PJM 101

The Basics

PJM State & Member Training Dept.

PJM©2024

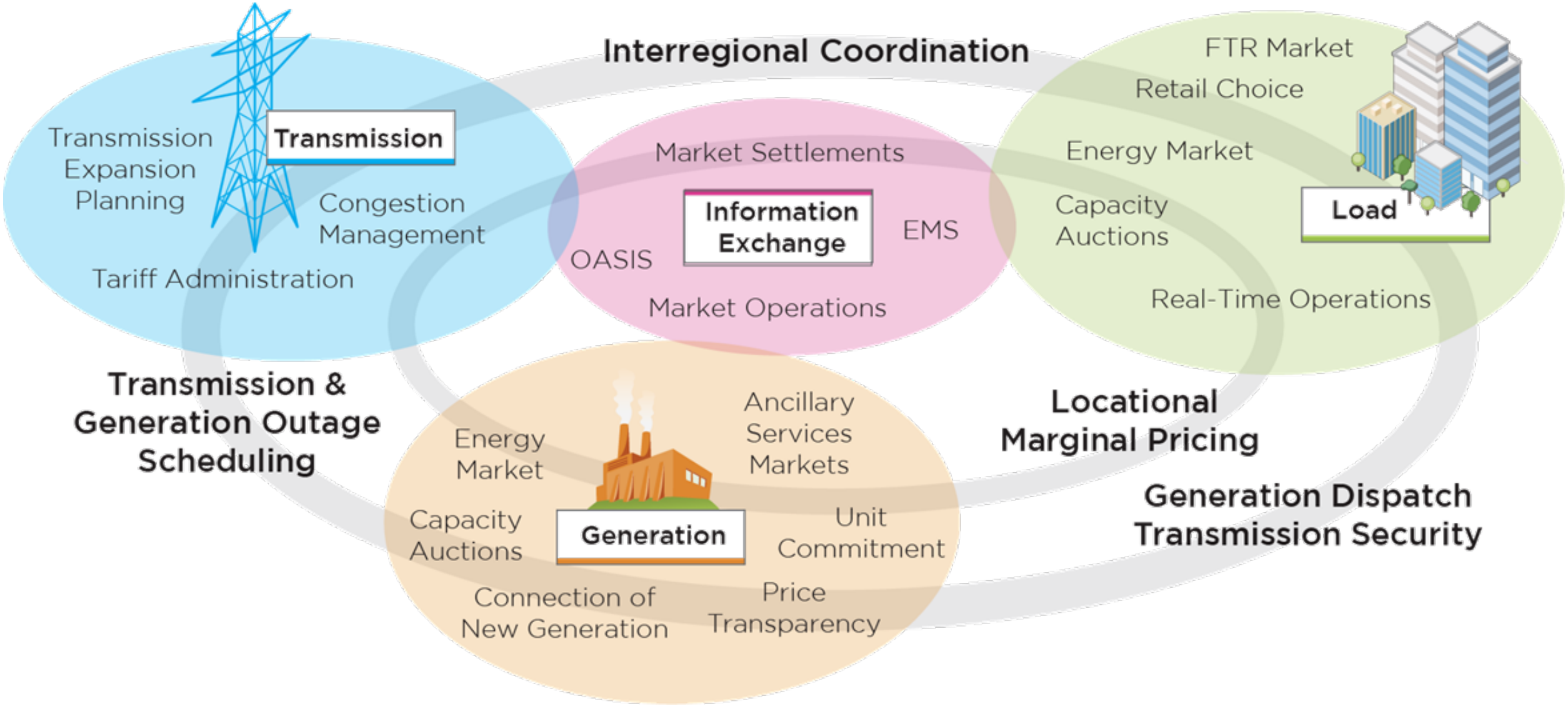
Objectives

Students will be able to:

- Identify the role & responsibility of the PJM RTO
- Describe the Regional Transmission Expansion Plan (RTEP) process
- Describe PJM's control room
- Describe some of PJM Markets and Operations functions
- Identify basics of PJM Ancillary Services
- Identify the basics of PJM Emergency Procedures
- Describe the PJM billing and payment process
- Explain the role & responsibilities of the PJM Market Monitor

Introduction

RTO Operation

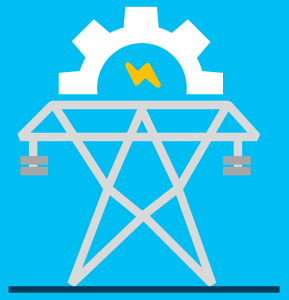


PJM – Primary Focus

RELIABILITY

Markets

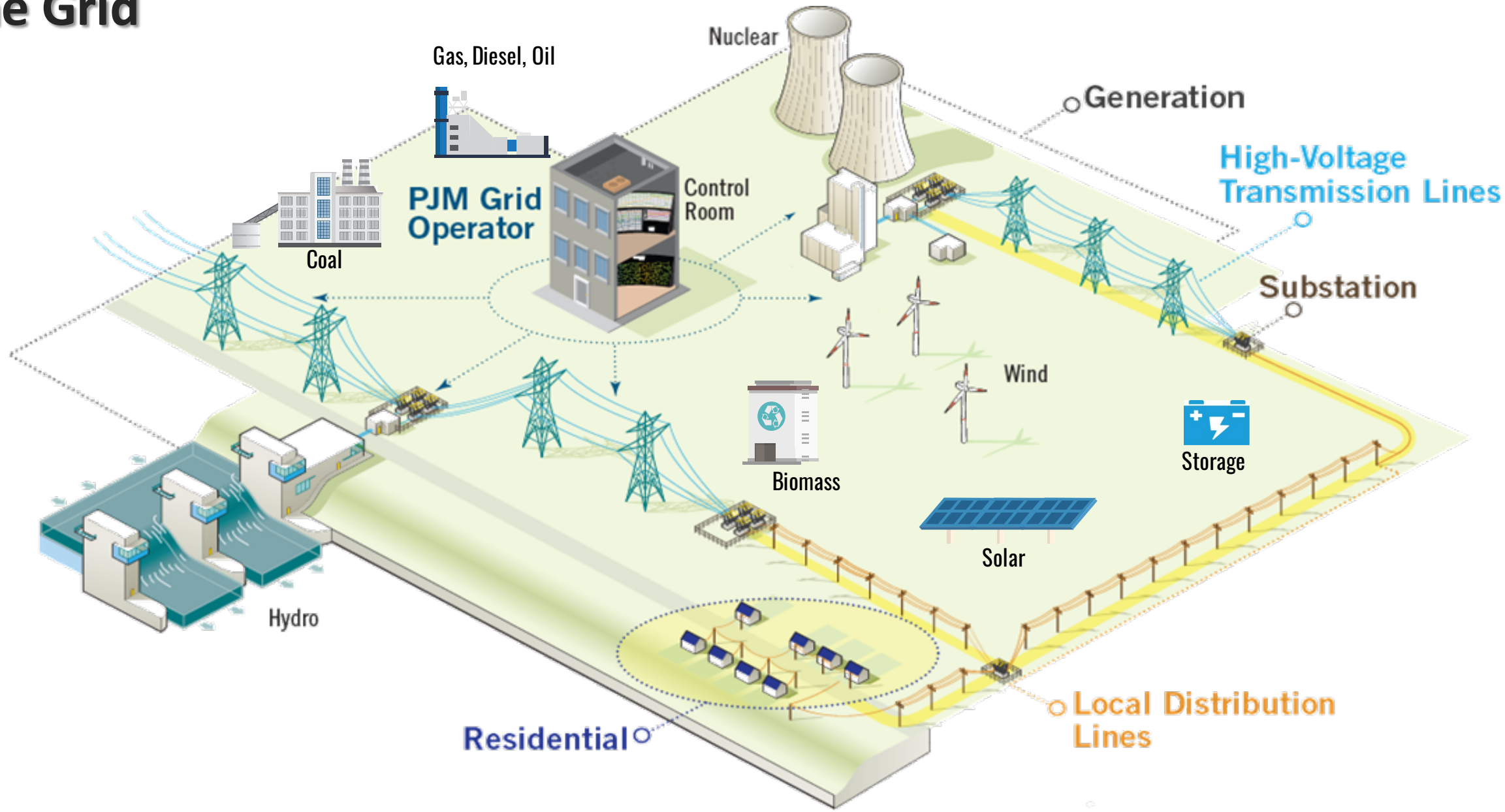
Operations



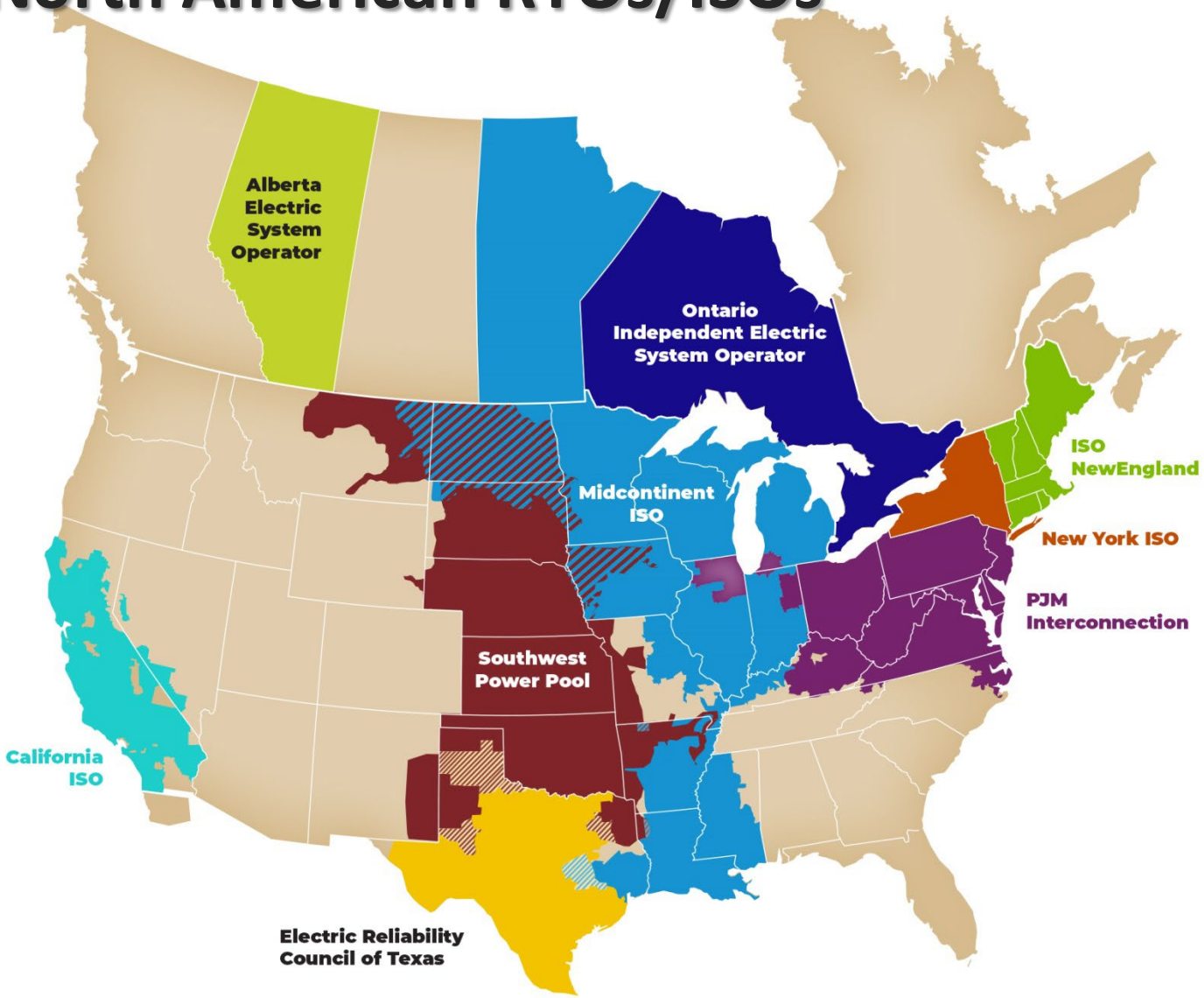
Regional Planning

Markets	Operations	Regional Planning
Energy	Grid Operations	15-Year Outlook
Capacity	Supply/Demand Balance	
Ancillary Services	Transmission Monitoring	

The Grid


Gas, Diesel, Oil
Nuclear
Generation
High-Voltage Transmission Lines
PJM Grid Operator
Control Room
Coal
Substation
Wind
Biomass
Storage
Solar
Hydro
Residential
Local Distribution Lines

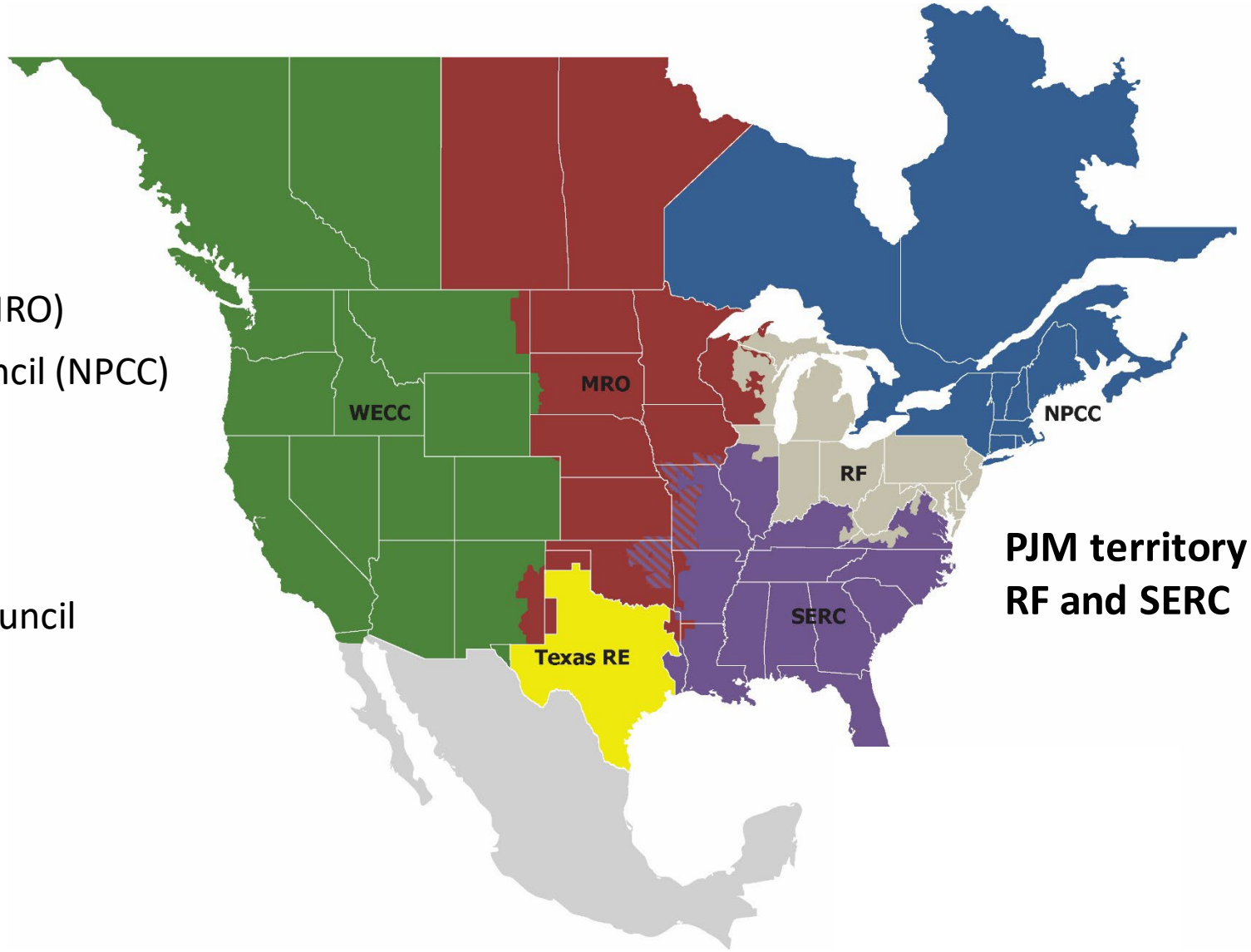
Nine Major North American RTOs/ISOs



IRC ISO/RTO COUNCIL

NERC Regions

- Midwest Reliability Organization (MRO)
- Northeast Power Coordinating Council (NPCC)
- Reliability First (RF)
- SERC Reliability Corporation (SERC)
- Texas Reliability Entity (Texas RE)
- Western Electricity Coordinating Council (WECC)



PJM territory within RF and SERC

How is PJM Different From Other Utility Companies?

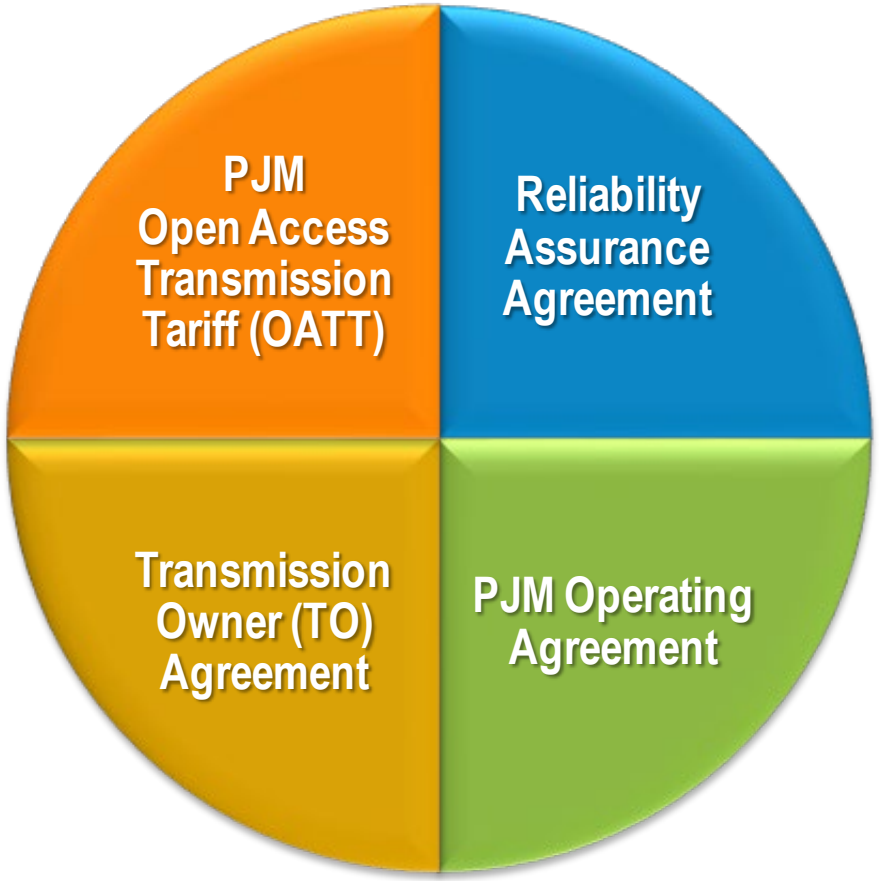
PJM Does:

- Direct operation of the transmission system
- Remain profit-neutral
- Maintain independence from PJM members
- Coordinate maintenance of grid facilities

PJM Does *NOT:*

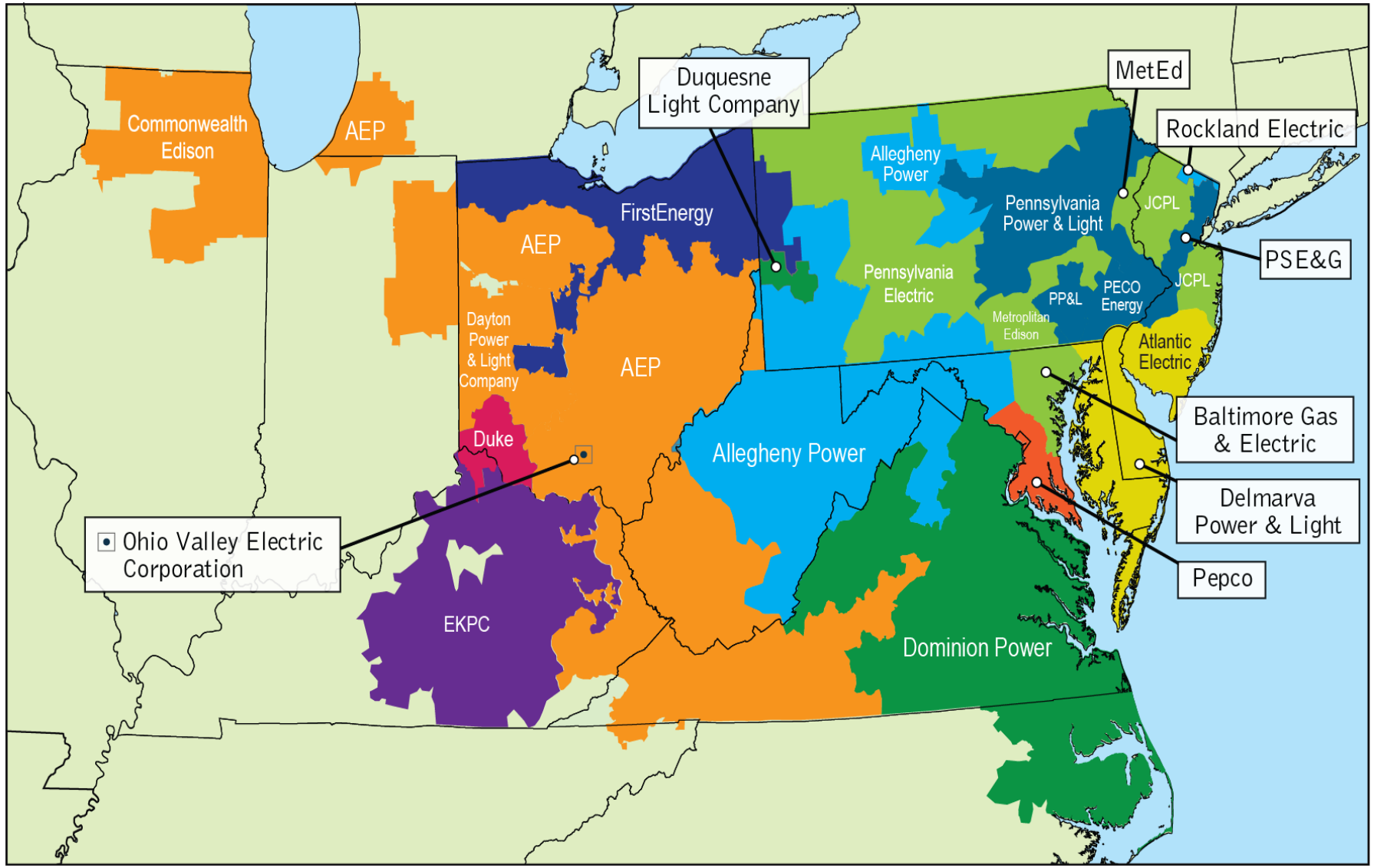
- Own any transmission or generation assets
- Function as a publicly-traded company
- Take ownership of the system's energy
- Perform maintenance on generators or transmission systems (e.g. repair power lines)
- Serve or direct any end-use customers (retail)

PJM Authority Provided by Contract



Growth of PJM

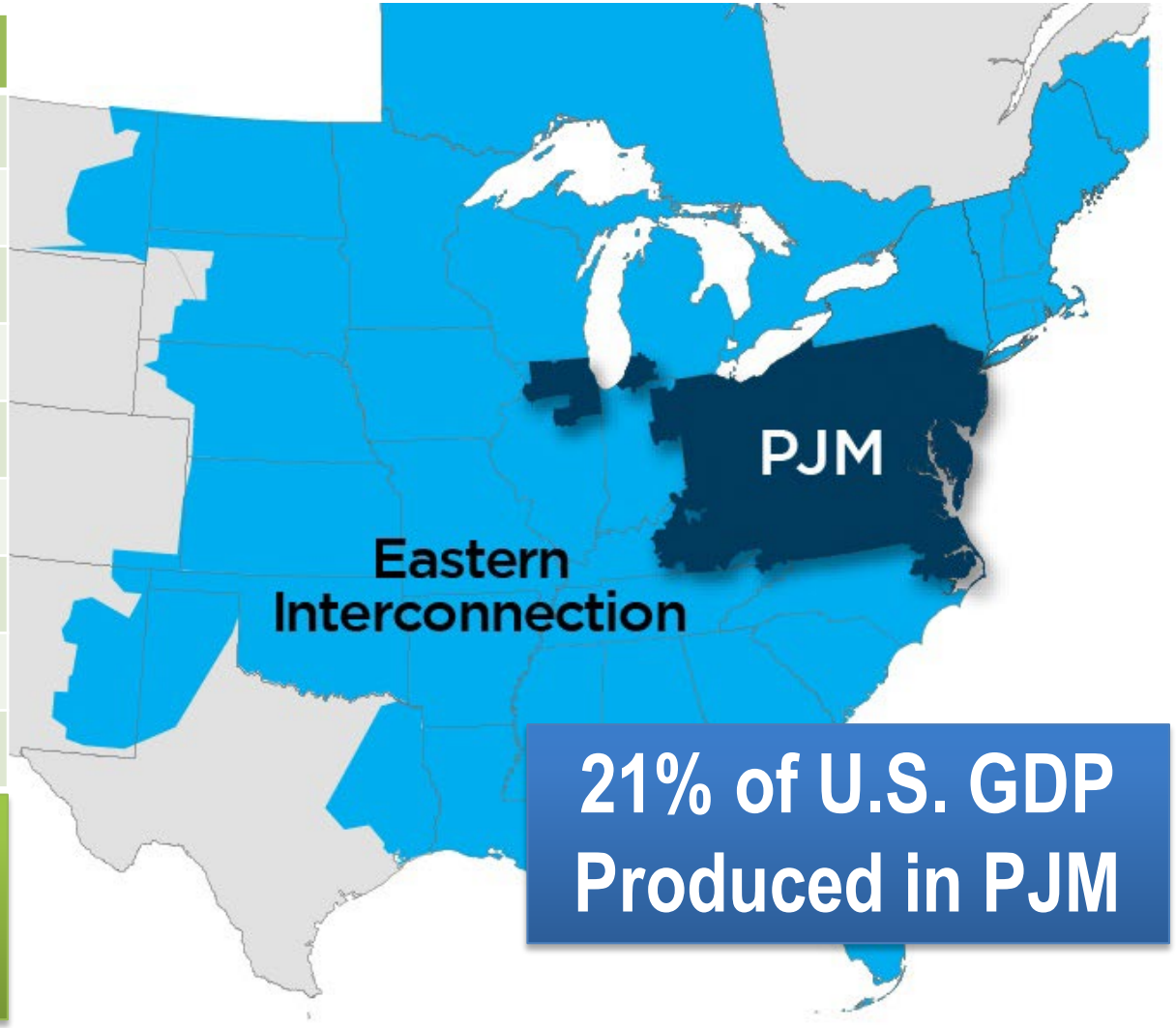
- Joined in 1927
- Joined in 1956
- Joined in 1965
- Joined in 1981
- Joined in 2002
- Joined in 2004
- Joined in 2005
- Joined in 2011
- Joined in 2012
- Joined in 2013
- Joined in 2018



