

Day-Ahead Market Operations



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.

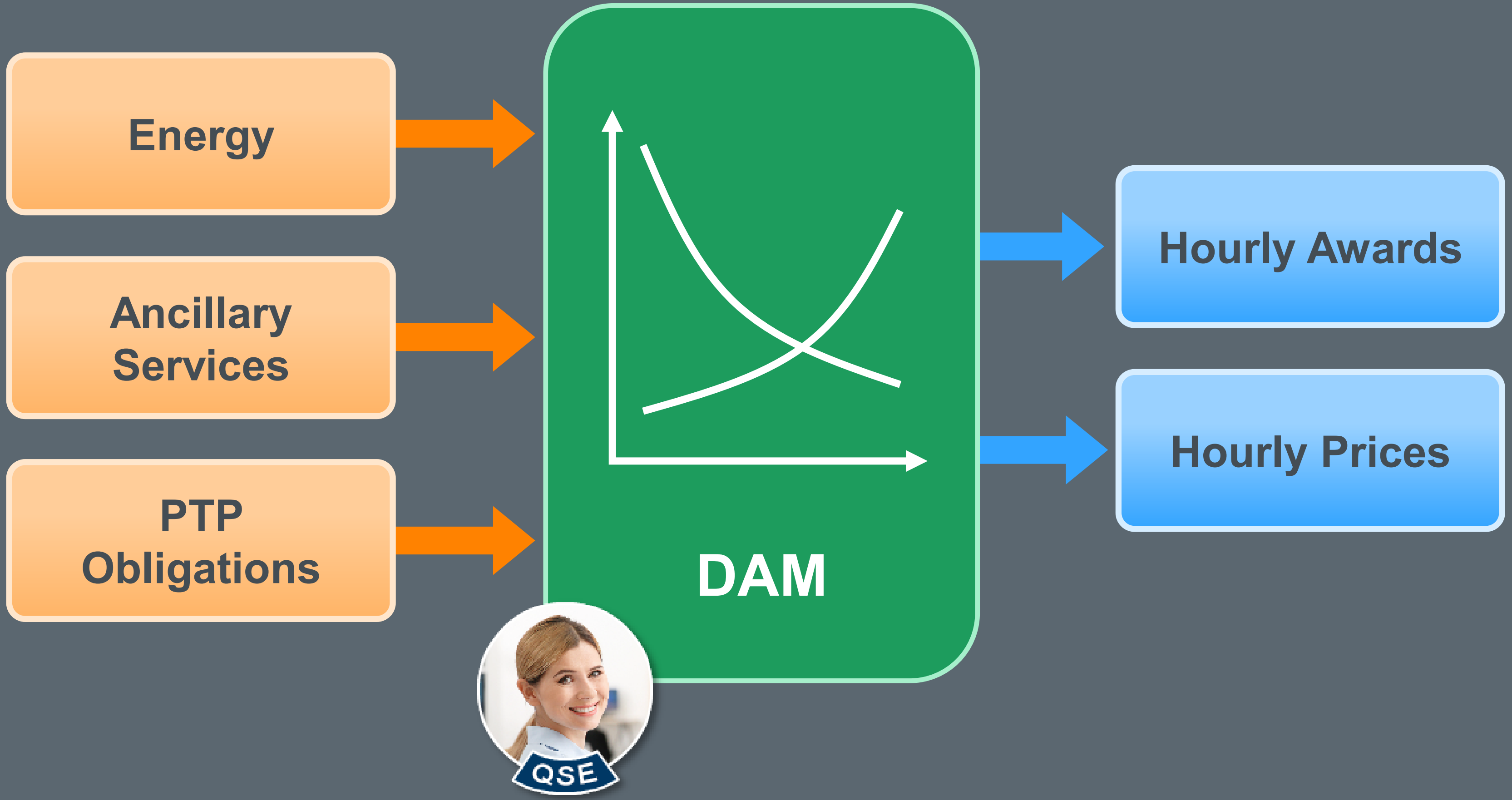
For more information, please visit:

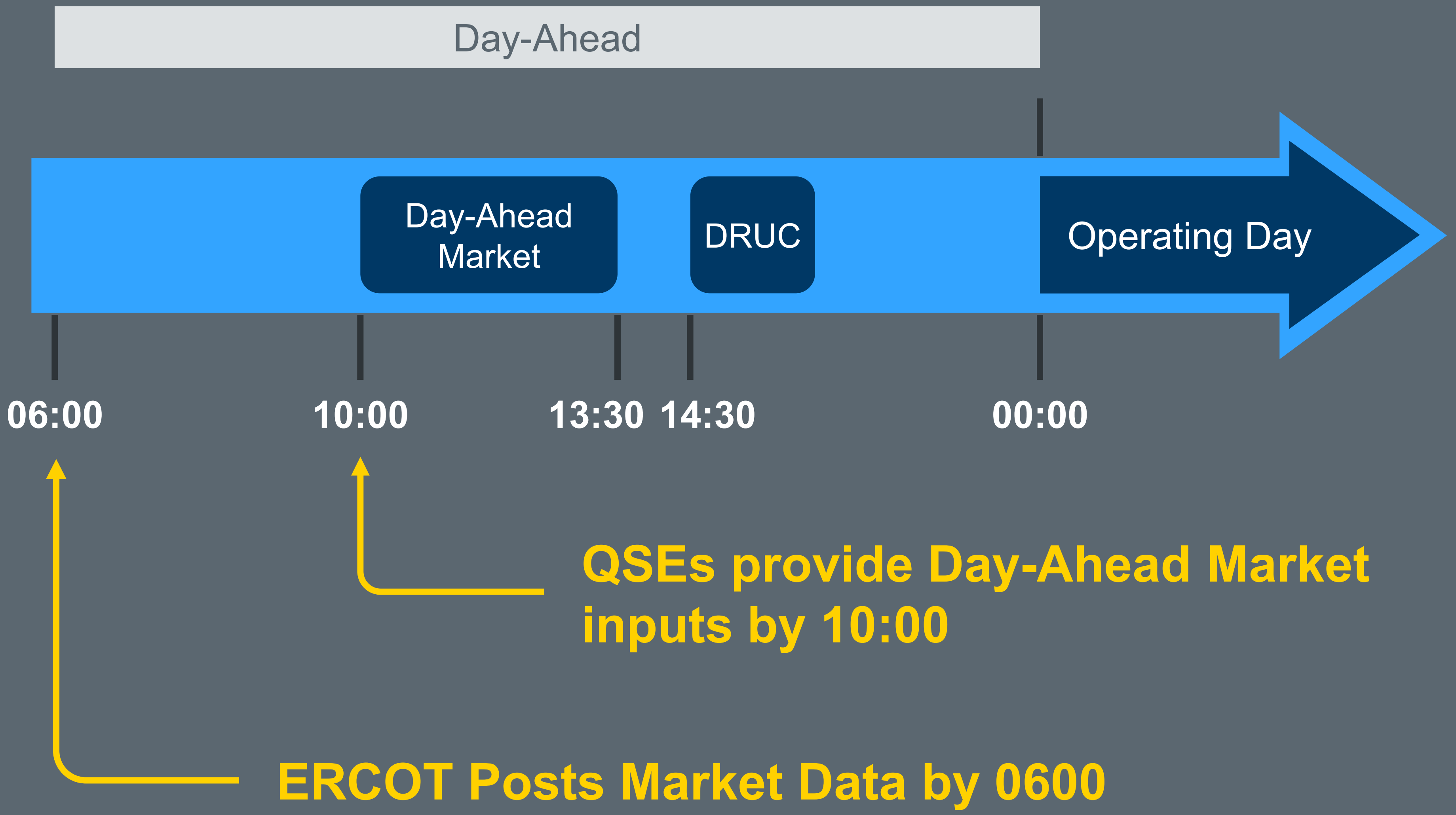
http://www.ercot.com/mktrules/nprotocols/

Format	Title
WBT	Wholesale Markets Overview

Format	Title	Topic
ILT	Day-Ahead Market Operations	Inputs
		Market Clearing
		Financial Impacts
	Reliability Unit Commitment	Overview
		Process
		Financial Impacts
	Real-Time Market Operations	Security Constrained Economic Dispatch
		Load Frequency Control
		Financial Impacts

ERCOT-Facilitated Forward Market




Day-Ahead
Day-Ahead Market
DRUC
Operating Day
06:00
10:00
13:30
14:30
00:00
QSEs provide Day-Ahead Market inputs by 10:00
ERCOT Posts Market Data by 0600

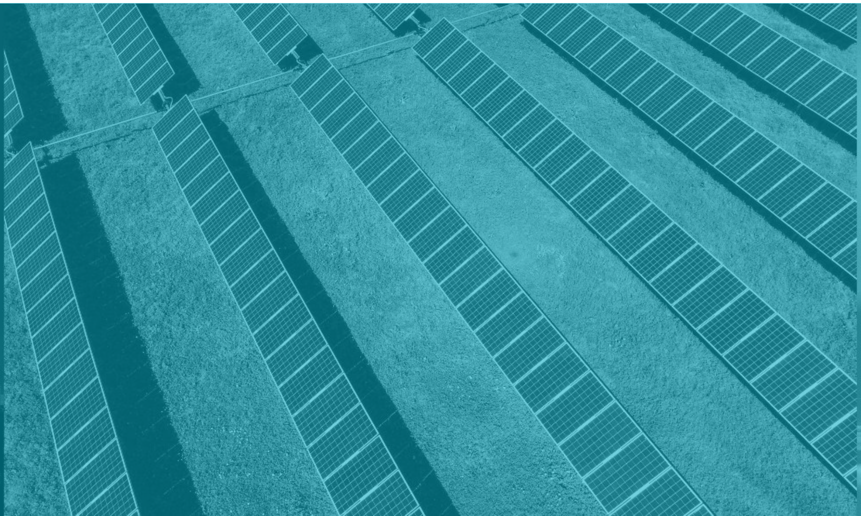
In accordance with PUCT Scarcity Pricing Mechanism,

ERCOT Market Caps		HCAP	LCAP*
Day-Ahead System Wide Offer Cap	DASWCAP	$5000	$2000
Real-Time System Wide Offer Cap	RTSWCAP	$2000	$2000
Value of Lost Load	VOLL	DASWCAP	

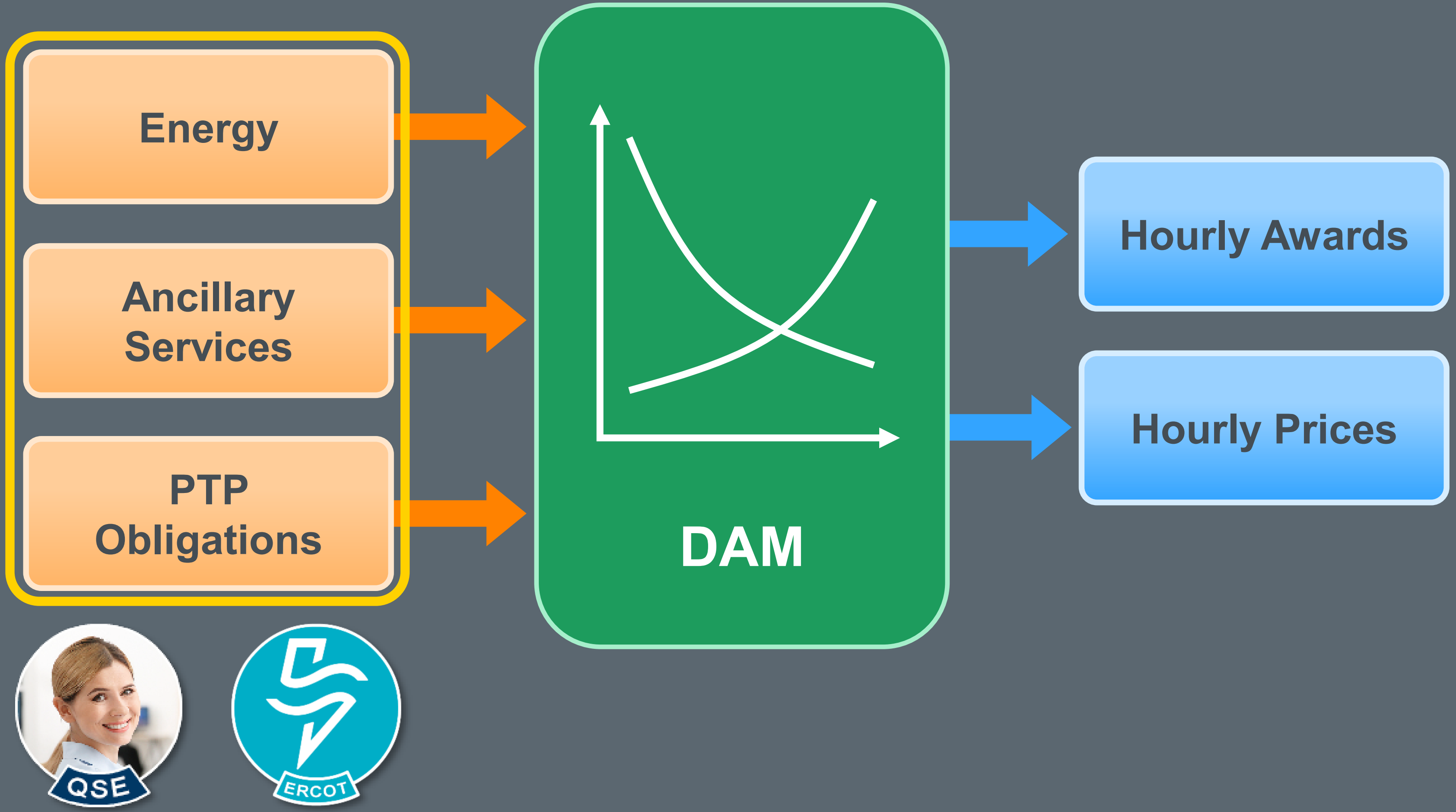
* Used when Peaker Net Margin exceeds annual threshold



