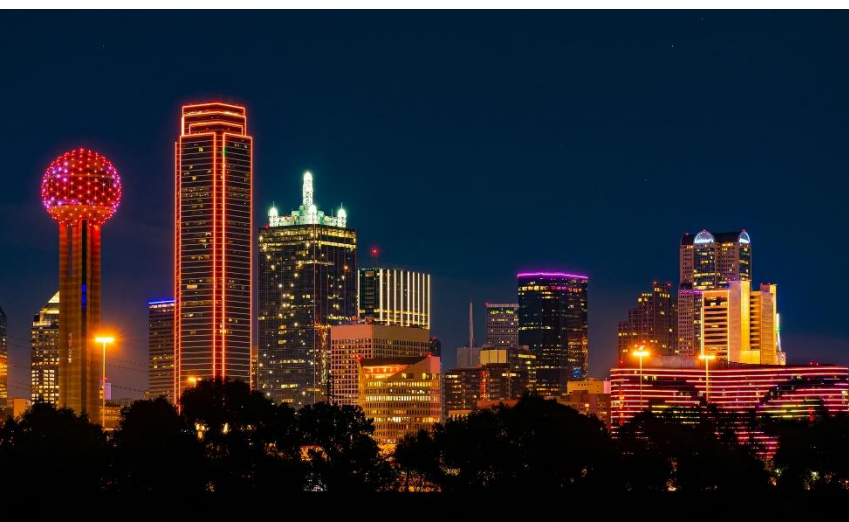




# Forward Markets 101



Greetings  
and  
Introductions

**Attendance**

**Questions**

**Presentation Materials**

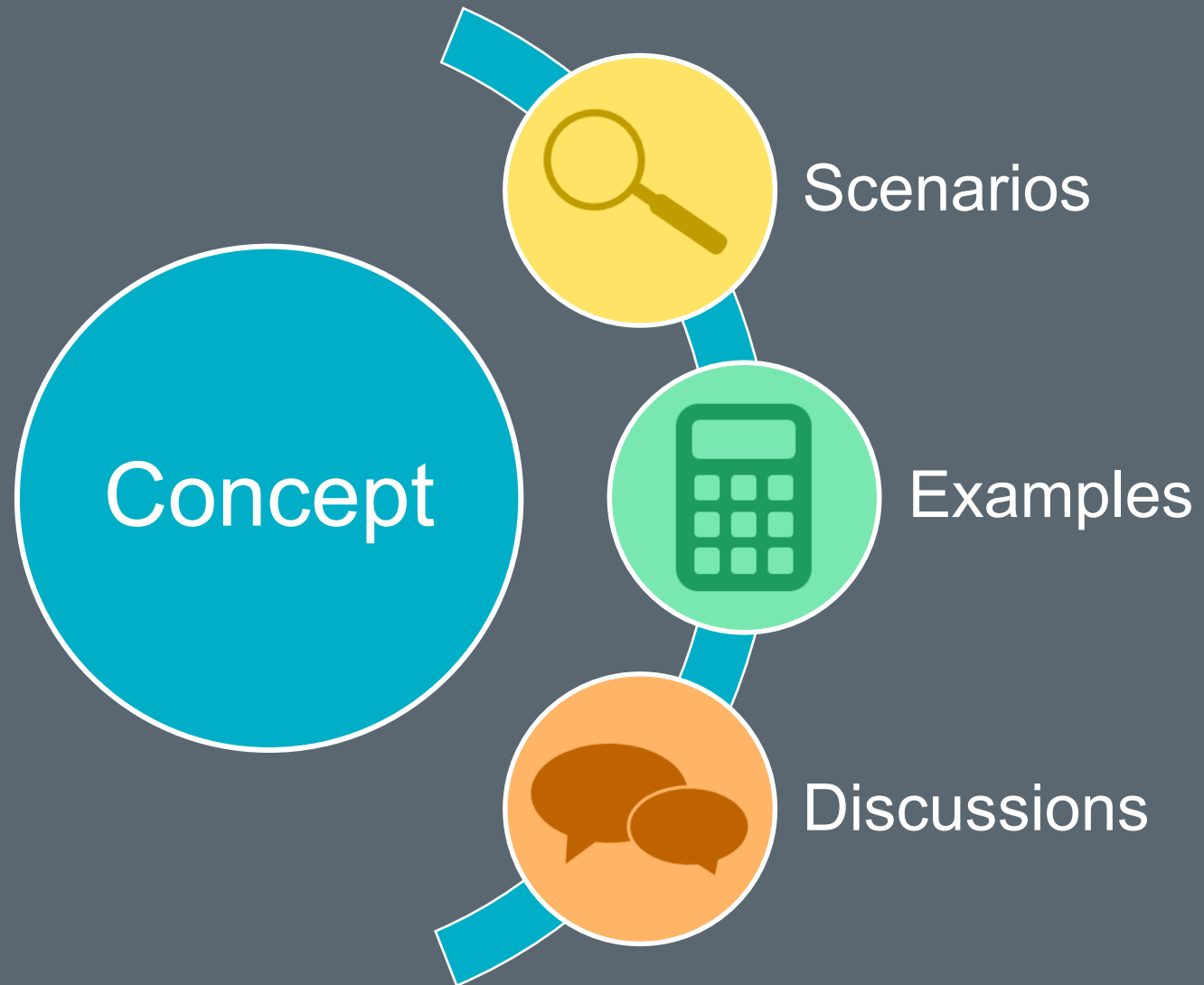


## PROTOCOL DISCLAIMER

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

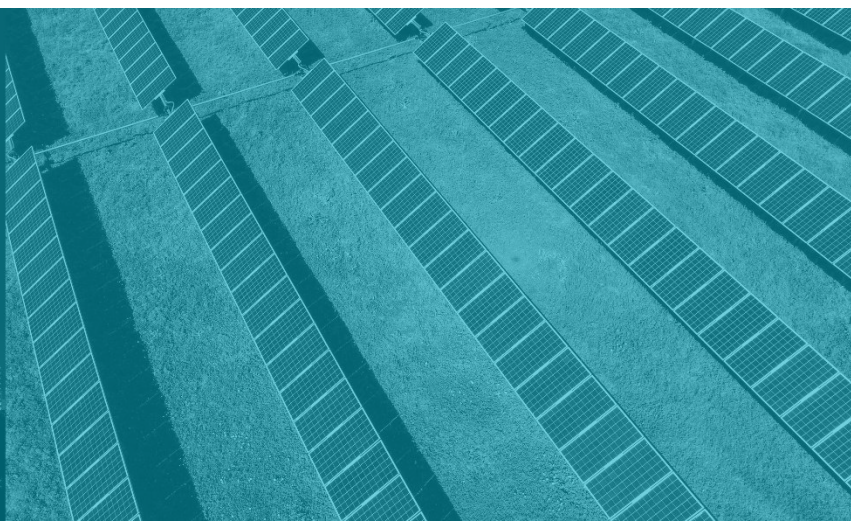
Congestion

4

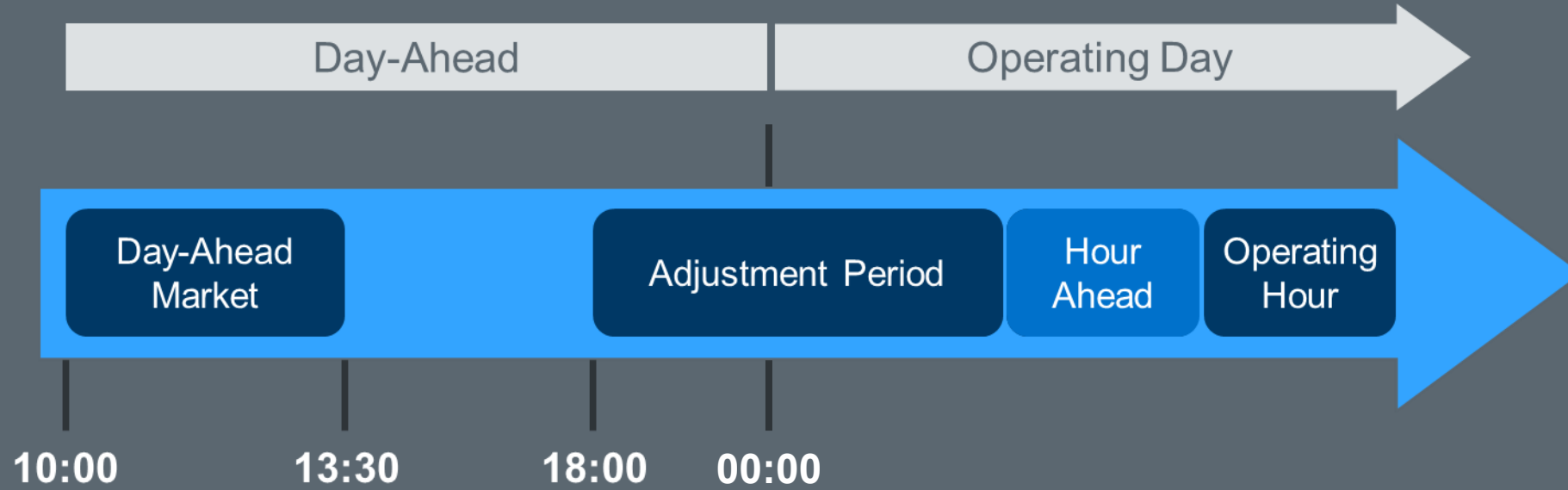
Summary and Conclusion

