Working to Perfect the Flow of Energy

PJM Manual 06

# Financial Transmission Rights

Revision: 15

Effective Date: October 10, 2013

Prepared by

Market Simulation Department

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# PJM Manual 6

# Financial Transmission Rights

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## Approval

Approval Date: 9/27/2013
Effective Date: 10/10/2013

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## Current Revision

***Revision 15 (10/10/2013):***

Added conforming changes to section 9.1explaining process PJM utilizes to reduce Stage 1A infeasible facilities.

# Introduction

Welcome to the ***PJM Manual for Financial Transmission Rights***. In this Introduction, you will find the following information:

- What you can expect from the PJM Manuals in general (see "*About PJM Manuals*").
- What you can expect from this PJM Manual (see "*About This Manual*").
- How to use this manual (see "*Using This Manual*").

## About PJM Manuals

The PJM Manuals are the instructions, rules, procedures, and guidelines established by PJM for the operation, planning, and accounting requirements of the PJM RTO and the PJM Energy Market.

- Transmission
- PJM Energy Market
- Generation and transmission interconnection
- Reserve
- Accounting and Billing
- PJM administrative services

For a complete list of all PJM Manuals, go to www.pjm.com and select "Manuals" under the "Documents" pull-down menu.

## About This Manual

The PJM Manual for ***Financial Transmission Rights*** is one of a series of manuals within the Transmission Owners group. This manual focuses on how Auction Revenue Rights (ARRs) are acquired, how Financial Transmission Rights (FTRs) are traded, in the FTR auctions or the secondary market, and on how the value of ARRs and FTRs are determined.

The ***PJM Manual for Financial Transmission Rights*** consists of ten sections. These sections are listed in the table of contents beginning on page ii.

### Intended Audience

The intended audiences for the PJM Manual for Financial Transmission Rights are:

- *Transmission Customers* - Transmission Customers submit requests to PJM for ARRs, and buy/sell FTRs in the FTR auctions and secondary market.
- *PJM Members* - PJM Members buy and sell FTRs in the FTR auctions and secondary market.
- *PJM Market Settlement Department* - The PJM Market Settlement Department uses information from the FTR database to calculate transmission congestion

credits for the monthly billing statements and to settle the FTR auctions including ARR Credits.

- *PJM Market Services Division* - The PJM Market Services Division processes requests for ARRs from Transmission Customers, facilitates the Annual ARR Allocation, runs Simultaneous Feasibility Tests to verify that the Transmission System can support the requested set of ARRs and FTRs, and conducts the FTR auctions.

### References

The references to other documents that provide background or additional detail directly related to the ***PJM Manual for Financial Transmission Rights*** are:

- PJM Manual for *Transmission Service Request (M-02)*
- PJM OASIS Users Guide
- PJM Manual for *Operating Agreement Accounting (M-28)*
- PJM Manual for *Billing (M-29)*
- FTR Auction User's Guide
- *e*Capacity
- *e*FTR

## Using This Manual

We believe that explaining concepts is just as important as presenting the procedures. This philosophy is reflected in the way we organize the material in this manual. We start each section with an overview. Then, we present details, procedures or references to procedures found in other PJM manuals.

### What You Will Find In This Manual

- A table of contents that lists two levels of subheadings within each of the sections
- An approval page that lists the required approvals and a brief outline of the current revision
- Sections containing the specific guidelines, requirements, or procedures including PJM actions and PJM Member actions
- A section at the end detailing all previous revisions of this PJM manual

# Section 1: Financial Transmission Rights Overview

Welcome to the *Financial Transmission Rights Overview* section of the ***PJM Manual for Financial Transmission Rights***. In this section, you will find the following information:

- A definition of Financial Transmission Rights (FTRs) and their purpose (see "*Definition and Purpose of FTRs*").
- How the economic value of FTRs is calculated (see "*Valuation of FTRs*").
- Requirements to participate in buying/selling of FTRs in the FTR auctions or in the secondary market (see "*Requirements to Participate*").
- An overview of the FTR-related actions performed by Market Participants (see "*Participant Actions*").
- An overview of the FTR-related actions performed by PJM (see "*PJM Actions*").

## 1.1 Definition and Purpose of FTRs

A Financial Transmission Right (FTR) is a financial instrument that entitles the holder to receive compensation for Transmission Congestion Charges that arise when the transmission grid is congested in the Day-ahead Market and differences in Day-ahead Congestion Prices result from the dispatch of generators out of merit order to relieve the congestion. Each FTR is defined from a point of receipt (where the power is injected onto the PJM grid) to a point of delivery (where the power is withdrawn from the PJM grid). For each hour in which congestion exists on the Transmission System between the receipt and delivery points specified in the FTR, the holder of the FTR is awarded a share of the Transmission Congestion Charges collected from the Market Participants.

One purpose of FTRs is to protect Firm Transmission Service Customers from increased cost due to Transmission Congestion when their energy deliveries are consistent with their firm reservations. Essentially, FTRs are financial instruments that entitle the holder to rebates of congestion charges paid by the Firm Transmission Service Customers. Market Participants are able to acquire financial transmission rights in the form of options or obligations. They do not represent a right for physical delivery of power.

The holder of the FTR is not required to deliver energy in order to receive a congestion credit. If a constraint exists on the Transmission System in the Day-ahead Market, the holders of FTRs receive a credit based on the FTR MW reservation and the Congestion Price difference between point of delivery and point of receipt. This credit is paid to the holder regardless of who delivered energy or the amount delivered across the path designated in the FTR.

You can acquire FTRs in four market mechanisms: the Long-term FTR Auction, Annual FTR Auction, the Monthly FTR Auction or the FTR Secondary market.

- *Long-term FTR Auction* – PJM conducts a Long-term FTR process of selling and buying FTRs through a multi-round process for FTRs for three consecutive planning periods immediately subsequent to the planning period during which the Long-term FTR Auction is conducted. The capacity offered for sale in Long-term FTR Auctions shall be the residual system capability after the

assumption that all Auction Revenue Rights allocated in the immediately prior Annual Auction Revenue Rights allocation process are self-scheduled into FTRs, which shall be modeled as fixed injections and withdrawals in the Long-term FTR Auction.

- *Annual FTR Auction* – PJM conducts an annual process of selling and buying FTRs through a multi-round auction. The Annual FTR Auction offers for sale the entire transmission entitlement that is available on the PJM system on an annual basis. The clearing mechanism of the Annual FTR Auction will maximize the quote-based value of FTRs awarded in the auction. Auction Revenue Rights (ARRs) are the mechanism by which the proceeds from the Annual FTR Auction are allocated.
- *Monthly FTR Auction* – PJM conducts a monthly process of selling and buying FTRs through an auction. The FTR auction offers for sale any residual transmission entitlement that is available after FTRs are awarded from the Annual and Long-term FTR Auctions. The auction also allows Market Participants an opportunity to sell FTRs that they are currently holding. Market Participants offer to sell or request to buy FTRs through an Internet computer application called *e*FTR.
- *Secondary Market* – The FTR secondary market is a bilateral trading system that facilitates trading of existing FTRs between PJM Members through an Internet computer application called *e*FTR.

## 1.2 Valuation of FTRs

The hourly economic value of an FTR is based on the FTR MW reservation and the difference between Day-ahead Congestion Prices at the sink point (point of delivery) and the source point (point of receipt) designated in the FTR. Therefore, it is important to note that an FTR can provide financial benefit, but it can also be a financial liability resulting in a charge to the holder.

### 1.2.1 FTR Obligations

- The hourly economic value of an FTR Obligation is based on the FTR MW reservation and the difference between Day-ahead Congestion Prices at the sink point (point of delivery) and the source point (point of receipt) designated in the FTR.
- The hourly economic value of an FTR Obligation is positive (a benefit) when the path designated in the FTR is in the same direction as the congested flow. (The Day-ahead Congestion Price at the sink point (point of delivery) is higher than the Day-ahead Congestion Price at the source point (point of receipt).)
- The hourly economic value of an FTR Obligation is negative (a liability) when the designated path is in the direction opposite to the congested flow. (The Day-ahead Congestion Price at the point of receipt is higher than the Day ahead Congestion Price at the point of delivery.); however, if the holder were to actually deliver energy along the designated path, they would receive a congestion credit that would offset the FTR charge.

