

Congestion Revenue Rights (CRRs)



Greetings and Introductions

Attendance

Questions

Presentation materials

Recording for internal purposes

PROTOCOL DISCLAIMER

This presentation provides a general overview of the Texas Nodal Market and is not intended to be a substitute for the ERCOT Protocols, as amended from time to time. If any conflict exists between this presentation and the ERCOT Protocols, the ERCOT Protocols shall control in all respects.

For more information, please visit:

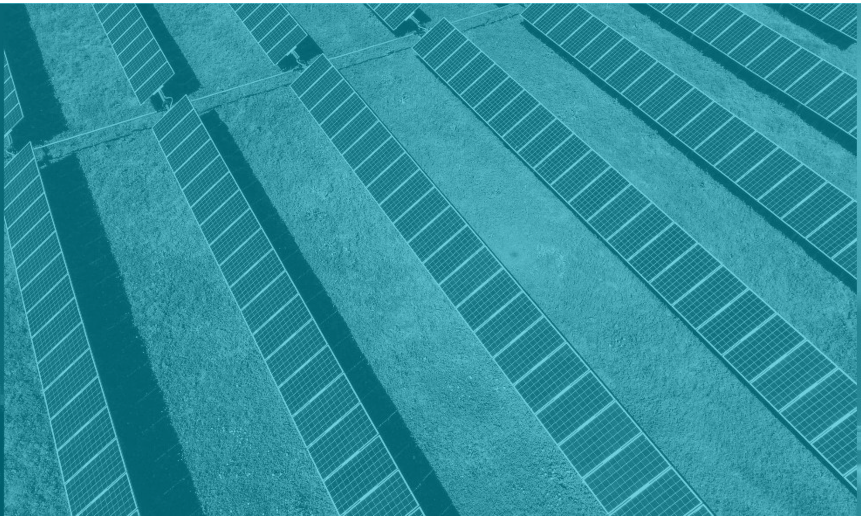
http://www.ercot.com/mktrules/nprotocols/

Topics in this course include:

1. CRR Introduction
2. CRR Auction Inputs
3. CRR Auction Process & Results



CRR Introduction

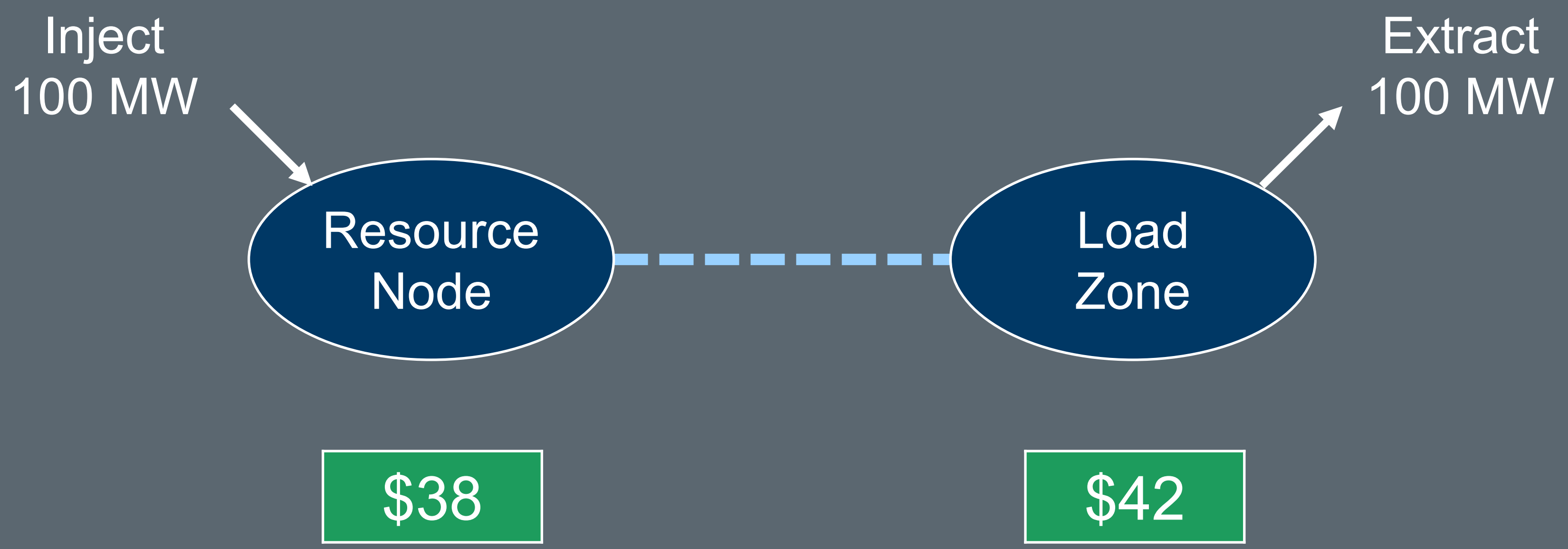




When would you use the Express Lanes?

Would you use a monthly Toll Credit purchased ahead of time?

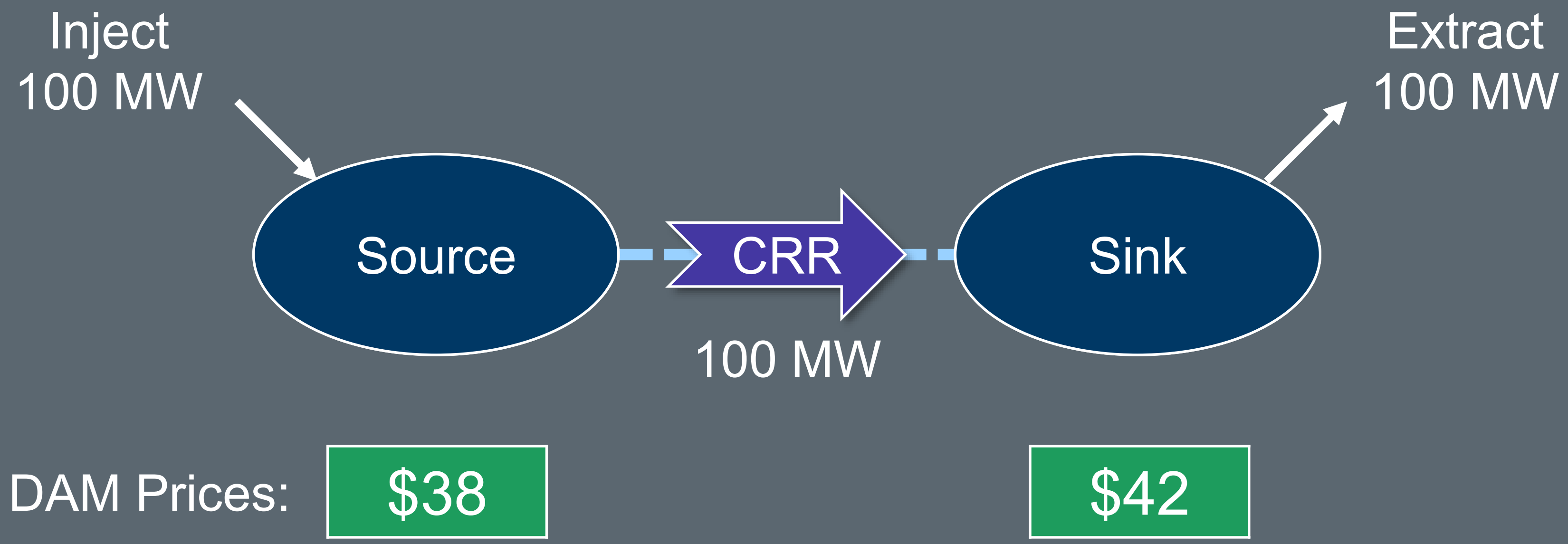
What if your Toll Credit paid the cost of the Express Lanes?

Congestion Costs result from price separation

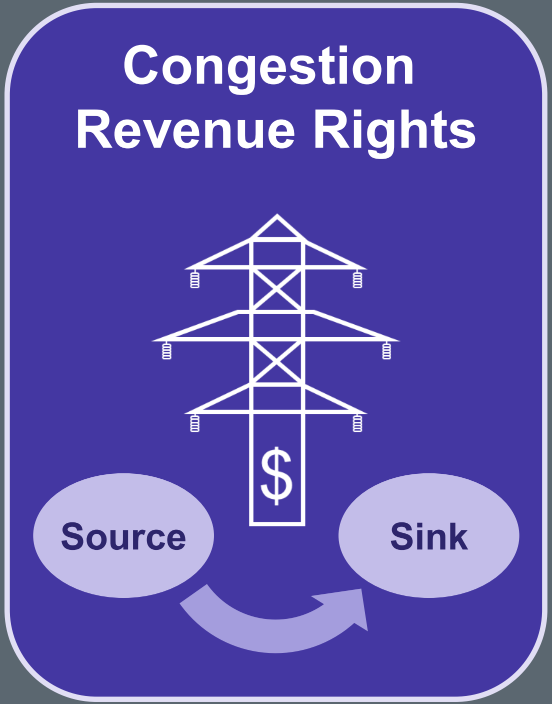


What are the Settlement Implications?