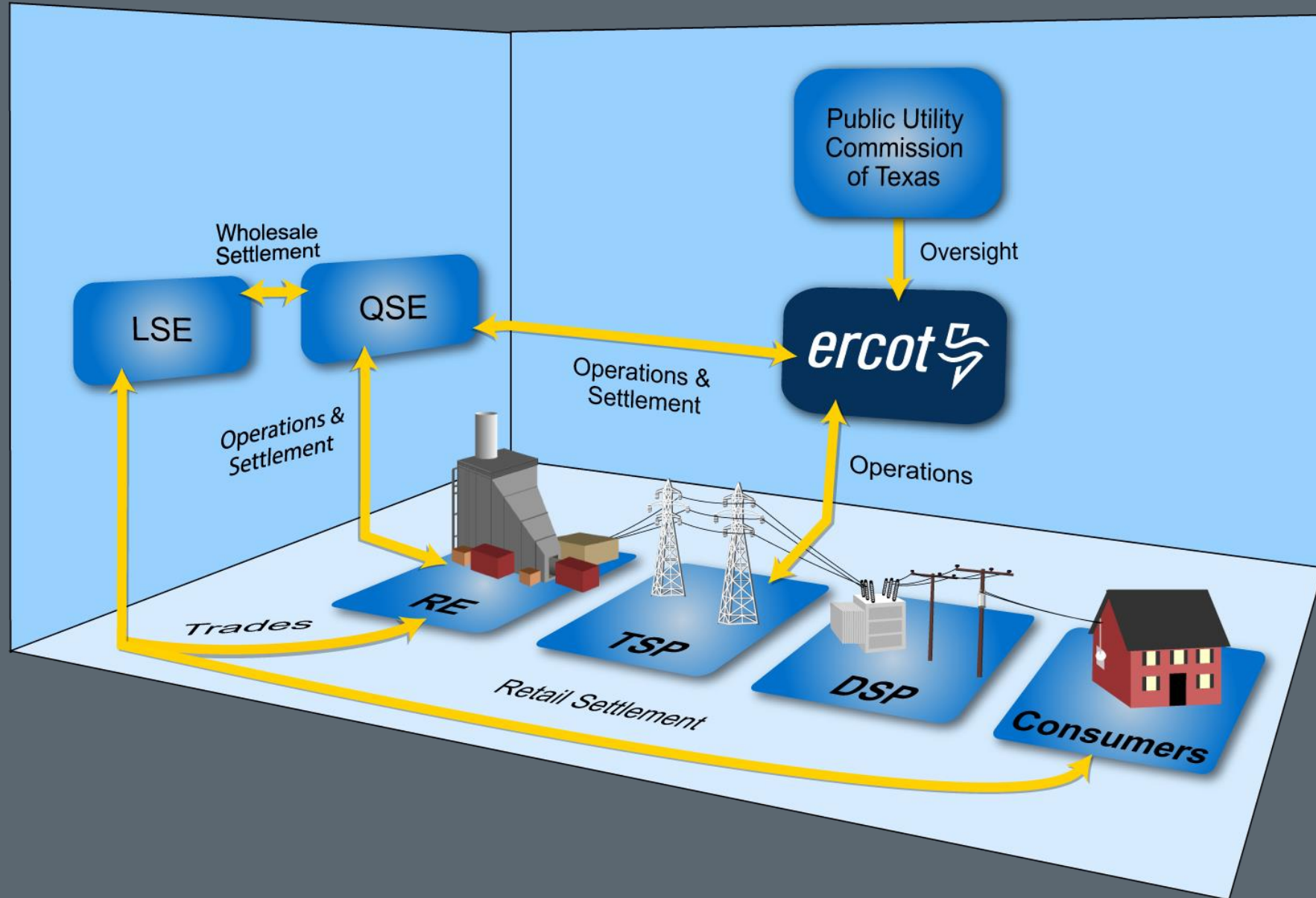


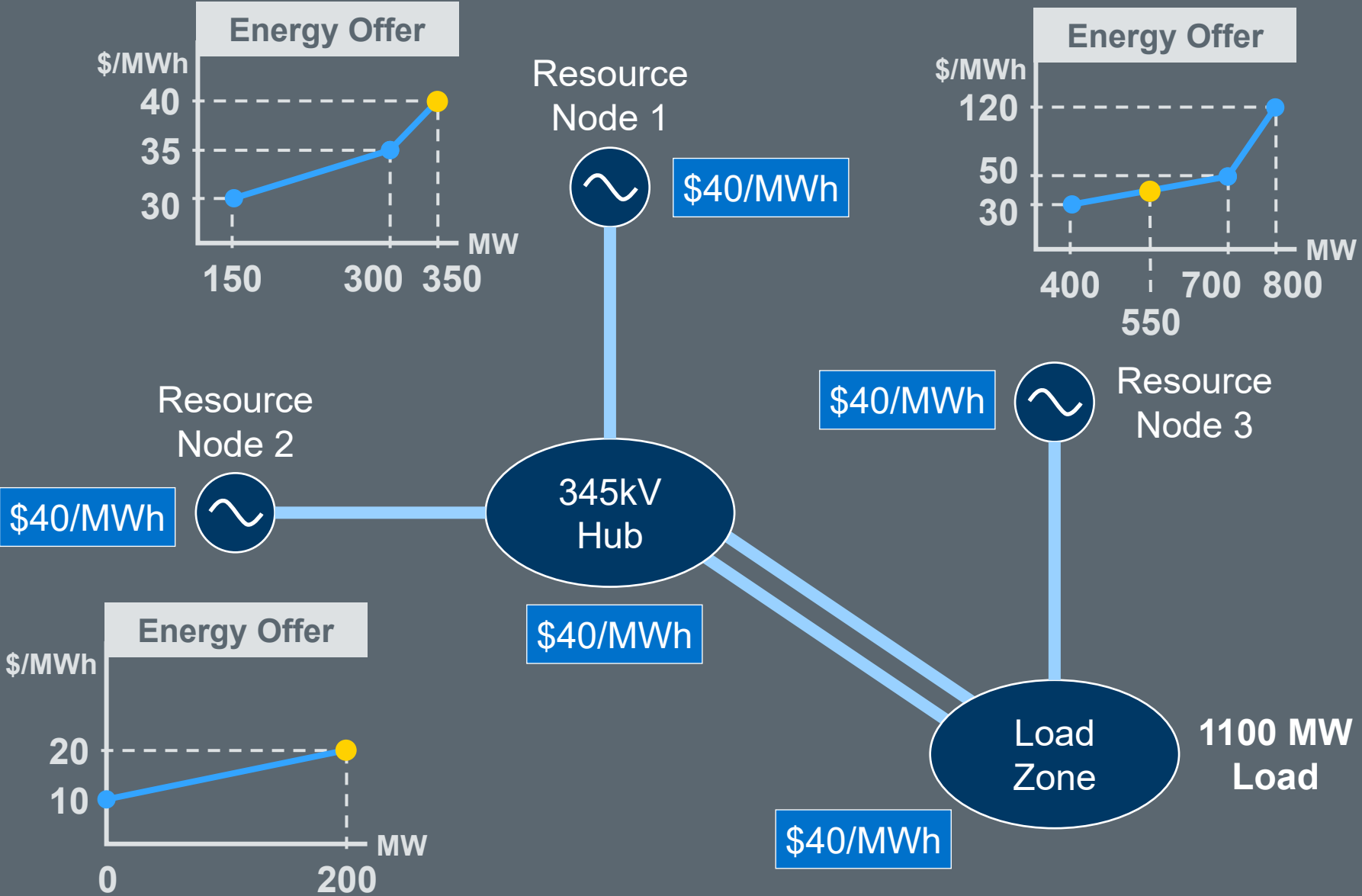
# Introduction



In general, . . .

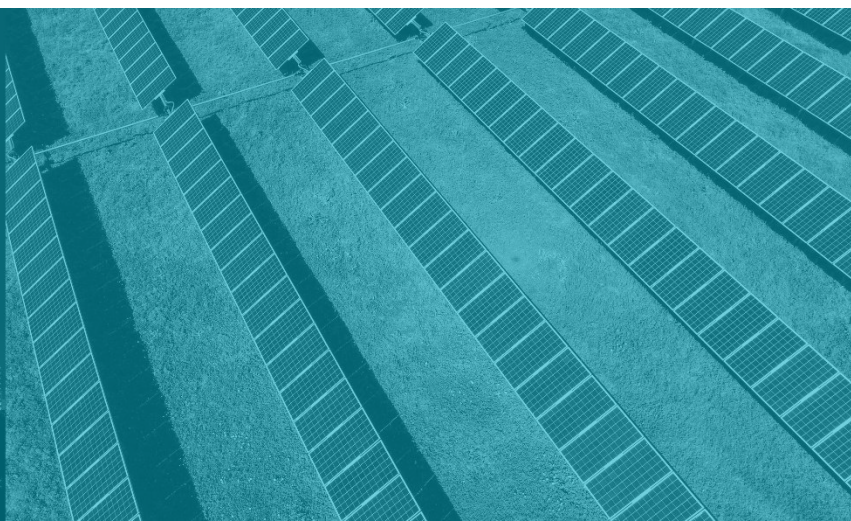








# Forward Markets



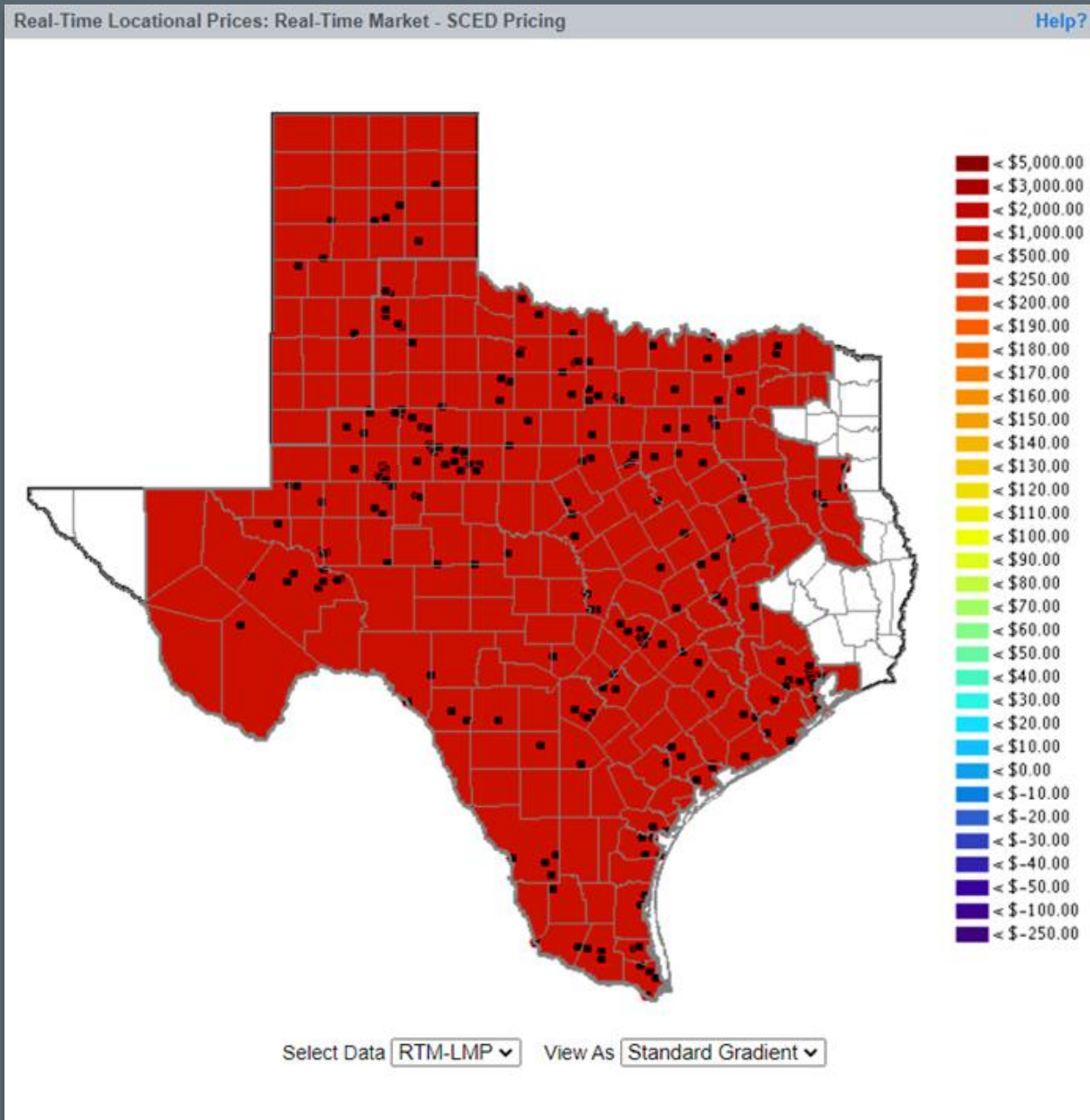
**Hedging** is transacting at a known price now ...

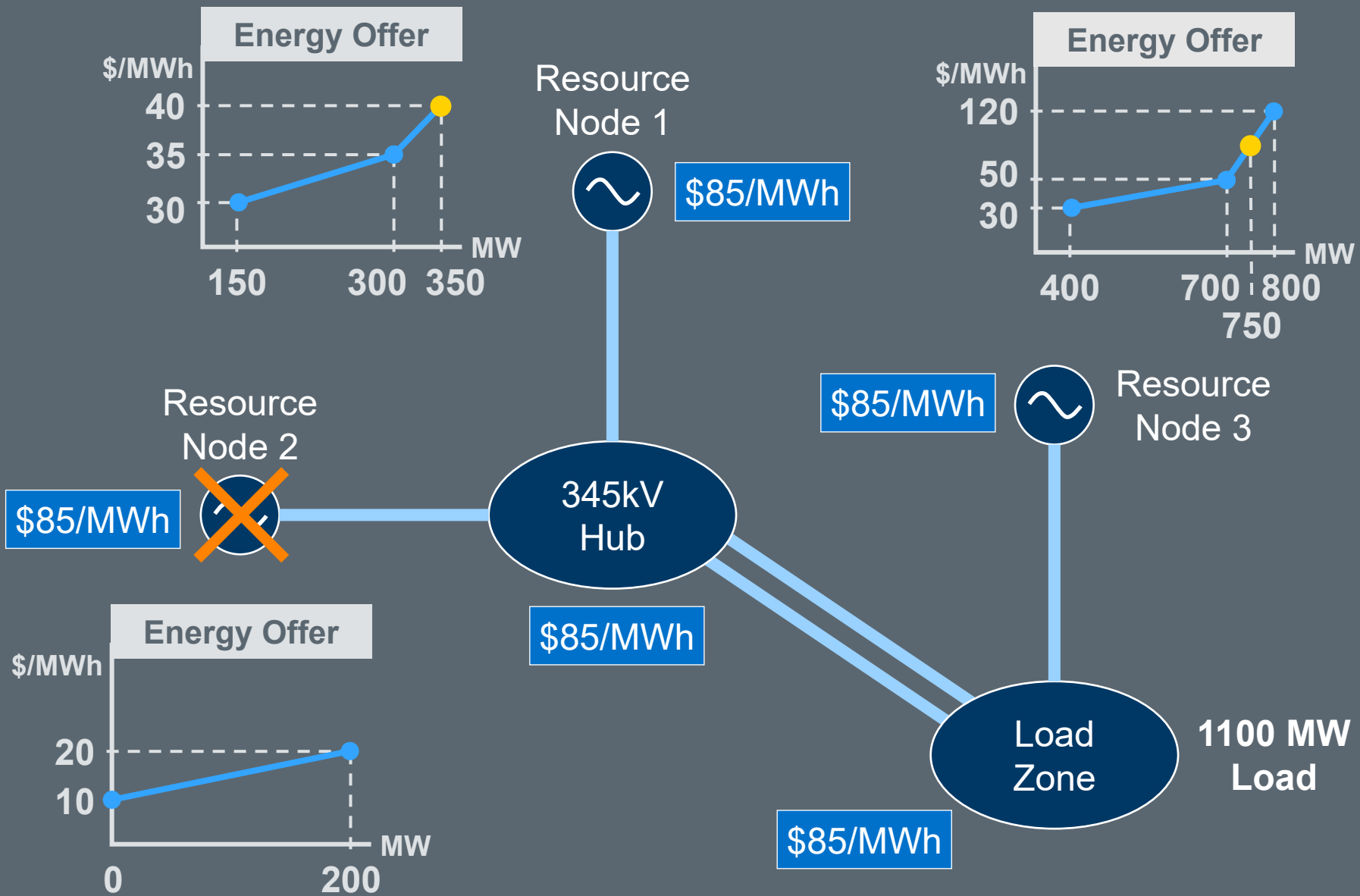


... to protect from having to transact at an unknown price later.



