



Forward Markets 101



Greetings
and
Introductions

Attendance

Questions

Presentation Materials

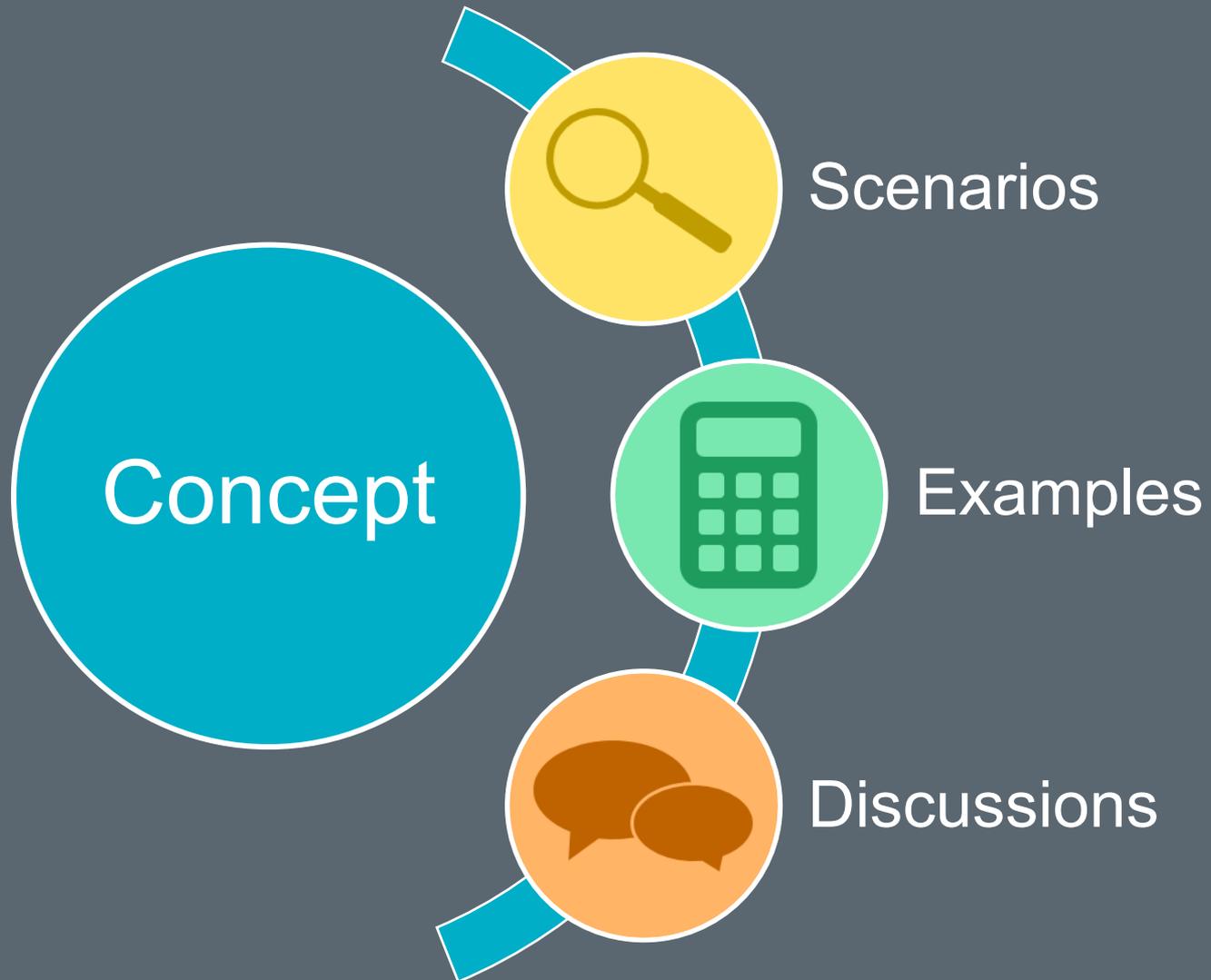


PROTOCOL DISCLAIMER

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

Introduction

2

Forward Markets

3

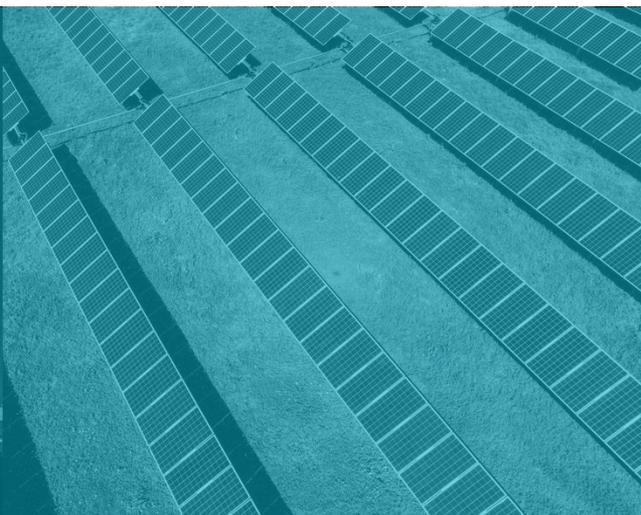
Congestion

4

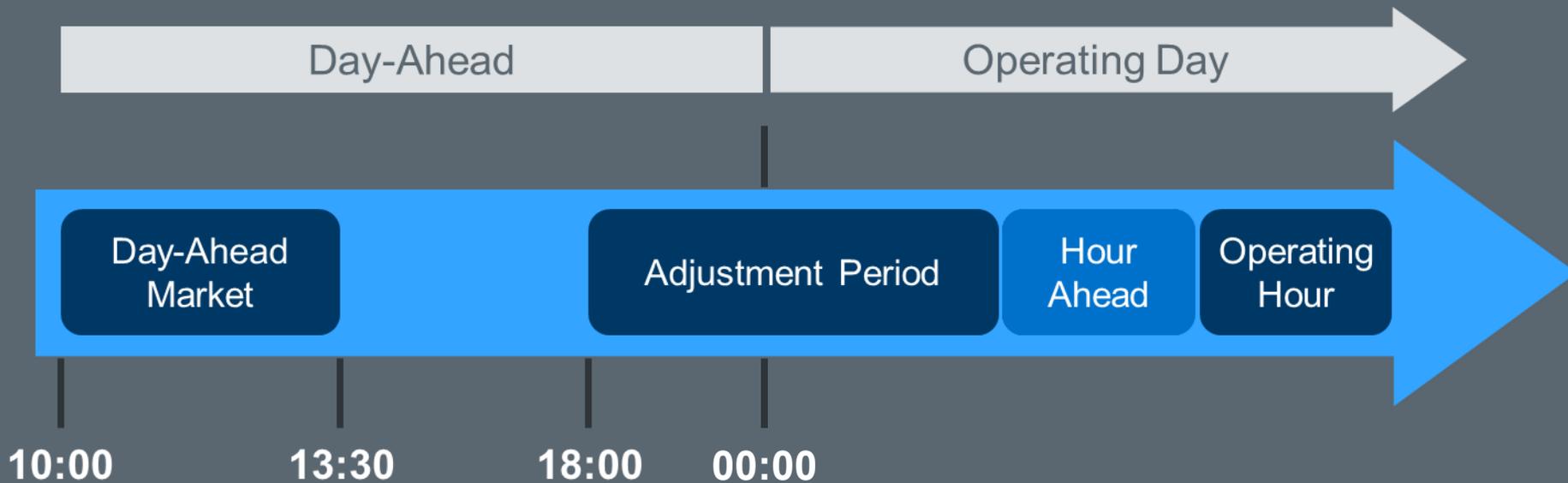