Day-Ahead Market Inputs


QSEs and ERCOT provide economic Inputs



Energy Inputs	Ancillary Service Inputs	PTP Obligation Inputs
Energy Bids	Self-Arranged AS Quantities	PTP Obligation Bids
Energy-Only Offers	AS-Only Offers	
Resource-Specific Energy Offers	Resource-Specific AS Offers	
Current Operating Plans		

Ancillary Service Inputs
AS Demand Curves

DAM Energy Bid

Proposal to *buy* energy:

- Quantity
- Price
- Settlement Point

DAM Energy-Only Offer

Proposal to *sell* energy:

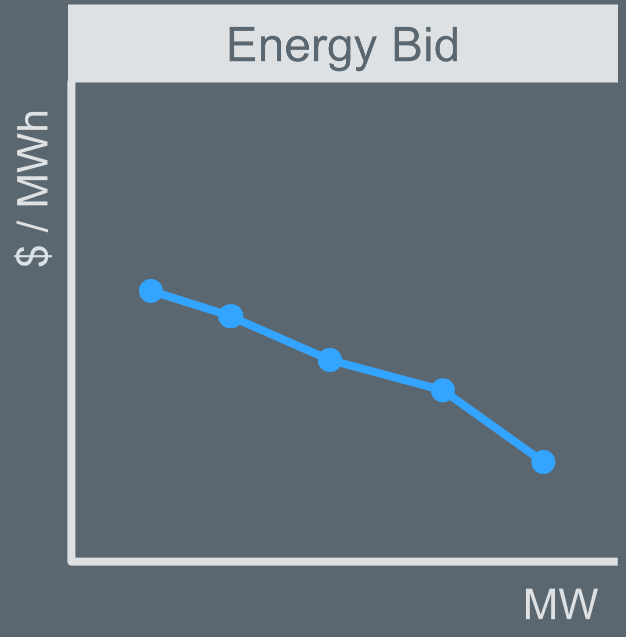
- Quantity
- Price
- Settlement Point

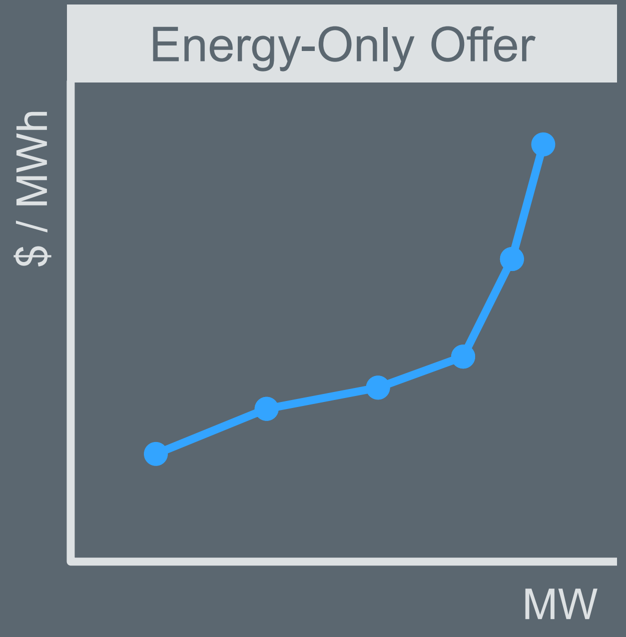
Discussion: DAM Energy Bids

Purely Financial Transactions

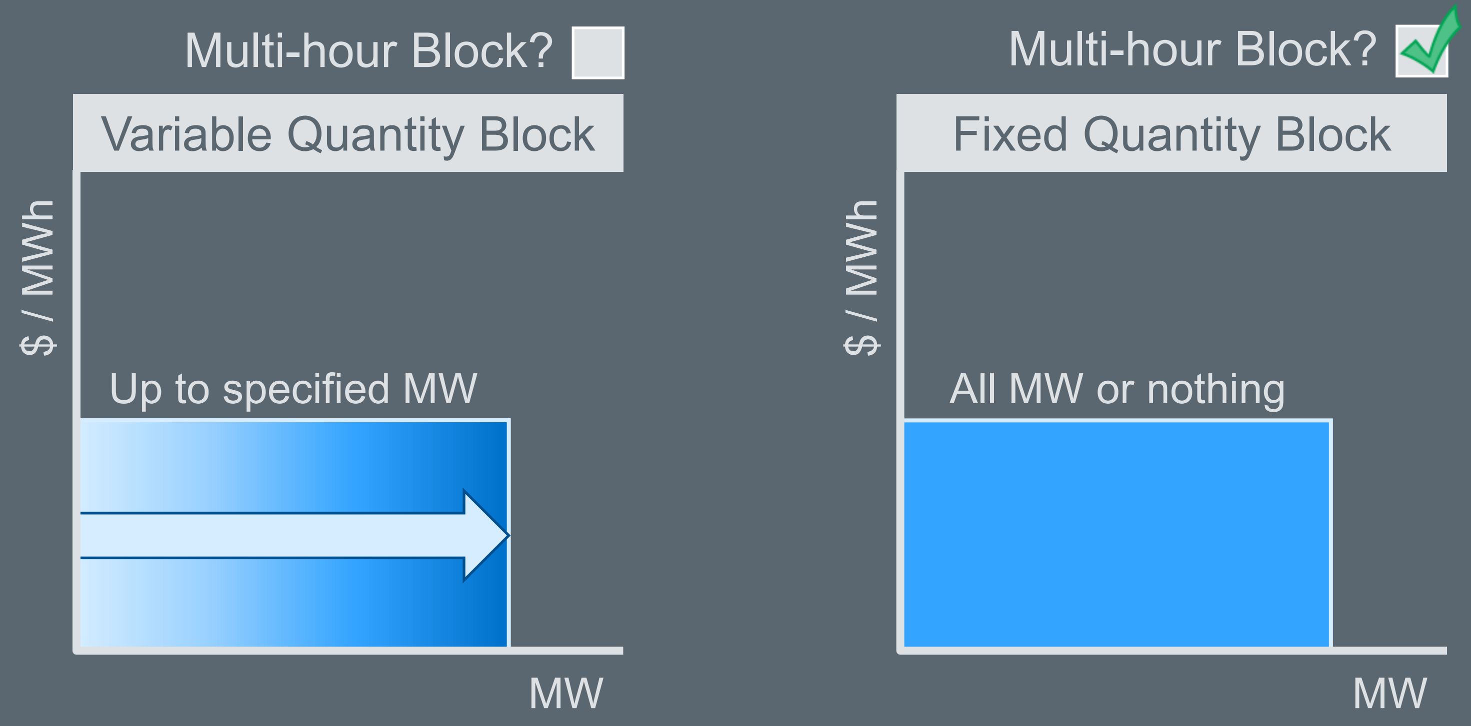
Purely Financial Transactions

Curve with up to 10 Price/Quantity Pairs

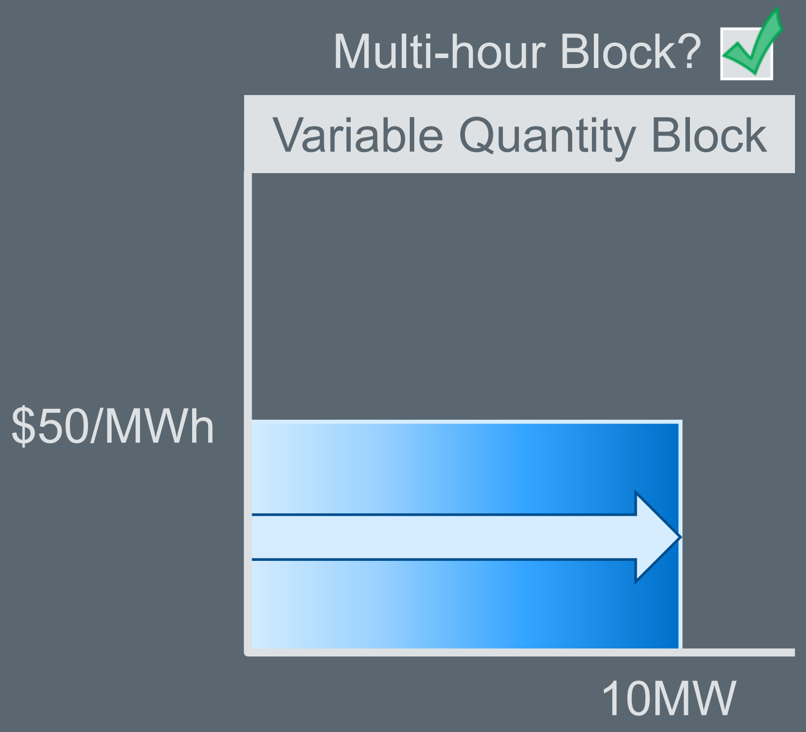




Block with Single Price/Quantity Pair

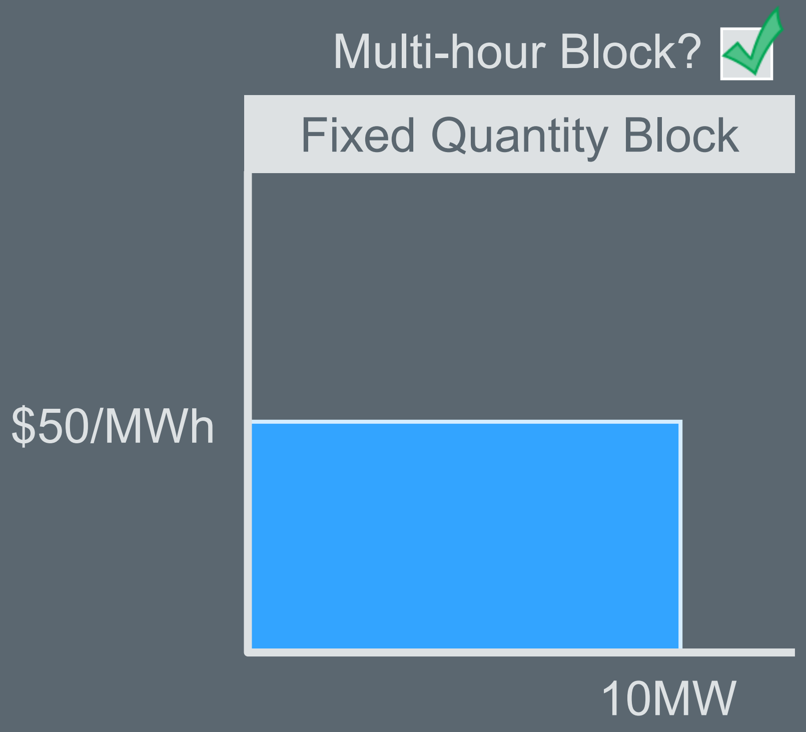


QSE submits the following Energy Bid for 0700-2200



Day-Ahead Market Options?

QSE submits the following Energy Bid for 0700-2200



Day-Ahead Market Options?

