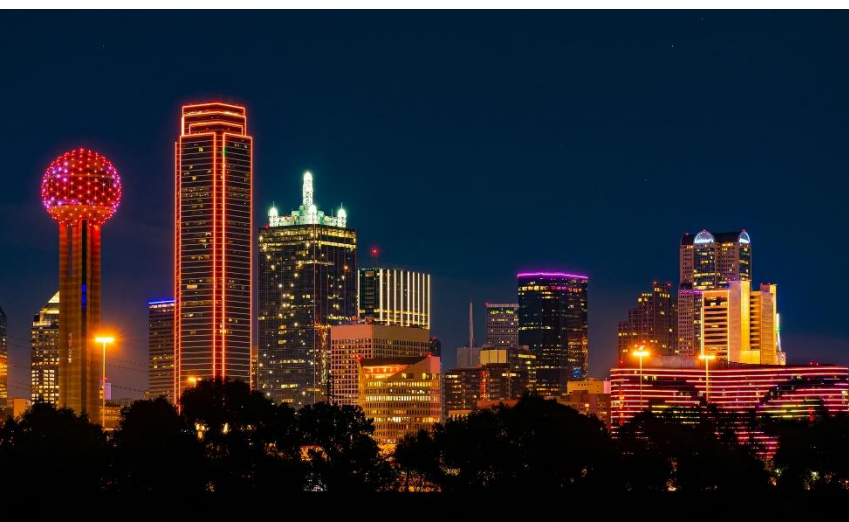




Real-Time 101



2026_04 Real-Time 101



Greetings
and
Introductions

Attendance

Questions

Presentation Materials

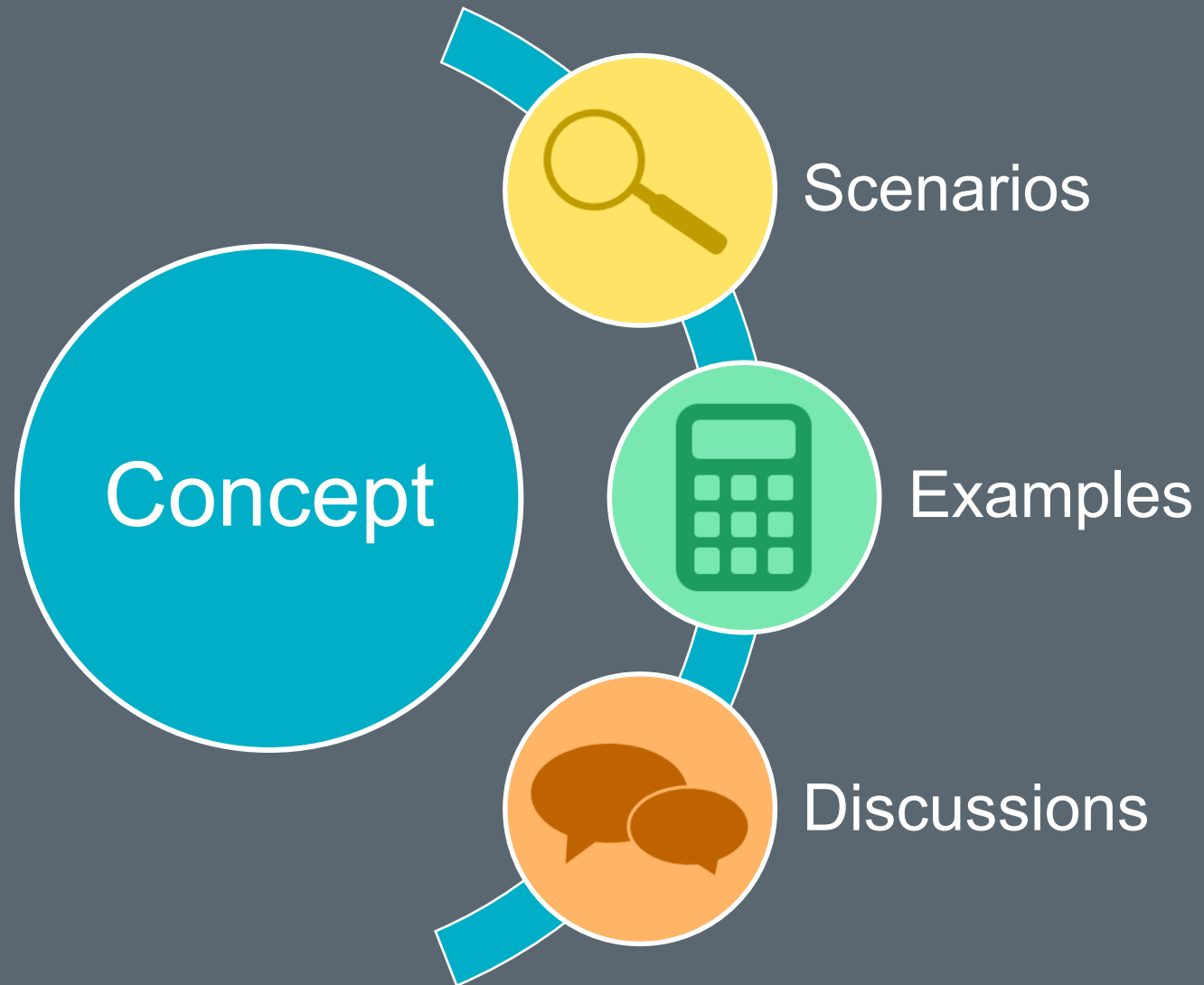


PROTOCOL DISCLAIMER

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/>

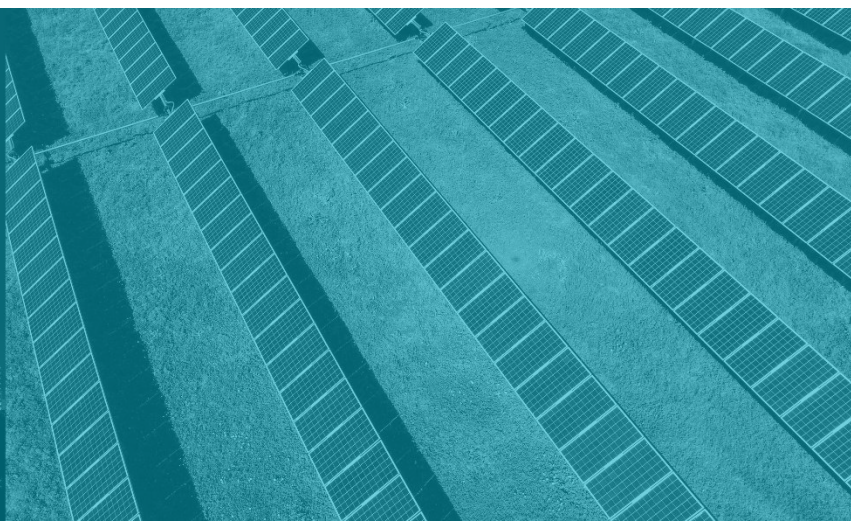


Topics in this course include:

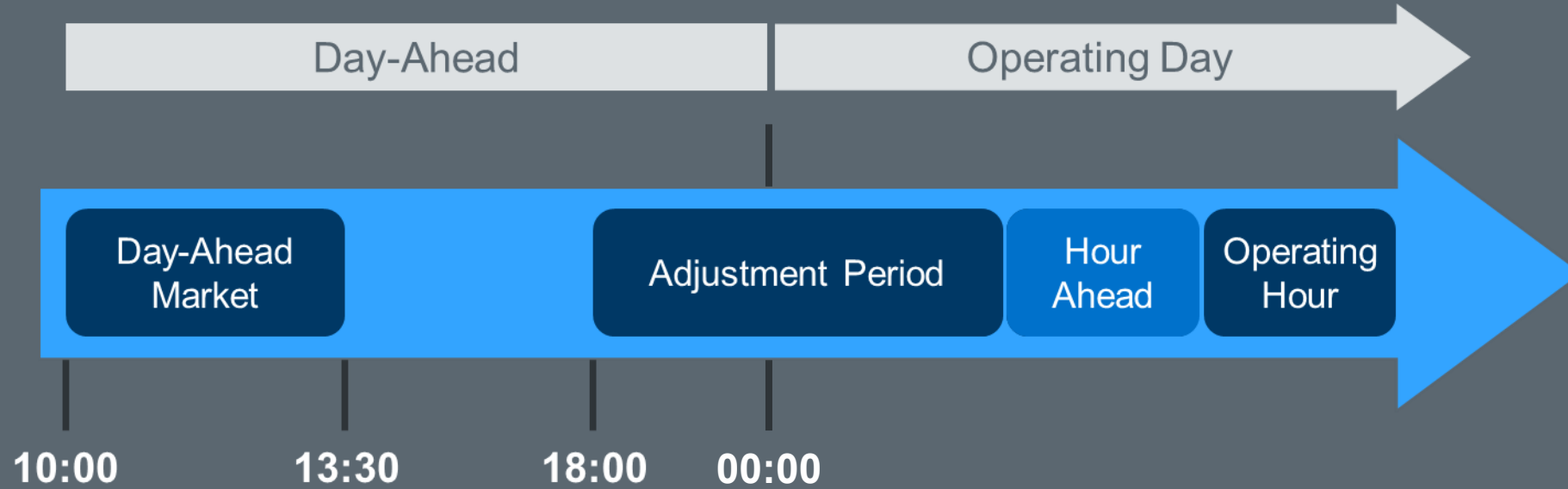
- 1 Introduction
- 2 Real-Time Dispatch and Pricing
- 3 Ancillary Services
- 4 Real-Time Co-Optimization
- 5 System Capacity
- 6 Summary and Conclusion