Summary and Conclusion

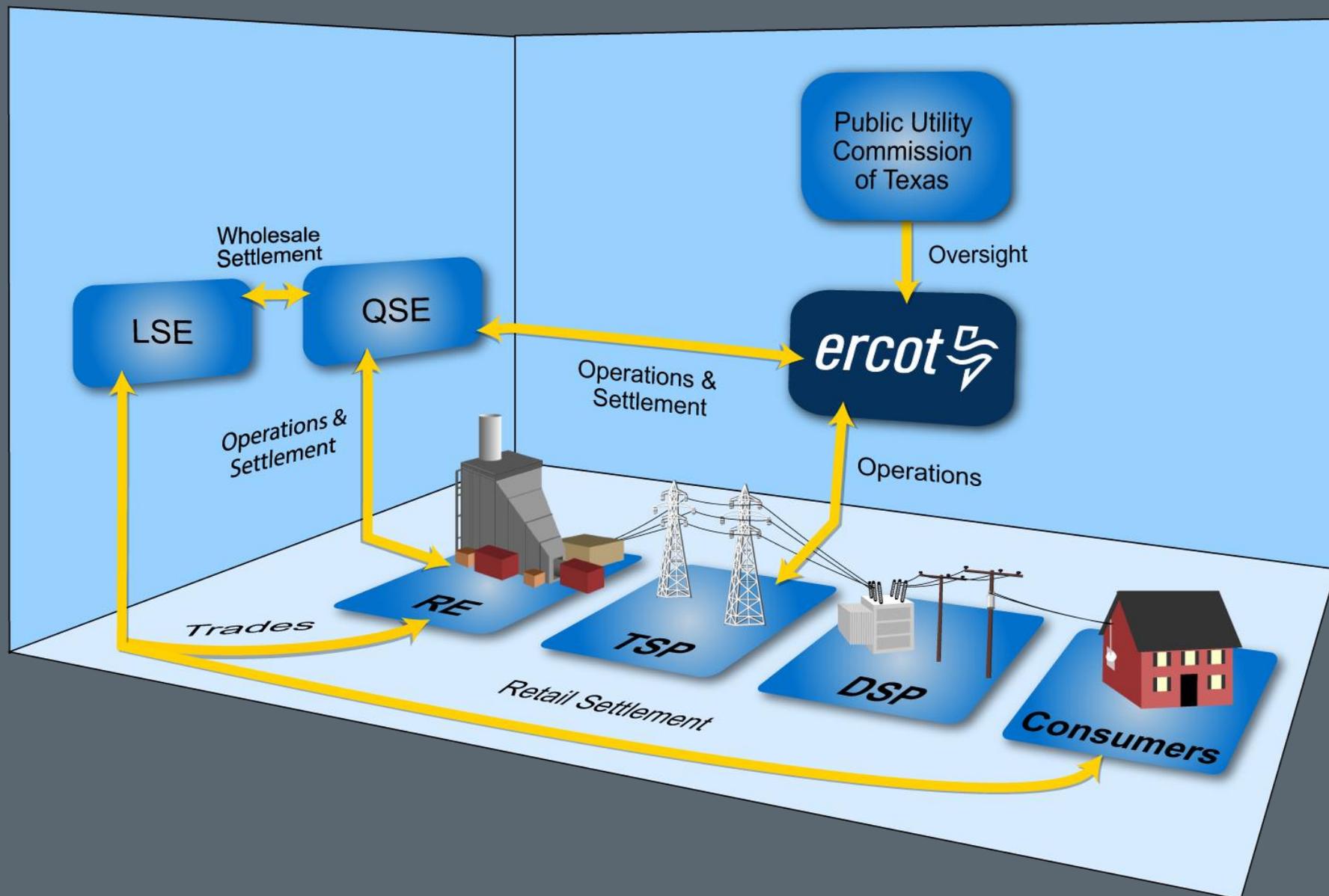


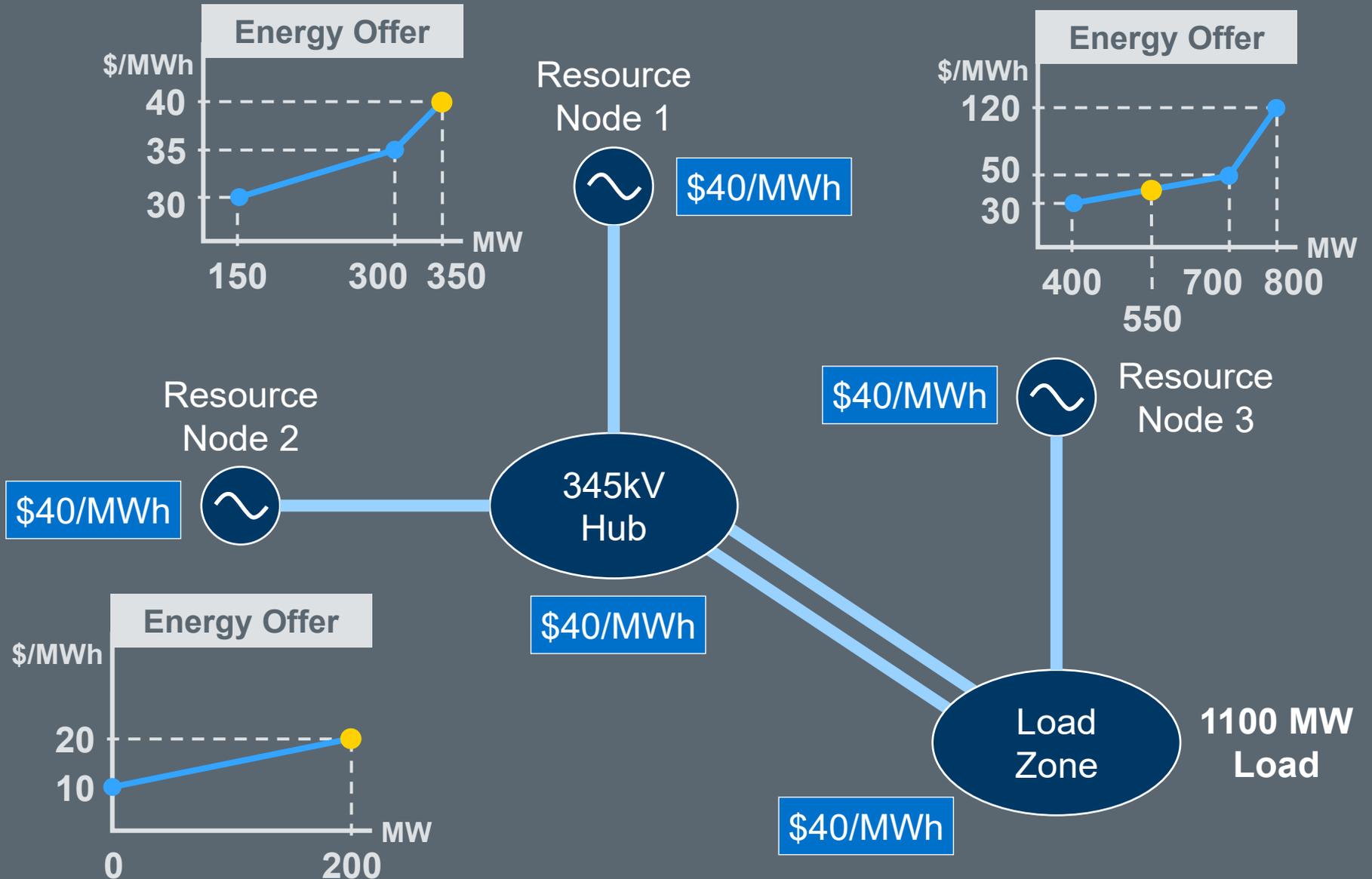
Introduction



In general . . .









Forward Markets



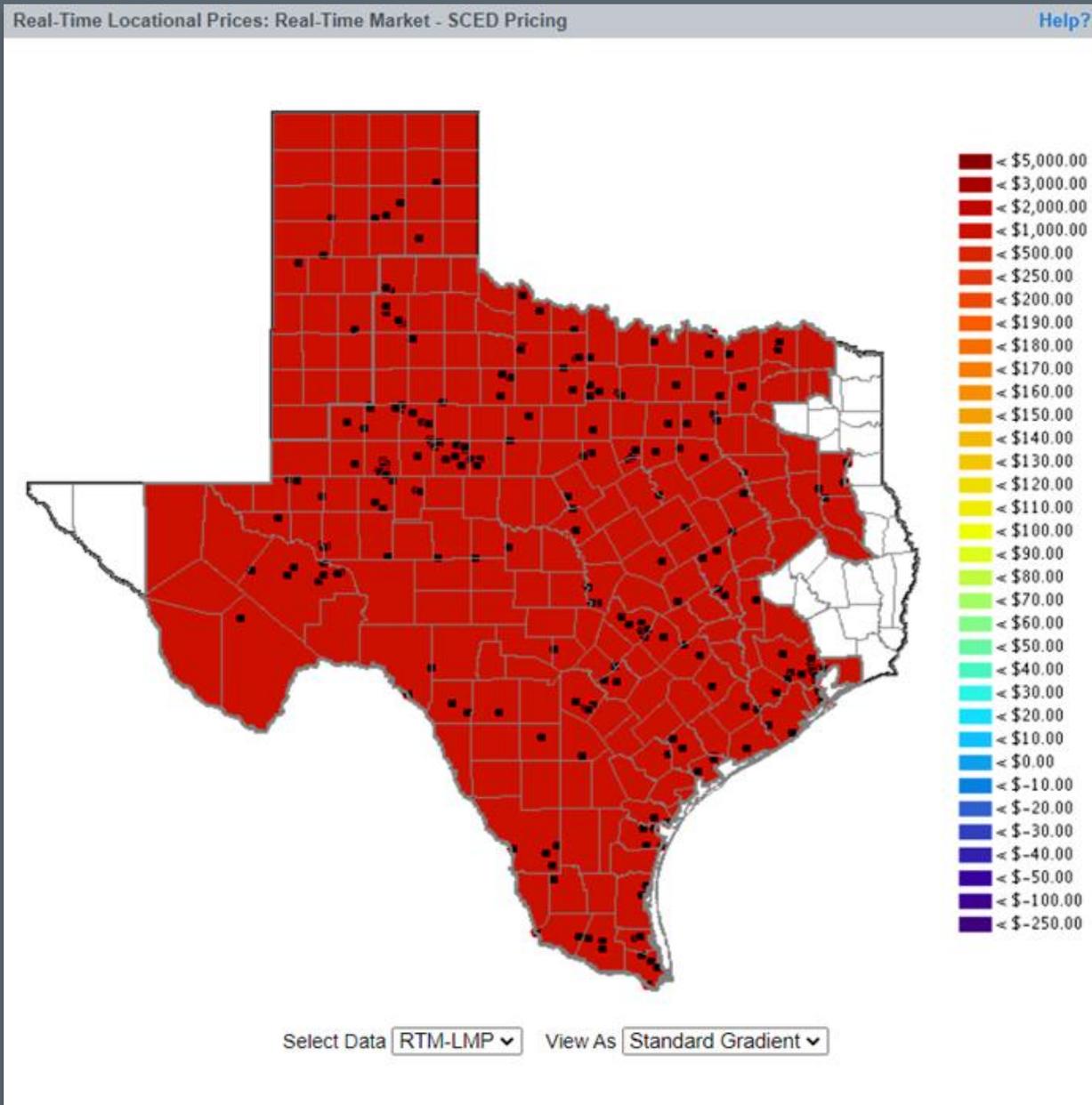
Hedging is transacting at a known price now ...

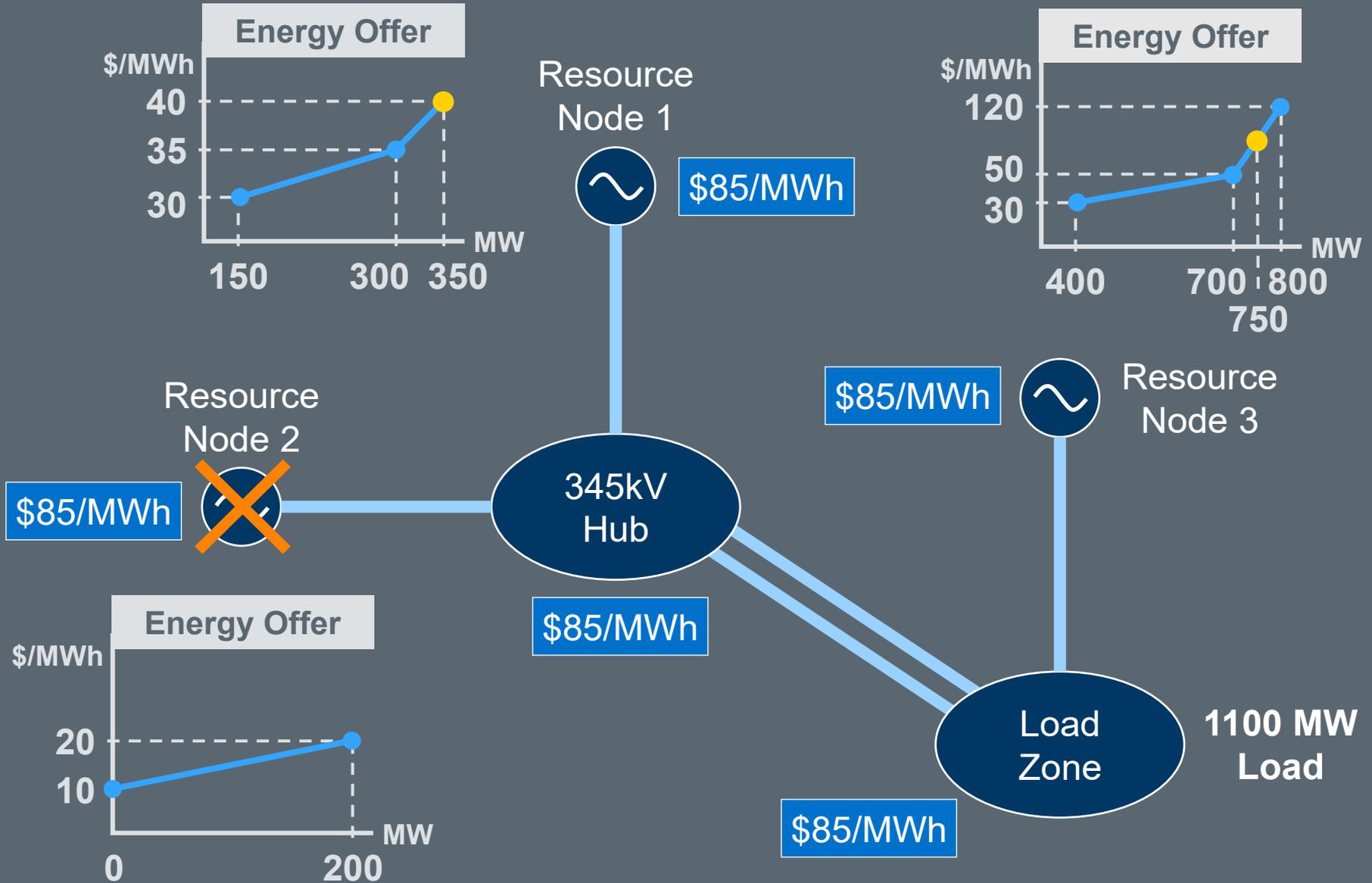


... to protect from having to transact at an unknown price later.