Fixed Block price will not set clearing price

Day-Ahead Market Inputs

Energy Inputs	Ancillary Service Inputs	PTP Obligation Inputs
Energy Bids	Self-Arranged AS Quantities	PTP Obligation Bids
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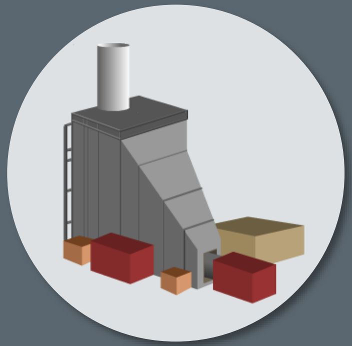
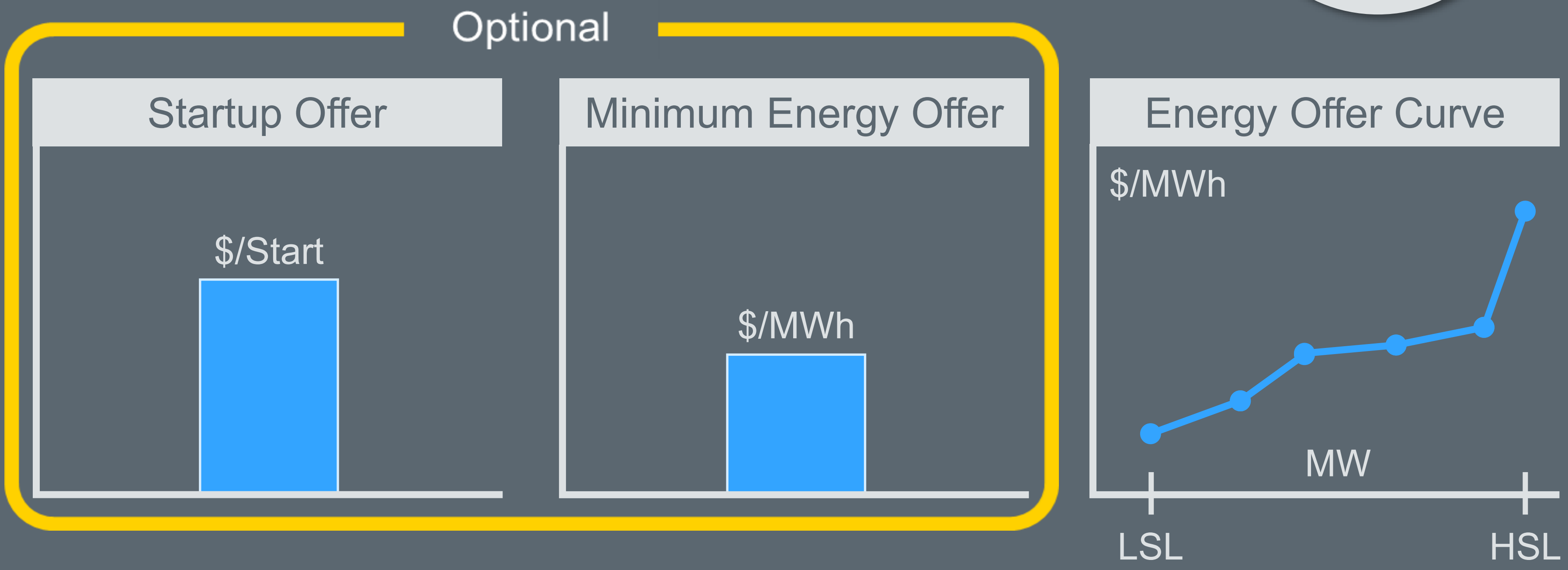
Current Operating Plans		

Ancillary Service Inputs
AS Demand Curves

Energy Offer from Generation Resource

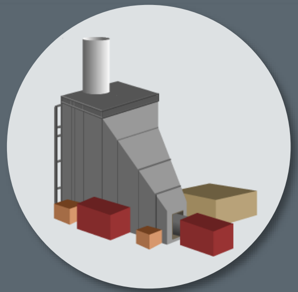




LSL – Low Sustained Limit

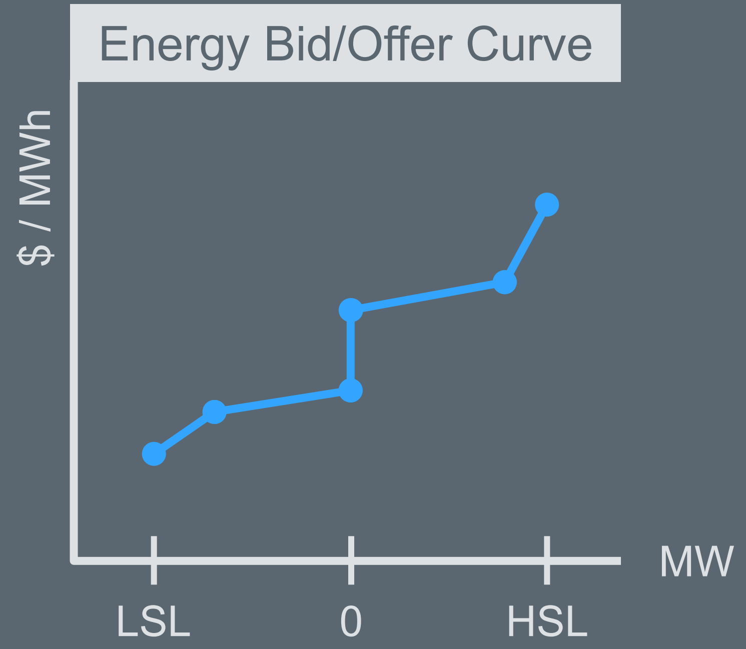
HSL – High Sustained Limit

Where are the three parts used?



	Three-Part Supply Offer		
	Startup Offer	Minimum Energy Offer	Energy Offer Curve
Day-Ahead Market	✓	✓	✓
RUC-Commitment	✓	✓	
Real-Time Dispatch			✓

Energy “Offer” from an Energy Storage Resource



HSL = High Sustained Limit
LSL = Low Sustained Limit

Day-Ahead Market Inputs

Energy Inputs	Ancillary Service Inputs	PTP Obligation Inputs
Energy Bids	Self-Arranged AS Quantities	PTP Obligation Bids
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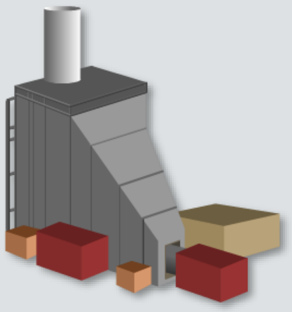
Current Operating Plans		

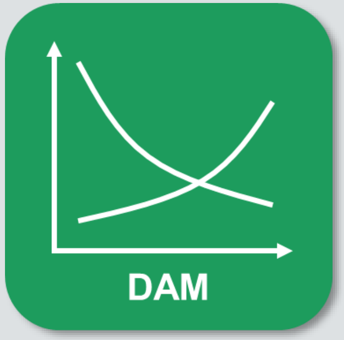
Ancillary Service Inputs
AS Demand Curves

A QSE may have Advisory Ancillary Service Obligations

Self-Arrange



Allow ERCOT to procure



May choose to Self-Arrange before DAM

QSE has Regulation Up Obligations for a range of hours

Hour	Advisory AS Obligation	Self-Arranged Quantity	Net Obligation	ERCOT action on QSE's behalf
1500	7 MW			
1600	6 MW			
1700	5 MW			
1800	3 MW			

A Few Rules:

QSE Action	Rules
Self-Arrangement	May not exceed their Advisory AS Obligation per service
	Paid for Self-Arranged Quantity that exceeds their Final AS Obligation
Negative Self-Arrangement	Limited to Net AS Trade Sales Up to 500 MW per Service

Energy Inputs	Ancillary Service Inputs	PTP Obligation Inputs
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Current Operating Plans		

Ancillary Service Inputs
AS Demand Curves

Financial Offers for Each Service

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

. . . subject to $0 / MW price floor

Purely Financial Transactions

Energy Inputs	Ancillary Service Inputs	PTP Obligation Inputs
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Current Operating Plans		

ERCOT

Ancillary Service Inputs
AS Demand Curves

Resource-Specific Offers for Each Service

Type of Service	Offer	
Regulation Up	MW	$ / MW
Regulation Down	MW	$ / MW
Responsive Reserve	MW	$ / MW
ERCOT Contingency Reserve	MW	$ / MW
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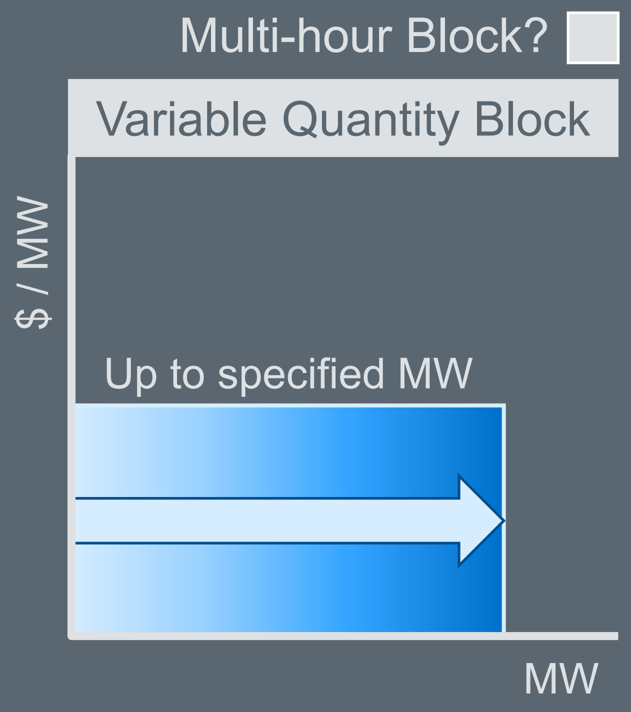
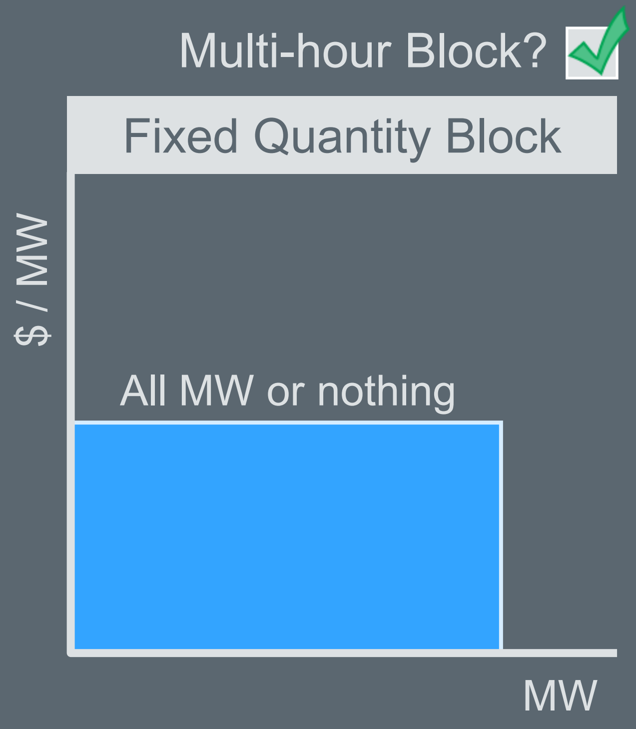
. . . subject to $0 / MW price floor

Block with Single Price/Quantity Pair



Any qualified Resource



Load Resources Only

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Current Operating Plans		

ERCOT

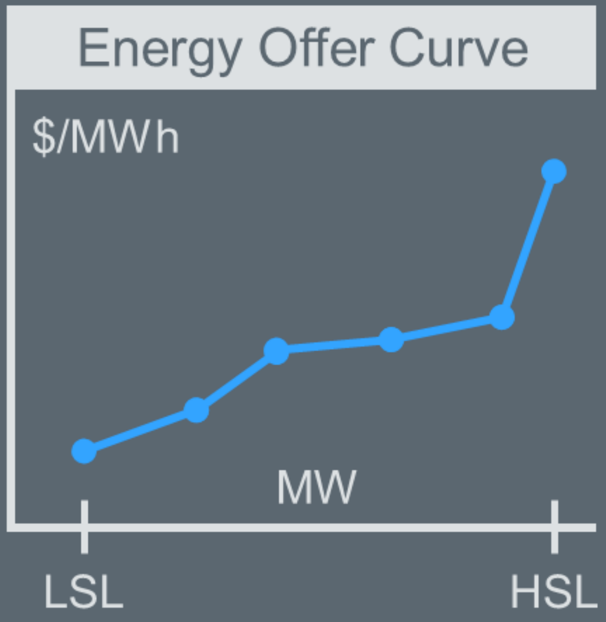
Ancillary Service Inputs
AS Demand Curves

What does DAM need from Current Operating Plans?

