Energy Market

Generator Offers & Parameters

Student Guide

Prepared by:
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Objectives

- Identify the process and procedures for participating in the Energy Market

Introduction to Markets Gateway

Uses of Markets Gateway

Markets Gateway is a PJM tool that allows members to submit information and obtain data needed to conduct business in the Energy, Regulation and Synchronized Reserve Markets.

- Market Participants can use PJM Markets Gateway to:
  - Prepare and submit:
    - Offers for Generation, Reserves, and Regulation
    - Bids for Demand and Load Response
    - Bilateral regulation and reserve transactions
  - Review public and private Energy and Ancillary Services market results

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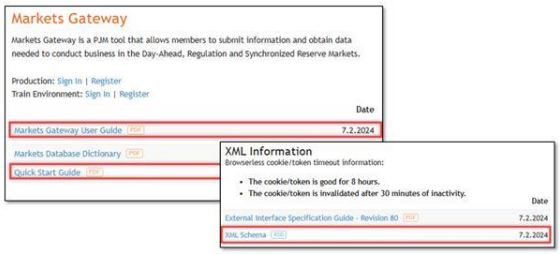
Interfacing with Markets Gateway

- **Web-based Interactions**: access is provided through a series of web-based interactive displays, which are accessible through the internet
- **XML-formatted File Exchange**: input and output files that are posted or downloaded, using the market user interface (MUI) or another participant-created application



Refer to **Markets Gateway Documentation**

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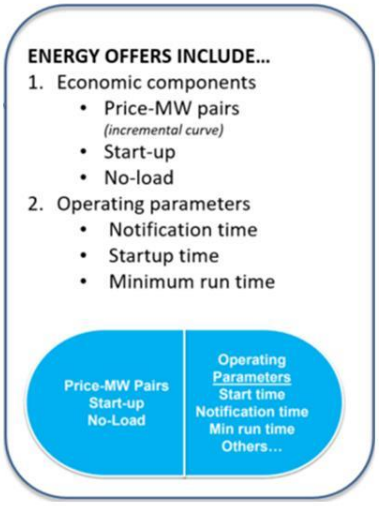
Markets Gateway Documentation: https://www.pjm.com/markets-and-operations/etools/markets-gateway

PJM Day-Ahead Market

PJM Day-Ahead Market

PJM Day-Ahead Market

- Any resource that is a PJM generation-type capacity resource having an *RPM Resource Commitment:*
  - Must submit an offer schedule into the Day-ahead Market, even if it is self-scheduled or unavailable due to outage
- Generation capacity resources shall submit:
  - A schedule of availability for the **next seven days**
  - May submit non-binding offer prices for the days beyond the next Operating Day
- The set of offer data last submitted for each generation capacity resource:
  - Shall remain in effect for each day until specifically superseded by subsequent offers



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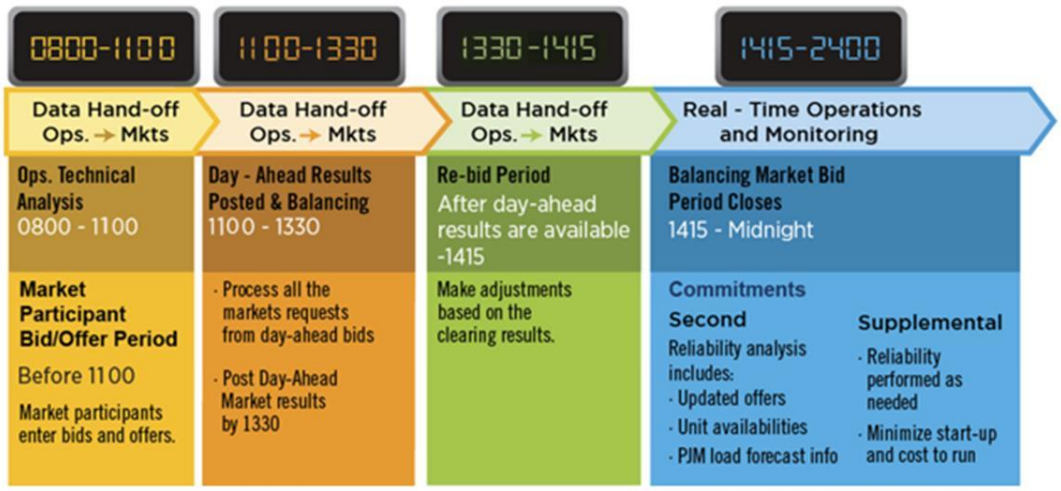
PJM Markets Timeline



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Intraday Updates to Energy Offers

- Generation offers can be updated after the Reliability Run is complete, starting at 18:30 up to 65 minutes prior to the operating hour
- Potential updates to offers include:
  - Price Component of the Offer Segment
  - No Load and Startup Costs
  - Notification Time
  - Min Run Time
  - Switch to Cost Schedule

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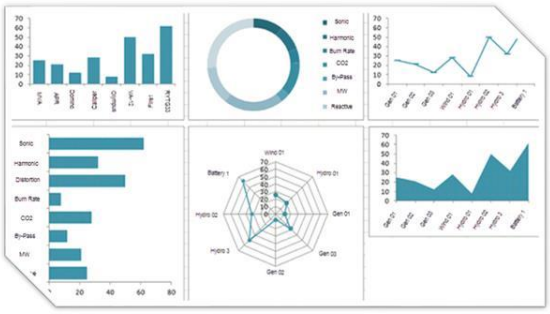
Unit Parameters

Unit Parameters

Unit Parameters

- These characteristics are submitted to PJM along with their energy offer based on:
  - Cost
  - Price
  - Time
  - Physical Parameters



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Cost Based Unit v Price Based Unit

Cost-Based Units

- Only Cost Schedules
- Cost Parameter Limited (PLS)
- PJM Manual 15 + up to 10% adder
- Can change Startup and No-Load daily/hourly

Price-Based Units

- Cost and Price PLS (79) Required
  - Non-PLS (99) is optional
- Not limited to Manual 15
- At least 1 Available Cost Schedule and PLS Price (79) Available
- Choice of Cost Based or Price Based Startup and No-Load (6 Month period)

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Cost-Based Offers 10% Adder Compliance

- Market Sellers can include a 10% adder in their startup, no-load, and incremental energy offers. The 10% adder is ***limited*** in the following situations:
  - For incremental energy offers *less than* $2,000/MWh, the 10% adder is limited to **the lesser of** 10% *or* $100/MWh, the sum of which shall not exceed $2,000/MWh, **AND**
  - For incremental energy offers *greater than* $2,000/MWh, the 10% adder is limited to $0/MWh

Example

MW	Incremental Cost ($/MWh)	Calculated 10% Adder ($/MWh)	Limitation	Allowable 10% Adder ($/MWh)
100	800	$80	N/A	$80
200	1100	$110	Lessor of 10% or $100	$100
300	1950	$195	Sum shall not exceed $2000/ MWh	$50
400	2010	$201	10% Adder = $0	$0

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Energy Market Offer Cap: Cost-Based Offers

- **For the purposes of setting LMP**, all offers are capped at $2,000/MWh
  - Cost-based offers above $2000/MWh will not be eligible to set LMP
- Generation resources with demonstrated costs above $2,000/MWh can recover those costs through make-whole payments
  - The lesser of 10% or $100 adder will not apply to costs above $2,000/MWh
- Participants wishing to enter cost-based offers above $2,000/MWh will need to contact the Markets Hotline for assistance
  - Cost-based offers above $2,000/MWh will be considered in merit order for dispatch purposes

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Unit Parameters

- Generators can be ***cost-based*** or ***price-based*** and determined for each new unit or new unit ownership
  - Cost (per cost development manual)
  - Price (has additional price schedules that differ from cost schedules)

Type Offer/Schedule	Economic Component	Operating Parameters
Cost-based (PLS) Cost	Limited to Cost + lesser of 10% or $100	Must be at least as flexible as PLS
Price-based (PLS) Price 79	Capped @ $1000/MWh unless **Cost** exceeds that May be higher or lower than **Cost**-based offer	Must be at least as flexible as PLS
Price-based (Non-PLS) Price 99 (optional)		Does not need to conform to PLS

Limitations are enforced at the time of offer submission

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Energy Market Offer Cap: Price-Based Offers

- Price-based offers will be capped at the lower of $2,000/MWh or the corresponding cost-based offer when costs are above $1,000/MWh
  - Remain capped at $1,000/MWh when the corresponding cost-based offers are at or below $1,000/MWh

Example

If a unit's cost offer is:

- $1500, the price offer can be no higher than $1500
- $800, the price offer can be no higher than $1000
- $2200, the price offer can be no higher than $2000

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Unit Parameters in Markets Gateway