Discussion: Hedging for High Prices





Day-Ahead Market

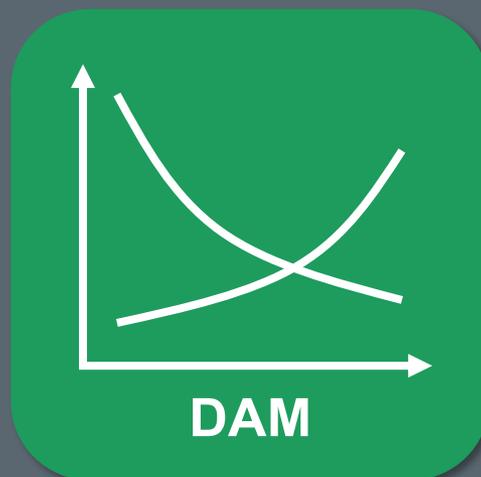


Bilateral Trades

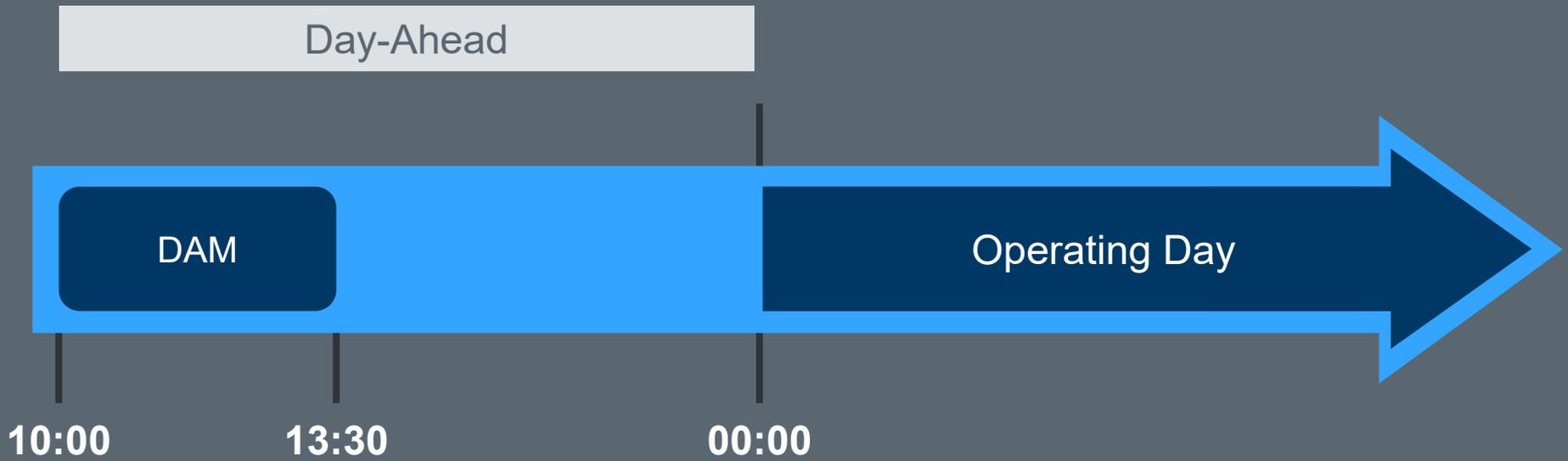


Centralized Forward Market

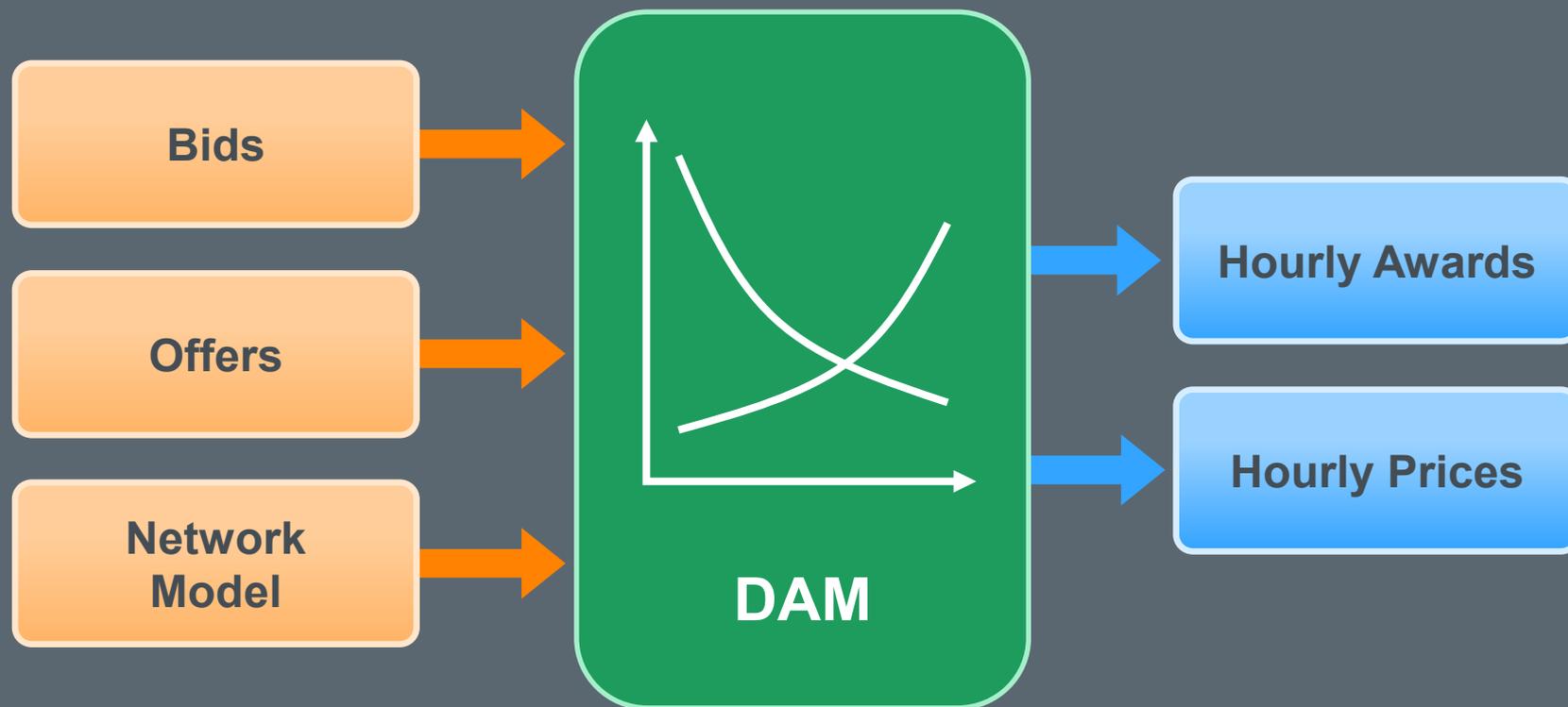
- Conducted daily
- Facilitated by ERCOT



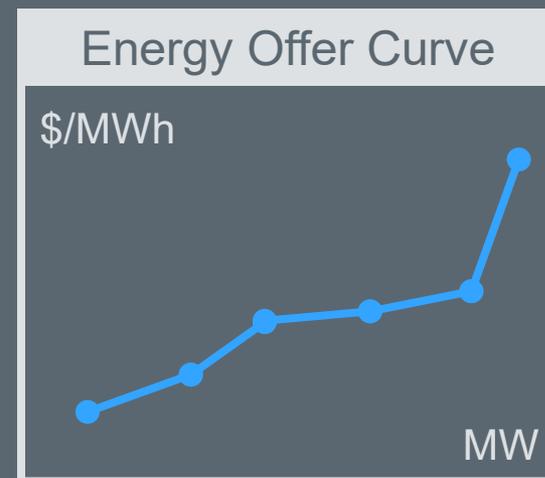
Timing



Transactions



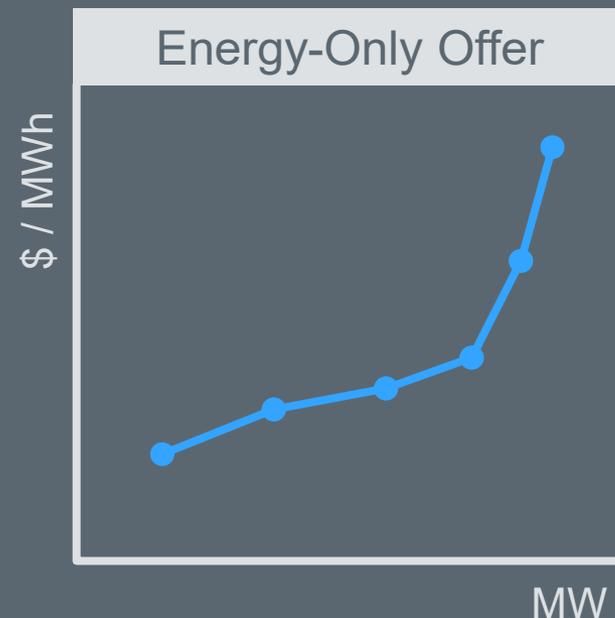
Three-Part Supply Offer



Financial obligation in Real-Time

Day-Ahead Market Energy-Only Offer

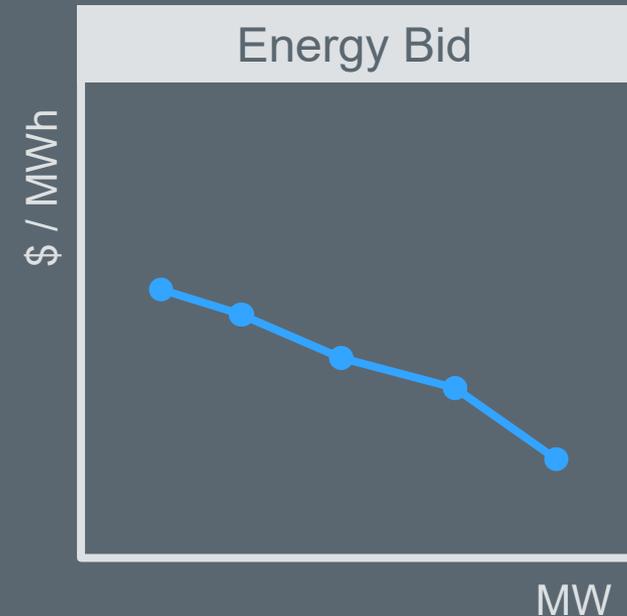
- Proposal to sell energy in DAM
- Offered at any Settlement Point