Current Operating Plan												
Resource Name	Resource Status	Resource Limits		ESR SOC Limits			Ancillary Service Capabilities				
		HSL	LSL	Min	Max	Hour Beginning	Reg-Up	Reg-Dn	Responsive	ECRS	NSRS
GEN1	ON	600	120	-	-	-	20	20	40	40	120
GEN2	OFF	100	25	-	-	-	0	0	0	0	0
ESR3	ON	40	-40	0	40	40	0	0	40	20	10

Single Resource may be offered for multiple products

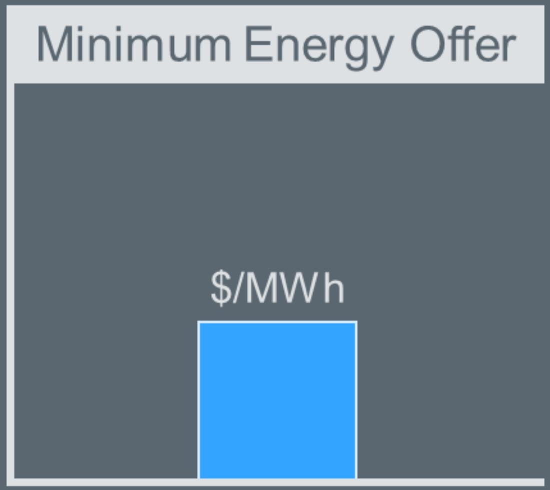
AS Type	Offer	
Reg-Up	MW	$ / MW
Reg-Down	MW	$ / MW
Responsive	MW	$ / MW
ECRS	MW	$ / MW
Non-Spin	MW	$ / MW

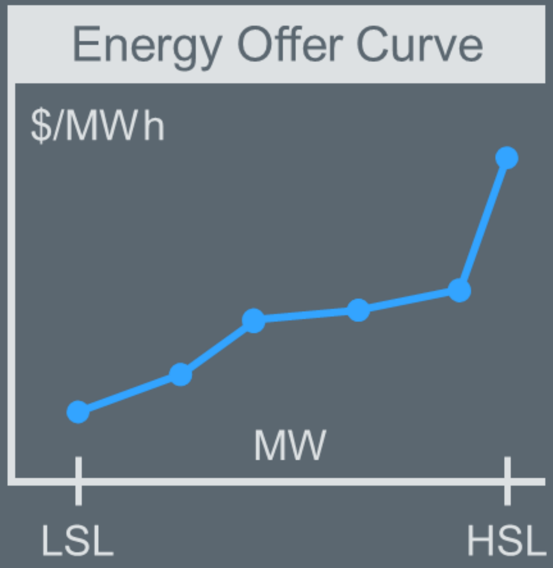


Total DAM award will not exceed Resource's Capacity

But how would the Day-Ahead Market handle this?

AS Type	Offer	
Reg-Up	MW	$ / MW
Responsive	MW	$ / MW





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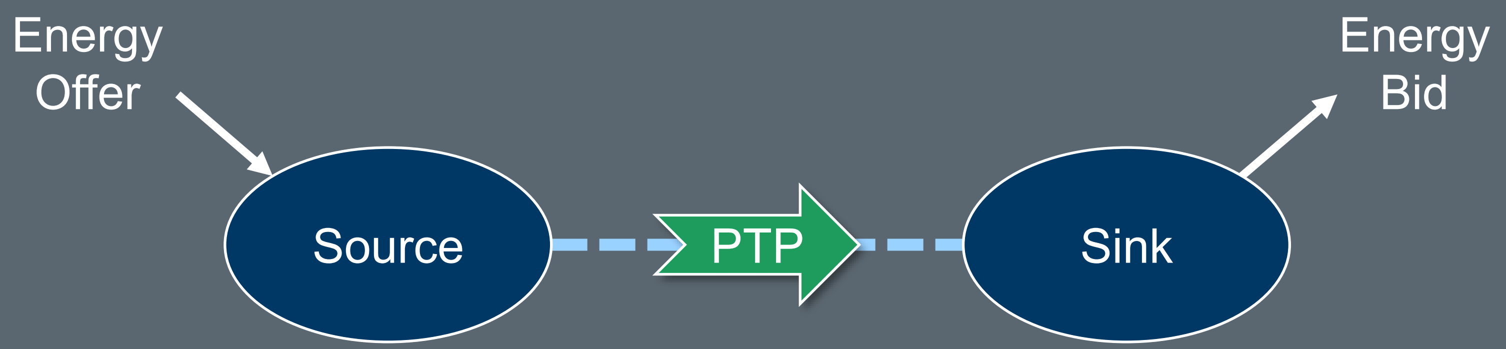
Current Operating Plans		

Ancillary Service Inputs
AS Demand Curves

Discussion: Point-to-Point Obligation Bid

Like a coupled Energy-Only Offer and Energy Bid



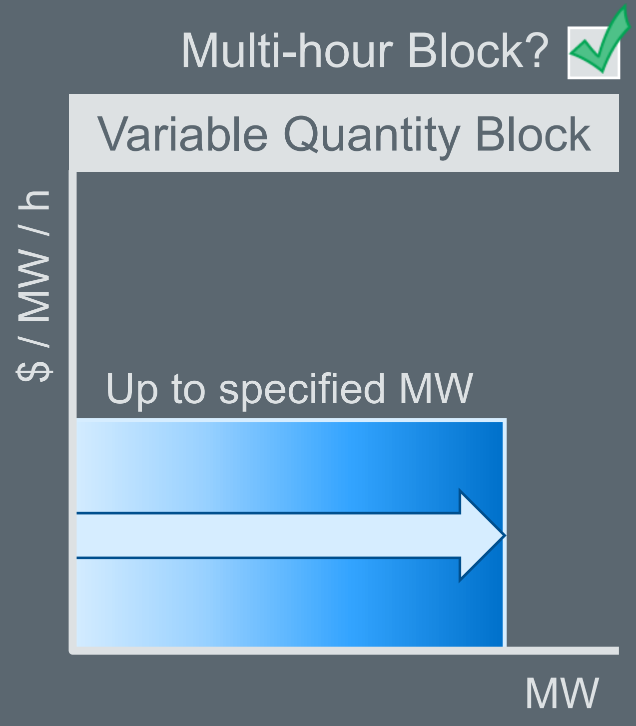
Charge (If Awarded) **=** **?**

SPP = Settlement Point Price

Submitted between any two Settlement Points

Source	Sink	Bid	
Hub	Load Zone	MW	$ / MW / h
Resource Node	Load Zone	MW	$ / MW / h
Resource Node	Hub	MW	$ / MW / h
Load Zone	Resource Node	MW	$ / MW / h
Load Zone	Hub	MW	$ / MW / h

Block with Single Price/Quantity Pair



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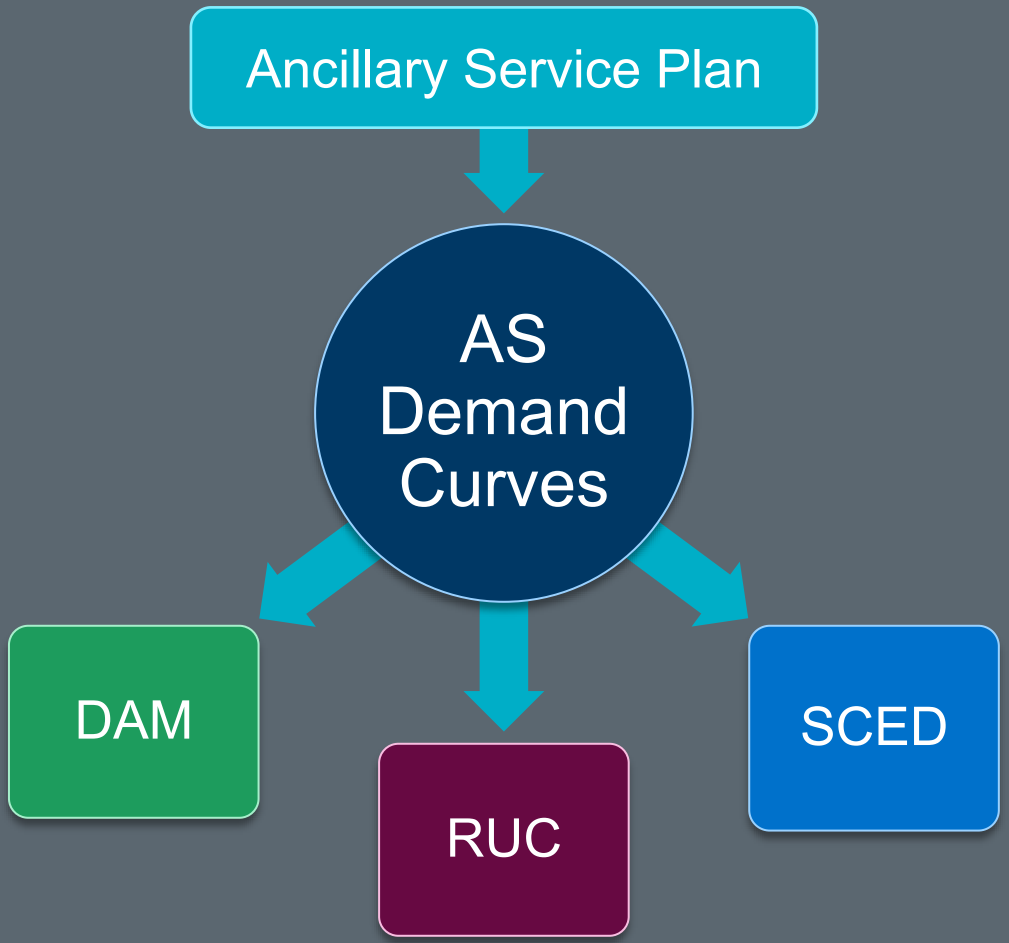
Current Operating Plans		

