






Markets Gateway – Hybrid Resource Participation

As of May 15, 2023

Action Required	Deadline	Who May Be Affected
<p>Electric Storage Resources participating in the ESR model, as well as Hybrid Resource owners, should review the User Interface changes in Markets Gateway when it's available in Train, or make the necessary XML changes per the updated Markets Gateway External Interface Specification Guide.</p>	<p>June 1, 2023</p>	<p>Markets Gateway UI & XML Users</p>
		

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hybrid Resource Participation (FERC approved)						◆ Production 6/1						

- In July 2022, FERC approved Phase 1B of PJM including Hybrid Resources in their Markets
 - “Hybrid Resource” – a resource composed of one generation component and one energy storage component behind the same point of interconnection operating in the capacity, energy, and/or ancillary services market(s) as a single integrated resource. A hybrid resource forms all or part of a Mixed Technology Resource.
 - Phase 1 hybrid project includes solar & storage resources
 - If hybrid resource is comprised of only renewable generation, it will be treated as intermittent generation
 - 2 distinct types of Hybrid Resources:
 - “Open-Loop Hybrid” – physically and contractually *capable* of charging its storage component from the grid
 - “Closed-Loop Hybrid” – physically or contractually *incapable* of charging from the grid

- A Hybrid Resource must be permitted to:
 - Sell the Energy, Capacity, and Ancillary Service the resource is technically capable of providing
 - Be dispatched and set price as seller and buyer
 - Account for the physical and operational characteristics of Electric Storage Resources (ESR) through bidding parameters or other means
 - Specify that the sale of electric energy must be at the wholesale LMP
- Manual changes will be reviewed and approved with Stakeholders at the April & May MIC/MRC
- FERC approved and PJM is expecting to go live with Hybrid Resource (Phase 1) capability effective June 1, 2023.

- The Markets Gateway changes that support Hybrid Resource functionality will impact only participants with ESR or Hybrid resource ownership
- Markets Gateway changes will be installed in the Train environment by May 5, 2023
- The Markets Gateway User Guide & External Interface Specification Guide will be updated to reflect the new Hybrid Resource functionality
- The Production go-live date is scheduled for June 1, 2023

- The following fields will be used in Markets Gateway to accommodate Hybrid Resources
 - Mode selection (charging, discharging, continuous, intermittent)
 - Minimum/Maximum Discharge Limit (updateable intra-hour)
 - Minimum/Maximum Charge Limit (updateable intra-hour)
 - Emergency Minimum/Maximum Discharge Limit (updateable intra-hour)
 - Emergency Minimum/Maximum Charge Limit (updateable intra-hour)
 - Charge Synch Max (daily default and also hourly)
 - Discharge Synch Max (daily default and also hourly)
 - Charge Secondary Max (daily default and also hourly)
 - Discharge Secondary Max (daily default and also hourly)
 - Charge Up/Down ramp rate (daily default and also hourly)
 - Discharge Up/Down ramp rate (daily default and also hourly)
 - State of Charge Min/Max (information only)



Generator > Unit > Hourly Updates (Open Loop Hybrid)

*Disclaimer: Bid data in the screenshot below is for educational purposes only

- Bilaterals
- Demand
- ▶ Demand Response
- ▼ Generator
 - Unit
 - Schedules
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- ▶ Public
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 - Weather Forecast

Portfolio PORTFOLIO Location TEST UNIT 01

Hourly Updates | Detail | Ramp Rates | Ramp Rates Updates | Wind Forecast | Solar Forecast | IntraDay Opt Out | Storage Updates

PJMST >> 2023-04-01 >> TEST UNIT 01 (UnitID)

Last Updated Date/Time: 2023-03-30 14:25:30

Discharge Emer. Min. : 2.0 Econ. Min. : 2.0 Econ. Max. : 2.0 Emer. Max. : 2.0 Charge Emer. Min. : -10.0 Econ. Min. : -10.0 Econ. Max. : -16.0 Emer. Max. : -16.0 Commit Status : Unavailable Fixed Gen : No