PJM as Part of the Eastern Interconnection

Key Statistics	
Member companies	1,090
Millions of people served	65+
Peak load in megawatts	165,563
Megawatts of generating capacity	180,785
Miles of transmission lines	88,185
Terawatt hours of annual energy	770
Generation sources	1,439
Square miles of territory	368,906
States served	13 + DC

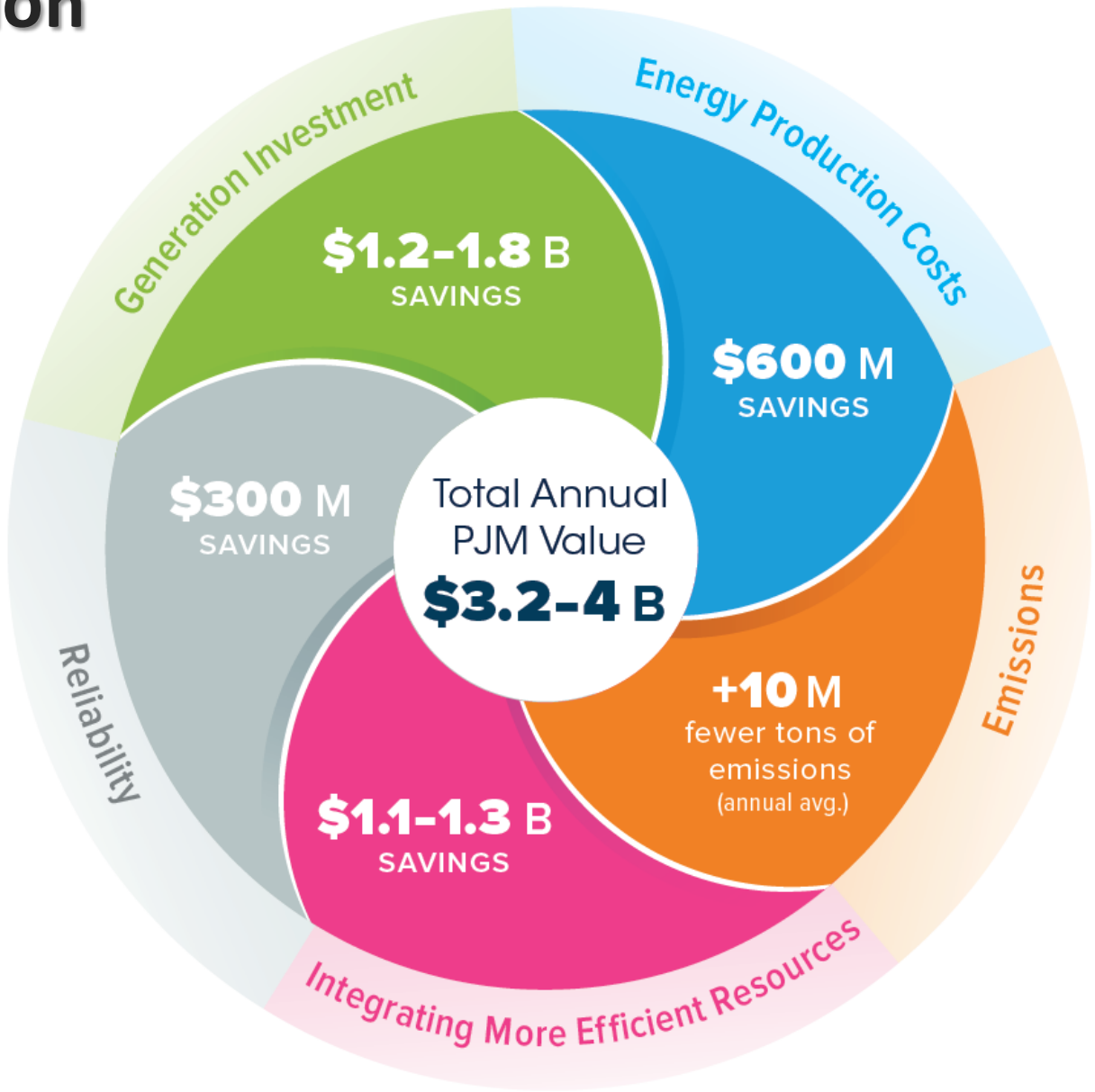
- 26% of generation in Eastern Interconnection
- 25% of load in Eastern Interconnection
- 20% of transmission assets in Eastern Interconnection



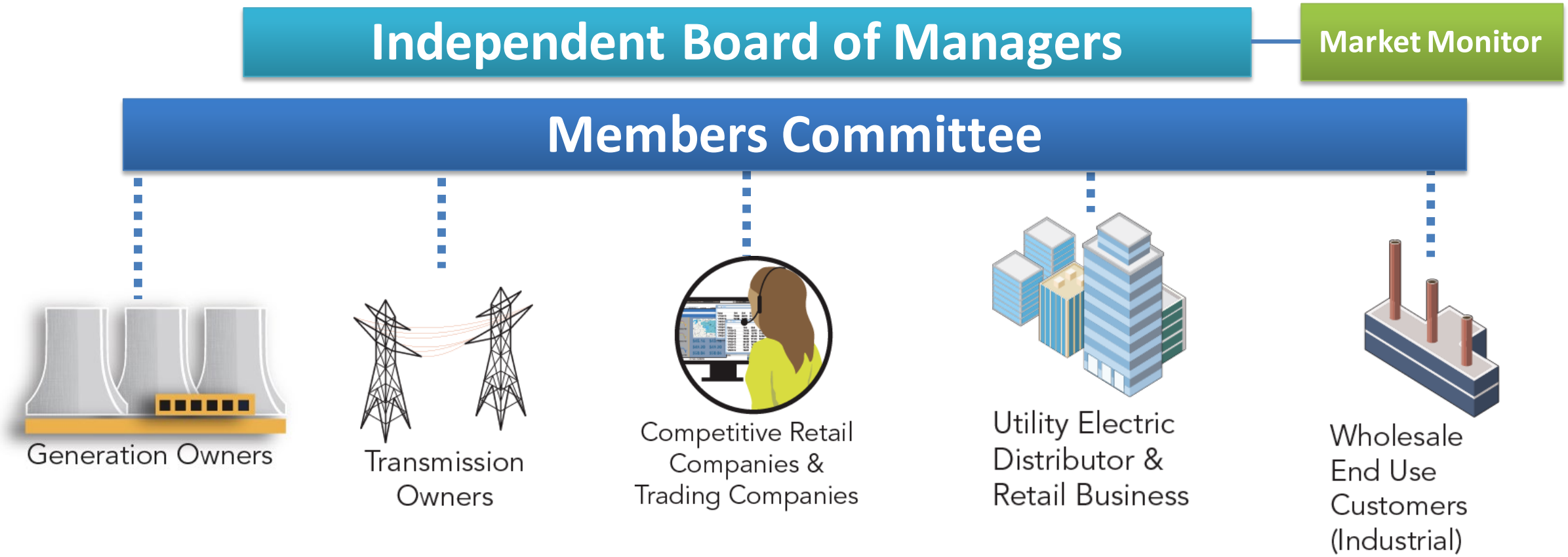
21% of U.S. GDP Produced in PJM

As of 2/2024

Value Proposition



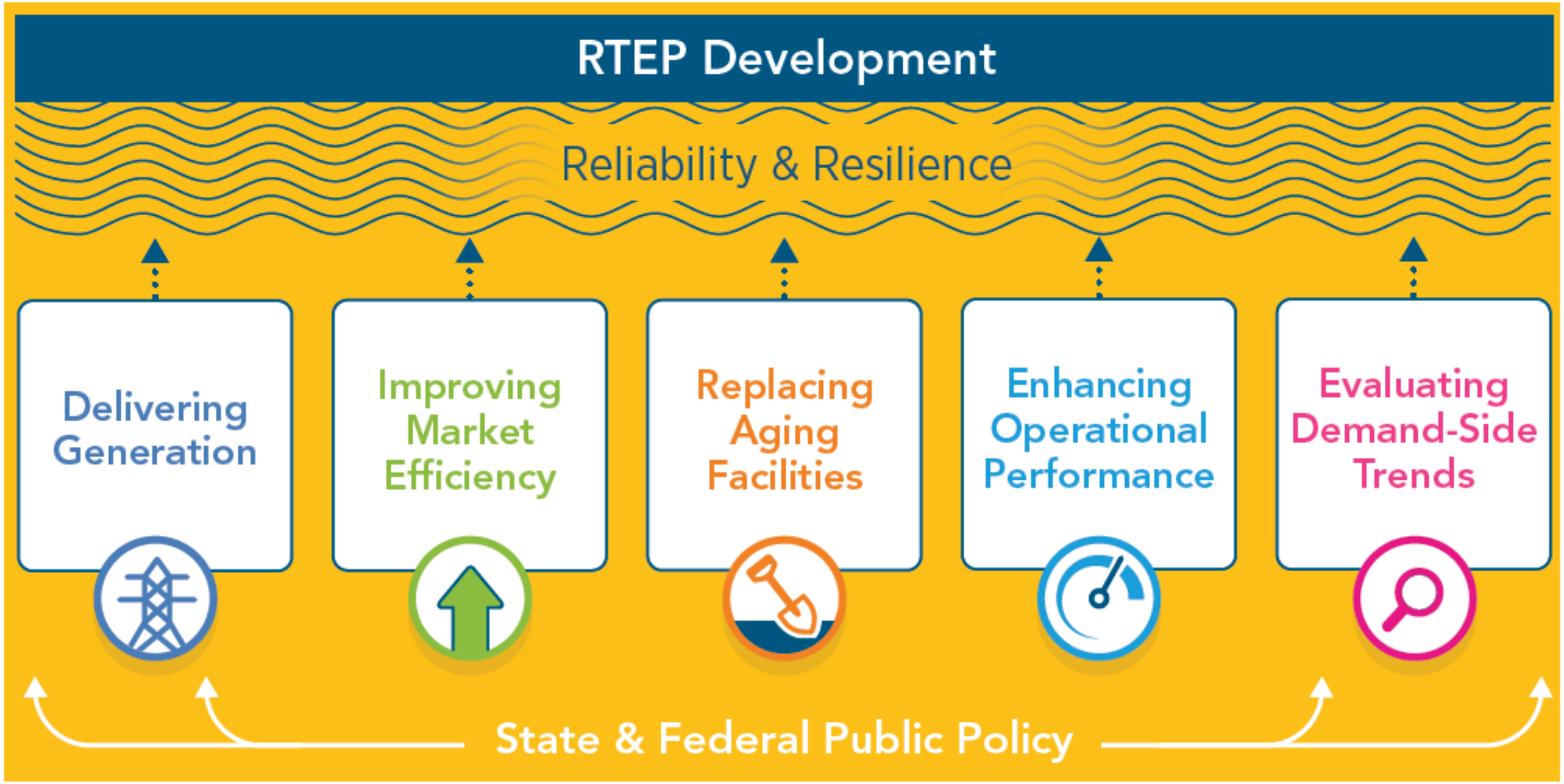
Independence and Governance Process



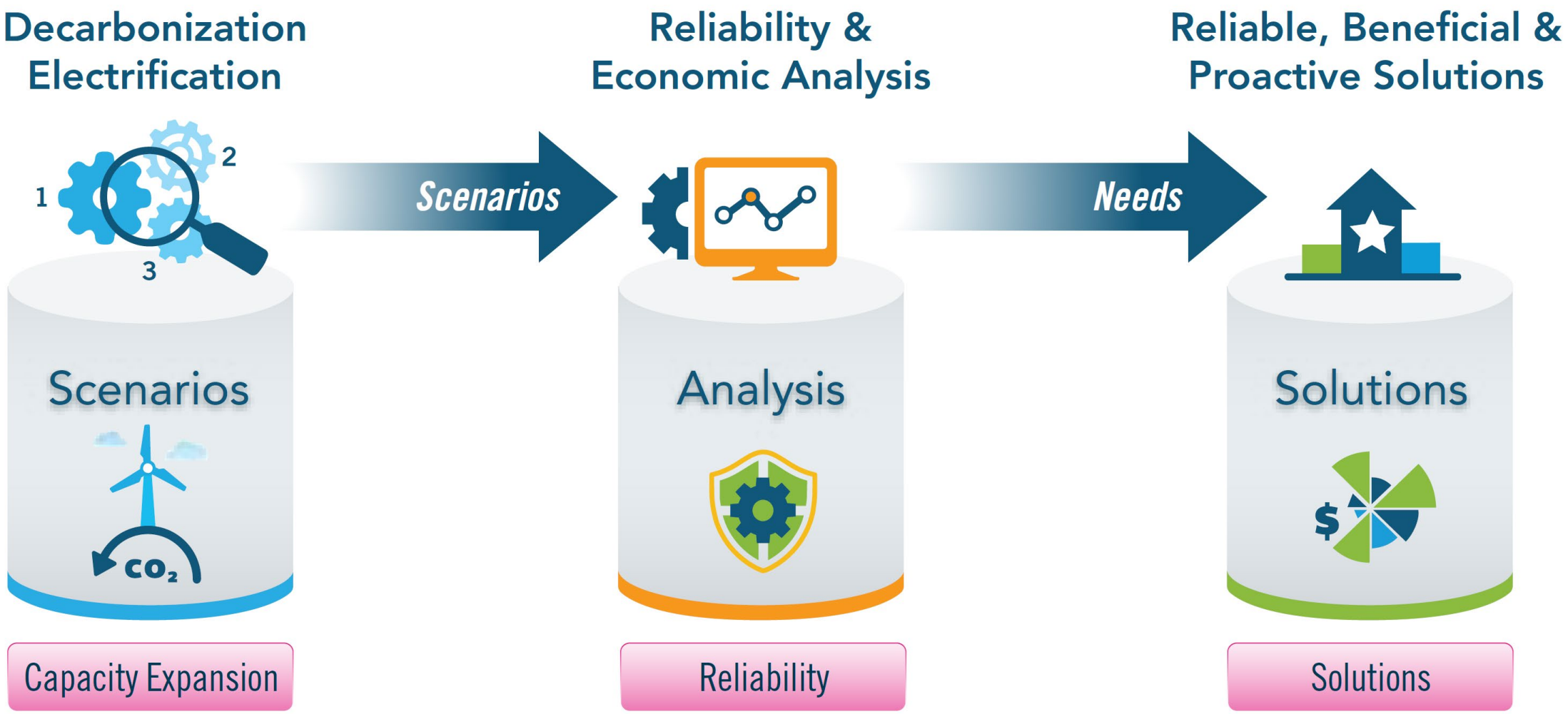
- Independent Board of Managers
- Stakeholder process – provide balanced stakeholder input
- Established process for discussion of market evolution

Regional Transmission Expansion Planning (RTEP)

System Expansion Drivers



Long-Term Regional Transmission Planning Framework



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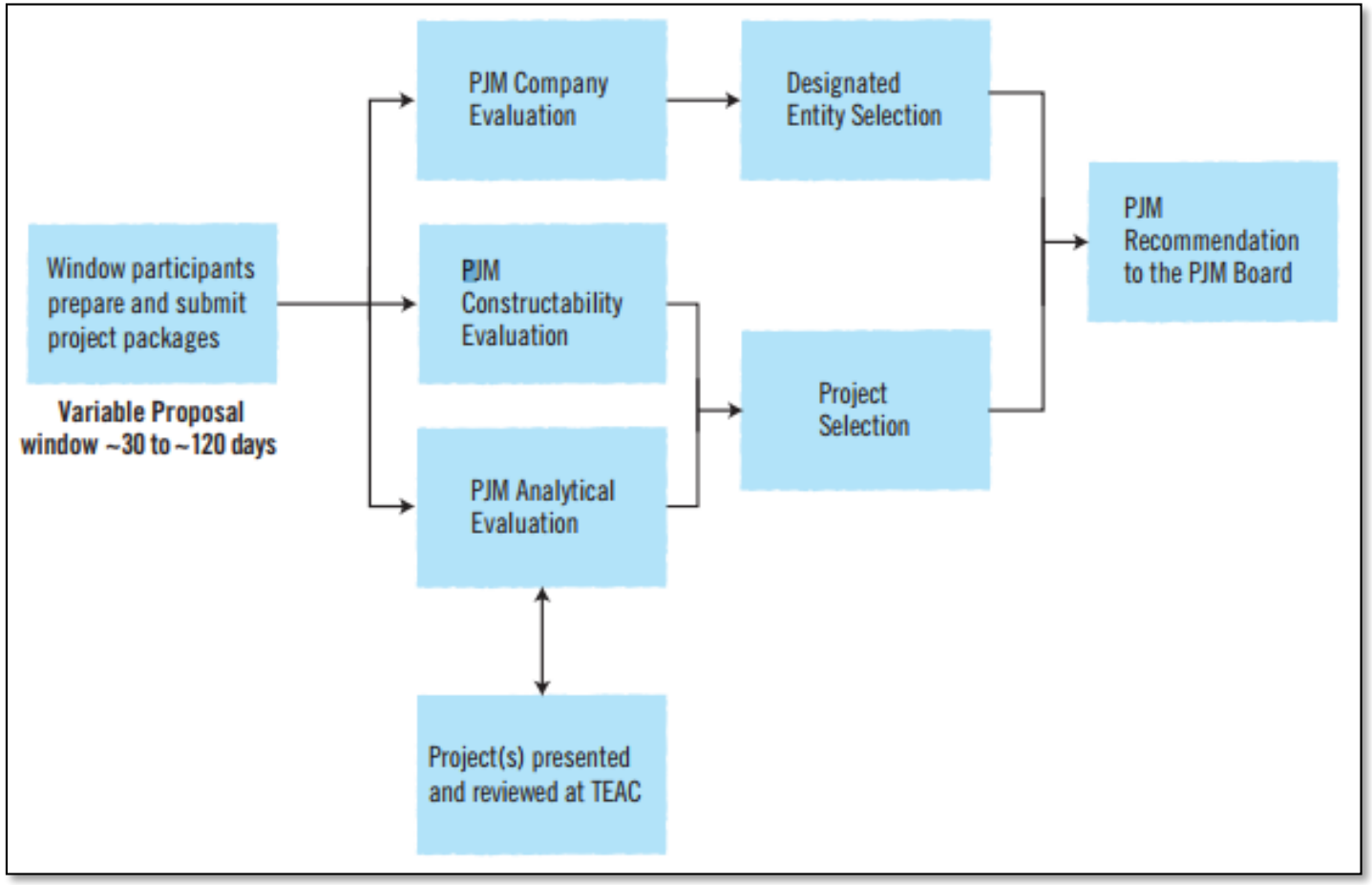
RTEP Process Windows

During each window PJM seeks transmission proposals to address one or more identified needs – reliability, market efficiency, operational performance and public policy.



Accessing the PJM RTEP Report

about pjm | training | committees & groups | planning | markets & operations | library

- Service Requests
- Project Status & Cost Allocation
- Competitive Planning Process
- RTEP Development
- Resource Adequacy Planning
- Planning Criteria
- Design, Engineering & Construction
- Interregional Planning

Home ▸ Planning

Planning

Most Recently Approved RTEP Updates

13 New Projects

1 Project Scope/Cost Change

0 Project Cancellations

Transmission Under Construction

TEAC White Paper PDF

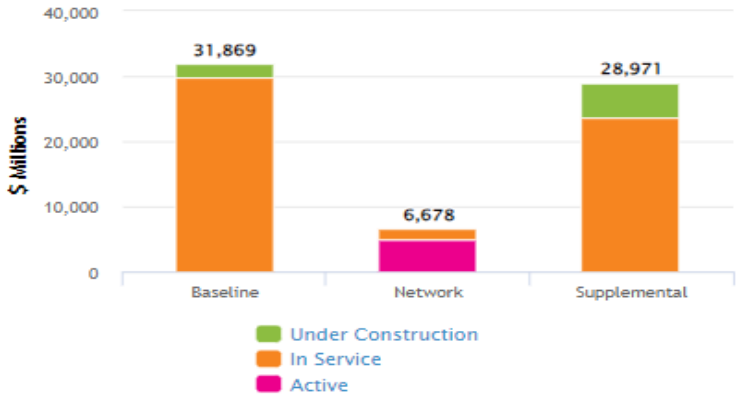
Regional Transmission Expansion Plan

Transmission Projects and Cost Allocation

Load Forecast Reports

Learn How PJM Plans for the Future

As of 9:58 a.m. EPT



Supplemental project costs are not PJM Board approved.

Tools

Planning Center: Queue Point | Queue Scope | Gen Model | Competitive Planner | TO Planner

Submit a Competitive Planning Process Proposal

Planning Community

Training Video | Community User Guide PDF

Register for community

Competitive Planning Process

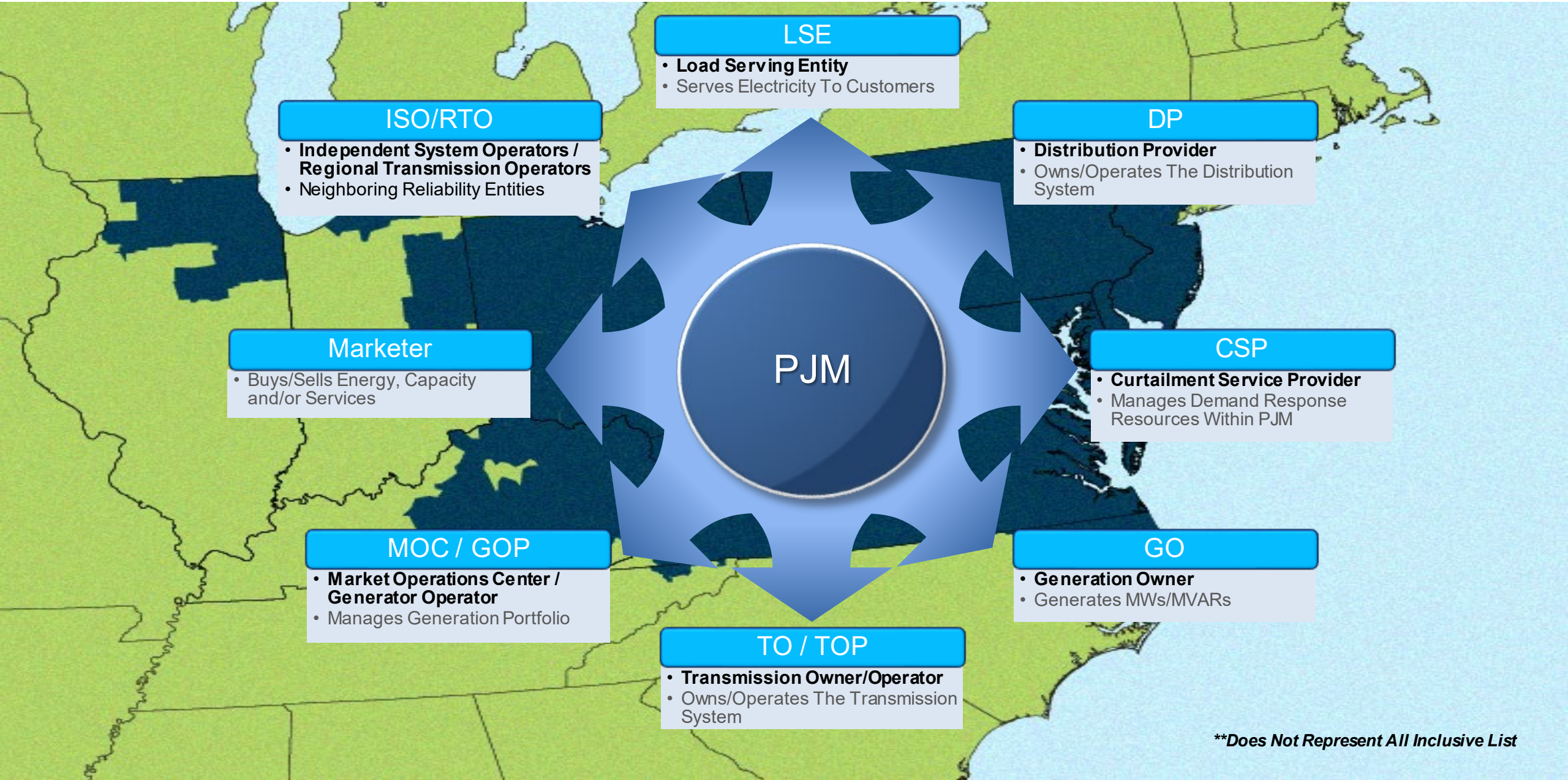
The PJM competitive planning process affords non-incumbent transmission developers an opportunity to participate in the regional planning and expansion of the PJM bulk electric system.