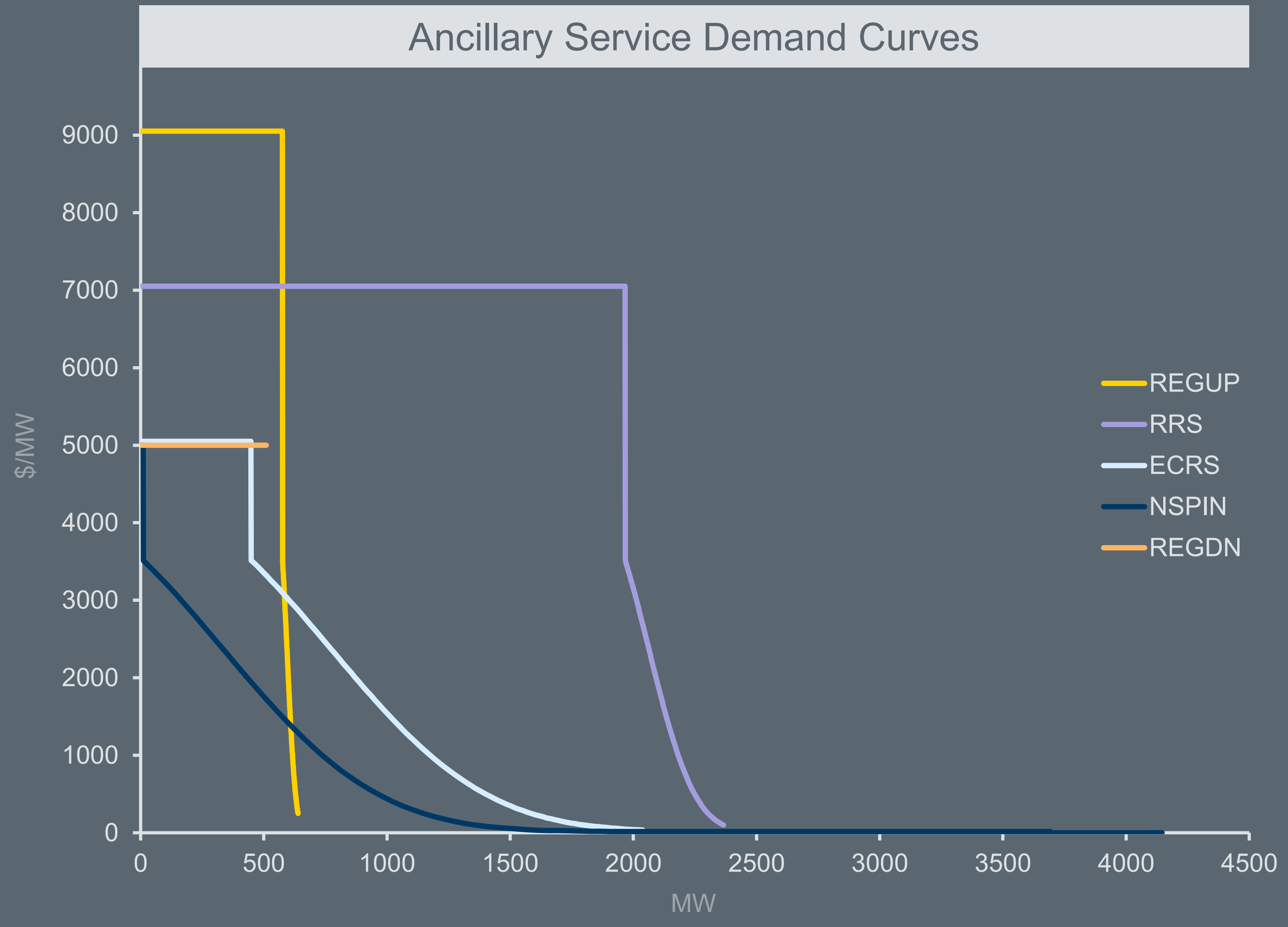
ERCOT

Ancillary Service Inputs
AS Demand Curves

Posted by 0600 Day-Ahead

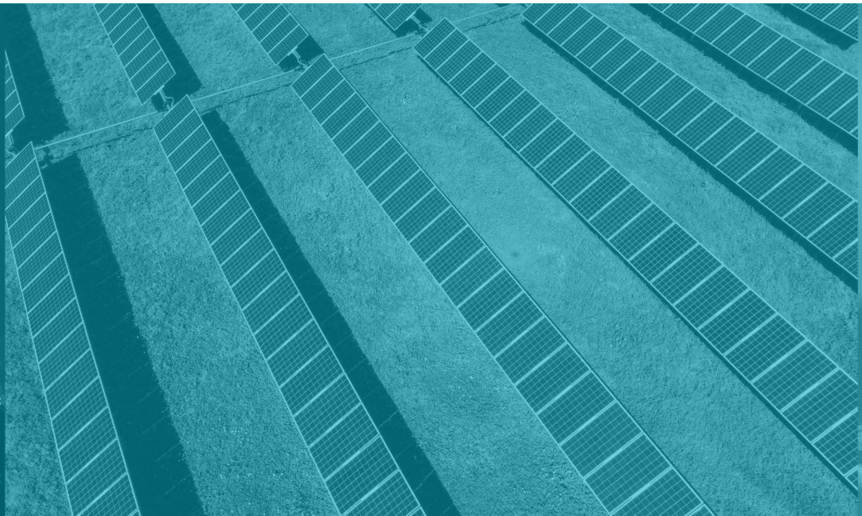

Ancillary Service Plan
AS Demand Curves
DAM
RUC
SCED

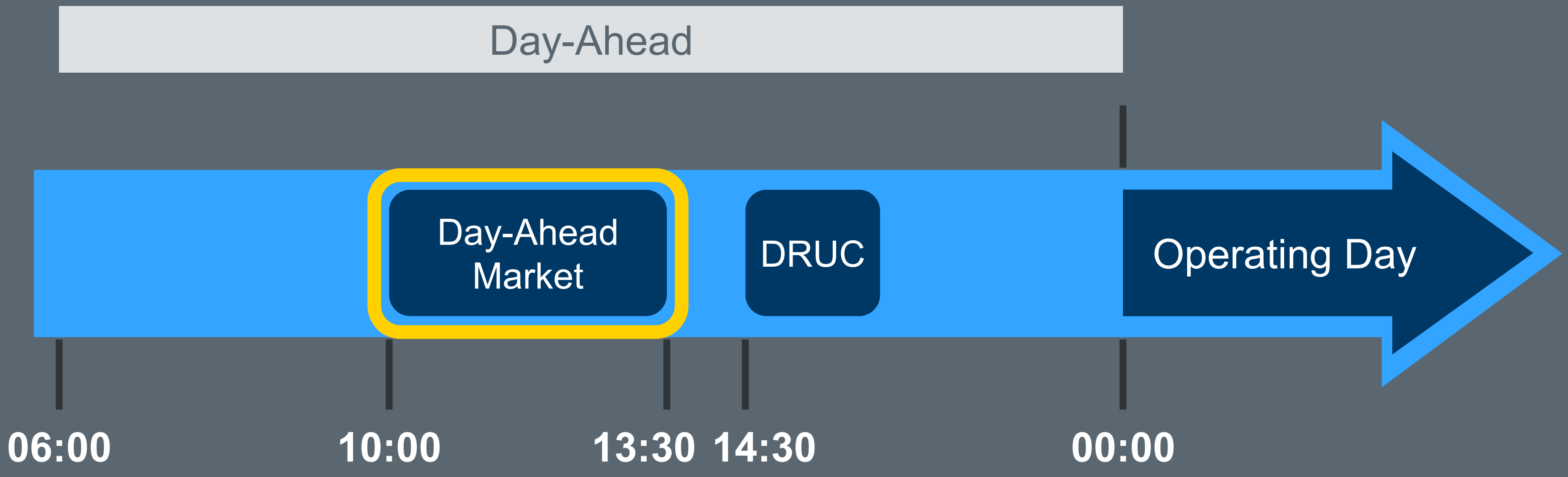
Discussion: What do they do?



