



5-Minute Settlements Roadmap

As of April 10, 2018

- Proposed implementation date now April 1, 2018
- FERC Order 825 – Sub-Hourly Settlements
 - Align settlement and dispatch intervals by:
 - Settling energy transactions in its real-time markets at the same time interval it dispatches energy
 - Settling operating reserves transactions in its real-time markets at the same time interval it prices operating reserves
 - Settling intertie transactions in the same time interval it schedules intertie transactions
 - Final Rule issued June 16, 2016
 - Compliance Filing submitted January 11, 2017
- Align prices with resource dispatch instructions and operating needs, providing appropriate incentives for resource performance

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Training Implementation									
Member Education Session	◆ January 8, 2018								
Production Implementation				◆ Implementation Date: April 1, 2018					

- Project went live on 4/1 per the schedule

Legend

- Start Date
- ◆ End Date



- Market Settlement Calculation System (MSCS)
- Market Settlement Reporting System (MSRS)
 - New 5 Minute reports
 - Minimize changes to current hourly reports
- Power Meter
 - Accept 5 minute meter data (though not required)
- Emergency Procedures application changes
 - User Interface changes
 - XML file changes



Existing Hourly Data: Where will data exist for an Operating Day?

	Operating Days < 4/1/2018	Operating Days >= 4/1/2018
Hourly RT LMP & Ancillary Service LMP (Daily and Monthly files)	<ul style="list-style-type: none"> Flat files on pjm.com** Data Miner 2 	<ul style="list-style-type: none"> Data Miner 2
Hourly DA LMP (Daily and Monthly Files)	<ul style="list-style-type: none"> Flat files on pjm.com** Data Miner 2 	<ul style="list-style-type: none"> Data Miner 2
Operational Data Page	pjm.com**	
RT Marginal Value	<ul style="list-style-type: none"> Flat files on pjm.com** Data Miner 2 	<ul style="list-style-type: none"> Data Miner 2 Consolidated into 1 data feed 5-minute version only
RT Transmission Constraints	<ul style="list-style-type: none"> Flat files on pjm.com** Data Miner 2 	
Preliminary Billing Data <ul style="list-style-type: none"> Operating Reserve Rates Regulation Sync & Non-Sync Reserves DASR 	<ul style="list-style-type: none"> Flat files on pjm.com** <ul style="list-style-type: none"> Data Miner 2 	

**3Q 2018 pjm.com flat files retirement plan and Operational Data Page changes will continue to be discussed at Tech Change Forum

Operating Days \geq 4/1/2018

5-minute RT LMPs	Data Miner 2 only
5-minute Ancillary Service LMPs	
5-minute RT Marginal Value and Transmission Constraints	
RT Settlement LMPs in eDataFeed	Data Miner 2 only

- Preliminary and Final load weighted average transmission zone LMPs and residual aggregate LMPs will be available

Appendix – Previously Communicated Information



- The following MSRS reports containing static test data for the operating days of 11/13 and 12/15 have been released in the MSRS training environment.
 - Spot Market Energy Charge Summary
 - Energy Market & Congestion Loss Charges Details
 - Generator LMP Charge Summary
 - Balancing Generator LMP Charges
 - Explicit Loss Charges
 - Explicit Congestion Charges
 - Real-Time Daily Energy Transactions*
 - Day-Ahead Daily Energy Transactions*

* Denotes new

- Ancillary Services and Operating Reserves data available in MSRS Training environment
 - Utilize the same operating days as the Day-ahead and Balancing market trials
 - 11/13/2017 and 12/15/2017
 - Regulation, Sync Reserve, and Non-Sync Reserve data on 2/20
 - Load Response and Operating Reserve data on 2/26
 - Communication will be sent out to identify specific reports
- **3rd Market Trial date – Posted on or before 3/19 for the date of 3/6/2018**
- Questions/Comments? mss@pjm.com

Generation Resource

- Sends email to PJM Market Settlements at least 3 business days prior to Operating Day for which 5-minute revenue meter data is effective

PJM Market Settlements

- Performs verification
- Notifies Generation Resource that resource is set-up in Power Meter

Generation Resource

- Submits five minute revenue meter data on effective Operating Day

- Based on member requests, the following data will be available beginning March 6 for testing purposes for the operating day of March 5
 - Five Minute Real-Time LMPs – Daily only
 - Five Minute Ancillary Services Prices – Daily only
- Data Miner 2 beta environment will provide UI and API interface to access this data
- These Real-Time LMPs will be considered test data and will not be used for any settlement calculations

Note 1: PJM is publishing the LMP data solely for member testing purposes only. These LMPs will be available on Data Miner 2 train environment until April 1. After April 1, the verified LMP data will be available in Data Miner 2 production

Note 2: This data will be available on Data Miner 2 only. The csv files will be posted on pjm.com will remain the hourly LMP values

Hourly RT and DA LMP CSV files

Available through March 31, 2018

Will no longer be published
effective April 1, 2018

Production Data Miner

Hourly RT LMPs, Ancillary Service
Clearing Prices, and DA LMPs available
in August 2017

Hourly values will continue to be
published in Data Miner after April 1,
2018

5 Minute RT LMPs and Ancillary Service
Clearing Prices published on
April 1, 2018

- PJM will be implementing the following:
 - Transpose the data label column into numerous report columns and add in EPT Interval Ending and GMT Interval Ending columns
 - Conserves report width, but adds more rows to report
 - Removes “Total” column