'Flexible?' & 'Ancillary Only?' columns are hidden for Hybrid resources

Hour	Discharge Emer. Min. (Default)	Discharge Emer. Min. (MW)	Discharge Econ. Min. (Default)	Discharge Econ. Min. (MW)	CIR	Discharge Econ. Max. (Default)	Discharge Econ. Max. (MW)	Discharge Emer. Max. (Default)	Discharge Emer. Max. (MW)	Charge Emer. Min. (Default)	Charge Emer. Min. (MW)	Charge Econ. Min. (Default)	Charge Econ. Min. (MW)	Charge Econ. Max. (Default)	Charge Econ. Max. (MW)	Charge Emer. Max. (Default)	Charge Emer. Max. (MW)	Charge Synchron. Max. (MW)	Discharge Synchron. Max. (MW)	Discharge Secondary Max. (MW)	Charge Synchron. Max. (MW)	Charge Secondary Max. (MW)	Commit Status	Fixed Gen.?	Area	Condense Notification Time
<input type="checkbox"/> 1	2.0	0.0	2.0	0.0		2.0	0.0	2.0	0.0	-10.0		-10.0		-16.0		-16.0							Charge	Yes	MAD	
<input type="checkbox"/> 2	2.0	0.0	2.0	0.0		2.0	0.0	2.0	0.0	-10.0		-10.0		-16.0		-16.0							Discharge	Yes	MAD	
<input type="checkbox"/> 3	2.0	0.0	2.0	0.0		2.0	0.0	2.0	0.0	-10.0		-10.0		-16.0		-16.0							Continuous	Yes	MAD	
<input type="checkbox"/> 4	2.0	0.0	2.0	0.0		2.0	0.0	2.0	0.0	-10.0		-10.0		-16.0		-16.0			New 'Intermittent' mode added for Hybrids				Intermittent	Yes	MAD	
<input type="checkbox"/> 5	2.0	0.0	2.0	0.0		2.0	0.0	2.0	0.0	-10.0		-10.0		-16.0		-16.0							Unavailable	Yes	MAD	
<input type="checkbox"/> 6	2.0	0.0	2.0	0.0		2.0	0.0	2.0	0.0	-10.0		-10.0		-16.0		-16.0							Unavailable	Yes	MAD	
<input type="checkbox"/> 7	2.0	0.0	2.0	0.0		2.0	0.0	2.0	0.0	-10.0		-10.0		-16.0		-16.0							Unavailable	Yes	MAD	
<input type="checkbox"/> 8	2.0	0.1	2.0	0.1		2.0	0.1	2.0	0.1	-10.0		-10.0		-16.0		-16.0							Unavailable	Yes	MAD	
<input type="checkbox"/> 9	2.0	0.2	2.0	0.2		2.0	0.2	2.0	0.2	-10.0		-10.0		-16.0		-16.0							Unavailable	Yes	MAD	
<input type="checkbox"/> 10	2.0	0.2	2.0	0.2		2.0	0.2	2.0	0.2	-10.0		-10.0		-16.0		-16.0							Unavailable	Yes	MAD	
<input type="checkbox"/> 11	2.0	0.3	2.0	0.3		2.0	0.3	2.0	0.3	-10.0		-10.0		-16.0		-16.0							Unavailable	Yes	MAD	
<input type="checkbox"/> 12	2.0	0.4	2.0	0.4		2.0	0.4	2.0	0.4	-10.0		-10.0		-16.0		-16.0							Unavailable	Yes	MAD	
<input type="checkbox"/> 13	2.0	0.4	2.0	0.4		2.0	0.4	2.0	0.4	-10.0		-10.0		-16.0		-16.0							Unavailable	Yes	MAD	
<input type="checkbox"/> 14	2.0	0.4	2.0	0.4		2.0	0.4	2.0	0.4	-10.0		-10.0		-16.0		-16.0							Unavailable	Yes	MAD	
<input type="checkbox"/> 15	2.0	0.3	2.0	0.3		2.0	0.3	2.0	0.3	-10.0		-10.0		-16.0		-16.0							Unavailable	Yes	MAD	
<input type="checkbox"/> 16	2.0	0.3	2.0	0.3		2.0	0.3	2.0	0.3	-10.0		-10.0		-16.0		-16.0							Unavailable	Yes	MAD	
<input type="checkbox"/> 17	2.0	0.2	2.0	0.2		2.0	0.2	2.0	0.2	-10.0		-10.0		-16.0		-16.0							Unavailable	Yes	MAD	
<input type="checkbox"/> 18	2.0	0.2	2.0	0.2		2.0	0.2	2.0	0.2	-10.0		-10.0		-16.0		-16.0							Unavailable	Yes	MAD	
<input checked="" type="checkbox"/> 19	2.0	0.2	2.0	0.2		2.0	0.2	2.0	0.2	-10.0	-0.1	-10.0	-0.1	-16.0	-0.1	-16.0	-0.1	0.2	0.2	-0.2	-0.2		Not Available	Y	MAD	
<input type="checkbox"/> 20	2.0	0.0	2.0	0.0		2.0	0.0	2.0	0.0	-10.0		-10.0		-16.0		-16.0							Not Available	Yes	MAD	
<input type="checkbox"/> 21	2.0	0.0	2.0	0.0		2.0	0.0	2.0	0.0	-10.0		-10.0		-16.0		-16.0							Charge	Yes	MAD	
<input type="checkbox"/> 22	2.0	0.2	2.0	0.2		2.0	0.3	2.0	0.3	-10.0	-0.1	-10.0	-0.1	-16.0	-0.1	-16.0	-0.1	0.2	0.3	-0.2	-0.2		Continuous	Yes	MAD	
<input type="checkbox"/> 23	2.0	0.0	2.0	0.0		2.0	0.0	2.0	0.0	-10.0		-10.0		-16.0		-16.0							Intermittent	Yes	MAD	
<input type="checkbox"/> 24	2.0	0.0	2.0	0.0		2.0	0.0	2.0	0.0	-10.0		-10.0		-16.0		-16.0							Unavailable	Yes	MAD	