Unit

- Unit Status
- Resource Type
- MW Operating Limits
- Ramp Rates
- Solar and Wind Forecasts

Schedule

- Schedule Types and Selection
- Offer Curves
- MW Operating Limits
- Startup & No-Load
- Startup/No-Load switch
- Startup and Notification times
- Min and Max Data
- Condenser Data

Hourly Updates

- Commit Status
- MW Operating Limits

Subject to Lockout

- Price component of the Offer Segment
- No load and Startup Costs
- Notification Time
- Min Run Time
- Switch to Cost Schedule

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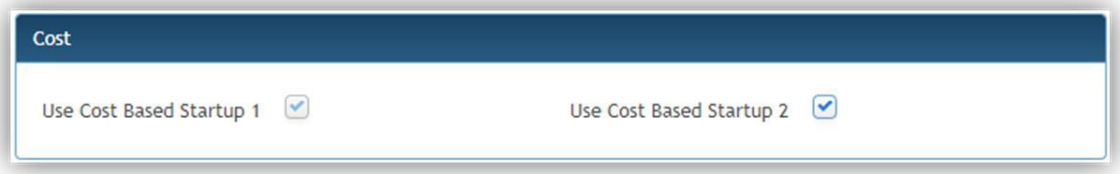
Start Costs for Price-Based Units

1. Price-based units choosing *price-based startup and no-load costs* can only change them twice per year effective for two six month periods
   - Use ***Unit Detail*** page to change the Startup and No-Load costs during the open enrollment periods
   - Period 1 Cost Based Startup Cost and Period 2 Cost Based Startup Cost



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Start Costs for Price-Based Units

2. Price-based units have the option to submit *cost-based startup and no-load costs* on a daily basis
   - Entered on ***Schedule Detail*** page
   - Must stay as cost-based startup and no-load costs for the entire 6-month period
   - Choice between using cost-based or price-based startup and no-load fees can be made twice a year

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Bi-annual Periods for *Price Based* Start Costs

Period	Period Covers:	Submit By:
1	April 1st to September 30th	11:00 Hours March 31st
2	October 1st to March 31st	11:00 Hours September 30th

If a price-based unit chooses the price-based startup and no-load fees option, the decision cannot be changed until the next open enrollment period takes place

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Use Start Costs

- The generation owner determines whether PJM should use the Startup and No Load information for their unit (price-based or cost-based) on a daily basis for Unit Commitment
- This is accomplished by marking the Use Startup No Load switch available and unavailable on the ***Schedule Detail*** page

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Unit Detail

Emergency Max (MW)*	The MW energy level at which the operating company operates the generating unit once PJM requests Maximum Emergency Generation. It is the highest short-term MW level a generating unit can produce and may require extraordinary procedures to produce the desired output
Economic Max (MW)*	Max energy available from the unit for economic dispatch
Economic Min (MW)*	Min energy available from the unit for economic dispatch
Emergency Min (MW)*	The lowest level of energy in MW the unit can produce and maintain a stable level of operation. This level is operated at during a Minimum Generation Emergency

*Also available in *Schedule Parameters*

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Unit Detail

CIR	Indicates the MW value of the Capacity Interconnection Rights
Regulation Minimum MWs	Minimum generation limit when unit is providing regulation. Value defaults to the economic minimum limit if left blank. Note: Hourly updates are made on the Regulation Updates screen, not the Unit Hourly Updates Screen
Regulation Maximum MWs	Maximum generation limit when unit is providing regulation. Value defaults to the economic maximum limit if left blank. Note: Hourly updates are made on the Regulation Updates screen, not the Unit Hourly Updates Screen
Default Ramp Rate (MW/Min)	The default energy ramp rate, in MW/minute, for increasing or decreasing a unit's output. This average rate is used by PJM in the Day-Ahead commitment process if the segmented Energy Ramp rate is not entered

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Unit Hourly Updates

- Unit Hourly Updates is used to submit unit status and MW operating limits on an hourly basis
  - Changes made to the unit data using the Unit Hourly Updates supersede all other pages
  - Updates can be made up to the close of the hour
  - Updates do not automatically carry forward to the next operating day

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Unit Hourly Updates - Generating Unit Commit Status

- **Economic:** Unit is available and offered into the market for PJM to schedule
- **Must Run:** Indicates that the generating unit is self-scheduling
  - Unit **MUST** be committed
  - Unit is committed at *economic min* and allowed to move up to *economic max*
- **Emergency:** Entire unit is placed in **Max Emergency** category and will not be scheduled unless PJM calls for max emergency generation
- **Not Available:** Unit is out of service and will not be scheduled
  - Must have a corresponding outage ticket in eDART if a capacity resource

Note:
Status choices differ for Load Response, Energy Storage, Closed Loop Hybrid, and Open Loop Hybrid Resources.

Refer to the **Markets Gateway User Guide** for more information.

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Markets Gateway Documentation: https://www.pjm.com/markets-and-operations/etools/markets-gateway

Unit Hourly Updates - Fixed Gen

Fixed Gen	This field should be set to yes if a resource intends to remain "fixed" or otherwise not follow PJM real-time dispatch

- The Day-Ahead Market does **NOT** consider the Fixed Gen field
  - To offer a fixed MW, set the economic minimum and economic maximum to the same value

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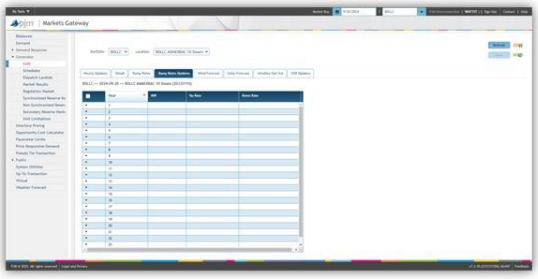
Energy Ramp Rates

- A generating unit's energy ramp rate can be defined by MW ranges, or segments
- The MW segment ramp rates are used during real-time operations
- A maximum of 20 Ramp Rate segments can be defined
  - The MW/Minute increase or decrease of a unit between the previous and current segments
    - Up Ramp Rate
    - Down Ramp Rate
      - Must be greater than or equal to up ramp rate



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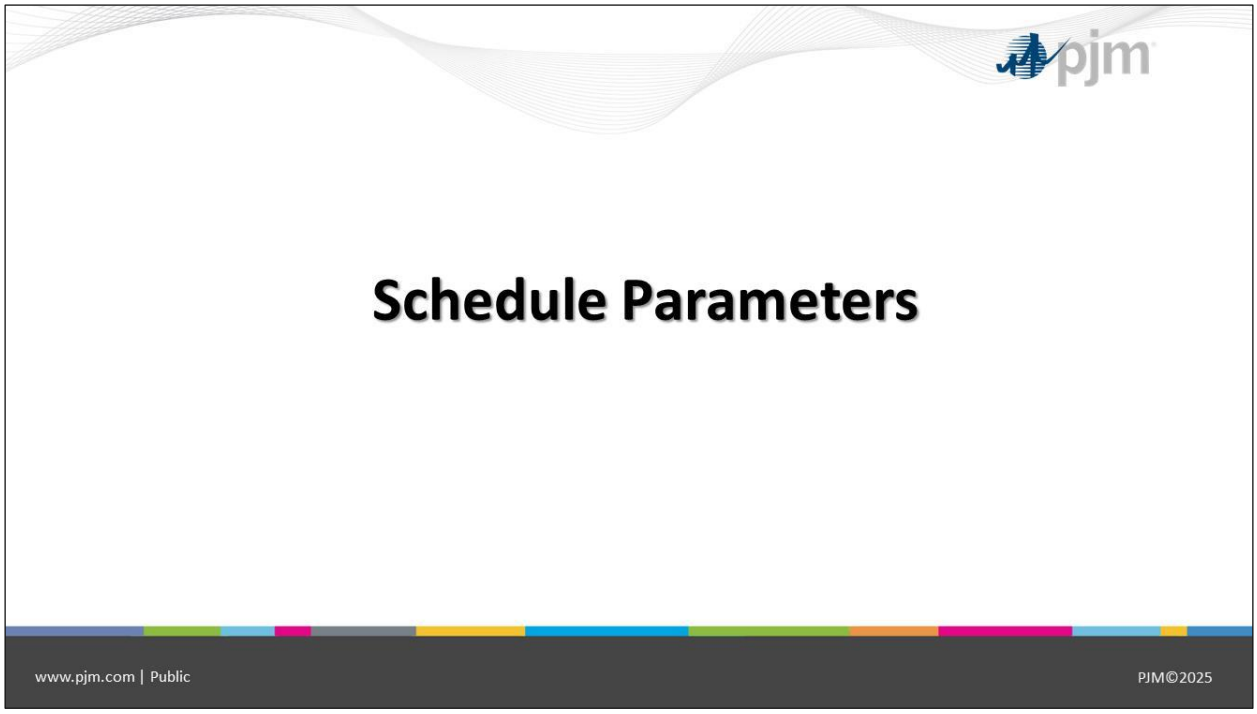
Schedule Parameters



