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Residual Zone Pricing

1. Overview of Residual Zone Pricing

PJM currently calculates prices for individual buses, aggregates, and transmission zones. Load within a fully metered EDC's territory is assigned to non-metered entities using Retail Load Responsibility (RLR) and Wholesale Load Responsibility (WLR) transactions in the PJM eSchedules system. Currently, load carved out of the fully metered EDC's load and assigned to other entities can be priced using a node (or nodal aggregate) or at the physical transmission zone's price. Any load may choose to be carved out for nodal or aggregate wholesale settlement as per rules defined in PJM Manual M-27. If load is carved out at an aggregate or nodal level, the zonal average price itself does not change. However, as is the case today, the effective price paid by the remainder of the zonal load that is not carved out from the zonal EDC total will be impacted by the load carved out at a location other than the physical zone price. The Residual Zone price which reflects the average price for the remainder of the zonal load is currently not calculated or available as a pricing point in PJM market systems. The implementation of Residual Zone pricing will offer additional options for the pricing of load in PJM market systems and allow for the publication of Residual Zone prices.

The proposed rules for the integration of Price Responsive Demand (PRD), does not contain a requirement that the PJM wholesale energy settlement of the PRD load occur at the substation location nor a requirement that individual load be carved out at the node for wholesale settlement. However, during the stakeholder discussion of PRD, it was identified that increases in aggregate or nodal wholesale load settlement could increase the zonal pricing impact described above, depending if load is carved out at low or high priced load busses relative to the applicable physical zonal price. Therefore, it has been identified that the full implementation of residual zone pricing (at the fully-metered EDC level) may be necessary due to the potential increased use of aggregate pricing.

2. Current Pricing Definitions

Zonal prices are defined by weighting each load bus LMP by its hourly individual load bus contribution to the total zonal load. Real-time bus contributions are determined using the state-estimated hourly integrated MW distributions for each bus. Day-ahead default bus contributions are determined using the State Estimator distribution for that zone at 8:00 a.m. one week prior to the Operating Day (i.e., if the next Operating Day is Monday, the default distribution is from 8:00 a.m. on Monday the previous week). The EDC has the ability to update the default day-ahead distributions in the eMKT system (PJM Manual 11, Section 2.3.2).

Zonal bus contributions are also defined for FTR credit target allocations. These bus contributions are fixed for the planning period (June 1st – May 31st) and are determined using the hourly individual load bus contribution to the total zonal load at the time of the PJM annual peak from the previous year.

Aggregate prices are defined by weighting each load bus LMP by percentages provided to PJM that represent each bus' defined average load contribution to the total aggregate load. The same aggregate bus contributions are used for day-ahead and real-time aggregate price calculations. These definitions are fixed and do not change daily.

Aggregate and zonal congestion, loss, and total prices are calculated using the definitions defined above. The sum of factors for each zone and each aggregate is 100%.

3. Residual Zone Load Determination

The total real-time hourly load actually served at each load bus is initially determined by the State Estimator. The total revenue metered load is determined for each EDC that reports hourly net energy flows from all metered tie lines and for which all generators within the EDC's territory report revenue quality data in eMTR. The total revenue meter hourly load within this fully metered EDC's territory is calculated as the sum of all net import energy flows reported by their tie revenue meters and all net generation reported via generator revenue meters. The amount of load at each of the EDC's load buses calculated by the State Estimator is then adjusted, in proportion to its share of the total state-estimated load of that EDC, in order that the total amount of load across all of the EDC's load buses matches its total revenue meter calculated load (OATT Attachment K – Appendix, Section 5.1.3(e)).

Load within a fully metered EDC's territory is assigned to non-metered entities by submitting hourly load data in the eSchedules system. Nodal priced load (e.g., municipals, co-ops, qualified retail access load) is defined as any hourly load eSchedule that is priced at an aggregate. The hourly nodal load amounts submitted in eSchedules are multiplied by the nodal fixed aggregates definitions to calculate the nodal priced load at each bus. Residual zone load at each bus is defined as the bus load (adjusted revenue meter calculated load) less nodal priced load at each bus.

4. Residual Zone Pricing Definitions

Residual zone distribution factors are determined by the hourly bus residual load contribution to the total residual zone load. Residual zone prices are defined by weighting each load bus LMP by that bus' residual zone distribution factor. For the majority of PJM transmission zones, the EDC territory is the same as the physical zone. In cases where the fully metered EDC's territory differs from the physical zone, residual zone prices that differ from that EDC's physical zone price will be calculated for each fully metered EDC.

Residual zone congestion prices, loss prices, and total LMPs are calculated using the residual zone distribution factors. Factors for each residual zone sum to exactly 100%.

Residual zone pricing will be represented in the Day-ahead LMPs, Real-time LMPs, and FTR Credit Target Allocations as follows:

- Final hourly real-time residual zone distribution factors will be calculated using eSchedule submitted nodal MWs. Preliminary real-time residual zone LMPs will not be calculated.
- Day-ahead residual zone distribution factors will default to the final real-time distribution factors for the residual zone at 8:00 a.m. one week prior to the Operating Day (i.e., if next Operating Day is Monday, the default distribution is from 8:00 a.m. on Monday of the previous week). Consistent with physical zones, the definition will apply to all hours in the day.