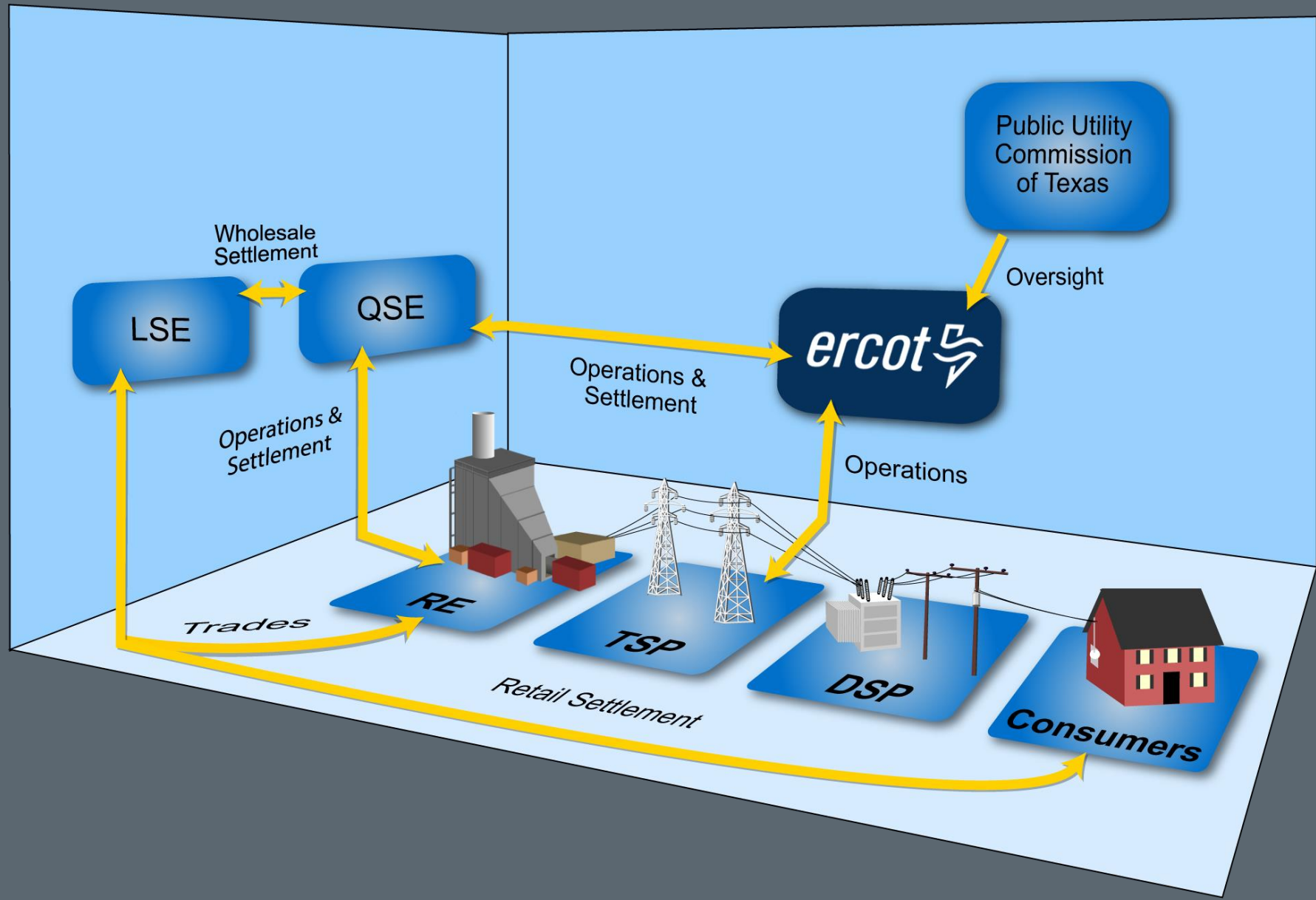


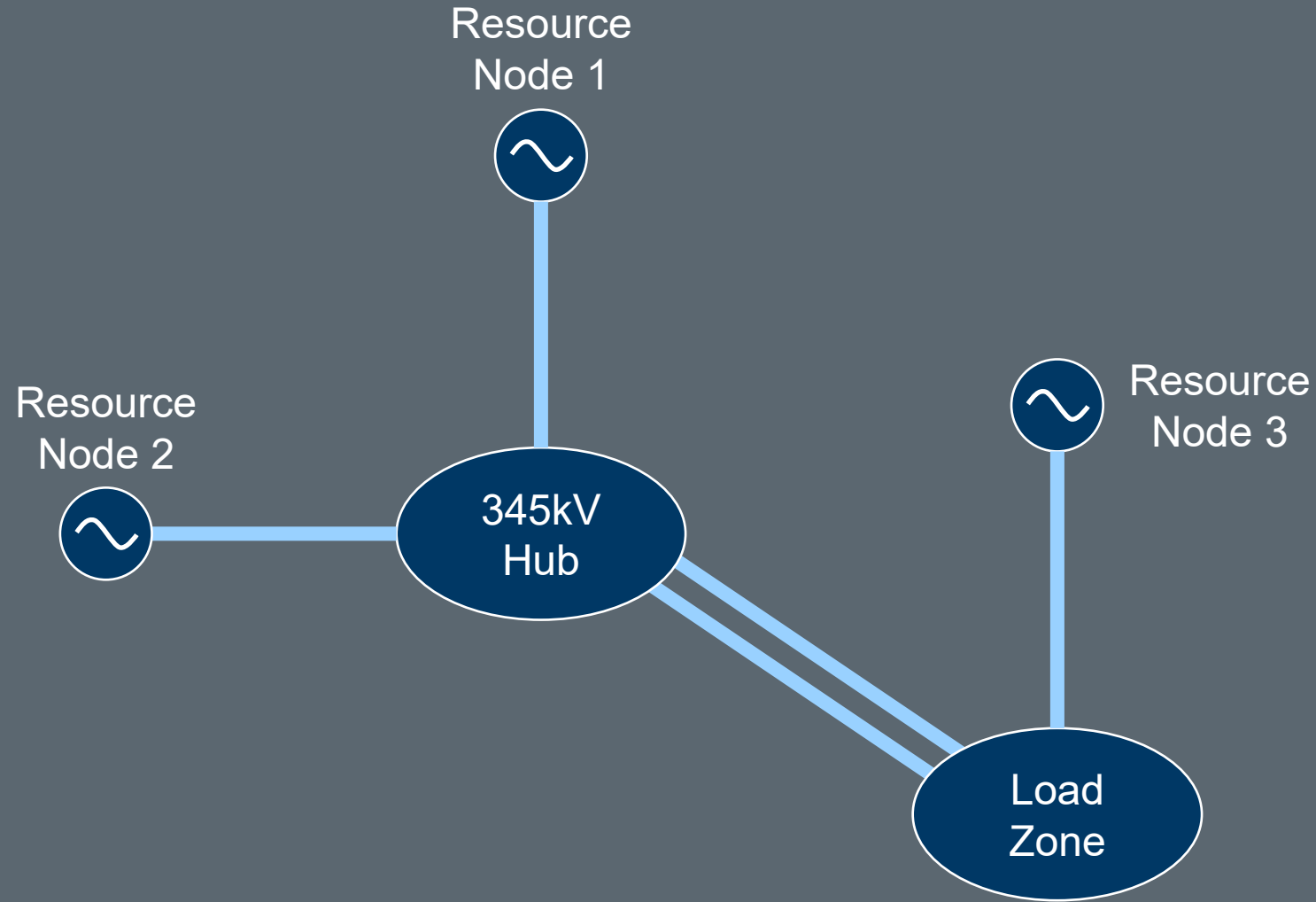
Introduction



In general, . . .

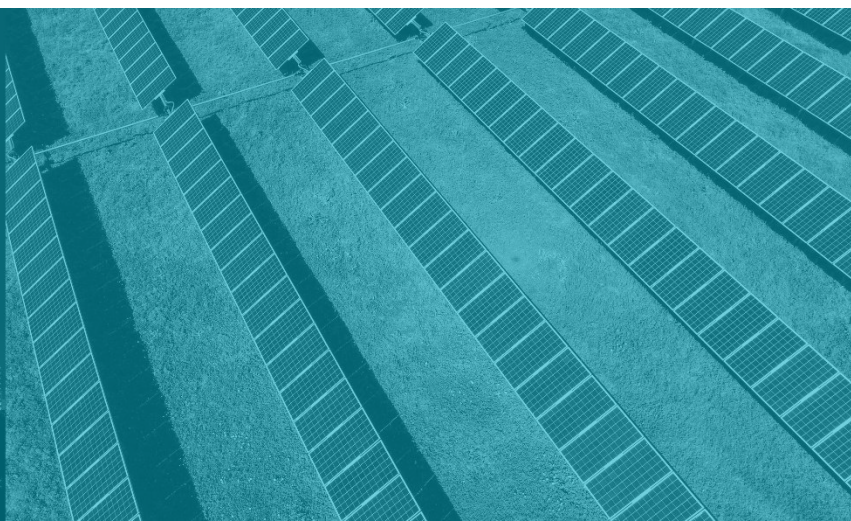




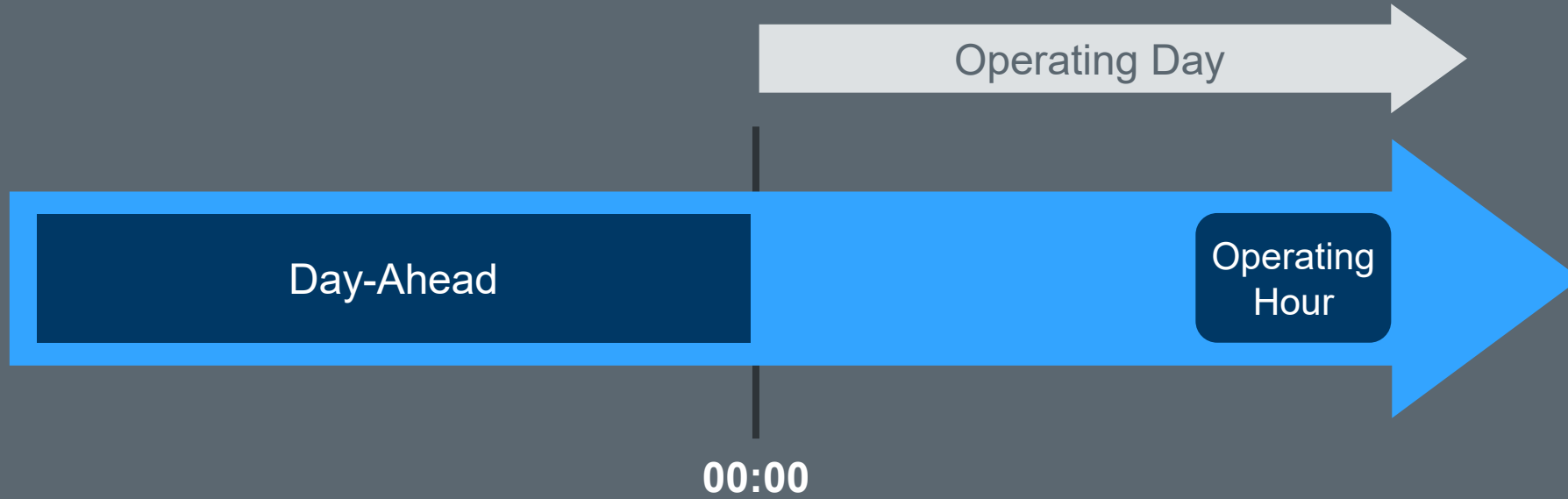




Real-Time Dispatch and Pricing



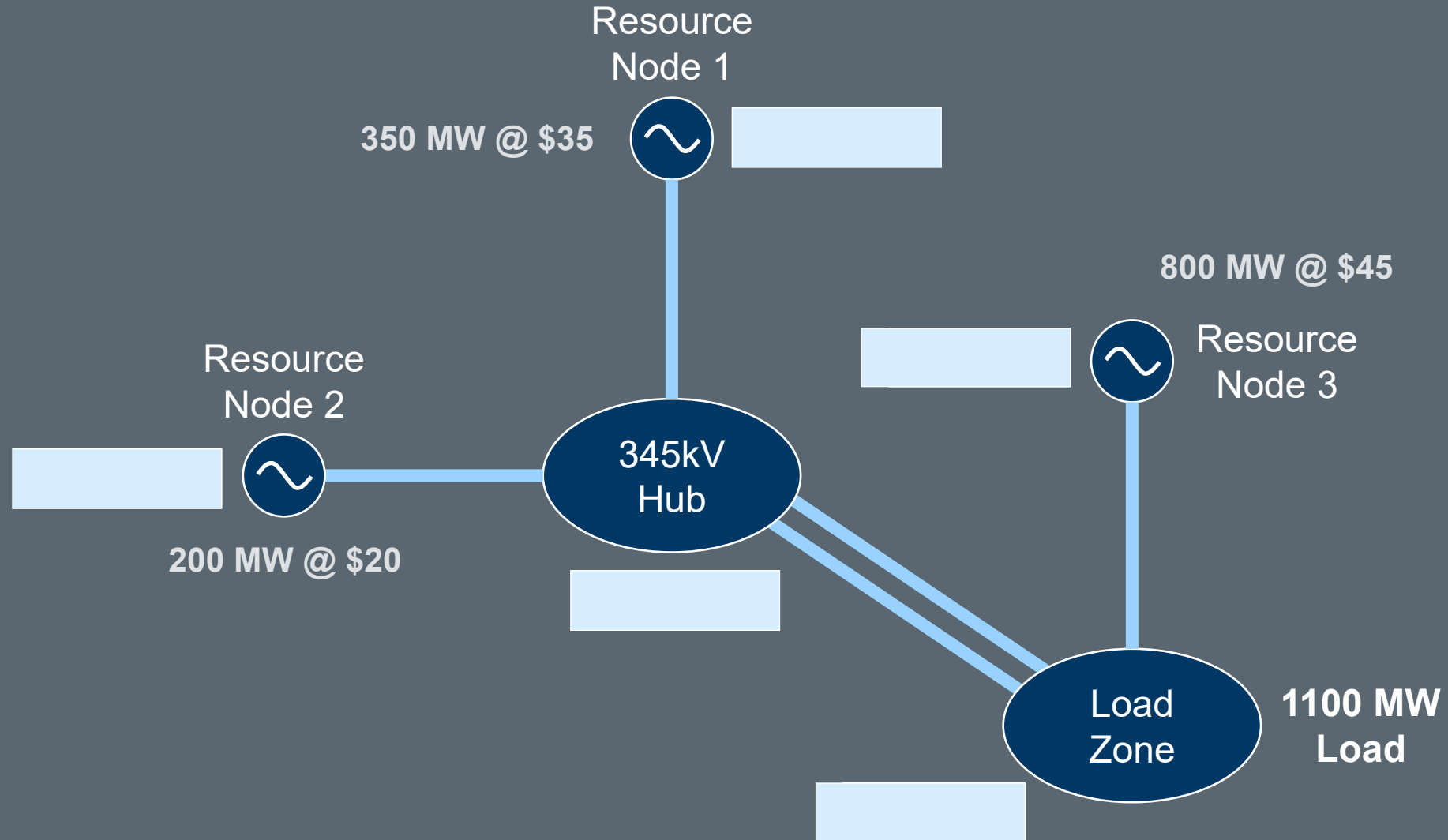
Timing

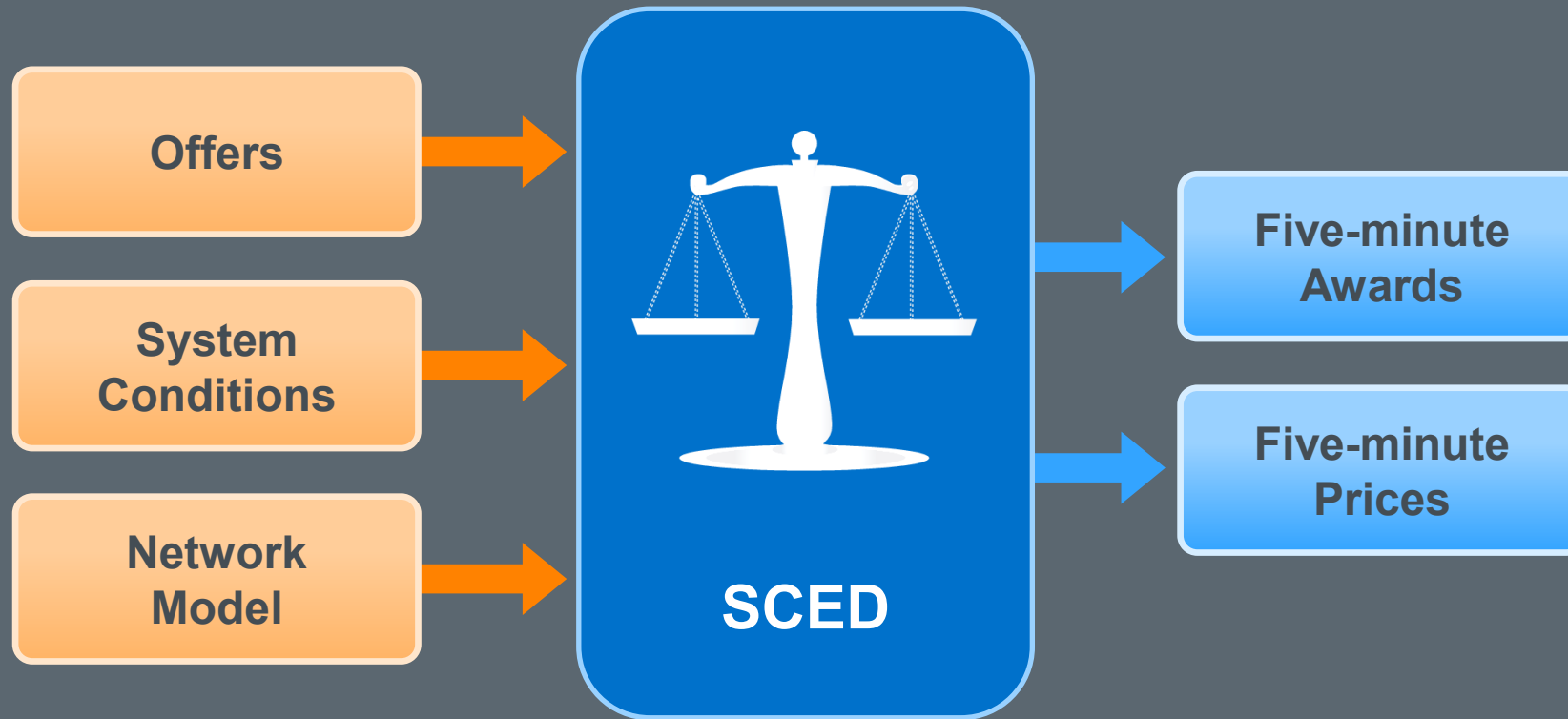


Goals

- Manage reliability
 - Match generation with demand
 - Keep transmission flows within limits
- Operate the system at least cost