Acquired by CRR Account Holders



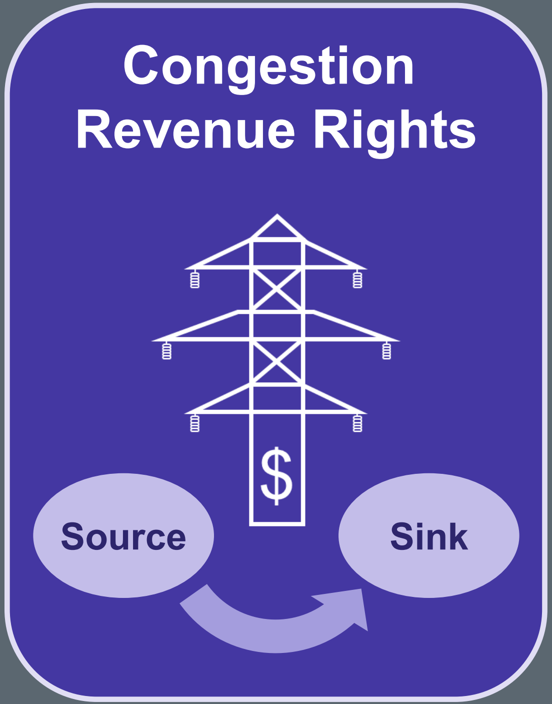
CRRs = Monthly financial instruments settled at DAM Price spreads



Three ways to acquire:

- Auction
- Allocation (NOIEs* only)
- Bilateral Trades (not common)

*NOIE = Non-Opt-In Entities



Two financial instruments

Point-to-Point Obligation

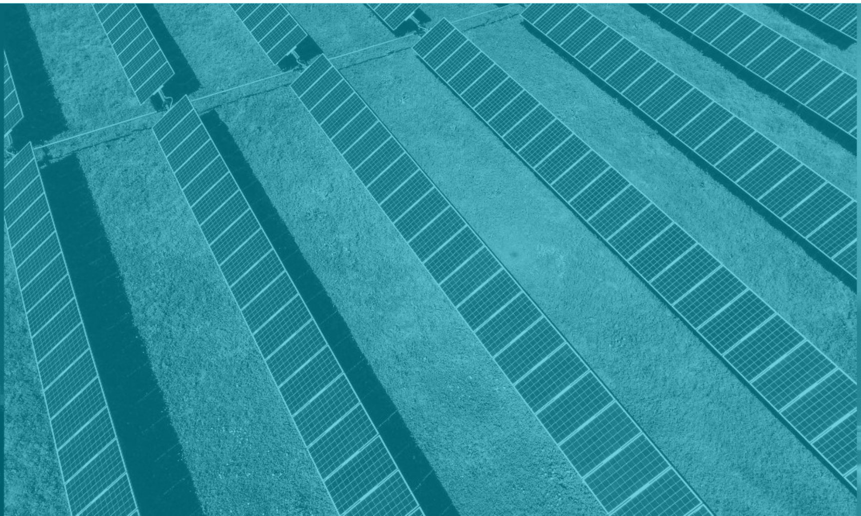
Payment or Charge in DAM

Point-to-Point Option

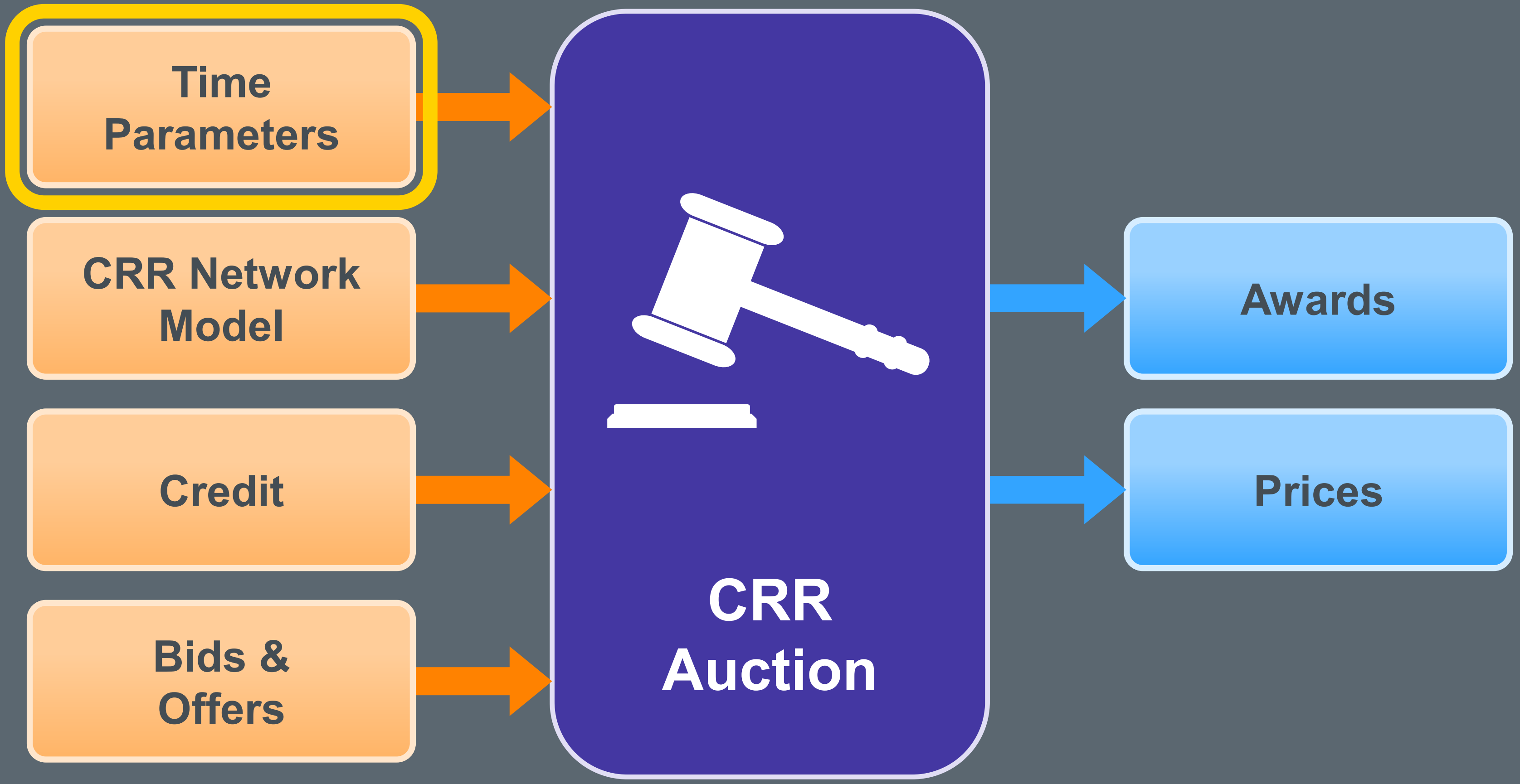
Payment only in DAM



CRR Auction Inputs


CRR Auctions adhere to appropriate time parameters

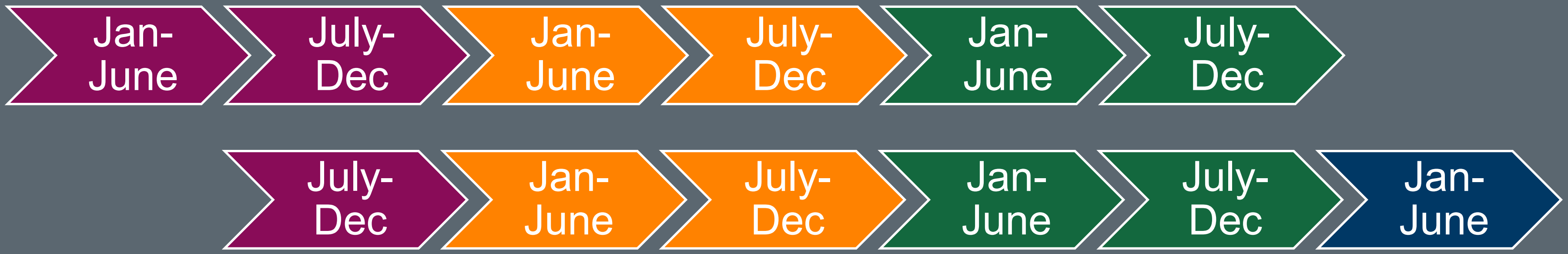


CRR Auction Dates & Parameters are communicated by Auction Notice

CRR Auction Time Parameters

CRR Auctions take place twice per month:

- Monthly Auction
- Long-Term Auction Sequence (LTAS)
  - Six-month timeframe (Jan. - June or July - Dec.)
  - Six Sequences (Three years)
  - One Auction per month



Example: CRR Auction Time Parameters & Availability

2028 System Capacity

- Monthly Auctions = 90%
- Long-Term Auction Sequences
  - Sequence 1 = 70%
  - Sequence 2 = 55%
  - Sequence 3 = 40%
  - Sequence 4 = 30%
  - Sequence 5 = 20%
  - Sequence 6 = 10%

Exact dates on CRR Activity Calendar - http://www.ercot.com/mktinfo/crr

CRR Auction transaction requirements

- Date Range: One-Month Strips
- Time-of-Use (TOU) Blocks: Off-Peak, Peak WD & Peak WE