### 1.2.2 FTR Options

- The hourly economic value of an FTR Option is based on the FTR MW reservation and the difference between Day-ahead Congestion Prices at the sink point (point of delivery) and the source point (point of receipt) designated in the FTR when that difference is positive.
- The hourly economic value of an FTR Option is positive (a benefit) when the path designated in the FTR is in the same direction as the congested flow. (The Day-ahead Congestion Price at the sink point (point of delivery) is higher than the Day-ahead Congestion Price at the source point (point of receipt).)
- The hourly economic value of an FTR Option is zero (neither a benefit nor a liability) when the designated path is in the direction opposite to the congested flow. (The Day-ahead Congestion Price at the source point (point of receipt) is higher than the Day-ahead Congestion Price at the sink point (point of delivery).)

## 1.3 Requirements to Participate

To be able to buy and sell FTRs in the PJM FTR Auctions, or in FTR secondary trading, you must be a PJM Member or a Transmission Customer. Anyone may buy and sell FTRs on the secondary market outside of eFTR; however, PJM Market Settlements makes the proper billing adjustments only for eFTR transactions.

## 1.4 Participant Actions

As a participant in the FTR process, you are required to perform the following actions:

- for those FTRs you wish to sell in any of the auctions through *e*FTR, enter the required information and submit offers for sale
- for those FTRs you wish to buy in any of the auctions through *e*FTR, enter the required information and submit the bids to purchase
- if you are an FTR trader in the secondary market, post, accept or reject quotes made through *e*FTR

## 1.5 PJM Actions

PJM performs the following actions:

- conducts Simultaneous Feasibility Tests (SFTs) on FTRs
- notifies customers of SFT results and FTRs awarded in the FTR Auctions
- initiates, directs, and oversees the FTR Auctions
- incorporates FTRs into market settlements

# Section 2: Auction Revenue Rights Overview

Welcome to the *Auction Revenue Rights Overview* section of the ***PJM Manual for Financial Transmission Rights***. In this section, you will find the following information:

- A definition of Auction Revenue Rights (ARRs) and their purpose (see "*Definition and Purpose of ARRs*").
- How the economic value of ARRs is calculated (see "*Valuation of ARRs*").
- Requirements to participate in the acquisition and allocation of ARRs (see "*Requirements to Participate*").
- An overview of the ARR-related actions performed by Market Participants (see "*Participant Actions*").
- An overview of the ARR-related actions performed by PJM (see "*PJM Actions*").

## 2.1 Definition and Purpose of ARRs

Auction Revenue Rights (ARRs) are the mechanism by which the proceeds from the Annual FTR Auction are allocated. Auction Revenue Rights are entitlements allocated annually to Firm Transmission Service Customers that entitle the holder to receive an allocation of the revenues from the Annual FTR Auction.

Auction Revenue Rights will be allocated to Network Transmission Service Customers and Firm Point-to-Point Transmission Customers. Market Participants will request ARRs, and PJM will approve all, part or none of the request based on the results of the Simultaneous Feasibility Test. At the beginning of each Annual Planning Period, ARRs are allocated to Network Transmission customers and to Firm Point to Point Transmission customers for the duration of the Annual Planning Period.

- *Network Integration Service* - Network Integration Service ARRs are designated along paths from specific generation resource(s) to the customer's aggregated load. The Network Service Customer has the option to request ARRs for all or any portion of an historic generation resource. A Network Service Customer's total ARR designation to a zone cannot exceed the customer's total network load in that zone. Network Service Customers make ARR requests through PJM eTools.
- *Firm Point-to-Point Service* - PJM allocates ARRs to Firm Point-to-Point Service customers for approved service requests, subject to passing the Simultaneous Feasibility Test. The point of receipt is either a generation resource within the PJM RTO or the interconnection point with the sending Control Area. The point of delivery is the set of load buses designated in OASIS or the point of interconnection with the receiving Control Area. The duration of the ARR is the same as for the associated Transmission Service Request (TSR). The Point-to-Point Customer has the option to request ARRs consistent with the transmission reservation.

## 2.2 Valuation of ARRs

Auction Revenue Rights are defined from a source Price Node to a sink Price Node for a specific MW amount.

The economic value of each ARR is based on the MW amount and on the Locational Price differences between the source and sink node for FTR Obligations resulting from the Annual FTR Auction. The economic value of an Auction Revenue Right can either be positive (a benefit) or negative (a liability).

Annual FTR Auction revenue is distributed to Auction Revenue Rights holders in proportion to, but not to exceed, the economic value of the ARRs when compared to the clearing prices for FTR Obligations in each round of the Annual FTR Auction proportionally.

The settlements for Auction Revenue Rights will be based on the clearing prices from each round of the Annual FTR Auction. The amount of the credit that the ARR holder should receive for each round is equal to the MW amount of the ARR (divided by the number of rounds) times the price difference from the ARR sink point (delivery point) to the ARR source point as shown in the following formula:

$$ARR\ Target\ Allocation = (ARR/\#\ of\ rounds) * \left(\mathrm{LMP}_{\mathrm{Sink}} - \mathrm{LMP}_{\mathrm{Source}}\right)$$

**Note**: The LMP values in the above equation are results for FTR Obligations from the appropriate round of the Annual FTR auction.

Holders of Auction Revenue Rights may retain allocated ARRs, and receive associated allocations of revenues from the Annual FTR Auction. ARR holders may also convert ARRs into FTRs by “self-scheduling” an FTR into the first round of the Annual FTR Auction. When “self-scheduled”, an FTR must have the same path as the associated ARR. Additionally, holders of ARRs may also reconfigure ARRs by bidding into the Annual FTR Auction to acquire an FTR on an alternative path or for an alternative product.

## 2.3 Requirements to Participate

In order to be granted an ARR by PJM, you must be a PJM Firm Transmission Service customer – that is, you are using either Network Integration Service or Firm Point-to-Point Transmission Service. Network Integration Service and Firm Point-to-Point Transmission Service is available to Market Participants who have fulfilled the requirements defined in the ***PJM Manual for Transmission Service Request (M-02)***.

## 2.4 Participant Actions

As a participant in the ARR process, you are required to perform the following actions:

- submit requests for Network Integration Service ARRs
- submit Transmission Service Requests (TSRs) for Firm Point-to-Point Service
- after approval of ARRs by PJM, confirm acceptance

## 2.5 PJM Actions

PJM performs the following actions:

- confirms receipt of all TSRs and Network Integration Service ARR requests
- conducts Simultaneous Feasibility Tests (SFTs) on ARRs

# Section 3: Auction Revenue Rights Request and Approval Process

Welcome to the Auction Revenue Rights Request & Approval Process section of the **PJM Manual for Financial Transmission Rights.** In this section, you will find the following information:

- How participants request Network Integration Service ARRs and how PJM processes those requests (see "*Network Integration Service Auction Revenue Rights (ARRs)*").
- How ARRs for Firm Point-to-Point Service are awarded by PJM (see "*Firm Point-to-Point Transmission Auction Revenue Rights (ARRs)*").

## 3.1 Network Integration Service Auction Revenue Rights (ARRs)

The following procedure is used in requesting and processing Network Integration Service ARRs:

- The Network Service Customer submits requests to Network Integration Service ARRs using *e*FTR.
- PJM enters accepted ARRs into the PJM FTR database.