Notification and Startup Times

The following information can be changed on the Schedule Detail page:	
Notification Times: The time interval in hours, between PJM notification and the start sequence of a generating unit that is currently in one of three temperature states • Hot Notification Time • Inter Notification Time • Cold Notification Time	**Startup Times:** The time interval, measured in hours, from the actual unit start sequence to the breaker close for a generating unit in one of the three temperature states • Hot Startup Time • Inter Startup Time • Cold Startup Time

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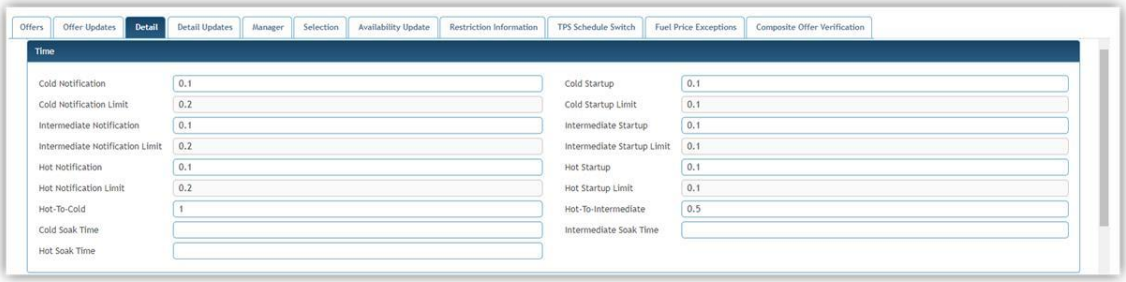
Notification and Startup Times



Markets Gateway Schedule Detail Web Page

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Capacity and Energy Resources

- Each Generation **Capacity Resource** with an RPM or FRR commitment must make available into the Day-ahead and Real-time Markets:
  - At least one cost-based schedule
  - Price-based units must also make available a price-based Parameter Limited Schedule (PLS)
    - All price-based units have the option of submitting a second price schedule that is not parameter limited
  - Minimum MW Offer 0.1 MW

- Each **Energy Resource** that offers into the Day-ahead and Real-time Markets must make available:
  - At least one cost-based schedule
  - Price-based units must also make available a price-based schedule and/or a price-based Parameter Limited Schedule (PLS)
  - Minimum MW Offer 0.1 MW

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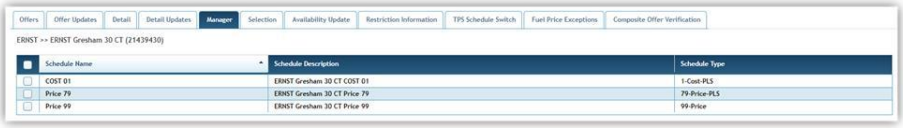
Schedule Manager

Schedules define the **offer** and **offer type**



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Schedule Manager

- Multiple schedules can be created
  - Schedule Name (8 characters) – Name used to reference schedule offer
  - Schedule Description (40 characters) – Text description of the schedule
  - Schedule Type
    - 1-12: Cost-based Parameter Limited Schedules (PLS)
    - 79: Price PLS
    - 99: Price-based schedule

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Schedule Detail

- A variety of schedule-related parameters are editable using the Markets Gateway ***Schedule Detail*** page and includes:
  - **Use Startup No Load**: The generation owner determines whether PJM Unit Commitment should consider the startup and no-load information for their unit
    - Price-based or Cost-based, on a daily basis
  - **Minimum Downtime**: The minimum number of hours between when the unit shuts-down and the next time the unit can be online
  - **Minimum Runtime**: The minimum number of hours a unit must run before being taken offline. This parameter affects total production cost since PJM is obligated to run the unit for a minimum of hours indicated by this parameter.
  - **Maximum Weekly Starts**: The maximum number of times a unit can be started in one week
  - **Maximum Runtime (hours)**: The maximum number of hours a resource can run over the course of an Operating Day as measured by PJM's state estimator
  - **Maximum Daily Starts**: The maximum number of times that a unit can be started in a day
  - **Maximum Weekly Energy (MWh)**: The maximum amount of energy, reported in MWh, that the unit can produce in one week (used for study purposes)

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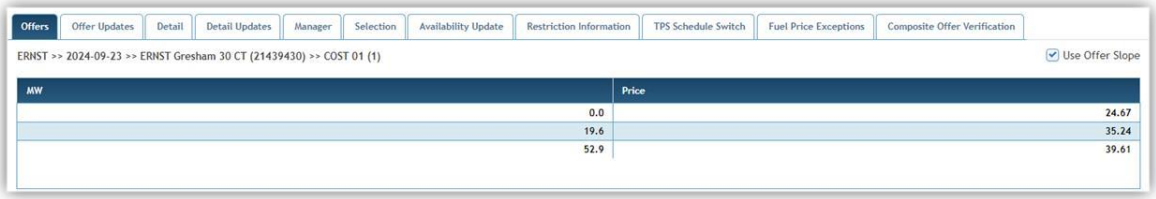
Schedule Offers

- Up to 20 pairs of MW and pricing points can be created or modified for each price schedule
- The Offer Slope selection can be used to calculate the schedule's offer when dispatched between MW segments
  - Cannot be changed for today or the next day when the market is closed



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Schedule Selection

The ***Schedule Selection*** page is used to mark schedules as Available, or Not Available, and allows the user to modify the No Load, Cold Start, Intermediate Start, and Hot Start costs.

Location	Type	Parameter Limited	Schedule Name	Availability	Daily No Load Cost	Daily Cold Startup Cost	Daily Int. Start Cost	Daily Hot Start Cost
ERNST Gresham 30 CT	Cost	True	COST 01	Available	3840.59	8312.32	6063.26	3562.14
ERNST Gresham 30 CT	Price	True	Price 79	Available				
ERNST Gresham 30 CT	Price	False	Price 99	Not Available				

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Dual Fuel Capability Field

- A mandatory field
- Used to indicate when a resource has the ability to switch to an alternate type of fuel

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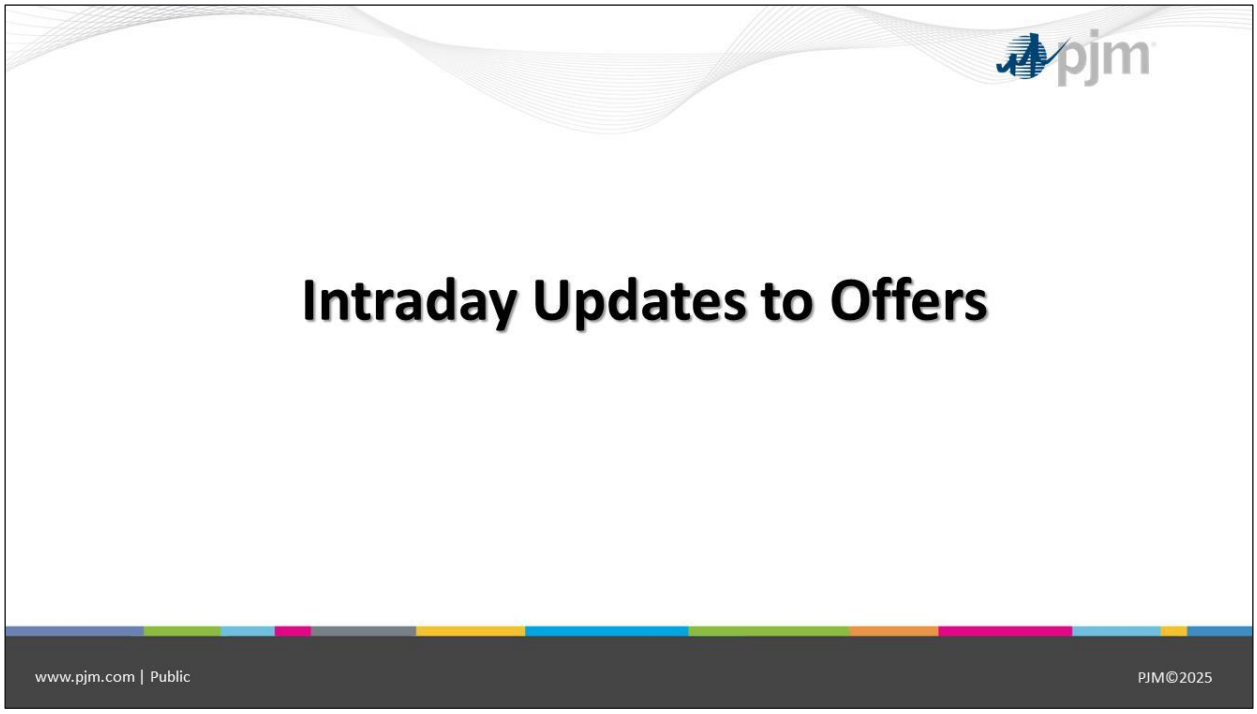
Intraday Updates to Offers



