



# Order 825 – 5 minute Settlement

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- Generation and Load Imbalance
- Energy Market Billing Line Item Changes

# Generation and Load Imbalance

- On an hourly basis, RTO DA Net Interchange is typically negative
- Day Ahead Net Interchange calculation is not impacted by 5 Minute Settlements

## Withdrawals

- + Demand
- + DECs
- + Exports
- + IBT sales

## Injections

- Generation
- INCs
- Imports
- IBT purchases
- Demand Response

Values  
are all  
hourly

- On an hourly basis, RTO RT Net Interchange is typically negative
- Adding in losses plus inadvertent, RTO RT Net Interchange nets to 0 MW for each hour

## Withdrawals

- + Demand
- + Exports
- + IBT sales

## Injections

- Generation
- Imports
- IBT purchases

Values  
are all  
hourly

- On a 5 minute basis, an imbalance is inherently introduced in RT Net Interchange due to different profiling
- As a result of different profiling, the sum of the twelve 5 minute intervals will not equal 0 MW
  - The current hourly RT Net Interchange does not equal 0 MW
  - $\sum \text{RT Net Interchange} + \text{Hourly Losses} + \text{Inadvertent} = 0 \text{ MW}$

## Withdrawals

- + Demand (Flat profiled)
- + Exports (15 minutes)
- + IBT sales (Flat profiled)

## Injections

- Generation (5 minutes)
- Imports (15 minutes)
- IBT purchases (Flat profiled)

- PJM will transition from an hourly calculation to a 5 minute calculation for Balancing Spot Market Energy Charges
  - Day-ahead Spot Market Energy charge for each hour for each Market Participant:
    - *Day-ahead Spot Market Energy Charge = (Hourly Day-ahead Net Interchange) \* (Hourly Day-ahead System Energy Price)*
  - Balancing Spot Market Energy charge for each hour for each Market Participant:
    - *5 Minute Balancing Spot Market Energy Charge = (5 Minute Real-time Net Interchange – Flat Profiled Day-ahead Net Interchange) \* (5 Minute Real-time System Energy Price)*

- Day Ahead Spot Market Energy Charge = the value of the DA losses
- 5 Minute Balancing Spot Market Energy Charge = the value of the balancing losses
  - *Spot Market Loss Value = Day Ahead Spot Market Energy Charge + Hourly Sum of 5 Minute Balancing Spot Market Energy Charges*



- PJM calculates the total hourly transmission loss charges by summing the day-ahead and balancing loss charges for each market participant plus the **spot market value of losses**, including an adjustment for the inadvertent interchange loss value.
- PJM allocates the total hourly transmission loss charges as hourly transmission loss credits for each market participant based on their hourly real-time load plus exports ratio share.

- Situation 1
  - If load **increases** through the hour, generation is priced accordingly. As a result \$ collected from load will be **less** than the \$ that needs to be paid to generation.
    - **Spot Market Value of Losses increases**
- Situation 2
  - If load **decreases** through the hour, generation is priced accordingly. As a result \$ collected from load will be **greater** than the \$ that needs to be paid to generation.
    - **Spot Market Value of Losses decreases**

# Generation and Load Imbalance Summary

5 Minute Gen / Load MW Imbalance component due to flat profiling



5 Minute RT Net Interchange



5 Minute Balancing Spot Market Energy Charge



Spot Market Loss Value



Total Hourly Transmission Loss Charges



Hourly Transmission Loss Credits allocate to market participants based on ratio share of hourly RT load plus exports

- PJM proposes to include the value of the Generation and Load imbalance in the Transmission Loss Charges calculation and the Transmission Loss Credits allocation.