2023 RTEP Window 1

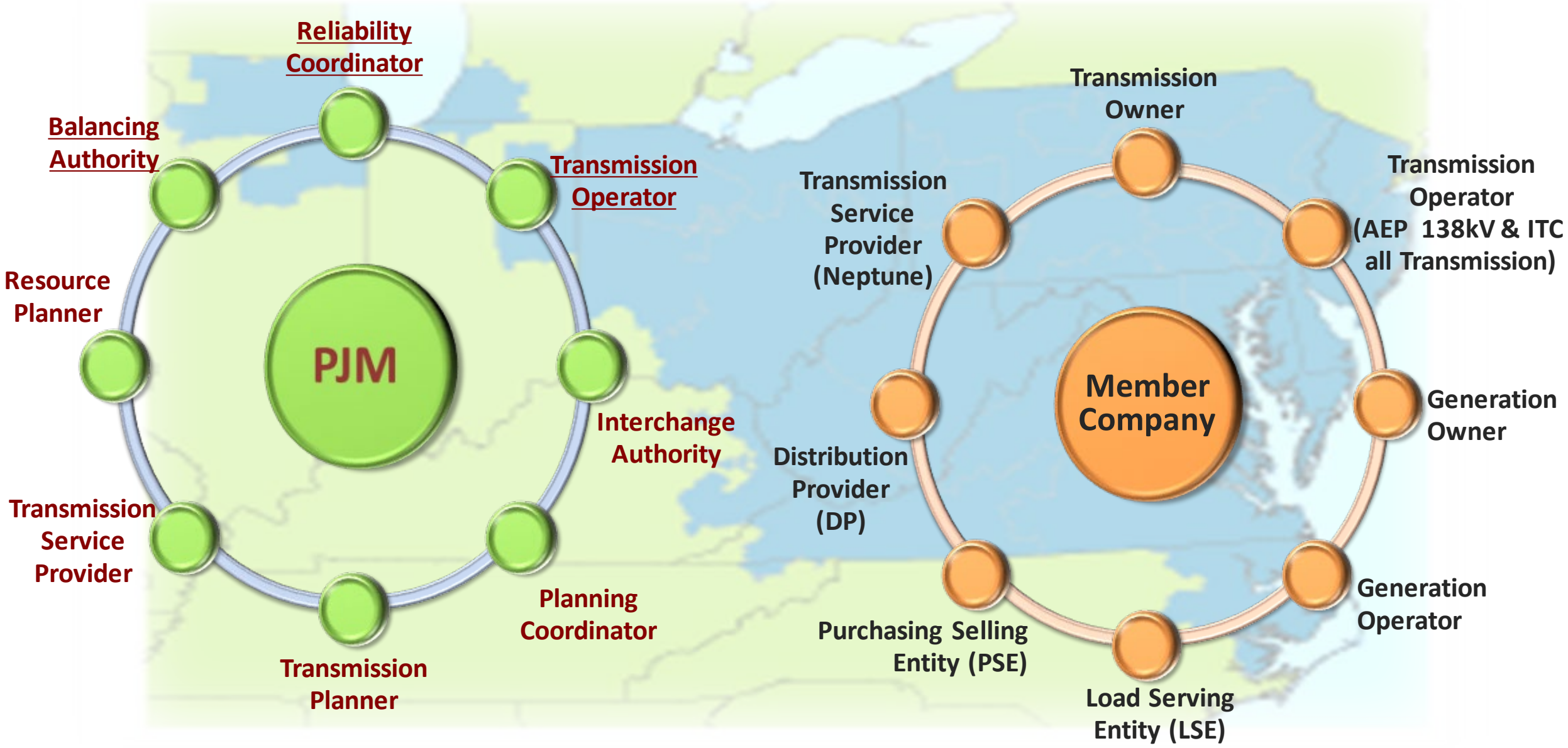
OPEN 7.24.2023 CLOSE 9.22.2023

PJM Control Room Overview

PJM maintains many relationships to ensure safe and reliable operation of the Bulk Electric System (BES)

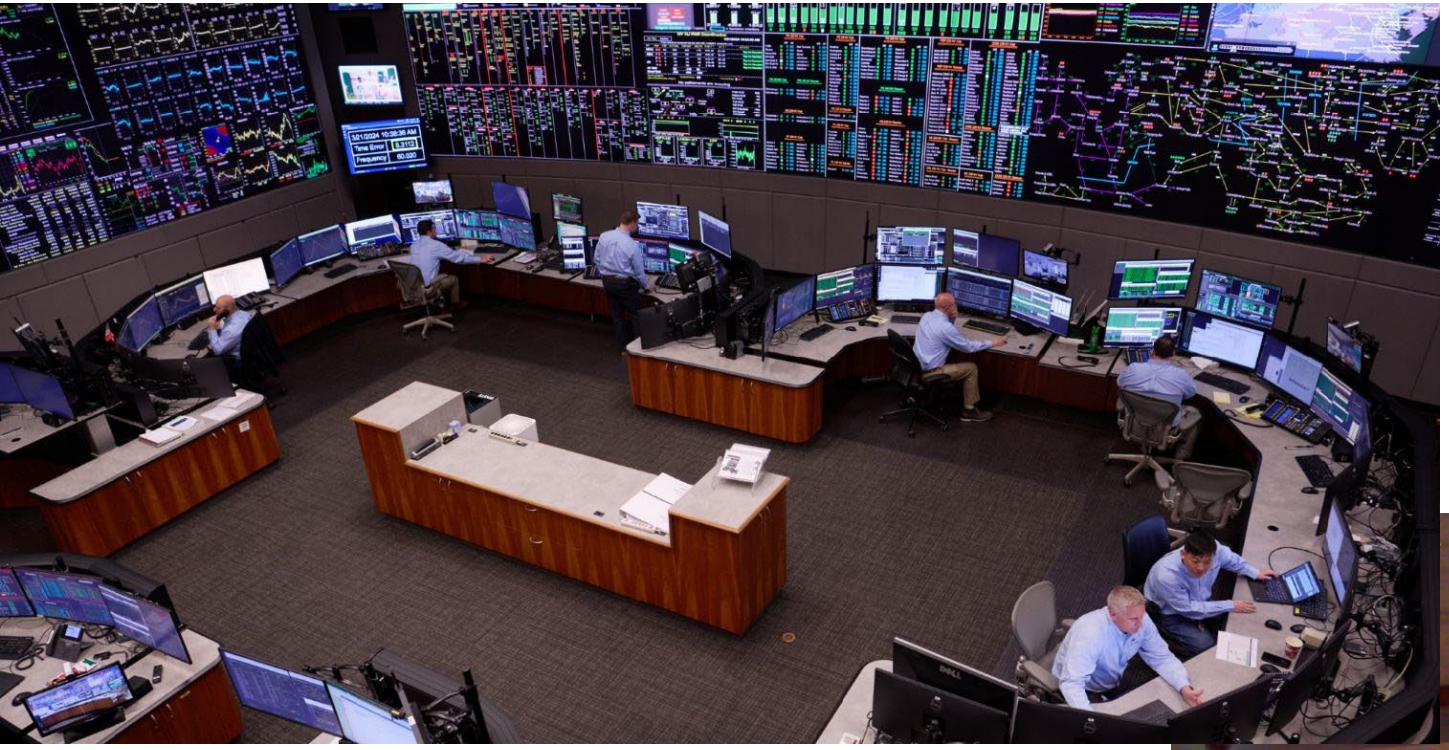


PJM NERC Registration vs. Member Company NERC Registration



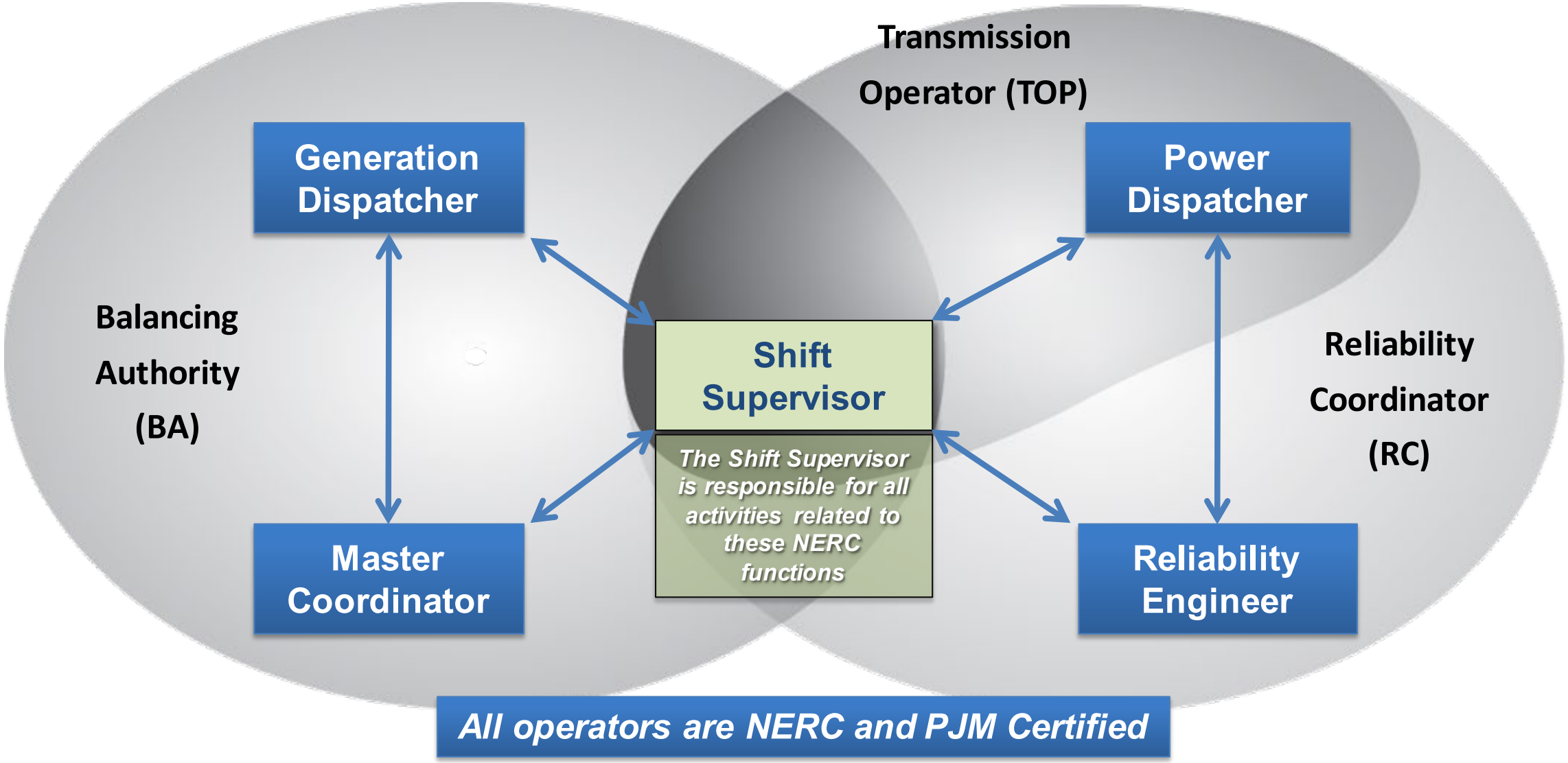
Three Key NERC Functional Model Definitions

Valley Forge Control Room



Milford Control Room

PJM Control Room Positions and NERC Responsibilities

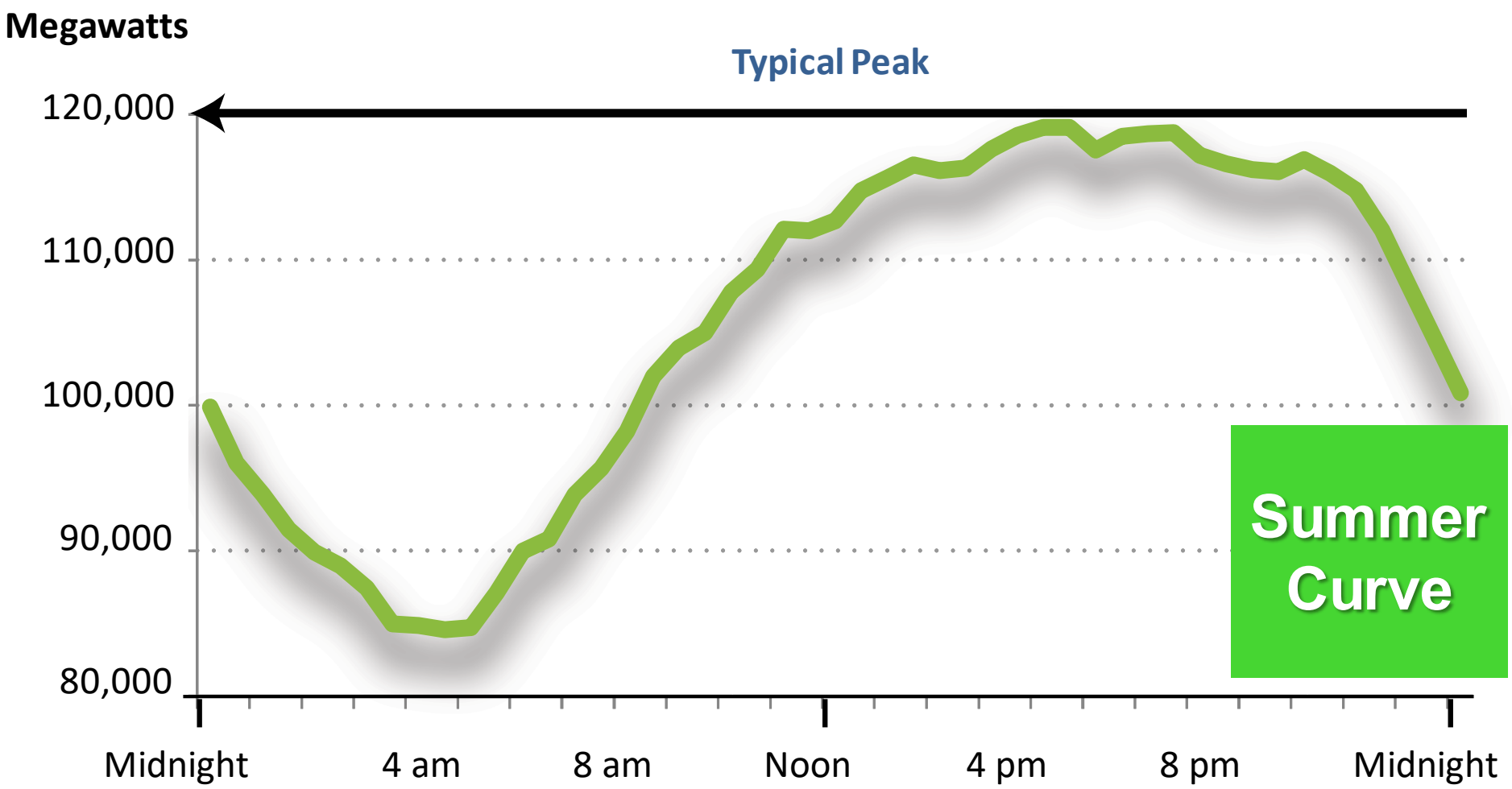


Load Forecasting

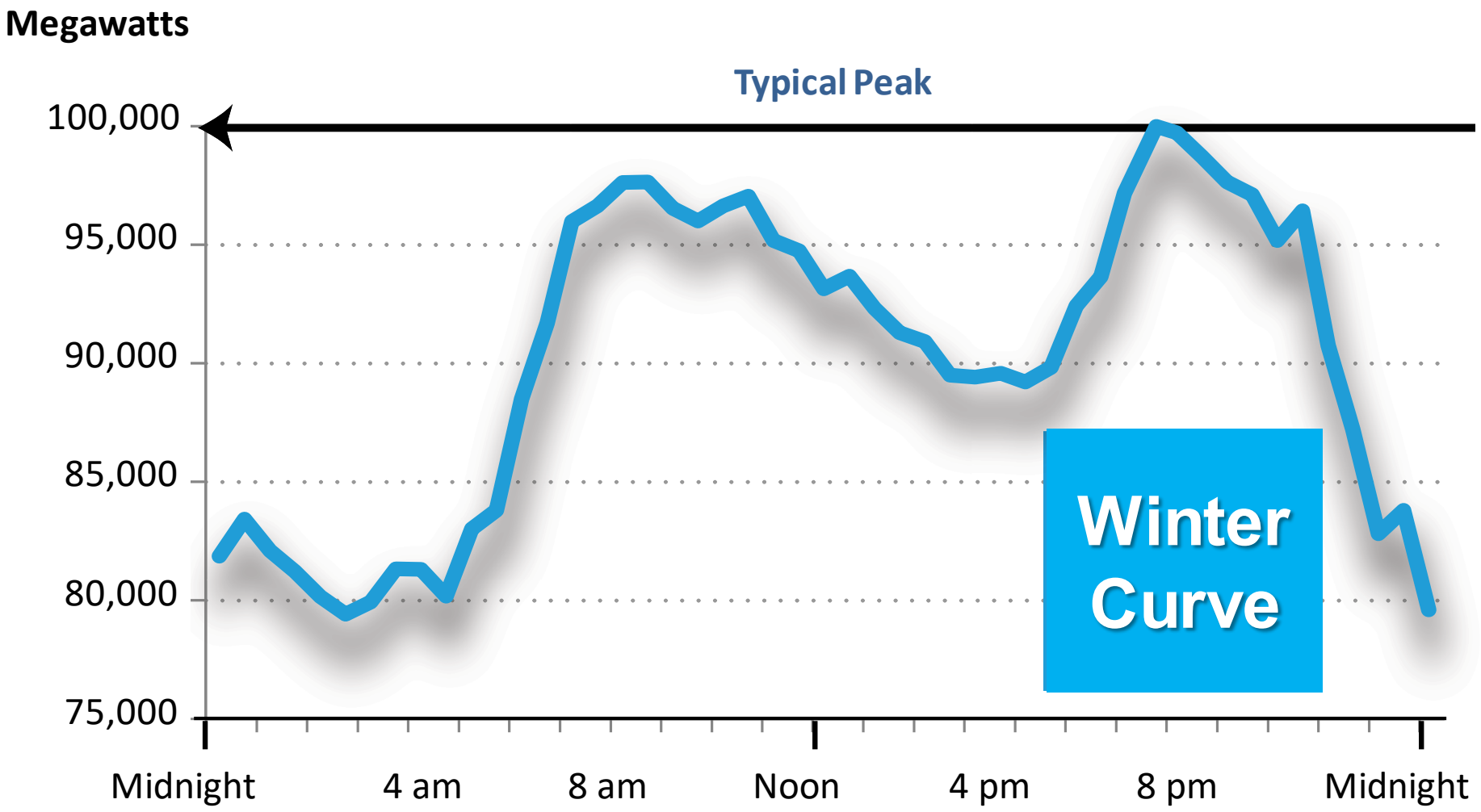
What Affects Load (Customer Demand)?

- Weather
  - Temperature
  - Dew point
  - Wind speed
  - Clouds
  - Time of day
- Season
  - Fall, Winter, Spring, Summer
- Human behavior

Summer Load Curve

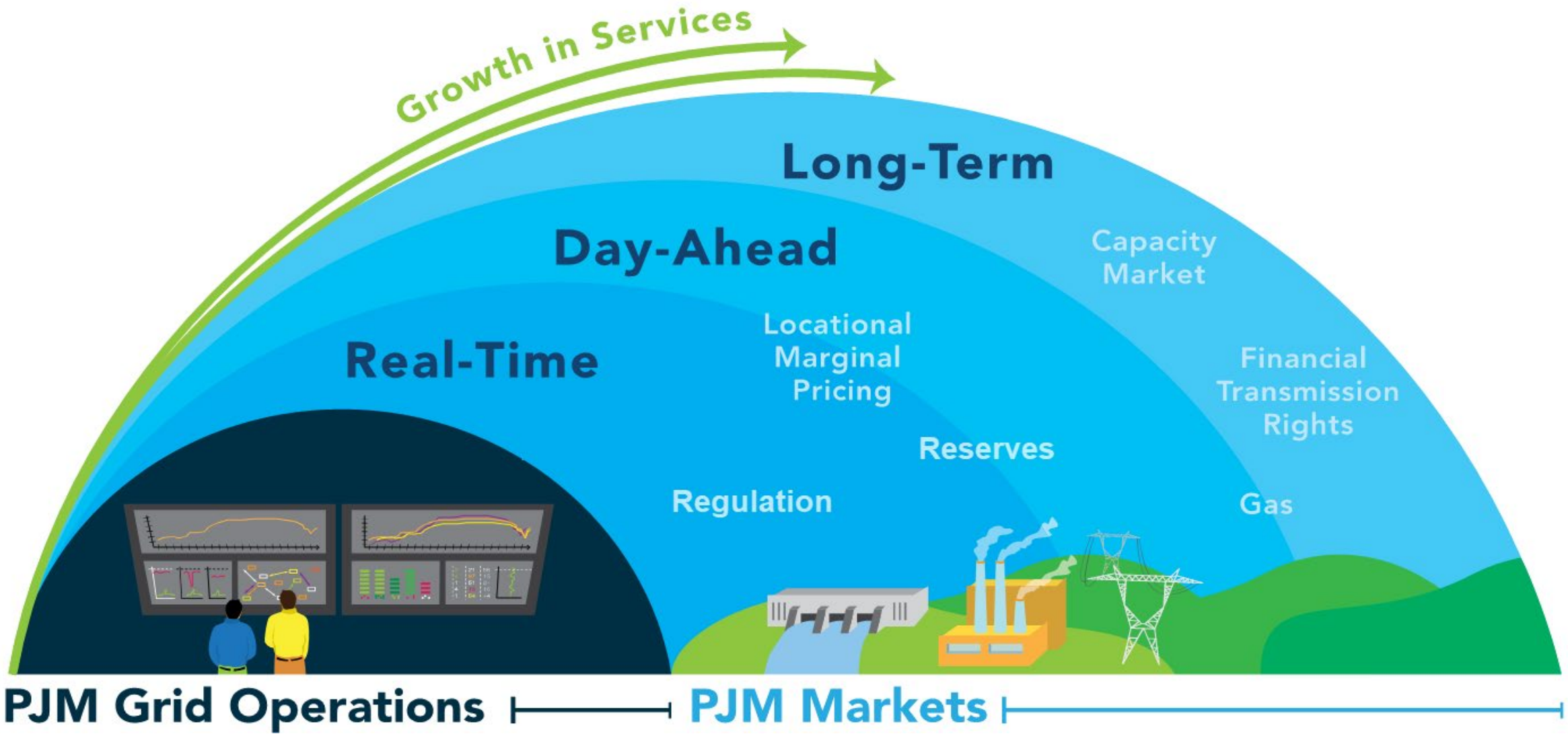


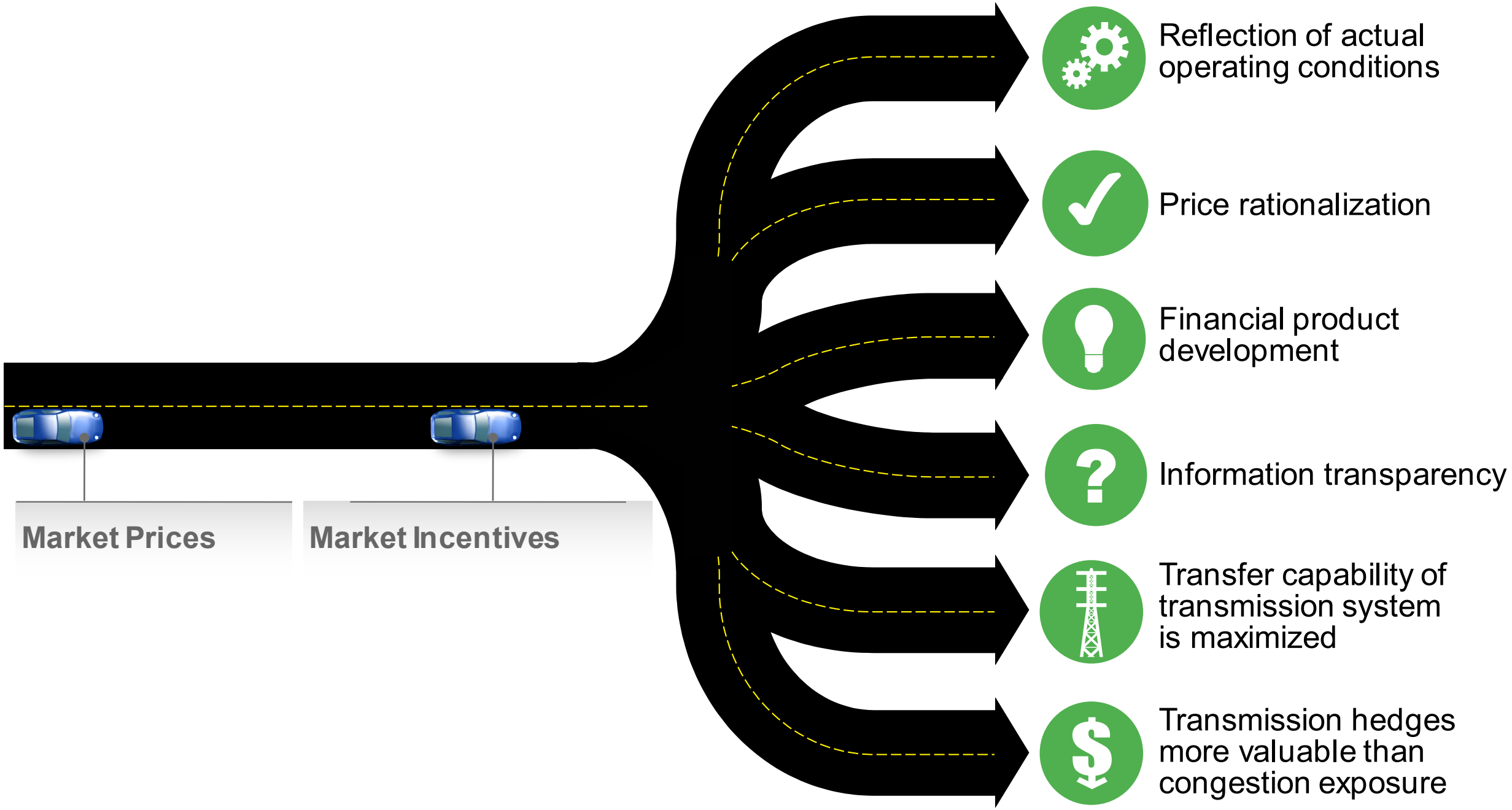
Winter Load Curve



Markets

PJM Markets


Growth in Services
Long-Term
Day-Ahead
Real-Time
Capacity Market
Locational Marginal Pricing
Financial Transmission Rights
Reserves
Regulation
Gas
PJM Grid Operations
PJM Markets


Market Prices
Market Incentives
Reflection of actual operating conditions
Price rationalization
Financial product development
Information transparency
Transfer capability of transmission system is maximized
Transmission hedges more valuable than congestion exposure

Capacity Market

Reliability Pricing Model (RPM)

Reliability Pricing Model (RPM) Purpose & Objectives

Purpose: To enable PJM to obtain sufficient resources to reliably meet needs of electric consumers within PJM

- Resource commitments to meet system peak loads three years in future
- Three year forward pricing that is aligned with reliability requirements and adequately values all capacity resources
- Provides transparent information to all participants far enough in advance for actionable responses

Capacity vs. Energy

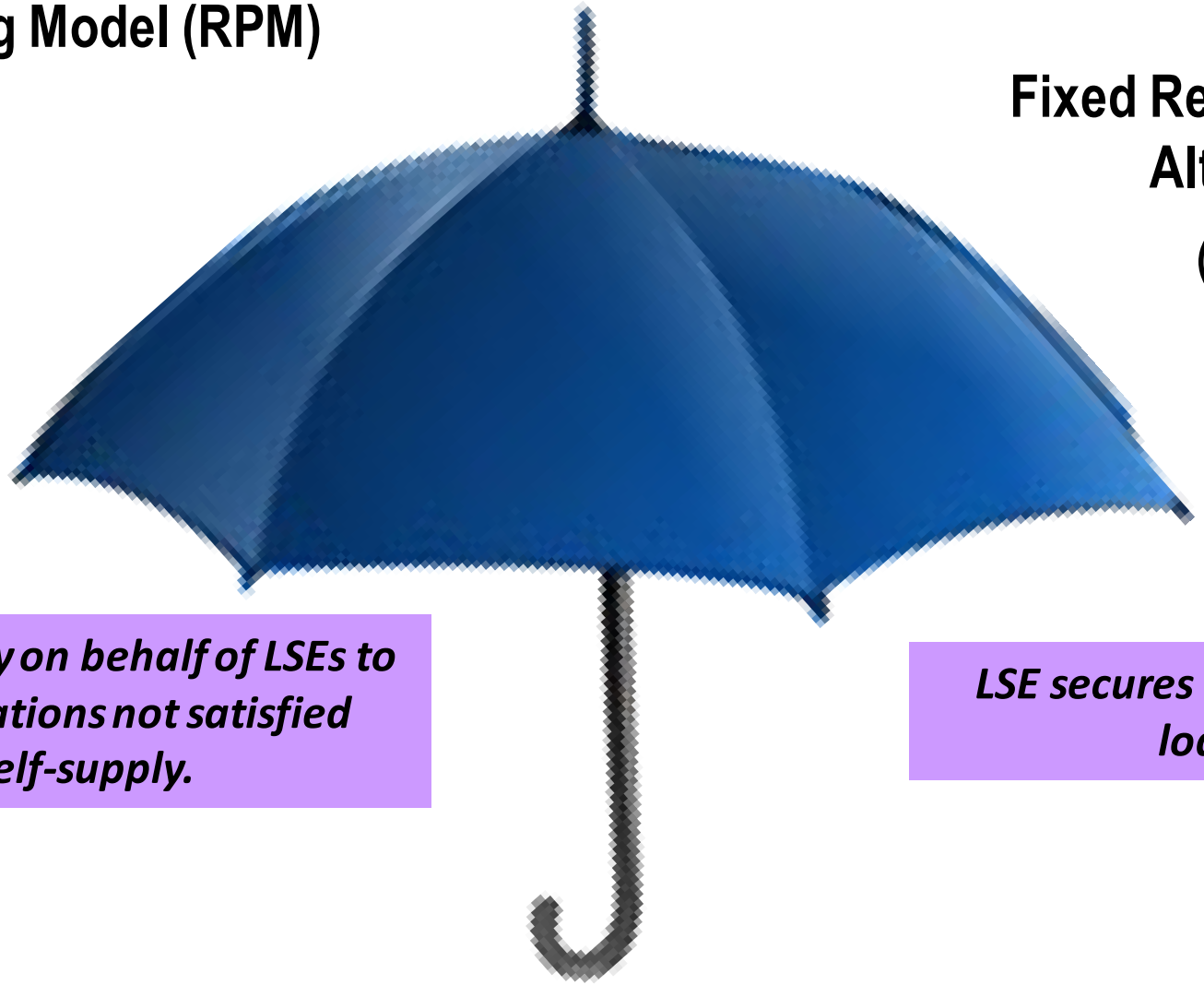
CAPACITY	Product:
• A commitment of a resource to provide energy, particularly during PJM emergencies • Capacity revenues paid to committed resource whether or not energy is produced by resource.	Daily
ENERGY	
• Generation of electrical power over a period of time • Energy revenues paid to resource based on participation in PJM's Day-Ahead & Real-Time Energy markets	Hourly

Think of capacity like a parking lot. A business includes enough parking to accommodate customers at its busiest times, but on a typical day, many spaces remain empty.