<table>
<tr><th>Monday</th><th>Tuesday</th><th>Wednesday</th><th>Thursday</th><th>Friday</th><th>Saturday</th><th>Sunday</th></tr>
<tr><td colspan="7">Off-Peak (0100 – 0600)</td></tr>
<tr><td colspan="5">Peak Weekday (0700 – 2200)</td><td colspan="2">Peak Weekend (0700 – 2200)</td></tr>
<tr><td colspan="7">Off-Peak (2300 – 0000)</td></tr>
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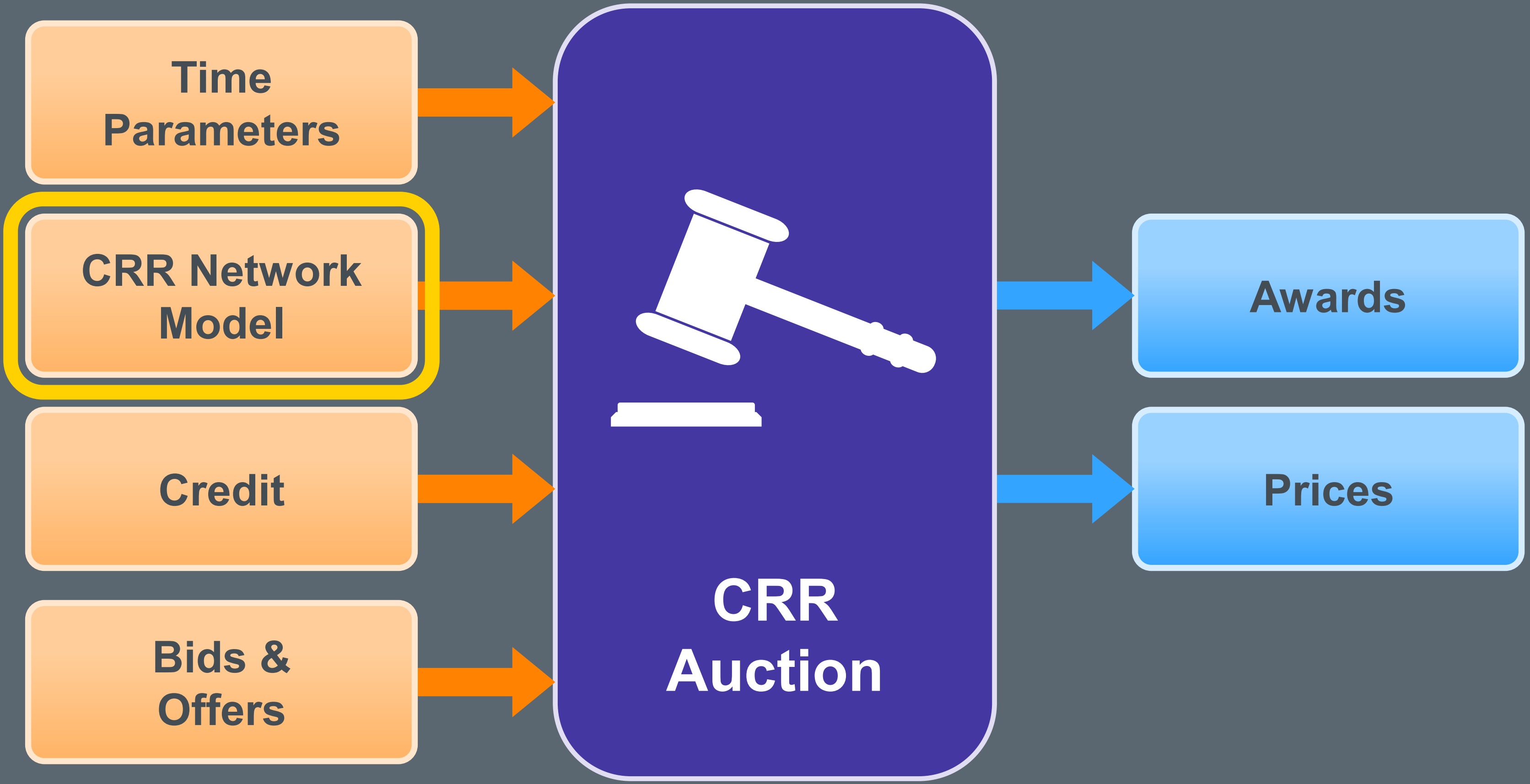
CRR Transactions are limited by the System Capacity



ERCOT determines System Capacity

- Derived from the Network Operations Model
- Used in the CRR Network Model
    - Represents real-world transmission system
    - Reflects operational feasibility and constraints
    - Bulit per month (same model for all TOUs)
    - Most limiting case (hour)

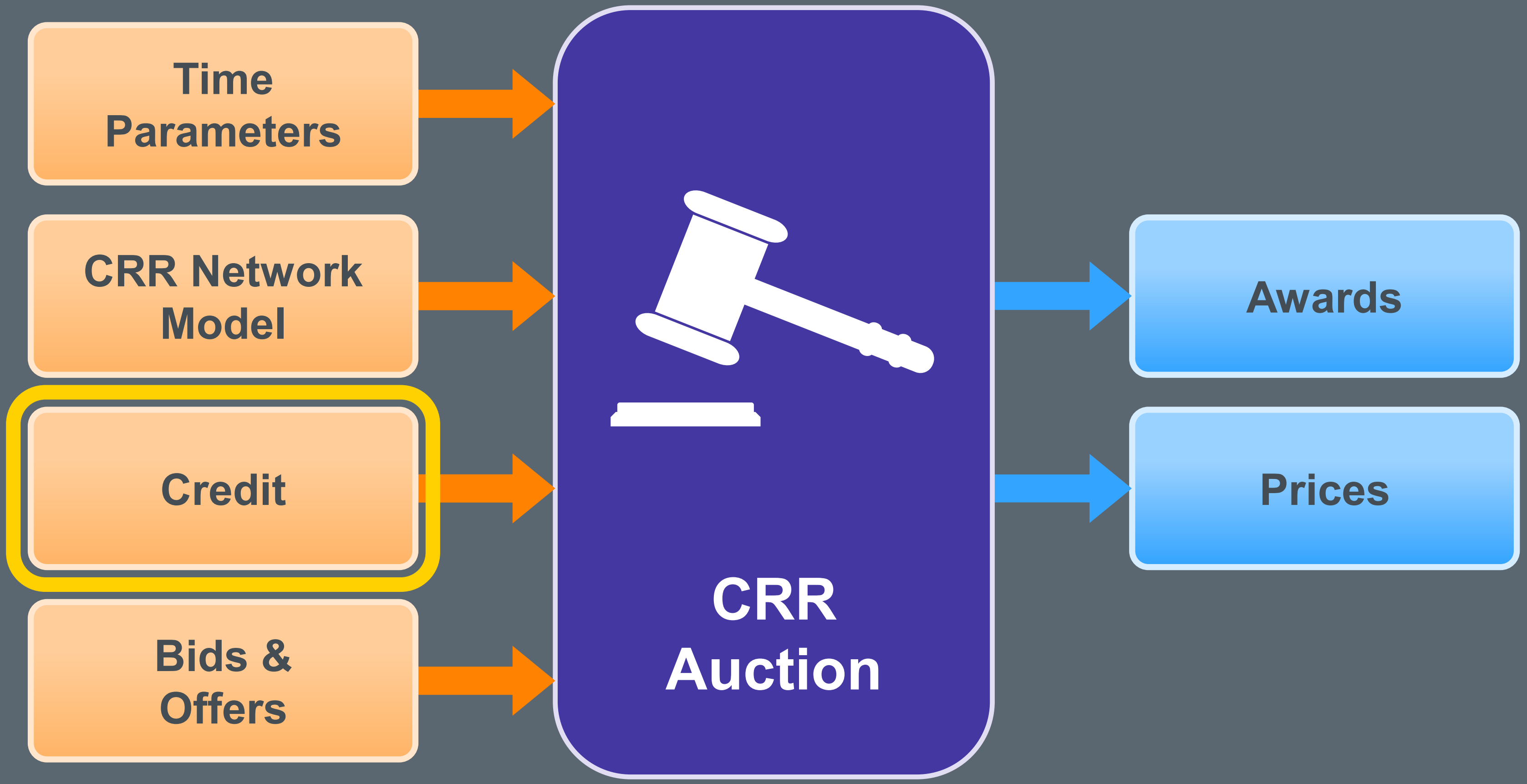
Posted:

- Monthly Auctions:
  - 10 business days in advance
  - 1 Model
- Long-Term Auction Sequences:
  - 20 business days in advance
  - 6 Models (one for each month)

Reflects:

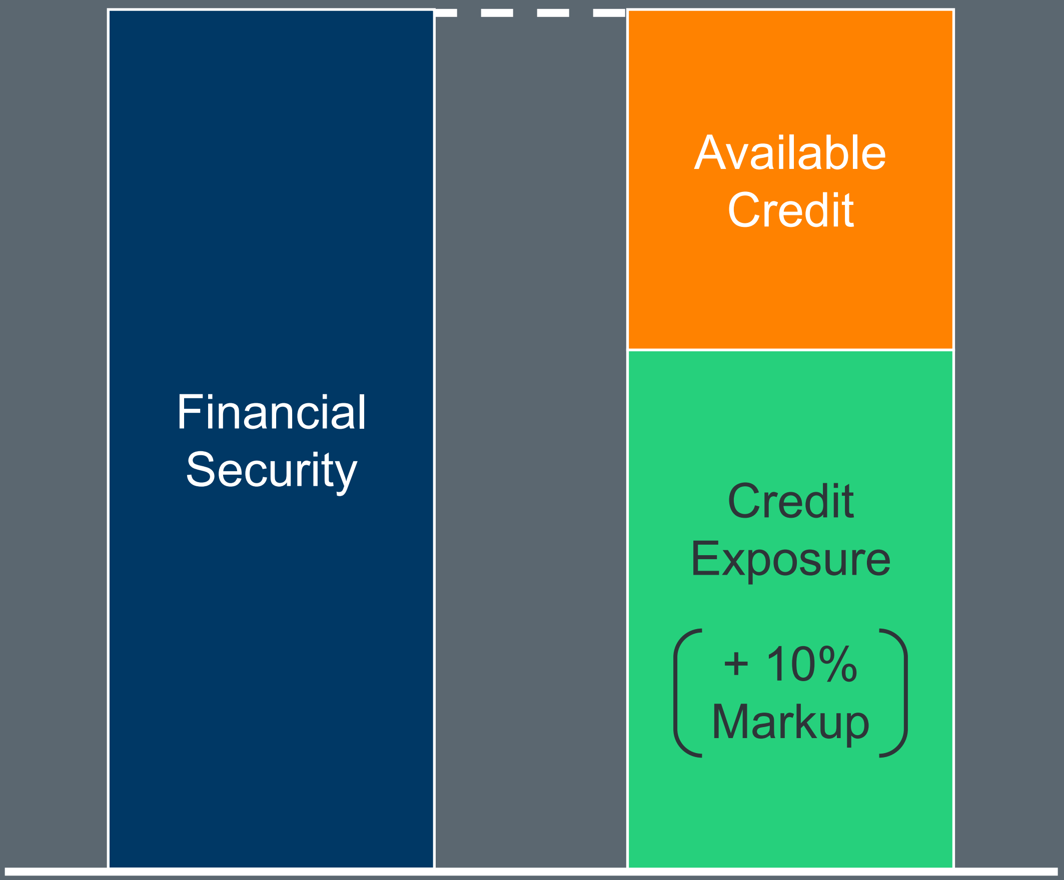
- Transmission Elements
- Significant Outages
- Dynamic Ratings
- Contingency List
- Settlement Points

CRR Account Holders are limited by their posted Credit



Introducing … The Counter-Party

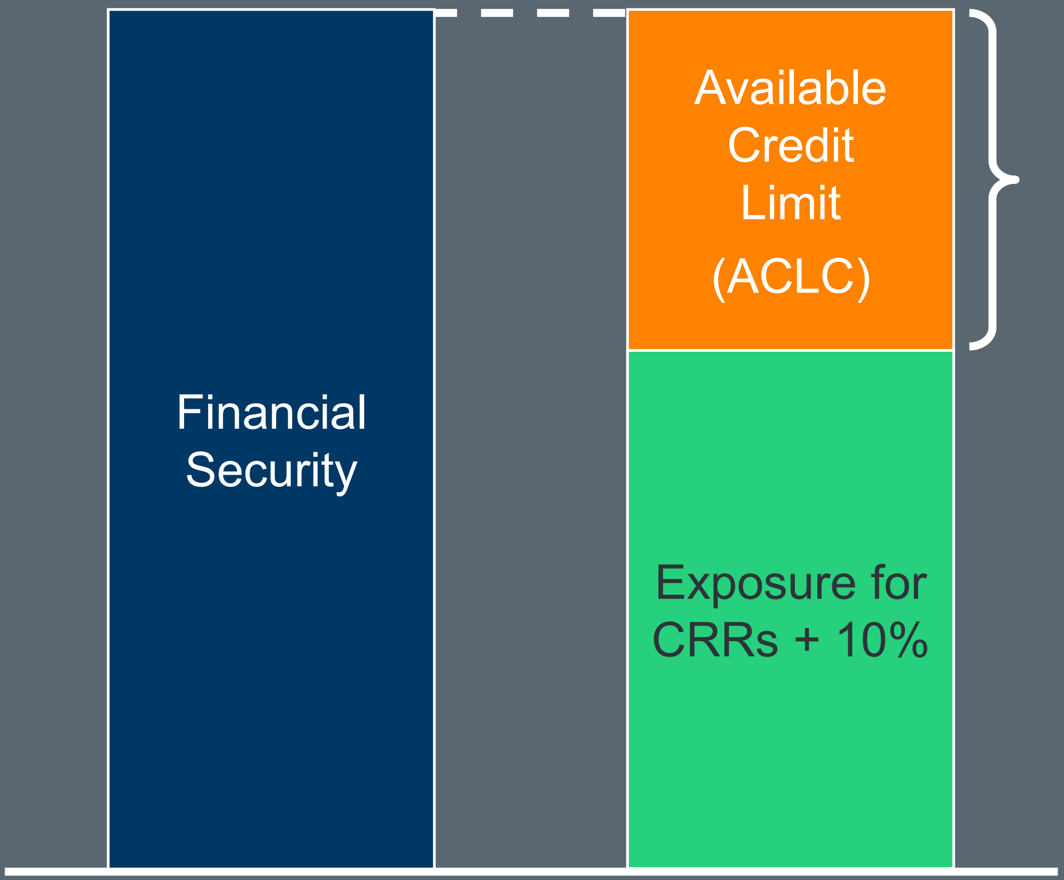
Available Credit



Counter-Party posts Financial Security to make credit available to its CRR Account Holders and QSEs

Available Credit Limit for CRR Auctions (ACLC)

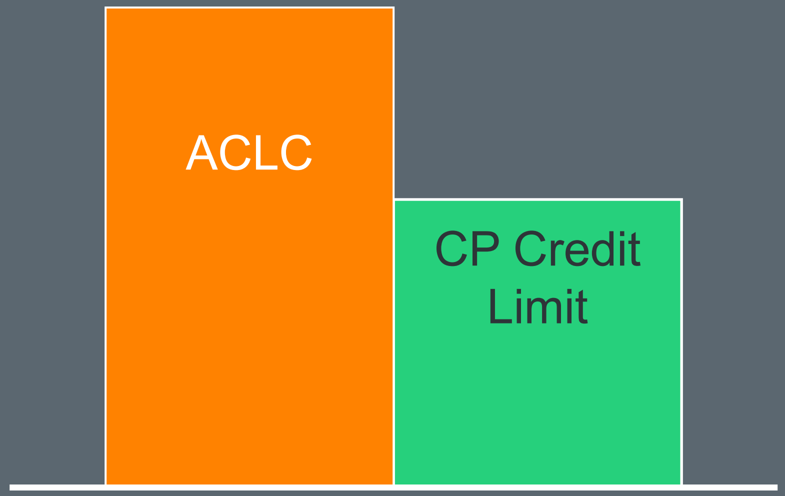
ERCOT Calculates Counter-Party's ACLC



Counter-Party allocates up to 100% to CRR Auction

Counter-Party locks Credit Limits for an Auction

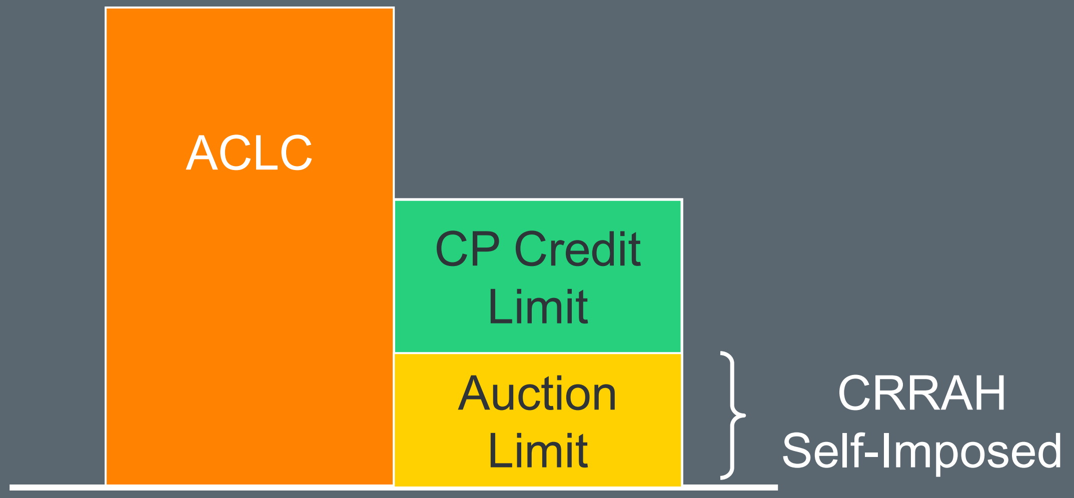
- Needed for CRR Account Holder to participate
- Unique values for each Time-of-Use (TOU) in a Long-Term Auction Sequence (LTAS)



Counter-Party must lock credit by close of the Bid Window for the CRR Auction

Special Rules

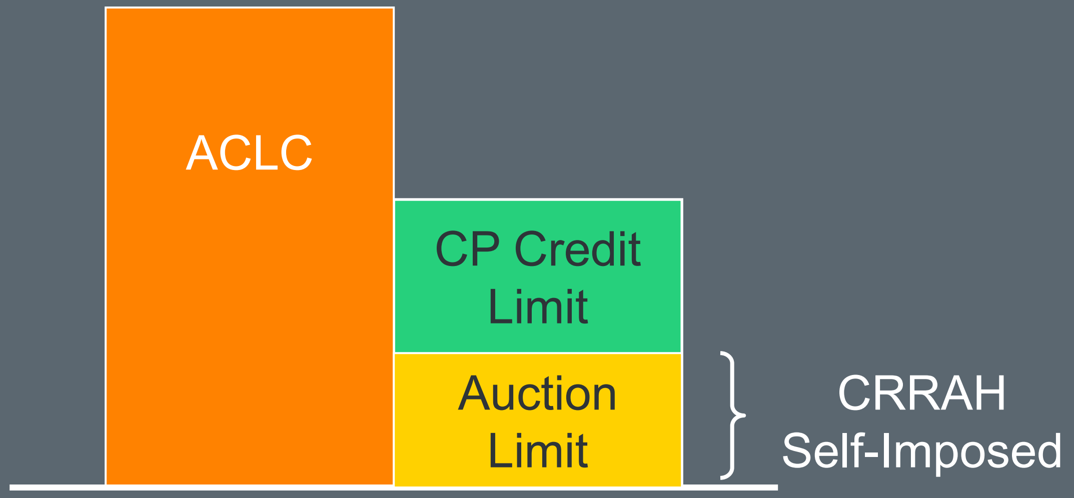
- CRR Account Holder may assign a self-imposed Credit Limit
- Counter-Party Credit limit remains locked from other market activities