Financial obligation in Real-Time

Day-Ahead Market Energy Bid

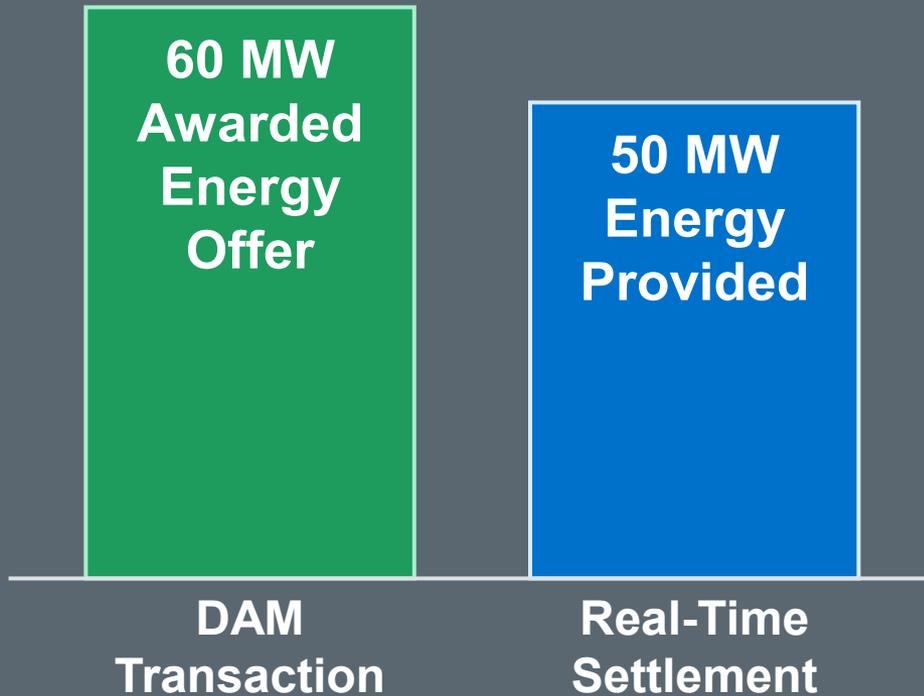
- Proposal to buy energy in DAM
- Submitted at any Settlement Point



Financial credit in Real-Time

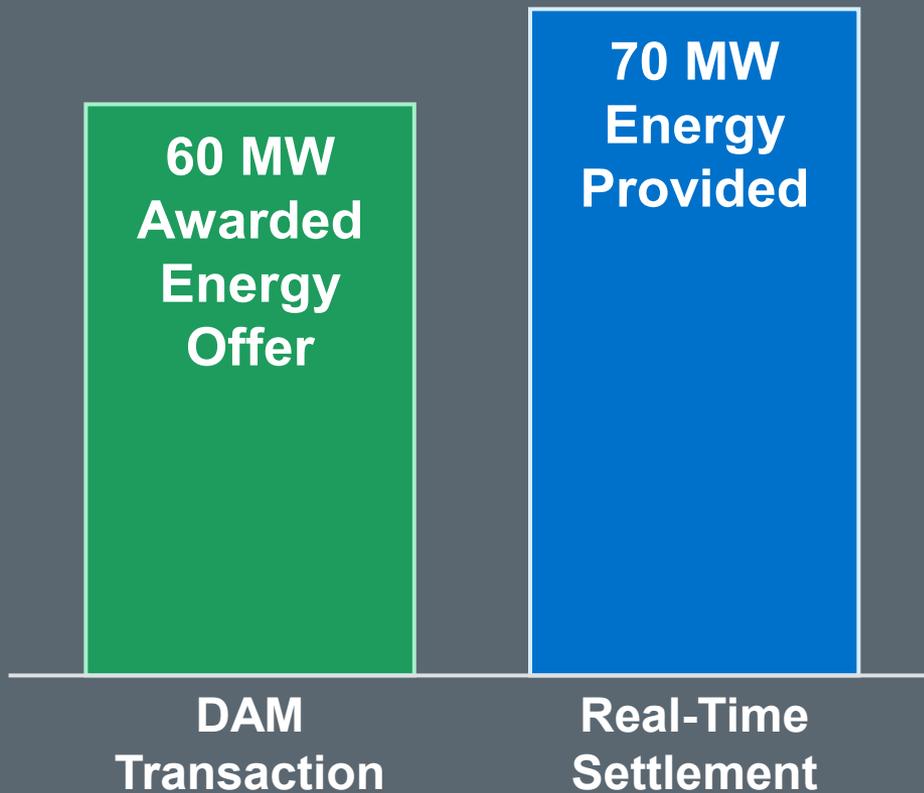


QSE awarded Energy Offer in DAM



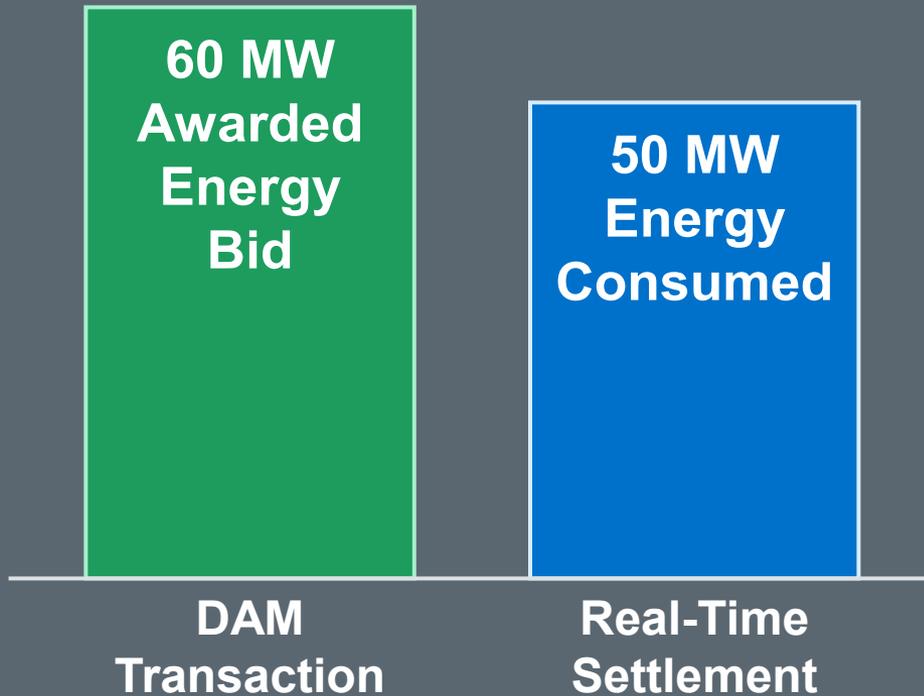


QSE awarded Energy Offer in DAM



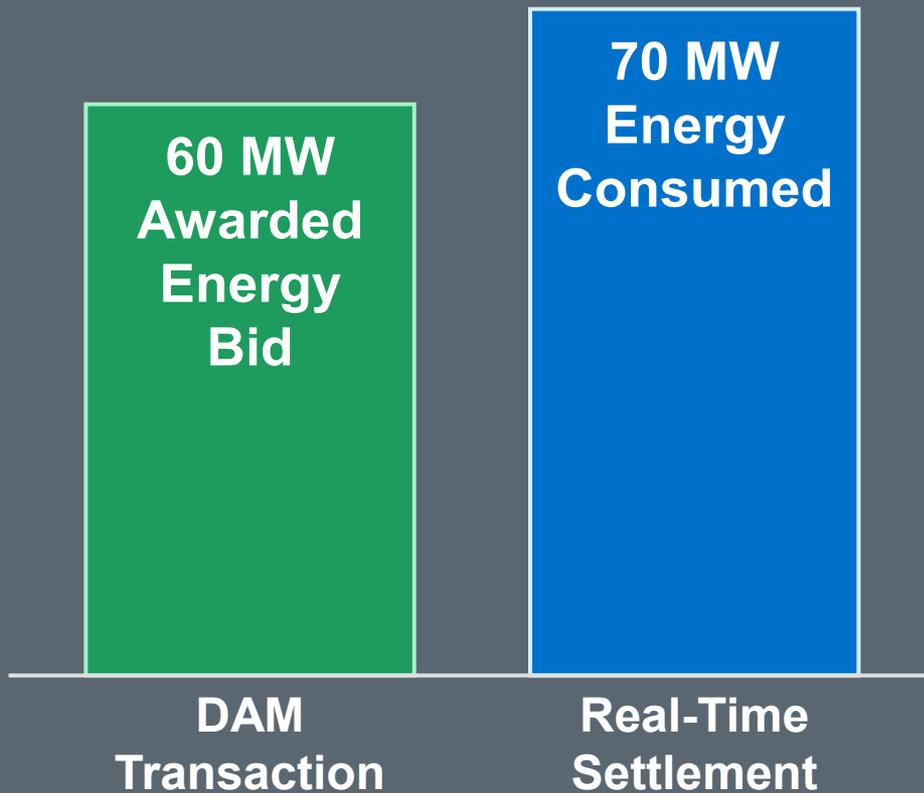


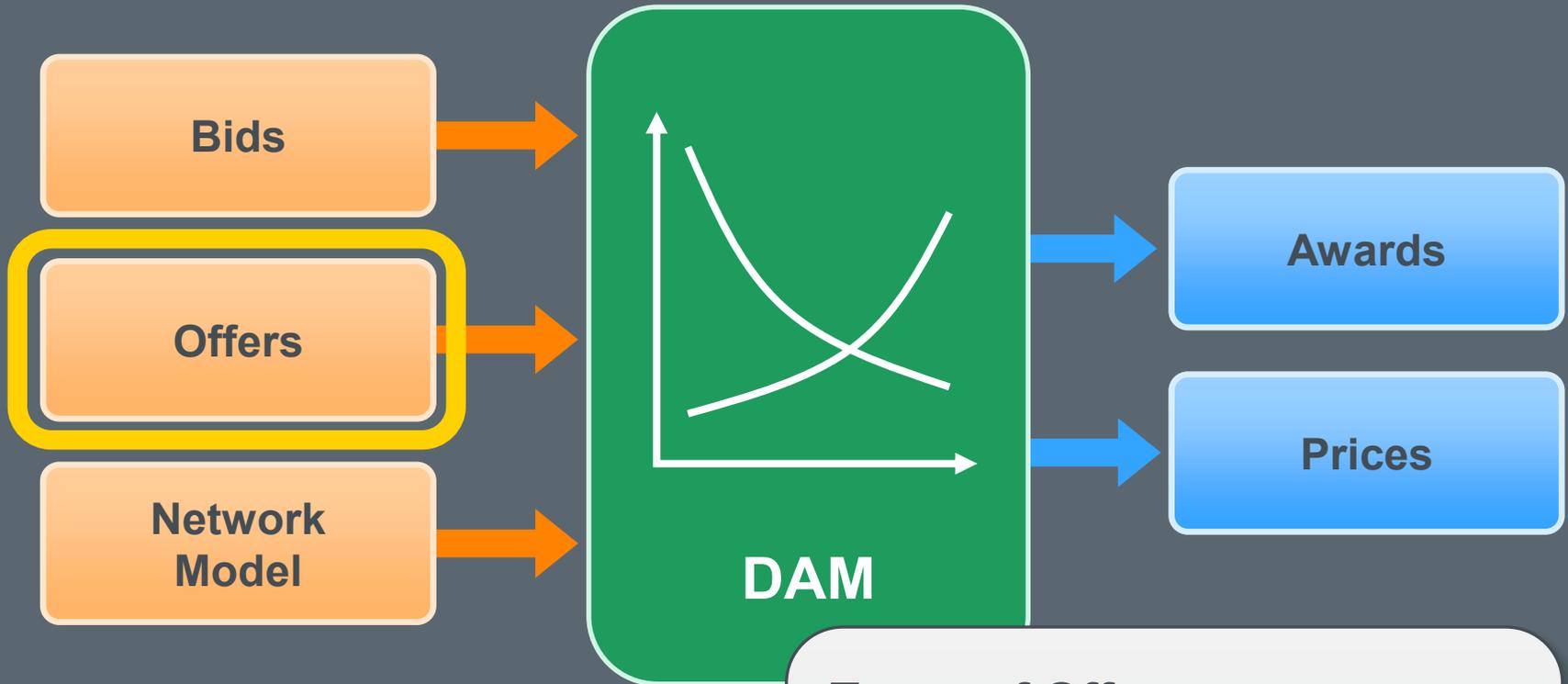
QSE awarded Energy Bid in DAM





QSE awarded Energy Bid in DAM





Types of Offers:

- Three-Part Supply Offer
- DAM Energy-Only Offer
- Ancillary Service (AS) Offers

Resource-Specific AS Offers for Each Service

Type of Service	Offer	
Regulation Up	MW	\$ / MW
Regulation Down	MW	\$ / MW
Responsive Reserve	MW	\$ / MW
Contingency Reserve	MW	\$ / MW
Non-Spinning Reserve	MW	\$ / MW

Multiple offers from single Resource:

- Multiple Ancillary Services
- May be combined with Energy Offers

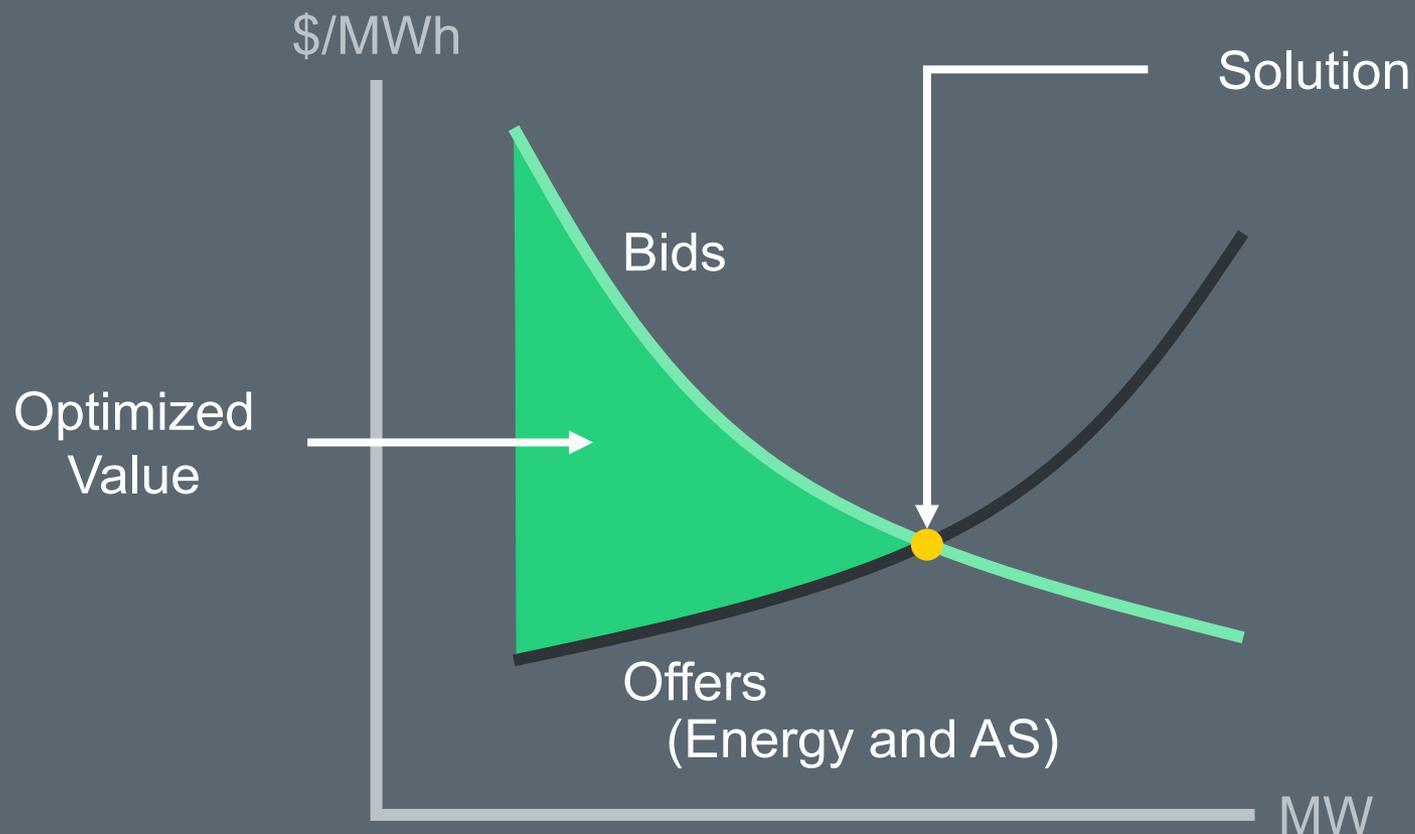
Financial AS Offers for Each Service

Type of Service	Offer	
Regulation Up	MW	\$ / MW
Regulation Down	MW	\$ / MW
Responsive Reserve	MW	\$ / MW
Contingency Reserve	MW	\$ / MW
Non-Spinning Reserve	MW	\$ / MW

Financial AS Transactions:

- Paid DAM AS Prices
- Charged Real-Time AS Prices

Energy and Ancillary Services are co-optimized



Day-Ahead Market



Bilateral Trades



Decentralized Forward Market

- QSE-to-QSE transactions
- Transfers settlement responsibility



Buyer and Seller QSE must confirm Trades

One QSE reports

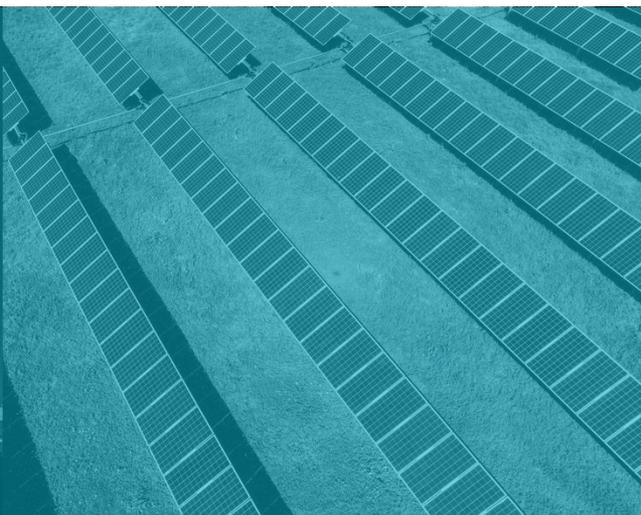


Other QSE confirms



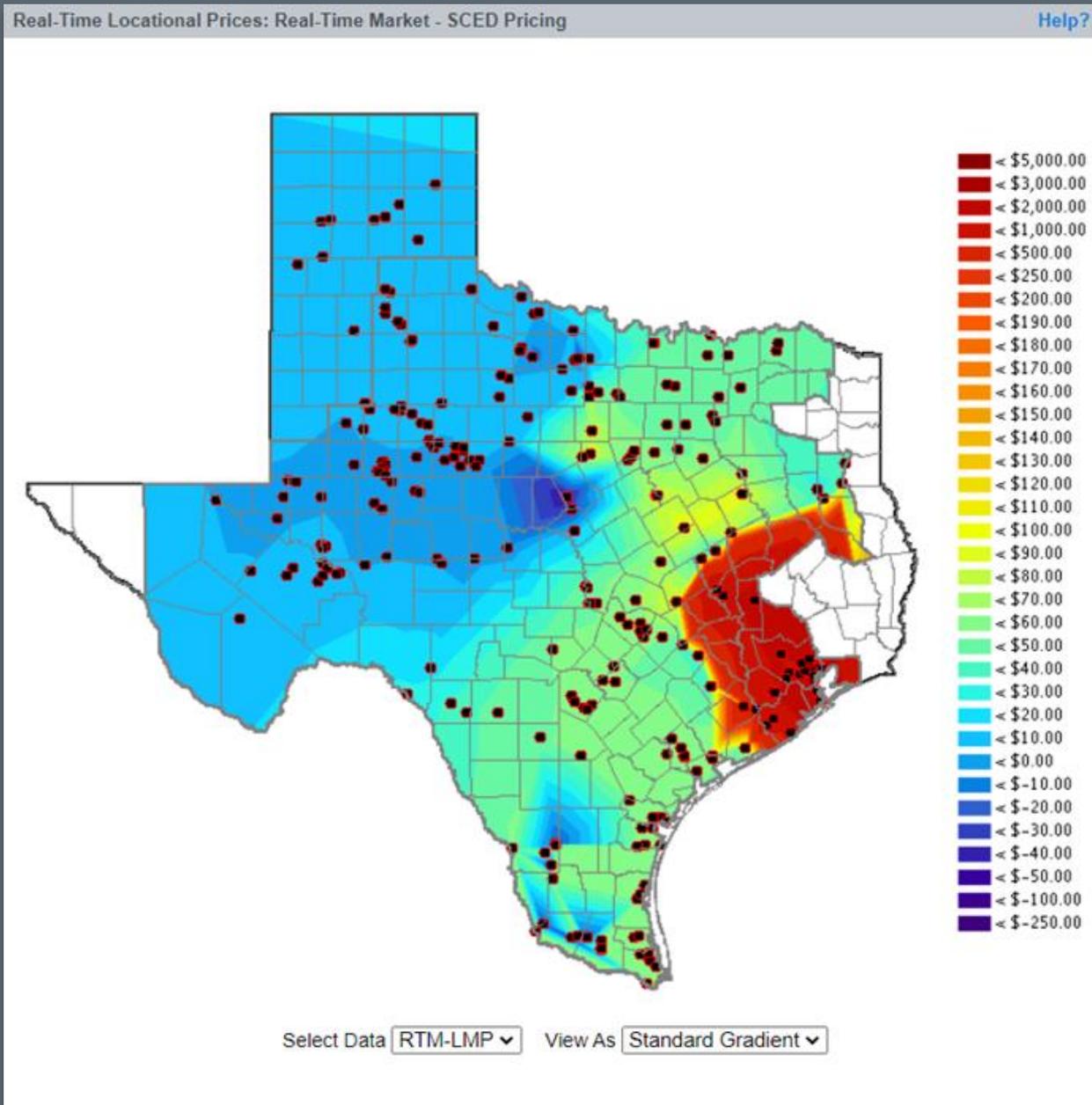


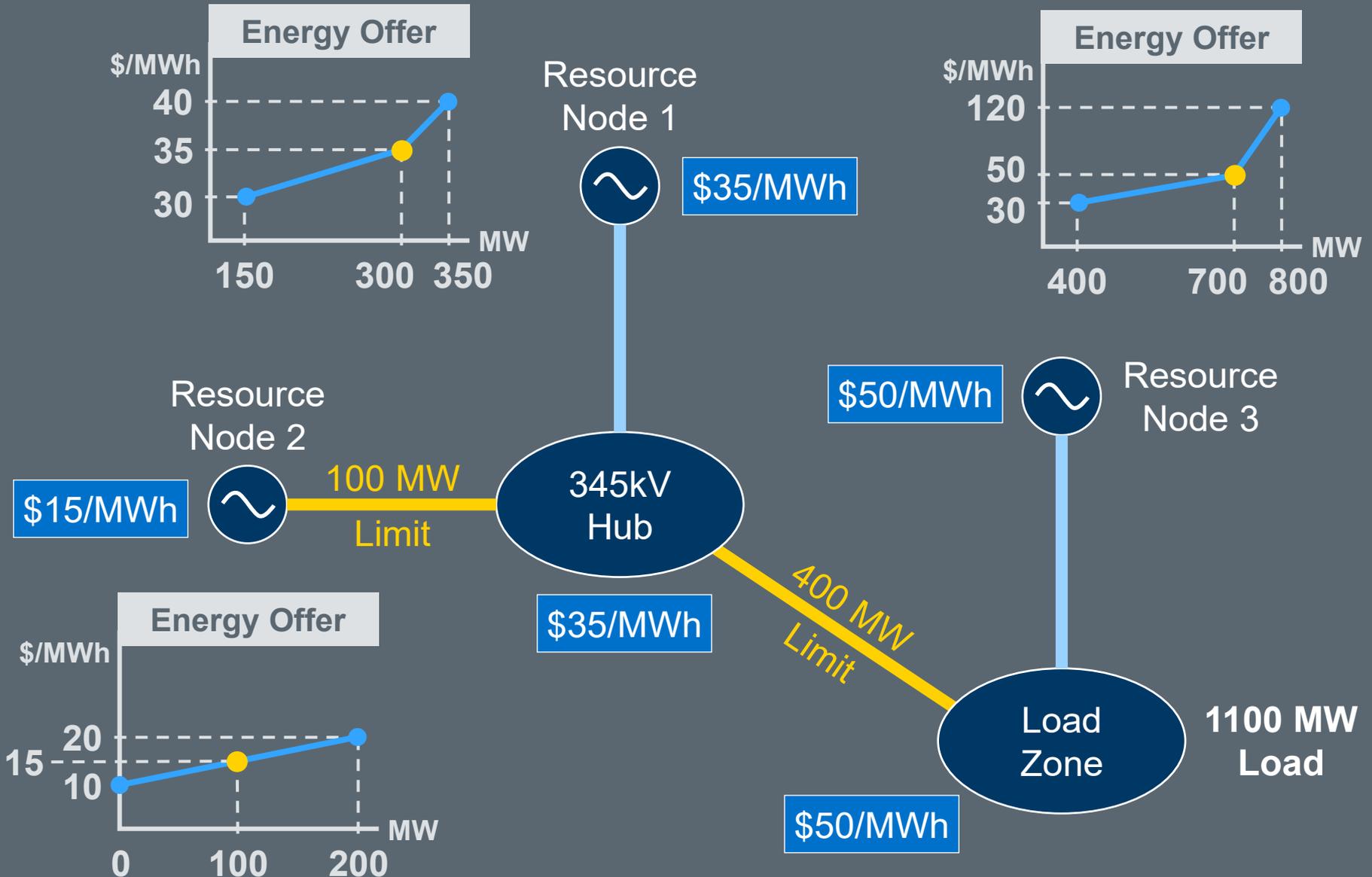
Congestion





Discussion: Hedging for Congestion







100 MW Trade Purchase

100 MW Load



DAM Prices:

\$38

\$42

RT Prices:

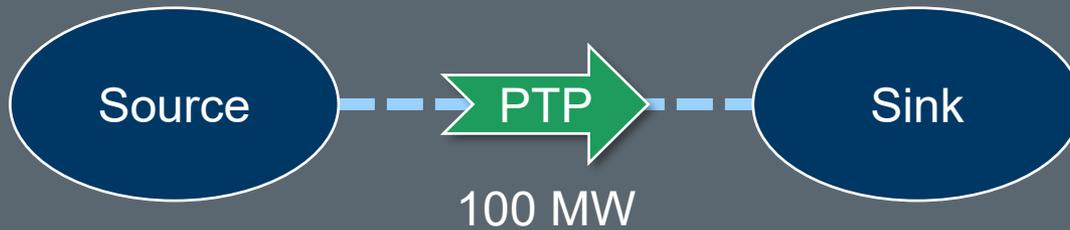
\$35

\$50

Settlement	Payment at Hub	Charge at Load Zone	Net Amount



Introducing DAM Point-to-Point Obligations



DAM Prices:

\$38

\$42

RT Prices:

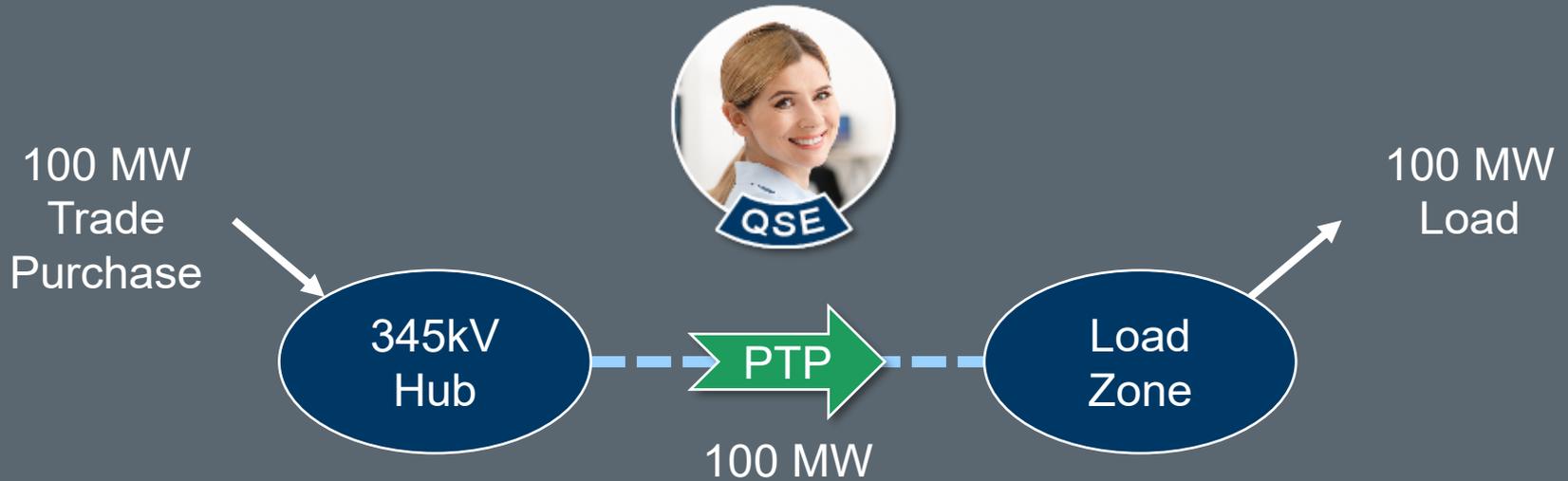
\$35

\$50

Settlement	Sink minus Source Price	PTP Obligation Amount
DAM		
RT		



Example: Hedging Real-Time Congestion Costs



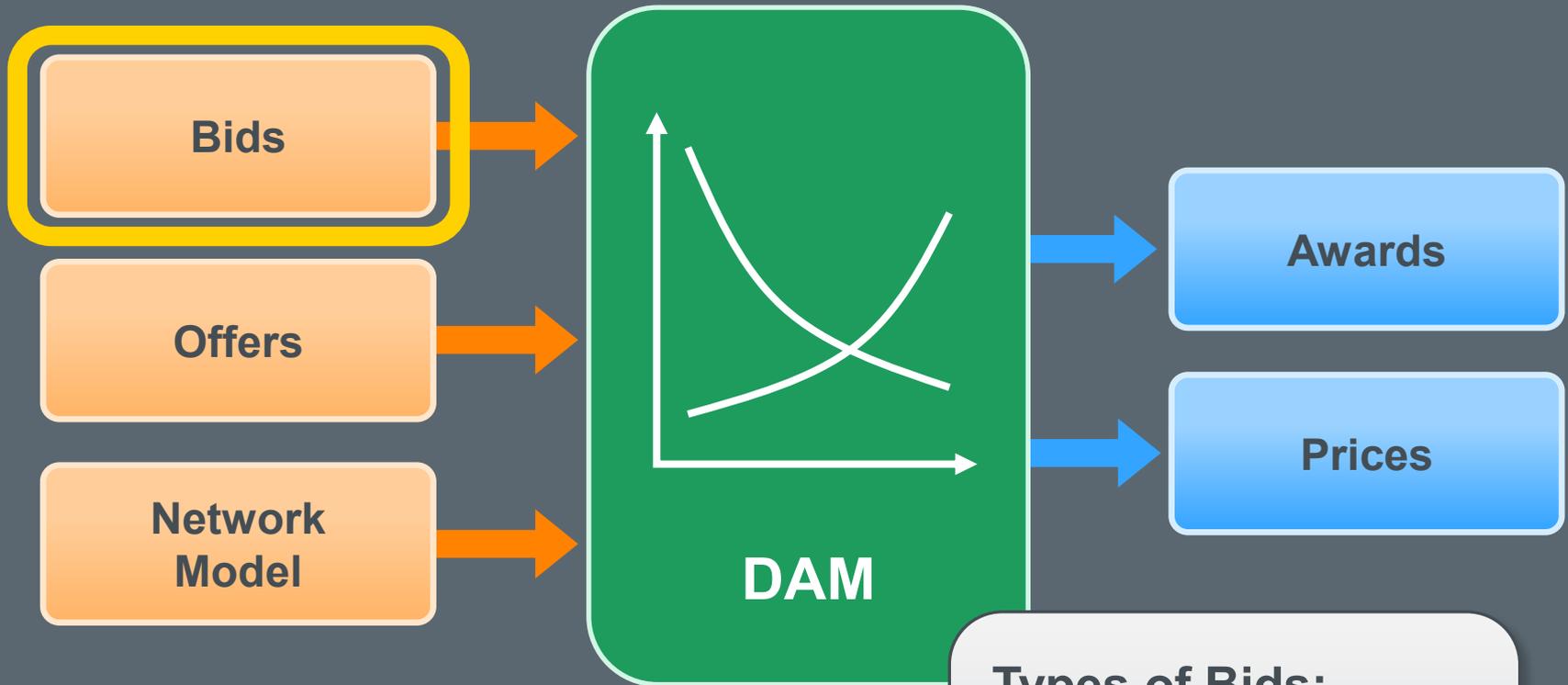
DAM Prices: \$38

\$42

RT Prices: \$35

\$50

Settlement Type		Amount
DAM	PTP Obligation	
RT	Energy	
	PTP Obligation	
Total		



Types of Bids:

- Energy Bid
- PTP Obligation Bid

Submitted between any two Settlement Points

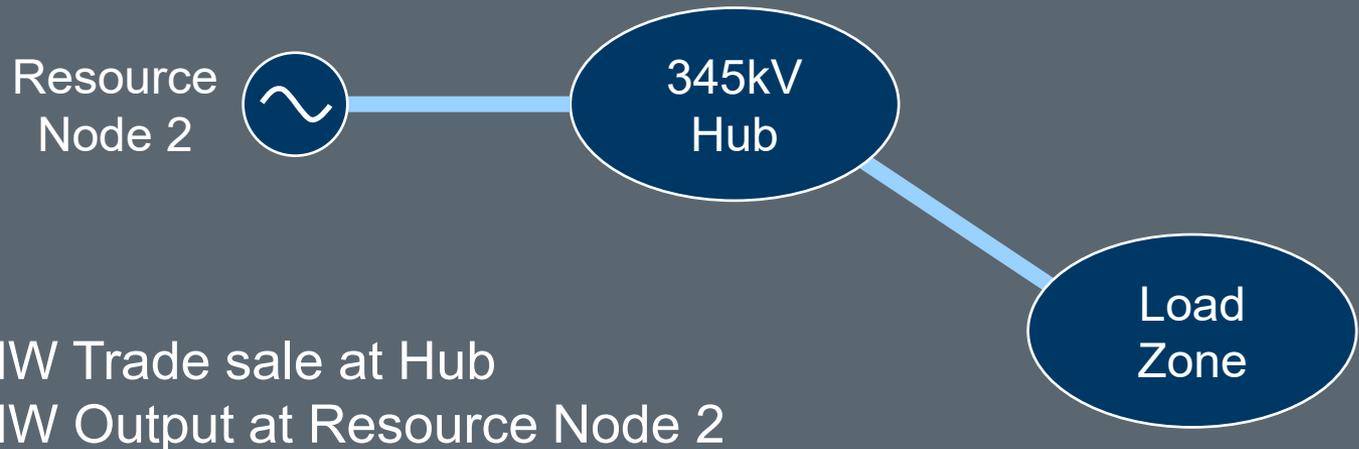
Source	Sink	Bid	
345kV Hub	Load Zone	MW	\$ / MW
Resource Node 1	Load Zone	MW	\$ / MW
Resource Node 2	Resource Node 3	MW	\$ / MW
Resource Node 1	345kV Hub	MW	\$ / MW



Payment or charge in Real-Time!