# Energy Market Billing Line Item Changes

Billing Line Item	Resource Type	Current	Proposed
DA Spot Market	All	Use hourly DA MW multiplied by hourly DA Energy Price	No Change
Balancing Spot Market	Generation	Use hourly Balancing MW multiplied by hourly RT Energy Price	Use 5 minute telemetry profiled MW or 5 minute meter MW and 5 minute RT Energy Price
	Load		Use flat profile MW for hour and 5 minute RT Energy Price
	Load Management		Use flat profile MW over actual dispatch timeframe and 5 minute RT Energy Price
	Import/Export		Use 5 minute profile MW over 15 minute schedule and 5 minute RT Energy Price

Billing Line Item	Resource Type	Current	Proposed
DA Transmission Congestion Charge	All	<p><b>Implicit</b> – Hourly summed withdrawal charges at the applicable DA congestion bus prices minus the hourly summed injection charges at the applicable DA congestion bus prices</p> <p><b>Explicit</b> – Hourly scheduled energy transactions MWh multiplied by the delta of DA sink and source congestion prices using the DA congestion aggregate prices</p>	<p><b>Implicit</b> – Change calculation to use the congestion aggregate prices; Generation will continue to use current process</p> <p><b>Explicit</b> – No Change</p>
Balancing Transmission Congestion Charge	All	<p><b>Implicit</b> – Hourly summed deviations withdrawal charges at the applicable RT congestion bus prices minus the hourly summed deviation injection charges at the applicable RT congestion bus prices</p> <p><b>Explicit</b> – Hourly deviations from the DA scheduled energy transactions MWh multiplied by the delta of RT sink and source congestion prices using the RT congestion aggregate prices</p>	<p><b>Implicit</b> – Change calculation to use the congestion aggregate prices calculated every 5 minutes; Generation will continue to use current process and 5 minute prices</p> <p><b>Explicit</b> – Change to calculate every 5 minutes</p>
Transmission Congestion Credits	All	Allocation to FTR holders until Docket ER16-121 is effective, then Balancing Congestion hourly to load and exports	No Change

Billing Line Item	Resource Type	Current	Proposed
DA Transmission Losses Charge	All	<p><b>Implicit</b> – Hourly summed withdrawal charges at the applicable DA loss bus prices minus the hourly summed injection charges at the applicable DA loss bus prices</p> <p><b>Explicit</b> – Hourly scheduled energy transactions MWh multiplied by the delta of DA sink and source loss prices using the DA loss aggregate prices</p>	<p><b>Implicit</b> – Change calculation to use the loss aggregate prices; Generation will continue to use current process</p> <p><b>Explicit</b> – No Change</p>
Balancing Transmission Losses Charge	All	<p><b>Implicit</b> – Hourly summed deviations withdrawal charges at the applicable RT loss bus prices minus the hourly summed deviation injection charges at the applicable RT loss bus prices</p> <p><b>Explicit</b> – Hourly deviations from the DA scheduled energy transactions MWh multiplied by the delta of RT sink and source loss prices using the RT loss aggregate prices</p>	<p><b>Implicit</b> – Change calculation to use the loss aggregate prices calculated every 5 minutes; Generation will continue to use current process and 5 minute prices</p> <p><b>Explicit</b> – Change to calculate every 5 minutes</p>
Balancing Transmission Losses Credit	All	Total hourly DA and BAL Transmission Losses charges allocated on ratio shares of RT load plus exports	No Change



Billing Line Item	Resource Type	Current	Proposed
Meter Error Correction Charges	Generation	Uses the hourly generation weighted average LMP	Use the 5 minute interval generation weighted average LMP
Emergency Energy Charges/ Credits	All	Charges & Credits – Hourly credits of emergency energy purchases are allocated to RT deviations from DA Net Interchange that create shorter RT position	Charges & Credits – Change to calculate every 5 minutes
Load Recon for Spot Market; Trans. Cong.; Trans. Losses	All	Reconciliation is conducted on a two month lag and adjusts the line items based on “actual” load usage and calculated hourly	No Change
FTR Auctions /ARR	All	<b>FTR Auctions</b> – charged for purchases and credited for sales <b>ARR</b> – allocation of Annual FTR net revenues (with any updates from ER16-121)	No Change

- Load Response
- Regulation
- Synchronized & Non-Synchronized Reserves
- Operating Reserves
- Reactive Services
- Capacity Performance
- M2M