Capacity, energy & ancillary services revenues are expected, in the long term, to provide generation resources with the opportunity to recover fixed and variable costs to ensure that adequate generation is maintained for reliability of the electric grid.

How PJM Secures Capacity

Reliability Pricing Model (RPM)



Fixed Resource Requirement Alternative (FRR)

(opt-out of RPM)

PJM secures capacity on behalf of LSEs to satisfy load obligations not satisfied through self-supply.

LSE secures capacity to satisfy their load obligation.

Capacity Performance

Obligation to deliver energy when PJM calls for it

Over-performers rewarded; under-performers pay

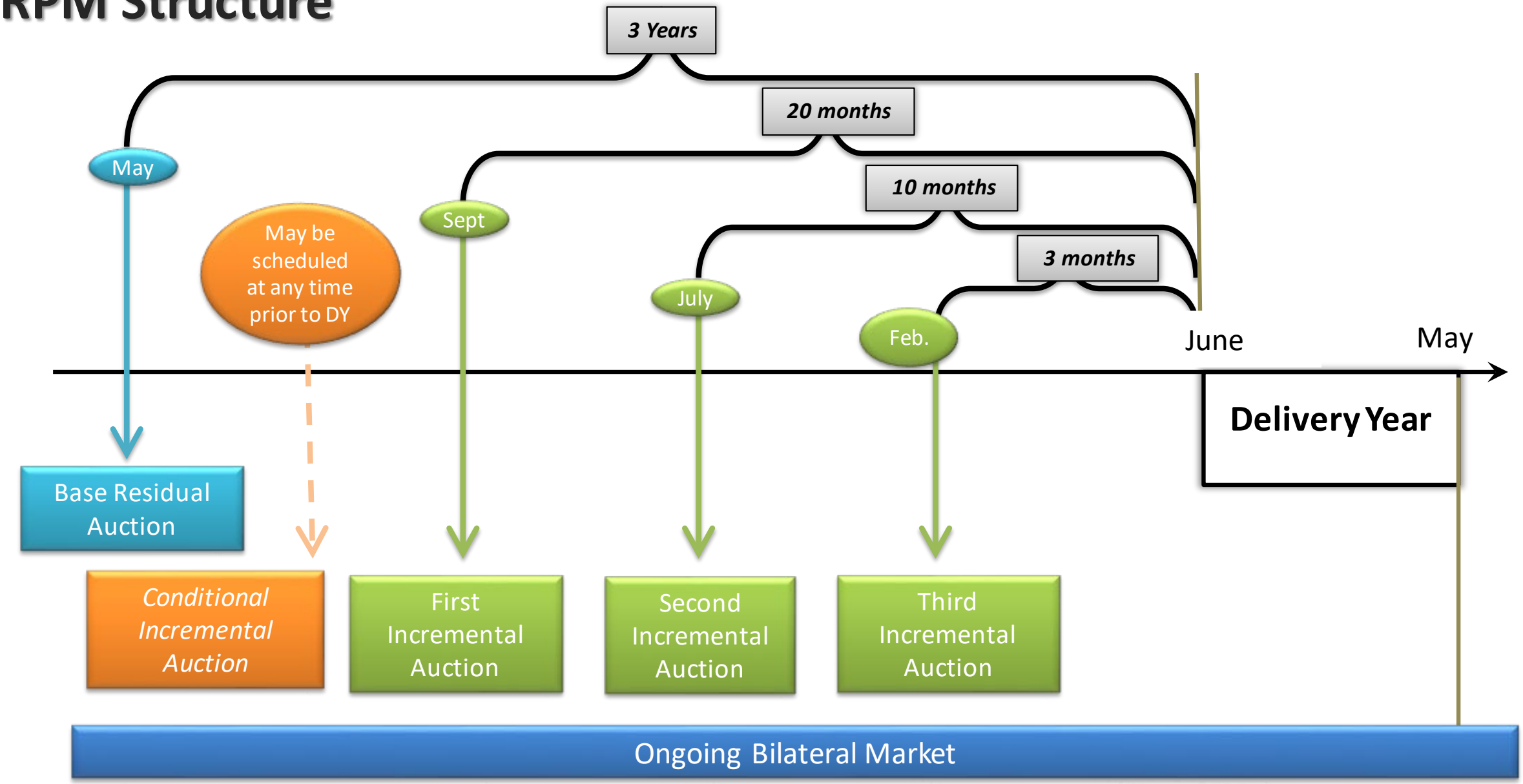
Small net cost for improved reliability/price stability

What is a Supply Resource in RPM?

In RPM, Resources are =

Generation Resources	Load Management Resources	Energy Efficiency Resources (EE)	Aggregate Resources	Qualifying Transmission Upgrades (QTU)

RPM Structure



Auction Schedule

pjm | about pjm | training | committees & groups | planning | markets & operations | library

- Operational Data
- Winter Storm Elliott Info
- Data Directory
- Interregional Data Map
- PJM Tools
- Energy Market
- Capacity Market (RPM)
- Financial Transmission Rights
- Ancillary Services
- Emissions
- Demand Response
- Billing, Settlements & Credit
- System Operations
- Advanced Technology Pilot Program

Home ▸ Markets & Operations ▸ Capacity Market (RPM)

Capacity Market (RPM)

PJM's capacity market, called the Reliability Pricing Model, ensures long-term grid reliability by securing the appropriate amount of power supply resources needed to meet predicted energy demand in the future. Learn more about the capacity market at the Learning Center.

Auction Schedule XLS

Delivery Years

- 2025/2026
- 2024/2025
- 2023/2024
- 2022/2023
- 2021/2022
- 2020/2021
- Previous Delivery Years

Contact PJM

Member Community

(866) 400-8980
(610) 666-8980
Member Relations

New to Capacity Market?

Date

Training Resources | Upcoming Training

Market Participation Requirements PDF

Capacity Exchange: Sign In | Register | Learn more

Financial Transmission Rights & Auction Revenue Rights

What are ARRs?

Auction Revenue Rights (ARRs) …

are entitlements ***allocated annually*** to Firm Transmission Service Customers that entitle the holder to receive an allocation of the revenues from the Annual FTR Auction

- Holders may self-schedule ARR in FTR Annual Auction to obtain FTR on same path as ARR
- Holders may retain allocated ARR and receive associated allocation of revenues from auction
- Holders may participate in FTR Auction

What Are FTRs?

Financial Transmission Rights

Financial instruments **awarded to bidders**

Stream of revenues (or charges)
based on the hourly Day Ahead
congestion price differences across the path

Entitle the holder to

Why Do We Need FTRs?

- Protect Load Servers from price uncertainty for congestion charges
- Distribute day-ahead excess congestion charges
- FTRs provide hedging mechanism that can be traded separately from transmission service
- FTR credits equal day-ahead congestion charges on same path

Financial Transmission Rights Rationale

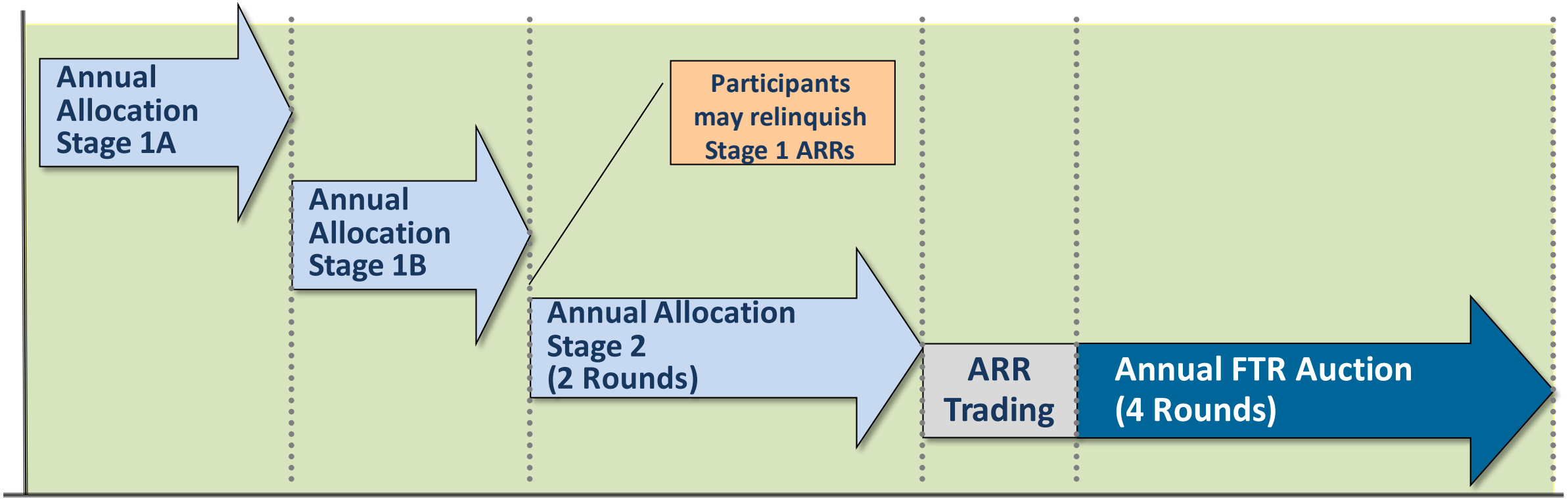
- Provide hedging and protection against locational energy price differences
- This design maximizes efficient utilization of transmission capability (no incentive to 'hoard') and efficient trading of transmission entitlements (e.g. reconfiguration)

Congestion Charge = MWh * (Day-Ahead Sink Congestion Price - Day-Ahead Source Congestion Price)

FTR Credit = MWh * (Day-Ahead Sink Congestion Price - Day-Ahead Source Congestion Price)

Timeline
1998: Annual FTR Allocation
1999: Monthly FTR Auction
2003: Added Annual FTR Auction and FTR Options
2008: Added Long-Term FTR Auction

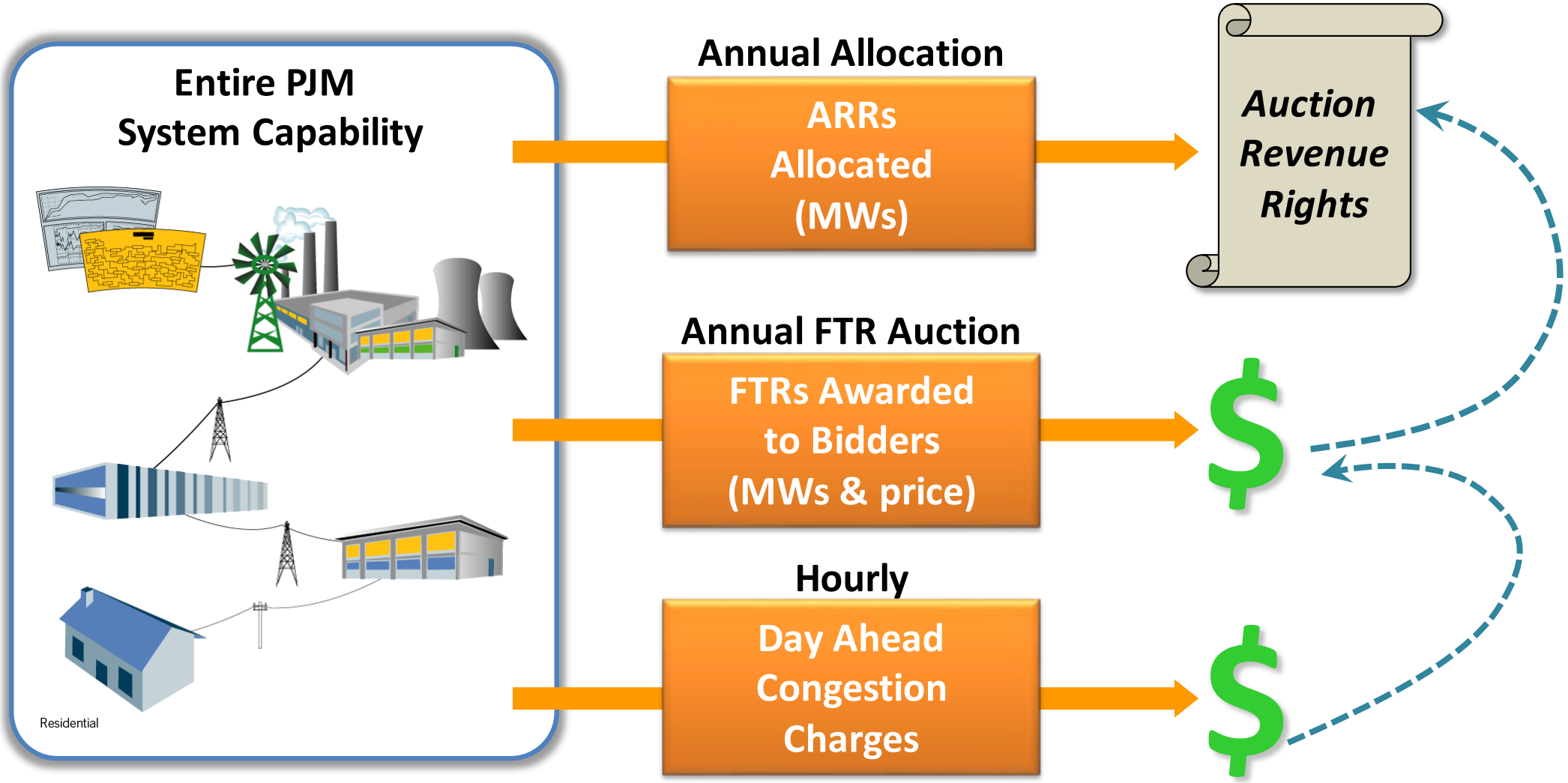
Annual ARR/FTR Market Generic Timeline



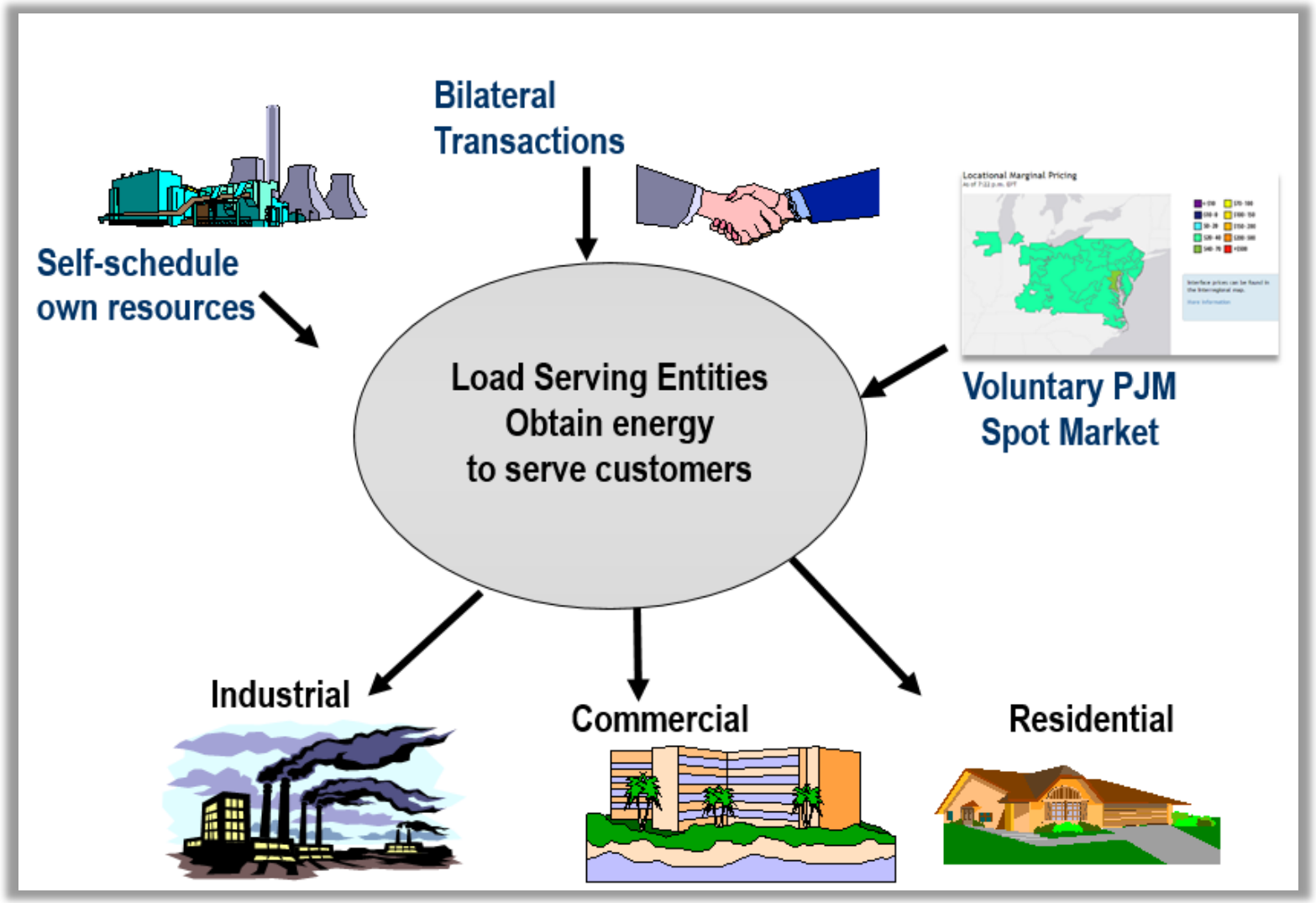
- ARR Annual Allocation **typically** occurs during month of March
- *Annual FTR Auction* **typically** occurs during month of *April*
- Actual schedule can be found under Auction User Information section on Financial Transmission Rights webpage
  - Web Calendar view
  - Excel version by year

ARR / FTR Relationship

ARRs provide revenue stream to firm transmission customer to offset purchase price of FTRs



Day Ahead


Bilateral
Transactions
Self-schedule
own resources
Load Serving Entities
Obtain energy
to serve customers
Voluntary PJM
Spot Market
Industrial
Commercial
Residential

Offers Received from Resources

10MW @$30

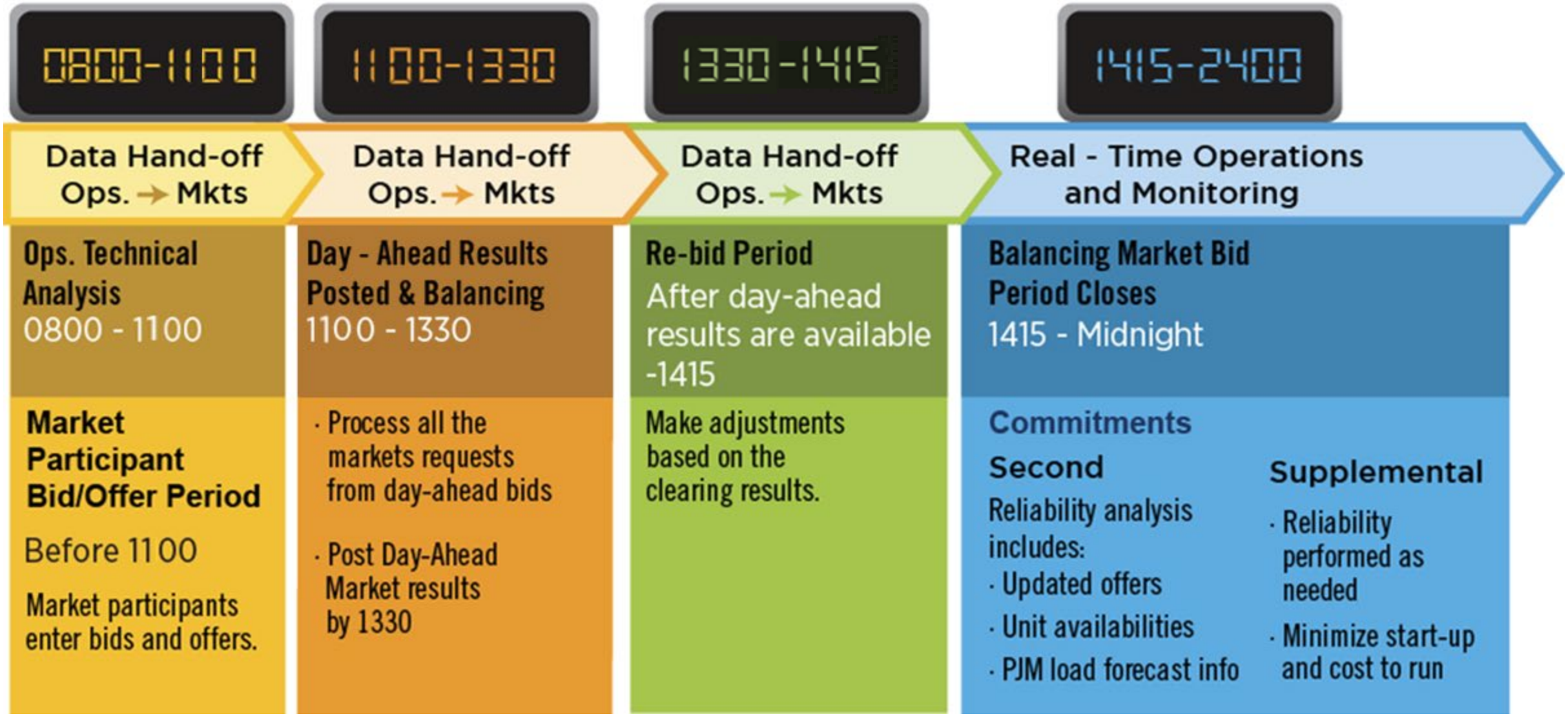
40MW @$5

20MW @$10

15MW @$25

25MW @ $15

PJM Markets Timeline



How Do Virtual Bids Work?

Increment Offer (INC) Offer

- Sells MW into Day-Ahead Market at Day-Ahead LMP
- Buys replacement MW from Real-Time Market at Real-Time LMP
- Profits when Day-Ahead Prices are Higher than Real-Time Prices

Decrement Bid (DEC) Bid

- Buys MW from Day-Ahead Market at Day-Ahead LMP
- Sells those MW in Real-Time Market at Real-Time LMP
- Profits when Day-Ahead Prices are Lower than Real-Time Prices

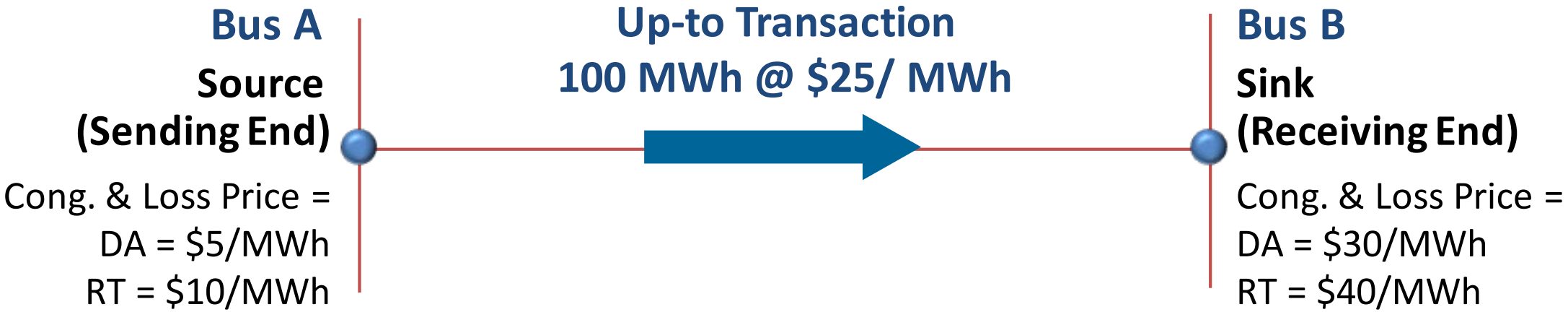
How Do Virtual Bids Make Money?

INC Sells MW into
Day-Ahead Market at $50

Buys replacement MW
at $40 in Real-Time Market

Gets paid $50 and pays back $40 = $10 profit

Up-to Congestion Transactions Example



Day-Ahead Charge = 100 MWh * ($30/MWh-$5/MWh) = $2,500

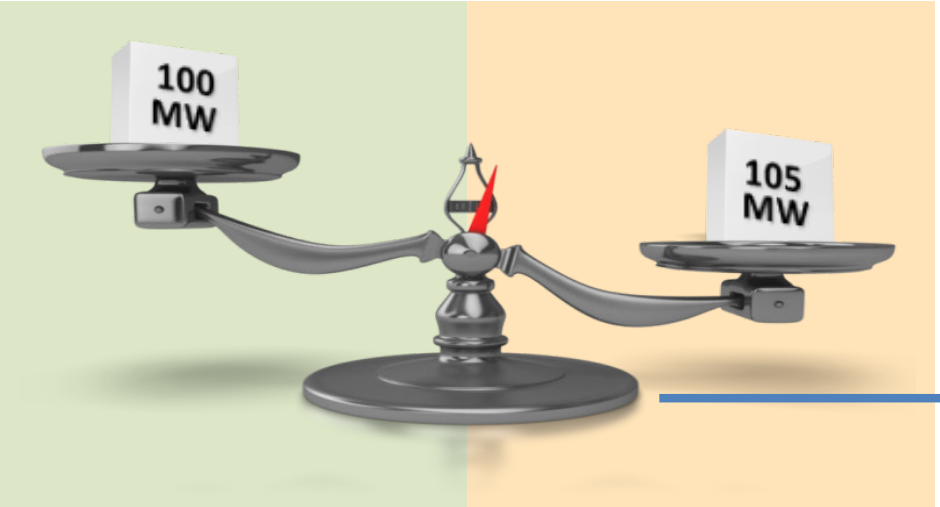
Balancing Charge = -100 MWh * ($40/MWh-$10/MWh) = -$3,000

Two Settlement

What is Two-Settlement?