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Generator > Unit > Hourly Updates (Close Loop Hybrid)

PJM | Markets Gateway

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Portfolio Location

Refresh Save

Hourly Updates | Detail | Ramp Rates | Ramp Rates Updates | Wind Forecast | Solar Forecast | IntraDay Opt Out | Storage Updates

PJMST >> 2023-04-01 >> TEST UNIT 02 (UnitID) Last Updated Date/Time: 2023-03-27 12:12:54

Discharge Emer. Min. : Econ. Min. : 0.1 Econ. Max. : 1.0 Emer. Max. : 1.2 Commit Status : Unavailable Fixed Gen : Yes

All Charging columns are hidden for Close Loop hybrids

'Flexible?' & 'Ancillary Only?' columns are hidden for Hybrid resources

<input type="checkbox"/>	Hour ^	Discharge Emer. Min. (Default)	Discharge Emer. Min. (MW)	Discharge Econ. Min. (Default)	Discharge Econ. Min. (MW)	CIR	Discharge Econ. Max. (Default)	Discharge Econ. Max. (MW)	Discharge Emer. Max. (Default)	Discharge Emer. Max. (MW)	Commit Status	Fixed Gen.?	Area	Condense Notification Time
<input type="checkbox"/>	1		0.0	0.1	0.0		1.0	0.0	1.2	0.0	Discharge	Yes	MAD	
<input type="checkbox"/>	2		0.0	0.1	0.0		1.0	0.0	1.2	0.0	Intermittent	Yes	MAD	
<input type="checkbox"/>	3		0.0	0.1	0.0		1.0	0.0	1.2	0.0	Unavailable	Yes	MAD	
<input checked="" type="checkbox"/>	4		<input type="text" value="0"/>	0.1	<input type="text" value="0"/>		1.0	<input type="text" value="0"/>	1.2	<input type="text" value="0"/>	Not Available	Yes	MAD	<input type="text"/>
<input type="checkbox"/>	5		0.0	0.1	0.0		1.0	0.0	1.2	0.0	Not Available	Yes	MAD	
<input type="checkbox"/>	6		0.0	0.1	0.0		1.0	0.0	1.2	0.0	Discharge	Yes	MAD	
<input type="checkbox"/>	7		0.0	0.1	0.0		1.0	0.0	1.2	0.0	Intermittent	Yes	MAD	
<input type="checkbox"/>	8		0.1	0.1	0.1		1.0	0.1	1.2	0.1	Unavailable	Yes	MAD	
<input type="checkbox"/>	9		0.1	0.1	0.1		1.0	0.1	1.2	0.1	Unavailable	Yes	MAD	
<input type="checkbox"/>	10		0.2	0.1	0.2		1.0	0.2	1.2	0.2	Unavailable	Yes	MAD	
<input type="checkbox"/>	11		0.2	0.1	0.2		1.0	0.2	1.2	0.2	Unavailable	Yes	MAD	
<input type="checkbox"/>	12		0.2	0.1	0.2		1.0	0.2	1.2	0.2	Unavailable	Yes	MAD	
<input type="checkbox"/>	13		0.2	0.1	0.2		1.0	0.2	1.2	0.2	Unavailable	Yes	MAD	
<input type="checkbox"/>	14		0.2	0.1	0.2		1.0	0.2	1.2	0.2	Unavailable	Yes	MAD	
<input type="checkbox"/>	15		0.2	0.1	0.2		1.0	0.2	1.2	0.2	Unavailable	Yes	MAD	
<input type="checkbox"/>	16		0.2	0.1	0.2		1.0	0.2	1.2	0.2	Unavailable	Yes	MAD	