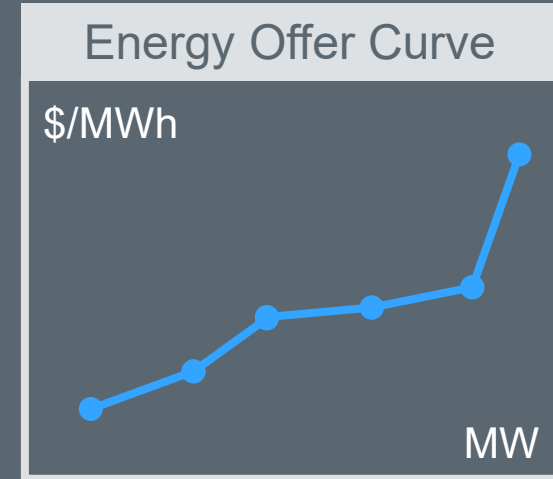






Energy Offer Curve

- Non-decreasing curve
- Ten price/quantity pairs max
- One MW minimum quantity
- Prices between $-\$250$ and appropriate Offer Cap



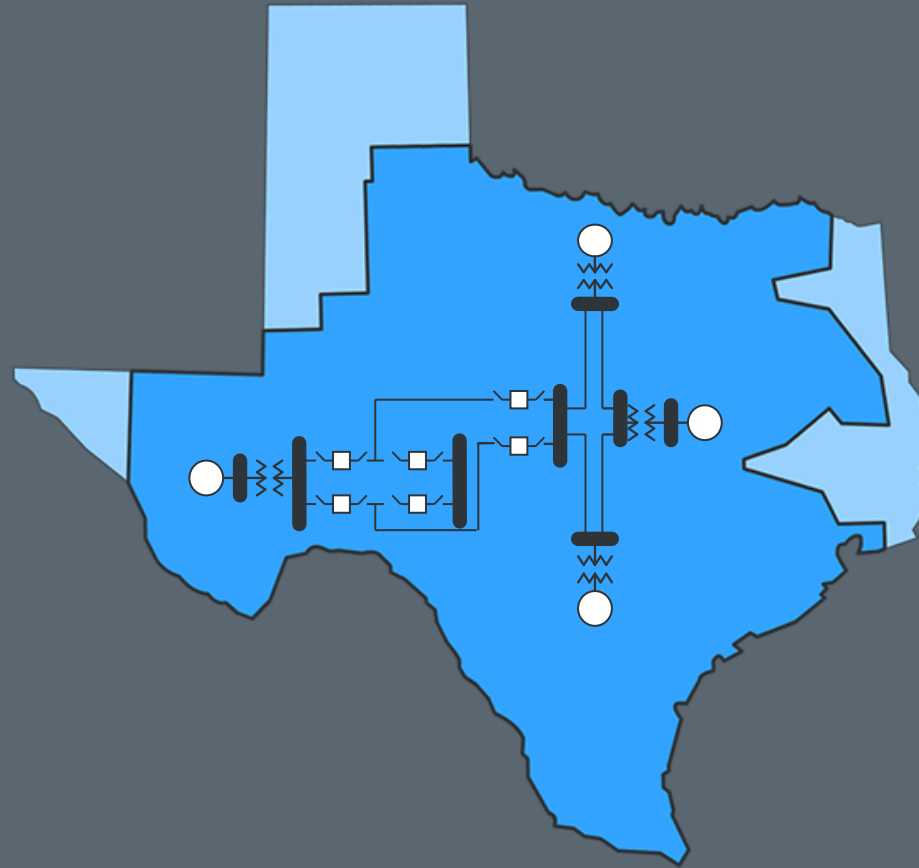


Monitored Conditions

What do we need to know to dispatch energy?



Represents physical transmission grid

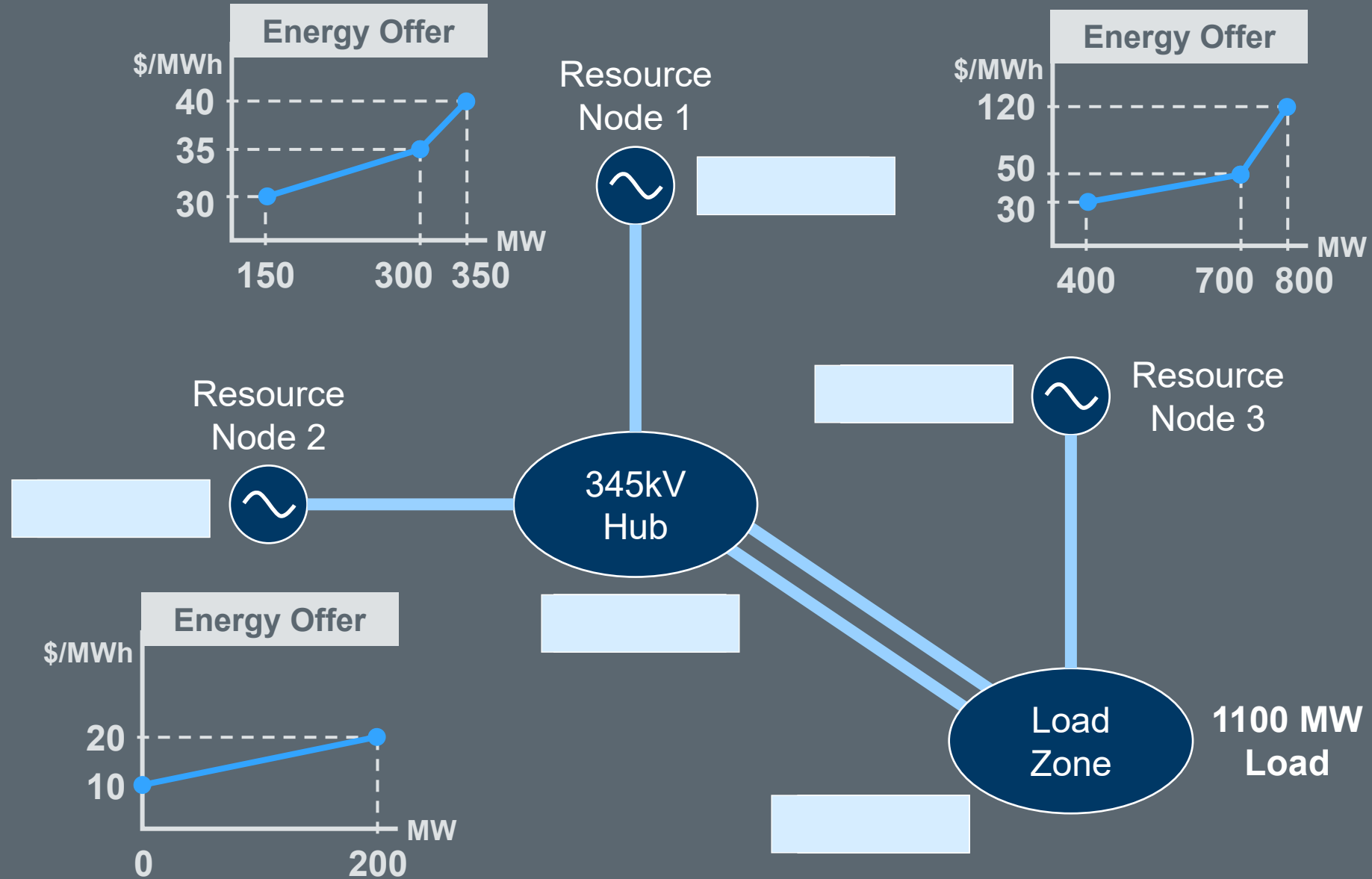


Used for:

- Reliability studies
- All Market Processes

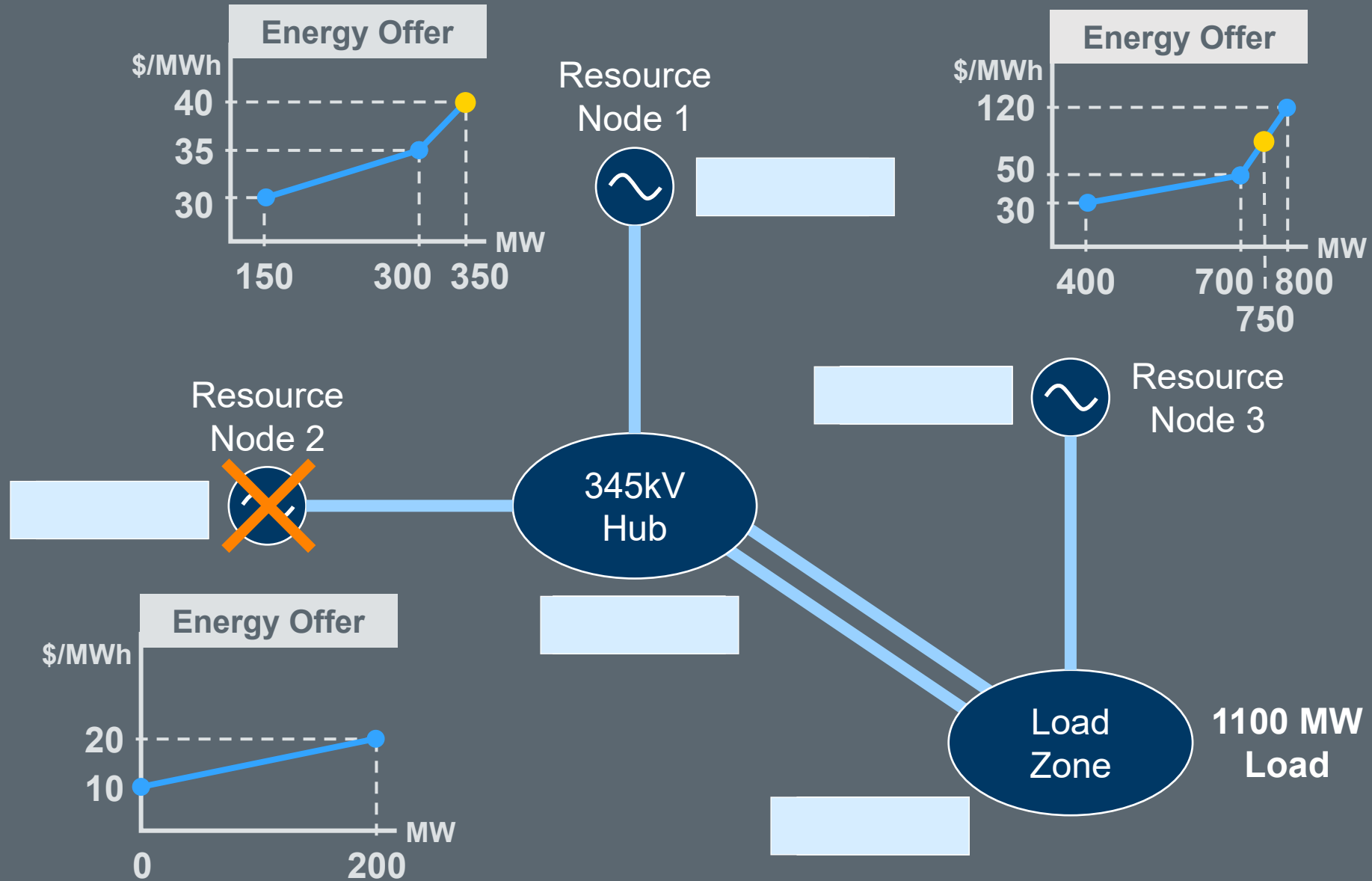


Scenario: Find Dispatch Solution



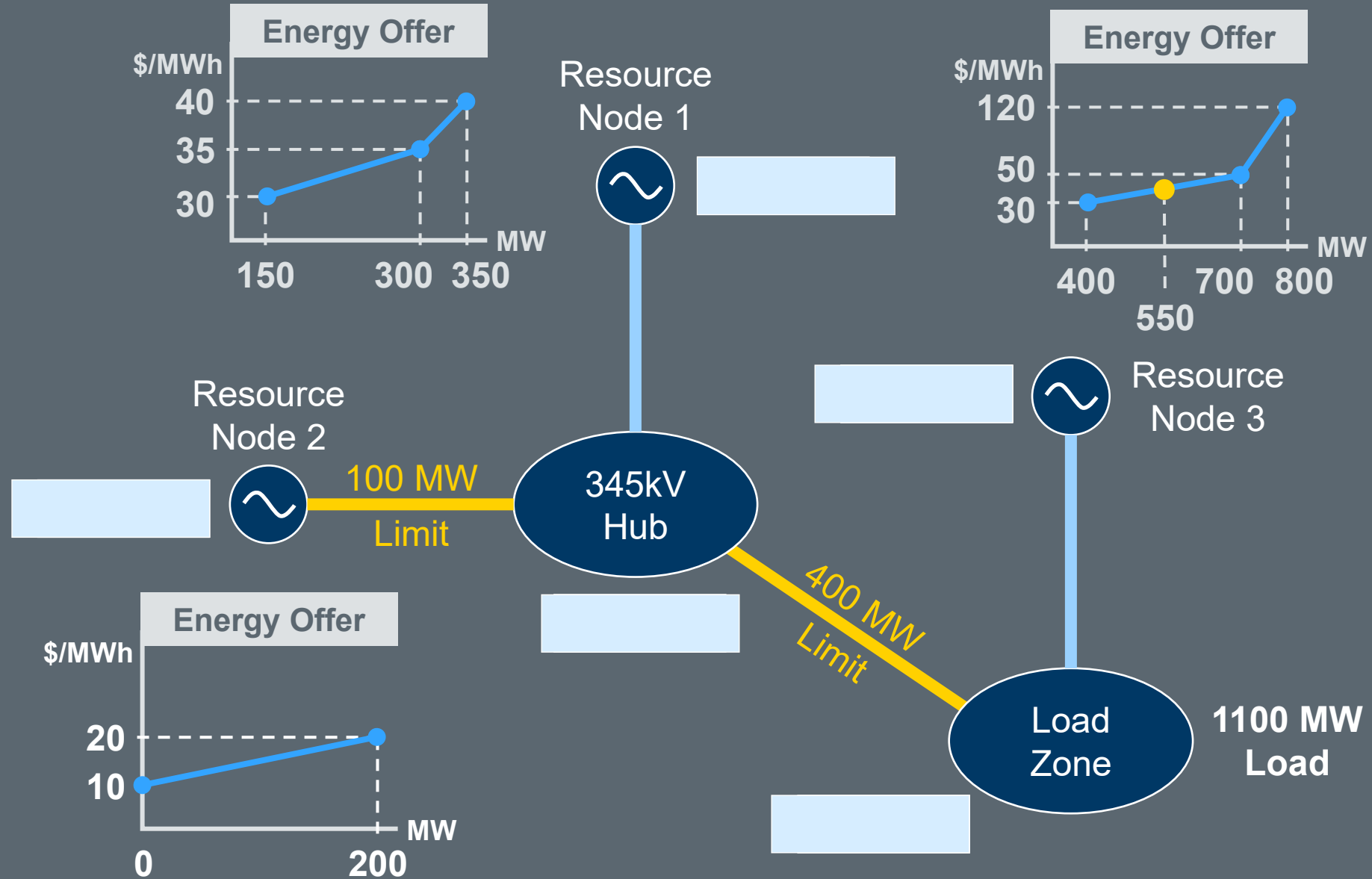


Scenario: Loss of a Resource



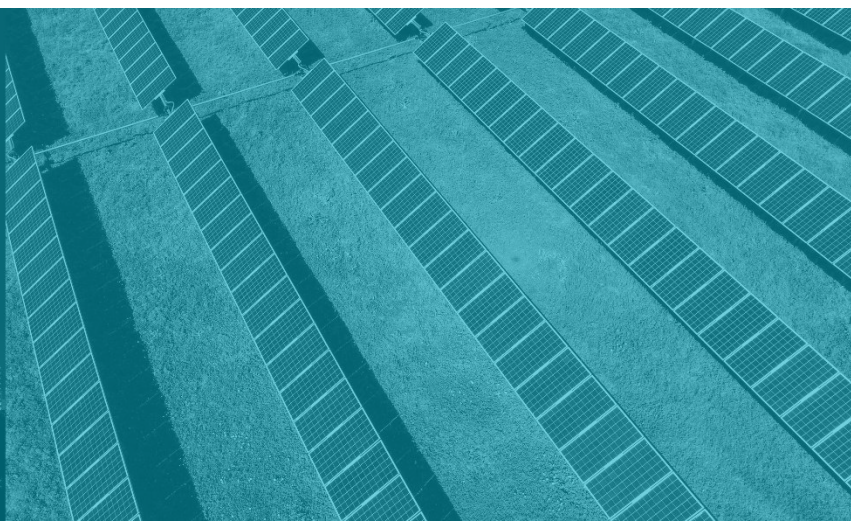


Scenario: Transmission Constraints



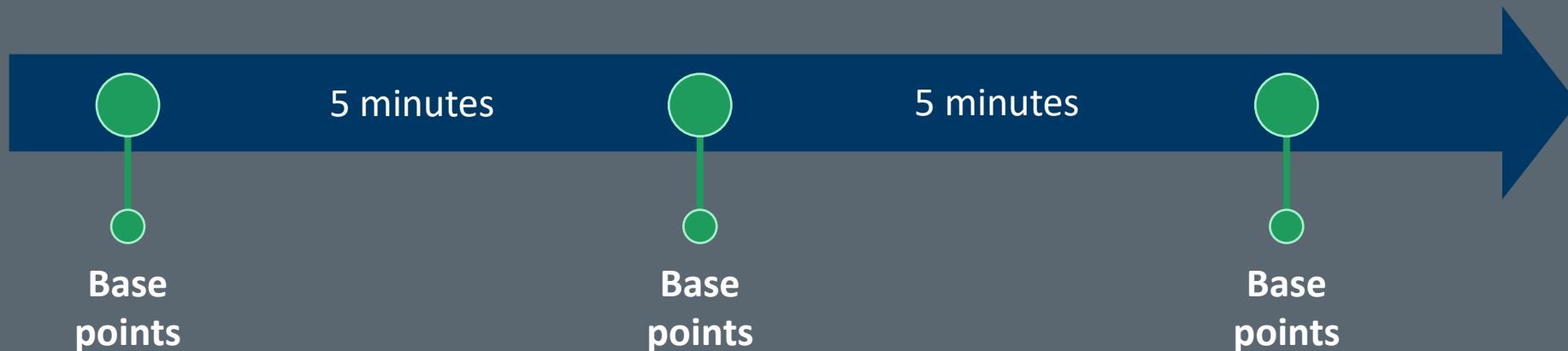


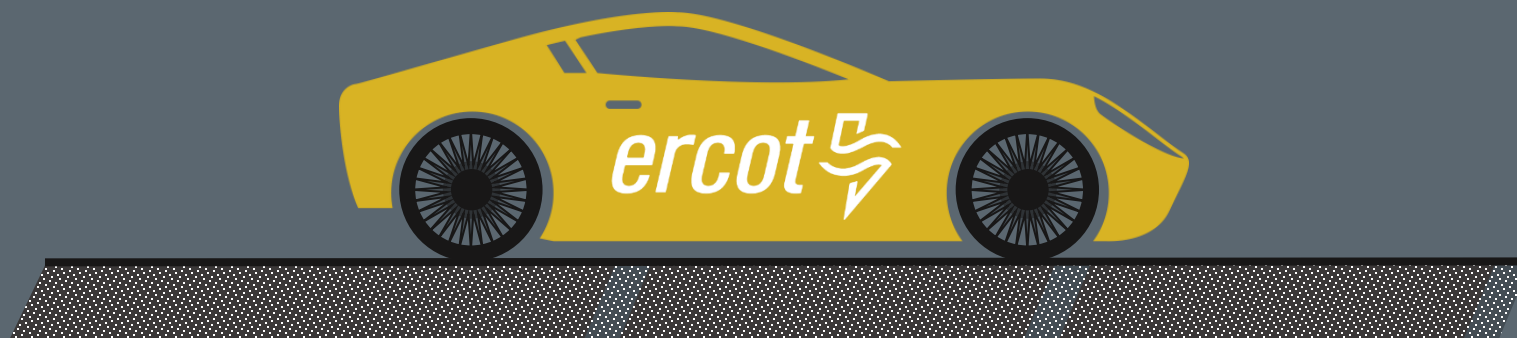
Ancillary Services



Security Constrained Economic Dispatch (SCED)

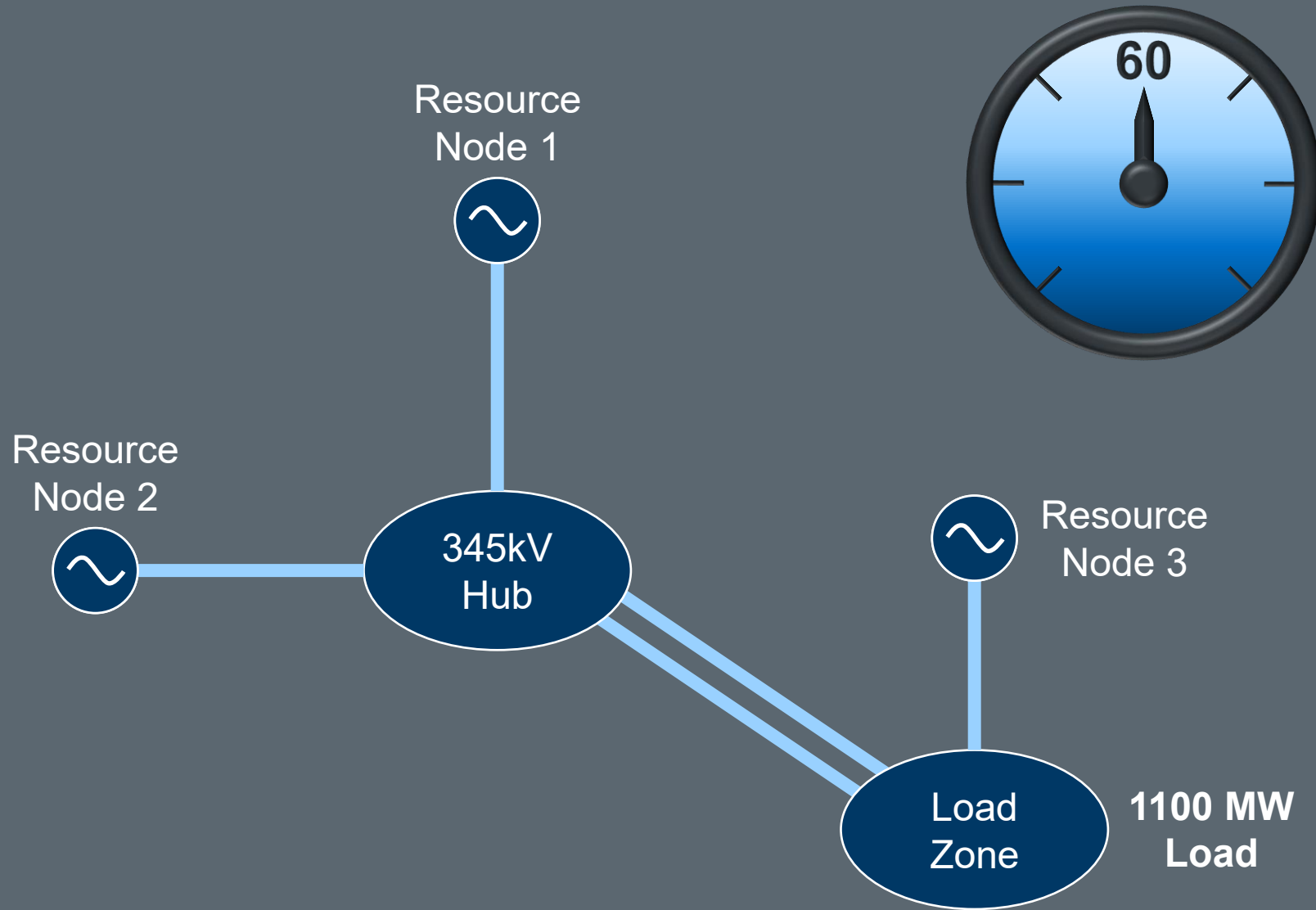
- Matches generation with demand
- Manages congestion
- Achieves least cost dispatch