### 3.1.1 Rules and Guidelines

The following is a list of business rules and guidelines to follow when requesting Network Integration Service ARRs:

- All Network Integration Service ARR requests must pass a Simultaneous Feasibility Test before being given PJM approval.
- PJM can approve all, part, or none of the ARR request based on the results of the Simultaneous Feasibility Test.
- The path for each Network Integration Service ARR is defined from specific historical generation resources to the Energy Settlement Area in the Transmission Zone or other designated Load Aggregation Zone. Effective for the 2015/2016 Planning Period, if the path of the ARR is to the Residual Metered Load aggregation zone, the participant can elect to have its ARRs allocated to the aggregate load buses in the Transmission Zone.
- The total ARRs for a historical generation resource to the LSE load cannot be greater than the MW amount of the resource that was assigned to the LSEs on a pro-rata basis.
- A participant's total ARR amount to a transmission zone or load aggregation zone cannot exceed the participant's total network load in that zone or load aggregation zone.
- ARRs are specified to the nearest 0.1 MW.

## 3.2 Firm Point-to-Point Transmission Auction Revenue Rights (ARRs)

To qualify for an annual allocation of ARRs, firm point-to-point ARR requests must be associated with firm point-to-point service that spans the entire next planning period and is confirmed by the opening of the Annual ARR Allocation window.

The following procedure is used in processing Firm Point-to-Point ARRs outside of the Annual ARR Allocation window:

- The Firm Point-to-Point Transmission Customer submits Transmission Service Requests (TSRs) via OASIS, including the optional request for the associated ARR, according to the procedure outlined in the ***PJM Manual for Transmission Service Request (M-02)*** and the ***PJM OASIS Users Guide***.
- PJM conducts a Simultaneous Feasibility Study of the ARR request and notifies the Transmission Customer of TSR and ARR status via OASIS.
- Firm Point-to-Point Transmission Customers notify PJM of acceptance or rejection of TSRs and their associated ARRs via OASIS.

### 3.2.1 Rules and Guidelines

The following is a list of business rules and guidelines concerning Firm Point-to-Point ARRs:

- All Point-to-Point ARR requests must pass a Simultaneous Feasibility Test before being given PJM approval.
- PJM can approve all, part, or none of the ARR request based on the results of the Simultaneous Feasibility Test.
- The path for each Point-to-Point ARR is defined from the source to the sink, as specified in the TSR.
- The MW value of each Firm Point-to-Point ARR may be up to the megawatts of the Firm Transmission Service being provided.
- Firm Point-to-Point Transmission Service Customers must enter the amount of ARRs they desire in the "ARRs Requested" field on the OASIS Buy page. This value is considered an "up to" amount. Therefore, a Transmission Customer should enter the maximum amount of the ARRs that they desire, not to exceed the capacity value of the transaction.
- A Transmission Customer requesting Firm Point-to-Point Transmission Service that does not want ARRs should enter a "0" in the "ARRs Requested" field on the OASIS Buy page.
- Prior to placing the transaction in the Accepted status, PJM enters the amount of ARRs awarded in the "ARRs Award" field in OASIS.
- For Firm Point-to-Point Transmission Service out of or through the PJM RTO, the Source is either the generation resource within the PJM RTO or the interconnection with the sending Control Area; and the sink of delivery is the point of interconnection with the receiving Control Area.

- The duration of each Firm Point-to-Point ARR is the same as the associated Firm Transmission Service, which may be one year (starting at the beginning of any month), one month (starting the first day of the month), one week (Monday through Sunday), or one day (hours 1 through 24).
- If an approved ARR spans multiple planning periods, the ARR is technically only approved until the end of the first Planning Period. Prior to each new Planning Period, PJM re-evaluates all ARRs for feasibility. If ARR reductions are required due to infeasibility, then the ARRs are reduced in proportion to their MW value and level of impact on the binding constraint in the Simultaneous Feasibility Test.
- An ARR associated with long term (1 year or more) Firm Point-to-Point Transmission Service will be allocated on a first come first served basis if the request falls outside the Annual open enrollment window. If the request can be considered within the annual open enrollment window, then the request will be process on the same priority as Network Integration Service-based requests.

# Section 4: Annual ARR Allocation

Welcome to the *Annual ARR Allocation* section of the ***PJM Manual for Financial Transmission Rights***. In this section, you will find the following information:

- A general overview of the PJM Annual ARR Allocation (see "*Annual ARR Allocation Overview*").
- How Auction Revenue Rights (ARRs) are allocated in Stage 1A of the Annual ARR Allocation (see "Annual Allocation of Auction Revenue Rights (ARRs) – Stage 1A").
- How Auction Revenue Rights (ARRs) are allocated in Stage 1B of the Annual ARR Allocation (see “Annual of Auction Revenue Rights (ARRs) – Stage 1B”).
- How Auction Revenue Rights (ARRs) are allocated in Stage 1 of the Annual ARR Allocation for External Load Serving Entities (see “Stage 1 Participation for External Load Serving Entities”).
- How Auction Revenue Rights (ARRs) are allocated in Stage 2 of the Annual ARR Allocation (see "Annual Allocation of Auction Revenue Rights (ARRs) – Stage 2").
- How ARRs are reassigned for Shifts in Load Responsibility (see "*Reassignment of ARRs*").
- How New Stage 1 Resources can be added to resource list (see “New Stage 1 Resources”).
- How Alternate Stage 1 resources can be made to resource list (see “Alternate Stage 1 Resources”).
- How Incremental Auction Revenue Rights (ARRs) associated with Transmission Expansion are allocated (see "*Allocation of Incremental Auction Revenue Rights (IARRs)*").
- How Auction Revenue Rights can be allocated for transmission upgrades that increase stage 1 capability (see “Residual Auction Revenue Rights”).

## 4.1 Annual ARR Allocation Overview

Auction Revenue Rights (ARRs) are the mechanism by which the proceeds from the Annual FTR Auction are allocated. ARRs are allocated to Network Service Customers and to Firm Point-to-Point Transmission Customers for the duration of the Annual Planning Period.

Auction Revenue Rights will be distributed to Network Service Customers and Firm Point-to-Point Transmission Customers. Market Participants submit ARR requests for the planning period during the Annual ARR Allocation process. The Annual ARR Allocation is a two-stage allocation process designed to provide long-term certainty along with increased flexibility. The first stage of the allocation consists of two parts, Stage 1A and Stage 1B. In this first stage, Network Service Customers make ARR requests based on generation resources that historically served load in each transmission zone. Also in Stage 1, Firm Transmission Customers that are deemed as Qualifying Transmission Customers, can make ARR requests based on the megawatts of firm service provided between the receipt and delivery

points as to which the Transmission Customer had Firm Point-to-Point Transmission Service during the historical reference year.

The second stage, Stage 2, is a three-round allocation procedure that allows market participants to adjust their hedging paths on an annual basis. PJM will allocate ARRs that pass a Simultaneous Feasibility Test to Firm Transmission Customers based on priority (feasibility).

## 4.2 Annual Allocation of Auction Revenue Rights (ARRs) - Stage 1A

The first stage of the Annual ARR Allocation is based on generation resources that historically served load in each transmission zone. In Stage 1 of the Annual ARR Allocation, participants submit ARR requests for the planning period based on the following business rules:

- All ARR requests must pass a Simultaneous Feasibility Test during the allocation process.
- In Stage 1A, Network Services Customers must specify specific historical generation resources (source) to aggregate Network Customer Load in the Transmission Zone or other designated Load Aggregation Zone (sink) up to value of base load. Zonal Base load is defined as the lowest peak load from the previous year escalated by one-year's projected load growth rate for the zone.
- In Stage 1A, Firm Transmission Customers that are deemed as Qualifying Transmission Customers may request ARRs up to 50% of the megawatts of firm service provided between receipt and delivery points as to which the Transmission Customer had Point-to-Point Transmission Service during the historical reference year.
- All Network Integration Service ARRs allocated in Stage 1A are designated from a historical generation resource.
- All requests received during each stage of the Annual ARR Allocation are deemed to have arrived simultaneously.
- A Network Service Customer's total ARR amount allocated to a transmission zone or load aggregation zone cannot exceed the participant's total network base load in that zone or load aggregation zone.
- The sum of a Qualifying Transmission Customers ARR amount must be equal to or less than 50% of the megawatts of firm pt-to-pt transmission service provided between the receipt and delivery points as to which the Transmission Customer had Point-to-Point Transmission Service during the historical reference year.
- Qualifying Transmission Customers are any Firm Transmission Customers with an agreement for Long-Term Point-to-Point Transmission Service used to deliver energy from a designated network resource to load located either outside or within the PJM Region, and that was confirmed and in effect during the historical reference year for the zone in which the resource is located.