For credit-lock deadlines, refer to the CRR Activity Calendar on ercot.com

Credit Consumption for CRR Auctions

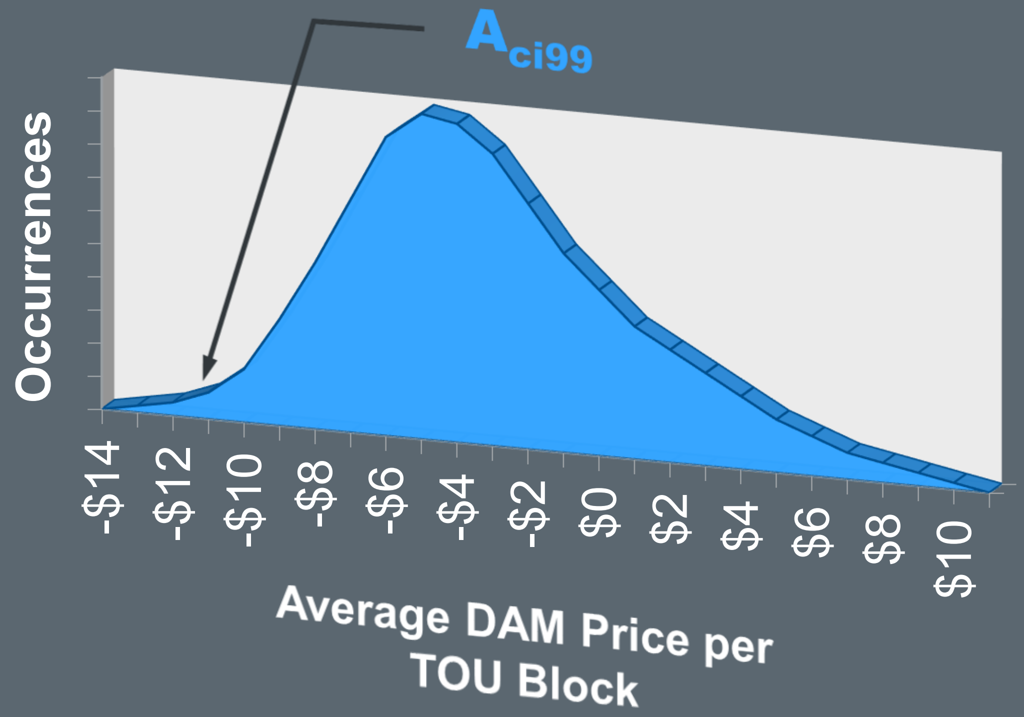
- PTP Option Offers: *no credit consumed*
- PTP Option Bids: volume * bid price * TOU hours
- PTP Obligation Offers: volume * Min (0, offer price) * TOU hours
- PTP Obligation Bids: volume * (bid price + Path-Specific Adders) * TOU hours



Path-Specific Adders for PTP Obligation Bids

- Calculated daily for each source/sink pair from DAM prices
- Average of recent history (by TOU block)
- Rolling three-year look-back

ci99 = 99th percentile Confidence Interval



CRR Auction

AOBLCR = Auction PTP Obligation Credit Requirement

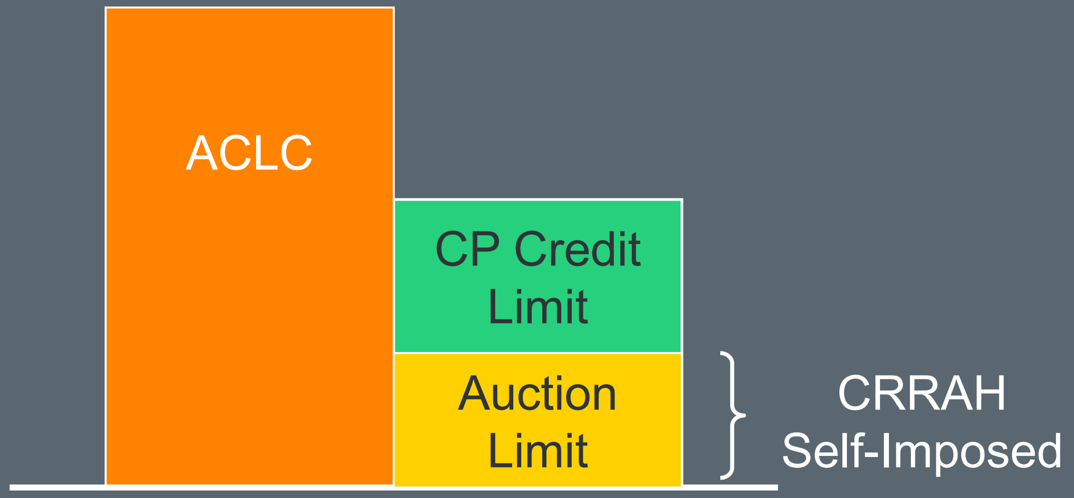
$$AOBLCR = BOBLMW * (Max\ (0,\ BPOBL) - Min(0,\ Aci_{99},\ EACP))$$

BOBLMW	Awarded Bid PTP Obligation (MW)
BPOBL	Bid Price for PTP Obligation
Aci_{99}	Path-Specific DAM-Based Adder
EACP	Effective Auction Clearing Price

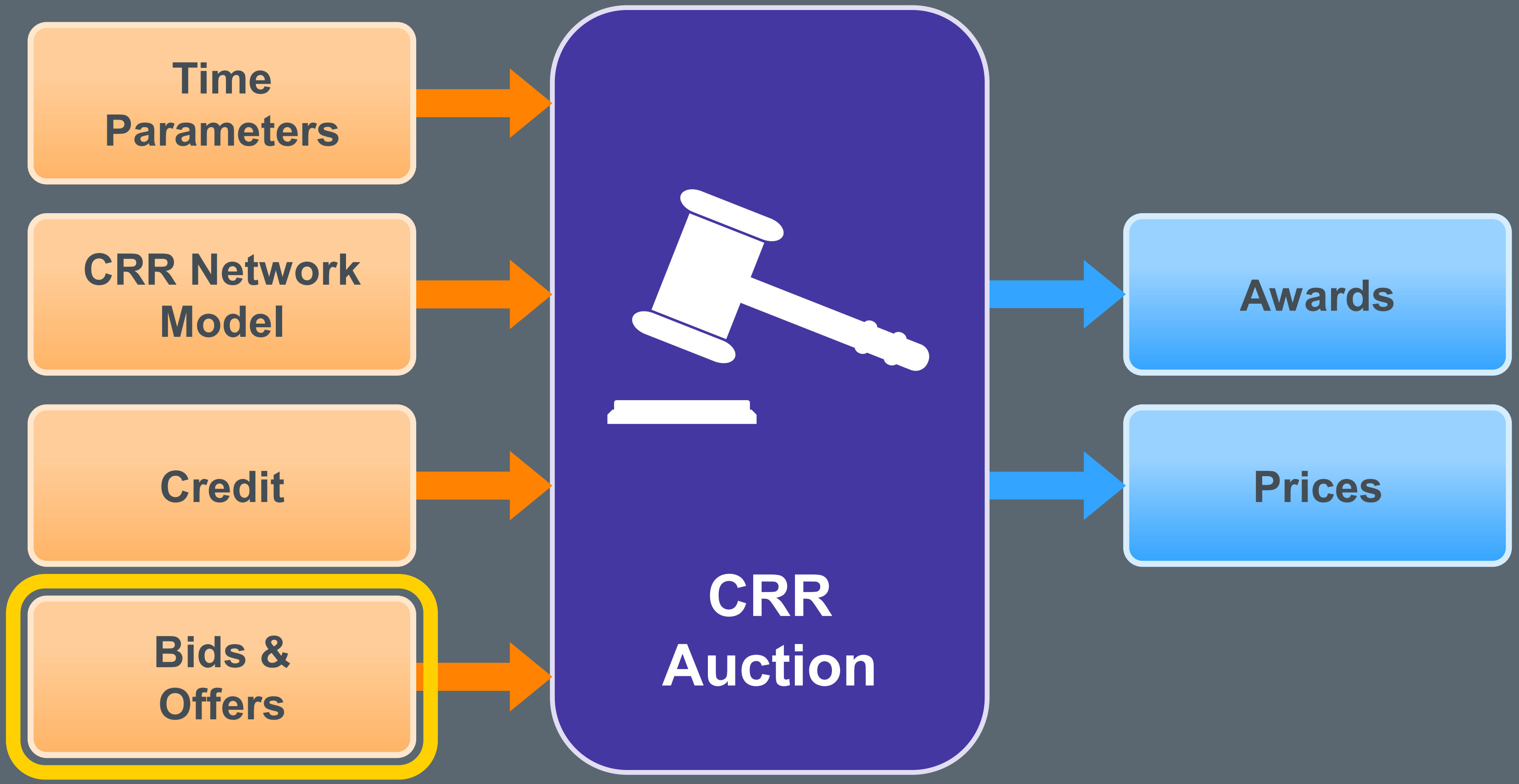
Credit Pre-Screening for CRR Auctions

When: Credit Consumption < Locked Credit

- Credit Limits are ignored during the auction
- Extra Credit is typically released 2 days later