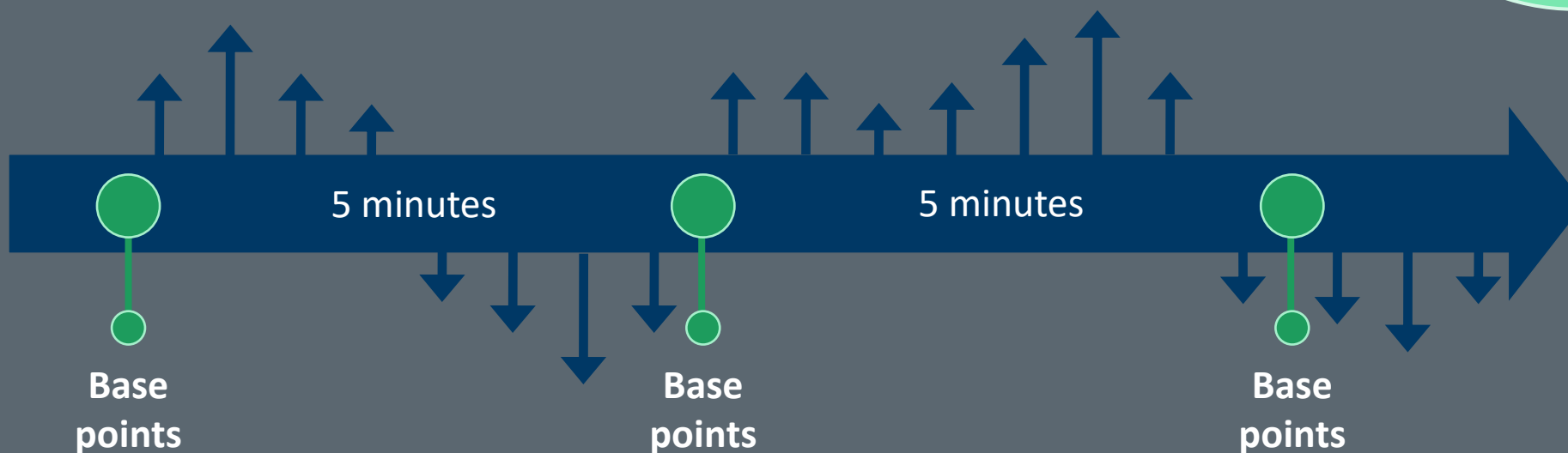


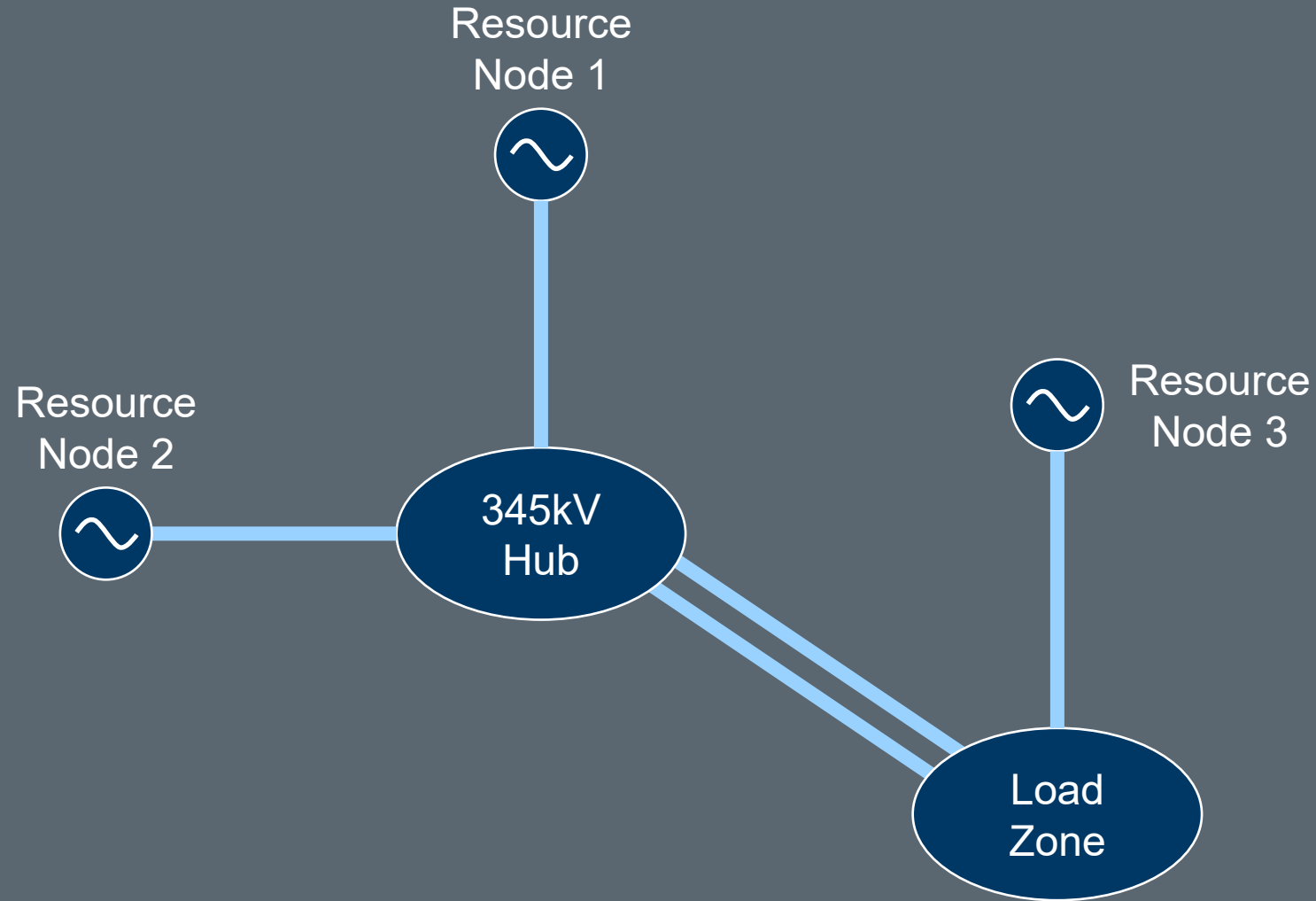
Discussion: Is five-minute dispatch enough?



Regulation Service

- Matches generation with demand
- Responds to frequency deviations





Responsive Reserve Service



Possible Uses

- Loss of Generation
- Large load-ramps

Responsive Reserve is frequency responsive



RRSPF – Primary Frequency Response

- Automatic response at 59.983 Hz
- Proportional to frequency decay

RRSFF – Fast Frequency Response

- Auto-deployed at 59.85 Hz
- Full response within 15 Cycles

RRSUF – Load Resource on Under-Frequency Relay

- Auto-deployed at 59.70 Hz
- Trips within 30 cycles

ERCOT Contingency Reserve Service

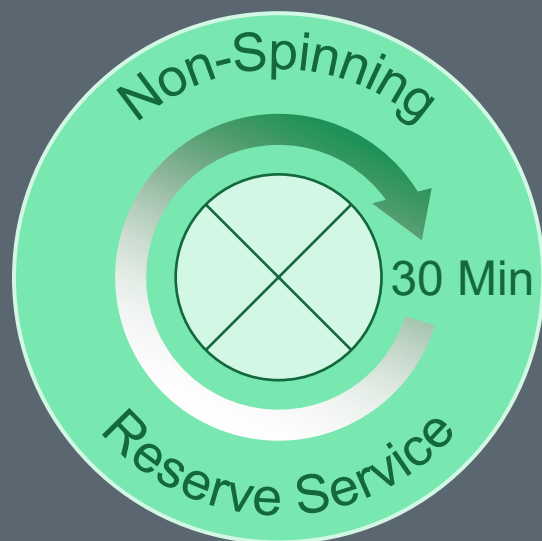


Possible Uses

- Restore RRS
- Provide ramping reserves to SCED

Resources must be capable of 1-hour deployment

Non-Spinning Reserve Service

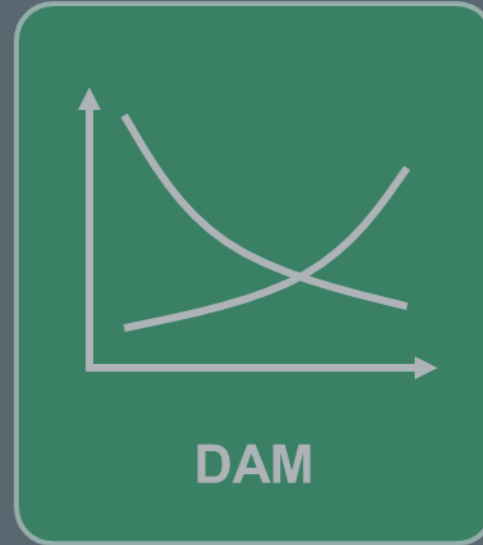


Possible Uses

- Restore RRS and ECRS
- Provide ramping reserves to SCED

Resources must be capable of 4-hour deployment

Day-Ahead Market



Energy Awards

Ancillary Service Awards

Security Constrained Economic Dispatch

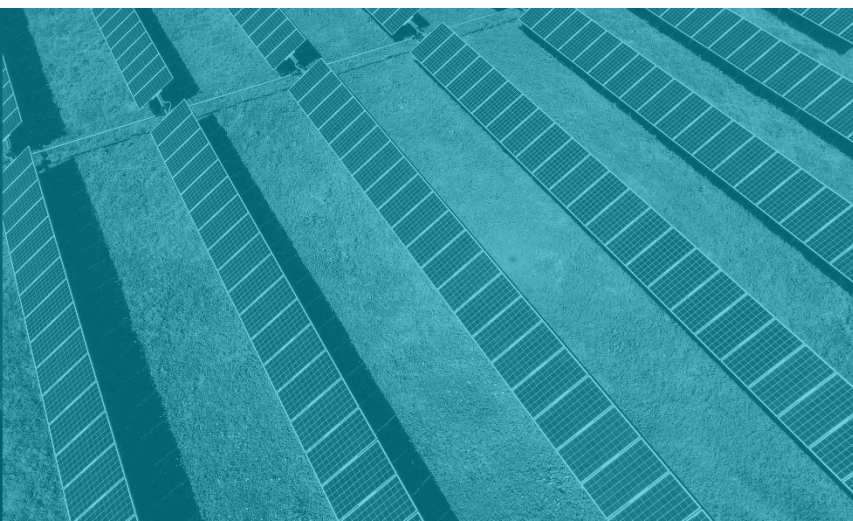


Energy Awards

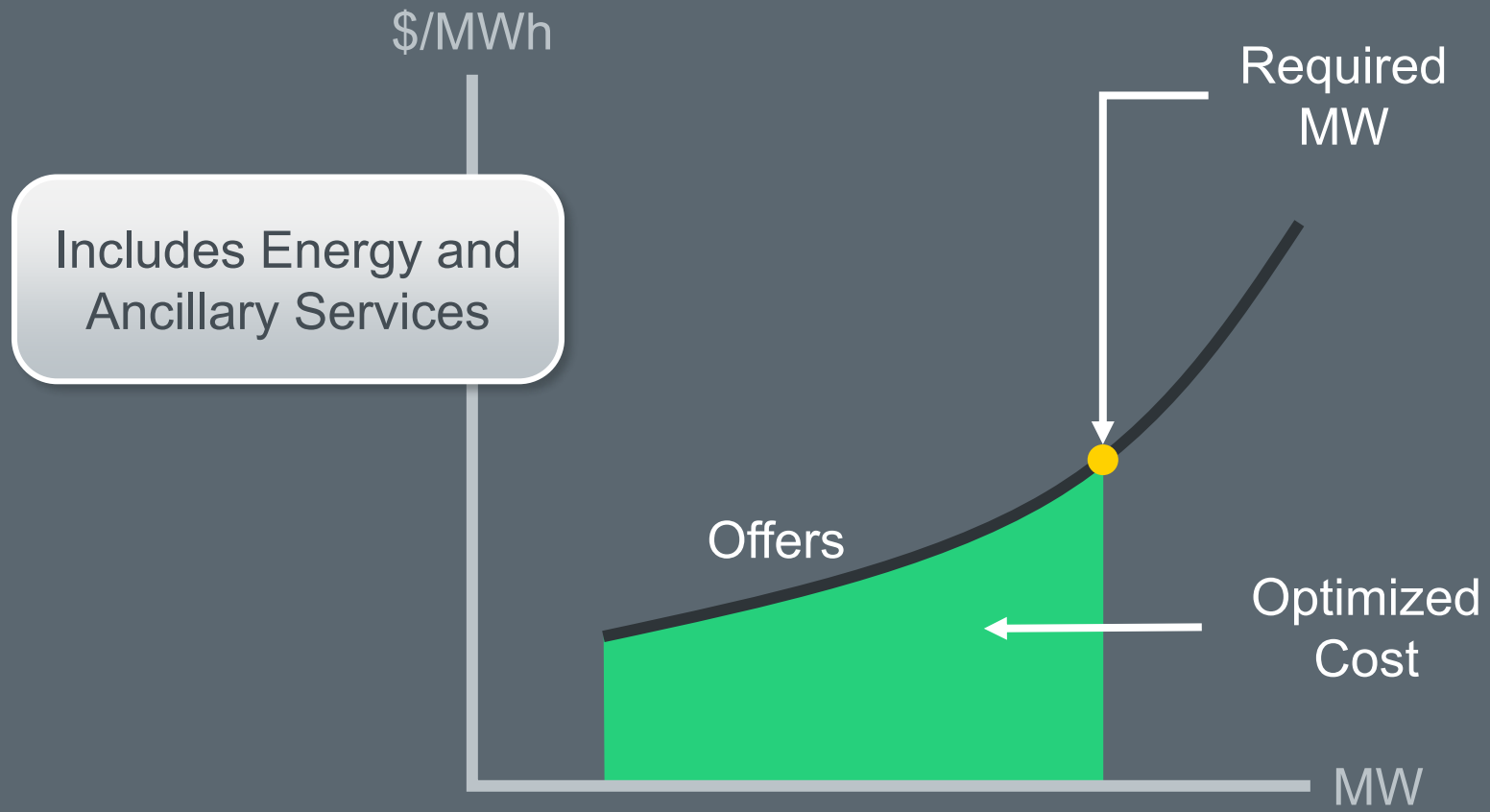
Ancillary Service Awards



Real-Time Co-Optimization



The SCED process is optimized for cost





Resource-Specific Offers for Each Service

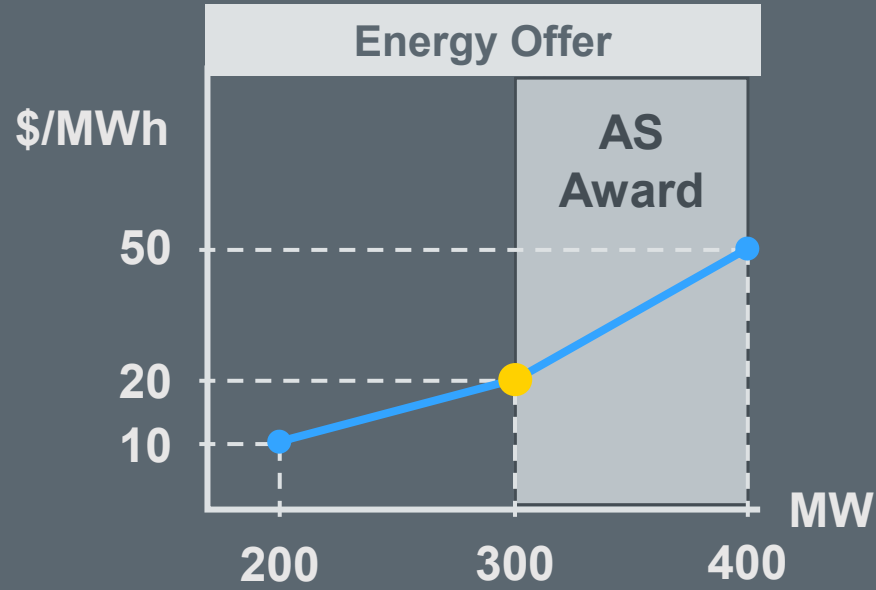
Type of Service	Offer	
Regulation Up	MW	\$ / MW
Regulation Down	MW	\$ / MW
Responsive Reserve	MW	\$ / MW
Contingency Reserve	MW	\$ / MW
Non-Spinning Reserve	MW	\$ / MW