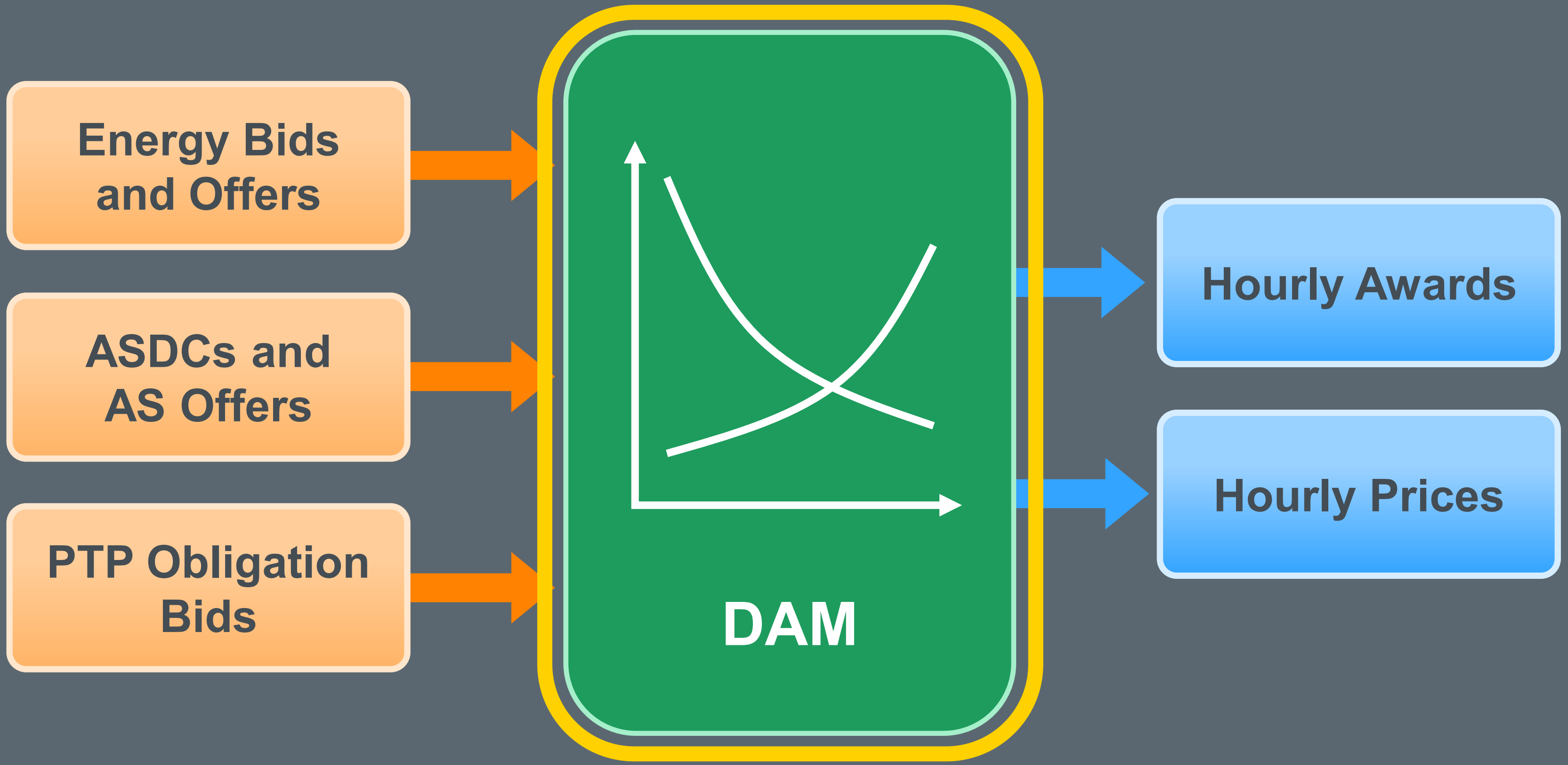


Day-Ahead Market Clearing

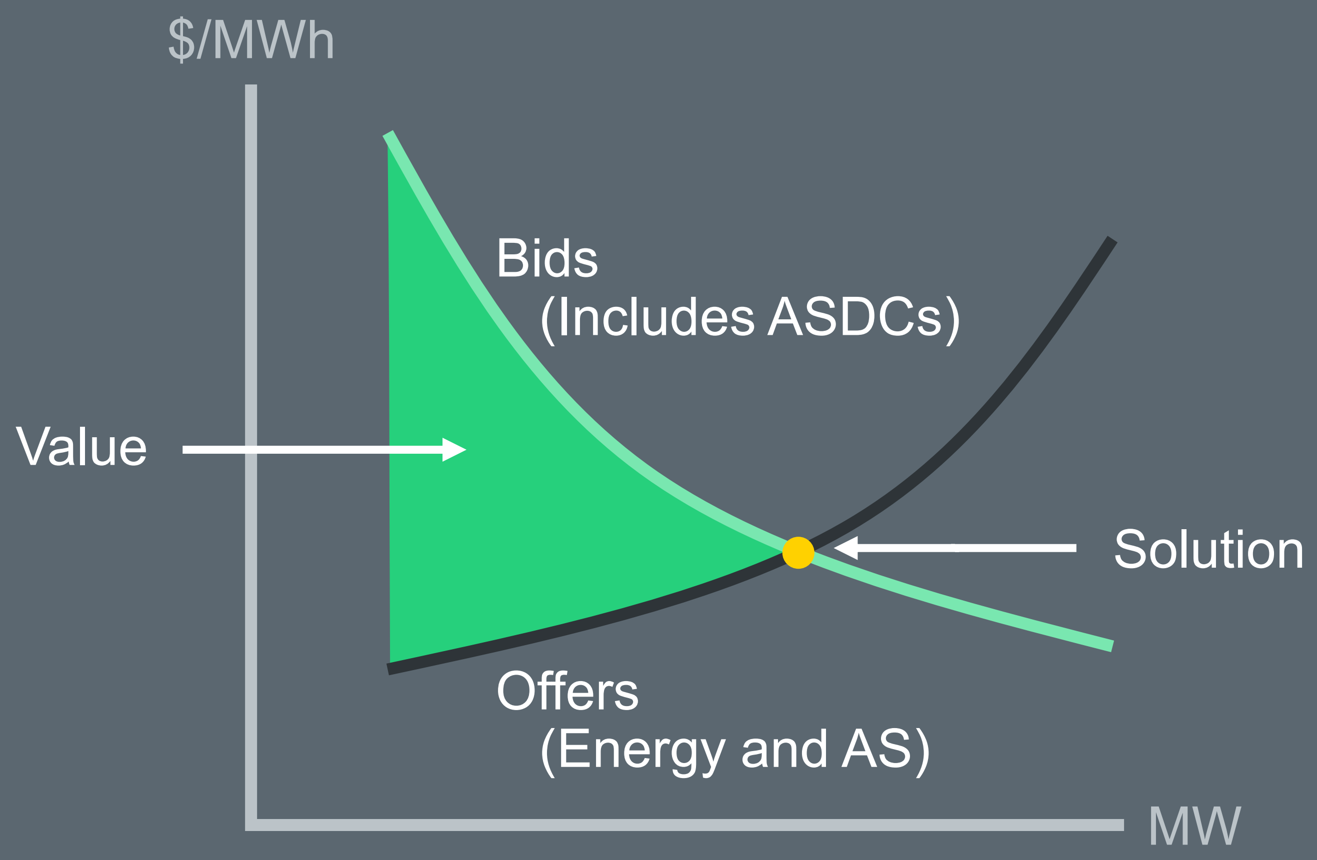





Day-Ahead
Day-Ahead Market
DRUC
Operating Day
06:00
10:00
13:30
14:30
00:00

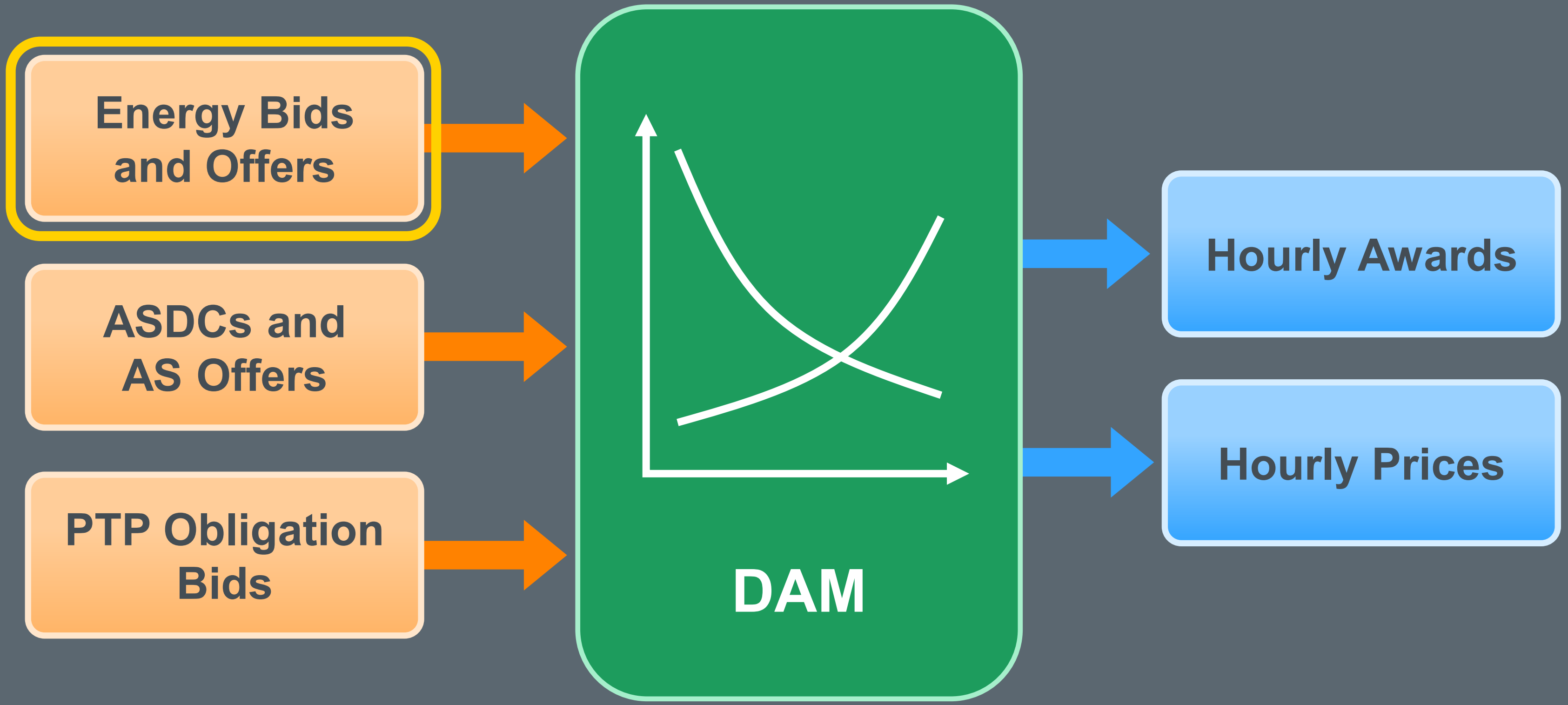
Economically optimized subject to constraints



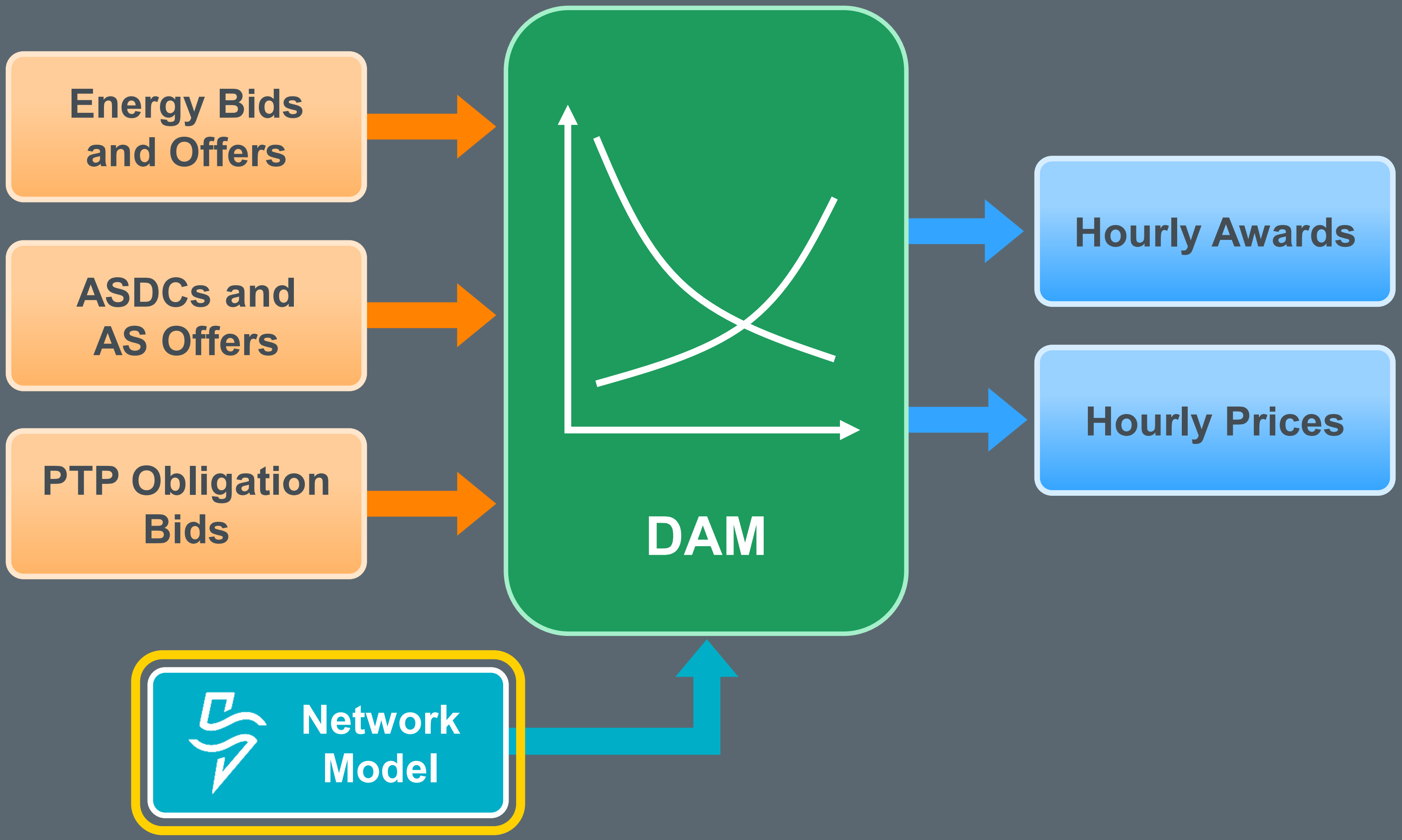
Maximize Bid-Based Revenues minus Offer-Based Costs