- Such agreement must also have remained in effect continuously following the historical reference year to continue in effect for the period addressed by the allocation, either by its term or by renewal.
- The megawatts of Auction Revenue Rights the Qualifying Transmission Customer may request in the Stage 1A of the allocation may not exceed the lesser of: (i)50% of the megawatts of firm service between the designated network resource and the load delivery point (or applicable point at the border of the PJM Region for load located outside such region) under contract during the historical reference year; and (ii)50% of the megawatts of firm service presently under contract between such historical reference year receipt and delivery points.
- A Qualifying Transmission Customer may request Auction Revenue Rights in either or both of the first stage or second stage of the allocation without regard to whether such customer is subject to a charge for firm Point-to-Point Transmission Service under section 1 of Schedule 7 of the PJM Tariff ("Base Transmission Charge").
- PJM determines the set of eligible ARR sources for each transmission zone or for each historic load aggregation zone within a transmission zone based on the historical reference year that corresponds to the LMP-based market implementation for the transmission zone.
- A historic load aggregation zone is defined as a sub-region of a transmission zone that was served under a separate set of supply contracts and/or generation resources (i.e. by a municipal or cooperative utility) than the other non-municipal/cooperative load in the transmission zone.
- Only long-term supply contracts or historical capacity contracts that were in place during the reference year and have a contract term of ten (10) years or greater (or were contracts with renewable options that have been exercised, and such exercised option term(s) plus the original contract term were or will be equal to a term of ten (10) years or more prior to the reference year are eligible to be considered historical generation resources for the purposes of Stage 1 allocation. This would include generation that was owned by an LSE and later sold but retained under a supply contract such that the generation was designated to serve the load continuously for ten (10) years or greater.

If load within a historic load aggregation zone disaggregates, then historic stage 1 resources associated with the historic load aggregation zone will be allocated according to load ratio share unless a FERC-accepted agreement explicitly states some other method of stage 1 resource allocation.

PJM will assign to each LSE a pro-rata amount of the MW capability from each generator that is designated to the transmission zone or load aggregation zone based on the LSE's percentage of the total peak load in the transmission zone or in the load aggregation zone. LSE is notified of the generation resource assignments. Each LSE chooses the set of ARRs that it wants to request based on the generator sources it was assigned. The requested ARRs must source at the designated generator and must sink at the LSEs aggregate load in the transmission zone or in the load aggregation zone. The ARR request is limited to an amount not greater than the designated MW amount.

PJM performs a Simultaneous Feasibility test to determine the set of ARRs that can be awarded to each Network customer. PJM notifies each LSE of the ARR awards resulting from the Stage 1 allocation process.

A participant may surrender any portion of the ARR awards resulting from Stage 1 of the Annual ARR Allocation process prior to the commencement of Stage 2 of the Annual ARR Allocation process provided that all remaining outstanding ARRs are simultaneously feasible following the return of such ARRs.

ARRs may be traded but trades must be made no later than the opening of the first round of the Annual FTR Auction and all trades are effective for the entire planning period. An LSE wishing to trade its ARRs must trade all of its ARRs associated with a particular zone. The LSE's zonal network service peak load is also automatically transferred to the new ARR owner for purposes of ARR allocation and reassignment. The new ARR owner is then subject to ARR reassignment associated with shifts in the original owners zonal network service peak load. Credit responsibility for an ARR that is traded within PJM's systems remains with the original party unless/until the receiving party ("3rd party") establishes to PJM's satisfaction, and consistent with the PJM credit policy, that it has sufficient credit with PJM and agrees by providing written notice to the PJM Treasury Department that it will fully assume the credit responsibility associated with the traded ARR. Since ARR value is derived from the annual FTR auction clearing prices, the credit requirement associated with traded ARRs cannot be determined until after completion of the annual FTR auction.

PJM will include the ARR credit and FTR payments and revenue credits (for any FTRs generated by the self-scheduling of the ARR) on the 3rd party's bill each month, but the original party retains the obligation to pay for any net negative ARR portfolio obligation and the self-scheduled FTR (offset by associated FTR congestion credits) if the 3rd party defaults on its payment obligation to PJM prior to credit responsibility being transferred to the 3rd party. Once the 3rd party establishes sufficient credit acceptable to PJM for its new ARR obligation, then PJM will notify both parties that the 3rd party has assumed credit responsibility for the ARR, and the original party is released from its credit responsibility for the ARR. PJM cannot guarantee that a 3rd party will establish sufficient credit acceptable to PJM. Market Participants trading ARRs to 3rd parties may retain credit responsibility for those ARRs up to the full term of the ARR.

Within the planning period, as load changes from one LSE to another within a transmission zone, a proportionate share of the ARRs defined to sink into the zone are reassigned from the old LSE to the new LSE. The reassignment of ARRs must be initiated by a request made by the LSE gaining load as described in the "Reassignment of ARRs for Shifts in Load Responsibility" section.

The planning process described in this manual will be conducted on an annual basis to determine the transmission system adequacy needed to maintain the 10-year feasibility of Stage 1A ARRs. PJM shall develop transmission system upgrades to maintain the feasibility of Stage 1A ARRs.

If statutory or regulatory changes are introduced that affect the rights going forward, the Stage 1A ARRs are preserved for at least ten consecutive PJM Planning Periods, and the term of the rights would decrease by one PJM Planning Period during each annual ARR allocation process so that the rights expire at the end of the relevant period.

PJM will conduct an annual simultaneous feasibility analysis to determine if the transmission system can accommodate Stage 1A ARRs to cover base load for the next 10-year period. A zonal growth rate will be applied to each zone's base load to develop a zonal base load for years 2 through 10. A simultaneous feasibility test of Stage 1A ARRs to base load will be conducted for each year of the relevant 10-year period. The simultaneous feasibility analysis for Base Load ARRs will include all requested Stage 1A ARRs plus additional ARRs to cover zonal base load for which no Stage 1A ARRs were requested. For zonal base load not covered by Stage 1A ARR requests, additional ARR MWs will be assumed from capacity remaining on eligible Stage 1 resources which have a historical LMP which is lower than the historical zonal LMP. ARR MWs will be delivered from such Stage 1 resources up to the maximum MW capacity of the resource until the historical LMP of the next highest price resource exceeds the historical zonal LMP or until the zonal base load is met. If an SFT violation occurs in any year of the analysis, then a transmission upgrade or acceleration of a planned upgrade to resolve the violation will be identified by PJM and such upgrades will be recommended for inclusion into the PJM RTEP. This recommendation will include an analysis of the economic benefits of the upgrade as additional information.