# Discussion: Hedging for High Prices





**Day-Ahead Market**



**Bilateral Trades**

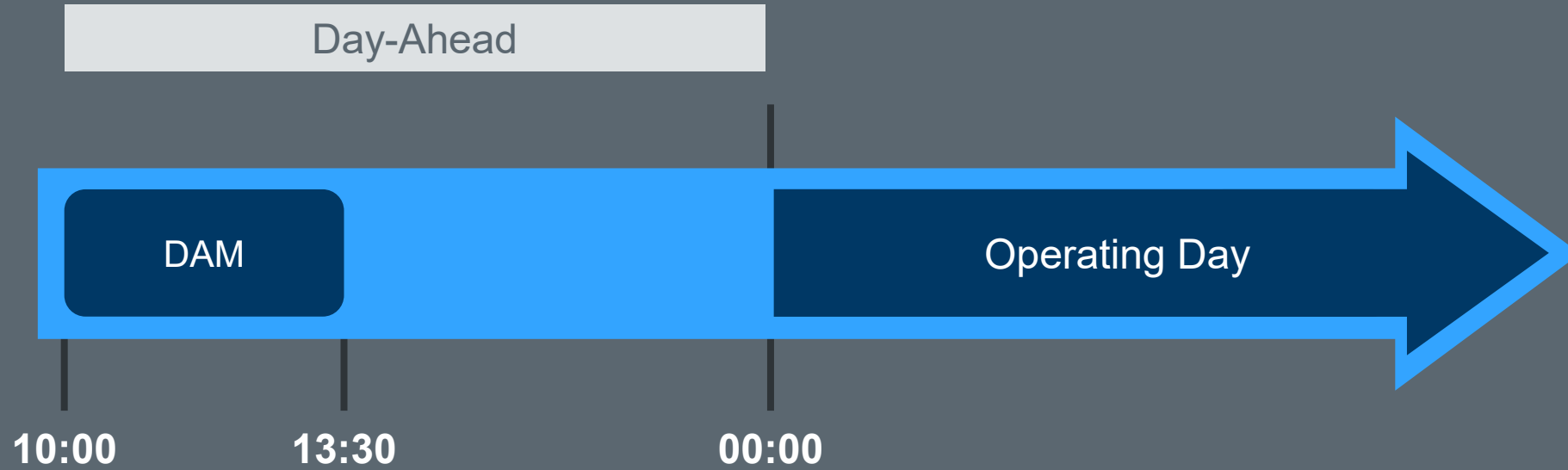


## Centralized Forward Market

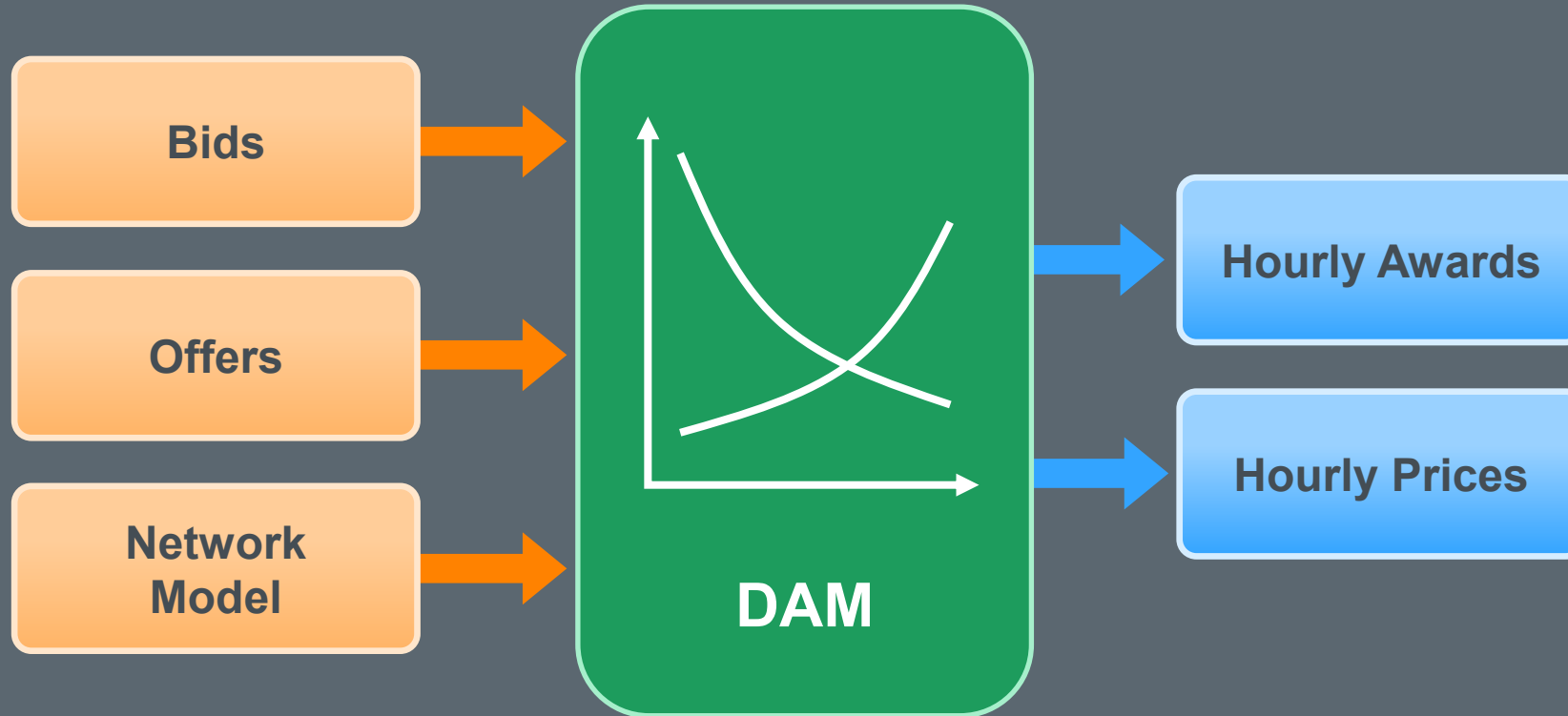
- Conducted daily
- Facilitated by ERCOT



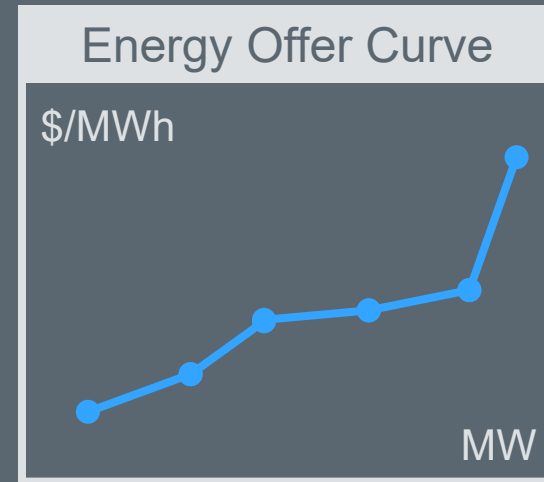
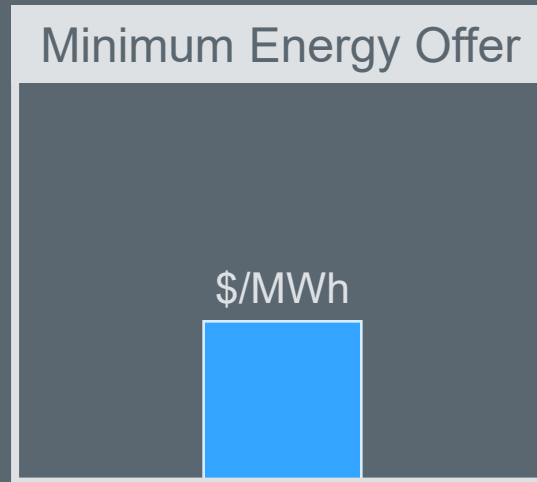
# Timing



## Transactions



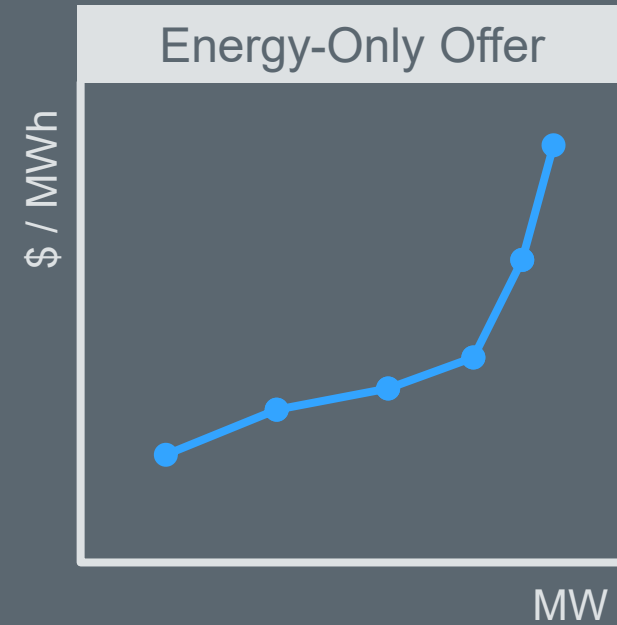
## Three-Part Supply Offer



Financial obligation in Real-Time

## Day-Ahead Market Energy-Only Offer

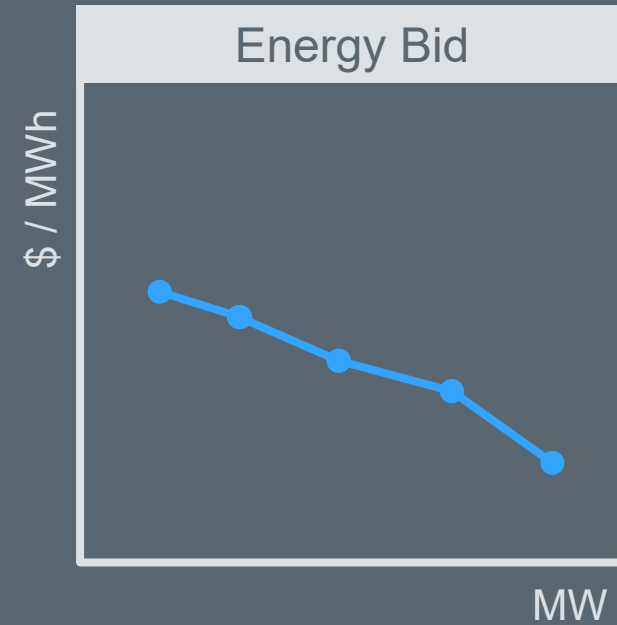
- Proposal to sell energy in DAM
- Offered at any Settlement Point



Financial obligation in Real-Time

## Day-Ahead Market Energy Bid

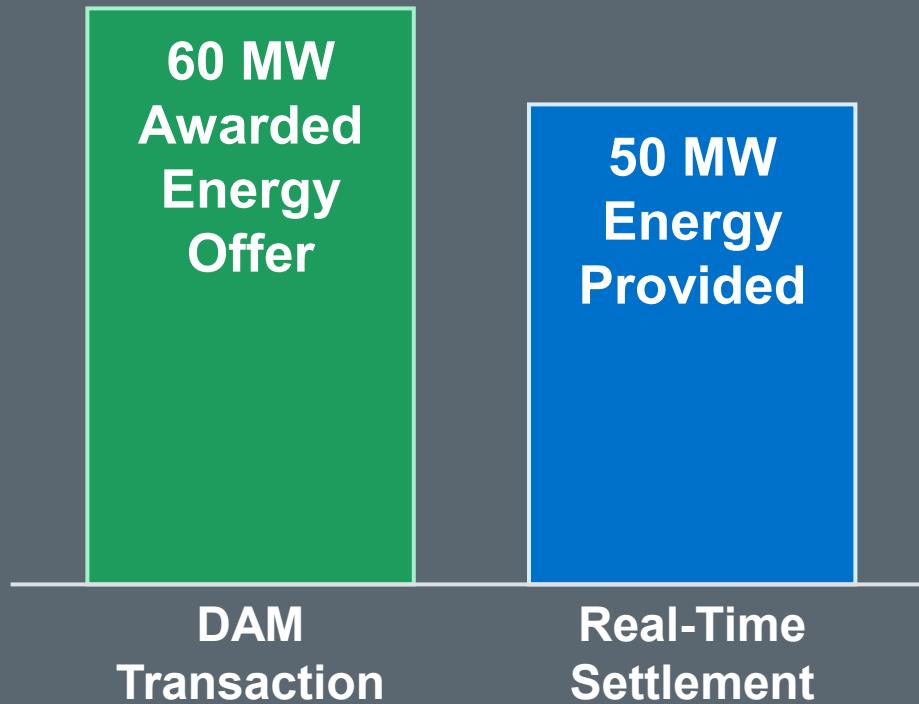
- Proposal to buy energy in DAM
- Submitted at any Settlement Point