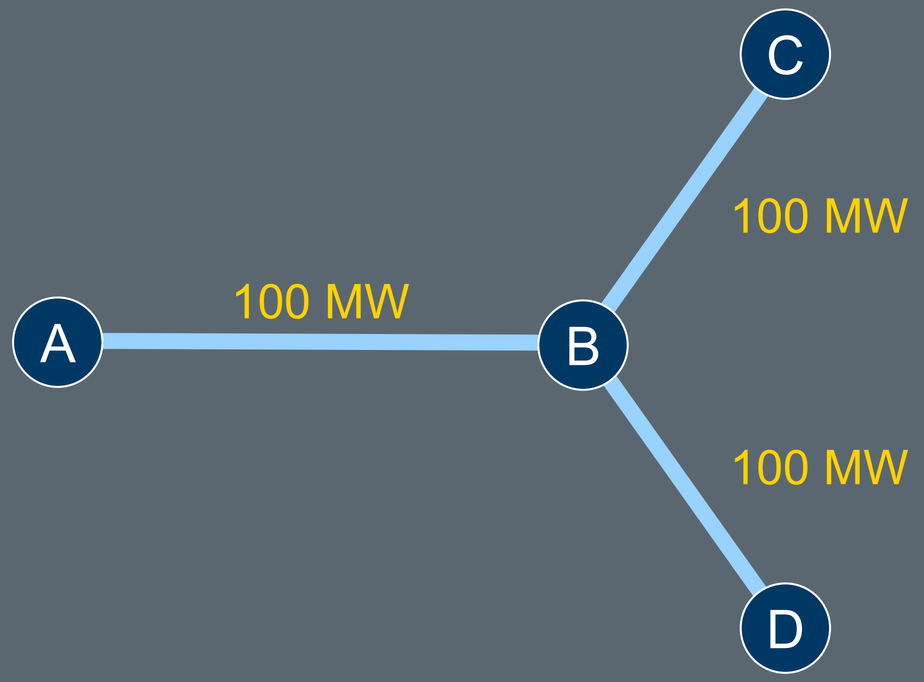
Energy Offers must equal Energy Bids



Solution must represent allowable power flow



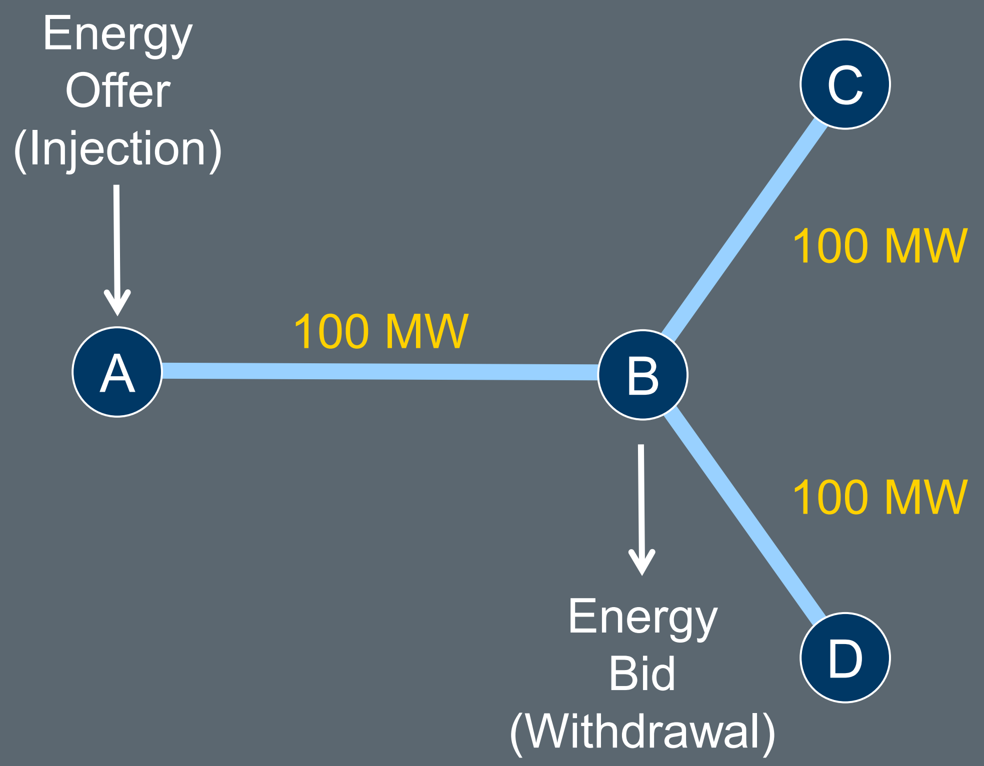
Introducing a simple Network Model …



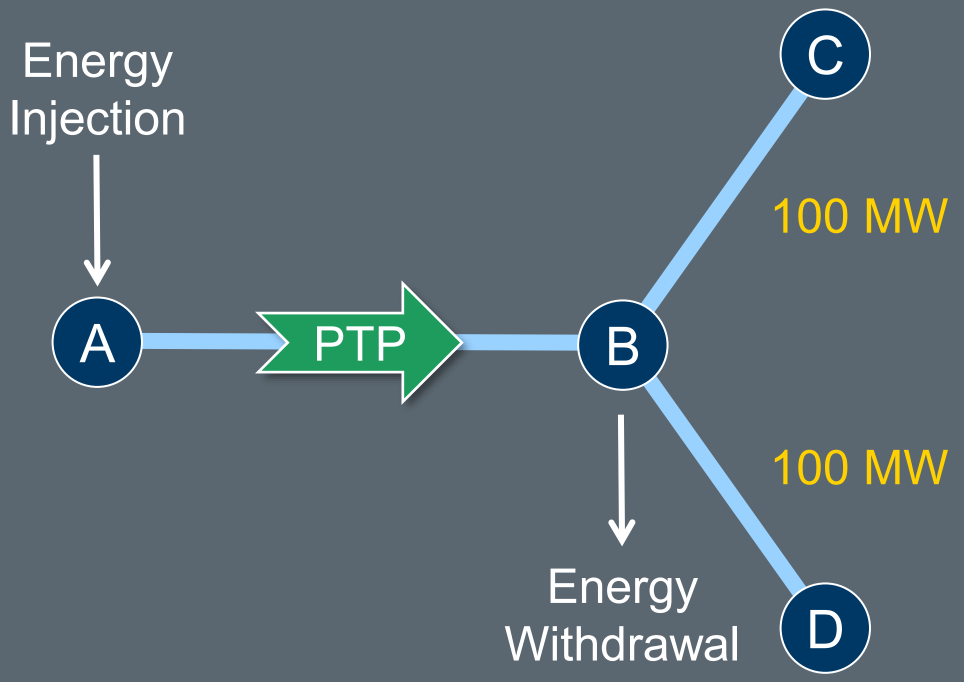
= Settlement Point

MW = Transmission Capacity

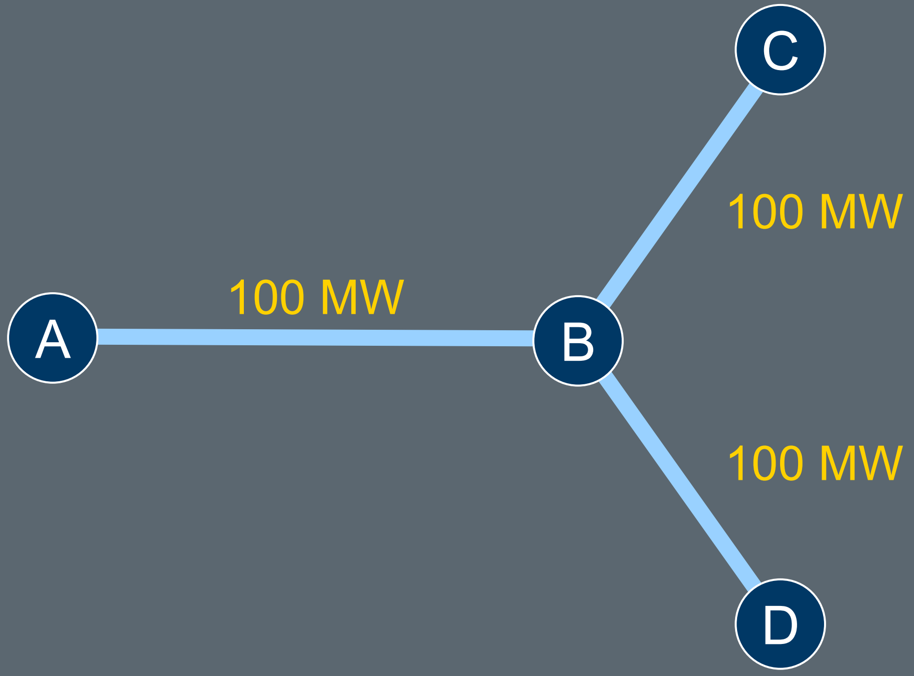
Energy Bids and Offers

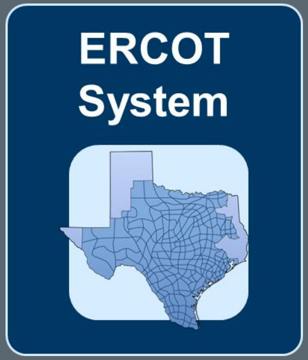


PTP Obligations Bids

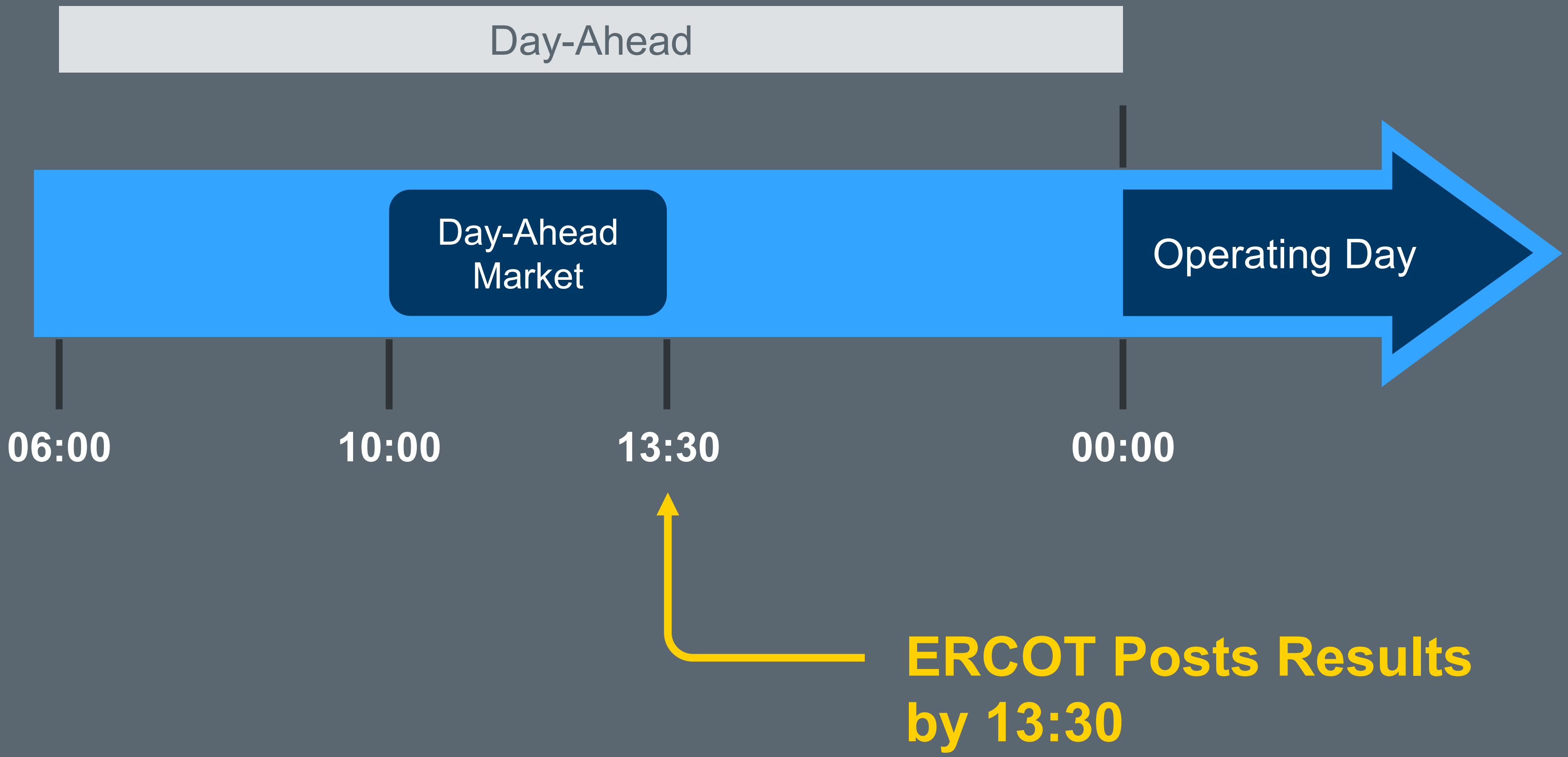


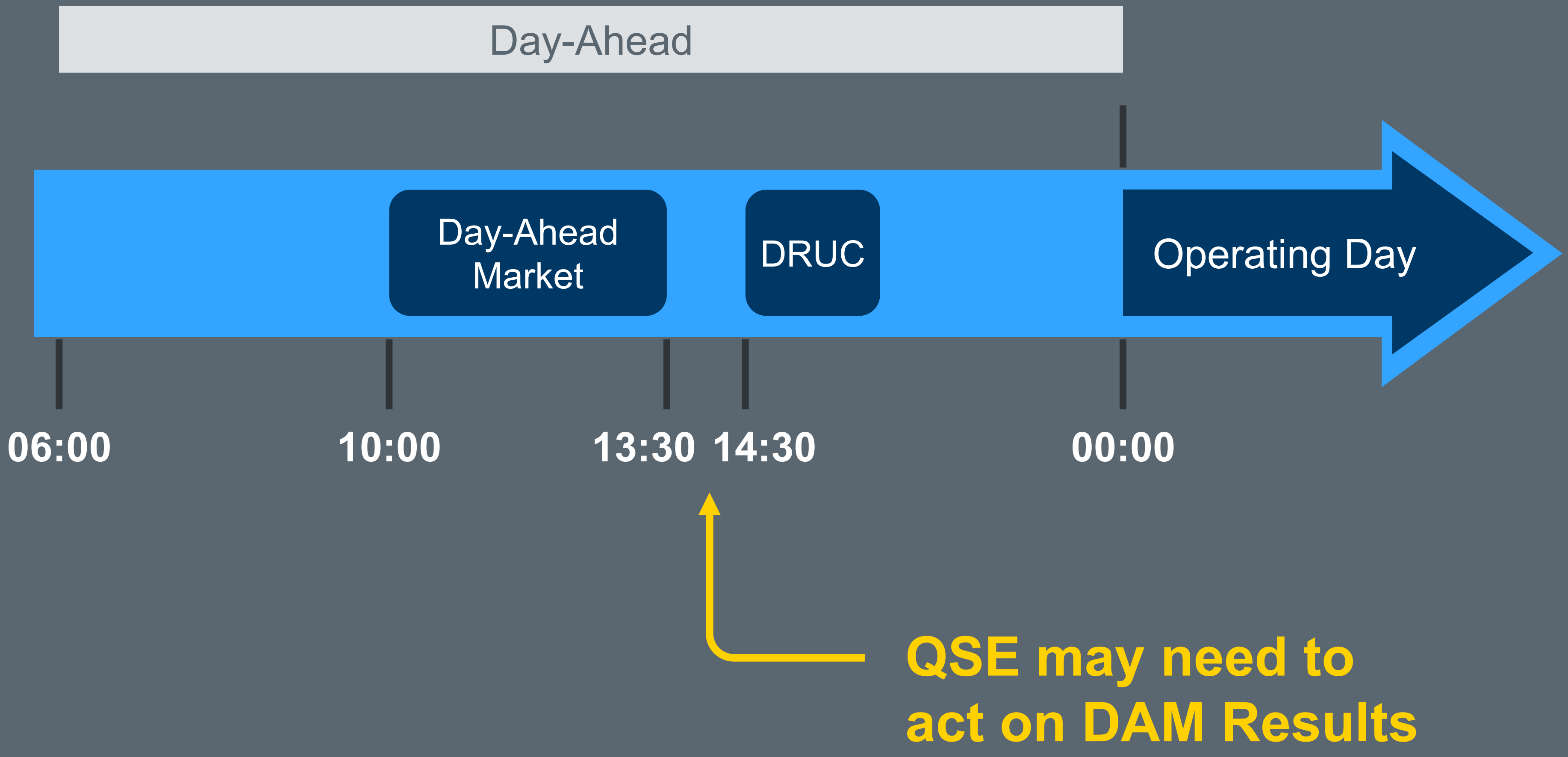
Ancillary Service Offers and Demand Curves?