Incremental Energy Offer Price Updates

Type of Unit	Type of Schedule	Committed Hours	Uncommitted Hours
Cost-Based*	Cost	Increase/Decrease	Increase/Decrease
Price-Based	Price	Decrease	Increase/Decrease
	Cost	Increase/Decrease	Increase/Decrease

*Cost-Based units cannot have a Price-Based Schedule

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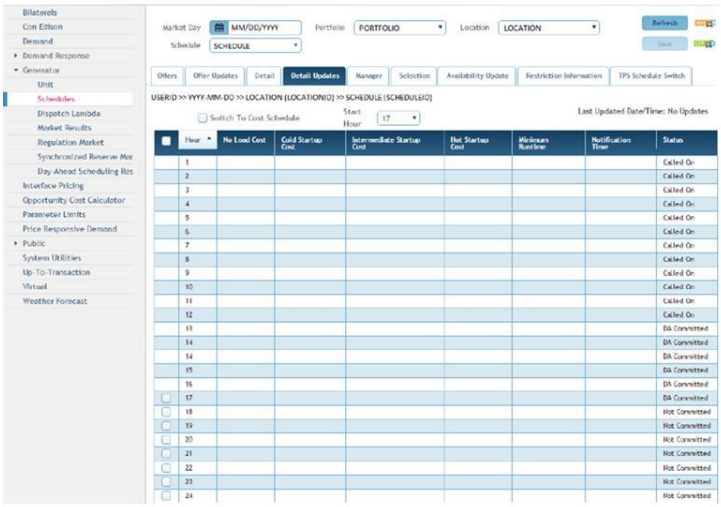
Price Increase Lockout Periods

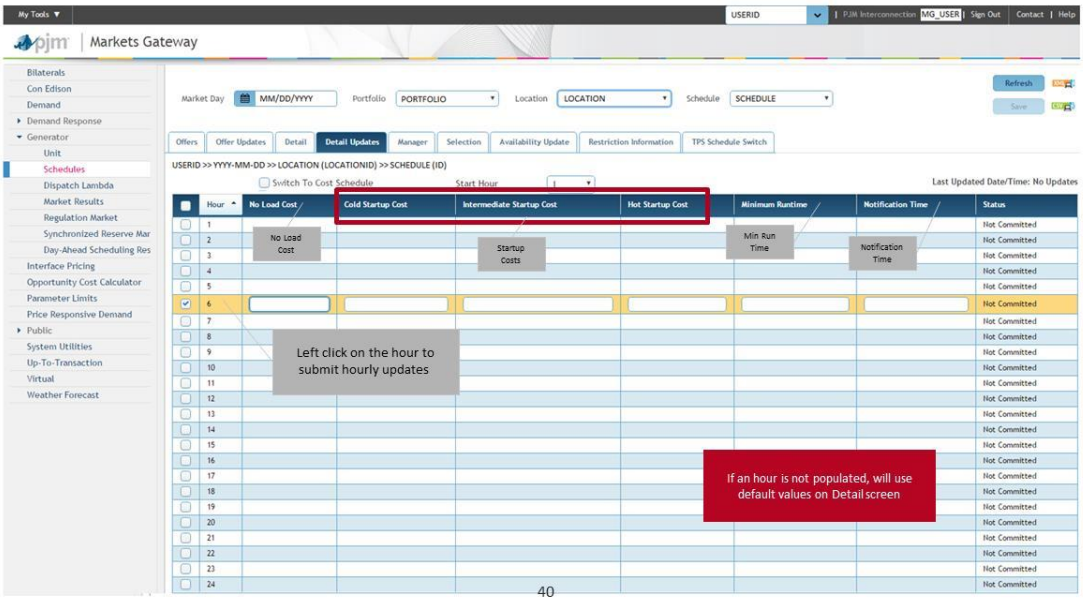


Real Time Updates to No Load and Startup Costs

No Load and Startup Costs (Cold, Intermediate, Hot) can be updated hourly via the ***Detail Updates*** page of Markets Gateway based on the following rules:

Type of Schedule	Startup/No load Election	Updates Permitted
Cost	Cost	Increase/Decrease hourly
Price	Cost	Increase/Decrease hourly
	Price	Changed for bi-annual periods

Detail Updates Screen in Markets Gateway



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Real Time Updates to Notification Time and Min Run Time

- Notification time and minimum run time can be updated via the Detail Updates Page of Markets Gateway based on the following rules:
  - May be updated hourly up to 65 minutes before the start of the target hour (excluding lockout periods)
  - Updates are used in Reliability Run and Real Time only
  - Min Run Time cannot be updated for committed hours
  - Updates made via the Detail Updates Screen
    - A PLS Exception needs submitted first to modify the value for any Parameter Limited Schedule

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Switch to Cost Schedule

- If a unit is committed on a price schedule and its cost schedule incremental energy offer subsequently exceeds its price schedule value, it may elect to be switched to its cost schedule based on the following rules:
  - Unit will be switched to use the cheapest available cost schedule
  - The unit must then stay on its cost schedule for the rest of the Operating Day
  - The price schedule will become unavailable and will not be permitted to be made available again for the rest of the Operating Day

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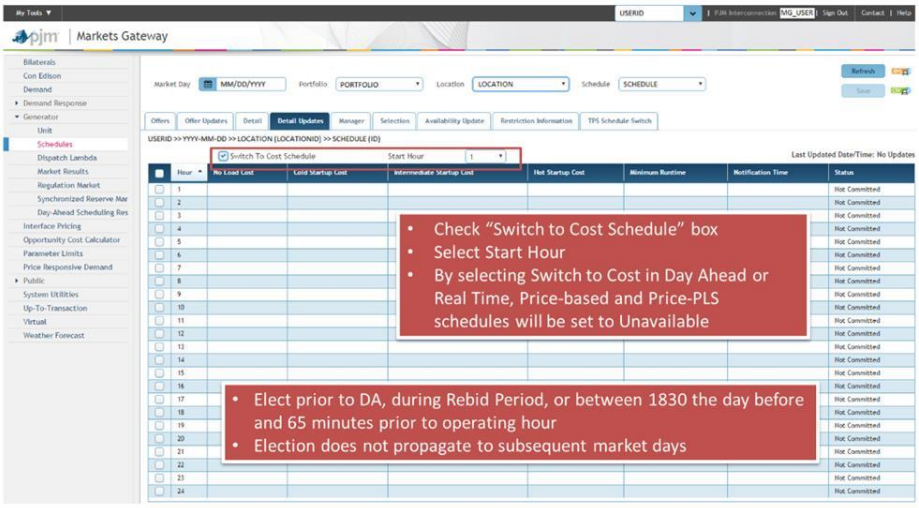
Switch to Cost Schedule in Markets Gateway



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Schedule Availability Update for Dual Fuel Units

- If a unit is designated as Dual Fuel on the ***Generator > Unit > Detail*** tab in Markets Gateway, schedule availability may be changed hourly throughout the operating day based on the following rules:
  - May be changed in Real Time only, between 1830 the day before and 65 minutes before the operating hour
  - For cost schedules only
  - Price schedule remains Available (*Note:* changing Availability does not imply switch to cost)
  - One cost schedule per fuel type may be Available at any one time
  - Can be changed for hours in which a schedule is not committed