## 4.3 Annual Allocation of Auction Revenue Rights (ARRs) - Stage 1B

The first stage of the Annual ARR Allocation is based on generation resources that historically served load in each transmission zone. In Stage 1B of the Annual ARR Allocation, participants submit ARR requests for the planning period based on the following business rules:

- All ARR requests must pass a Simultaneous Feasibility Test during allocation process.
- In Stage 1B, Network Services Customers must specify specific historical generation resources (source) to aggregate Energy Settlement Area in the Transmission Zone or other designated Load Aggregation Zone (sink) up to value of network service peak load minus awarded ARRs from Stage 1A. Effective for the 2015/2016 Planning Period, if the path of the ARR is to the Residual Metered Load aggregation zone, the participant can elect to have its ARRs allocated to the aggregate load busses in the Transmission Zone.
- In Stage 1B, Firm Transmission Customers that are deemed as Qualifying Transmission Customers may request ARRs up to the remainder of the megawatts of firm service not awarded in Stage 1A provided between receipt and delivery points as to which the Transmission Customer had Point-to-Point Transmission Service during the historical reference year.
- All Network Integration Service ARRs allocated in Stage 1B are designated from a historical generation resource.
- All requests received during each stage of the Annual ARR Allocation are deemed to have arrived simultaneously.
- A Network Service Customer's total ARR amount allocated to a transmission zone or load aggregation zone cannot exceed the participant's total network peak load in that zone or load aggregation zone minus the awarded ARRs from Stage 1A.

- The sum of a Qualifying Transmission Customers ARR amount must be equal to or less than the remainder of megawatts of firm pt-to-pt transmission service not awarded in Stage 1A provided between the receipt and delivery points as to which the Transmission Customer had Point-to-Point Transmission Service during the historical reference year.
- Qualifying Transmission Customers are any Firm Transmission Customers with an agreement for Long-Term Point-to-Point Transmission Service used to deliver energy from a designated network resource to load located either outside or within the PJM Region, and that was confirmed and in effect during the historical reference year for the zone in which the resource is located.
- Such agreement must also have remained in effect continuously following the historical reference year to continue in effect for the period addressed by the allocation, either by its term or by renewal.
- The megawatts of Auction Revenue Rights the Qualifying Transmission Customer may request in Stage 1B of the allocation may not exceed the lesser of: (i) Remainder of megawatts not awarded in Stage 1A of firm service between the designated network resource and the load delivery point (or applicable point at the border of the PJM Region for load located outside such region) under contract during the historical reference year; and (ii) Remainder of the megawatts not awarded in Stage 1A of firm service presently under contract between such historical reference year receipt and delivery points.
- A Qualifying Transmission Customer may request Auction Revenue Rights in either or both of the first stage or second stage of the allocation without regard to whether such customer is subject to a charge for firm Point-to-Point Transmission Service under section 1 of Schedule 7 of the PJM Tariff ("Base Transmission Charge").
- PJM determines the set of eligible ARR sources for each transmission zone or for each historic load aggregation zone within a transmission zone based on the historical reference year that corresponds to the LMP-based market implementation for the transmission zone.
- A historic load aggregation zone is defined as a sub-region of a transmission zone that was served under a separate set of supply contracts and/or generation resources (i.e. by a municipal or cooperative utility) than the other non-municipal/cooperative load in the transmission zone.
- Only long-term supply contracts or historical capacity contracts that were in place during the reference year and have a contract term of ten (10) years or greater (or were contracts with renewable options that have been exercised, and such exercised option term(s) plus the original contract term were or will be equal to a term of ten (10) years or more prior to the reference year are eligible to be considered historical generation resources for the purposes of Stage 1 allocation. This would include generation that was owned by an LSE and later sold but retained under a supply contract such that the generation was designated to the serve the load continuously for ten (10) years or greater.

PJM will assign to each LSE a pro-rata amount of the MW capability from each generator that is designated to the transmission zone or load aggregation zone based on the LSE's

percentage of the total peak load in the transmission zone or in the load aggregation zone. LSE is notified of the generation resource assignments. Each LSE chooses the set of ARRs that it wants to request based on the generator sources it was assigned. The requested ARRs must source at the designated generator and must sink at the LSEs aggregate load in the transmission zone or in the load aggregation zone. The ARR request is limited to an amount not greater than the designated MW amount.

PJM performs a Simultaneous Feasibility test to determine the set of ARRs that can be awarded to each Network customer. PJM notifies each LSE of the ARR awards resulting from the Stage 1B allocation process.

A participant may surrender any portion of the ARR awards resulting from Stage 1B of the Annual ARR Allocation process prior to the commencement of Stage 2 of the Annual ARR Allocation process provided that all remaining outstanding ARRs are simultaneously feasible following the return of such ARRs.

ARRs may be traded but trades must be made no later than the opening of the first round of the Annual FTR Auction and all trades are effective for the entire planning period. An LSE wishing to trade its ARRs must trade all of its ARRs associated with a particular zone. The LSE's zonal network service peak load is also automatically transferred to the new ARR owner for purposes of ARR allocation and reassignment. The new ARR owner is then subject to ARR reassignment associated with shifts in the original owners zonal network service peak load.

Within the planning period, as load changes from one LSE to another within a transmission zone, a proportionate share of the ARRs defined to sink into the zone are reassigned from the old LSE to the new LSE. The reassignment of ARRs must be initiated by a request made by the LSE gaining load as described in the "Reassignment of ARRs for Shifts in Load Responsibility" section.

## 4.4 Stage 1 Participation for External Load Serving Entities

Long-Term Firm Point-to-Point Transmission Service customers that are not Qualifying Transmission Customers and Network Service Users serving Non-Zone Network Load may participate in stage 1 of the Annual Allocation of Auction Revenue Rights pursuant to Section 7.4.2(a)-(c) of Schedule 1 of the PJM Tariff, subject to the following conditions:

- The relevant transmission service shall be used to deliver energy from a designated network resource located either outside or within the PJM region to load located outside the PJM Region.
- To be eligible to participate in stage 1A of the annual Auction Revenue
- Rights allocation: 1) the relevant transmission service shall remain in effect for the stage 1A period addressed by the allocation; and 2) the control area in which the external load is located has similar rules for load external to the relevant control area.
- Source points for stage 1 requests shall be limited to: 1) generation resources owned by the LSE serving the load located outside the PJM Region; or 2) generation resources subject to a bona fide firm energy and capacity supply contract executed by the LSE to meet its load obligations, provided that such

contract remains in force and effect for a minimum term of ten (10) years from the first effective Planning Period that follows the initial stage 1 request.

- For Long-Term Firm Point-to-Point Transmission customers requesting Stage 1 Auction Revenue Rights, the generation resource(s) designated as source points may not include any portion of the generating capacity of such resource(s) that, at the time of the request, is identified as a Capacity Resources.
- For Network Service Users requesting stage 1 Auction Revenue Rights, the generation resource(s) designated as source points must either be committed into PJM's RPM market or be designated as part of the entity's FRR Capacity Plan for the purpose of serving the capacity requirement of the external load.
- All stage 1 source point requests made shall not increase the MW flow on facilities binding in the relevant annual Auction Revenue Rights allocation or in future stage 1A allocations and shall not cause MW flow to exceed applicable ratings on any other facilities in either set of conditions in the simultaneous feasibility test.
- To ensure the conditions are met, a simultaneous feasibility test shall be conducted: 1) based on next allocation year with all existing stage 1 and stage 2 Auction Revenue Rights modeled as fixed injection-withdrawal pairs; and 2) based on 10 year allocation model with all eligible stage 1A Auction Revenue Rights for each year including base load growth for each year.
- Requests for stage 1 Auction Revenue Rights that are received by PJM by November 1st of a Planning Period shall be processed for the next annual Auction Revenue Rights allocation. Requests received after November 1st shall not be considered for the upcoming annual Auction Revenue Rights allocation. If all requests are not simultaneously feasible then requests will be awarded on a pro-rata basis.
- Requests for new or alternate stage 1 resources made by Network Service Users and External LSEs that are received by November 1st shall be evaluated at the same time. If all requests are not simultaneously feasible then requests will be awarded on a pro-rata basis.
- Stage 1 Auction Revenue Rights source points that qualify shall be eligible as stage 1 Auction Revenue Rights source points in subsequent annual Auction Revenue Rights allocations.
- Long-Term Firm Point-to-Point Transmission customers requesting stage 1 Auction Revenue Rights may request Auction Revenue Rights MWs up to the lesser of: 1) the customer's Long-Term Firm Point-to-Point Transmission service contract MW amount; or 2) the customer's Firm Transmission Withdrawal Rights.
- Network Service Users requesting stage 1 Auction Revenue Rights may request Auction Revenue Rights MWs up to the lesser of: 1) the customer's network service peak load; or 2) the customer's Firm Transmission Withdrawal Rights.