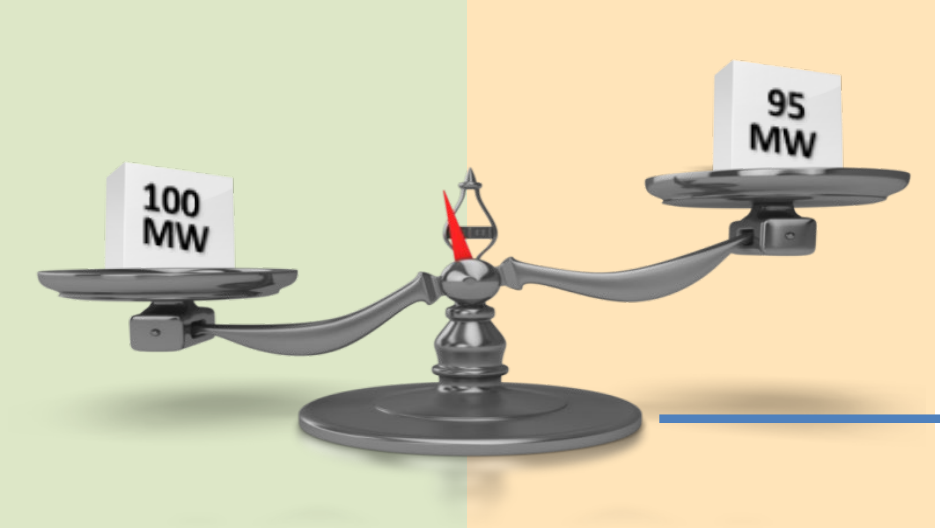
- It provides PJM Market Participants with the option to participate in a forward market for electric energy in PJM
  - Consists of two markets: The **Day Ahead** and the **Real Time**
  - **Balancing = Real Time – Day Ahead**
  - Separate settlements performed for **Day Ahead** and **Balancing**

Two Settlement Load



Day-Ahead Market
Scheduled Demand

Real-Time Market
Actual Demand



Less than Real-Time Demand

Day Ahead LMP = $20.00/MWh	Real-Time LMP = $25.00/MWh
$100 x 20.00/12 =	*$(105 - 100) x 25.00/12 =*
$166.67 Charge	*$10.42 Charge*

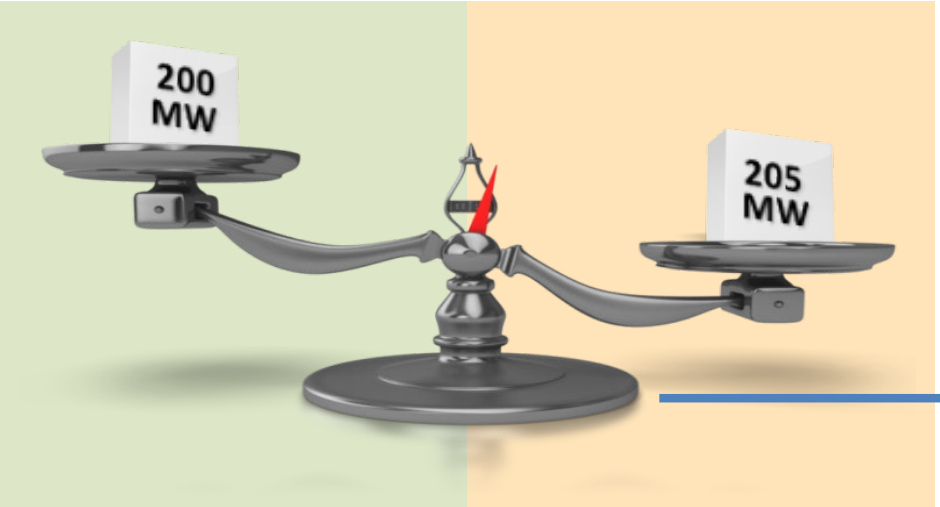
Total Charge = $166.67 + $10.42 = $177.09

Greater than Real-Time Demand

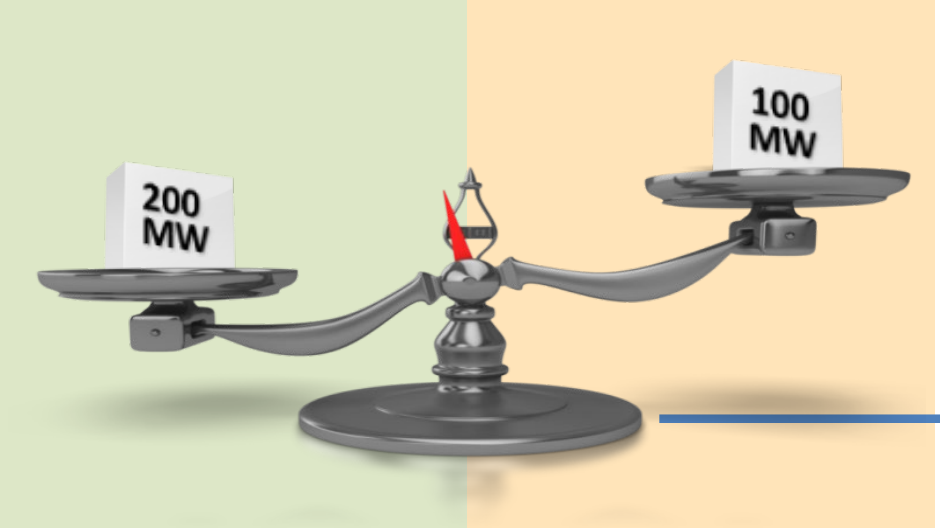
Day Ahead LMP = $20.00/MWh	Real-Time LMP = $15.00/MWh
$100 x 20.00/12 =	*$(95 - 100) x 15.00/12 =*
$166.67 Charge	*$-6.25 Charge*
	(Negative Number)

Total Charge = $166.67 + $-6.25 = $160.42

Two Settlement Generation



Day-Ahead Market	Real-Time Market
Scheduled Generation	*Actual Generation*



Less than Real-Time Generation

Day Ahead LMP = $20.00/MWh	Real-Time LMP = $25.00/MWh
$200 x 20.00/12 =	*$(205 - 200) x 25.00/12 =*
$333.33 Credit	*$10.42 Credit*

Total Credit = $333.33 + $10.42 = $343.75

Greater than Real-Time Generation

Day Ahead LMP = $20.00/MWh	Real-Time LMP = $25.00/MWh
$200 x 20.00/12 =	*$= (100 - 200) x 25.00/12 =*
$333.33 Credit	*$-208.33 Credit*
	(Negative Number)

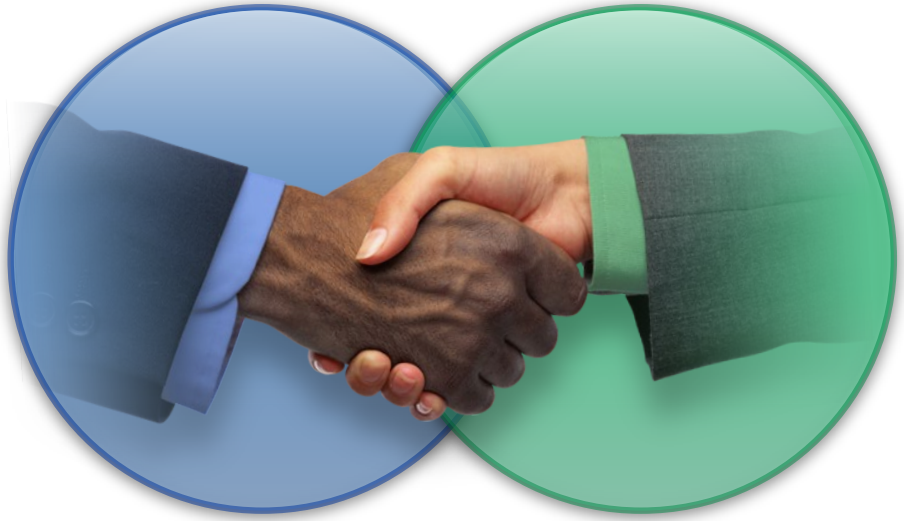
Total Credit = $333.33 + $-208.33 = $125.00

Locational Marginal Pricing (LMP)

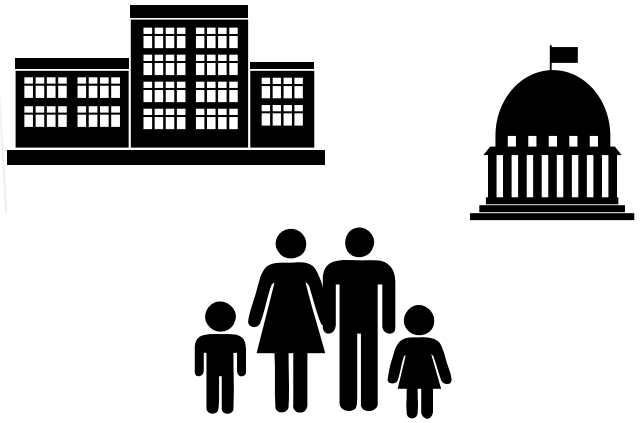
What is LMP?

- Locational Marginal Price
- Pricing method PJM uses to:
  - price energy purchases and sales in PJM Market
  - price transmission congestion costs to move energy within PJM RTO
  - price losses on the bulk power system
- Physical, flow-based pricing system:
  - how energy actually flows, NOT contract paths

Generators get paid the LMP



Transactions pay the difference in LMP



Loads pay the LMP

LMP = Locational Marginal Pricing

System Energy Price + **Transmission Congestion Cost** + **Cost of Marginal Losses**

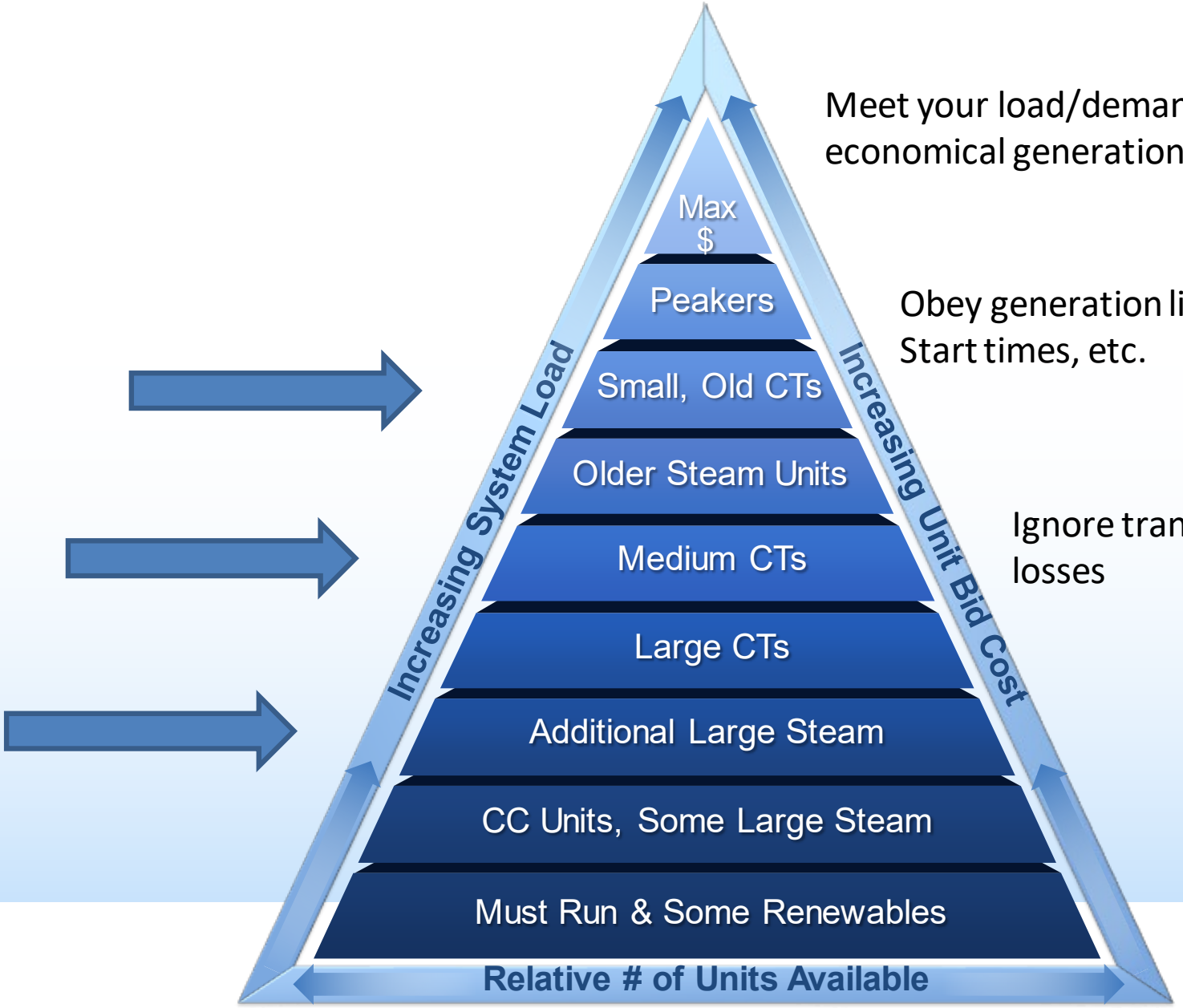
All components are calculated as part of both the Real-Time and Day-Ahead LMP

LMP = Locational Marginal Pricing

System Energy Price + Transmission Congestion Cost + Cost of Marginal Losses

System Marginal Price (SMP)

- Incremental price of energy for the system, given the current dispatch, at the load weighted reference bus
- SMP is LMP without losses or congestion
- Same price for every bus in PJM (no locational aspect)



Meet your load/demand with the most economical generation

Obey generation limitations: Max MW, Start times, etc.

Ignore transmission limitations and losses

System Marginal Price: Example

*Unit pricing levels are not necessarily accurate, only an example

LMP = Locational Marginal Pricing

System Energy Price + Transmission Congestion Cost + Cost of Marginal Losses

Congestion Component (CLMP)

- Represents price of congestion for binding constraints
- Uses the Shadow Price
- Will be zero in an Unconstrained System
- Varies by electrical "location" if system is constrained
- Load pays Congestion Price, Generation is paid Congestion Price

Congestion effects on LMP and Revenues

- When the bus is **upstream** of a constraint
  - Congestion Component is **negative**
  - Results in **negative** revenues to unit

- When the bus is **downstream** of a constraint
  - Congestion Component is **positive**
  - Results in **positive** revenues to unit

LMP = Locational Marginal Pricing

System Energy Price + Transmission Congestion Cost + Cost of Marginal Losses

Marginal Loss Component (MLMP)

- Represents price of marginal losses
  - Transmission losses are priced according to marginal loss factors which are calculated at a bus and represent the percentage increase in system losses caused by a small increase in power injection or withdrawal. Calculated using penalty factors
- Will vary by location
- Used to price losses
  - Load pays the Loss Price
  - Generation is paid the Loss Price

Marginal Loss effects on LMP and Revenues

- When the bus is electrically **distant** from the load
  - Marginal Loss Component is **negative**
  - Results in **negative** revenues to unit

- When the bus is electrically **close** to the load
  - Marginal Loss Component is **positive**
  - Results in **positive** revenues to unit

LMP Components – Unconstrained System

System Energy Price =	$20.4
Congestion =	$ 0.0
Losses =	$ 0.0
LMP=	$20.4

Installed = 2,000 MW

Dispatch 1500 MW

Loss Penalty Factor = 1.02

Unconstrained Transmission Path

Loss Penalty Factor = 1.0

System Energy Price =	$20.4
Congestion =	$ 0.0
Losses =	-$ 0.4
LMP =	$20.0

Installed = 700 MW

Constrained System
LMP Components Marginal Losses

System Energy Price =	$50.0
Congestion =	$ 0.0
Losses =	$ 0.0
LMP=	$50.0

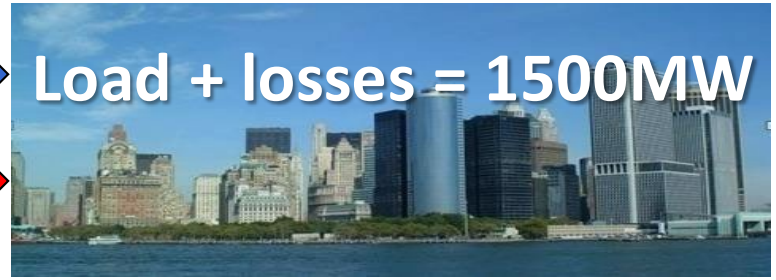
Installed = 2,000 MW

Dispatch 1000 MW

Loss Penalty Factor = 1.02

Flow = 1000 MW

Limit = 1000 MW



Loss Penalty Factor = 1.0

System Energy Price =	$50.0
Congestion =	-$29.0
Losses =	-$ 1.0
LMP =	$20.0

Dispatch 500 MW

Installed = 700 MW

Ancillary Services

Synchronized Reserves and Regulation

Ancillary Services Markets

Reserves Market

Purpose:

To bring generation and load back in balance after the loss of generation

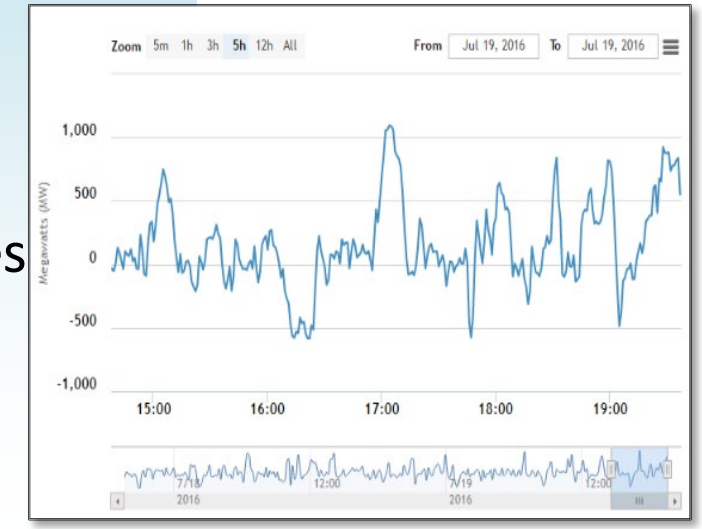
- Load Serving Entities have obligation to purchase based on Load Ratio Share
  - Bilateral
  - Scheduling owned resources
  - Purchase from Reserve Market
- Co-optimized with Regulation Market
- Allows for participation by Demand Side Response resources

Regulation Market

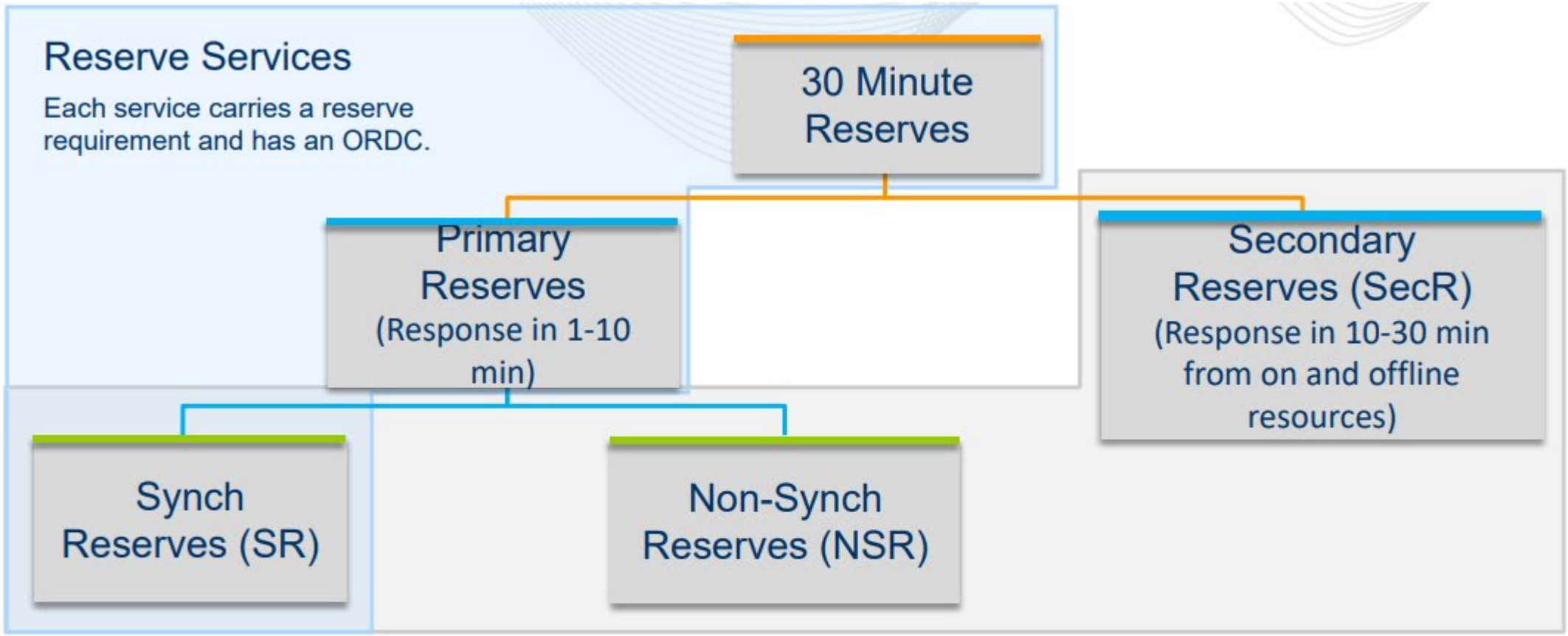
Purpose:

To provide for the continuous balancing of generation and load

- Generation and Demand Response resources
- Transmission customer must provide or purchase
- Resources must be able to respond within 5 minutes
- Resources are paid based on their performance

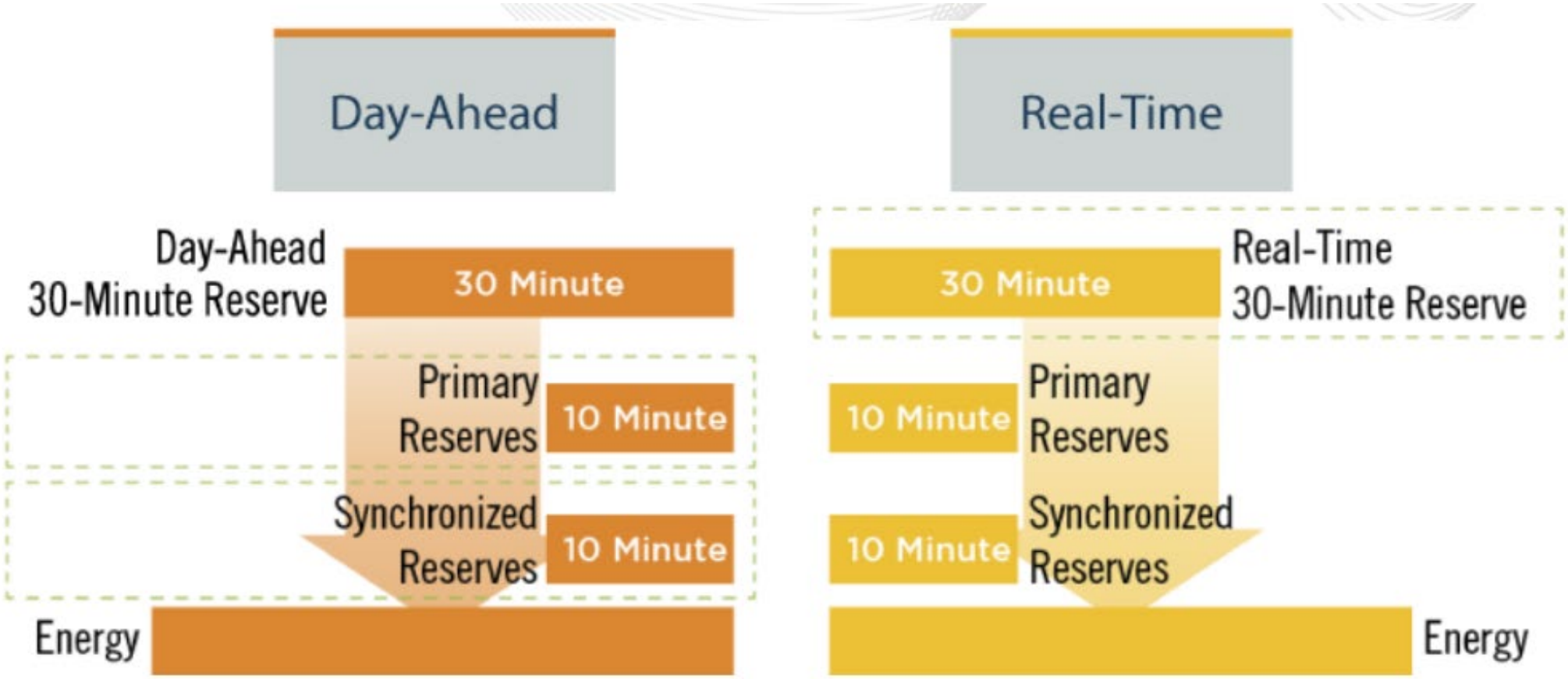


Reserve Markets



Clearing Price represents procurement of the Synch Reserve requirement	Clearing price represents procurement of the balance of the Primary Reserve Requirement not met by Synch Reserves	Clearing price represents procurement of the balance of the 30 Min Requirement not met by Synch and Non-Synch Reserves

Day-Ahead and Real-Time Reserve Alignment

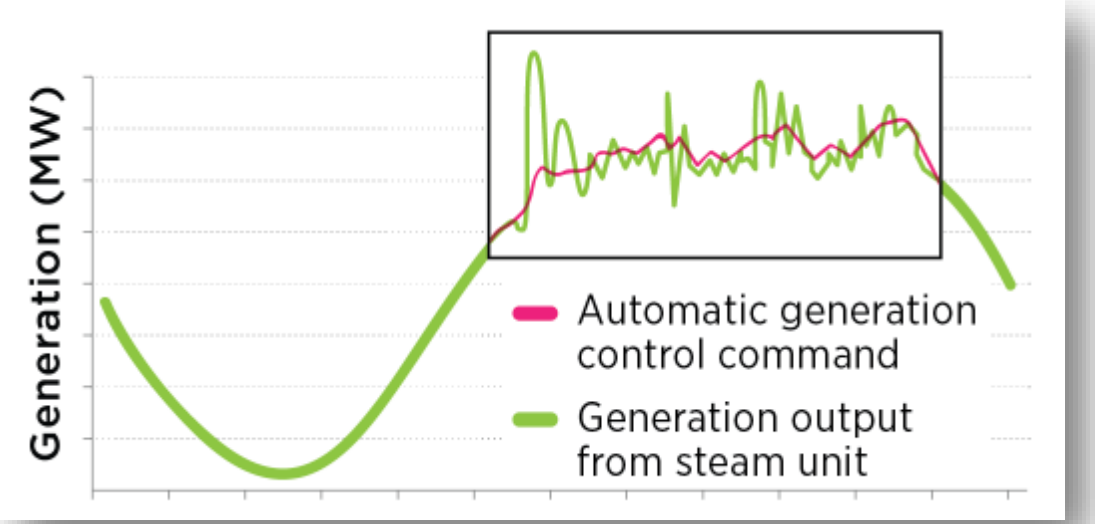


Solidify financial incentives to provide reserves when assigned due to day-ahead financial commitment.
Remove modeling differences between Day-Ahead and Real-Time Energy Markets.