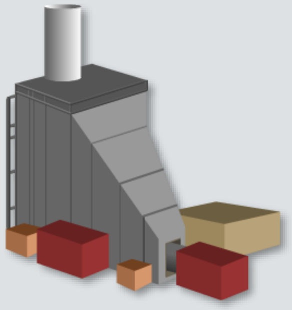
Use RTC_DAM Clearing Workbook


Day-Ahead
Day-Ahead Market
Operating Day
06:00
10:00
13:30
00:00
ERCOT Posts Results by 13:30


Day-Ahead
Day-Ahead Market
DRUC
Operating Day
06:00
10:00
13:30
14:30
00:00
QSE may need to act on DAM Results

Self-Arranged Ancillary Services

Self-Arranged AS Quantities



. . . must be arranged by 14:30

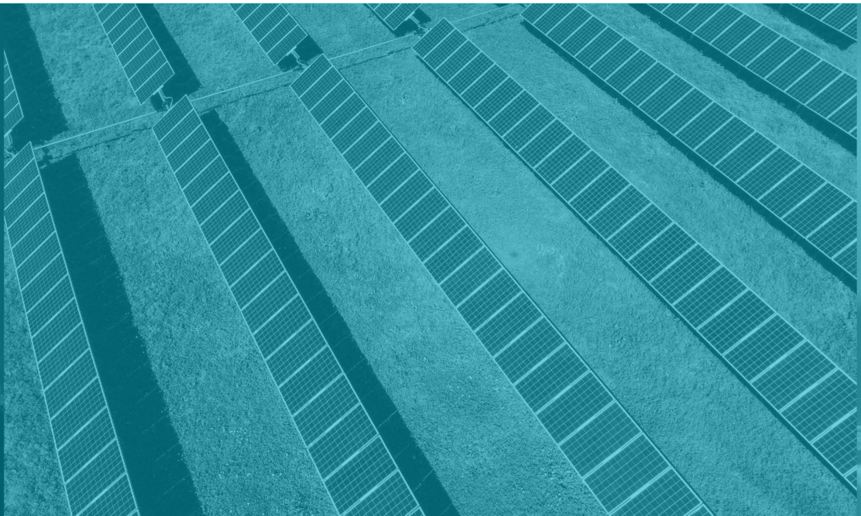
Current Operating Plan											
Resource Name	Resource Status	Resource Limits		ESR SOC Limits			Ancillary Service Capabilities				
		HSL	LSL	Min	Max	Hour Beginning	Reg-Up	Reg-Dn	Responsive	ECRS	NSRS
GEN1	ON	600	120	-	-	-	20	20	40	40	120
GEN2	OFF	100	25	-	-	-	0	0	0	0	0
ESR3	ON	40	-40	0	40	40	0	0	40	20	10

A QSE has an awarded Energy or AS Offer in DAM

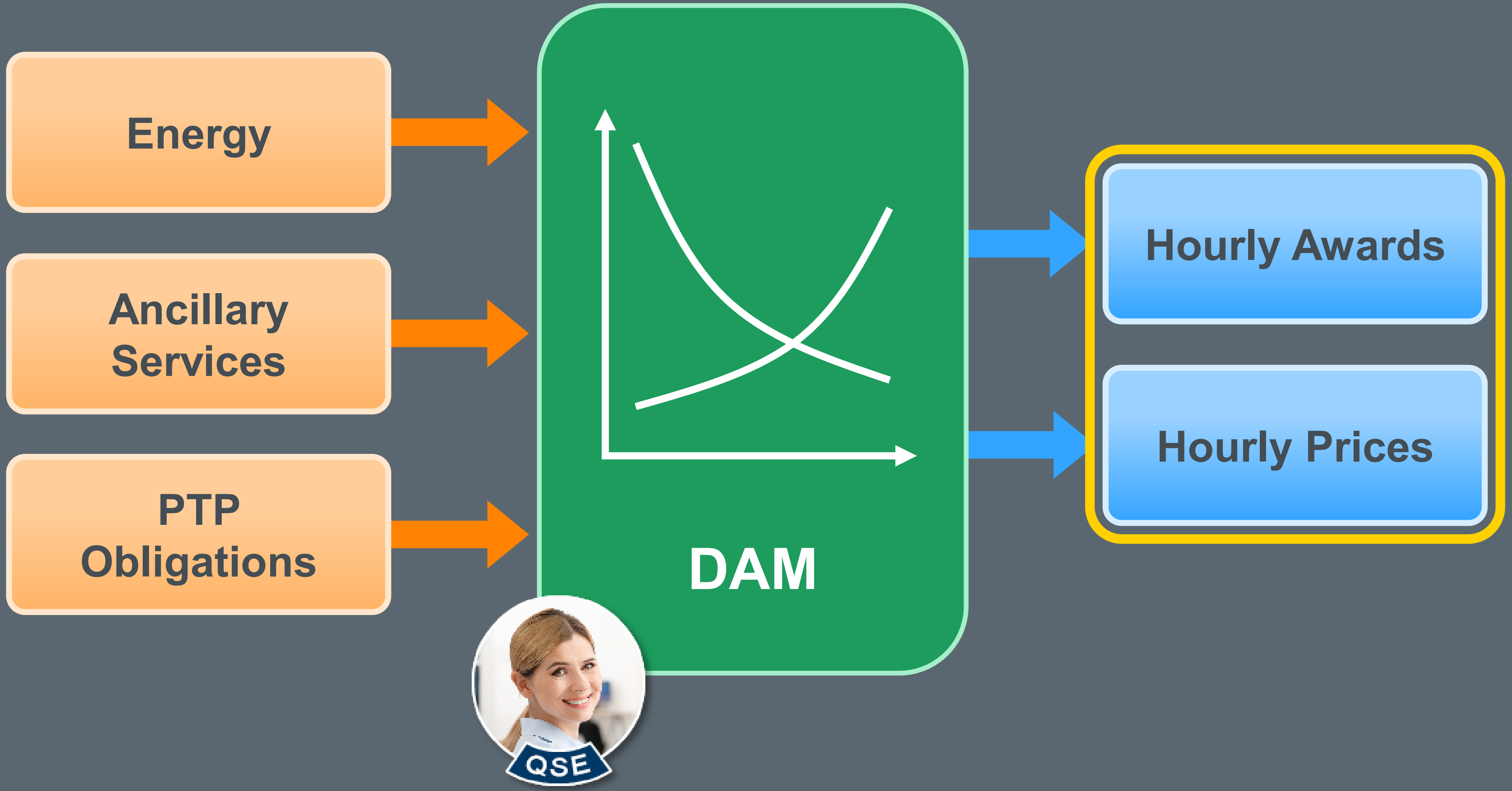
What is required?



Day-Ahead Market Financial Impacts


ERCOT settles with QSEs

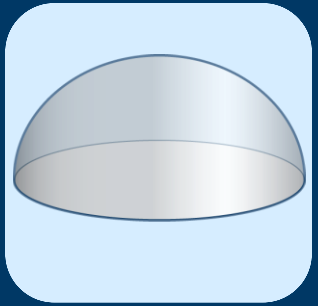


Day-Ahead Settlement Point Prices (DASPPs)

Resource Nodes

Load Zones

Hubs



Formed from Locational Marginal Prices

Ancillary Service Prices

Market Clearing Prices for Capacity (MCPCs) *

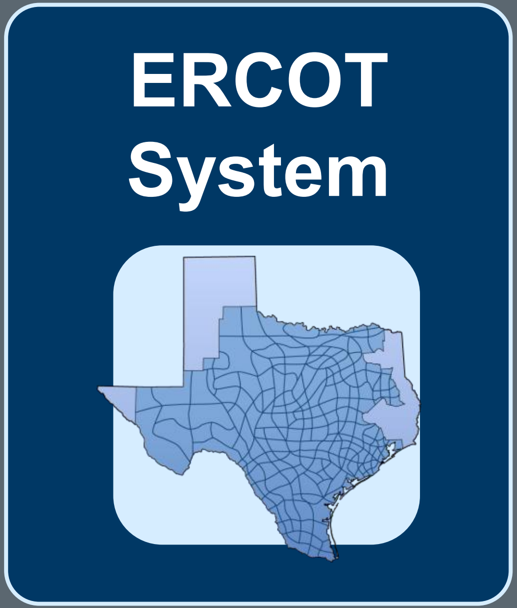
MCPCRU – Regulation-Up

MCPCRD – Regulation-Down

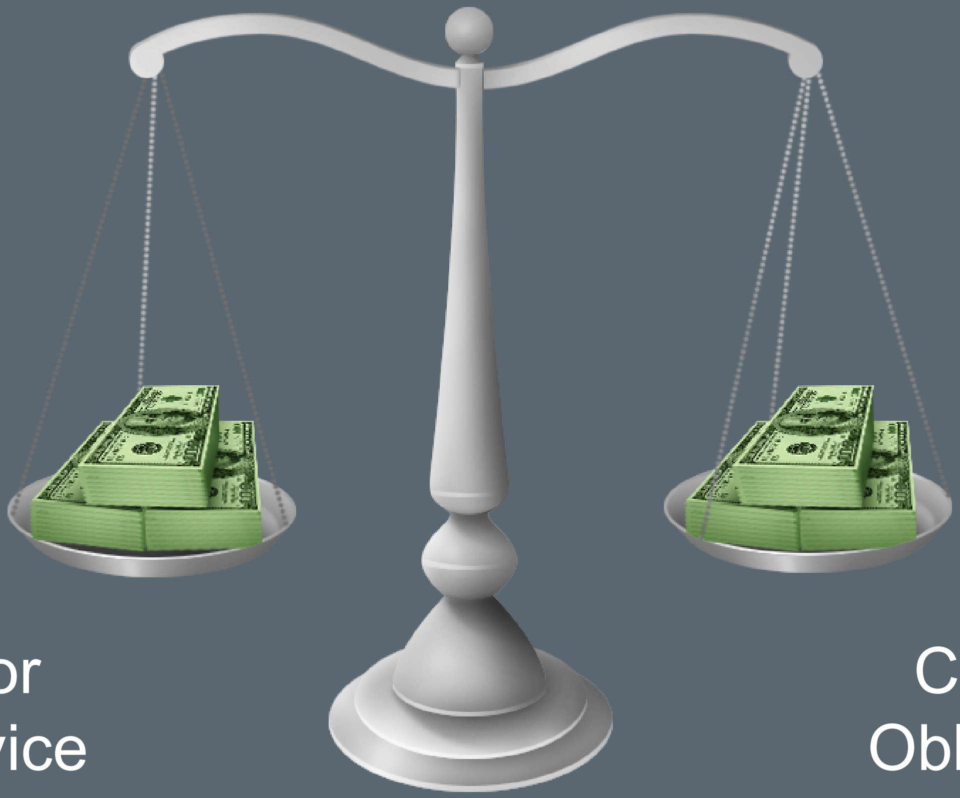
MCPCRR – Responsive Reserve

MCPCECR – ERCOT Contingency Reserve

MCPCNS – Non-Spin Reserve



* All MCPCs capped at VOLL

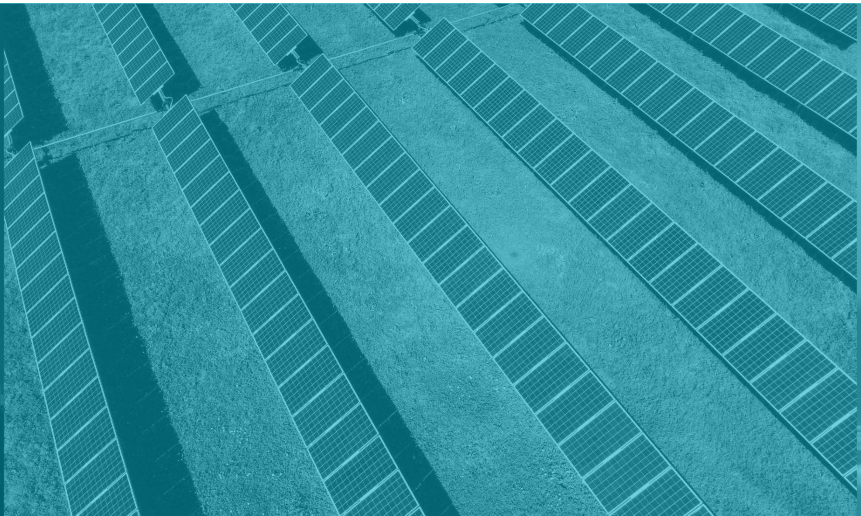


Payments for Ancillary Service Awards

Charges for Obligations not Self-Arranged



Course Wrap-Up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