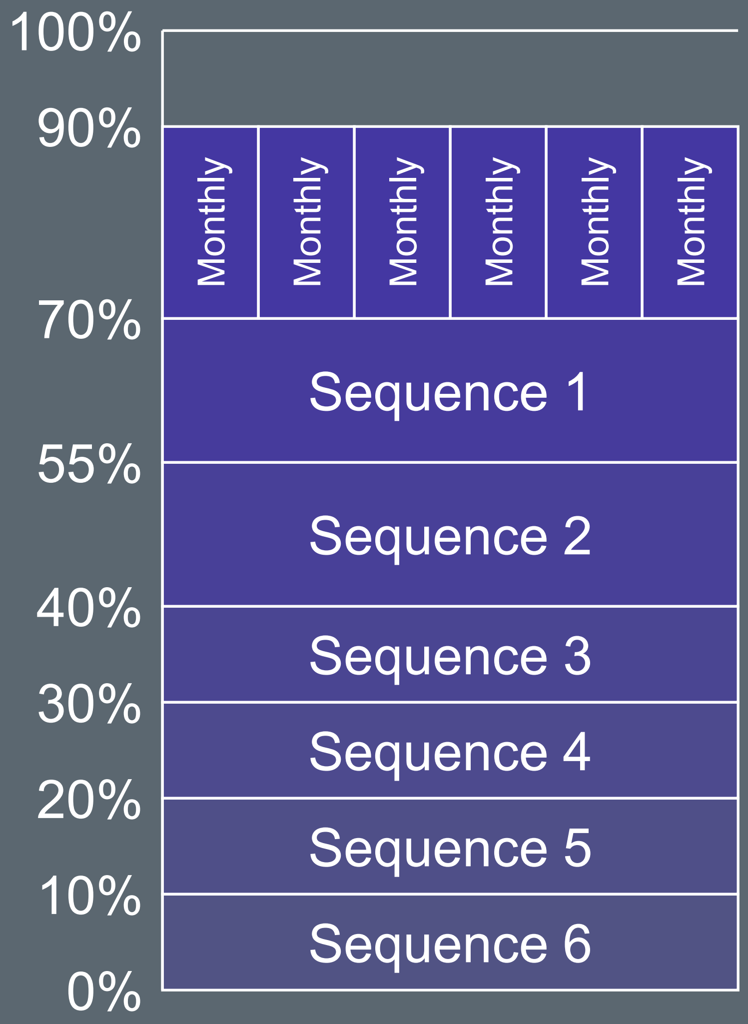


CRR Account Holders submit Bids and Offers



Previously granted transactions

- Allocated PCRRs
- Awarded CRRs



Pre-Assigned Congestion Revenue Rights (PCRRs)

- Established through long-term supply contracts (prior to 9/1/1999)
- Based on annual nominations (prior to Sequence 6)
- Cost = % of CRR Auction clearing price
- Confirmed by a Simultaneous Feasibility Test
  - DC power-flow model
  - Used during Allocation and DAM

Buy CRRs limited by maximum Quantity & Price

CRRAH	Source	Sink	MW	Price	TOU	Buy/Sell	Type	Start Date	End Date
COPE1	RN1	LZ4	10	$12	Peak WD	Buy	Option	07/01/2028	07/31/2028
COPE1	RN2	LZ4	8	$9	Peak WE	Buy	Option	07/01/2028	07/31/2028
COPE1	LZ5	RN3	5	$5	Off-Peak	Buy	Obligation	07/01/2028	07/31/2028
COPE1	Hub1	LZ2	5	$8	7x24	Buy	Obligation	07/01/2028	07/31/2028

Monthly Auctions allow for 7x24 Block Bids

Treated as a single bid across all three Time-of-Use blocks

IF…	THEN…
Bid Price ≥ Hourly-weighted average of TOU clearing prices	**Awarded** 7x24 Block Bid
Bid Price < Hourly-weighted average of TOU clearing prices	**Rejected** 7x24 Block Bid

Example: CRR 7x24 Block Bid

Consider a July 2028, CRR 7x24 Block Bid

- Bid Path: Hub 1 to Load Zone 2
- Bid Price: $8/MW
- Clearing Prices: $4 Off-Peak, $5 Peak WE, & $10 Peak WD
- Hours: 248 Off Peak, 176 Peak WE, 320 Peak WD, & 744 Total

Hourly Weighted Average = (248*$4 + 176*$5 + 320*$10) / 744

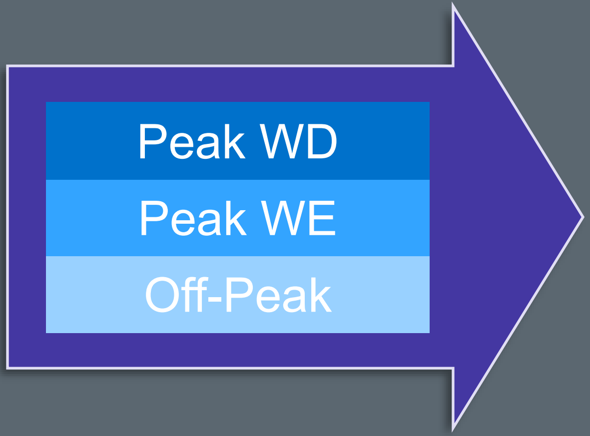
Hourly Weighted Average = $6.8172

$8.00 > $6.82, so the 7x24 Block Bid is awarded

Hours verified in the “CRR Time of Use Hours” Report

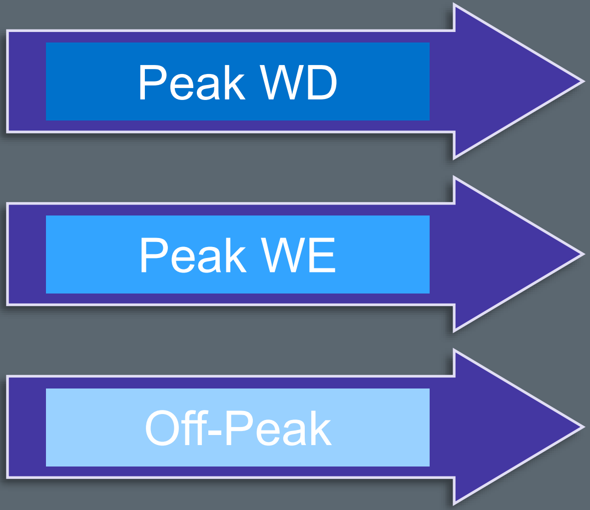
7x24 Block Bids are not allowed in Long-Term Auction Sequences

Monthly



TOU blocks
Optimized
Simultaneously

LTAS



TOU blocks
Optimized
Independently

Requirements for PTP Options

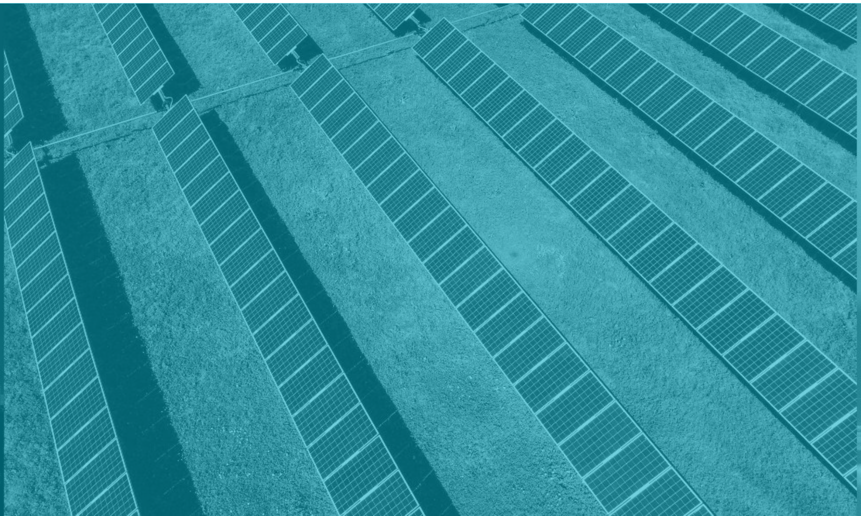
- Minimum Bid Price
  - Currently $0.01/MW/h
  - Reviewed by TAC annually
- Option Award Fee
  - When Option Clearing Price < Minimum Bid Price
  - Option Clearing Price + Option Award Fee = $0.01/MW/h

Sell CRRs limited by maximum Quantity & minimum Price (Only the owner of record can offer a CRR)