Option Implemented: Transposed Data Labels

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
Operating Reserve Generator Credit Details																								
Customer Account: Report Creation Timestamp (EPT):																								
Start Date:		End Date:																						
4000.01	4000.02	4000.04	4001.4	4001.41	4000.63	4000.64	3000.8																	
Customer ID	Customer Code	Date	EPT Interval Ending	GMT Interval Ending	Unit ID	Unit Name	Unit Ownership Share	DA Generator LMP (\$/MWh)	DA Scheduled MWh	Dispatch Rate (\$/MWh)	RT Generator LMP (\$/MWh)	RT Generation (MWh)	DA Schedule ID	DA Energy Offer (\$)	DA No-Load Cost (\$)	DA Startup Cost (\$)	DA Value (\$)	DA Net Revenue (\$)	Scheduled Min (MWh)	Scheduled Max (MWh)	RT Schedule ID	Segment ID	BOR Reason ID	BOR Region ID
123	ABC		2/1/2018 0:05	2/1/2018 5:05	12341234	ABC	1	1.123	1.123	1.123	1.123	1.123	11	1.123	1.123	1.123	1.123	1.123	1.123	1.123	12	2	1	2
123	ABC		2/1/2018 0:10	2/1/2018 5:10	12341234	ABC	1	1.123	1.123	1.123	1.123	1.123	11	1.123	1.123	1.123	1.123	1.123	1.123	1.123	12	2	1	2
123	ABC		2/1/2018 0:15	2/1/2018 5:15	12341234	ABC	1	1.123	1.123	1.123	1.123	1.123	11	1.123	1.123	1.123	1.123	1.123	1.123	1.123	12	2	1	2
123	ABC		2/1/2018 0:20	2/1/2018 5:20	12341234	ABC	1	1.123	1.123	1.123	1.123	1.123	11	1.123	1.123	1.123	1.123	1.123	1.123	1.123	12	2	1	2
123	ABC		2/1/2018 0:25	2/1/2018 5:25	12341234	ABC	1	1.123	1.123	1.123	1.123	1.123	11	1.123	1.123	1.123	1.123	1.123	1.123	1.123	12	1	1	2
123	ABC		2/1/2018 0:30	2/1/2018 5:30	12341234	ABC	1	1.123	1.123	1.123	1.123	1.123	11	1.123	1.123	1.123	1.123	1.123	1.123	1.123	12	1	1	2
123	ABC		2/1/2018 0:35	2/1/2018 5:35	12341234	ABC	1	1.123	1.123	1.123	1.123	1.123	11	1.123	1.123	1.123	1.123	1.123	1.123	1.123	12	1	1	2
123	ABC		2/1/2018 0:40	2/1/2018 5:40	12341234	ABC	1	1.123	1.123	1.123	1.123	1.123	11	1.123	1.123	1.123	1.123	1.123	1.123	1.123	12	1	1	2
123	ABC		2/1/2018 0:45	2/1/2018 5:45	12341234	ABC	1	1.123	1.123	1.123	1.123	1.123	11	1.123	1.123	1.123	1.123	1.123	1.123	1.123	12	1	1	2
123	ABC		2/1/2018 0:50	2/1/2018 5:50	12341234	ABC	1	1.123	1.123	1.123	1.123	1.123	11	1.123	1.123	1.123	1.123	1.123	1.123	1.123	12	1	1	2
123	ABC		2/1/2018 0:55	2/1/2018 5:55	12341234	ABC	1	1.123	1.123	1.123	1.123	1.123	11	1.123	1.123	1.123	1.123	1.123	1.123	1.123	12	1	1	2
123	ABC		2/1/2018 1:00	2/1/2018 6:00	12341234	ABC	1	1.123	1.123	1.123	1.123	1.123	11	1.123	1.123	1.123	1.123	1.123	1.123	1.123	12	1	1	2

Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO
Economic Min (MWh)	Economic Max (MWh)	RT Dispatch Desired MWh	RT Dispatch Desired Type	RT MWh Used	Bal Value MWh Used	RT Energy Offer (\$)	RT No-Load Cost (\$)	RT Startup Cost (\$)	RT Additional Startup Cost (\$)	Bal Value (\$)	Operating Reserve Offsetting Synch Reserve Revenue (\$)	Operating Reserve Offsetting Reactive Services Revenue (\$)	Operating Reserve Offsetting DASR Revenue (\$)	Operating Reserve Offsetting Non-Synch Reserve Revenue (\$)	Bal Net Revenue (\$)
1.123	1.123	1.123		1	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123
1.123	1.123	1.123		1	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123
1.123	1.123	1.123		1	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123
1.123	1.123	1.123		1	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123
1.123	1.123	1.123		1	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123
1.123	1.123	1.123		1	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123
1.123	1.123	1.123		1	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123
1.123	1.123	1.123		1	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123
1.123	1.123	1.123		1	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123
1.123	1.123	1.123		1	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123
1.123	1.123	1.123		1	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123
1.123	1.123	1.123		1	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123
1.123	1.123	1.123		1	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123
1.123	1.123	1.123		1	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123