Dual Fuel Units please view **FAQ Document** for additional guidance

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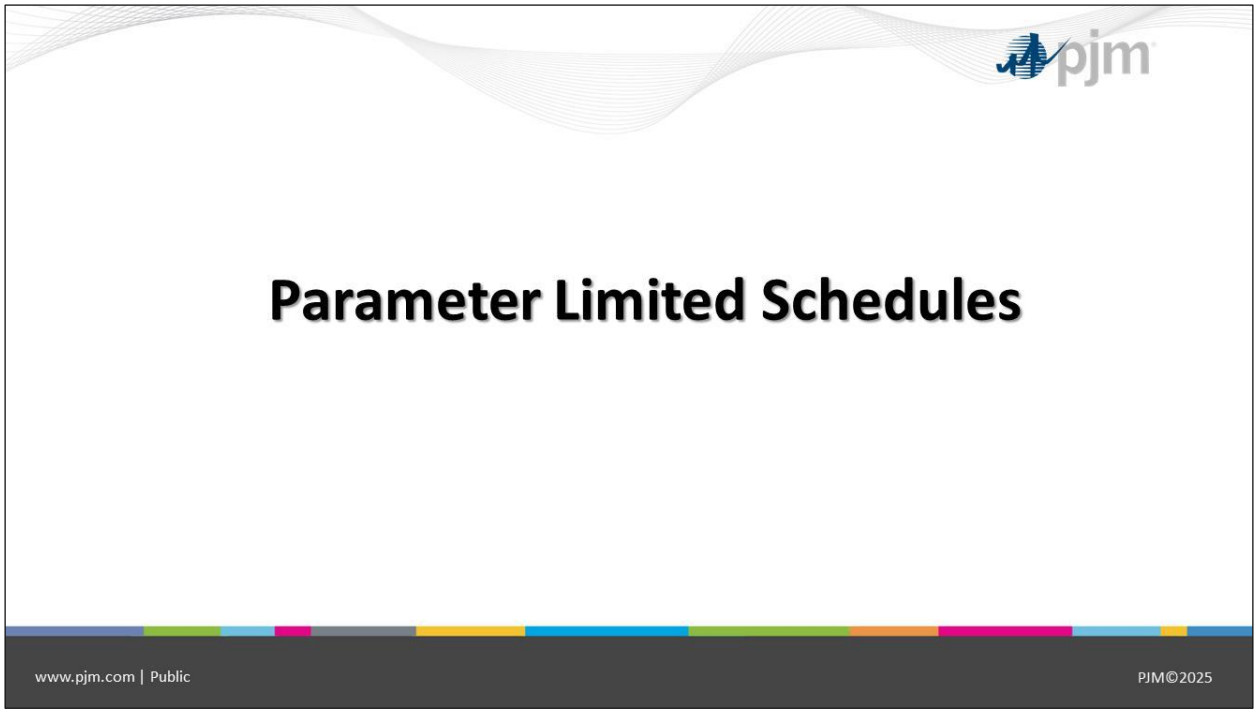
Offering Dual Fuel Generation with Intraday Offers FAQ: https://www.pjm.com/-/media/DotCom/etools/markets-gateway/ido-dual-fuel-faqs.pdf

Parameter Limited Schedules



Parameter Limited Schedules

- Parameter limits are **limitations** that **could be imposed** on the parameters that generators submit as part of their offers
- Capacity Resources are subject to pre-determined limits on physical offer parameters for any Parameter Limited Schedule

- Capacity Resources are required to submit
  - For Price Based Units: (1) at least one cost-based schedule that is parameter limited, (2) a price-based parameter limited schedule
  - For Cost Based Units: (1) at least one cost-based schedule that is parameter limited

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Parameter Limits for Capacity Resources

Parameter Limits Listed in OATT (per unit)
Turn Down Ratio
Minimum Down Time
Minimum Run Time
Maximum Daily Starts
Maximum Weekly Starts
Maximum Run Time
Start-Up Time
Notification Time

PJM posts unit class specific parameter limits in Section 6.6 of Schedule 1 in the **Operating Agreement**

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Unit Specific Parameter Adjustments

- A Capacity Market Seller that does not believe its Generation Capacity Resource can meet the PJM defined unit-specific values due to actual operating constraints may request adjusted unit-specific parameter limitations. Actual operating constraints may include:
  - Physical Operating Limitation
  - Environmental Limitation
  - Other Actual Constraints

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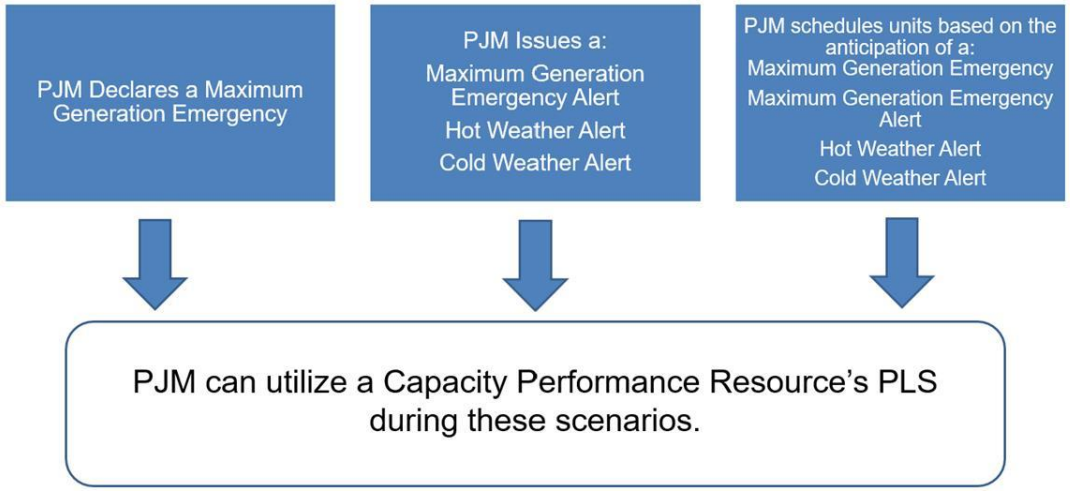
Parameter Limited Schedules Eligibility in Unit Commitment



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Schedule Selection Matrix - Price Based Units

	Fails TPS	Does Not Fail TPS
Non-Emergency Conditions	Committed on Cheapest of Cost-Based PLS offer or Price-based offer (non-PLS)	Committed on Price-based offer (Non-PLS)
Emergency Conditions	Committed on Cheapest of Cost-based PLS offer, Price-based (non-PLS), or Price-based PLS offer	Committed on Cheapest of Price-based offer (non-PLS) or Price-based PLS offer

Emergency conditions include a (issued or anticipated) Maximum Generation Emergency, Maximum Generation Emergency Alert, Hot Weather Alert, Cold Weather Alert.

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Current Selection of Cheapest Schedule

Day-Ahead Market: Commitment of resources across all 24 hours of the day are solved in a single solution

- Resources are mitigated on the schedule with the lowest overall production cost (considering the MW level at which they are committed in commitment solution)

Real Time Market: Commitment decisions happen separately from the 5-minute dispatch decisions

- Selection of the mitigated schedule must use an assumed MW level and commitment duration since the eventual RT dispatch MW and length of commitment beyond min run time is unknown at the time of commitment
- Resources are mitigated on the schedule with the lowest production cost at economic min output over the min run time of the schedule