Financial credit in Real-Time

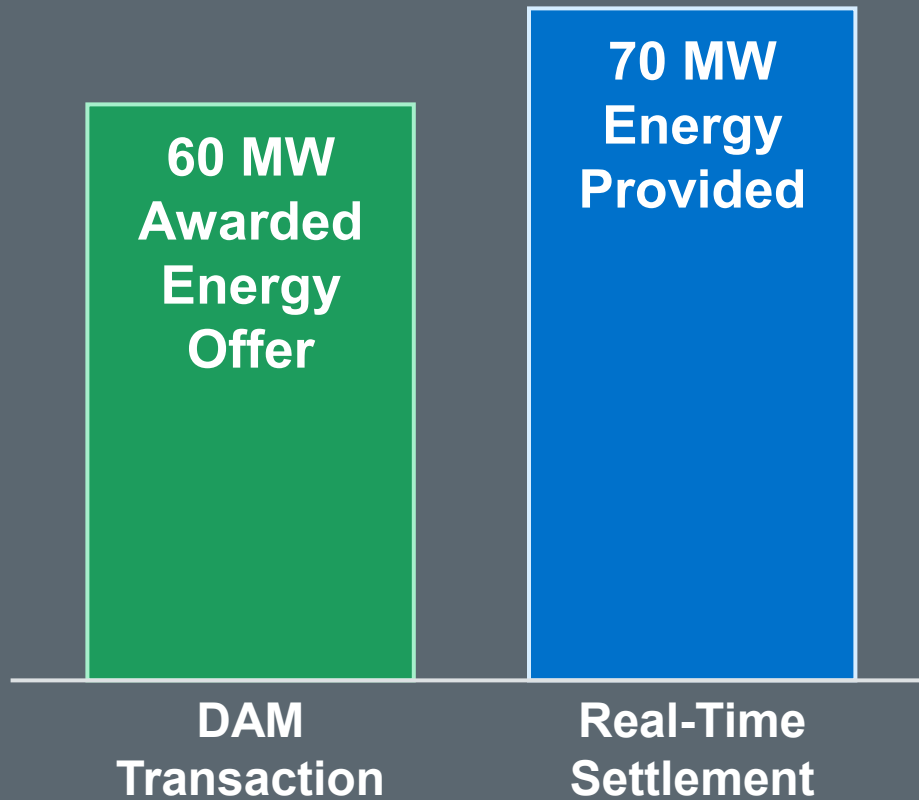


## QSE awarded Energy Offer in DAM



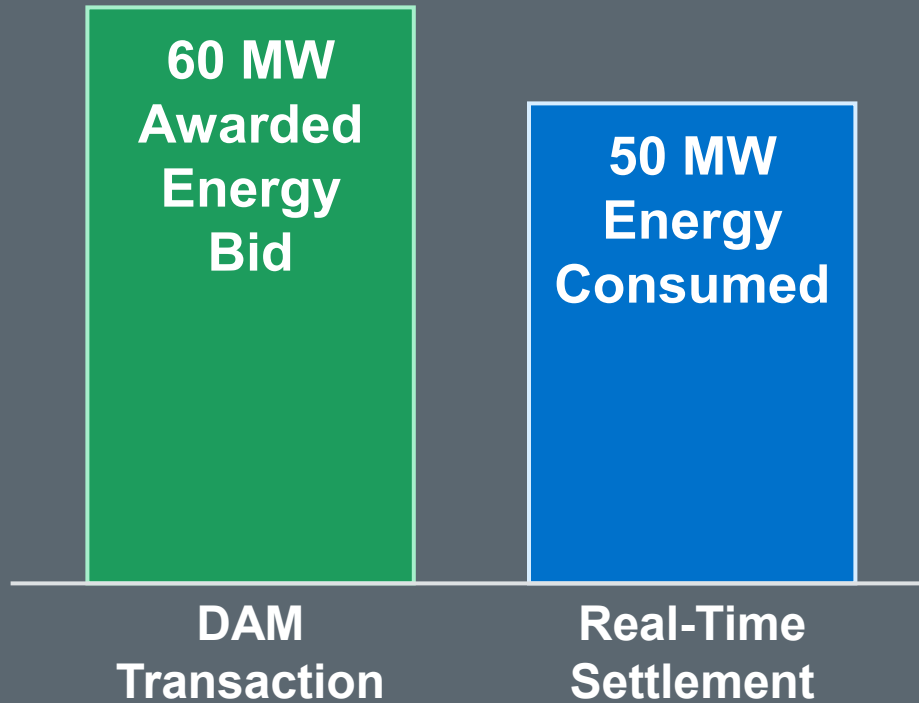


## QSE awarded Energy Offer in DAM



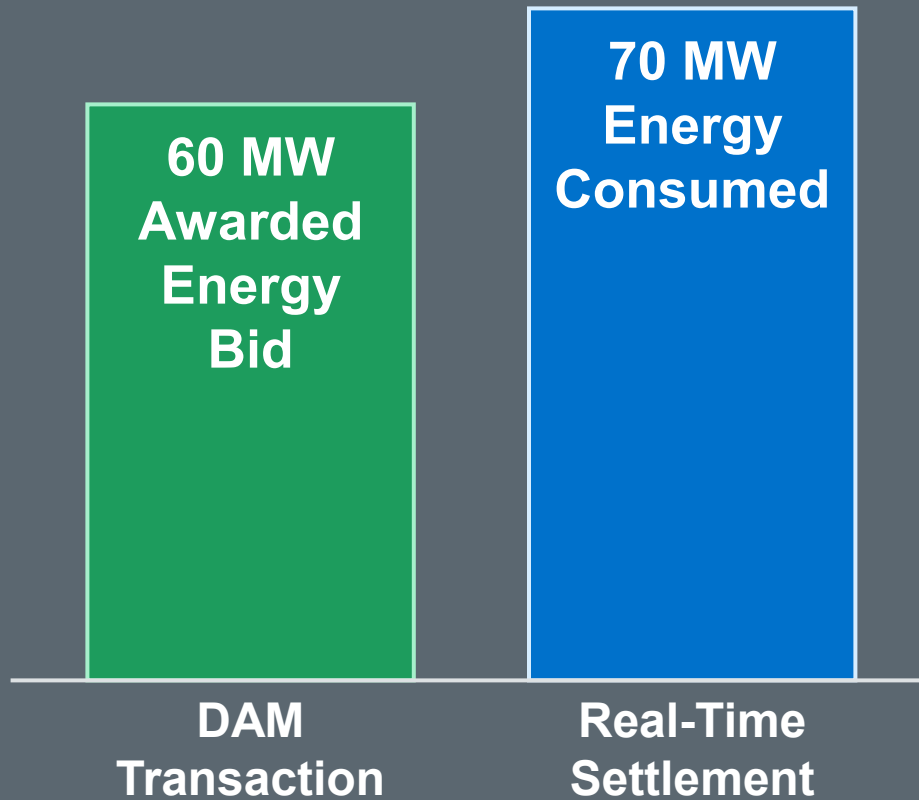


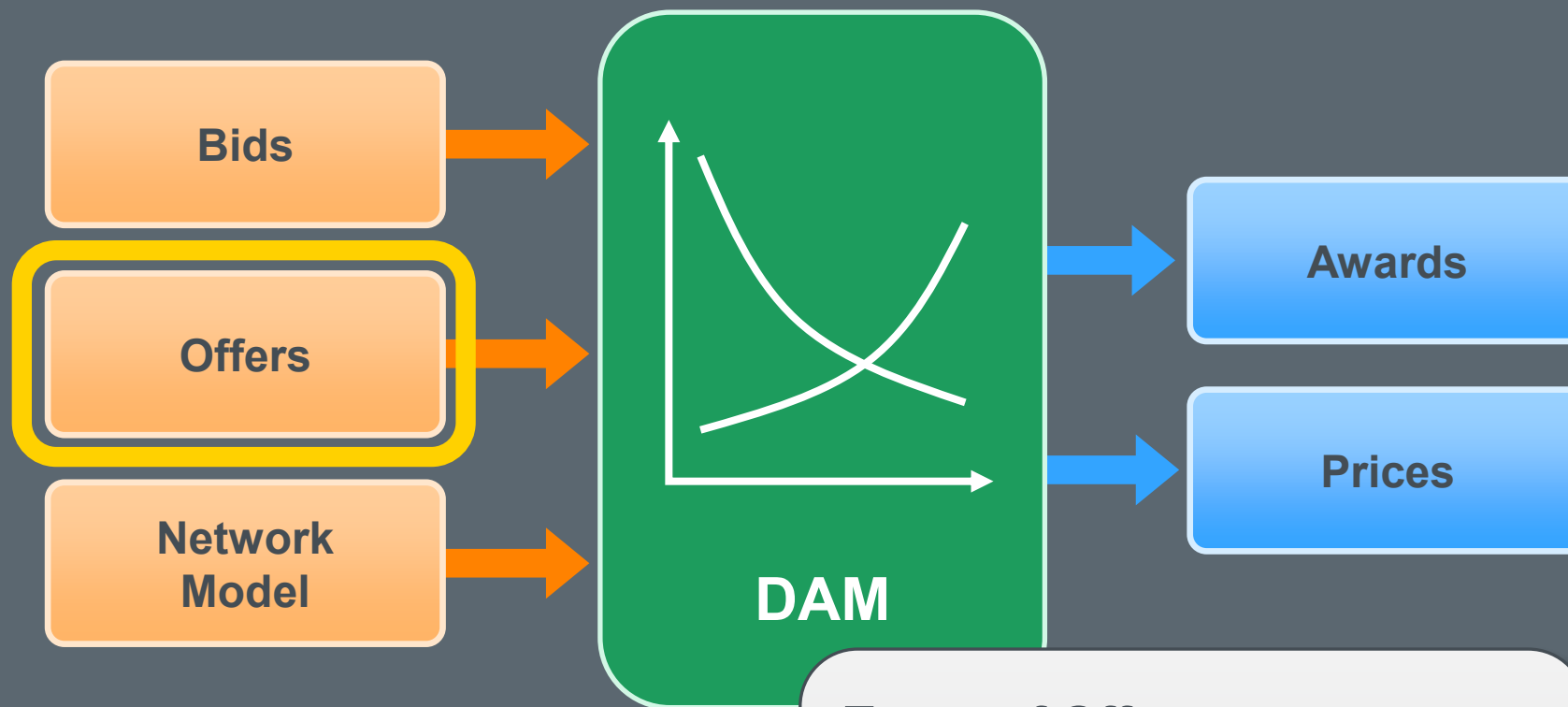
## QSE awarded Energy Bid in DAM





## 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

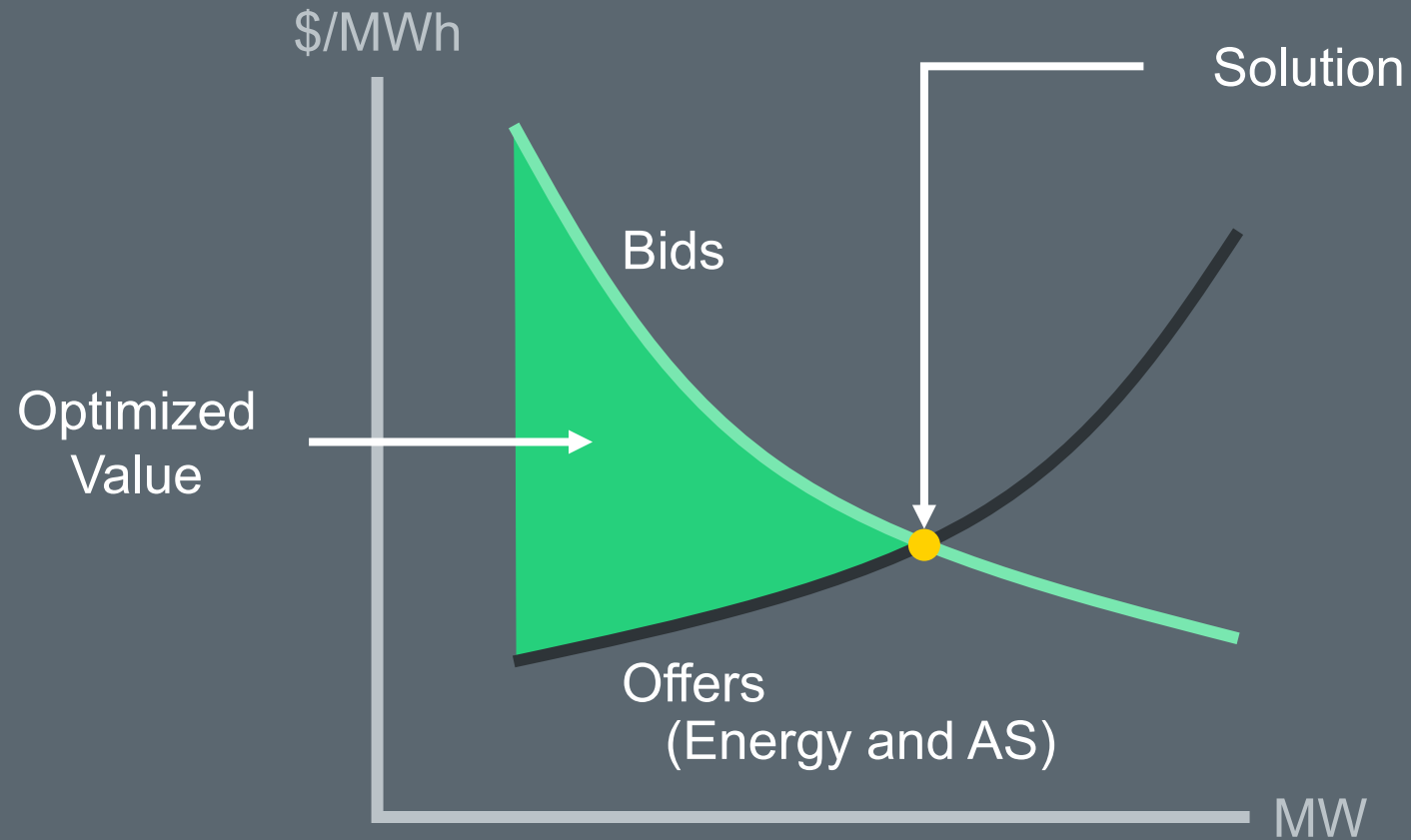
## Financial AS Offers for Each Service

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*