<input type="checkbox"/>	17		0.1	0.1	0.1		1.0	0.1	1.2	0.1	Unavailable	Yes	MAD	
<input type="checkbox"/>	18		0.1	0.1	0.1		1.0	0.1	1.2	0.1	Unavailable	Yes	MAD	
<input type="checkbox"/>	19		0.1	0.1	0.1		1.0	0.1	1.2	0.1	Unavailable	Yes	MAD	
<input type="checkbox"/>	20		0.0	0.1	0.0		1.0	0.0	1.2	0.0	Unavailable	Yes	MAD	
<input type="checkbox"/>	21		0.0	0.1	0.0		1.0	0.0	1.2	0.0	Unavailable	Yes	MAD	
<input type="checkbox"/>	22		0.0	0.1	0.0		1.0	0.0	1.2	0.0	Unavailable	Yes	MAD	
<input type="checkbox"/>	23		0.0	0.1	0.0		1.0	0.0	1.2	0.0	Unavailable	Yes	MAD	
<input type="checkbox"/>	24		0.0	0.1	0.0		1.0	0.0	1.2	0.0	Unavailable	Yes	MAD	

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Generator > Unit > Detail (Open Loop Hybrid)

- Bilaterals
- Demand
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- ▼ Generator
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- Pseudo Tie Transaction
- ▶ Public
 - System Utilities
 - Up-To-Transaction
 - Virtual
 - Weather Forecast

Portfolio Location

Refresh XML
Save CSV

Hourly Updates **Detail** Ramp Rates Ramp Rates Updates Wind Forecast Solar Forecast IntraDay Opt Out Storage Updates

PJMST >> 2023-03-31 >> TEST UNIT 01 (UnitID)

Last Updated Date/Time: 2023-03-29 11:45:18

Description

Type of Unit	<input type="text" value="SolarBattery"/>	Plant Name	<input type="text" value="PJM"/>
Unit Number	<input type="text" value="1"/>	Unit Name	<input type="text" value="TEST UNIT 01"/>
Node	<input type="text" value="PJM69 KV NODE"/>	Operating Company	<input type="text" value="PJMST"/>
Capacity Resource	<input checked="" type="checkbox"/>	Regulation Resource	<input type="checkbox"/>
Capacity Performance	<input type="checkbox"/>	Energy Storage	<input type="checkbox"/>
Fast Start	<input checked="" type="checkbox"/>	Open Loop Hybrid	<input checked="" type="checkbox"/>

Defaults

Commit Status	<input type="text" value="Not Available"/>	Ramp Rate	<input type="text"/>
Fixed Generation	<input type="text" value="Not Available"/>		

Miscellaneous

Reduced Ramp Rate Percent	<input type="text" value="0"/>	Self Supply	<input type="checkbox"/>
Discharge Synch Max	<input type="text" value="2"/>	Charge Synch Max	<input type="text" value="-10"/>
State Of Charge Min	<input type="text" value="2"/>	State Of Charge Max	<input type="text" value="-10"/>
Discharge Secondary Max	<input type="text" value="2"/>	Charge Secondary Max	<input type="text" value="-10"/>