- Stage 1A Auction Revenue Rights requests shall not exceed 50% of the maximum allowed MWs. Stage 1B Auction Revenue Rights requests shall not exceed the difference between the maximum allowed MWs authorized and the Auction Revenue Rights MWs granted in stage 1A.
- In each round of Stage 2 of an annual allocation of Auction Revenue Rights MW requests shall be equal to or less than one third of the difference between the maximum allowed MWs authorized and the Auction Revenue Rights MW amount allocated in stage 1.
- Stage 1 Auction Revenue Rights sources established and the associated Auction Revenue Rights MW amount may be replaced with an alternate resource pursuant to the process established in the Alternate Stage 1 Resources section of this manual.

## 4.5 Annual Allocation of Auction Revenue Rights (ARRs) – Stage 2

The second stage, Stage 2, of the allocation is a three-round allocation procedure. In Stage 2 of the Annual ARR Allocation, participants submit ARR requests for the planning period based on the following business rules:

- All Network Service ARR requests must pass a Simultaneous Feasibility Test before being given PJM approval.
- PJM can approve all, part, or none of the ARR request based on the results of the Simultaneous Feasibility Test.
- The path for each Network Integration Service ARR is defined from a generator bus, hub, zone or interface to aggregate Energy Settlement Area or other designated Load Aggregation Zone. Effective for the 2015/2016 Planning Period, if the path of the ARR is to the Residual Metered Load aggregation zone, the participant can elect to have its ARRs allocated to the aggregate load buses in the Transmission Zone.
- A participant's total ARR amount to a transmission zone or load aggregation zone cannot exceed the participant's total network load in that zone or load aggregation zone.
- The source point of each ARR request may be any available generator bus, Hub or external interface or load zone for which PJM calculates and posts a Day-ahead Congestion Price value.
- The sink point of each ARR request must be the Network LSEs aggregate load in the Energy Settlement Area in the transmission zone or load aggregation zone. Effective for the 2015/2016 Planning Period, if the path of the ARR is to the Residual Metered Load aggregation zone, the participant can elect to have its ARRs allocated to the aggregate load buses in the Transmission Zone.
- ARRs are specified to the nearest 0.1 MW.

PJM will perform an iterative allocation process that consists of three sequential rounds, with one third of the remaining system ARR capability allocated in each round. Network Service customers and Firm Transmission customers can view the results of each allocation round before submitting their ARR requests for a subsequent round.

In every round of the three-round allocation process, the Network Customer's ARR requests are limited to one third of the Network customer's peak load remaining unallocated after the Stage 1 allocation process.

For example, if the Network customer's peak load is 100 MW and they had received 70 MW of ARRs in Stage 1, then the ARR requests in each round of Stage 2 are limited to (100-70)/3 = 10 MW.

A Firm Transmission Customer, that is deemed a Qualifying Transmission Customer, may request Auction Revenue Rights in each round of the second stage of the allocation process in a number of megawatts equal to or less than one third of the difference between the number of megawatts of firm service being provided between the receipt and delivery points as to which the Transmission Customer currently has firm Point-to-Point Transmission Service and its Auction Revenue Right Allocation from the first stage of the allocation process.

A Firm Transmission Customer, that is not deemed a Qualifying Transmission Customer, may request Auction Revenue Rights in the second stage of the allocation process, but only if it is subject to a Base Transmission Charge, or if it is expressly identified on a grandfathering schedule approved by FERC in connection with the elimination of such Base Transmission Charge. PJM transmission customers that serve load in MISO using service from non-historic sources may participate in Stage 2 but in no event can they receive an allocation of ARRs/FTRs from PJM greater than their firm service to loads in MISO. Requests for firm point-to-point ARRs must be associated with firm point-to-point service that spans the entire next planning period, either by its term or by renewal, and is confirmed by the opening of the Annual ARR Nomination period. Firm point-to-point requests are separated into thirds and each third is assigned to each round of Stage 2.

In each round, PJM staff performs the Simultaneous Feasibility test to determine the feasible set of ARRs that can be awarded. If all ARR requests are not simultaneously feasible, then proration is required. If ARR proration is required due to infeasibility then ARRs are allocated in proportion to the MW value requested and in inverse proportion to the effect on the binding constraint as illustrated in the following example:

Line A to B Capacity is 50 MW

Two ARR requests are submitted exceeding 50 MW capability of Line A-B:

| ARR # | Requested ARRs | Path | Effect per MW on Line AB | Resulting Line AB Flow Impact |
|---|---|---|---|---|
| #1 | 200 MW | A to B | .50 | 100 MW |
| #2 | 200 MW | C to D | .25 | 50 MW |

*Exhibit 1: ARR Proration Example*

Because the total flow impact on Line A-B resulting from the two ARR requests is 150 MW, proration is required because the capability of Line A-B is only 50 MW.

Proration Calculation:

Prorated ARR amount awarded =

$$(LineCapability\ MW) \times (Requested\ \ MW\ /\ Total\ Requested\ \ ARR\ MW) \times (1/\ ARR\ effect\ \ per\ \ MW\ on\ Line\ A\text{-}B)$$

ARR #1 prorated MW awarded =

$$(50\ MW)\times(200\ MW\ /\ 400\ MW)\times(1/\ .50)=50\ MW$$

ARR #2 prorated MW awarded =

$$(50\ MW)\times(200\ MW\ /\ 400\ MW)\times(1/\ .25)=100\ MW$$

At the end of each round PJM notifies each Network Customer or Firm Transmission Customer of the ARRs that they were awarded as a result of Round 1. After viewing the results, Network Customers or Firm Transmission Customer submit ARR requests for next round. The allocation process continues in an iterative manner for three rounds.

ARRs may be traded but trades must be made no later than the opening of the first round of the Annual FTR Auction and all trades are effective for the entire planning period. An LSE wishing to trade its ARRs must trade all of its ARRs associated with a particular zone. The LSE's zonal network service peak load is also automatically transferred to the new ARR owner for purposes of ARR allocation and reassignment. The new ARR owner is then subject to ARR reassignment associated with shifts in the original owners zonal network service peak load.

Within the planning period, as load changes from one LSE to another within a transmission zone, a proportionate share of the ARRs defined to sink into the zone are reassigned from the old LSE to the new LSE. The reassignment of ARRs must be initiated by a request made by the LSE gaining load as described in the "Reassignment of ARRs for Shifts in Load Responsibility" section.

## 4.6 Reassignment of Auction Revenue Rights (ARRs)

ARRs allocated for the planning period will be reassigned on a proportional basis within a zone as load switches between within the planning period. As load shifts from one LSE to another within a transmission zone, a proportionate share of the ARRs defined to sink into the zone are reassigned from the old LSE to the new LSE. The reassignment of ARRs is an automatic process that is conducted on a daily basis.

ARRs are only reassigned from those LSEs that have lost load in a zone and have a net positive economic ARR position to that zone. An LSE that loses load will lose ARR MWs in proportion to the amount of load lost and this same proportion will reduce each individual ARR assigned to the LSE. ARRs are initially allocated to the nearest 0.1 MW but reassigned to the nearest .001 MW. The total set of ARRs to be forfeited by LSEs losing load in a zone will be reallocated to LSEs gaining load in the zone in proportion to each LSE's MW load gain relative to the total load shifted in the zone.