Multiple offers from single Resource:

- Multiple Ancillary Services
- Combined with Energy Offers

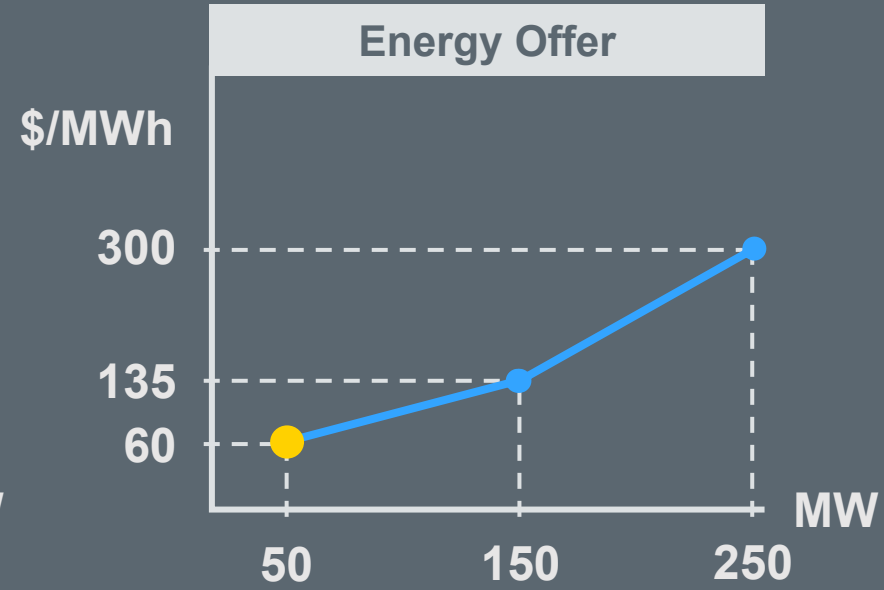


GEN 1



AS offer \$10/MW

GEN 2

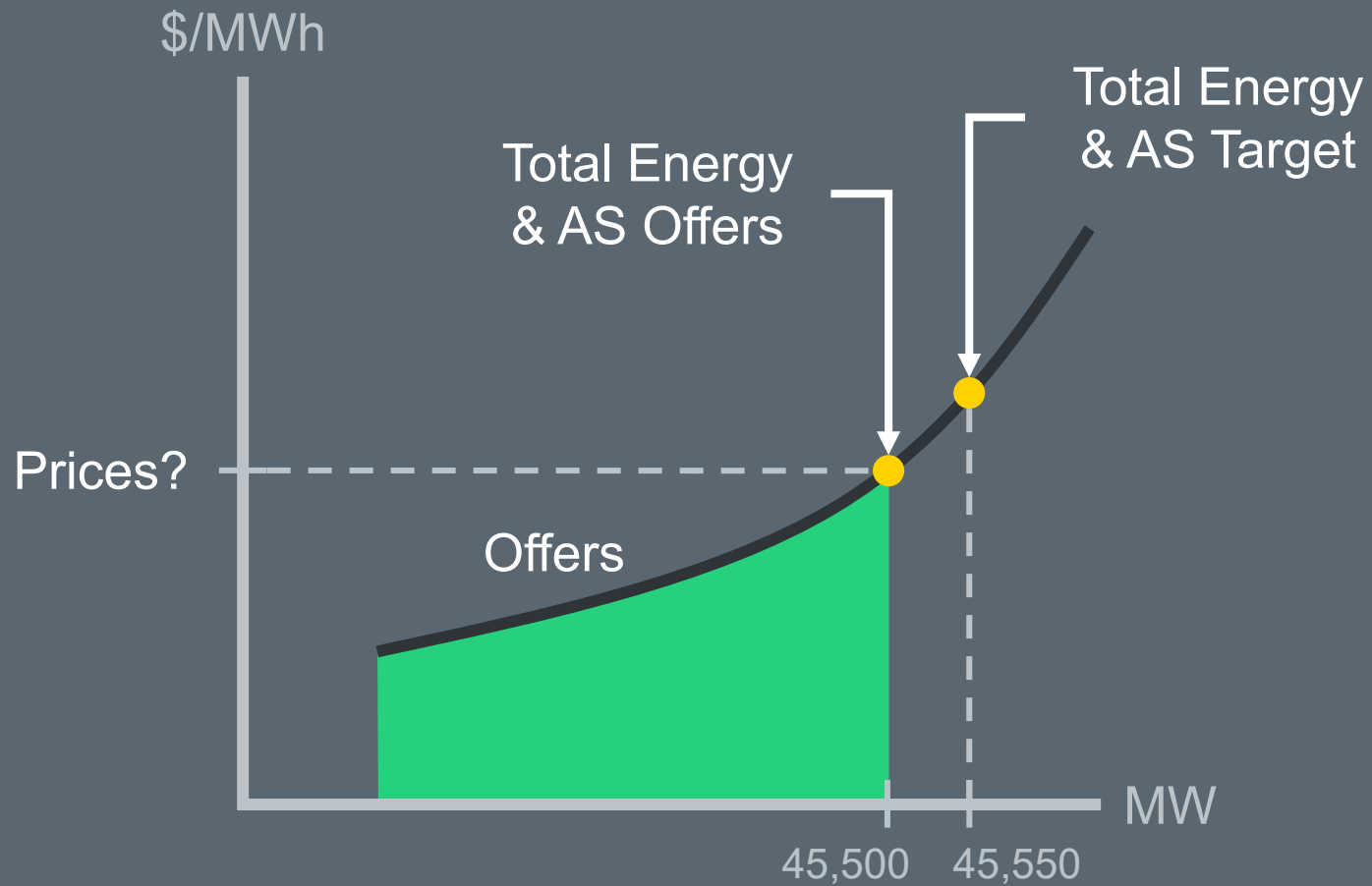


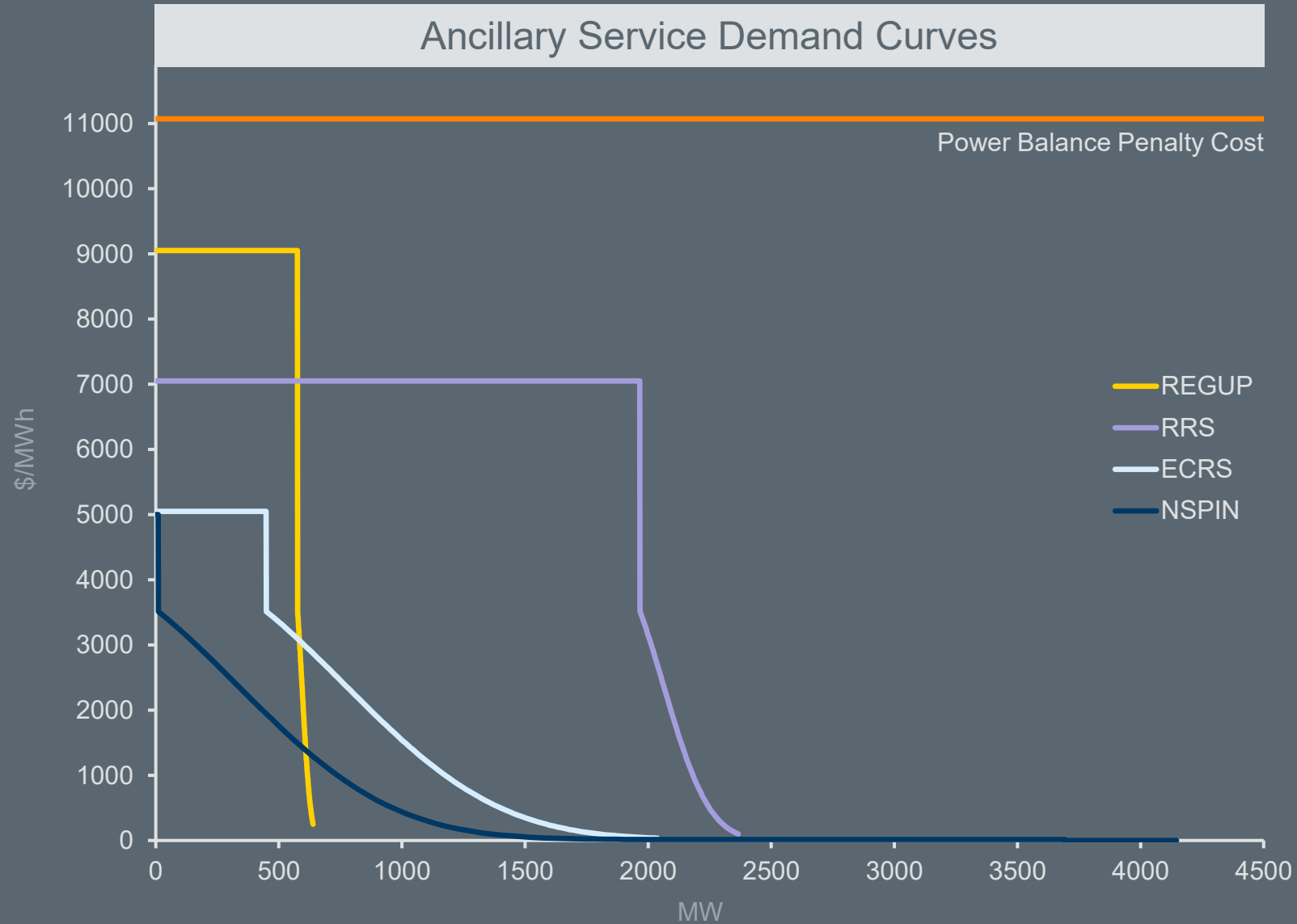
AS offer \$20/MW

\$20.00



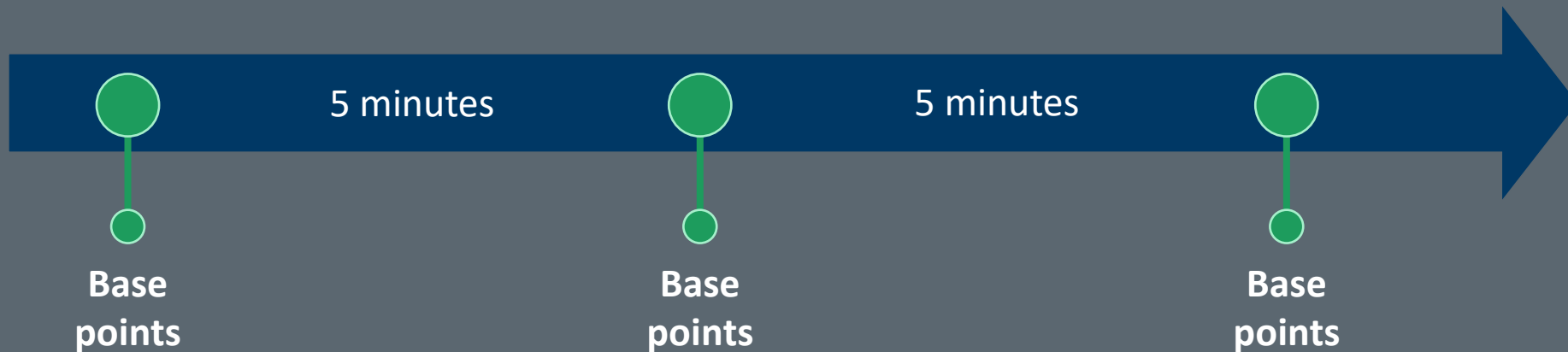
What will SCED do?