Economic & Emergency

Discharge Emergency Min	<input type="text" value="2"/>	Charge Emergency Min	<input type="text" value="-10"/>
Discharge Economic Min	<input type="text" value="2"/>	Charge Economic Min	<input type="text" value="-10"/>
Discharge Economic Max	<input type="text" value="2"/>	Charge Economic Max	<input type="text" value="-16"/>
Discharge Emergency Max	<input type="text" value="2"/>	Charge Emergency Max	<input type="text" value="-16"/>



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Generator > Unit > Detail (Close Loop Hybrid)

pjm | Markets Gateway

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Portfolio **PORTFOLIO** Location **TEST UNIT 02**

Refresh **RMH**
Save **GSV**

Hourly Updates **Detail** Ramp Rates Ramp Rates Updates Wind Forecast Solar Forecast IntraDay Opt Out Storage Updates

PJMST >> 2023-04-01 >> TEST UNIT 02 (UnitID) Last Updated Date/Time: 2023-03-27 11:28:09

Description

Type of Unit	<input type="text" value="SolarBattery"/>	Plant Name	<input type="text" value="PJM"/>
Unit Number	<input type="text" value="2"/>	Unit Name	<input type="text" value="TEST UNIT 02"/>
Node	<input type="text" value="PJM 69KV NODE"/>	Operating Company	<input type="text" value="PJMST"/>
Capacity Resource	<input checked="" type="checkbox"/>	Regulation Resource	<input type="checkbox"/>
Capacity Performance	<input type="checkbox"/>	Energy Storage	<input type="checkbox"/>
Fast Start	<input checked="" type="checkbox"/>	Closed Loop Hybrid	<input checked="" type="checkbox"/>

Defaults

Commit Status	<input type="text" value="Not Available"/>	Charge & Continuous modes are hidden for Close Loop Hybrid	Ramp Rate	<input type="text"/>
Fixed Generation	<input type="text" value="Not Available"/>			
	<input type="text" value="Discharge"/>			
	<input type="text" value="Intermittent"/>			

Miscellaneous

Reduced Ramp Rate Percent	<input type="text" value="0"/>	Self Supply	<input type="checkbox"/>
Discharge Synch Max	<input type="text" value="1"/>	State Of Charge Max	<input type="text"/>
State Of Charge Min	<input type="text" value="0.2"/>	Charge Synch Max & Charge Secondary Max fields are hidden for Close Loop Hybrid	
Discharge Secondary Max	<input type="text" value="1"/>		

Economic & Emergency

Discharge Emergency Min	<input type="text"/>	All Charge fields are hidden for Close Loop Hybrid
Discharge Economic Min	<input type="text" value="0.1"/>	
Discharge Economic Max	<input type="text" value="1"/>	
Discharge Emergency Max	<input type="text" value="1.2"/>	

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Markets Gateway

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Portfolio

Location

Hourly Updates
Detail
Ramp Rates
Ramp Rates Updates
Wind Forecast
Solar Forecast
IntraDay Opt Out
Storage Updates

PJMTST >> 2023-03-31 >> TEST UNIT 01 (UnitID)

MW	Up Ramp Rate	Down Ramp Rate
-1.5	2.0	2.0
-1.0	1.0	1.0
1.0	4.0	4.0
1.5	3.0	3.0

One continuous ramp rate that supports negative MW for Open Loop Hybrid



Generator > Unit > Ramp Rates Updates (Open Loop Hybrid)

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Portfolio Location

One continuous ramp rate that supports negative MW for Open Loop Hybrid

- Hourly Updates
- Detail
- Ramp Rates
- Ramp Rates Updates**
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- Solar Forecast
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PJMST >> 2023-03-31 >> TEST UNIT 01 (UnitID)

	Hour	MW	Up Rate	Down Rate
<input type="checkbox"/>	1			
<input type="checkbox"/>	2			
		-1.5	2	2
		-1.0	1	1
		1.0	4	4
		1.5	3	3
<input type="checkbox"/>	3			
<input type="checkbox"/>	4			

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Portfolio Location

Refresh Save

ESR Updates tab renamed to Storage Updates

- Hourly Updates
- Detail
- Ramp Rates
- Ramp Rates Updates
- Wind Forecast
- Solar Forecast
- IntraDay Opt Out
- Storage Updates

PJM TST >> 2023-04-01 >> TEST UNIT 01 (UnitID)