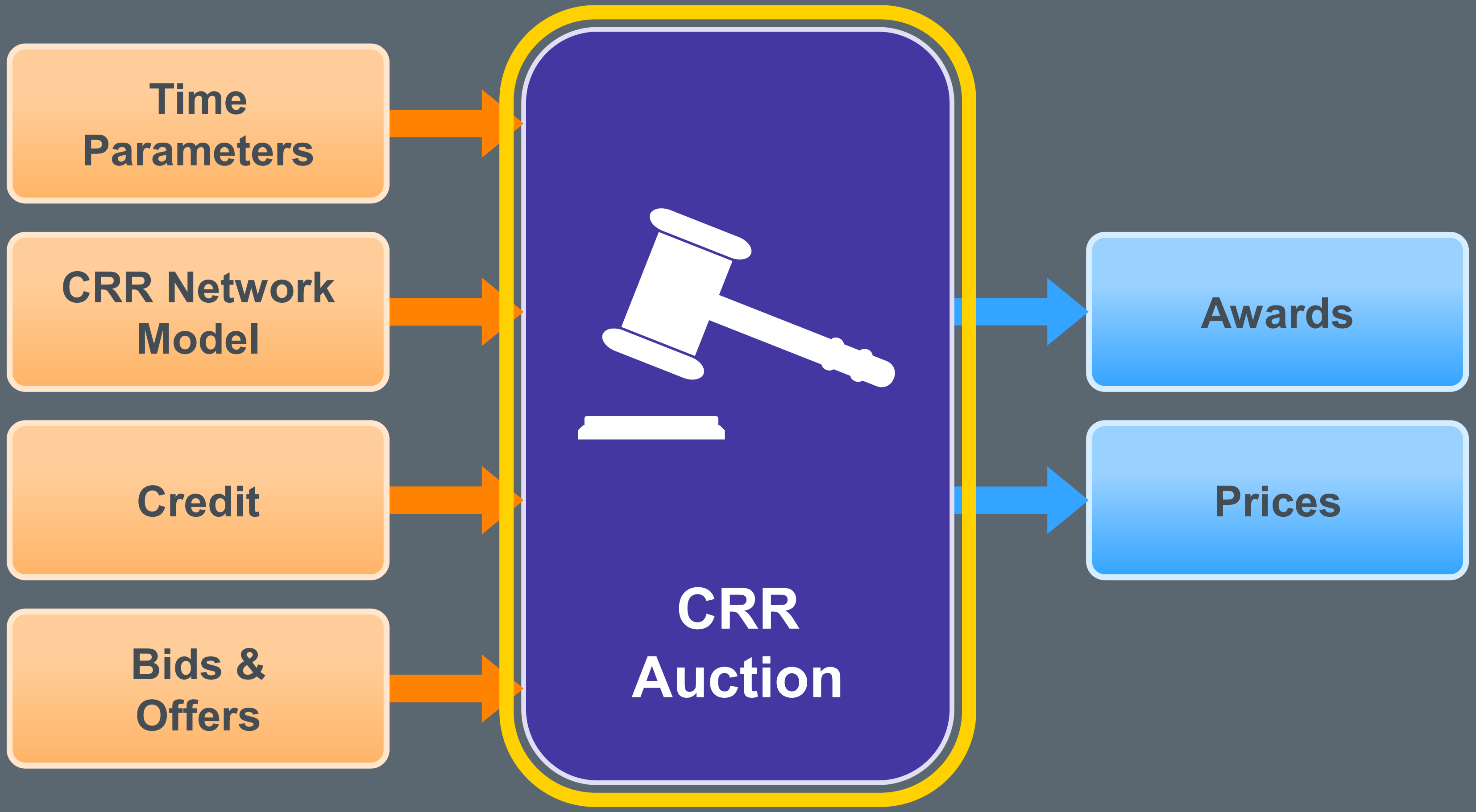
CRR ID	CRRAH	Source	Sink	MW	Price	TOU	Buy/Sell	Type	Start Date	End Date
86753	COPE1	RN1	LZ4	5	$15	Peak WD	Sell	Option	07/01/2028	07/31/2028
75309	COPE1	RN2	LZ4	4	$10	Peak WE	Sell	Option	07/01/2028	07/31/2028
84261	COPE1	LZ5	RN3	2	$8	Off-Peak	Sell	Obligation	07/01/2028	07/31/2028
29104	COPE1	Hub1	LZ2	2	$6	Peak WE	Sell	Obligation	07/01/2028	07/31/2028



CRR Auction Process & Results


CRR Auction Clearing Process



CRR Auction Objective

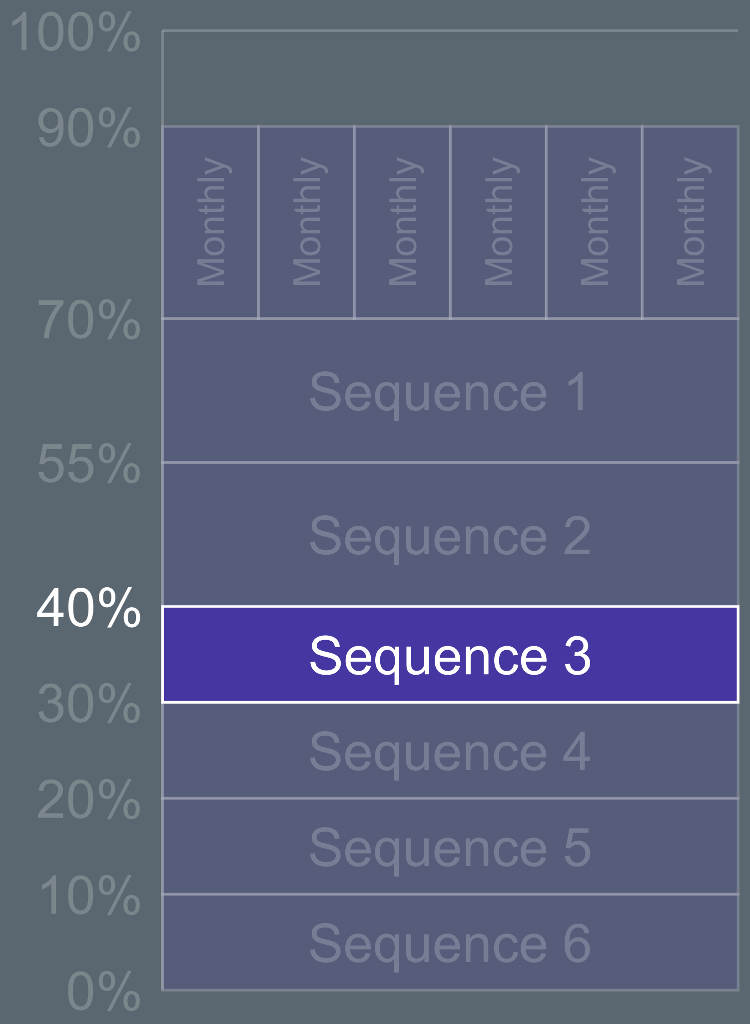
- Maximize net auction revenue
  - Bid-Based Value
  - Offer Based Cost
- Subject to applicable constraints
  - CRR Network Model
  - Credit
  - Previous Transactions

CRR Auction Objective is accomplished by a single-round, simultaneous auction

CRR Auction

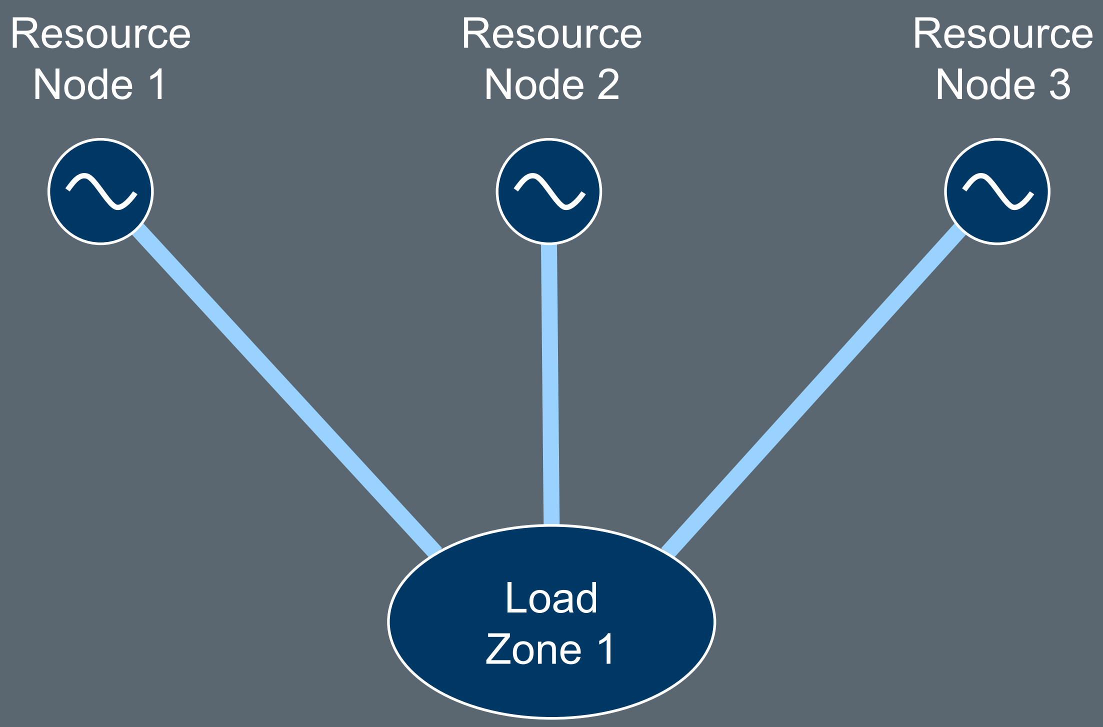
Need up to 8 Volunteers to be CRR Account Holders (AH1 to AH8)

- Participate in the Jan to Jun 2028 LTAS
  Sequence 3 = 10%
- Purchase April 2028 Peak Weekday PTP Options
  - RN1 to LZ1: **30MW** Capacity (**AH1**, **AH2** & **AH3**)
  - RN2 to LZ1: **30MW** Capacity (**AH4** & **AH5**)
  - RN3 to LZ1: **30MW** Capacity (**AH6**, **AH7** & **AH8**)
- Determine Option Bids (historical data provided)
  - Price Limit: Bid Price ≥ **$0.01**
  - Bid Limit: **2 Bids** per AH
  - Credit Limit: **20 MW** total