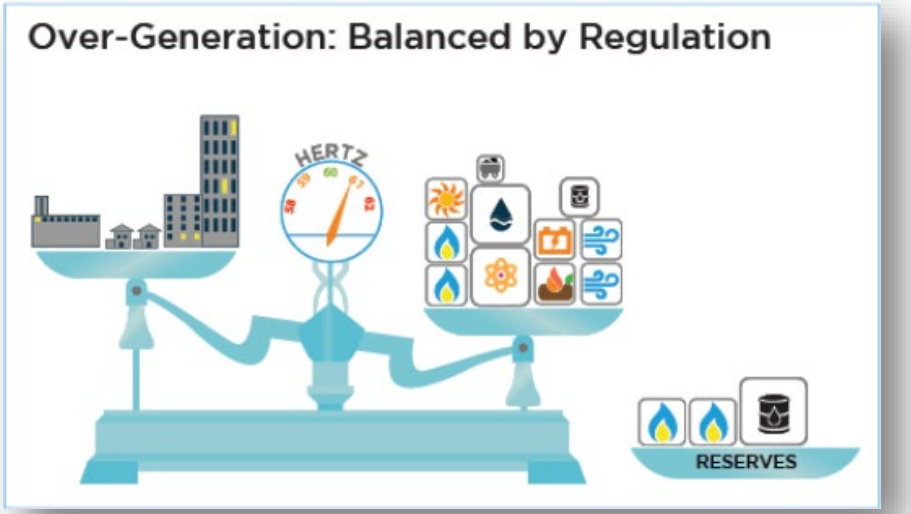
Regulation

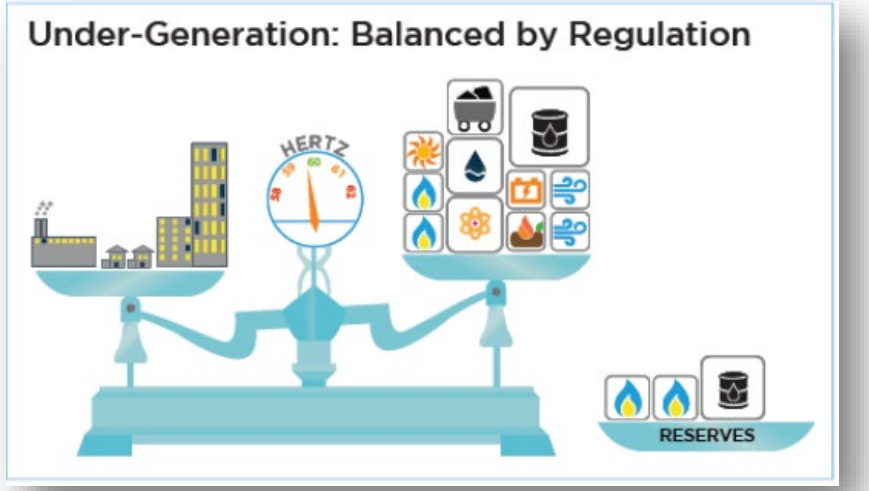
Regulation helps match generation and demand to keep grid functioning normally by …

- Maintaining system frequency of 60 Hertz
- Tracking moment-to-moment fluctuations in customer electricity use
- Correcting for unintended fluctuations in generation (such as a large generating unit disconnecting from the system)
- Managing differences between forecasted or scheduled power flow and actual power flow on system



Balancing Generation & Load





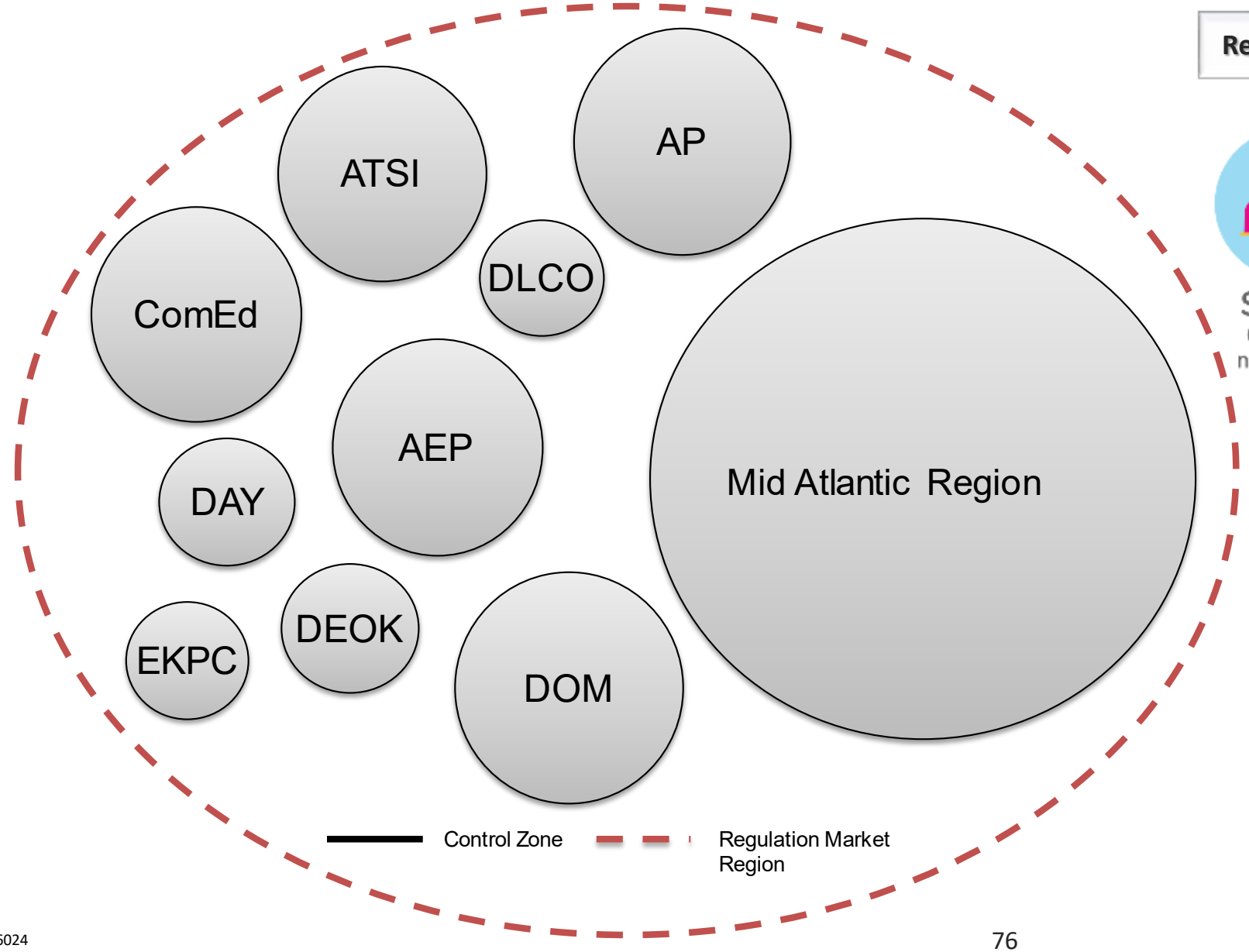
Over-Generation

- Total Generation > Total Demand
- Frequency > 60 Hertz
- Generators momentarily speed up

Under-Generation

- Total Generation < Total Demand
- Frequency < 60 Hertz
- Generators momentarily slow down

Single Regulation Market Region



Resources Types that Participate in Regulation Market

Steam
(coal and natural gas)

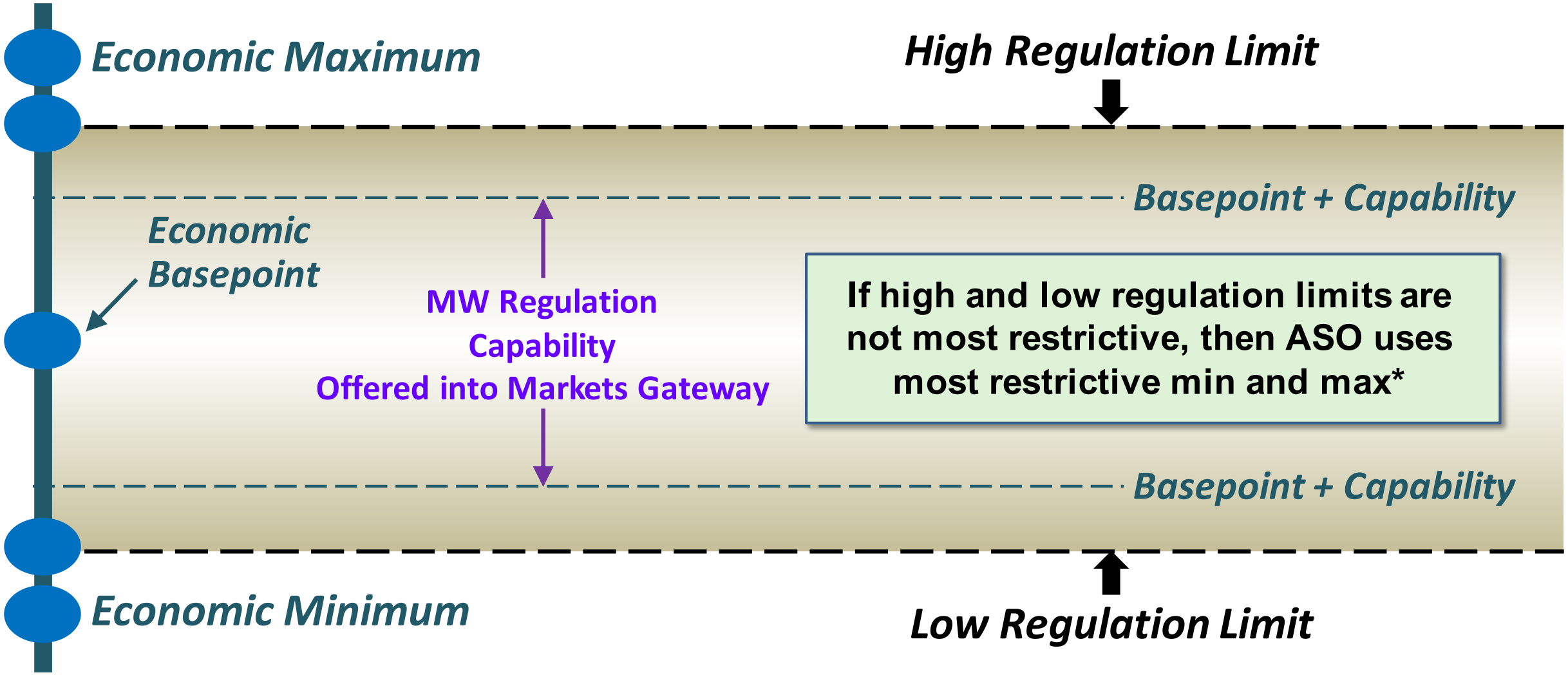
Combustion Turbines (natural gas oil, methane and biomass)

Hydro

Storage
(batteries, flywheels and hot water heaters)

Demand Response

Band of Regulation for Generator

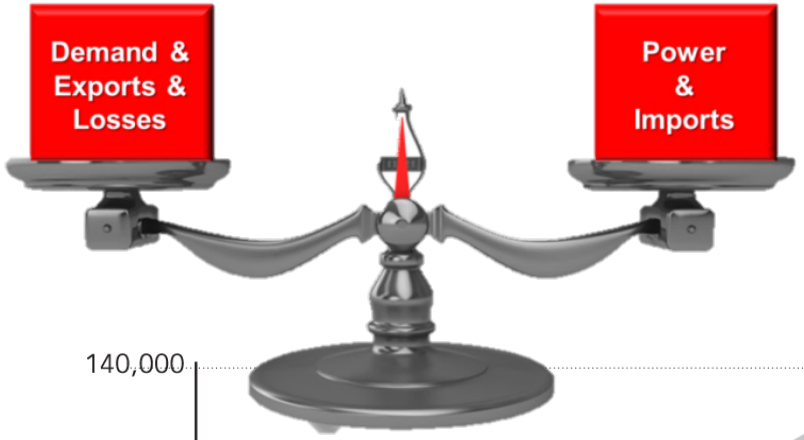


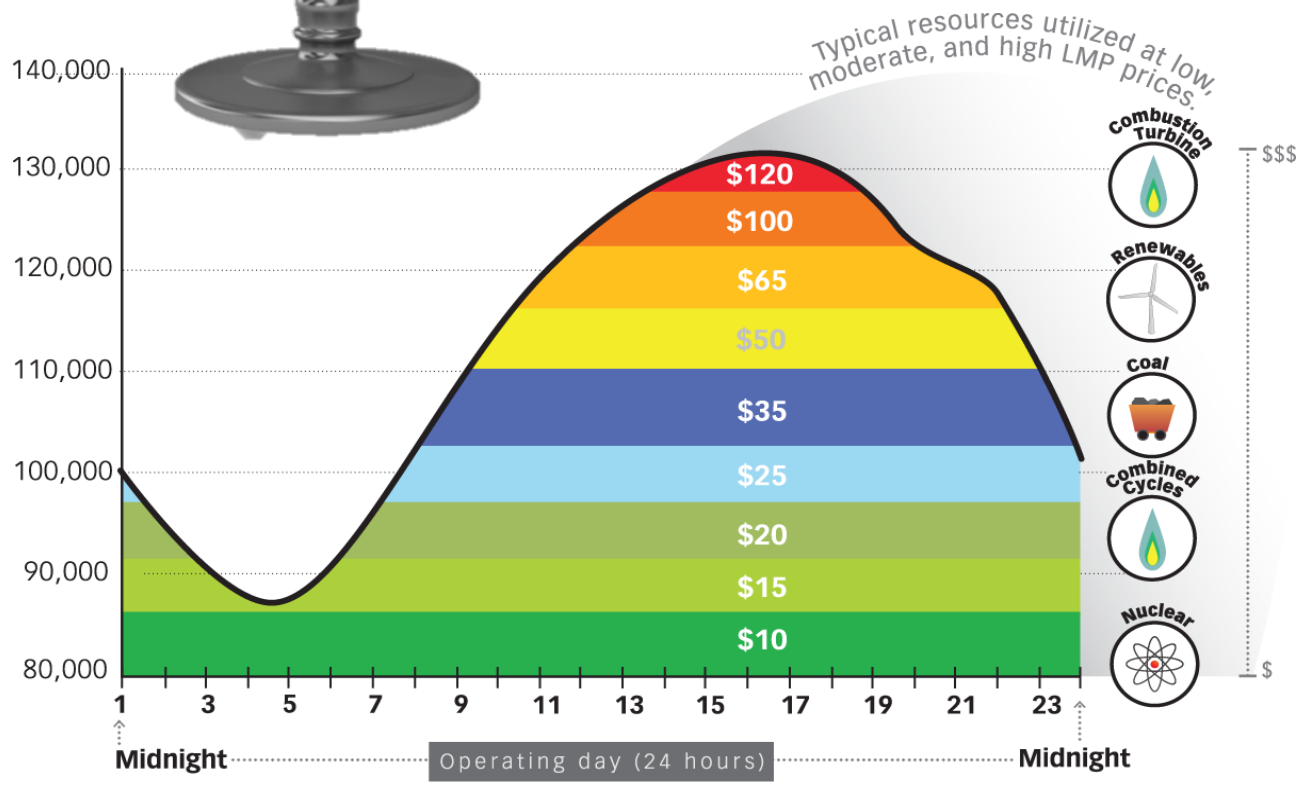
* Band of regulation must fall within the economic limits of the generating unit

Real-Time

Generation Dispatch Operations

- Maintain System Control
  - Generation / Demand balance
- Maintain Adequate Reserves
  - Operate on contingency basis
- Implement Emergency Procedures
  - To keep the lights on!
- Synchronized Reserve/ Regulation Market
  - Clear Market
  - Administer real-time optimization

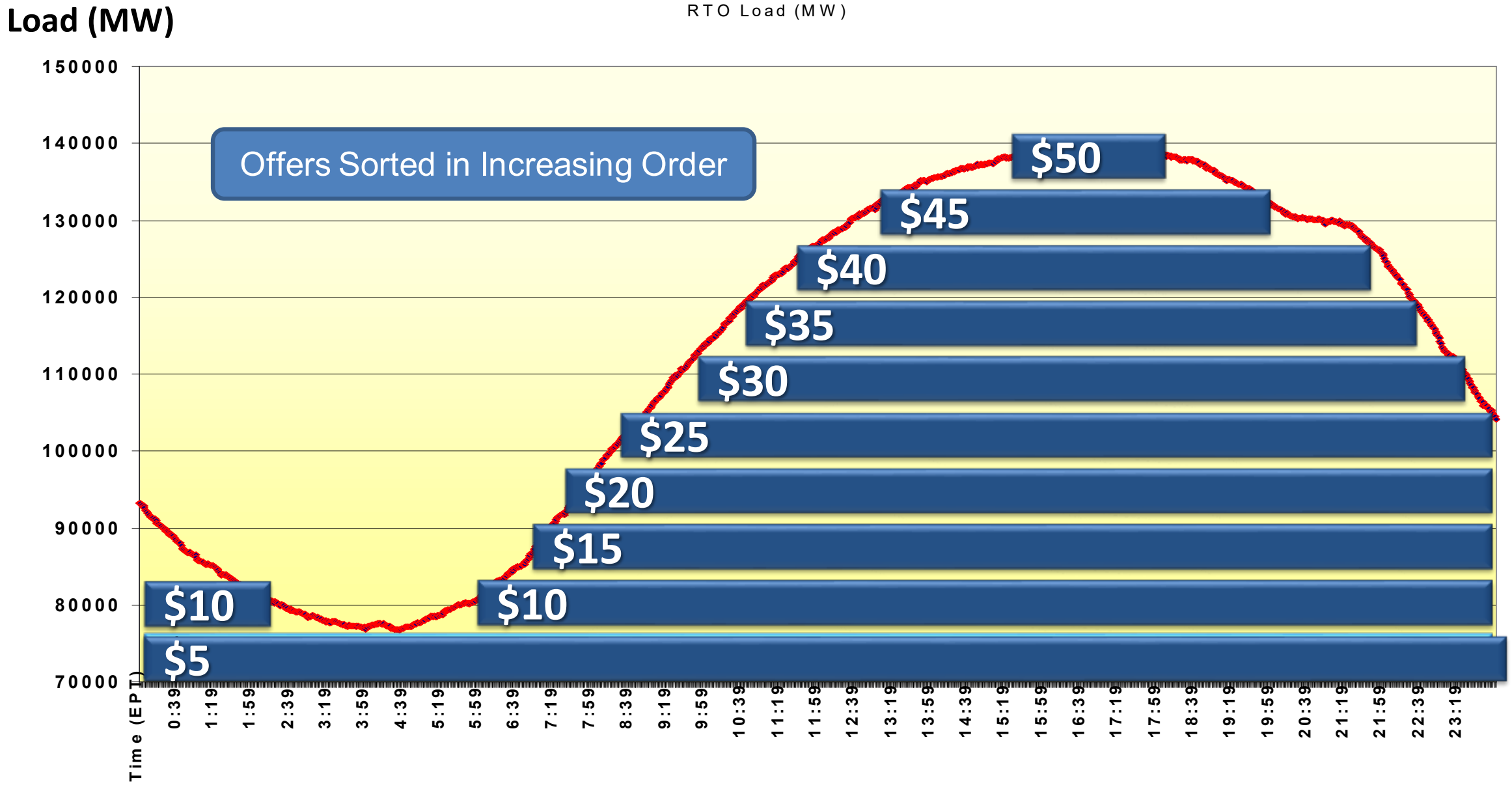




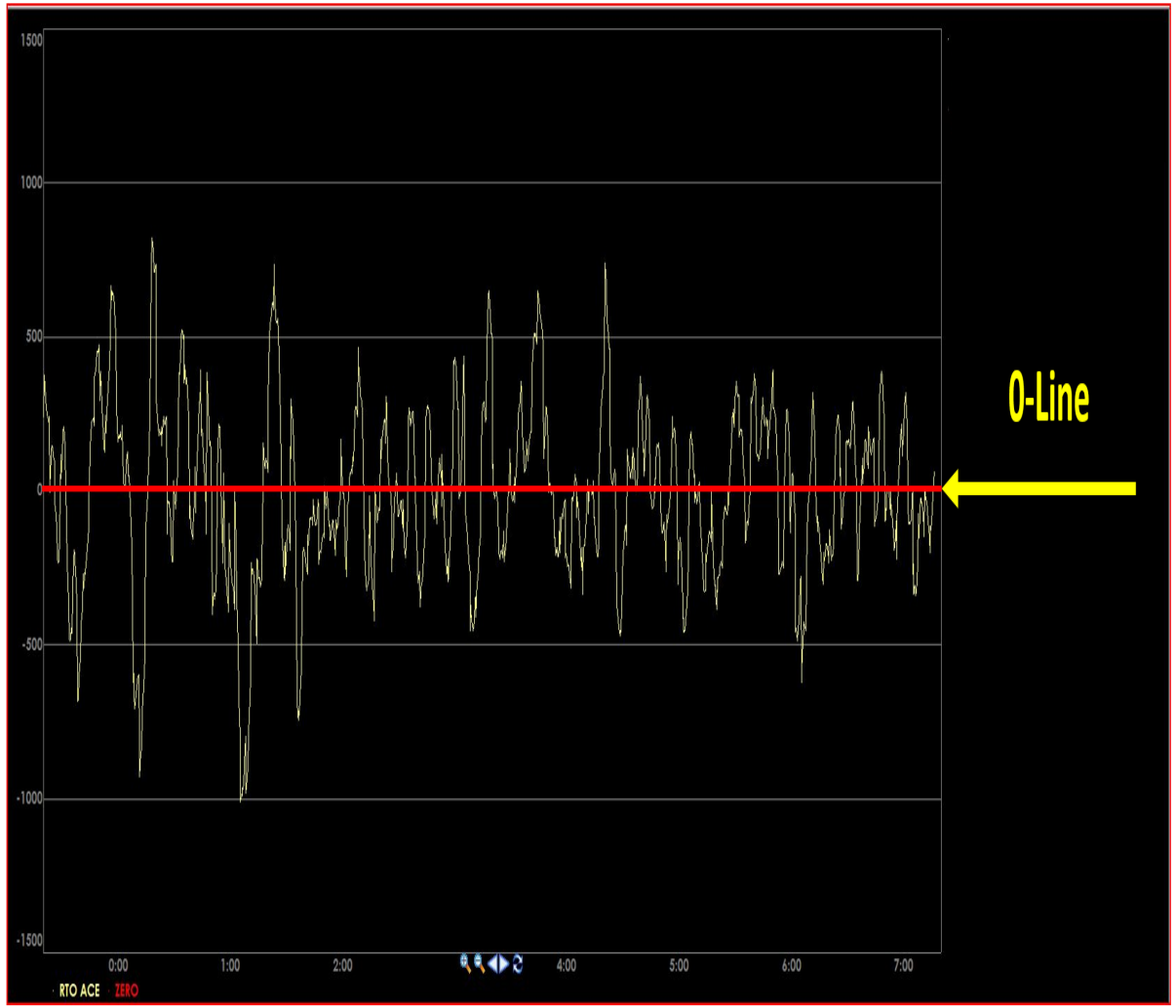
Economic Generation Control

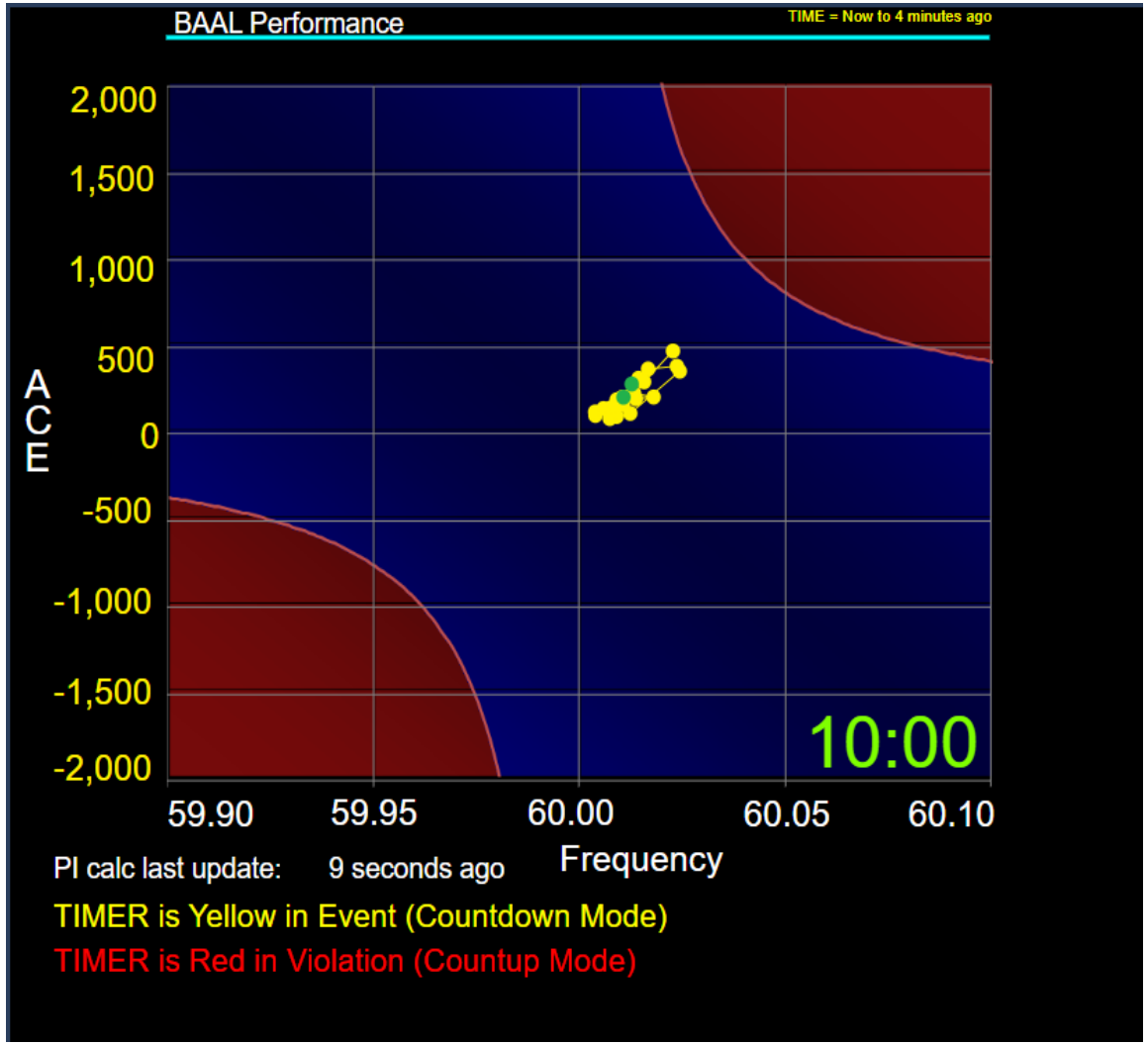
- Purpose is to ensure that the least cost generation is used to satisfy demand
- Enables power system to follow load as it moves from valley, to peak, to valley over a 24-hour period
- Adjustments are allocated to generating units to optimize economy

