date 2019 TBD, removes deration for any CRR that does not sink at a Resource Node.
- At the end of each month, money in the Balancing Account will be used to refund all the shortages to the degree possible. Any remaining money after this process is set aside in the rolling CRR Balancing Account Fund with a \$10M cap to help fund future shortages.
  - If the CRR Balancing Account Fund reaches the \$10M cap and there is still money remaining, that money is paid to load based on a Load Ratio Share.

# Funding illustration



Discussion purposes only – not to scale

# Funding imbalances

When conditions diverge between markets, funding imbalances can occur. Primarily this is caused by topology differences or modeling assumptions made.

- Note that a number of elements are designed to be conservative, i.e., to tend toward underselling as opposed to overselling. For instance, a total of only 90% of transmission capacity is made available in the CRR auctions.

Generic examples:

- An outage is modeled and expected for March. However, it later moves to April. This can cause CRRs to be undersold (funding surplus) in March. The rescheduled outage doesn't make the outage pull date for the April auction, so it also can cause April to be oversold (underfunded).
- February turns out to be significantly colder than expected. Because dynamically rated lines are modeled based on forecasted maximum temperature, February is undersold.
- Loads in a particular area increase quickly. CRRs sinking at Load Zones are distributed to individual loads based on distribution factors that are developed using historical information. Therefore, that Load Zone can be oversold.