CRRAH participates in a Monthly CRR Auction

- Self-imposed Credit Limit = $600,000
- PTP Option Bid
    - RN1 to LZ1
    - 10MW @ $500
    - TOU hours = 240



CRRAH is awarded 5MW @ $20

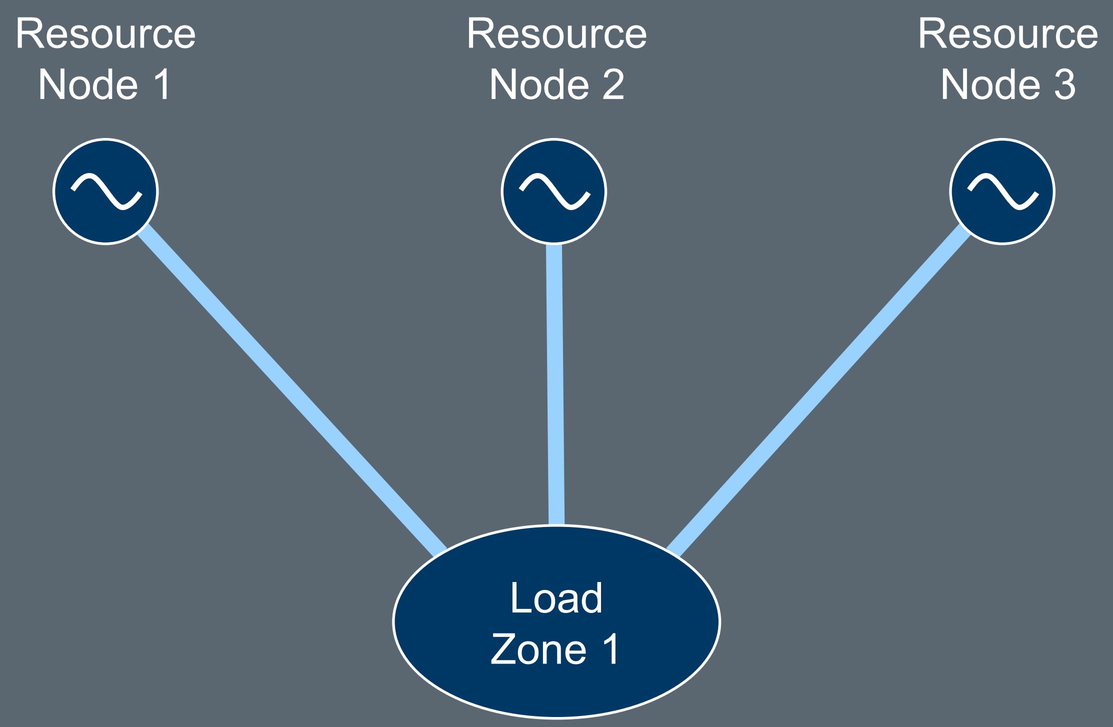
What happened?

CRRAH participates in a Monthly CRR Auction

- Self-imposed Credit Limit = $216,000
- PTP Obligation Bid
  - RN3 to LZ1
  - 10MW @ $90
  - TOU hours = 240

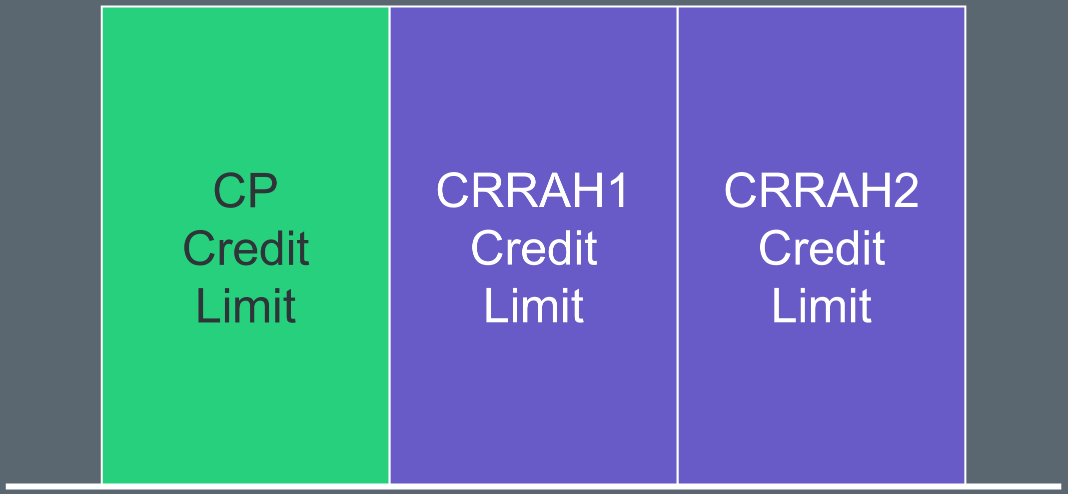
CRRAH is awarded 9MW @ -$20

What happened?



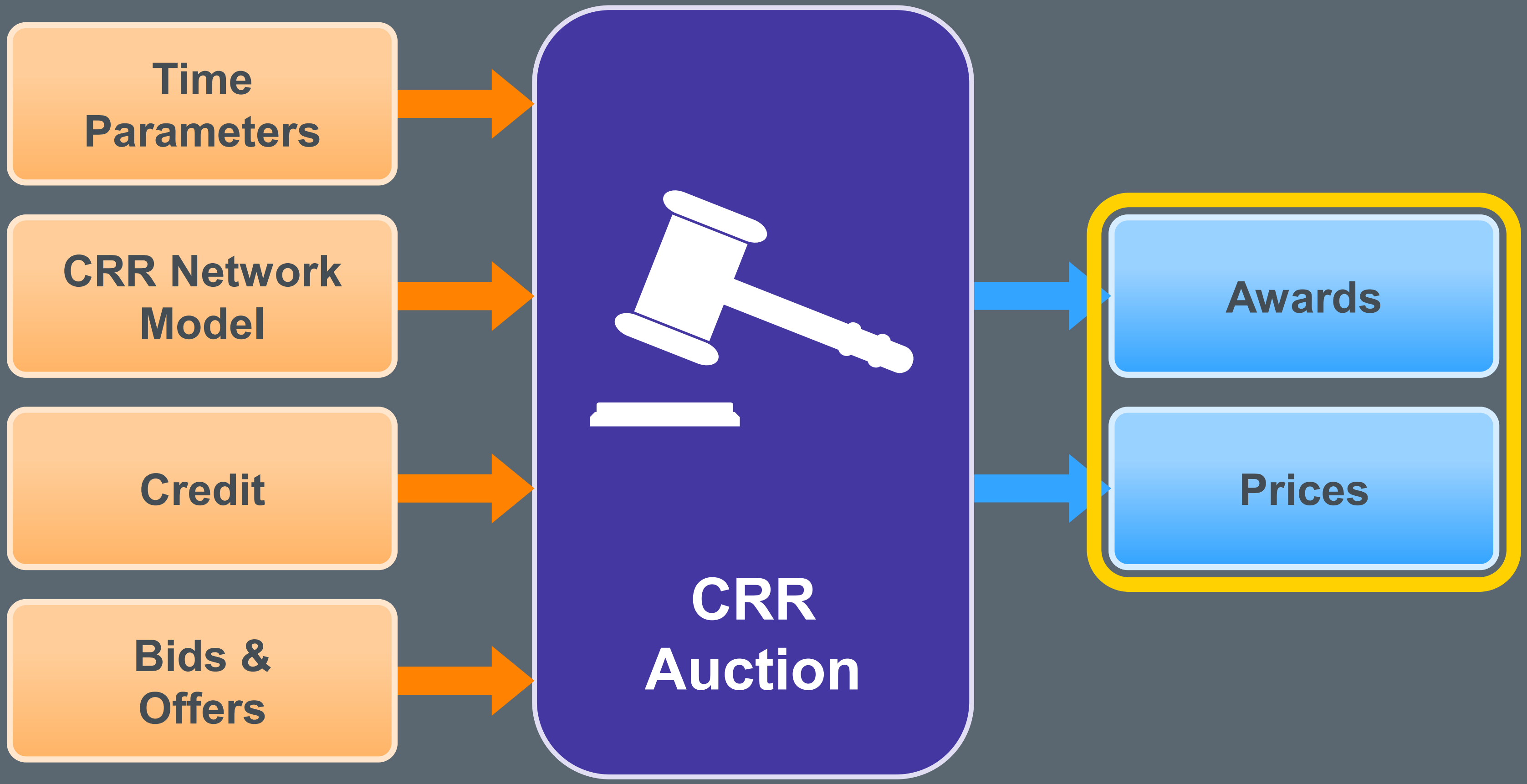
A Counter-Party has CRRAH1 and CRRAH2

Self-imposed credit limits are set



What happens?

CRR Auction Results



CRR Auction Postings

General Results

- All awarded CRRs
- Binding Constraints
- All Bids and Offers (no CRRAHs)

Specific Results

- CRRAH awarded CRRs
- Unique transaction IDs

Awarded CRRs include CRRAHs, Source-Sink, TOU, MWs, Clearing Prices, & Effective Dates

Charges and Payments for awarded transactions

- **Charge for awarded CRR Bids**

  = Clearing Price * Awarded Quantity * TOU Hours

- **Payment for awarded CRR Offers**

  = (-1) * Clearing Price * Awarded Quantity * TOU Hours

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