Resources Scheduled to Meet Demand



ACE and BAAL monitor Supply and Demand



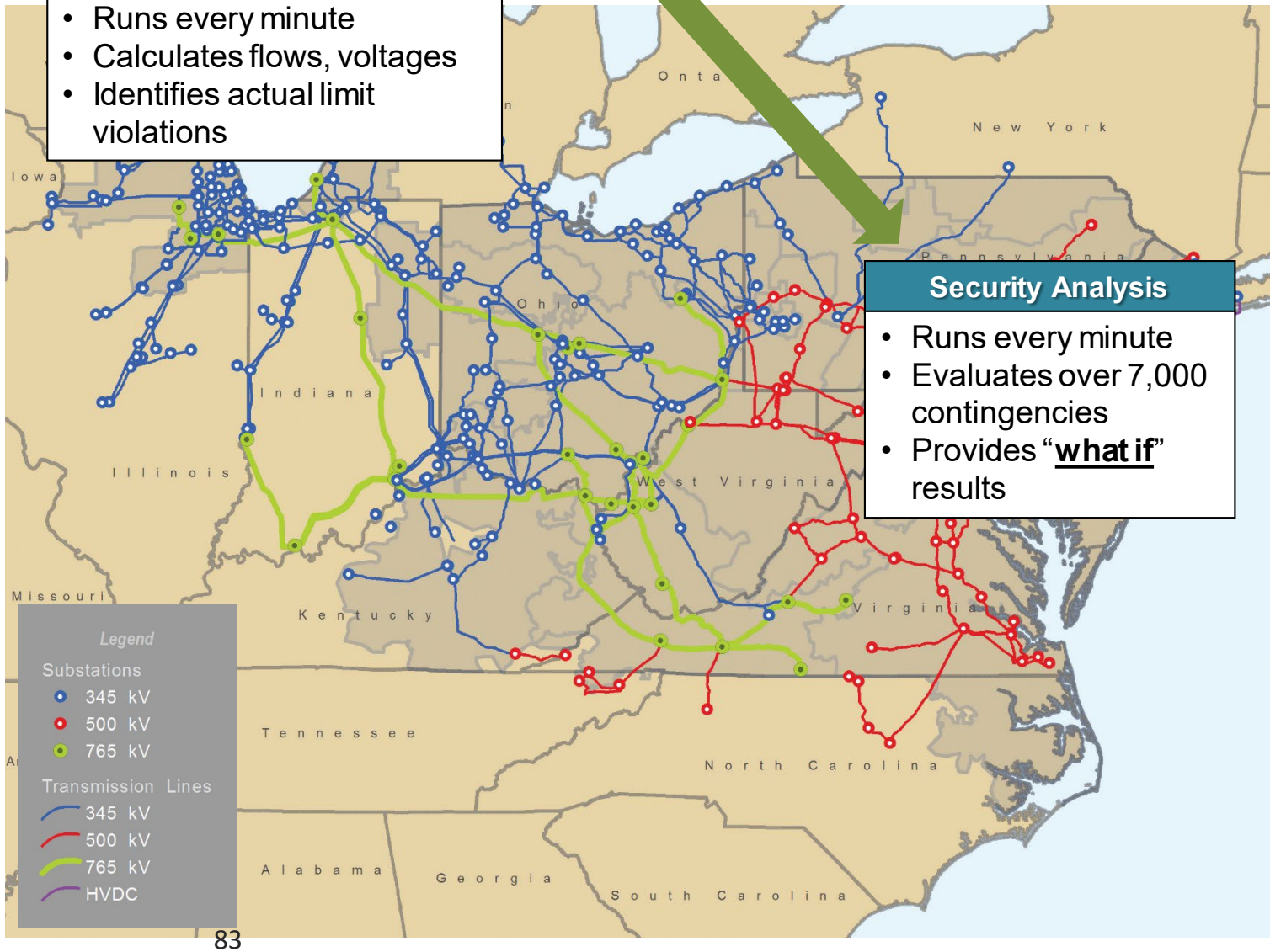


Transmission System Operations

- Ensure Security of the Transmission System
  - Monitor transfer limitations (IROL)
  - Monitor thermal constraints
- Contingency Analysis
- Direct Emergency Operations
- Direct Off-Cost Operations
  - Generation shifts
  - Contract curtailments
- Coordinate Switching

State Estimator – Computer

- Runs every minute
- Calculates flows, voltages
- Identifies actual limit violations



Security Analysis

- Runs every minute
- Evaluates over 7,000 contingencies
- Provides "**what if**" results

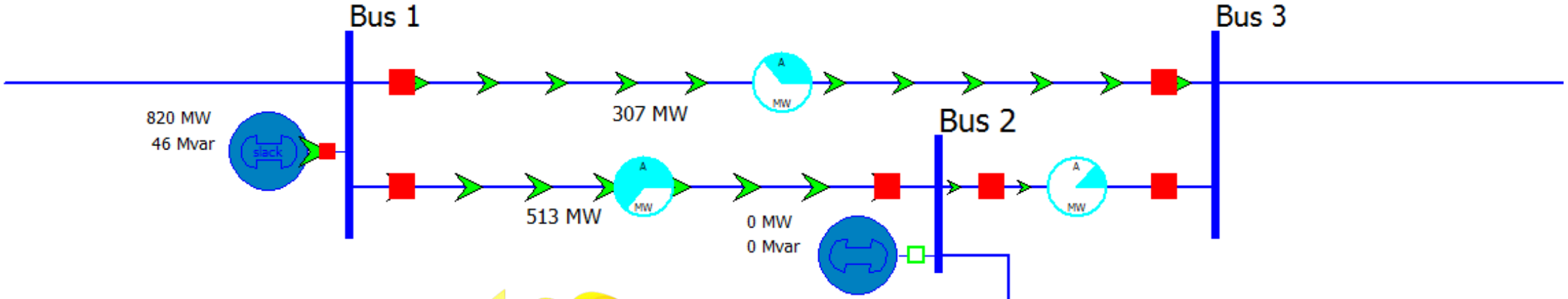
Power Transfer Limits

Thermal Limits

Voltage Limits

Stability Limits

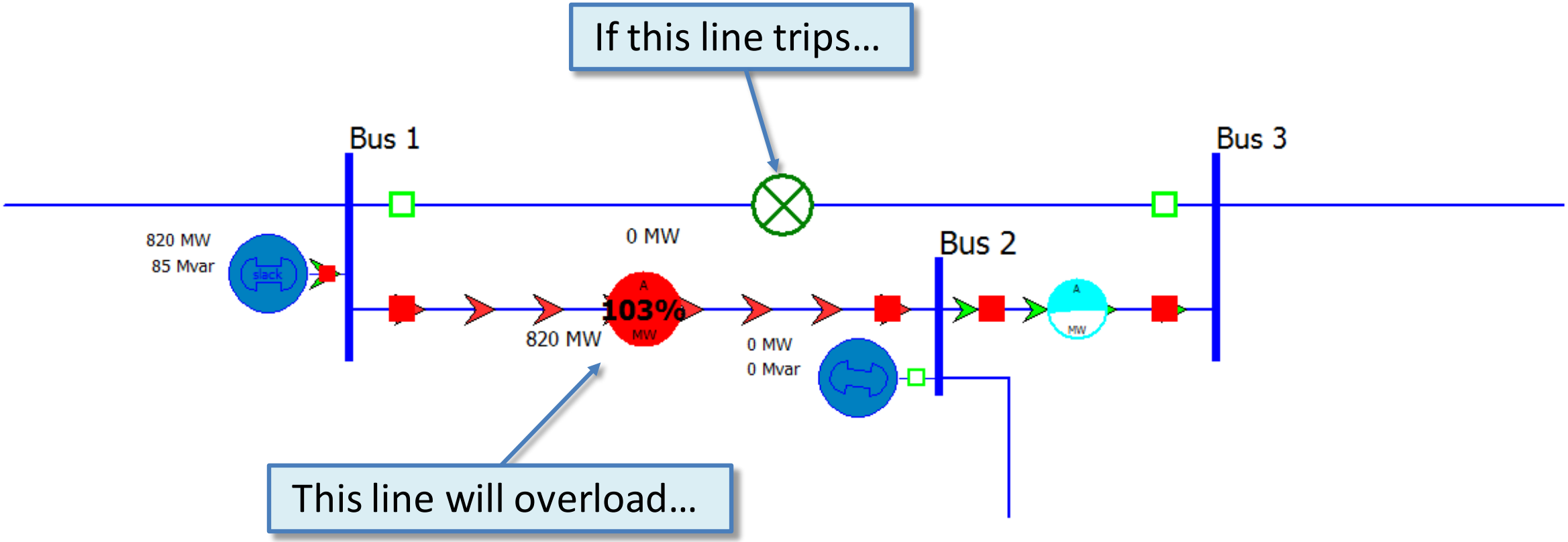
Control Actions for Contingencies



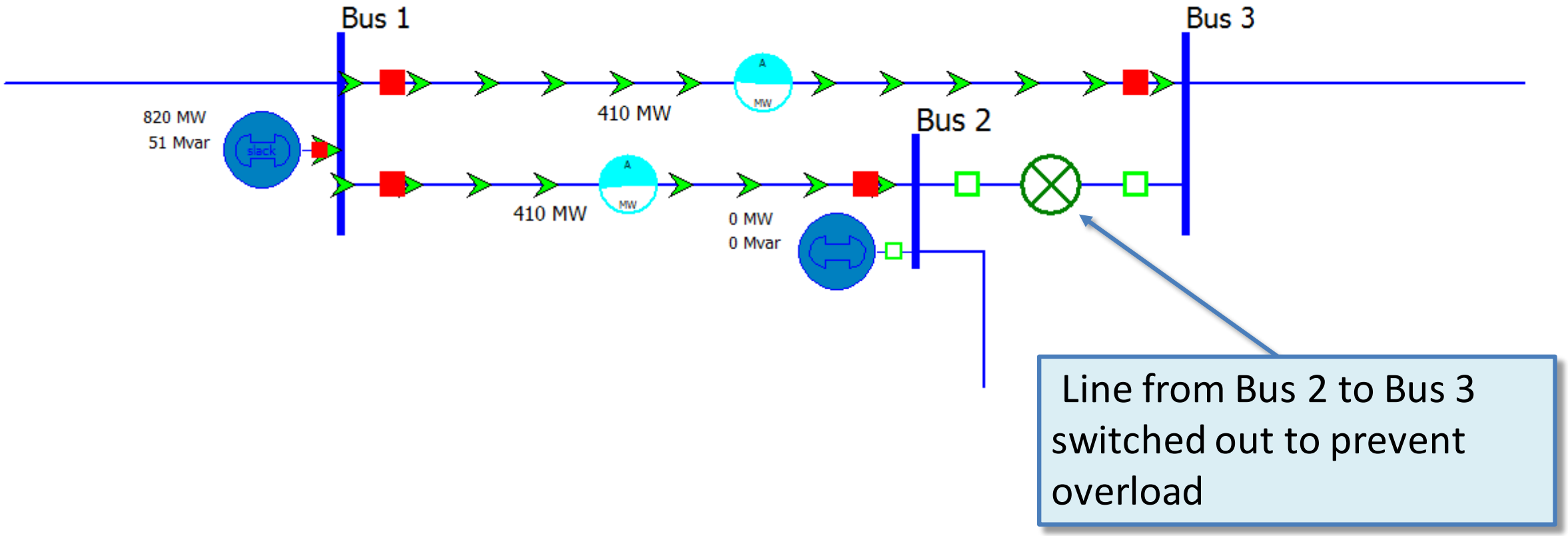
- System Reconfiguration
- Transaction Curtailments
- Generation Re-Dispatch

EMS Identifies a Potential Problem

PJM EMS does *"What If" analysis*

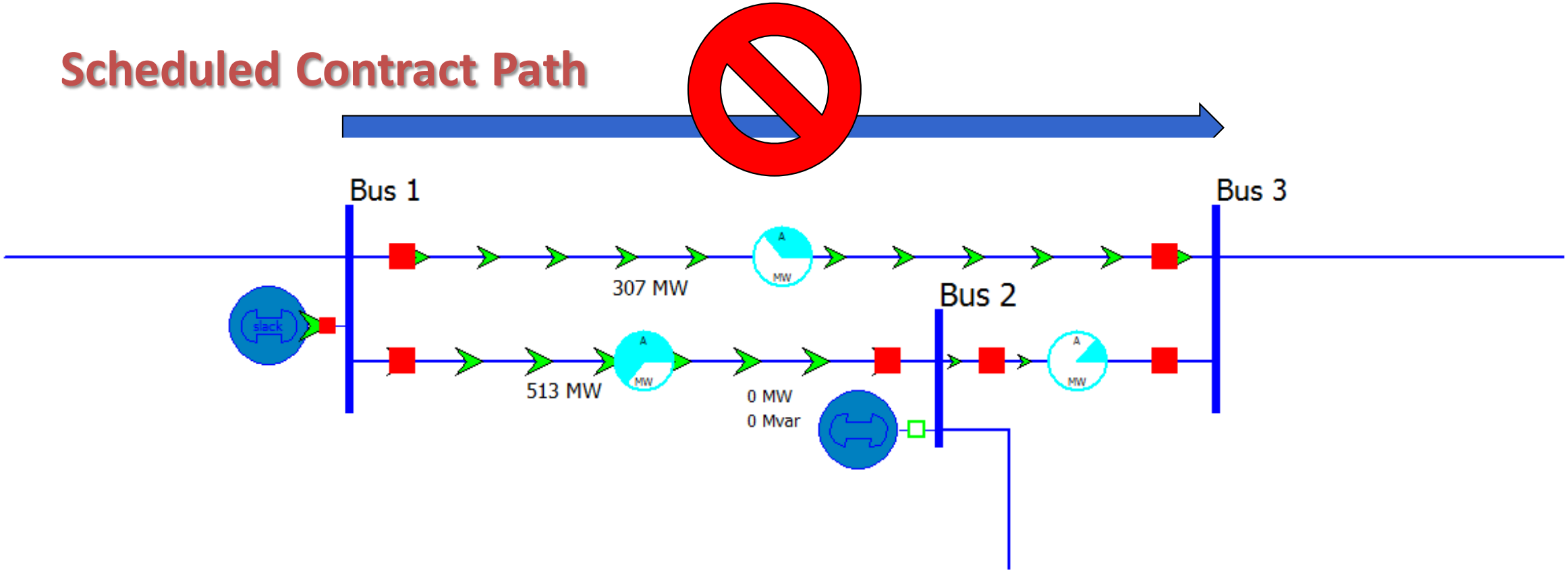


System Reconfiguration



Contract Curtailments

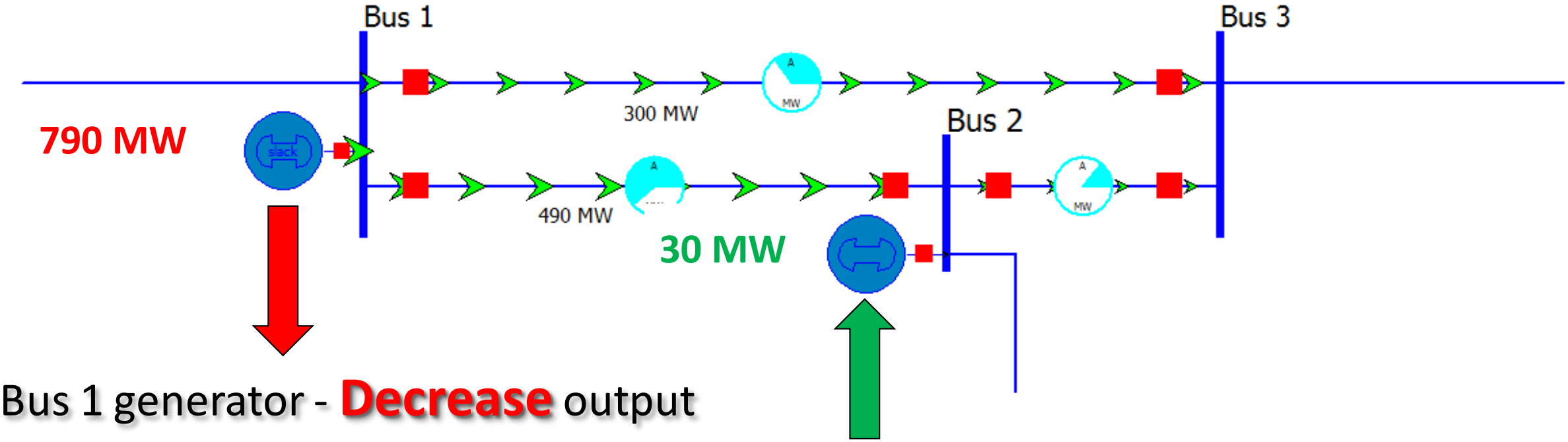
Scheduled Contract Path



Curtailing contract could fix problem……

Generation Re-Dispatch

Total Supply = Demand = 820 MW



Bus 1 generator - **Decrease** output

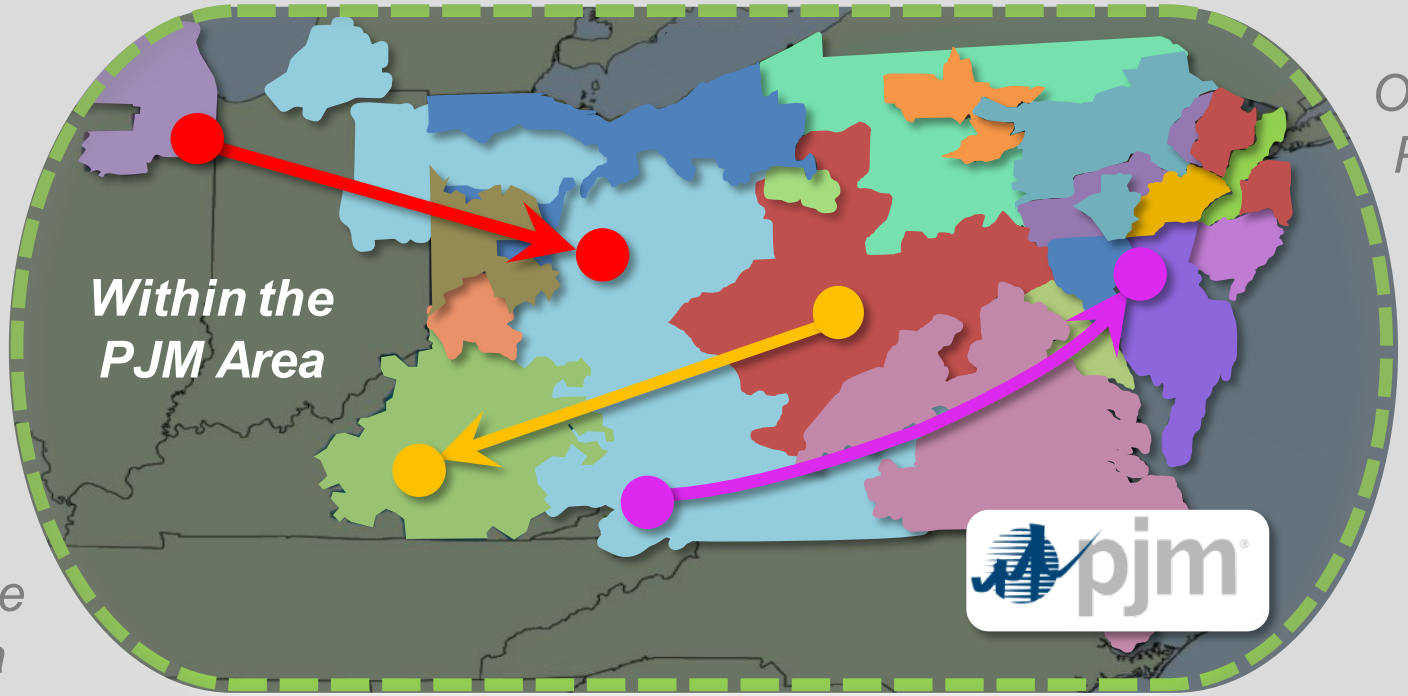
Bus 2 generator - **Increase** output

Transmission Services

Transmission Service Topics

- **Types of Transmission Service**
  - Network
  - Point-to-Point
- **Service Priority**
- **Transmission Service Reservations**
  - PJM OASIS

Network Integration Service

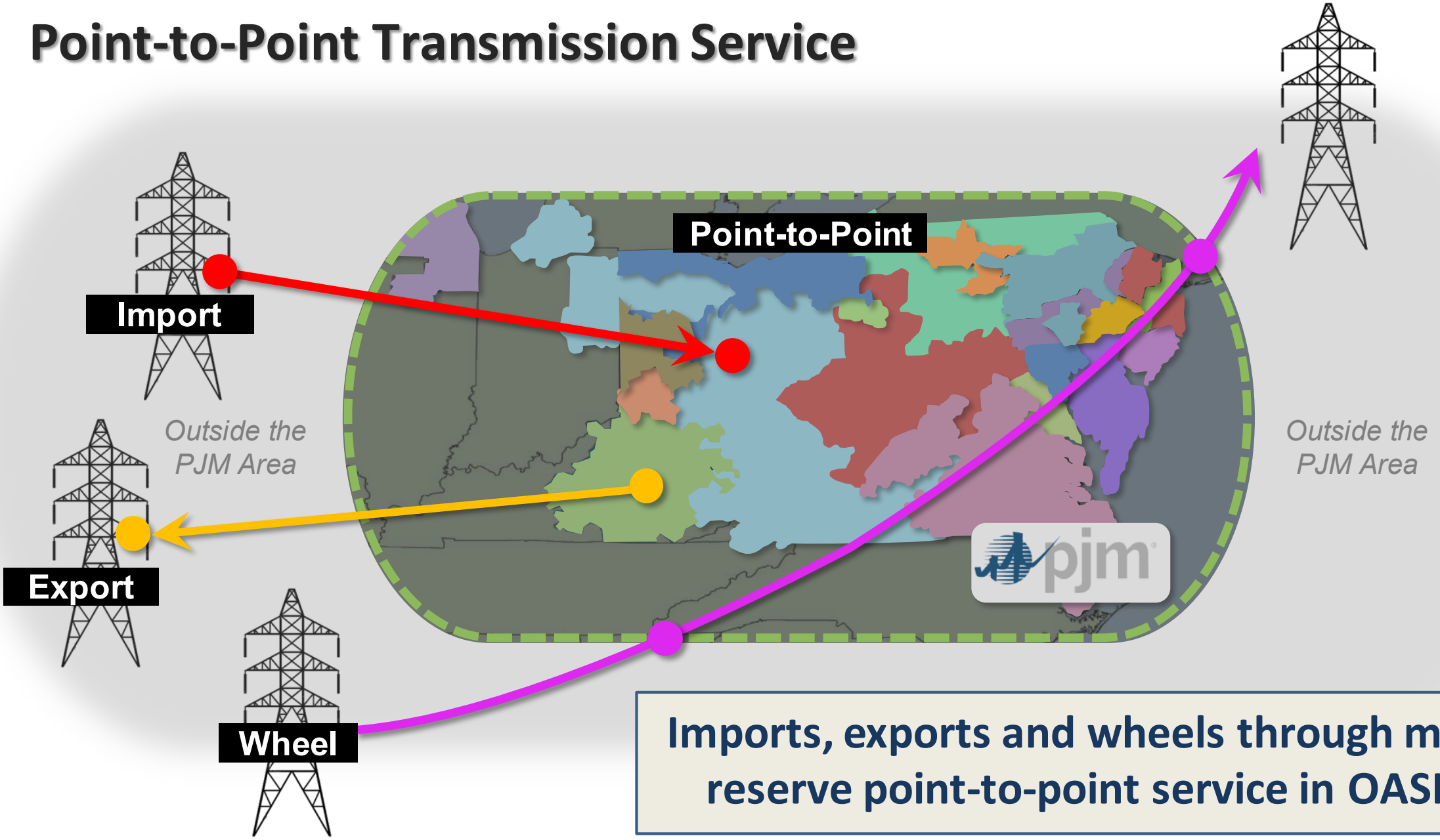


Outside the
PJM Area

Outside the
PJM Area

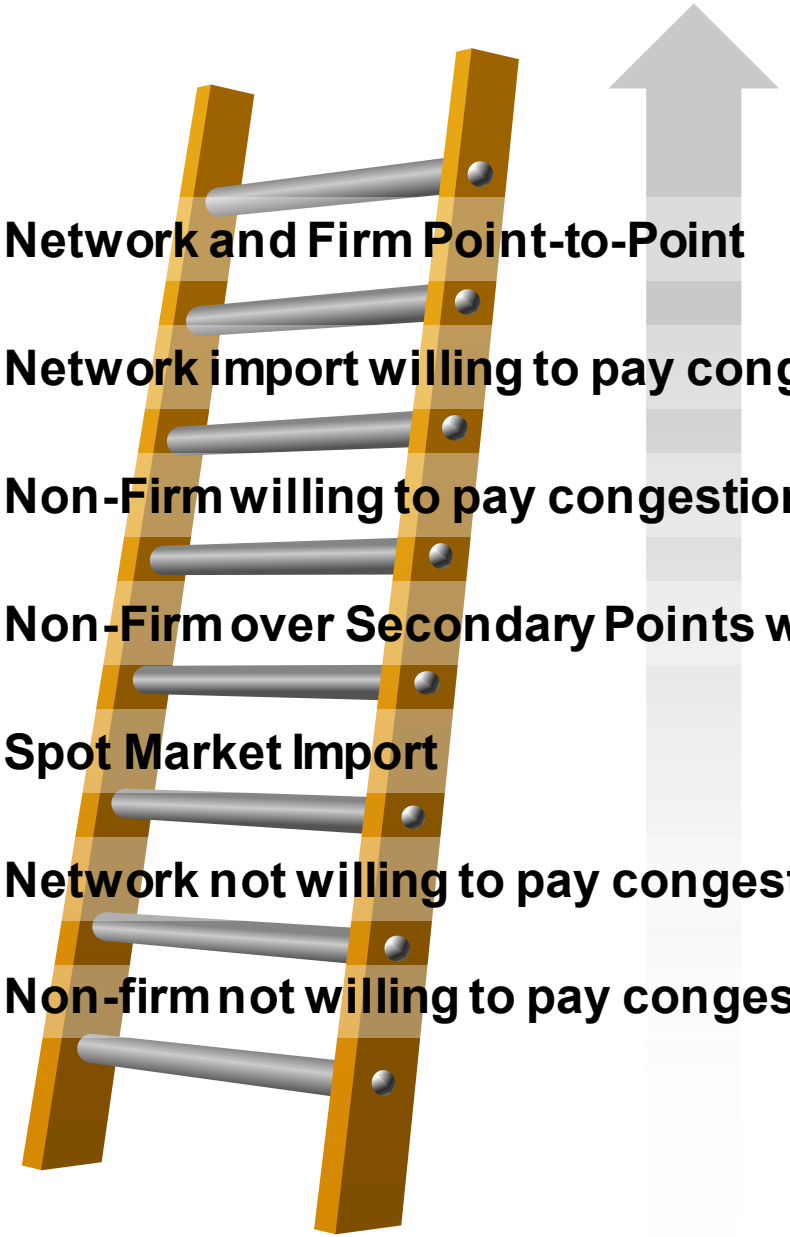
All load in PJM is served using Network Integration Transmission Service