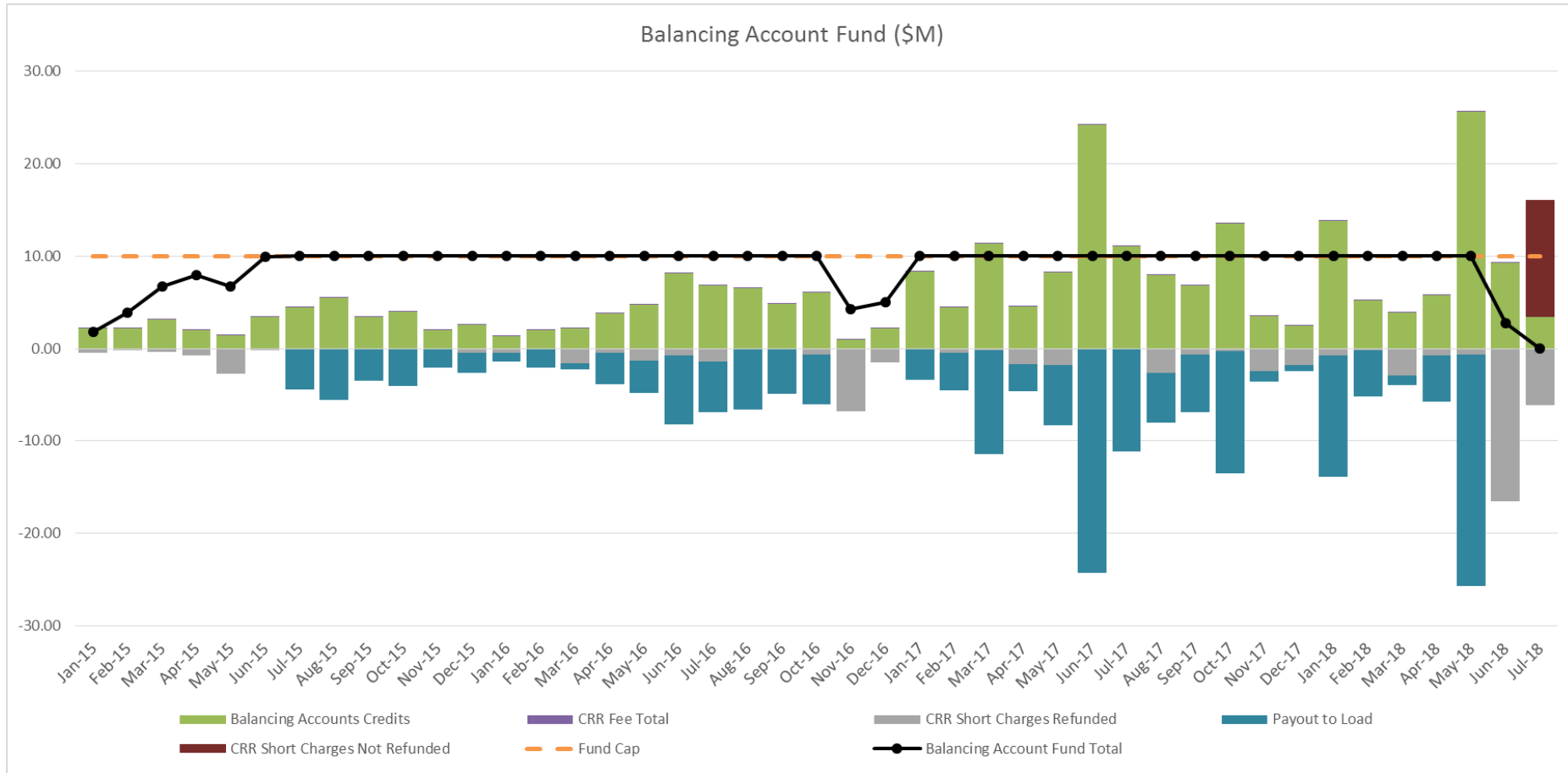
# Recent CRR imbalances

CRR Balancing Account (\$M)	June 2018	July 2018* MTD
Monthly Day-Ahead Congestion Rent	\$183.22	\$127.60
Monthly Day-Ahead CRR Settlements	(\$190.51)	(\$143.08)
Monthly Day-Ahead CRR Short -Charges	\$16.52	\$18.85
<b>CRR Balancing Account Credit Total</b>	<b>\$9.23</b>	<b>\$3.38</b>
Beginning Fund Balance for the Month	\$10.00	\$2.75
CRR Balancing Account Credit Total	\$9.23	\$3.38
Day-Ahead CRR Short-Charges Refunded	(\$16.52)	(\$6.17)
CRR PTP Option Award Charges	\$0.04	\$0.04
Load-Allocated CRR Amount	\$0.00	\$0.00
<b>Total Fund Amount</b>	<b>\$2.75</b>	<b>\$0.00</b>
Day-Ahead CRR Short-Charges Not Refunded	<b>\$0.00</b>	<b>\$12.68</b>