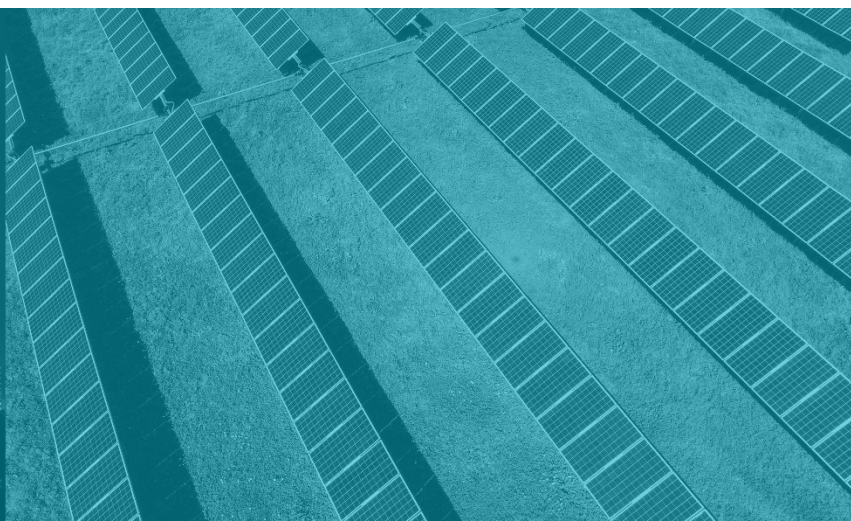


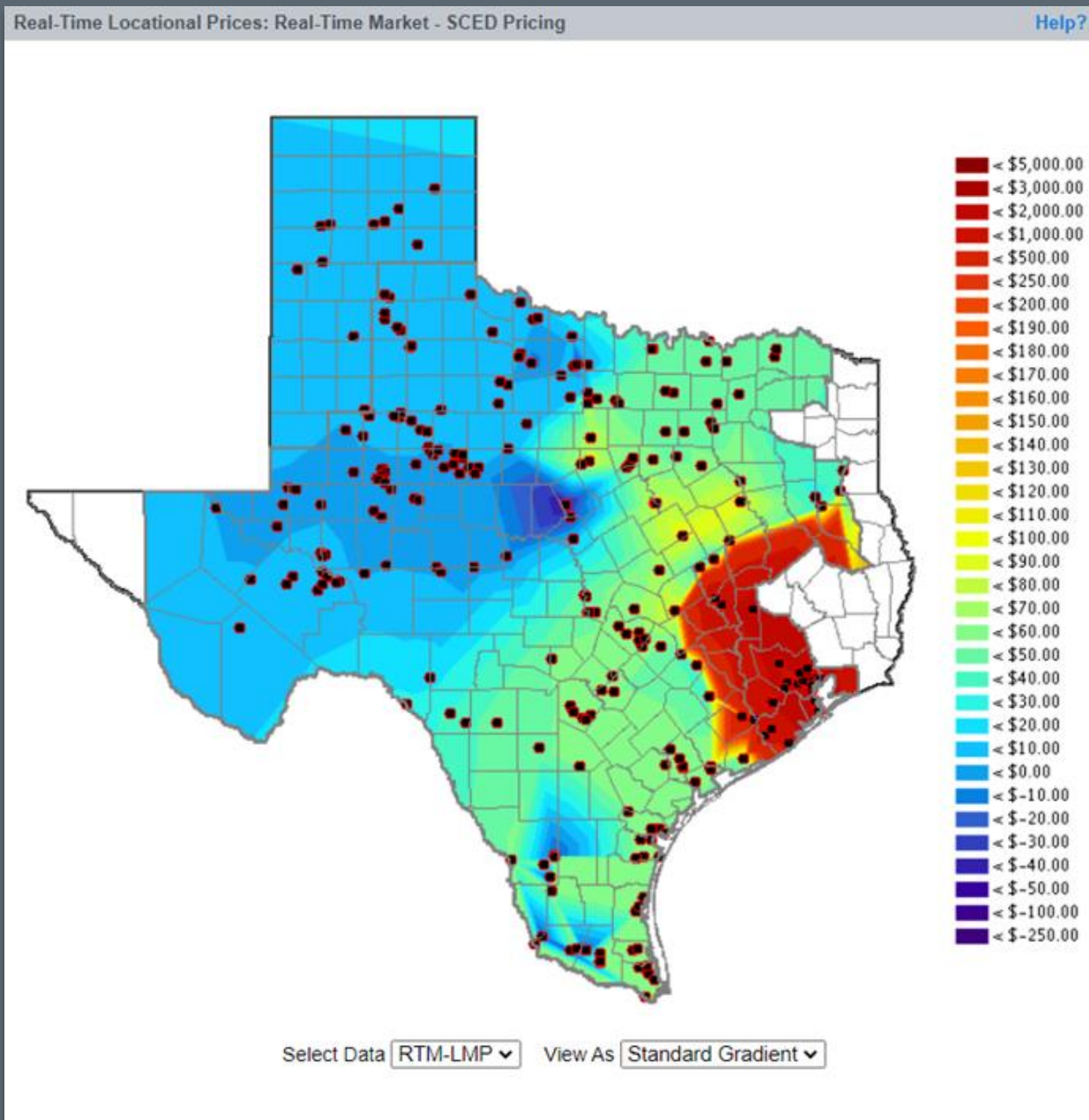
*Other QSE confirms*

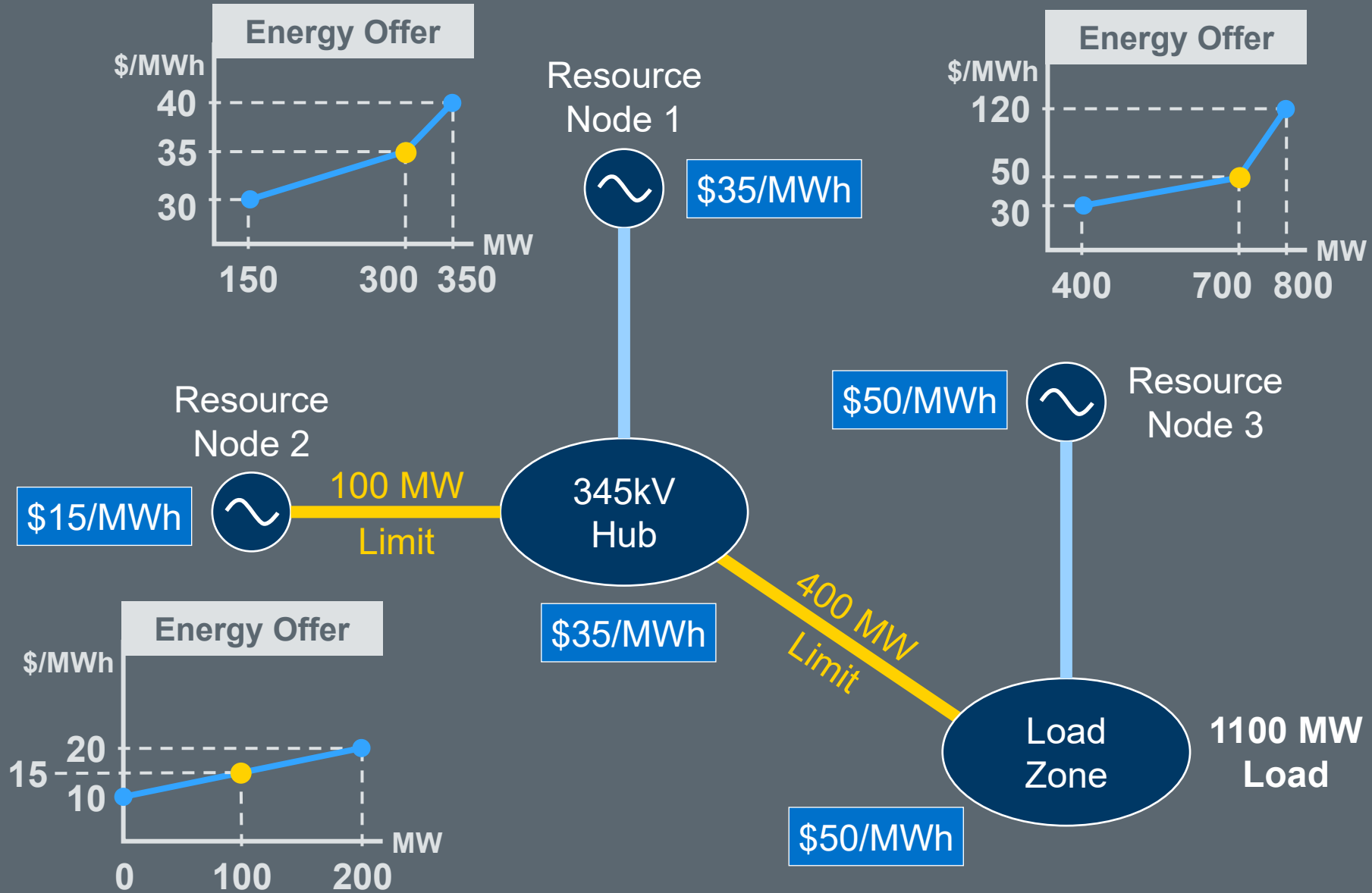


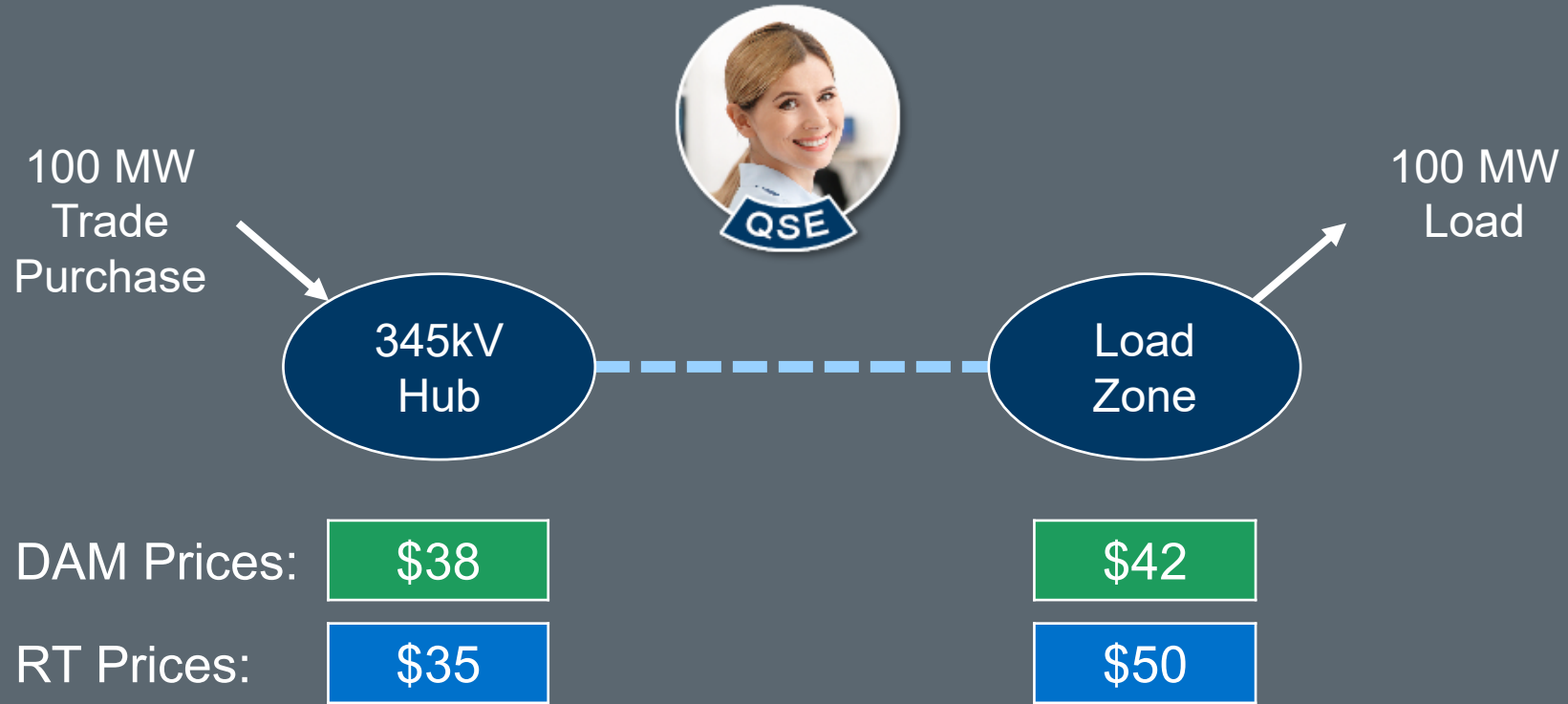


# Congestion





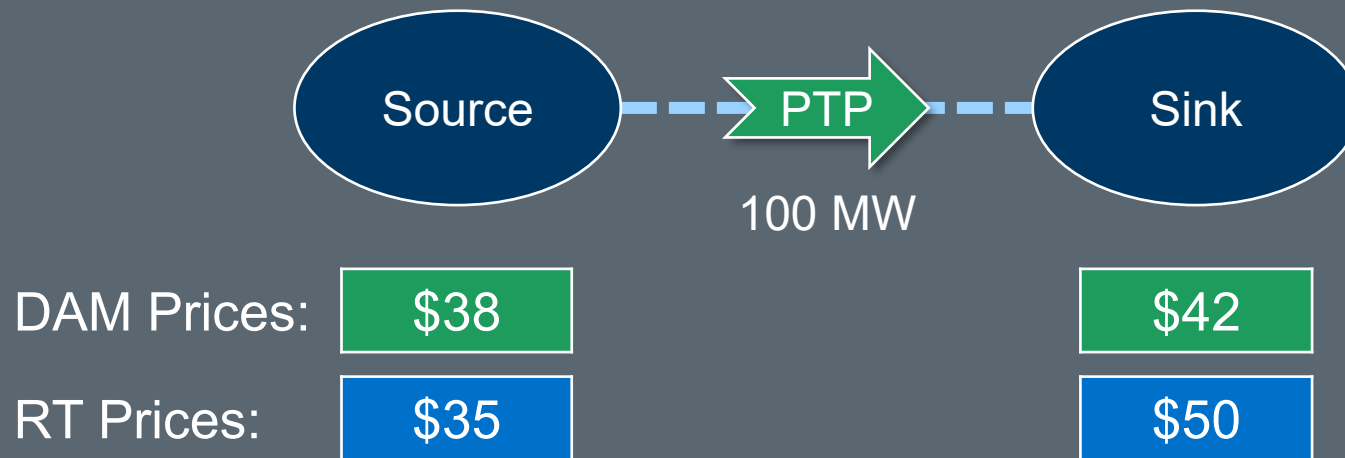




Settlement	Payment at Hub	Charge at Load Zone	Net Amount



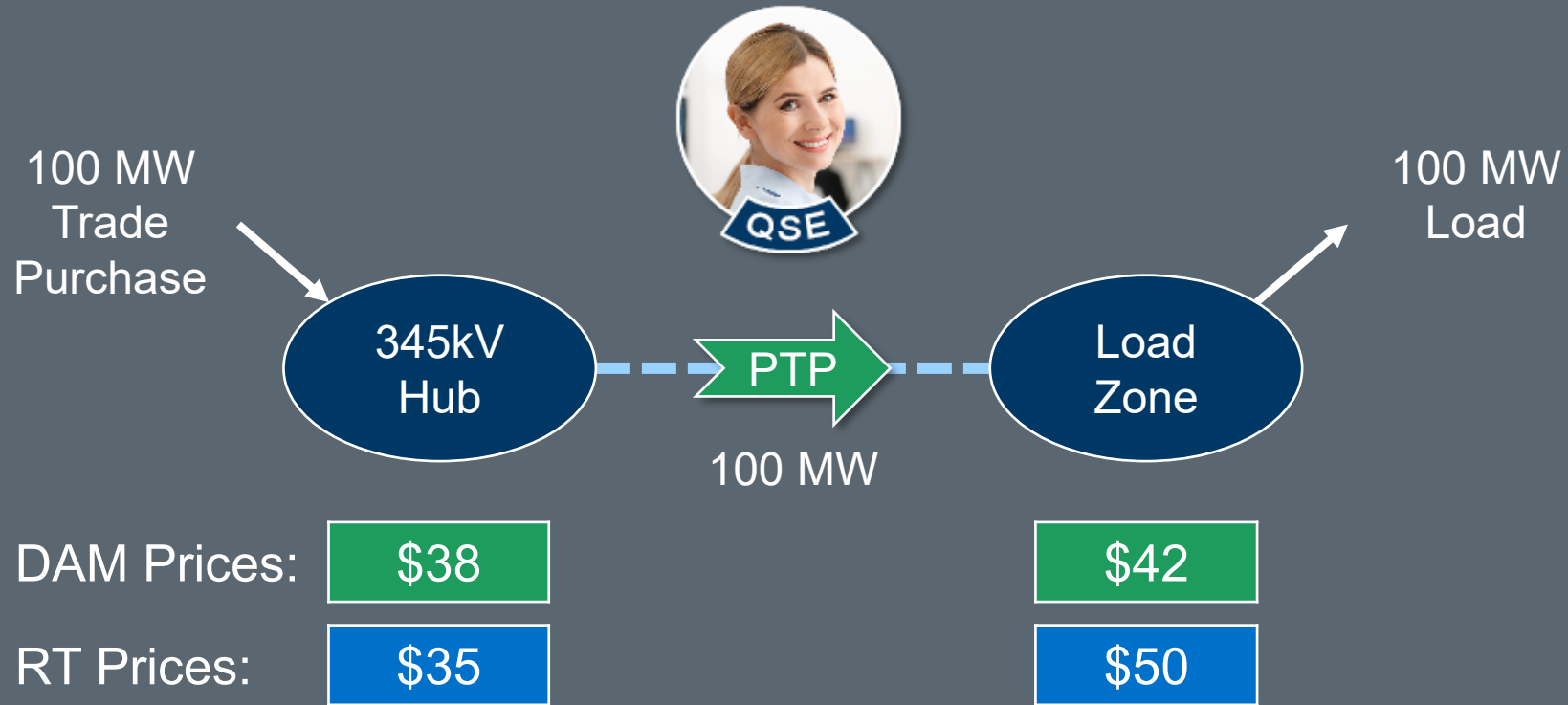
## Introducing DAM Point-to-Point Obligations



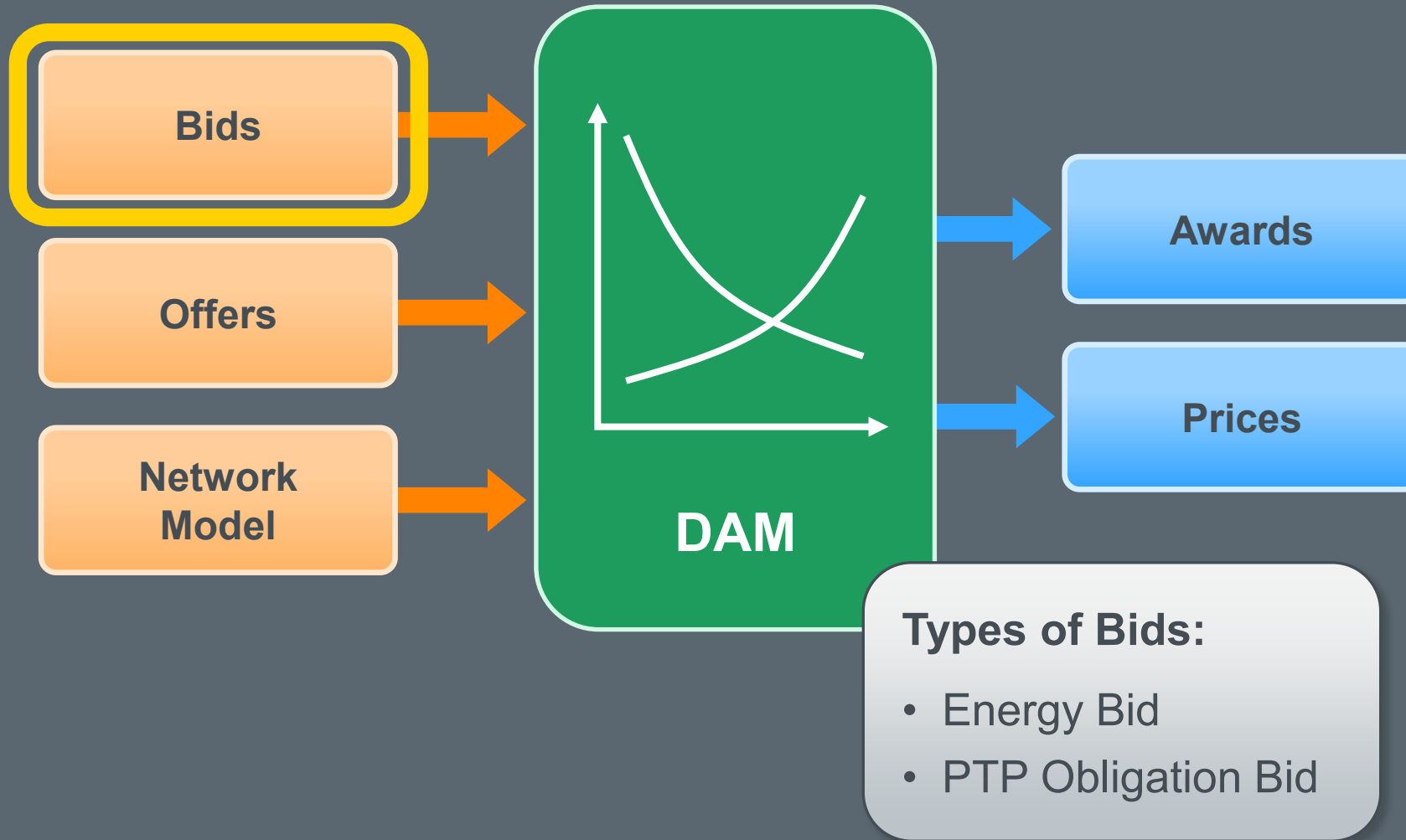