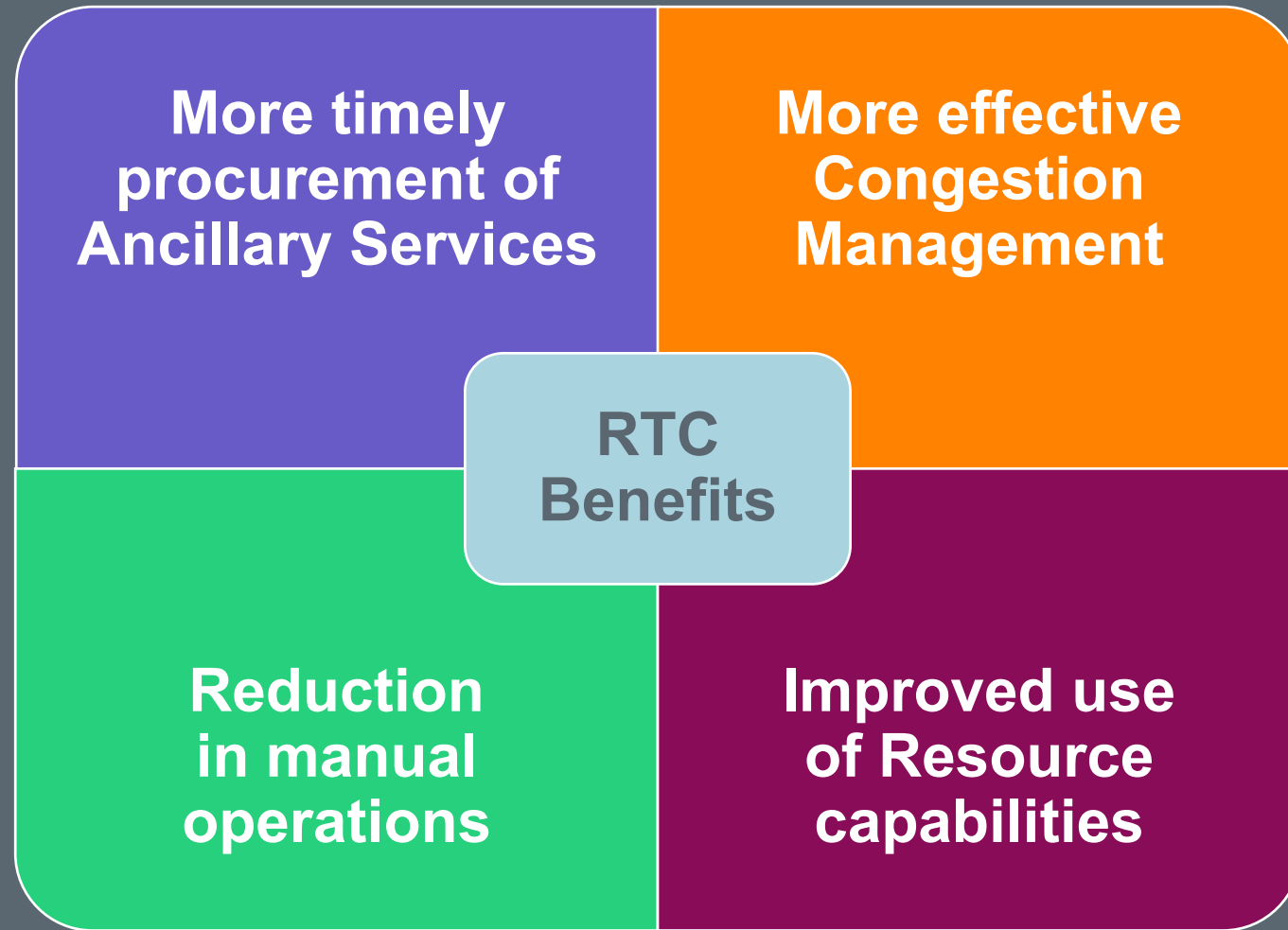




Security Constrained Economic Dispatch (SCED)

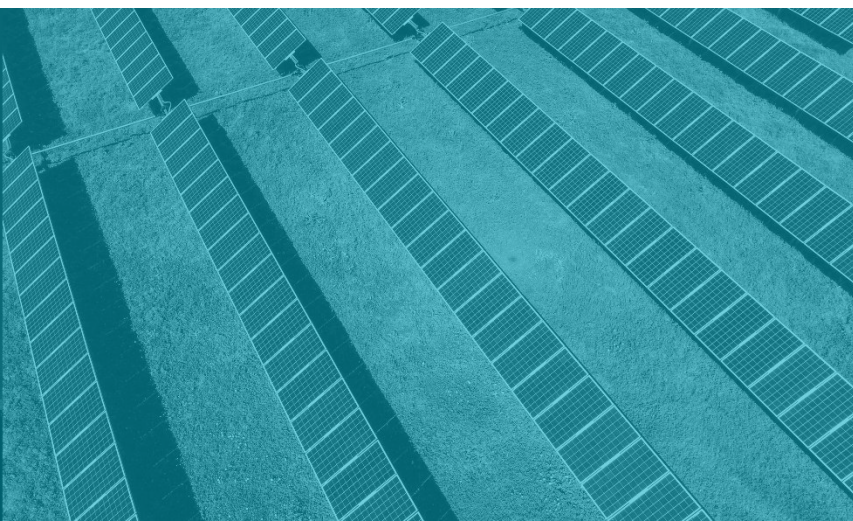
- Dispatches Energy
- Manages Congestion
- Awards Ancillary Services
- Achieves least cost solution



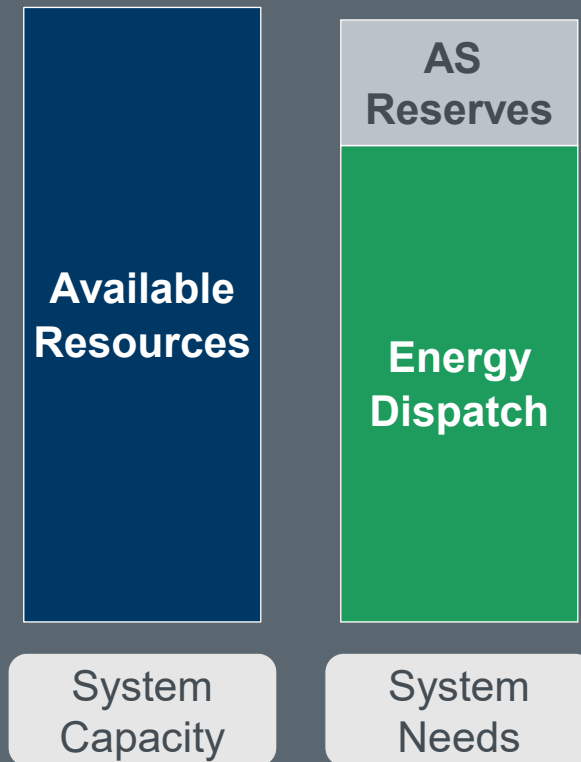




System Capacity



Co-Optimization requires sufficient capacity



Requirements:

- Serve Load
- Award Ancillary Services
- Manage Congestion

Current Operating Plan (COP)

Anticipated Resource operating conditions

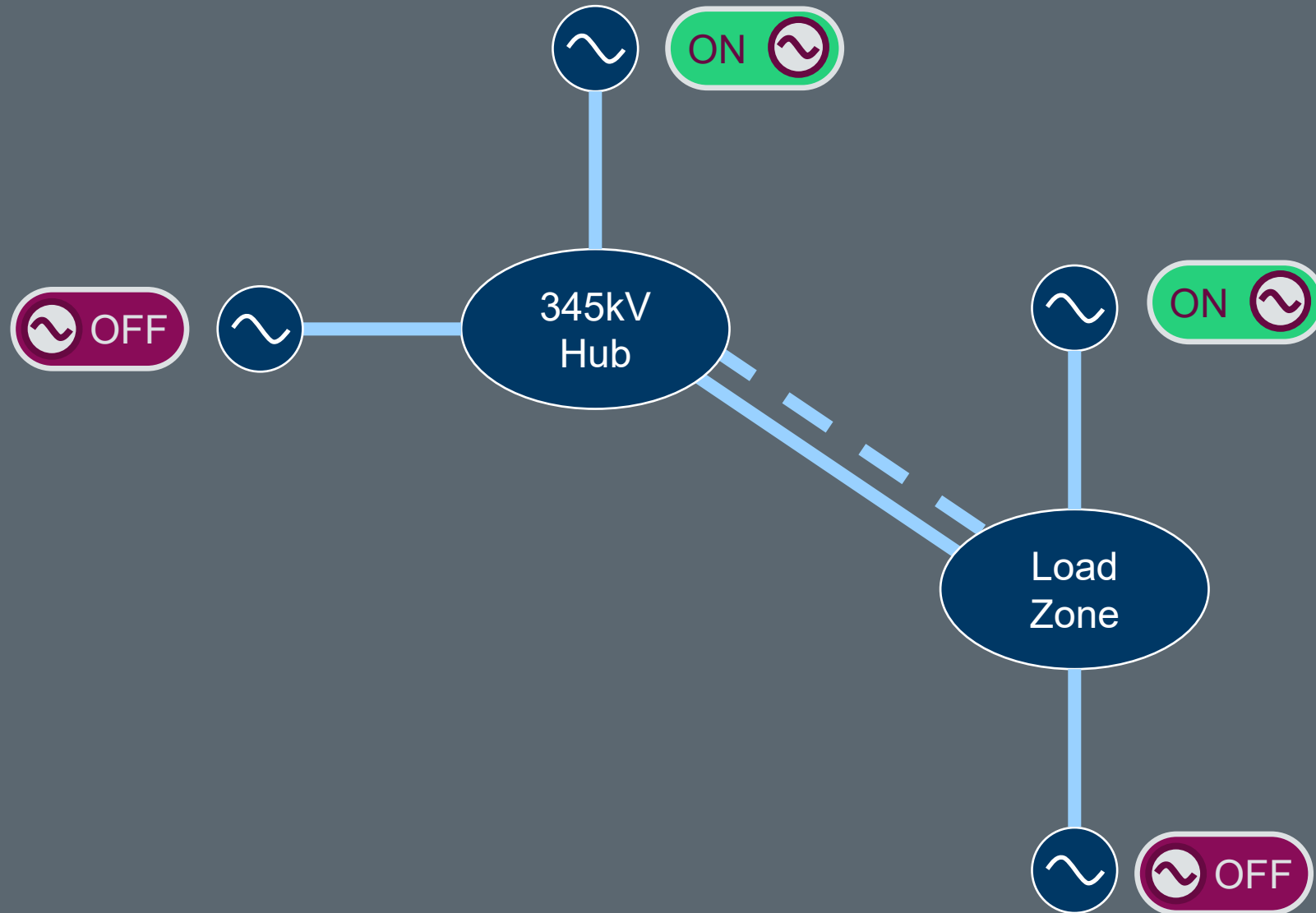
- Resource Status
- Resource Limits
- Ancillary Service Capabilities