\* Data for July 2018 is from July 1-23, 2018



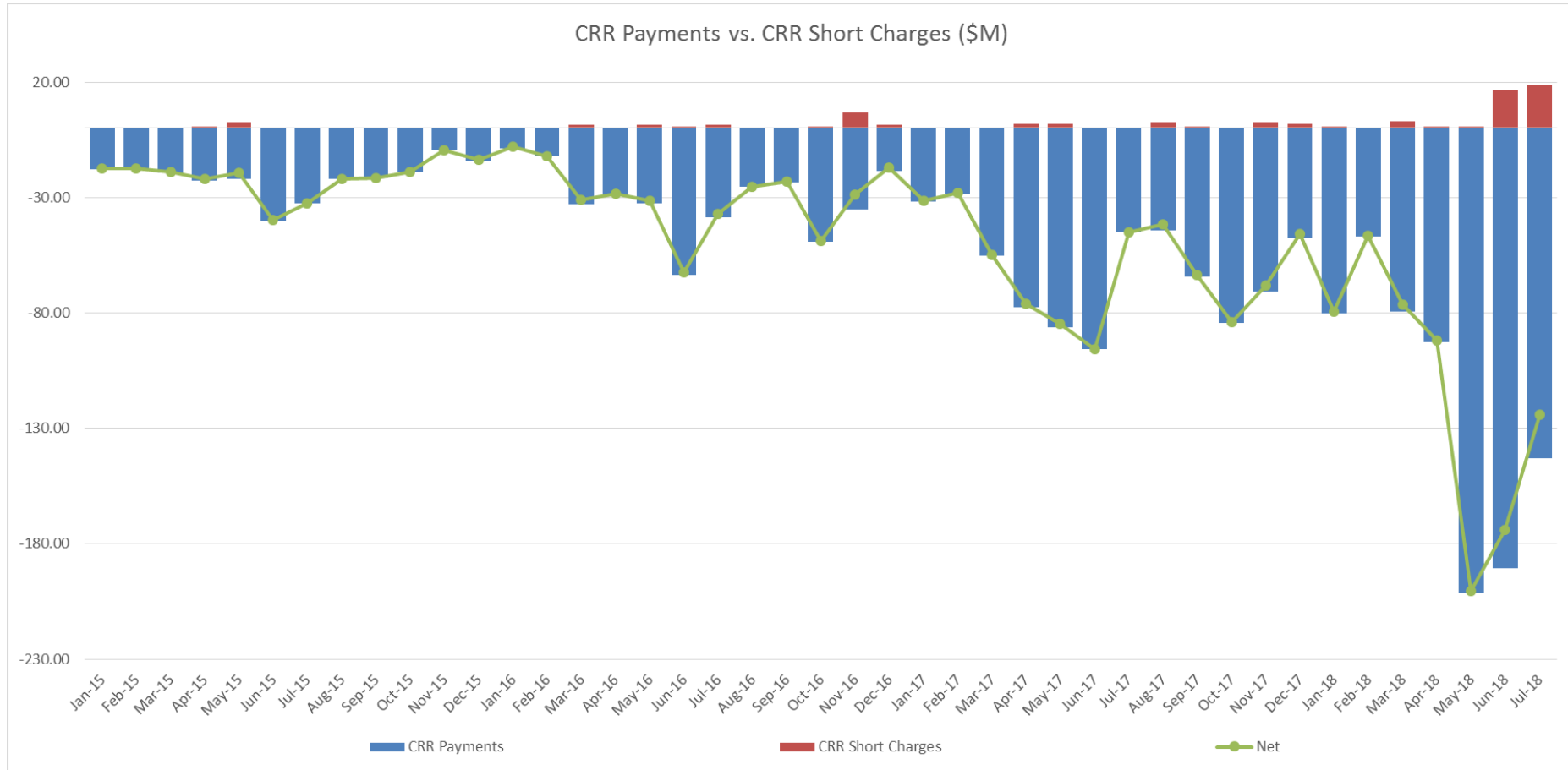
# Balancing Account Fund 2015 to date



\* Data for July 2018 is from July 1-23, 2018



# CRR payments 2015 to date



\* Data for July 2018 is from July 1-23, 2018

# Appendix

# CRR Model Building

Extraction date is roughly 2 weeks prior to the posting date for monthly auctions and 3 weeks prior for each Long-Term Auction Sequence (LTAS).

- Note that the bid window opens 10 business days after the model posting for a monthly auction and 20 business days after for an LTAS
- Therefore, for monthly auctions, Outages are pulled approximately 6 weeks prior to the start of the CRR effective month

To start off the outage process, ERCOT extracts all Outages that qualify for inclusion:

- ✓ Consecutive or continuous approved Outages greater than or equal to five days;
- ✓ Approved Outages which include Transmission Elements included in the definition of a Hub;
- ✓ Approved Outages which include Transmission Elements in a 345 kV Transmission Facility;
- ✓ Approved Outages that require the use of a Block Load Transfer (BLT); and
- ✓ Any other approved Outage that has been determined by ERCOT to carry a substantial risk of causing significant congestion.

Then an analysis is performed to determine the “worst day” upon which to base the topology of our auction for that time period.



# CRR Model Building

1) Gantt chart to highlight groupings of potential worst-case days, considering kV levels. Gantt chart example seen to the right.

2) Once we've narrowed it down, engineers consider historical data and knowledge about areas which may be more significantly constrained.

- Special consideration for impacts to interfaces (Generic Transmission Limits), impacts to historically significant constraints in Day-Ahead Market (DAM) and Real-Time, and consider Remedial Action Scheme equipment outages.
- MW flow impact analysis performed on subset of outage combinations.