On a daily basis, Auction Revenue Rights are reassigned using the following procedure:

- PJM compares each LSE's Network Service Peak Load in a zone to the Network Service Peak Load of the previous day.
- PJM analyzes each LSE's net economic ARR position. For each LSE losing load <u>and</u> having a net positive economic ARR position for that zone:
- The percentage of load lost for each LSE is determined,
- Each ARR owned by each LSE gaining load is reduced by this same percentage

- PJM assigns the total set of forfeited ARRs to LSEs gaining load in the zone:
- The percentage of ARRs to be assigned to each LSE gaining load is determined. The percentage will be equal to the MW load gain by the LSE divided by the total MWs of load shifting in the zone.
- Each LSE gaining load is assigned a percentage of each ARR in this set of forfeited ARRs.

## 4.7 New Stage 1 Resources

A Network Service User may request the addition of new stage 1 resources to the stage 1 resource list if the capacity of the historical resources for a zone is less than the zonal base load. Such requests are subject to the simultaneous feasibility tests described below and are limited to generation resources either owned by the requesting party or subject to ten-year or longer firm energy and capacity contracts that have been executed to serve load eligible for stage 1A ARRs and remains in effect for a minimum term of ten years.

Simultaneous feasibility tests for new stage 1 resource requests shall ensure that the requests for a new base resource does not increase the MW flow on facilities binding in the current ARR allocation or in future stage 1a allocations and does not cause MW flow to exceed applicable ratings in either set of conditions. The most limiting set of conditions will be used as the limiting condition. A simultaneous feasibility test of new stage 1 resource requests will assess the feasibility of the requests under the following conditions:

- Based on the next allocation year with all existing stage 1 and stage 2 ARRs modeled as fixed injection-withdrawal pairs.
- Based on the 10 year allocation model with all eligible stage 1 ARRs for each year including base load growth for each year.

The amount of MWs that can be nominated from the new base resource will be the lower of the contract MW or 1.15 times the Network Service User's NSPL value minus the Network Service User's share of the existing Stage 1 MW capability for the zone. Requests for new stage 1 resource that are received by PJM by November 1 will be processed for the next Annual ARR Allocation. Requests received after this date will not be considered for the upcoming Annual ARR Allocation. All requests for new or alternate stage 1 resources that are received by November 1 will be deemed to have been submitted simultaneously and will be evaluated at the same time.

## 4.8 Alternate Stage 1 Resources

A Network Service User may replace one or more of its existing stage 1 resources and its associated MW amount of ARRs with an alternate resource. Such requests are subject to the simultaneous feasibility tests described below and are limited to generation resources either owned by the requesting party or subject to ten-year or longer firm energy and capacity contracts that have been executed to serve load eligible for stage 1A ARRs and remains in effect for a minimum term of ten years.

Simultaneous feasibility tests for alternate stage 1 resource requests shall ensure that relative to the existing resource, the alternate base resource does not consume a greater amount of transmission capability on facilities binding in the current ARR allocation or future stage 1A allocations, and does not allow MW flow(s) to exceed applicable ratings on any

other facilities. A simultaneous feasibility test of alternate stage 1 resource requests will assess the feasibility of the requests under the following conditions:

- Based on the next allocation year with all existing stage 1 and stage 2 ARRs modeled as fixed injection-withdrawal pairs.
- Based on the 10 year allocation model with all eligible stage 1 ARRs for each year including base load growth for each year.

The amount of MWs that can be nominated from the alternate resource cannot exceed the original awarded stage 1 MW amount of ARRs associated with the original stage 1 resource. Requests for new stage 1 resource that are received by PJM by November 1 will be processed for the next Annual ARR Allocation. Requests received after this date will not be considered for the next Annual ARR Allocation. All requests for new or alternate stage 1 resources that are received by November 1 will be deemed to have been submitted simultaneously and will be evaluated at the same time.

If the Network Service User accepts the MW amount of ARRs associated with the alternate resource as established by the simultaneous feasibility test, the alternate resource will replace the relevant existing stage 1 resource beginning with the next Annual ARR Allocation. If the Network Service User rejects the MW amount of ARRs associated with the alternate resource as established by the simultaneous feasibility test, the original stage 1 resource will remain in effect.

## 4.9 Allocation of Incremental Auction Revenue Rights (IARRs)

### 4.9.1 Merchant and Generation Interconnection IARRs

Transmission expansion projects associated with new generation interconnection and Merchant Transmission Expansion projects will be allocated incremental ARRs in a three-round allocation process in which the customer requests incremental ARRs for three pairs of point-to-point combinations (one point-to-point combination is requested per round).

In each round, one-third of the Incremental ARRs made available by the expansion project will be assigned to the requester. After each of rounds one and two, the requester may accept the assigned Incremental ARRs or refuse them. Acceptance of the assignment will remove the assigned Incremental ARRs from availability in the next rounds. Refusal of the assignment will result in the Incremental ARR being available for the next round. The Incremental ARR assignment made in round three will be final and binding. The final and binding Incremental Auction Revenue Right assignment for a requested point-to-point combination in each round shall in no event be less than one third of 80% and no greater than one-third of 100% of the non-binding estimate of Incremental Auction Revenue Rights for that point-to-point combination that was provided to the New Service Customer.

Incremental ARRs will be effective for thirty years or the life of the facility or upgrade, whichever is less.

At any time during this thirty-year period, in lieu of continuing this thirty-year ARR, the Interconnection Customer shall have a one-time choice to switch to an optional mechanism, whereby, on an annual basis, the customer has the choice to request an ARR during the Annual ARR Allocation process between the same source and sink, subject to simultaneous feasibility. Once this option is chosen, the Interconnection Customer must request the

Incremental ARR during each annual ARR enrollment window for the upcoming planning period. If no request is made, the Incremental ARR is forfeited for that planning period.

At any time during this thirty-year period, an Interconnection Customer may return Incremental ARRs that it no longer desires at any time, provided that all remaining outstanding ARRs can be simultaneously accommodated following the return of such ARRs. In the event an Interconnection Customer returns Incremental ARRs, the Interconnection Customer shall have no further rights regarding such Incremental ARRs.

### 4.9.2 Regional Transmission Expansion Plan (RTEP) IARRs

RTEP Projects Eligible for Allocation of IARRs will be calculated for any RTEP upgrade the costs of which will be allocated on a regional basis. IARRs created by a project will be allocated to Responsible Customers in proportion to each Responsible Customers' share of the project cost. Responsible Customers as defined in Schedule 12 of the Tariff that are Network Customers, Transmission Customers with an agreement for Firm Point-To-Point Service, or Merchant Transmission Providers that are assigned cost responsibility for a Regional Facility or a Necessary Lower Voltage Facility ("Regionally Assigned Facility").

**RTEP IARR Calculation Method**

The source point of the IARR will be a new aggregate pricing point comprised of up to ten (10) generator buses having the largest positive distribution factor (DFAX) on the constraint being relieved by upgrade (i.e. – where increased generation increases the flow on the constraint being relieved).

The sink point of the IARR will be a new aggregate pricing point comprised of the load-weighted average of the transmission zone for which the aggregate DFAX on the constraint being relieved by upgrade is negative (i.e. – where increased load increases the flow on the constraint being relieved).

IARRs associated with an upgrade are calculated by determining the incremental ARR capability between the source and sink points created by the project.

- Using the base network topology, ARR capability between the specified source-sink combination is measured by increasing MW transfers from the specified source to the specified sink until a transmission limit is encountered.
- Using a network topology which includes the expansion project, the ARR capability between the specified source-sink combination is measured by increasing MW transfers from the specified source to the specified sink until a transmission limit is encountered.
- The incremental ARR (IARR) capability between the source-sink combination created by the expansion project is the difference between the ARR capability in the base system and the ARR capability in the system which include the project

PJM will determine the quantity of IARRs to be allocated within three months prior to the actual in-service date of the upgrade.

**RTEP IARR Allocation Method**

Each Responsible Customer will be allocated IARR MWs in proportion to the Responsible Customers' share of the project cost.

Within each zone, each network customer will be allocated a share of the zone's IARRs in proportion to the customer's share of the zonal NSPL.