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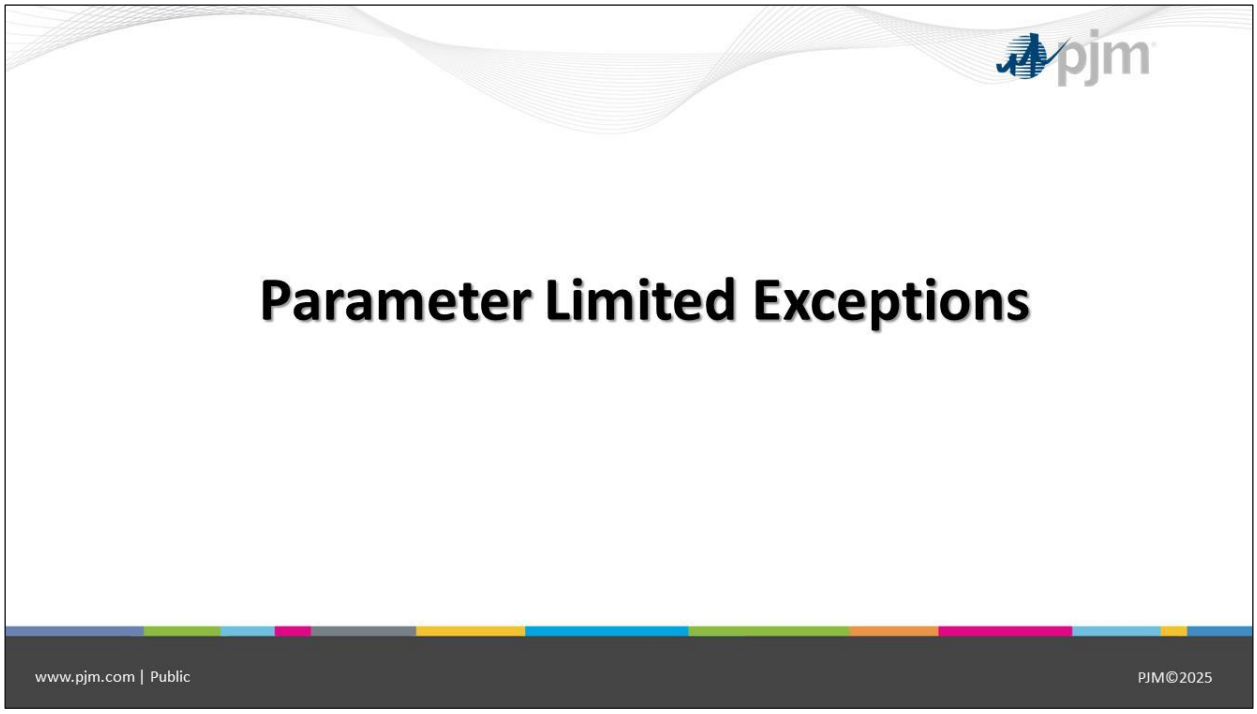
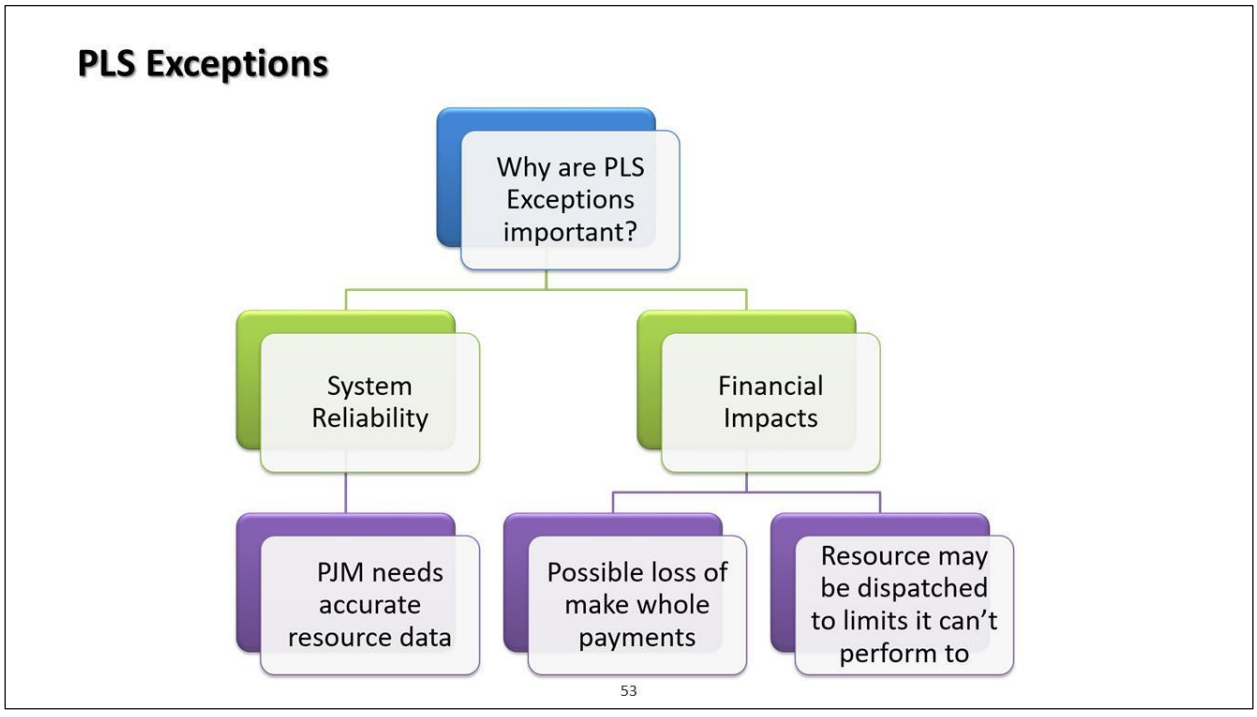
Parameter Limited Exceptions





Parameter Limited Schedule Exceptions

- A **physical operational limit** may occur that prevents a resource from operating to the Parameter Limited Schedule's minimum parameters
- **Exceptions** are used to alter a resource's established parameters in a Parameter Limited Schedule (PLS) when a physical operational limit occurs.

- PLS Exceptions fall under three different types:
  - Temporary Exception – A one-time exception lasting for thirty (30) days or less during the twelve month period from June 1 to May 31
  - Period Exception – Lasting for at least thirty-one (31) days but no more than one year during the twelve month period from June 1 to May 31
  - Persistent Exception – Lasting for at least one year

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Period and Persistent Exceptions

- Period and Persistent Exceptions are submitted prior to the delivery year
  - Must be sent by February 28 for the June 1 delivery year submitted via email
  - PJM provides approval by April 15
  - Historical resource operating data or technical information needed

- Physical operational limitations for period or persistent exception requests could include:
  - Physical design modifications
  - Operating limits imposed by federal, state or local regulatory requirements
  - Environmental permit limitations under non-emergency conditions

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Temporary Exceptions

- Temporary Exception requests can be submitted in Markets Gateway using "Parameter Limits".
- Documentation needs to be submitted within three days following the start of the temporary exception.
- Temporary Exceptions may only be requested one-time for the same physical and actual constraint per occurrence.

- Physical Operational Limitations for temporary exception requests include but are not limited to:
  - Short term equipment failures
  - Short term fuel quality problems such as excessive moisture in coal fired units
  - Environmental permit limitations under non-emergency conditions

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Temporary Exceptions

The process and timeline for submitting an exception in Markets Gateway is as follows:

By 11:00 am prior to the close of DAM
- Initial Deadline to request a parameter exception that will begin the next operating day
- Temporary Exception Request is submitted
- Revise PLS Schedules and change the parameter for the next operating day

During Intra-day Operations
- Limitation requiring adjustment occurs during the operating day
- Temporary Exception Request is submitted
- Intra-day parameters are updated

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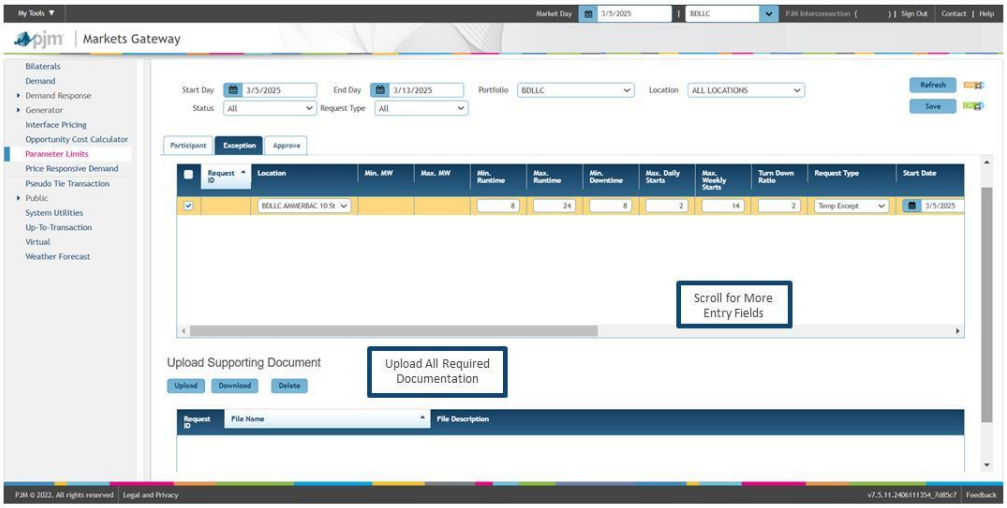
Temporary Exception Submission



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Temporary Exception Documentation

- Unit Name
- Parameter Limit Requested
- Reason for Exception Request
- eDART ticket number
- Justification for Exception Request
- Date on which the exception period will end

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Temporary Exception and Operating Reserve Credits

- If a generator is committed or running on its cost-based or price-based parameter limited schedule, the generator can be made-whole for intervals during which offered parameters are less flexible than unit-specific parameters if the documentation (*within 3 business days*) to support the Temporary Exception is received and supports the exception was needed for an actual physical constraint.
- If the documentation does not support this or no documentation is received, PJM has the option to refer the resource to the Independent Market Monitor (IMM)/FERC.
- If the parameters are adjusted such that the unit is not dispatched or dispatched at a lower MW value during a PAI, then the unit will receive a performance penalty.