Optimize QSE's Revenues using DAM PTP Obligations

	Resource Node 2	345kV Hub	Load Zone
DAM SPP	\$36/MWh	\$38/MWh	\$40/MWh
Average RT SPP	\$15/MWh	\$35/MWh	\$42/MWh



100 MW Trade sale at Hub
 100 MW Output at Resource Node 2

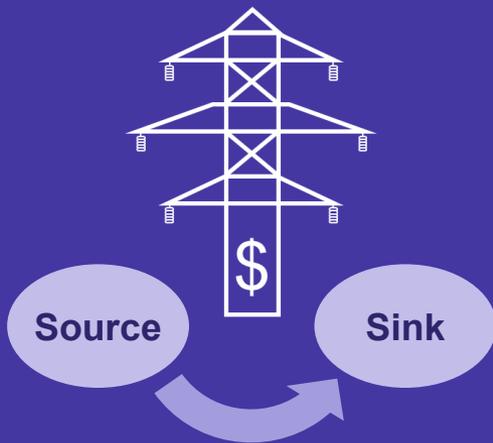
Point-to-Point Obligations



Hourly Financial instruments

- Purchased at DAM price spread
- Settled at Real-Time price spread

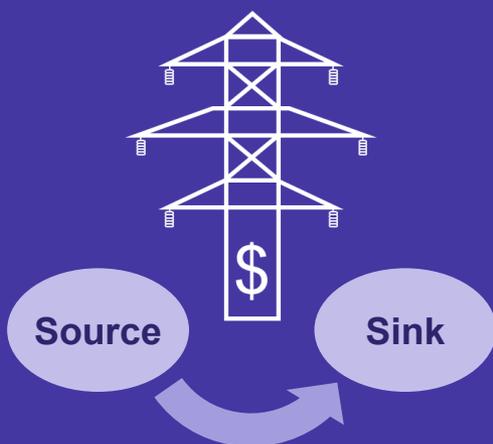
Congestion Revenue Rights



Monthly Financial instruments

- Purchased at Auction Price
- Settled at DAM price spread

Congestion Revenue Rights



Two types of instruments

Point-to-Point Obligation

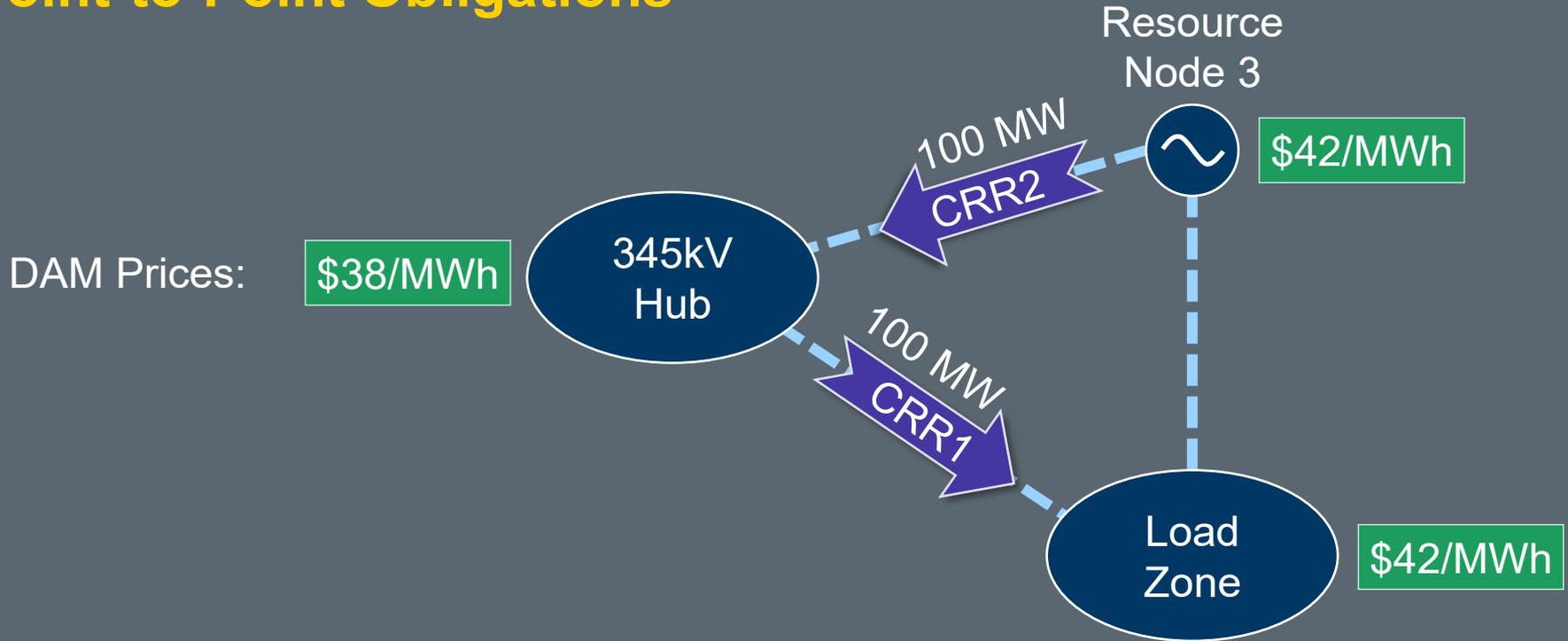
Payment or Charge in DAM

Point-to-Point Option

Payment only in DAM



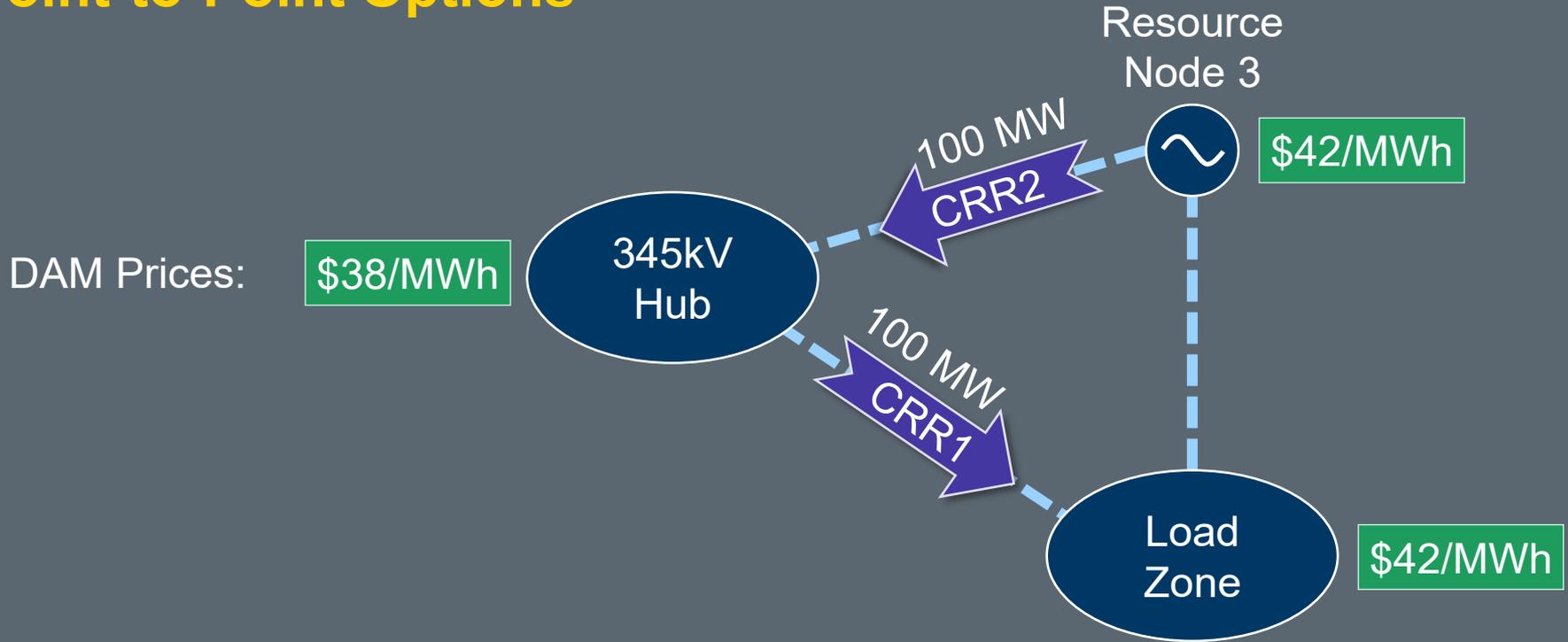
Point-to-Point Obligations



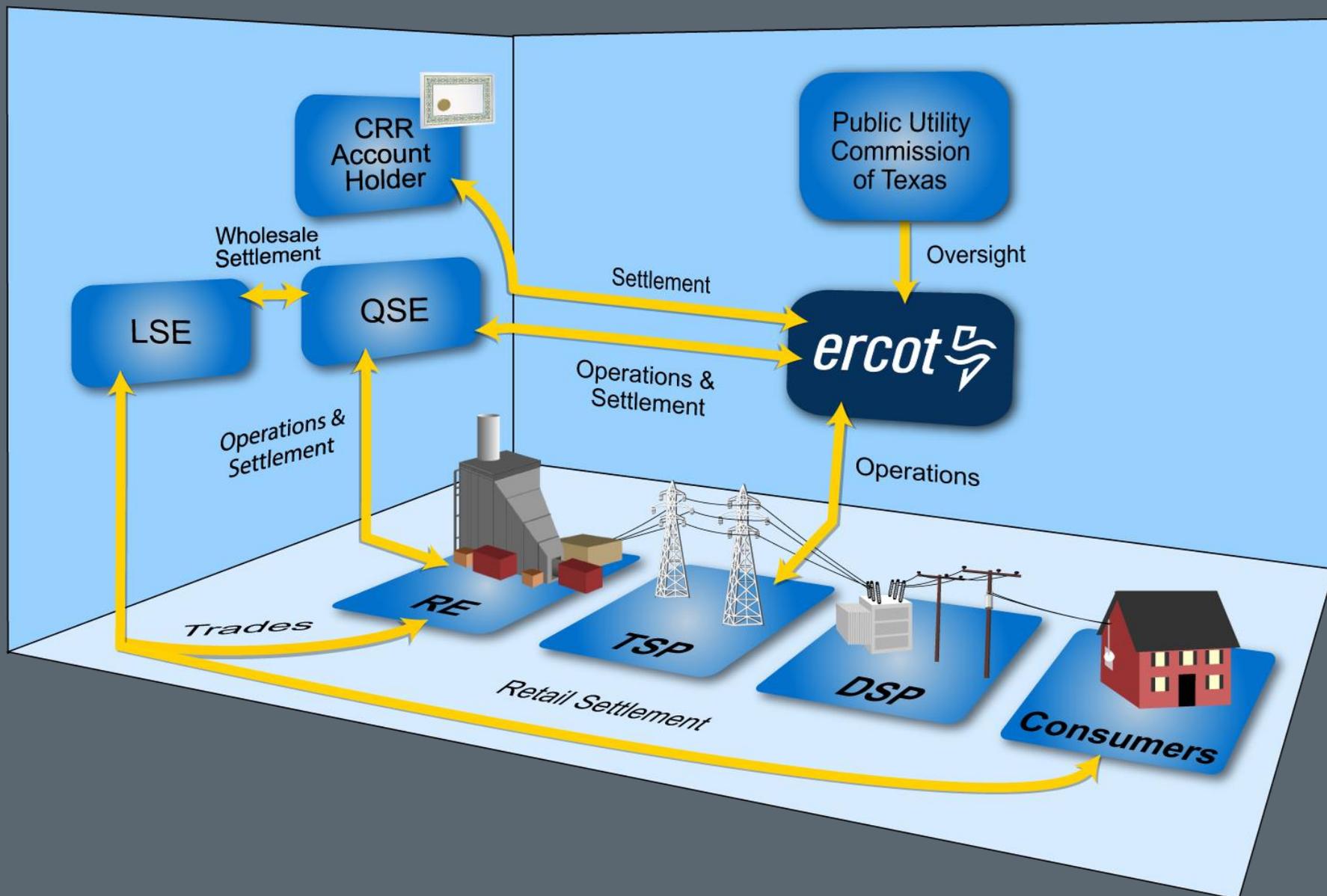
Settlement	Sink minus Source Price	CRR Amount
CRR1		
CRR2		



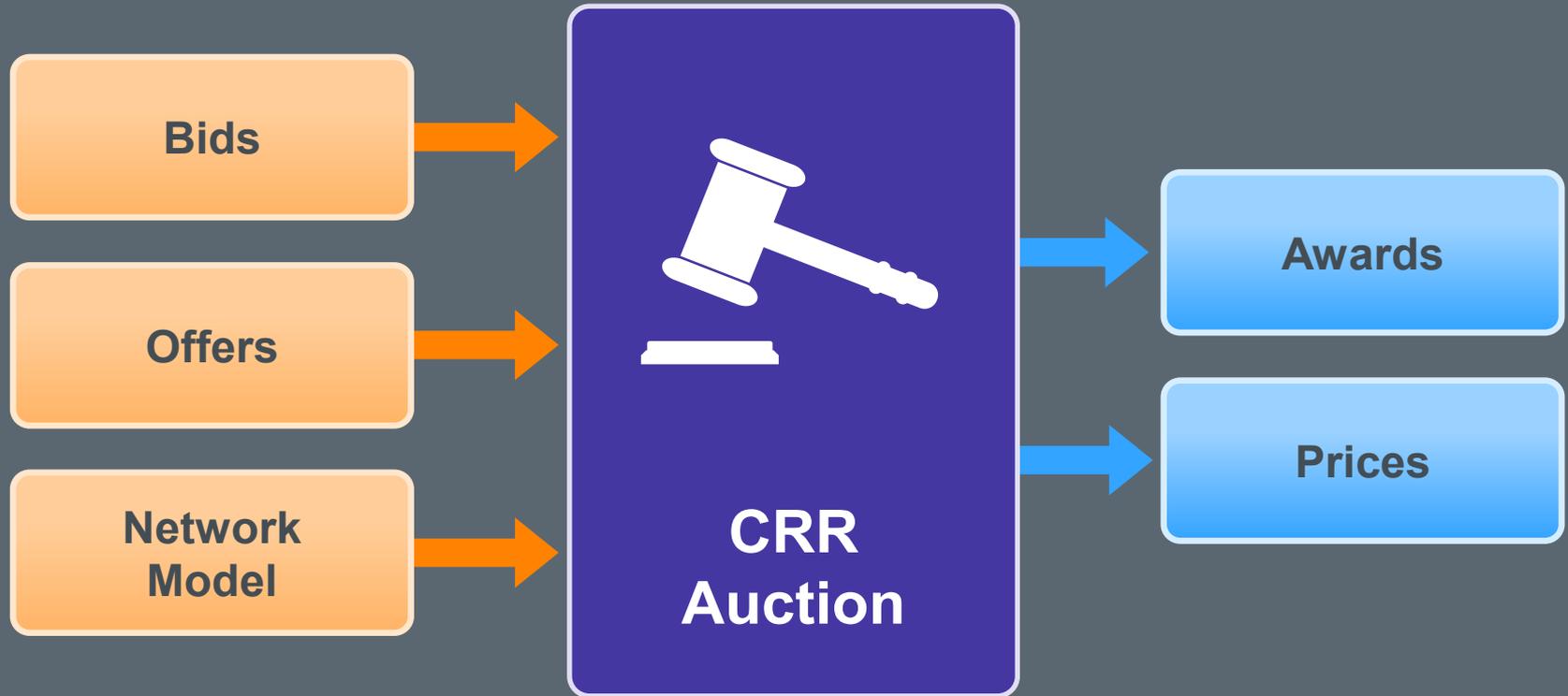
Point-to-Point Options