Settlement	Sink minus Source Price	PTP Obligation Amount
DAM		
RT		



# Example: Hedging Real-Time Congestion Costs



Settlement Type		Amount
DAM	PTP Obligation	
RT	Energy	
	PTP Obligation	
Total		



**Submitted between any two Settlement Points**

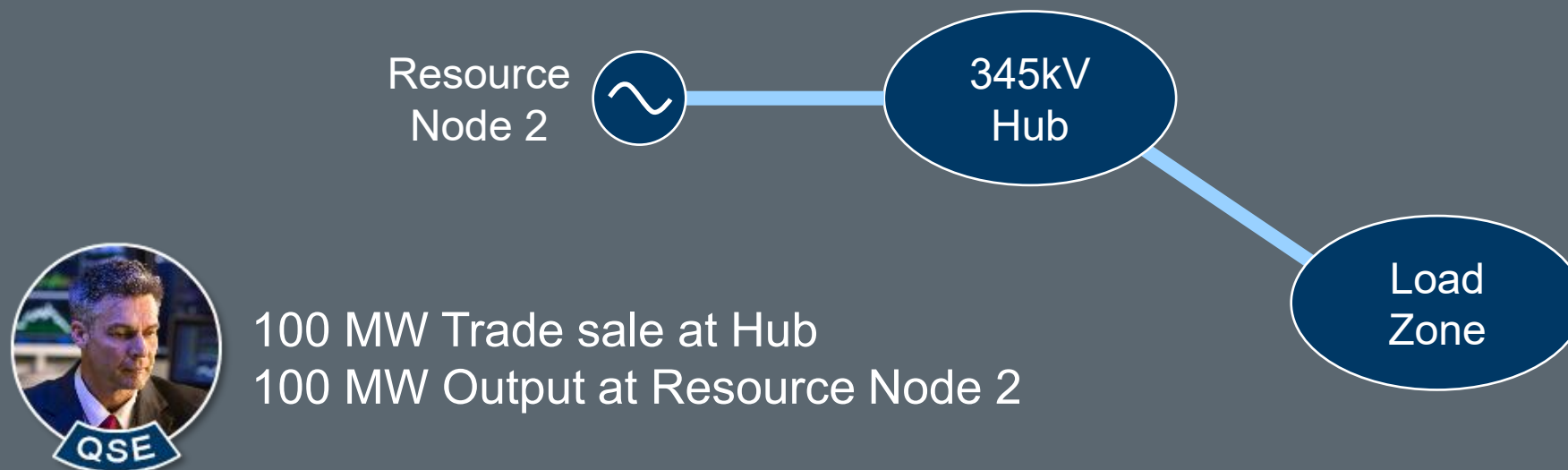
Source	Sink	Bid	
345kV Hub	Load Zone	MW	\$ / MW
Resource Node 1	Load Zone	MW	\$ / MW
Resource Node 2	Resource Node 3	MW	\$ / MW
Resource Node 1	345kV Hub	MW	\$ / MW