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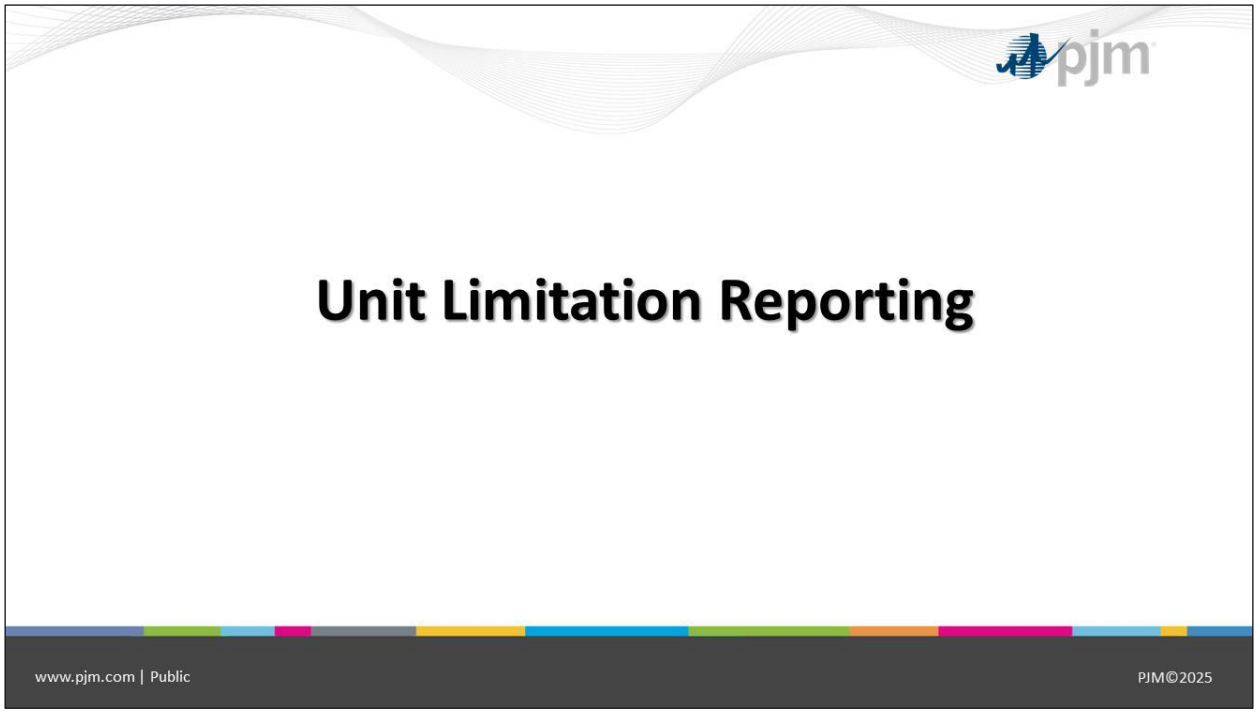
Unit Limitation Reporting



Unit Limitations Reporting (via Markets Gateway)

- Restrictions that **limit run time**, and can be **monitored in advance** of current operating day and/or Day-Ahead:
  - Onsite Fuel Inventory
  - Emissions Hours
  - Demineralized Water
  - Cooling Water
  - Other Consumables

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Unit Limitations Reporting in Markets Gateway

- Resources have the ability to enter unit-level or fuel-level limitation information, as a means to provide more dynamic notice to dispatch if a unit is running close to its limitations by:
  - Providing a mechanism for members to regularly update limitation information in terms of "hours remaining" for a specified time window
  - Linking member-provided limitation hours to actual unit run hours to monitor how close unit is to its limitation
  - Displaying limitation information in tool for PJM Dispatch & Operations Planning for enhanced operational awareness

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M13, Section 6.4 - Resource Limitation Reporting

Resource Limited Unit (Type)	Resource Limitations					PJM Member Actions
	On-site Fuel Only	Emissions	Cooling Water	Demin. Water	Other	
CT	< 72 hours					Report remaining run hours in the ***Resource Limitation*** page in Markets Gateway
	< 24 hours					Update ***Max Run*** field in Markets Gateway
	< 16 hours					Verbally notify PJM Master Coordinator
	< 16 hours					Offer as Maximum Emergency (if PJM issues Cons. Ops/Hot/Cold Weather Alert) and report as detailed in the *Maximum Emergency Reporting and Documentation* section of PJM Manual 13
Steam	< 240 hours (coal units only*)					Can be offered as Maximum Emergency consistent with the requirements noted below
	< 72 hours					Report remaining run hours in the ***Resource Limitation*** page in Markets Gateway
	< 32 hours					Verbally notify PJM Master Coordinator
	< 32 hours					Offer as Maximum Emergency (if PJM issues Cons. Ops/Hot/Cold Weather Alert) and report as detailed in the *Maximum Emergency Reporting and Documentation* section of PJM Manual 13
	< 24 hours					Update ***Max Run*** fields in Markets Gateway

Yellow Highlighting - Minimum Level Thresholds for Resource Limited Units

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M13, Section 6.4 - Resource Limitation Reporting

CEJA Units please view Illinois CEJA Reliability Guidance for additional information

Gas-Only Units with Fuel Limitations:

1) These are not considered Resource Limited Units, and should not be reported as Resource Limited in Markets Gateway.
2) These should not be placed in Max Emergency, following PJM Cons. Ops/Hot/Cold Weather Alerts, but remain Economic, unless directed otherwise by PJM.
3) Gas-Only Units with other Resource Limitations (emissions, etc.) should report as indicated in the above table.

Dual Fuel (Gas/Other) Units:

1) These should report as Resource Limited for only on-site fuel restrictions or other Resource Limitations as indicated in the above table. They should not report natural gas fuel restrictions.
2) These may be placed in Max Emergency, following PJM Cons. Ops/Hot/Cold Weather Alerts, for only on-site fuel restrictions (when unavailable on natural gas and on-site fuel falls below Minimum Level Thresholds) or other Resource Limitations as indicated in the above table.

***Coal units with less than 240 hours remaining:**

1) Coal units with less than 240 hours but more than 32 hours can be offered as Maximum Emergency by the generation owner unless:
   a) PJM has issued a Hot Weather Alert, Cold Weather Alert, or declares Conservative Operations, or
   b) PJM denies the use of Maximum Emergency for any reason, including but not limited to a potential thermal or voltage violation, to avoid running a CEJA limited unit with no economic hours remaining, a black start concern, tornado/hurricanes, extreme weather, GMD activity, etc.
2) If a coal unit is offered into the Maximum Emergency state under the above conditions, it may remain in that state until one of the following is true:
   a) The generation owner elects to offer the unit as economic
   b) The remaining run hours reaches 21-days
   c) PJM has issued a Hot Weather Alert, Cold Weather Alert, or declares Conservative Operations, or
   d) PJM denies the use of Maximum Emergency for any reason, including but not limited to a potential thermal or voltage violation, to avoid running a CEJA limited unit with no economic hours remaining, a black start concern, tornado/hurricanes, extreme weather, GMD activity, etc.

Resource Limitation Reporting Table - Manual 13 Section 6.4

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CEJA Units please view Illinois CEJA Reliability Guidance for additional information

Offer Unit as Maximum Emergency

To offer a unit as **Maximum Emergency**, 1 of 4 qualifications must be met:

1. Environmental Limits

- If a resource has imposed limits on its run hours due to environmental regulations, it may be eligible for Maximum Emergency
- Units limited by laws, like the Illinois Climate and Equitable Jobs Act (CEJA), may not use Maximum Emergency to conserve hours
- Units with environmental permits can only use Maximum Emergency under specific conditions:
  - Economic hours left are fewer than the minimum run time plus one hour
  - Total hours remaining are less than the threshold (e.g., 16 hours for CTs, 32 hours for CC/STs)

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Offer Unit as Maximum Emergency

2. Fuel Limits

- If external physical events, such as disruptions to fuel supply, affect the resource's availability, the unit can be offered for Maximum Emergency
- **Note**: Interruptions due to contractual obligations (e.g., under interruptible service agreements) are not considered outside the owner's control

3. Temporary Emergency Conditions

- If there are physical limitations at the unit, like a safety notice from the Original Equipment Manufacturer (OEM) or insurance carrier limiting its operation, the unit may qualify for Maximum Emergency
- These MWs must be available to PJM upon request
  - If the unit can't provide them, it should be reported as an outage

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Offer Unit as Maximum Emergency

4. Temporary MW Additions

- Some resources can temporarily produce additional MWs through methods like oil topping or boiler over-pressure
- These MWs are only available under certain conditions, usually specified by the OEM or insurance carrier
- Non-qualifying scenarios include increased wear and tear, duct firing, and similar techniques unless specified by the OEM

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Maximum Emergency Reporting and Documentation

- All units that utilize Maximum Emergency should:
  - Report remaining run hours in Markets Gateway through the "Unit Limitations" page
  - Enter an informational eDART ticket for all uses of Maximum Emergency
  - Verbally notify the PJM Generation Dispatcher for all uses of Maximum Emergency
  - Send email to FuelCostPolicyAnalysis@pjm.com within 7 business days