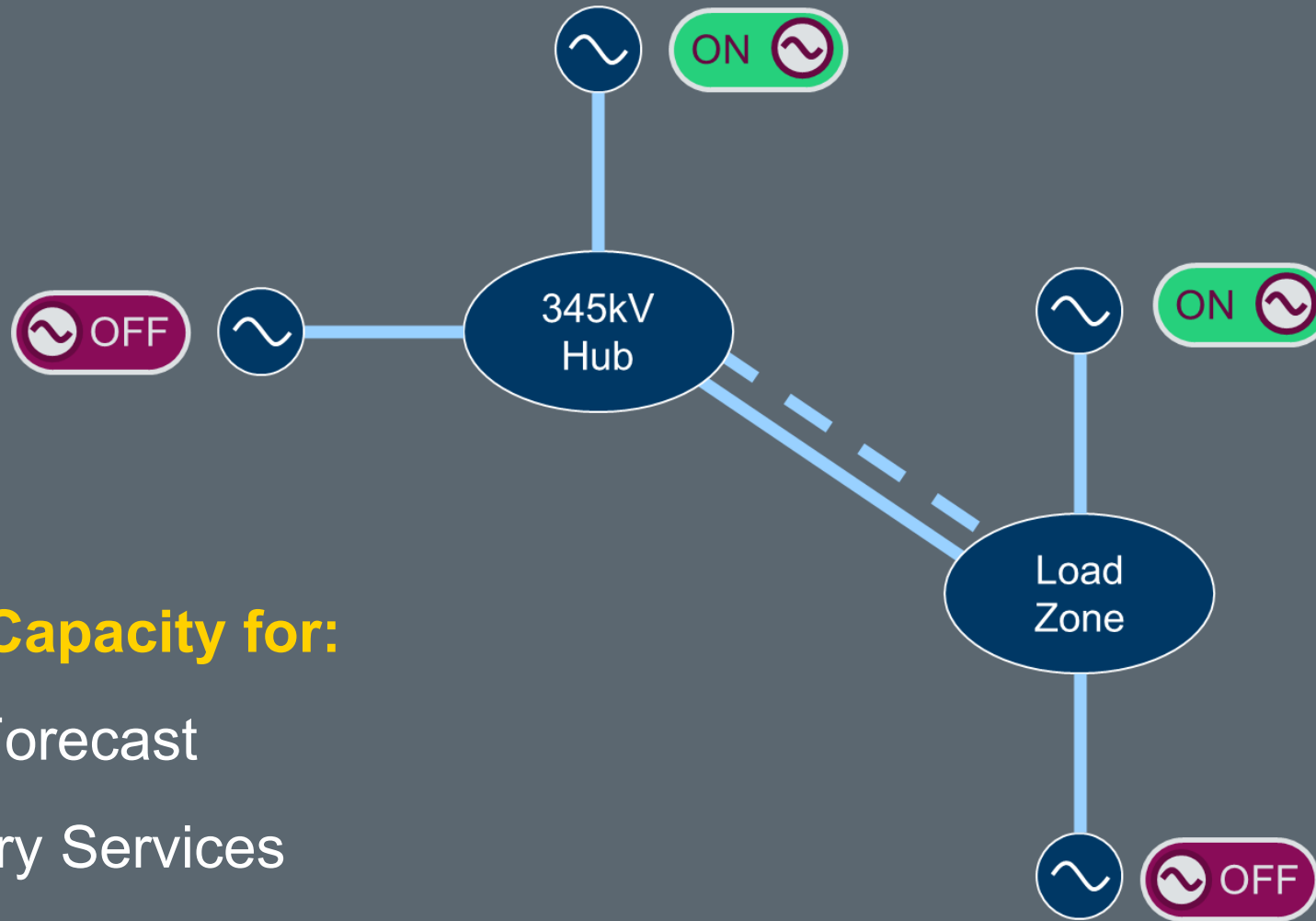


Resource QSEs must maintain a COP for each hour of the next 7 days



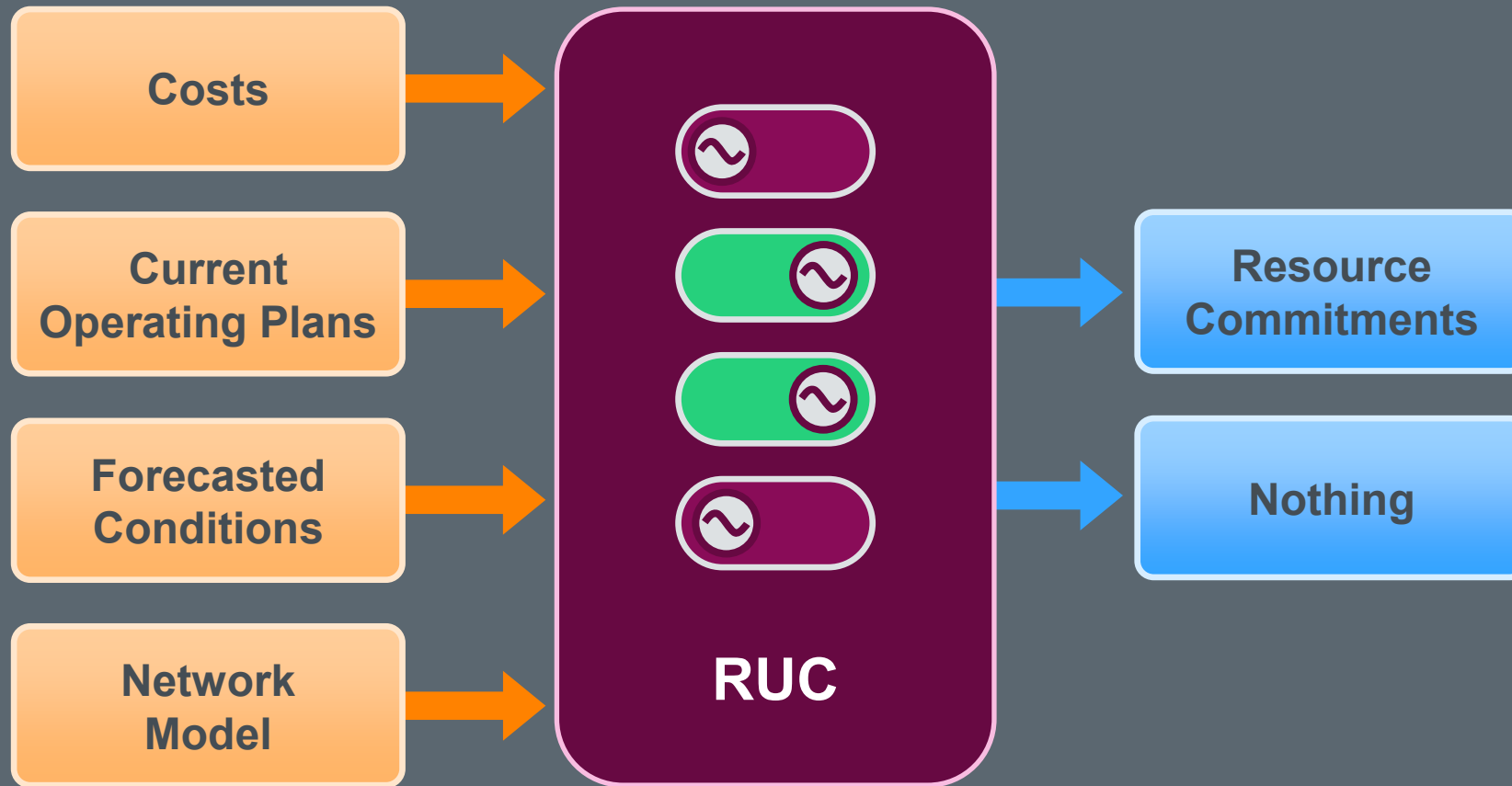
Discussion: What if not enough generators plan to run?



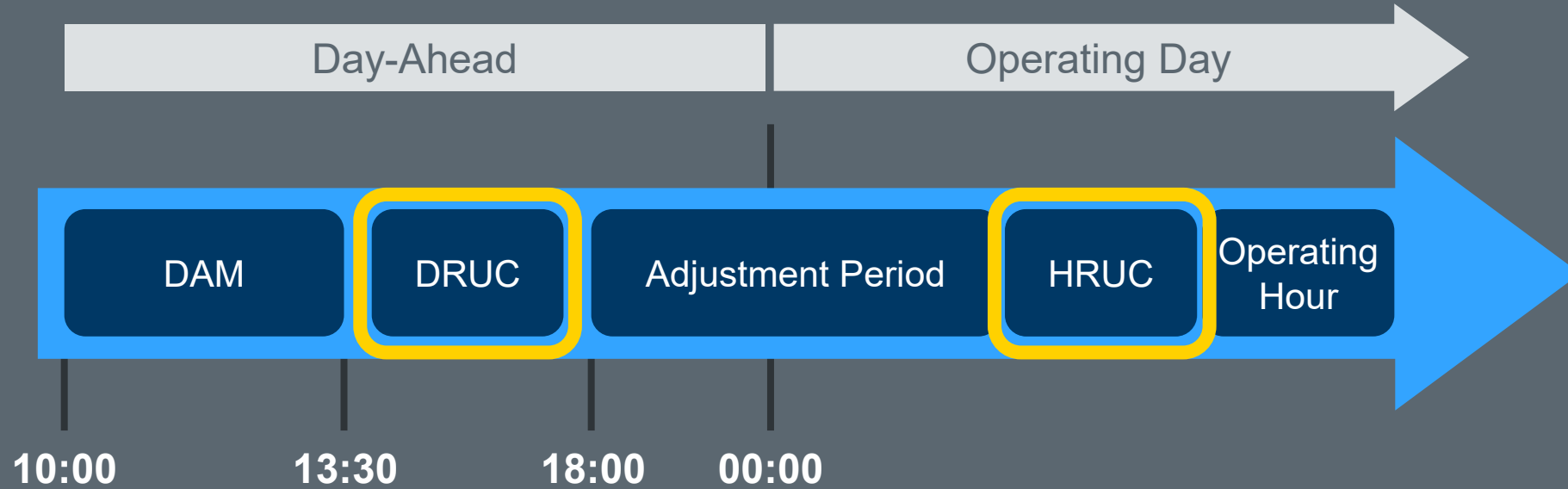


Ensures Capacity for:

- Load Forecast
- Ancillary Services
- Congestion Management



Timing

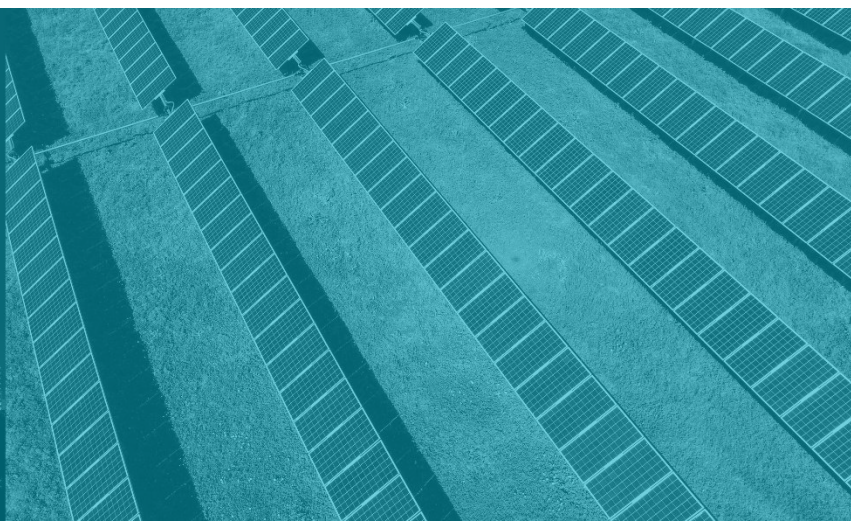


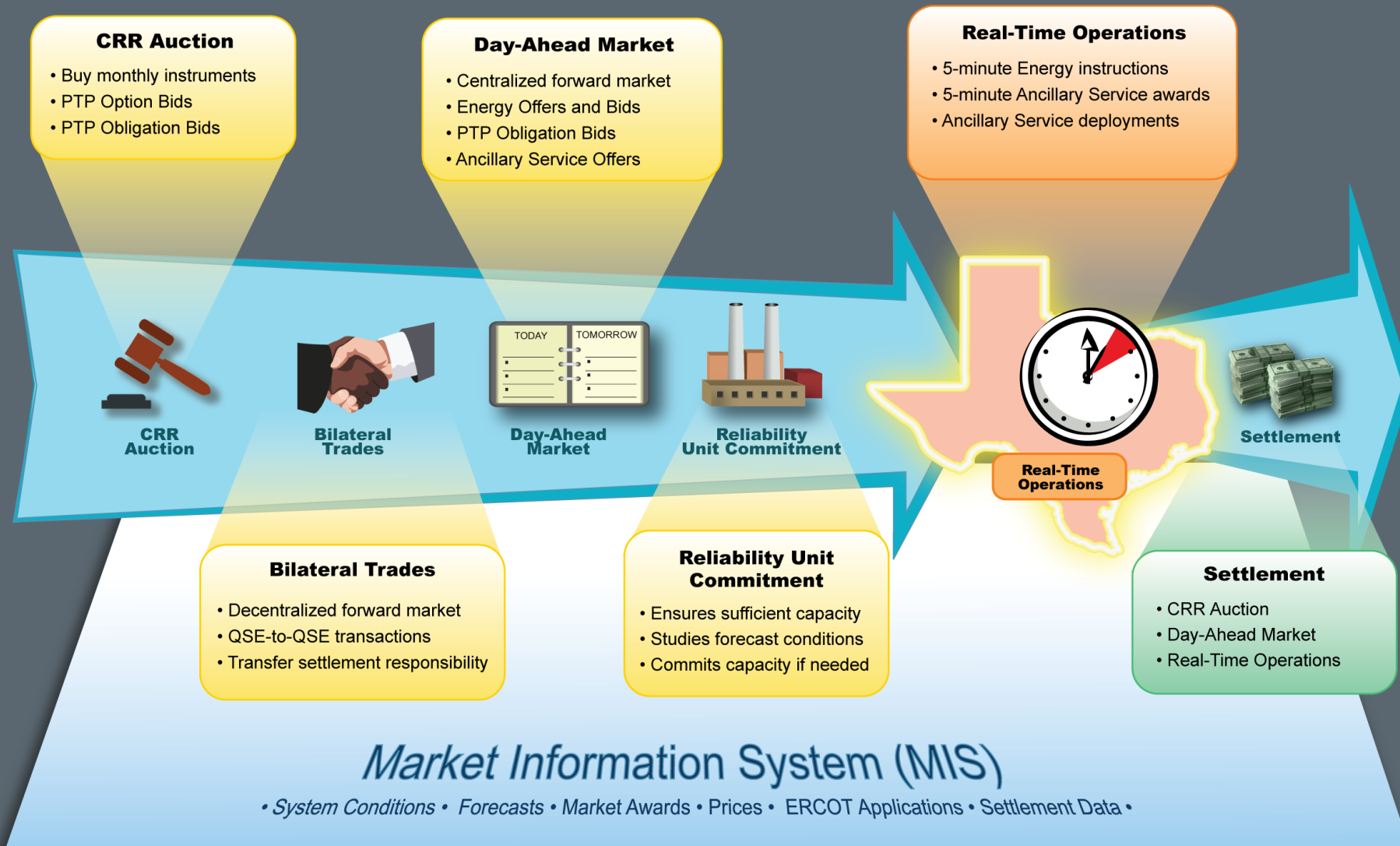
DRUC = Day-Ahead Reliability Unit Commitment

HRUC = Hourly Reliability Unit Commitment



Summary and Conclusion







Also available
on ercot.com



Available to
all Market
Participants



Available to
specific Market
Participant

ERCOT Training Information

<http://www.ercot.com/services/training/>

Course Recommendations

<https://www.ercot.com/services/training/recommendations>

Market Education Contact

Training@ercot.com

ERCOT Client Services Contact

Clientservices@ercot.com

ERCOT Mailing Lists

<http://lists.ercot.com/>

Scan this QR code to take the course survey!

<https://www.surveymonkey.com/r/ERCOTILT>