<input type="checkbox"/>	Hour	State Of Charge (MW)
<input type="checkbox"/>	1	
<input type="checkbox"/>	2	
<input type="checkbox"/>	3	
<input type="checkbox"/>	4	
<input type="checkbox"/>	5	
<input type="checkbox"/>	6	
<input type="checkbox"/>	7	
<input type="checkbox"/>	8	
<input type="checkbox"/>	9	
<input type="checkbox"/>	10	
<input type="checkbox"/>	11	
<input type="checkbox"/>	12	
<input type="checkbox"/>	13	
<input type="checkbox"/>	14	
<input type="checkbox"/>	15	
<input type="checkbox"/>	16	
<input type="checkbox"/>	17	
<input type="checkbox"/>	18	
<input type="checkbox"/>	19	
<input type="checkbox"/>	20	
<input type="checkbox"/>	21	
<input type="checkbox"/>	22	
<input type="checkbox"/>	23	
<input type="checkbox"/>	24	

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- ▶ Public

Portfolio PORTFOLIO Location TEST UNIT 01 Schedule Schedule (1)

Refresh Save

- Offers
- Offer Updates
- Detail
- Detail Updates
- Manager
- Selection
- Availability Update
- Restriction Information
- TPS Schedule Switch
- Fuel Price Exceptions
- Composite Offer Verification

PJMTST >> 2023-04-01 >> TEST UNIT 01 (UnitID) >> Schedule (1) Use Offer Slope

MW	Price
-2.0	0.00
Allow negative MW for Open Loop Hybrid	
-1.5	0.20
-1.0	0.30
1.0	1.00

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Portfolio PORTFOLIO Location TEST UNIT 01 Schedule Schedule (1)

Refresh Save

Offers **Offer Updates** Detail Detail Updates Manager Selection Availability Update Restriction Information TPS Schedule Switch Fuel Price Exceptions Composite Offer Verification

PJMTST >> 2023-04-01 >> TEST UNIT 01 (UnitID) >> Schedule (1) Last Updated Date/Time: 2023-03-27 12:18:33

<input type="checkbox"/>	Hour	MW	Price	Capped Price	Exception Exists
▼ <input type="checkbox"/>	1	-2.0	10.00		
		1.0	11.00		
▼ <input type="checkbox"/>	2				
▼ <input type="checkbox"/>	3				
▼ <input type="checkbox"/>	4				
▼ <input type="checkbox"/>	5				
▼ <input type="checkbox"/>	6				
▼ <input type="checkbox"/>	7				
▼ <input type="checkbox"/>	8				



*Disclaimer: Bid data in the screenshot below is for educational purposes only

Generator > Schedules > Detail (Close Loop Hybrid)

- Bilaterals
- Demand
- ▶ Demand Response
- ▼ Generator
 - Unit
 - Schedules**
 - Dispatch Lambda
 - Market Results
 - Regulation Market
 - Synchronized Reserve Market
 - Non-Synchronized Reserve Market
 - Secondary Reserve Market
 - Unit Limitations
- Interface Pricing
- Opportunity Cost Calculator
- Parameter Limits
- Price Responsive Demand
- Pseudo Tie Transaction
- ▶ Public
 - System Utilities
 - Up-To-Transaction
 - Virtual
 - Weather Forecast

Portfolio Location Schedule

Refresh Save

- Offers
- Offer Updates
- Detail**
- Detail Updates
- Manager
- Selection
- Availability Update
- Restriction Information
- TPS Schedule Switch
- Fuel Price Exceptions
- Composite Offer Verification

PJMSTST >> 2023-04-01 >> TEST UNIT 02 (UnitID) >> Schedule (1)

Economic & Emergency	
Discharge Emergency Min	<input type="text"/>
Discharge Emergency Min Default	<input type="text"/>
Discharge Economic Min	<input type="text"/>
Discharge Economic Min Default	0.1
Discharge Economic Max	<input type="text"/>
Discharge Economic Max Default	1
Discharge Emergency Max	<input type="text"/>
Discharge Emergency Max Default	1.2

All Charge fields are hidden for Close Loop Hybrid

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Product Details

[Markets Gateway](#) allows users to submit information and obtain data needed to conduct business in the Day-Ahead, Real-Time, Regulation and Reserve Markets.

Key Product Features

- View Market Results
- Manage Generation and Load Response Portfolios
- Manage Ancillary Service Data
- Manage Market Offers and Transactions