See Manual 13 section 6.4 for additional details

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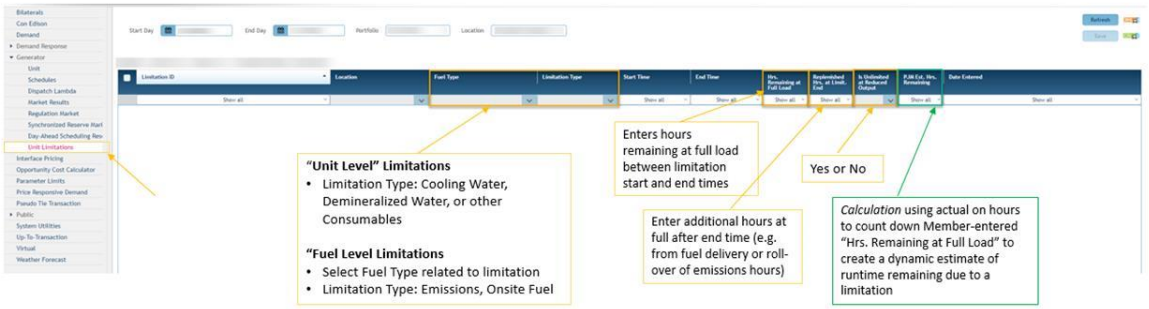
Generator > Unit Limitations



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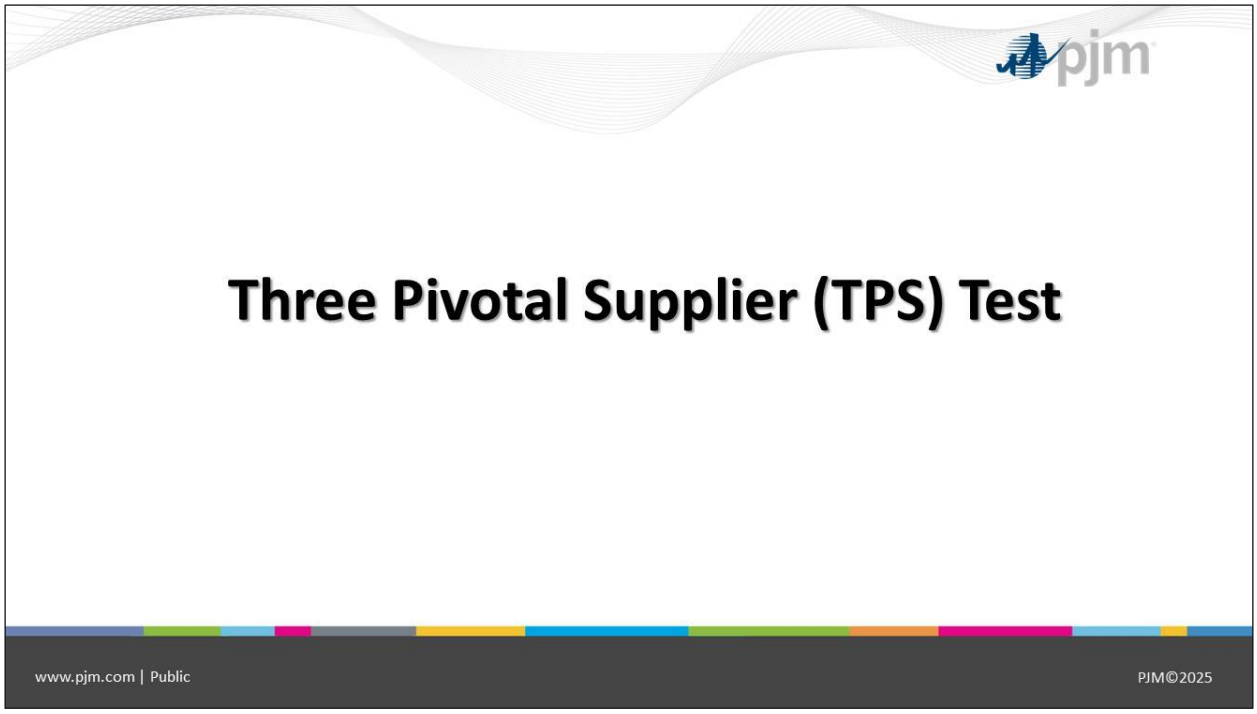
Three Pivotal Supplier (TPS) Test



Three Pivotal Supplier Test

- The Three-Pivotal Supplier (TPS) test is a **test for structural market power**
  - It is a test concentration of ownership of *supply* relative to *demand*
  - The test **does not** examine the competitiveness of offers or other factors

- PJM utilizes the Three Pivotal Supplier (TPS) Test to mitigate market power for:
  - Energy Market
  - Regulation Market
  - RPM
  - Shortage Pricing

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Three Pivotal Supplier Test

- A test failure means that the ownership of the supply needed is concentrated among few suppliers:
  - Those suppliers have the potential to exercise market power (structural market power)
  - It does not mean those suppliers are attempting to exercise market power
  - A test failure triggers mitigation as a preventative step in the event of a concentration of ownership

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Three Pivotal Supplier Test

- Theoretical concept of how the Three Pivotal Supplier Test works:
  - Each supplier is ranked from largest to smallest offered MW of eligible supply
  - If there are not enough MWs to satisfy the constraint without using the top two suppliers' output plus the output of the supplier being tested, then those three suppliers are jointly pivotal
  - Because the supply can be constrained by those three owners and the demand could potentially not be satisfied, they are considered to have structural market power
  - If any test supplier fails, then the top two suppliers also fail
    - **Resources that fail TPS are placed on the lower production cost of the cost schedule or price schedule**

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TPS Schedule Switch – Markets Gateway

- Markets Gateway's ***TPS Schedule Switch*** page will indicate resources that have been switched to different schedules due to a constraint after failing the TPS test:
  - Shows the original and new schedule for the specific unit
  - Shows which constraint and contingency that caused the unit to be offer-capped

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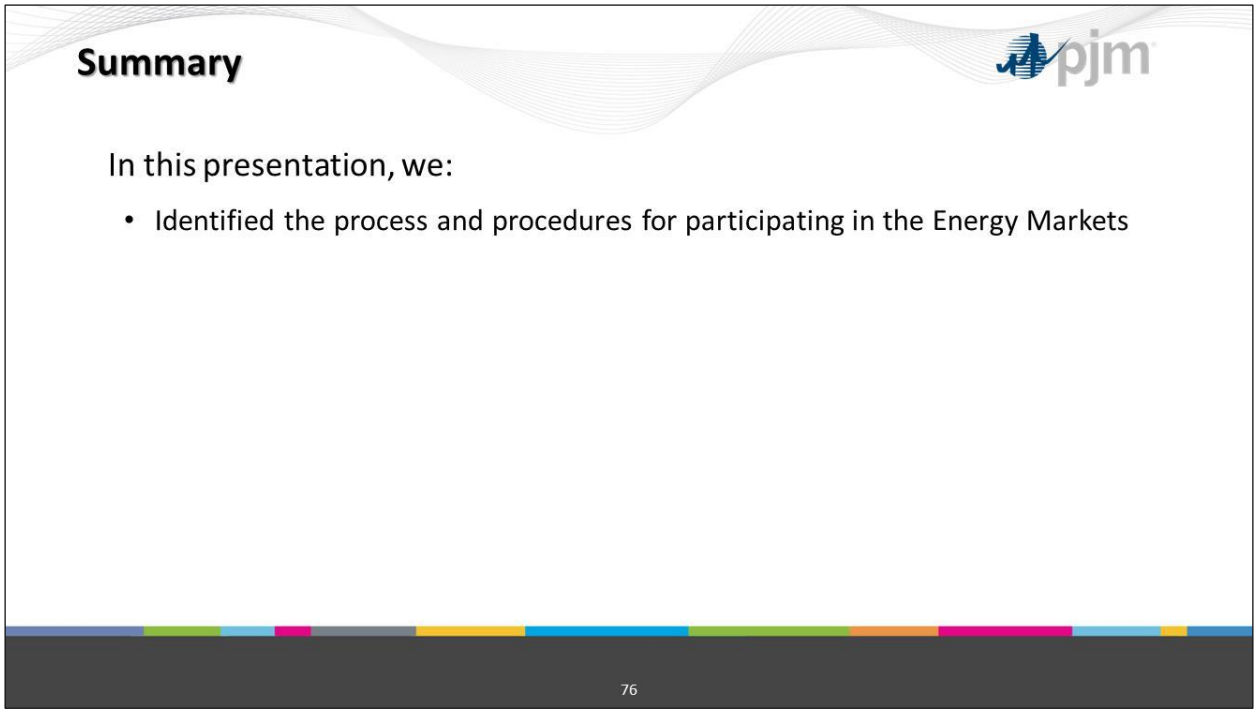
Summary



Questions?

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Member Community

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