***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

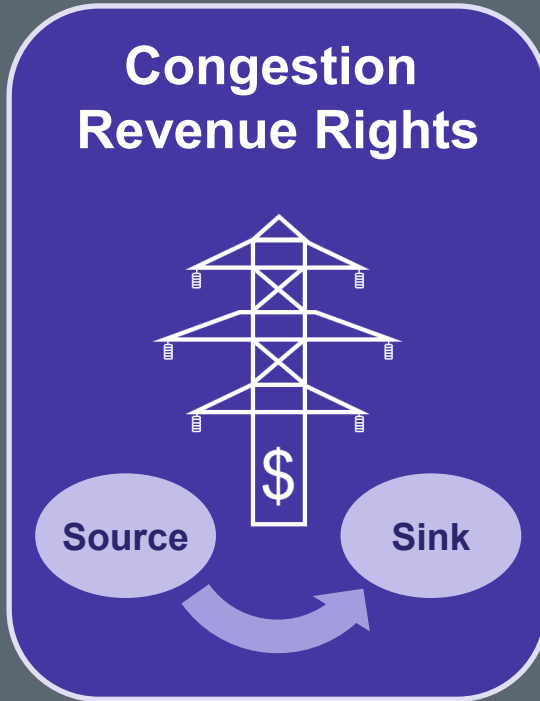




## Hourly Financial instruments

- 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

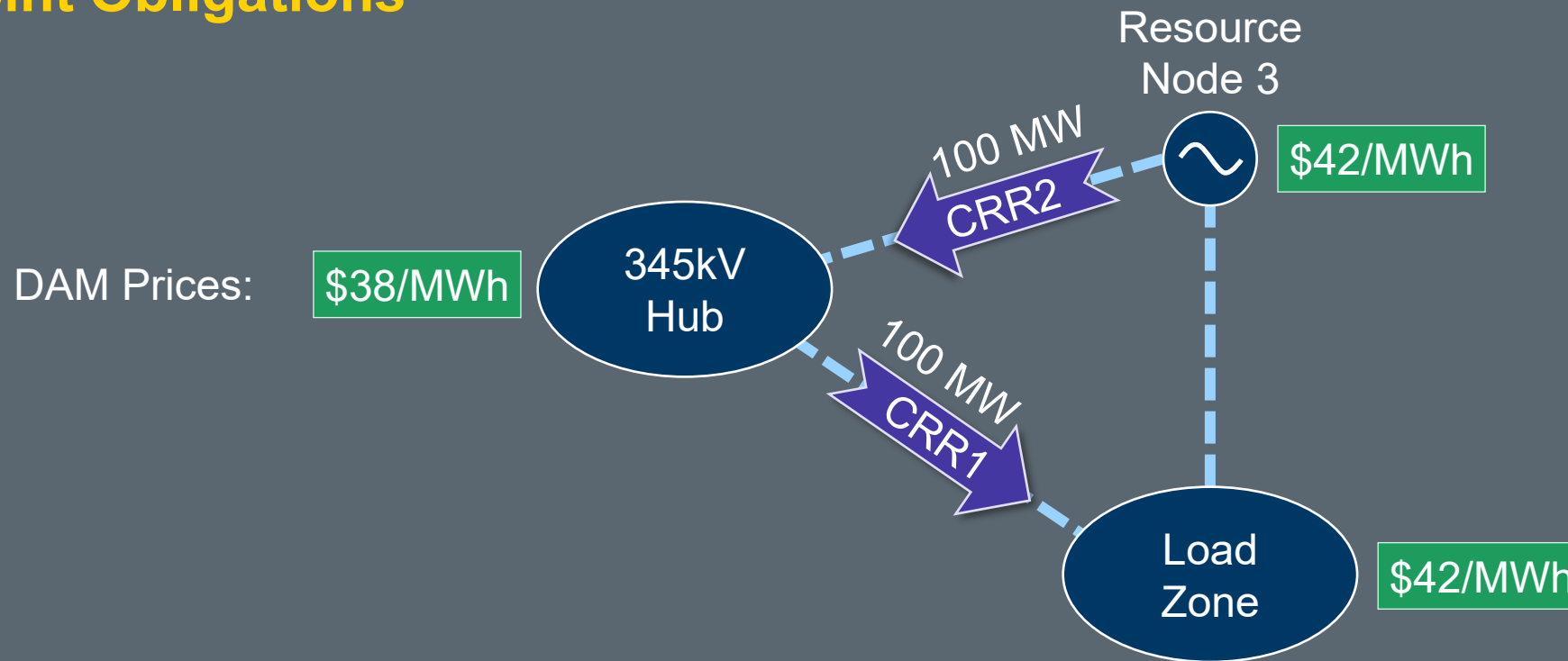
*Payment or Charge in DAM*

Point-to-Point Option

*Payment only in DAM*



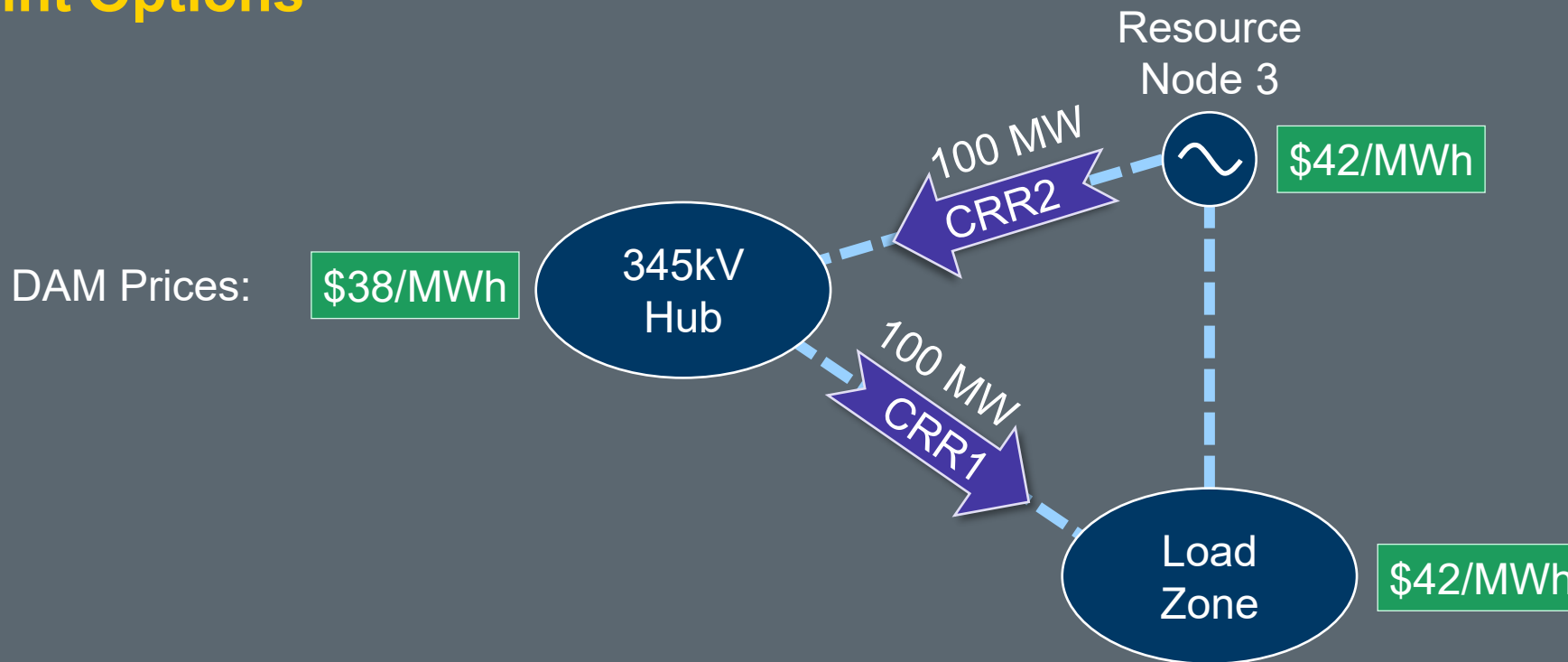
## Point-to-Point Obligations



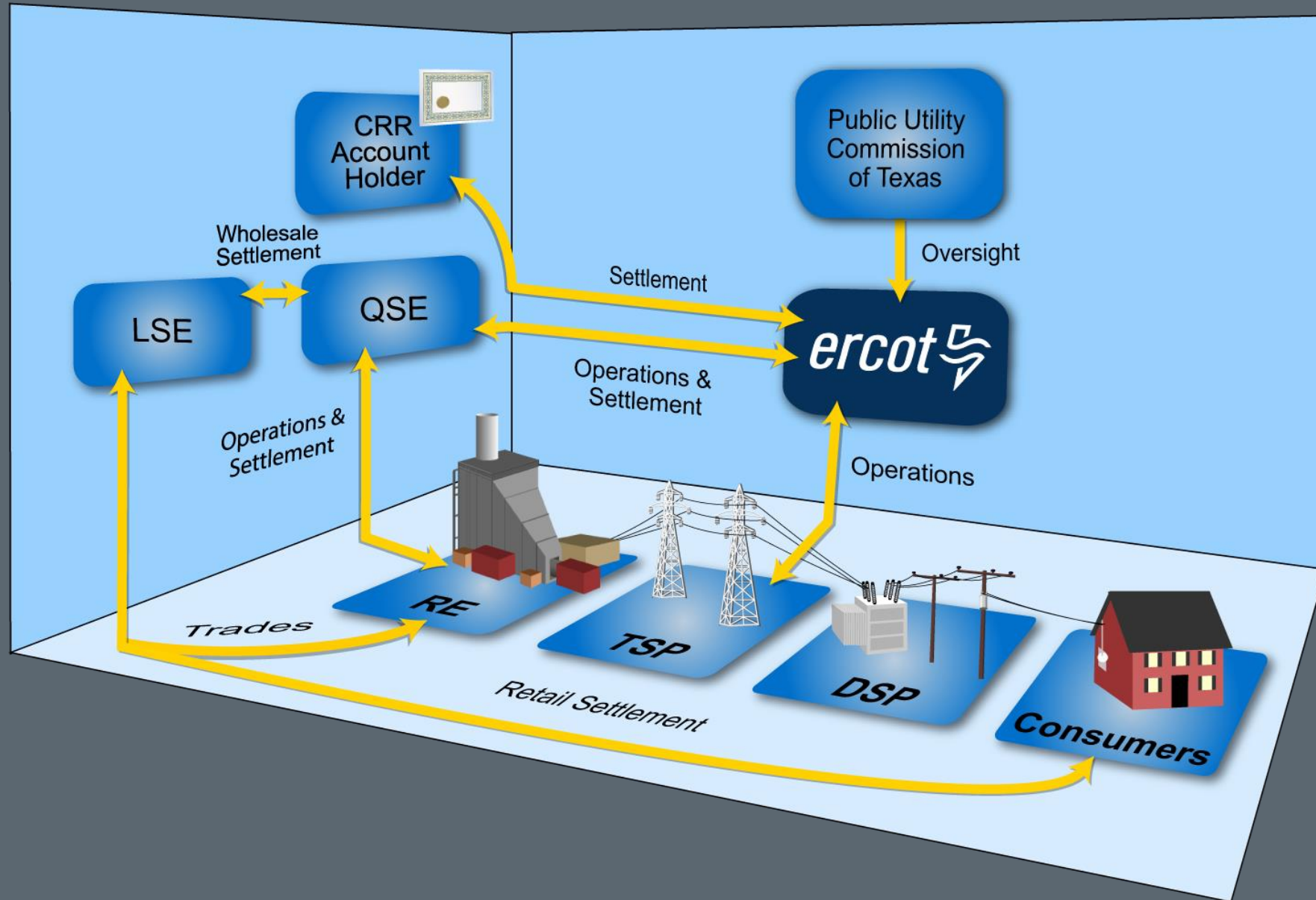
Settlement	Sink minus Source Price	CRR Amount
CRR1		
CRR2		