Settlement	Sink minus Source Price	CRR Amount
CRR1		
CRR2		



CRR Auction Transactions



CRRs are auctioned by:

- Time-of-Use Blocks
- One-month strips

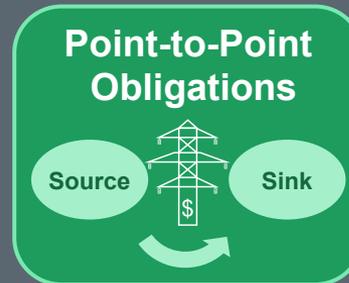
Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Off-Peak (0100 – 0600)						
Peak Weekday (0700 – 2200)					Peak Weekend (0700 – 2200)	
Off-Peak (2300 – 0000)						



CRR Auction

Day-Ahead Market

Real-Time



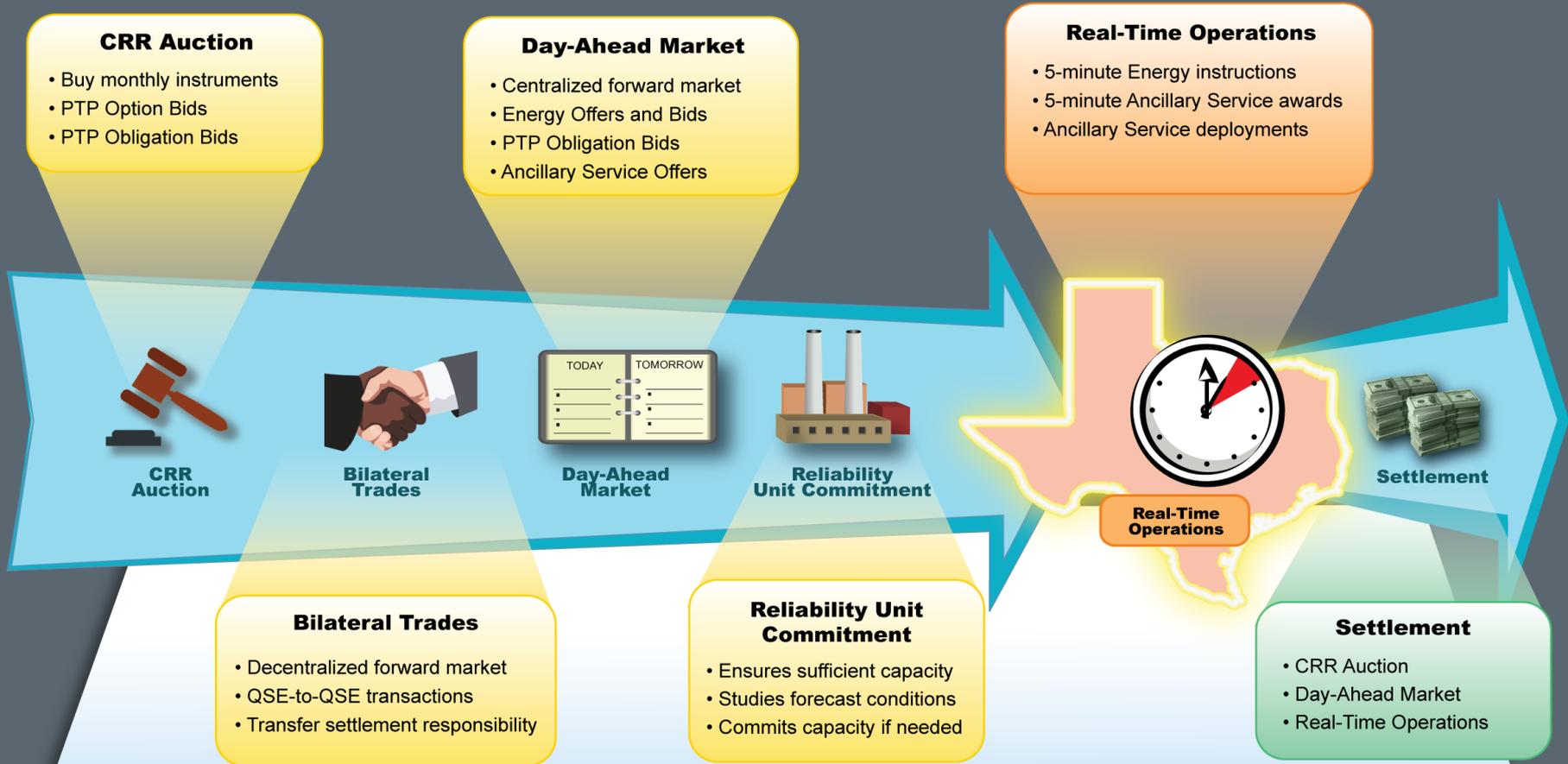
	PTP Obligation (CRR)	DAM PTP Obligation
How acquired:	Auction / Allocation	DAM
Who Purchases:	CRR Account Holder	QSE
Tradable:	Yes	No
How Purchased:	TOU Blocks	Hourly
Initial Investment:	Auction clearing price	Day-Ahead SPPs (Sink – Source)*
Target Payout:	Day-Ahead SPPs (Sink – Source)	Real-Time SPPs (Sink – Source)

** Other DAM charges may apply*



Summary and Conclusion





Market Information System (MIS)

• System Conditions • Forecasts • Market Awards • Prices • ERCOT Applications • Settlement Data •



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