B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM	BN	BO	BP	BQ	BR	BS	BT	BU	BV	BW	BX	BY	BZ	CA	CB	CC	CD	CE	CF	CG	CH	CI	CJ	CK	CL	CM	CN	CO	CP	CQ	CR	CS	CT	CU	CV	CW	CX	CY	CZ	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL	DM	DN	DO	DP	DQ	DR	DS	DT	DU	DV	DW	DX	DY	DZ	EA	EB	EC	ED	EE	EF	EG	EH	EI	EJ	EK	EL	EM	EN	EO	EP	EQ	ER	ES	ET	EU	EV	EW	EX	EY	EZ	FA	FB	FC	FD	FE	FF	FG	FH	FI	FJ	FK	FL	FM	FN	FO	FP	FQ	FR	FS	FT	FU	FV	FW	FX	FY	FZ	GA	GB	GC	GD	GE	GF	GG	GH	GI	GJ	GK	GL	GM	GN	GO	GP	GQ	GR	GS	GT	GU	GV	GW	GX	GY	GZ	HA	HB	HC	HD	HE	HF	HG	HH	HI	HJ	HK	HL	HM	HN	HO	HP	HQ	HR	HS	HT	HU	HV	HW	HX	HY	HZ	IA	IB	IC	ID	IE	IF	IG	IH	II	IJ	IK	IL	IM	IN	IO	IP	IQ	IR	IS	IT	IU	IV	IW	IX	IY	IZ	JA	JB	JC	JD	JE	JF	JG	JH	JI	IJ	JK	KL	KM	KN	KO	KP	KQ	KR	KS	KT	KU	KV	KW	KX	KY	KZ	LA	LB	LC	LD	LE	LF	LG	LH	LI	LJ	LK	LM	LN	LO	LP	LQ	LR	LS	LT	LU	LV	LW	LX	LY	LZ	MA	MB	MC	MD	ME	MF	MG	MH	MI	MJ	MK	ML	MM	MN	MO	MP	MQ	MR	MS	MT	MU	MV	MW	MX	MY	MZ	NA	NB	NC	ND	NE	NF	NG	NH	NI	NJ	NK	NL	NM	NO	NP	NQ	NR	NS	NT	NU	NV	NW	NX	NY	NZ	OA	OB	OC	OD	OE	OF	OG	OH	OI	OJ	OK	OL	OM	ON	OO	OP	OQ	OR	OS	OT	OU	OV	OW	OX	OY	OZ	PA	PB	PC	PD	PE	PF	PG	PH	PI	PJ	PK	PL	PM	PN	PO	PP	PQ	PR	PS	PT	PU	PV	PW	PX	PY	PZ	QA	QB	QC	QD	QE	QF	QG	QH	QI	QJ	QK	QL	QM	QN	QO	QP	QQ	QR	QS	QT	QU	QV	QW	QX	QY	QZ	RA	RB	RC	RD	RE	RF	RG	RH	RI	RJ	RK	RL	RM	RO	RP	RQ	RR	RS	RT	RU	RV	RW	RX	RY	RZ	SA	SB	SC	SD	SE	SF	SG	SH	SI	SJ	SK	SL	SM	SN	SO	SP	SQ	SR	SS	ST	SU	SV	SW	SX	SY	SZ	TA	TB	TC	TD	TE	TF	TG	TH	TI	TJ	TK	TL	TM	TN	TO	TP	TQ	TR	TS	TT	TU	TV	TW	TX	TY	TZ	UA	UB	UC	UD	UE	UF	UG	UH	UI	UJ	UK	UL	UM	UN	UO	UP	UQ	UR	US	UT	UU	UV	UW	UX	UY	UZ	VA	VB	VC	VD	VE	VF	VG	VH	VI	VJ	VK	VL	VM	VO	VP	VQ	VR	VS	VT	VU	VV	VW	VX	VY	VZ	WA	WB	WC	WD	WE	WF	WG	WH	WI	WJ	WK	WL	WM	WN	WO	WP	WQ	WR	WS	WT	WU	WV	WW	WX	WY	WZ	XA	XB	XC	XD	XE	XF	XG	XH	XI	XJ	XK	XL	XM	XN	XO	XP	XQ	XR	XS	XT	XU	XV	XW	XX	XY	XZ	YA	YB	YC	YD	YE	YF	YG	YH	YI	YJ	YK	YL	YM	YN	YO	YP	YQ	YR	YS	YT	YU	YV	YW	YX	YZ	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZA	ZB	ZC	ZD	ZE	ZF	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