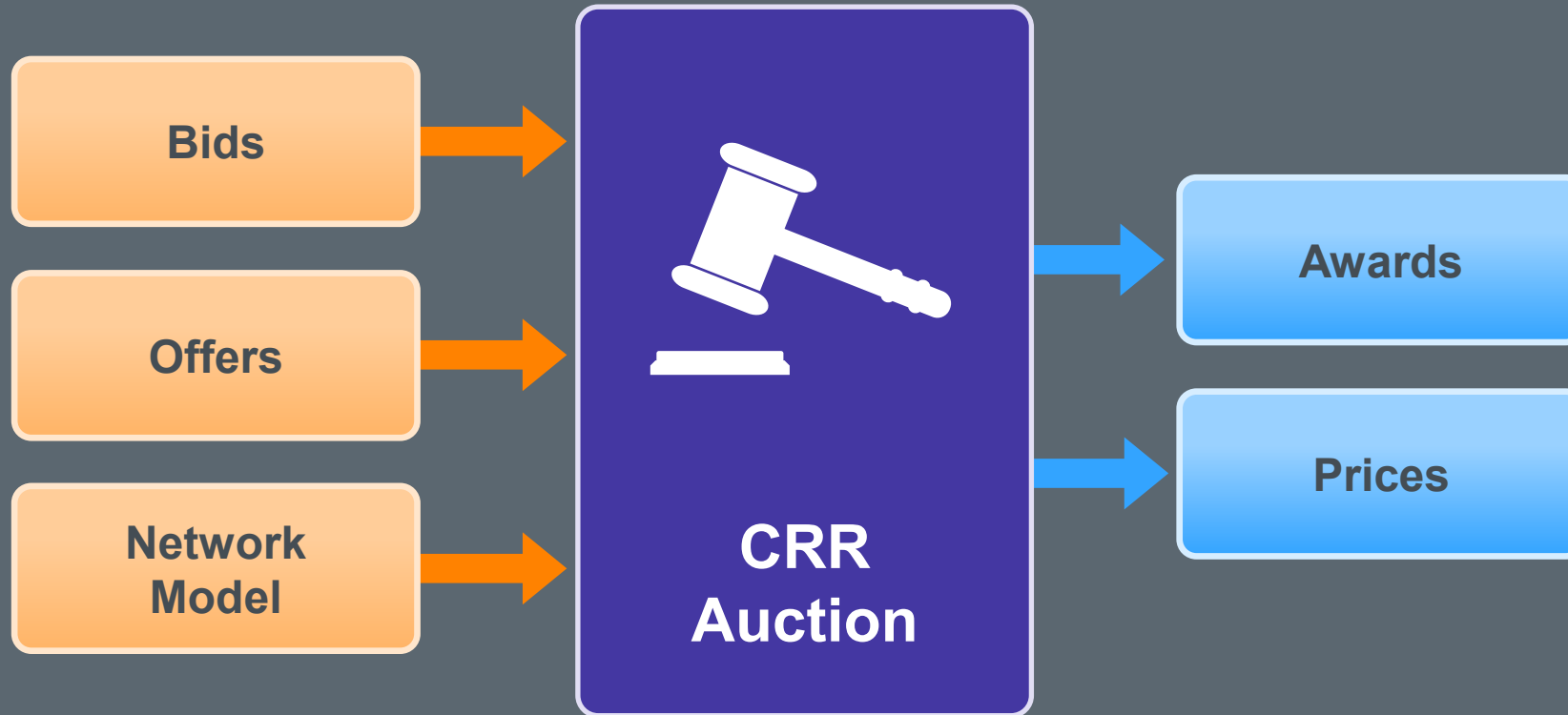
## Point-to-Point Options



Settlement	Sink minus Source Price	CRR Amount
CRR1		
CRR2		



## CRR Auction Transactions



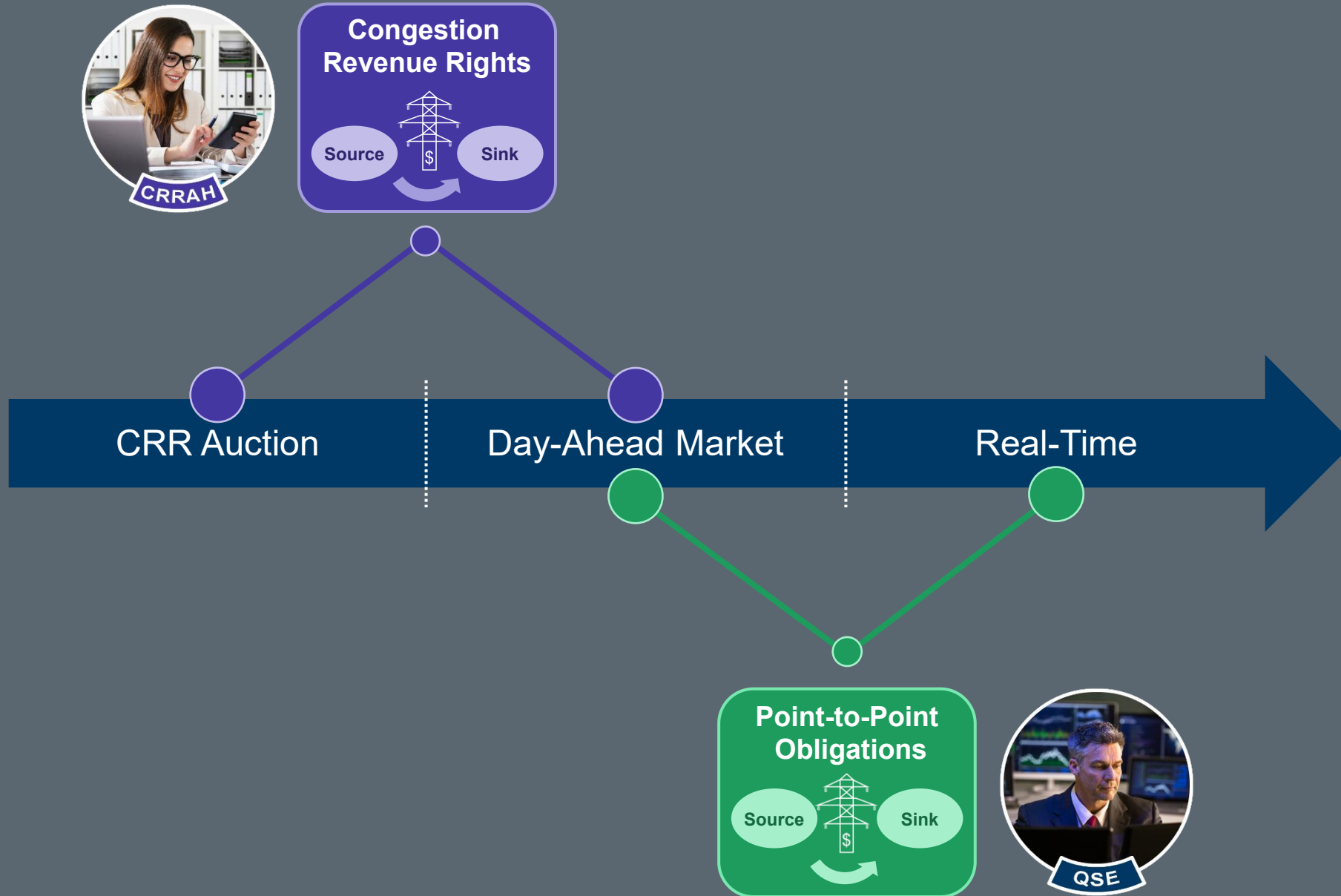
**CRRs are auctioned by:**

- 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)						



# Discussion: Congestion Hedging – The Big picture

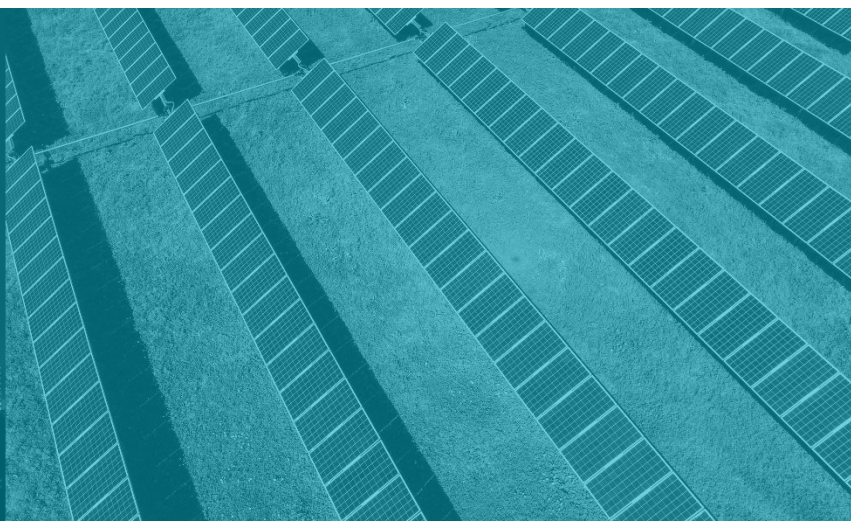


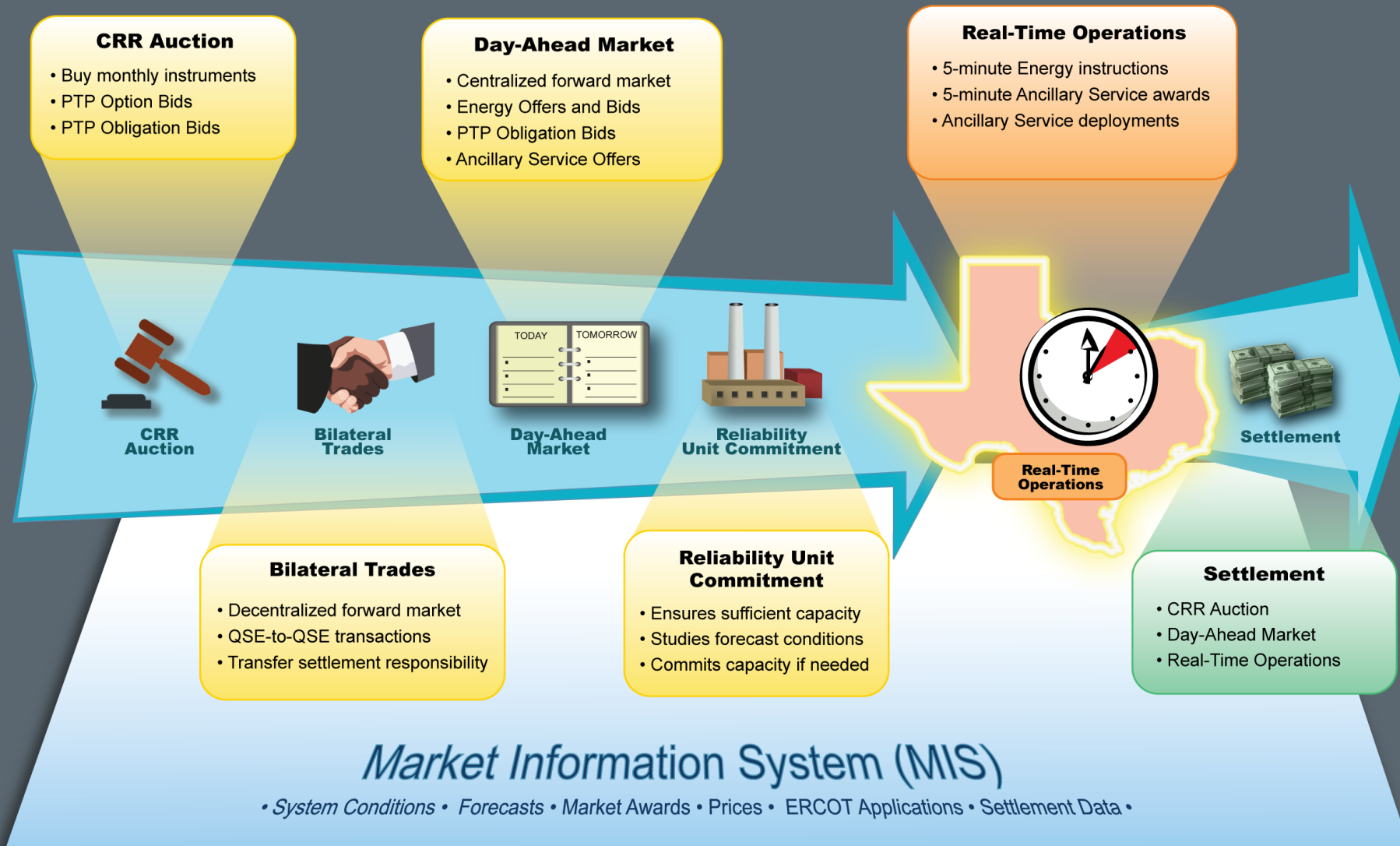
	PTP Obligation (CRR)	DAM PTP Obligation
<b>How acquired:</b>	Auction / Allocation	DAM
<b>Who Purchases:</b>	CRR Account Holder	QSE
<b>Tradable:</b>	Yes	No
<b>How Purchased:</b>	TOU Blocks	Hourly
<b>Initial Investment:</b>	Auction clearing price	Day-Ahead SPPs (Sink – Source)*
<b>Target Payout:</b>	Day-Ahead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

*\* Other DAM charges may apply*



# Summary and Conclusion







Also available  
on [ercot.com](http://ercot.com)



Available to  
all Market  
Participants



Available to  
specific Market  
Participant

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