Point-to-Point Transmission Service



Imports, exports and wheels through must reserve point-to-point service in OASIS

Priority of Service



Network and Firm Point-to-Point

Network import willing to pay congestion

Non-Firm willing to pay congestion

Non-Firm over Secondary Points willing to pay congestion

Spot Market Import

Network not willing to pay congestion

Non-firm not willing to pay congestion

Emergency Procedures

Emergencies

Emergencies

- Capacity Shortage
- Capacity Excess

Emergencies

- Cold Weather Alert
- Hot Weather Alert
- Inter RTO Natural Gas Coordination
- Thunderstorms and Tornados
- Geo-Magnetic Disturbance

Emergencies

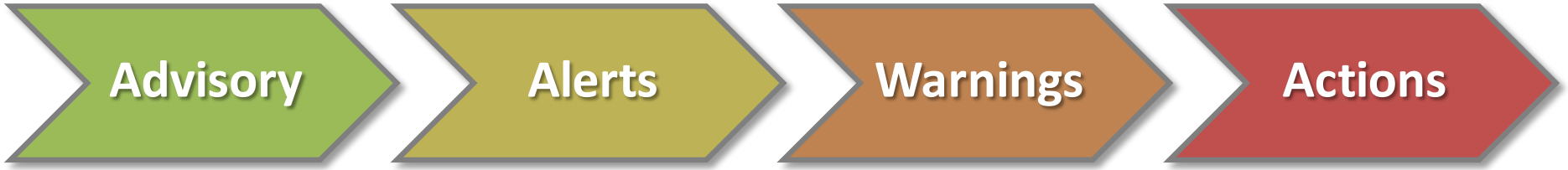
- Elevated Threat
- Imminent Threat

Emergencies

- High or Low Voltage
- Transmission Security
- Shortage Pricing
- Post Contingency Local Load Relief
- Interconnection Reliability Operating Limits Manual Load Dump
- Transmission Loading Relief

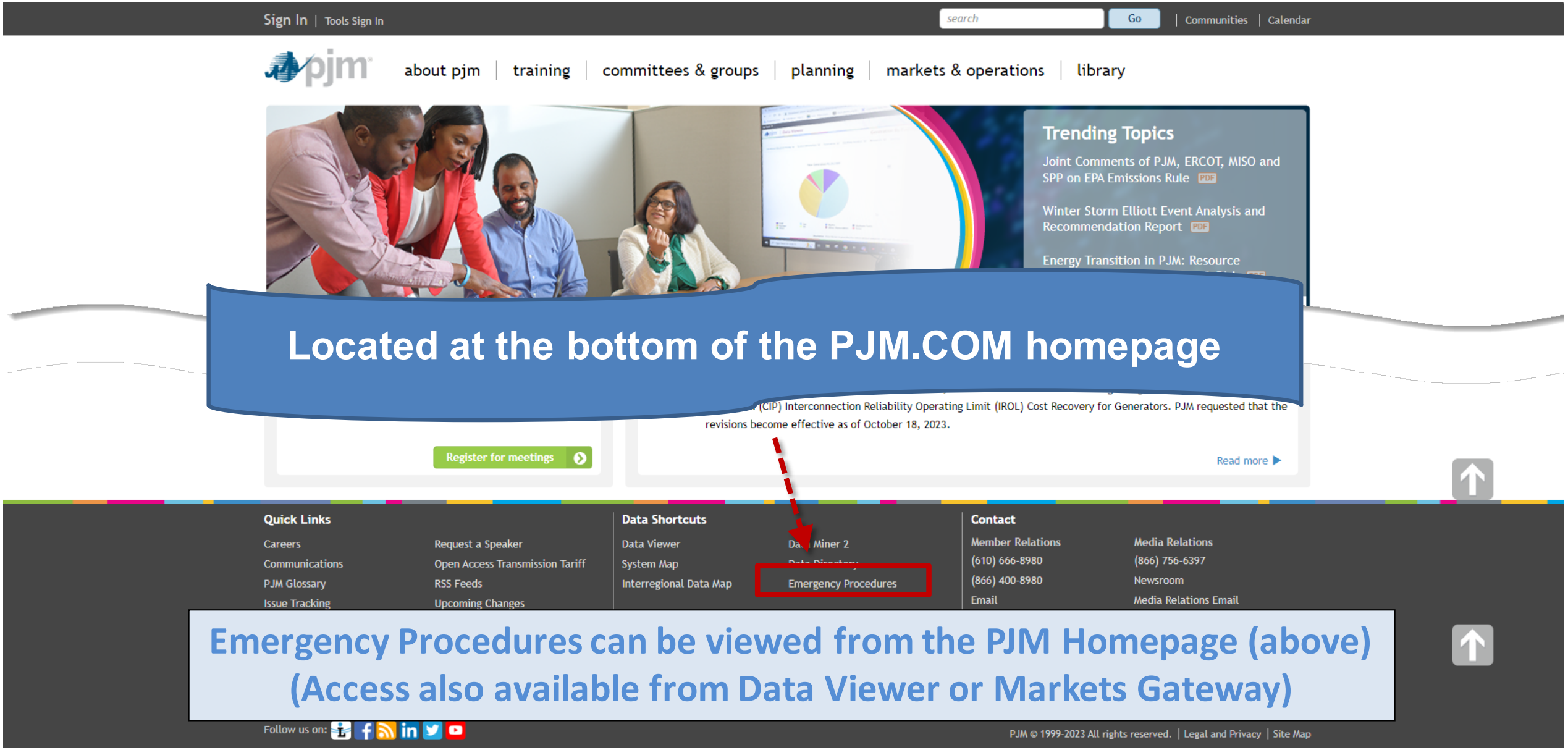
Emergency Procedures Levels

- 4 levels of emergency procedures:



- Most Advisories, Alerts, Warnings and Actions are communicated via:
  - PJM ALL-CALL
  - Posted to various PJM websites
- Advisories and Alerts are issued in advance of the operating day
  - Alerts may be issued during the operating day in advance of a scheduled load period to allow sufficient time for members to prepare for anticipated initial capacity shortages
- Warnings and Actions are issued during the operating day

Emergency Procedures - *Web Site*



Located at the bottom of the PJM.COM homepage

Emergency Procedures can be viewed from the PJM Homepage (above)
(Access also available from Data Viewer or Markets Gateway)

My Tools ▼ Welcome Guest (GUEST) | Sign In Contact | Help

pjm | Emergency Procedures

Postings

Postings | Message Definitions | Message Priorities | Postings Report | PAI Guidance | Regions | Emergency Bid Form

Effective From * 08/26/2023 Effective To * 08/28/2023 Regions Message Types PJM Drill Include Active Only PAI Only Reset

XML

Last Updated: 08.28.2023 14:51:38 Filters: 08/26/2023 to 08/28/2023; Include PJM Drill

Records Per Page: 15 « ‹ (1 of 1) › »

History	Msg ID	Priority	Message Type	Effective Start Time	Regions	Emergency Message	Effective End Time
		All					
	103970	Warning	Post Contingency Local Load Relief Warning	08.08.2023 10:30	AEP	A Post Contingency Local Load Relief Warning has been issued to maintain ADAMSIM 138 KV *E04 at 127.0 KV in the AEP for Transmission Contingency Control. Additional Comments: Load -No Generation or Switching available	

Records Per Page: 15 « ‹ (1 of 1) › »

All times are in EPT

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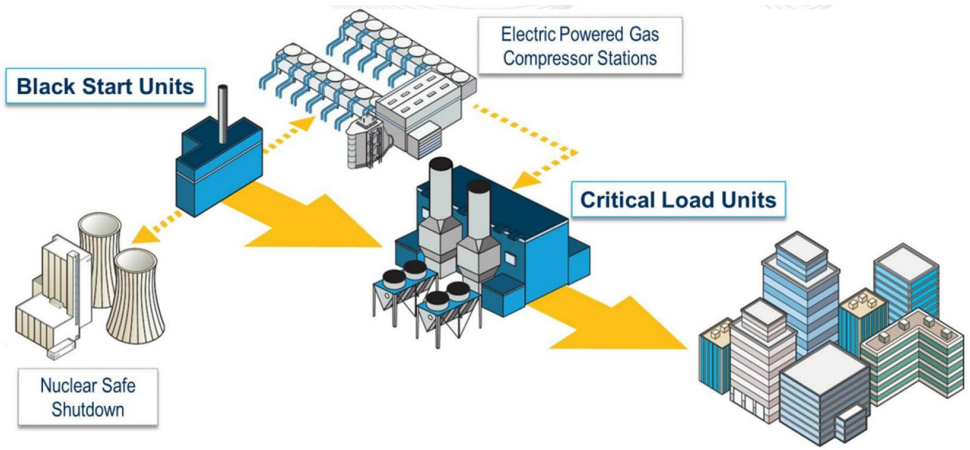
Operator Readiness Drills



Capacity and IROL Load Dump Drills

Reactive Reserve Checks

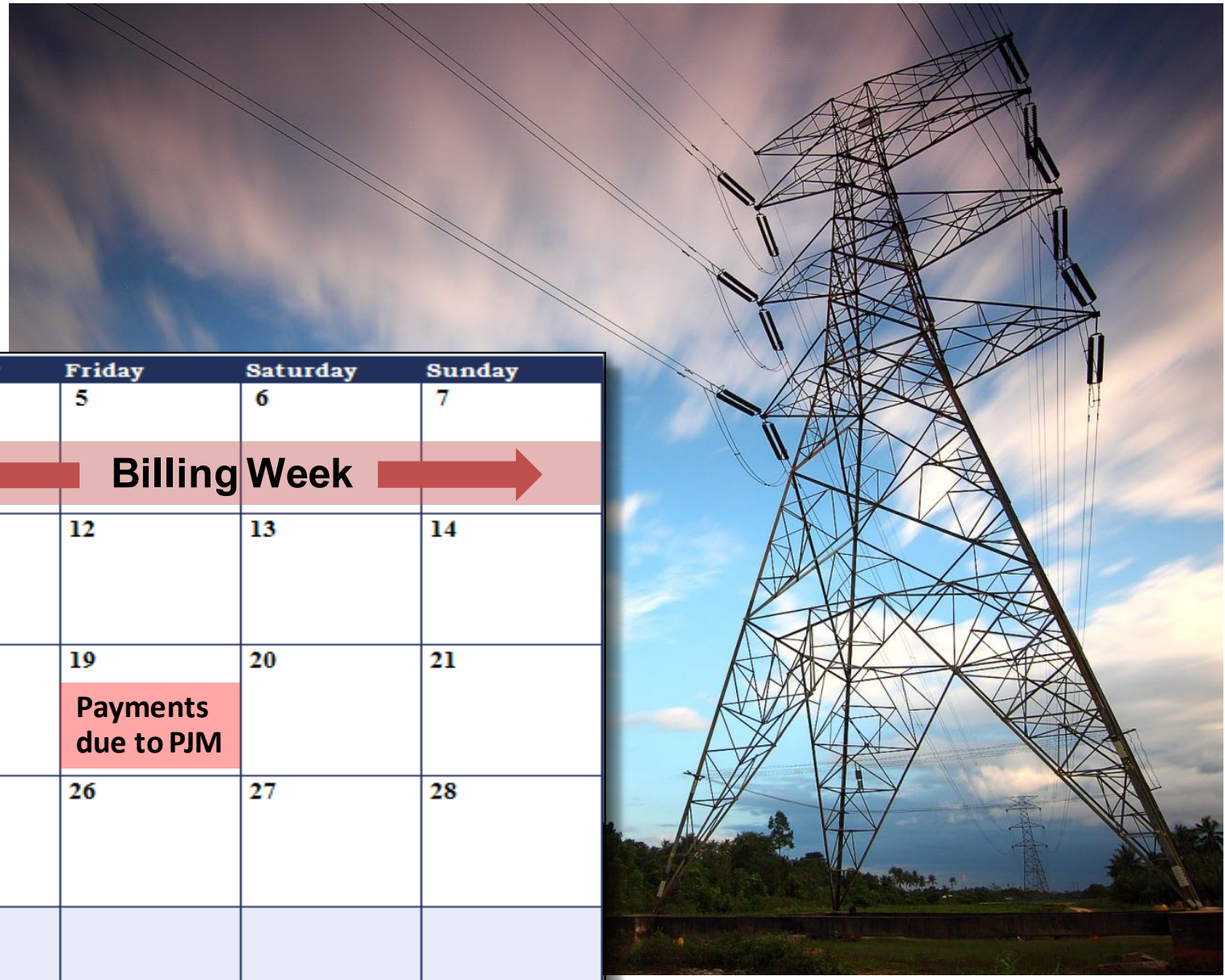
System Restoration Drills (Spring/Fall)

Emergency Procedures Drills (Summer/Winter)

104196	Action	DRILL - Manual Load Dump Action	05.02.2024 12:30	PJM-RTO	Drill A Manual Load Dump Action of 2005 MW and an EEA3 have been requested. Total load shed from all active Manual Load Dump Actions within this Region is 2005 MW. Additional Comments: Summer EP Drill.	05.02.2024 14:32	
104195	Action	DRILL - Curtailment of Non-Essential Building Load	05.02.2024 12:00	PJM-RTO	Drill A Curtailment of Non-Essential Building Load Action has been issued to provided additional load relief reductions. Transmission/Generation dispatchers/LSEs switch off all non-essential light and power in LSE-owned commercial, operations, and administration offices. Additional Comments: Summer EP Drill.	05.02.2024 14:32	Feedback
104194	Action	DRILL - Voltage Reduction Action	05.02.2024 12:00	PJM-RTO	Drill A Voltage Reduction Action of 5% % and a NERC level EEA2 have been issued for RTO . NOTE: Curtailment of Non-Essential Building Load should be issued prior to, but no later than the same time as a Voltage Reduction. Additional Comments: Summer EP Drill. 5% Voltage Reduction for RTO with the exception of the City of Chicago - 2.5% Voltage Reduction.	05.02.2024 14:32	
104193	Warning	DRILL - Manual Load Dump Warning	05.02.2024 11:25	PJM-RTO	Drill A Manual Load Dump Warning has been issued as of 11:25 on 05.02.2024 Additional Comments: Summer EP Drill	05.02.2024 14:32	
104192	Action	DRILL - Deploy All Resources Action	05.02.2024 11:15	PJM-RTO	Drill A Deploy All Resources Action , and associated NERC Energy Emergency Alert Level 2 [EEA2], has been issued. - Member Generation Dispatchers raise all available online generating units to full output (Emergency Maximum). - Member Generation Dispatchers start up all offline generation as soon as possible and ramp to full output (Emergency Maximum). - Member Curtailment Service Providers with Load Management (Pre-Emergency and/or Emergency) reduce load immediately when dispatched. - Transmission/Generation Dispatchers notify management of the emergency procedure and that they should consider the use of public appeals to conserve electricity usage. - Member dispatchers notify governmental agencies, as applicable. Additional Comments: Summer EP Drill	05.02.2024 14:32	
104190	Warning	DRILL - Voltage Reduction Warning and Reduction of NCPL	05.02.2024 10:45	PJM-RTO	Drill A Voltage Reduction Warning and Reduction of NCPL has been issued. Actual Synchronized (or Spinning) Reserves are less than the Synchronized (or Spinning) Reserve requirement. PJM Member Actions: 1. Generation dispatchers order all generating stations to curtail non-essential station light and power. Additional Comments: Summer EP Drill	05.02.2024 14:32	
104191	Action	DRILL - Emergency Voluntary Energy Only Demand Response	05.02.2024 10:30	PJM-RTO	Drill An Emergency Voluntary Energy Only Demand Response Reduction Action has been issued. Load reduction is expected to be implemented as soon as possible and is requested to remain reduced as long as possible or until cancelled by PJM. CSPs should review DR Hub for specific registration details. Dispatched Control Zone(s) only. Additional Comments: Summer EP Drill	05.02.2024 14:06	
104189	Warning	DRILL - Primary Reserve Warning	05.02.2024 10:00	PJM-RTO	Drill A Primary Reserve Warning has been issued from 10:00 on 05.02.2024 through 14:32 on 05.02.2024 Actual primary reserves are lesser than the requirement. Primary Reserve Objective is 2097 MW. Additional Comments: Summer EP Drill	05.02.2024 14:32	
104183	Action	DRILL - Emergency Load Mgmt Reduction Action	05.02.2024 09:15	AECO	Drill An Emergency Load Mgmt Reduction Action and a NERC level EEA2 have been issued. Load reduction start times can be found by clicking on the hyperlink(s) in the Regions column. Load reductions should continue until released by PJM. Reductions are mandatory based on product requirements. CSPs should review DR Hub for specific registration details. Lead Time(s) dispatched: Short_60 . Product(s) dispatched: Capacity Performance DR	05.02.2024 14:30	

Market Settlements

Market Settlements



Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

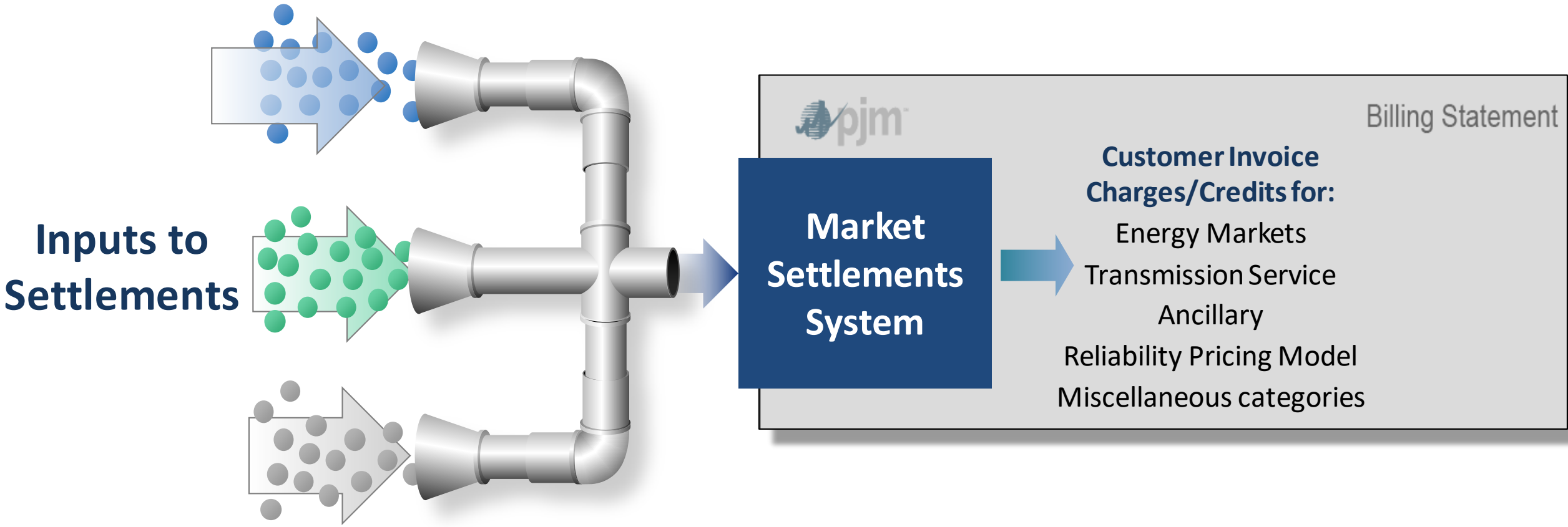
Billing Week

Weekly Bills issued

Payments due to PJM

Payments made to participants

Market Settlements Process



Settlement Information

Detailed Settlement Reports (both Monthly and Weekly) are provided electronically via the PJM MSRS System (Market Settlement Reporting System)

Overdue balances are subject to interest charges

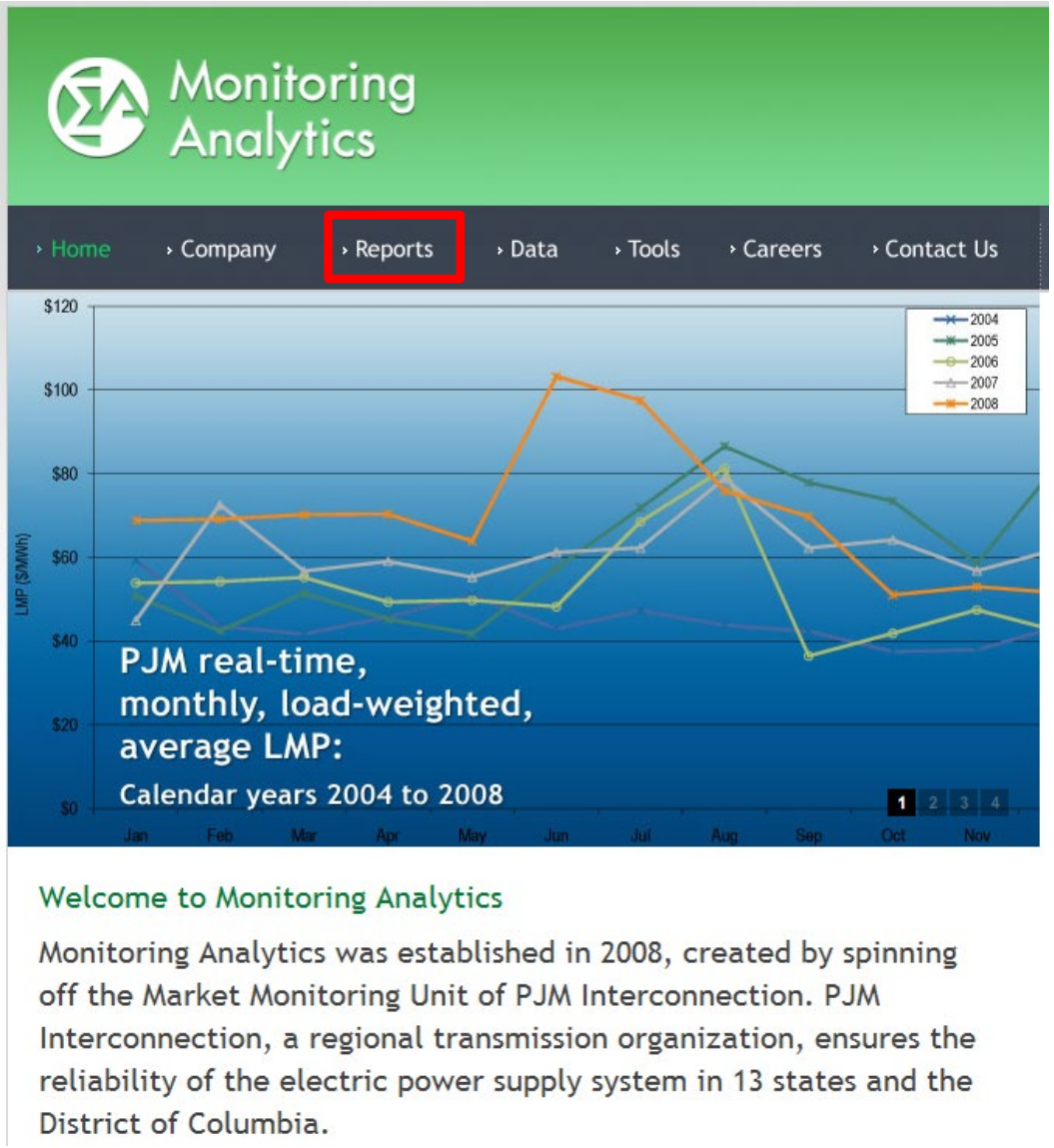
Weekly settlements
(as opposed to monthly settlements)
will reduce the default exposure
for all PJM members

Market Monitor

Market Monitoring Objectives

- Monitor **compliance** with rules, standards, procedures and practices of PJM
- Monitor **actual or potential design flaws**
- Monitor **structural problems** that may inhibit a robust competitive market
- Monitor the potential of market participants to **exercise market power**

State of the Market Report



- IMM's annual assessment of the competitiveness of the PJM markets
- Analyzes market structure, participant behavior, market performance
- Provides details, charts, and graphs of various market activities and prices

http://www.monitoringanalytics.com/home/index.shtml

Additional Training Resources

about pjm | training | committees & groups | planning | markets & operations | library

- Course Catalog
- Member Training Liaison
- PJM Certification
- Training Resources
- Webex Training Center

Home ▸ Training

Training

Quick Links

If you are working in the capacity of a practitioner and are subject to the PJM Training and Certification requirements, login to the PJM Learning Management System (LMS) for information about your training plan.

Learning Management System (LMS) - use this site to create & manage your training plan. New users must register to access the site.

Training Calendar - view current & upcoming courses.

Draft Training Plan: 2025 | 2024 PDF

PJM Certification: Apply

Manual 40: Certification & Training Requirements WEB | PDF

For additional courses, or questions related to course availability, contact Training Support.

Learning Center - learn about what we do at PJM.

Special Training Request Forms

Cloud Simulation Training Connection Information PDF

Find a Training Event

Events: Search

From: To:

Show me: All events Available events Only NERC CEH approved events

Upcoming Events

Training Event	Location	Start Date	End Date	Availability
Economic DR in Ancillary Services Markets	Virtual	10.29.2024	10.29.2024	Open
Generator Energy Schedules and Parameters	Virtual	10.30.2024	10.30.2024	Open
Capacity Exchange Training for RPM Auctions	Virtual	11.04.2024	11.04.2024	Open
Reserves & Regulation	Virtual	11.04.2024	11.04.2024	Open

Target Audience:

- Curtailment Ser...
- General/Governm...
- Generator-Opera...
- Load Serving En...

Questions?

PJM Client Management & Services
Telephone: (610) 666-8980
Toll Free Telephone: (866) 400-8980
Website: www.pjm.com

The Member Community is PJM's self-service portal for members to search for answers to their questions or to track and/or open cases with Client Management & Services