

# Primary Frequency Response in PJM

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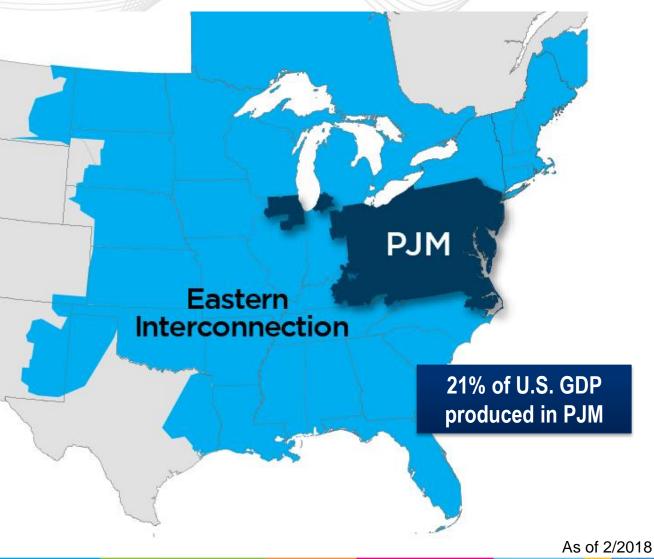
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#### PJM as Part of the Eastern Interconnection

Key StatisticsMember companies1,040+Millions of people served65Peak load in megawatts165,492MW of generating capacity178,563Miles of transmission lines84,0422017 GWh of annual energy773,522Generation sources1,379Square miles of territory243,417	, and the second se	No.
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	Square miles of territory	243,417
States served 13 + DC	States served	13 + DC

- 28% of load in Eastern Interconnection
- 20% of transmission assets in Eastern Interconnection





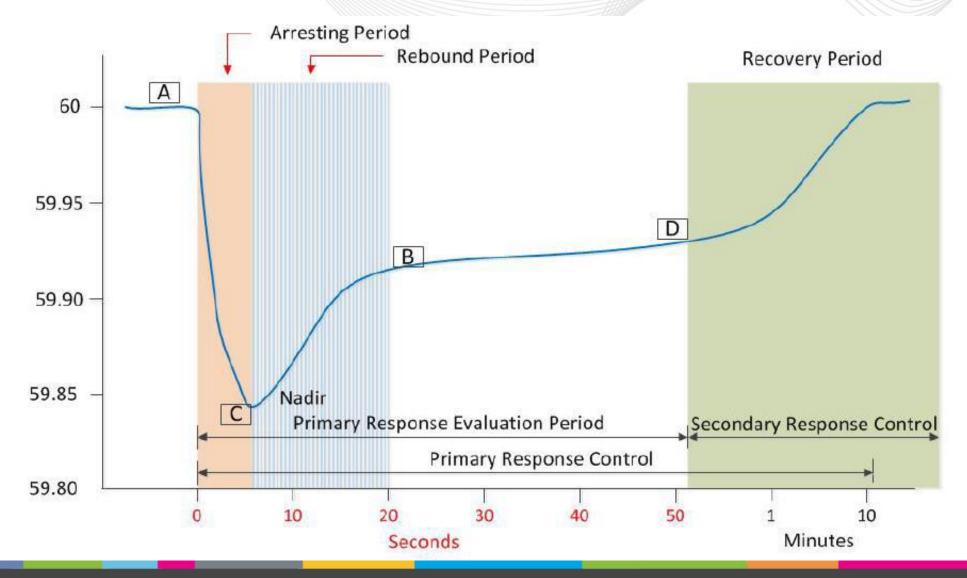
# Primary Frequency Response (PFR):

- First stage of system frequency control
- Inherent response of resources and load to arrest local changes in frequency
- Provided automatically by unit governors or equivalent speed control systems
- Response is in seconds and not controlled by any centralized system
- Critical for controlling frequency in system restoration event

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## Frequency Disturbance Example





#### **Droop Control:**

- Allows units to operate in parallel so that each unit shares MW response with other generators in the system
- NERC guideline: max. 5% droop setting

#### **Deadband:**

- Is the amount of frequency change a governor must see before it starts to respond
- NERC guideline: max. +/- 36 mHz deadband setting



## Formation of PFR Stakeholder Group - 2017

# Drivers for enhancing PJM's PFR business rules

- Review of current generator frequency response
- NERC Std. BAL-003
- NERC Advisory on Generator Governor Frequency Response
- FERC NOPR on Primary Frequency Response

#### PJM Task Force formed

- Evaluate PFR within PJM
- Evaluate need to revise PJM business rules for PFR requirement
- Discuss potential compensation mechanisms related to providing PFR capability



# FERC Order on Primary Frequency Response

## FERC Order 842 Issued February 25, 2018

- Requires all <u>new</u> generation with LGIA or SGIA to install, maintain and operate to provide frequency response
- Requirements for max 5% droop, max +/- 36 mHz deadband
- No headroom requirement or compensation requirements
- Does not address PFR for <u>existing</u> resources



#### PFR Task Force: Current Status and Next Steps

Continued stakeholder discussions on solution design components for PFR requirement:

- Applicability to existing resources
- Exception process
- Implementation plan
- Compensation
- Performance measurement