- Residual zone distribution factors for FTR Credit Target Allocations are fixed for the planning period (June 1st – May 31st). Consistent with physical zones, the residual zone distribution for FTRs will be initially determined using the hourly individual residual load bus contribution to the total residual load at the time of the PJM annual peak from the previous year. In cases where there are new nodal load requests pursuant to the nodal pricing rules in Manual 27, the initial residual zone definition for FTRs will be adjusted by the LSE's nodal load peak distribution. LSEs moving to nodal load settlement for the upcoming PJM planning year will be required to submit a peak load at the time of the PJM annual peak from the previous year. This value in conjunction with the distribution percentages currently required according to the nodal pricing rules in Manual 27 will be used to determine the final residual zone distribution.

- The residual zone distribution factors for FTR Credit Target Allocations will be calculated using the residual peak load distributions from the previous year adjusted for new nodal load. The following example assumes LSE 1 is a new nodal LSE with a 20 MW peak load and aggregate distribution of 1.0 at Bus C.

Bus	Peak Load	Zone Peak Load Distribution Factors	Initial Residual Peak Load	Initial Residual Zone Distribution Factors	LSE 1 Nodal Load Peak Distribution	Final Residual Peak Load	Final Residual Zone Distribution Factors
A	10	0.10	5	0.0625		5	0.08
B	20	0.20	5	0.0625		5	0.08
C	20	0.20	20	0.25	1.00	0	0.00
D	50	0.50	50	0.625		50	0.84
Total	100		80			60	1.0

- Requests from the LSE to move their load to nodal price settlement and deadlines for data submittals are specified in Manual 27, Sections 5.6 and 5.7.
  - For network load served under Attachment F-1 of the PJM Tariff, requests must be provided including the applicable bus distribution no later than January 15th or at least 30 days prior to the start of PJM's annual FTR/ARR allocation process, whichever is later. By January 25th, or 10 days after the initial notice from the LSE whichever is later, the zonal EDC must specify the appropriate node definition in PJM eSchedules for this load. The LSE must confirm the eSchedule by February 1st, or 15 days after the initial notice whichever is later. The LSE nodal peak load at the time of the PJM annual peak from the previous year must be submitted along with the request.

- For network load served under Attachment F of the PJM Tariff, notification of the intent to change settlement area definitions must be provided to PJM no later than October 1. No later than December 1, the affected EDC and network customer must identify the composition of the new area. The LSE nodal peak load at the time of the PJM annual peak from the previous year must be submitted by January 15th or at least 30 days prior to the start of PJM's annual FTR/ARR allocation process, whichever is later.

5. Residual Zone Price Postings

- Day-ahead residual zone LMPs will be posted in the day-ahead LMP file with all other day-ahead LMPs.
- Final Real-time LMPs will be posted 2-3 business days after the operating day on pjm.com. In addition, the final Real-time LMPs will be included in the monthly LMP posting which is provided by the fifth business day of the following month.
- Residual Zone distribution factors will be posted in MSRS.

6. Residual Zone Load Pricing Business Rules

- Once an EDC elects to switch load from physical zone to residual zone pricing, ~~T~~there cannot be a combination of residual zone and physical zone pricing within a zone. In cases where the fully metered EDC's territory differs from the physical zone and at least one fully metered EDC is using physical zone pricing, residual zone pricing cannot be elected for other EDCs in the zone.
- The effective date for switching load from physical zone pricing to residual zone pricing will be June 1 of each year to coincide with the PJM planning year.
- Prior to switching load from physical zone pricing to residual zone pricing, EDCs must confirm via a PJM form that all LSEs will be priced at the residual zone and will continue to be priced at the residual zone in the future. This form must be provided to PJM by January 15th or at least 30 days prior to the start of PJM's annual ARR/FTR allocation process, whichever is later. Implementation will be delayed one year to the following June 1 if all notifications and forms have not been received according to the business rules.
- Once a fully metered EDC has elected residual zone pricing for load within its territory, physical zone pricing for load will no longer be available.

7. Reconciliation Residual Zone Price Business Rules

PJM calculates reconciliation billing on a 2-month lag for certain allocations and settlements that are based on real-time load. The reconciliation kWh data supplied to PJM by the EDCs, which represents the difference between the schedule load responsibility eSchedules and the "actual" customer usage based on metered data, are multiplied by the applicable billing determinants to determine the reconciliation billing

amounts. Differences between nodal customers' eScheduled load (next day) and "actual" load (2 months later) result in real-time residual zone prices to be slightly different than original for EDCs, POLR providers, and Retail Access LSEs priced at the residual zone. These impacts are increased by large nodal reconciliation values, increased number of nodal priced LSEs, and large differentials between nodal and zonal prices. These impacts are mitigated by more accurate real-time metering, including AMI, and recalculation of residual zone prices for reconciliation.

The recalculation of residual zone prices due to adjustments in nodal customers' load will result in reconciliation billing for all LSEs priced at the residual zone even if reconciliation kWh data supplied is zero. Reconciliation using revised residual zone prices will not be implemented at this time. PJM will evaluate the reconciliation impacts on residual zone prices for future consideration.

8. Definitions

Aggregate – Combination of buses or bus prices

Fully Metered EDC - An Electric Distribution Company that reports hourly net energy flows from all metered tie lines and for which all generators within the EDC's territory report revenue quality data in eMTR.

PJM eSchedules – A PJM software application (one of the eTools) that supports the Interchange Energy Market and provides the ability to create PJM internal energy contracts and schedules.

PJM eMTR – A PJM software application (one of the eTools) that calculates a market participant's actual interchange energy amounts to be used for real-time energy market settlements. Transmission and generation owners submit hourly tie and generator values to be verified and corrected on a next-hour basis.

Transmission Zone – An area within the PJM Region, as set forth in Attachment J of the Tariff.