Allocation of the IARRs will occur for each identified RTEP upgrade for each of the 30-years following implementation of the upgrade. Potential recipients of the rights will be determined on an annual basis according to shares of the zonal NSPL for the upcoming Planning Year. Identified recipients will then have the opportunity to turn down the allocated rights prior to the initiation of the annual ARR allocation process.

### 4.9.3 Elective Upgrade IARRs

Section 7.8 of Schedule 1 of the Operating Agreement sets forth provisions to permit any party to request and obtain Incremental ARRs by agreeing to fund upgrades necessary to support the requested rights. Attachment EE to the PJM Tariff is the form of the Upgrade request. Requests must specify a source, sink and MW amount.

PJM will assess the simultaneous feasibility of the requested Incremental ARRs and all outstanding ARRs against the base system ARR capability and stage 1A ARR capability for the future 10 year period. Based on this preliminary assessment, PJM will conduct studies to determine the upgrades required to accommodate the requested Incremental ARRs and ensure that all outstanding ARRs are simultaneously feasible. If a party elects to fund the upgrades PJM will notify the party of the actual amount of Incremental ARRs that will be awarded based on the allocation process established pursuant to Section 231 of Part VI of the Tariff.

### 4.9.4 Duration and Value of IARRs

IARRs will become effective on the first day of the first month that the upgrade is included in the transmission system model for the monthly FTR auction.

Incremental ARRs will be effective for thirty years or the life of the facility or upgrade, whichever is less.

For IARRs that become effective at the beginning of a planning year, their value will be determined identically to that of annually allocated ARRs, based on the nodal prices resulting from the annual FTR auction. If IARRs become effective during a planning year, then their value for each month remaining in that planning year will be based on the results of the prompt-month FTR auctions. For each planning year thereafter, the value of IARRs will be determined identically to that of annually allocated ARRs, based on the nodal prices resulting from the annual FTR auction.

## 4.10 Residual Auction Revenue Rights

Residual Auction Revenue rights (ARRs) are defined as Network Service or Firm Point-to-Point Auction Revenue rights that were made available as a result of transmission upgrades that occur after the Annual ARR Allocation. Residual ARRs are defined for transmission upgrades or other increased transmission system capability that was not modeled in the Annual ARR Allocation, and if such increased capability had been modeled, a greater amount of ARRs would have been allocated in Stage 1. Residual ARRs available for allocation will be only those rights in excess of rights allocated directly to entities to whom cost responsibility for the same upgrades has been assigned. PJM will calculate the Residual ARRs made available by the increased transmission capability for paths which

were pro-rated in Stage 1 of the Annual ARR Allocation. This calculation will be made prior to when the increase in the transmission capability occurs. Firm Transmission Customers that had ARRs pro-rated in Stage 1 of the Annual ARR Allocation would be eligible for Residual ARRs. Residual ARR MWs plus previously awarded Stage 1 and Stage 2 MWs cannot exceed the Network Service Peak Load value for a particular participant. Residual ARRs become effective the first month that the increased transmission capability is included in the SFT of the Monthly FTR Auction and terminate at the end of the current Planning Period. Residual ARRs values will be determined for participants whose Stage 1 requests were prorated and then shifted to reflect load shifts occurring between June 1st of the current planning year and the effective month. The economic value of each Residual ARR is a monthly quantity based on the MW amount and on the nodal clearing price difference between the source and sink nodes for FTR Obligations resulting from each Monthly FTR Auction of the effective period of the Residual ARR. (For example the economic value of a Residual ARR that becomes effective in April, is based on April clearing prices from April FTR Auction).

# Section 5: Financial Transmission Rights (FTRs) for New Load in Zones Associated with Market Growth

Welcome to the Financial Transmission Rights (FTRs) for New Load in Zones Associated with Market Growth section of the **PJM Manual for Financial Transmission Rights**. In this section, you will find the following information:

- An overview of the FTR Allocation Process for New Load in Zones Associated with Market Growth (see "*FTR Allocation Process for New Load in Zones Associated with Market Growth*").
- How participants request Network Integration Service FTRs for New Load in Zones Associated with Market Growth and how PJM processes those requests (see "*Network Integration Service Financial Transmission Rights (FTRs) for New Load in Zones Associated with Market Growth*").
- How FTRs for Firm Point-to-Point Service are awarded by PJM (see "*Firm Point-to-Point Transmission Financial Transmission Rights (FTRs)*").
- How FTRs are reassigned for Shifts in Load Responsibility (see "*Reassignment of FTRs*")

## 5.1 FTR Allocation Process for New Load in Zones Associated with Market Growth

A transitional FTR Allocation will be conducted for a new zone load being added as a result of market growth. This transitional allocation of FTRs will cover the period of time between the implementation of the new zone added as a result of market growth and the next Annual ARR Allocation.

For a transitional period, Network Service Users and those Firm Transmission Customers that receive, and pay for, that take service that sinks or sources, in new PJM zones, at their election, may receive a direct allocation of Financial Transmission Rights instead of an allocation of Auction Revenue Rights. This transitional period covers the succeeding two Annual FTR Auctions after the integration of the new zone into the PJM interchange energy market. The election of a direct FTR Allocation shall be made prior to the commencement of each Annual FTR Auction.

1. Network Service Users and Firm Transmission Customers in new PJM zones that elect not to receive direct allocations of Financial Transmission Rights, may receive allocations of Auction Revenue Rights. Network Service Users and Firm Transmission Customers in new PJM zones must choose to receive either an FTR Allocation or an ARR Allocation. A Network Service User or Firm Transmission Customer cannot choose to receive both an FTR Allocation and an ARR Allocation.
2. All FTR requests in new zones made during these transition periods will be subject to the same allocation procedures as those set forth in the Annual ARR Allocation process as described in the "Annual ARR Allocation" section (Section 4). As part of the integration of new zones into the PJM Market, PJM will identify the set of eligible FTR sources for the Stage 1 allocation process based on historic and contractual delivery patterns.

3. These FTR requests must satisfy the same requirements as mentioned above for Annual ARR requests. The Annual FTR Allocation process for new zones will be conducted simultaneously with the Annual ARR Allocation process for the other zones to ensure Simultaneous Feasibility of all rights.

## 5.2 Network Integration Service Financial Transmission Rights (FTRs)

The following procedure is used in requesting and processing Network Integration Service FTRs:

- The Network Service Customer submits requests to Network Integration Service FTRs using *e*FTR.
- PJM enters accepted FTRs into the PJM FTR database.

### 5.2.1 Rules and Guidelines

The following is a list of business rules and guidelines to follow when requesting Network Integration Service FTRs:

- All Network Integration Service FTR requests must pass a Simultaneous Feasibility Test before being given PJM approval.
- PJM can approve all, part, or none of the FTR request based on the results of the Simultaneous Feasibility Test.
- The path for each Network Integration Service FTR is defined from specific historical generation resources to aggregate Network Customer Load in the Transmission Zone or other designated Load Aggregation Zone.
- The total FTRs for a historical generation resource to the LSE load cannot be greater than the MW amount of the resource that was assigned to the LSEs on a pro-rata basis.
- A participant's total FTR amount to a transmission zone or load aggregation zone cannot exceed the participant's total network load in that zone or load aggregation zone.
- FTRs are specified to the nearest 0.1 MW.
- FTR requests are time-stamped and processed in the order in which they are received.

## 5.3 Firm Point-to-Point Transmission Financial Transmission Rights (FTRs)

To qualify for an allocation of FTRs, firm point-to-point FTR requests must be associated with firm point-to-point service that spans the entire next planning period and is confirmed by the opening of the Annual FTR Allocation window.

The following procedure is used in processing Firm Point-to-Point FTRs outside of the Annual FTR Allocation window:

- The Firm Point-to-Point Transmission Customer submits Transmission Service Requests (TSRs) via OASIS, including the optional request for the associated FTR, according to the procedure outlined in the PJM Manual for ***Transmission Service Request (M-02)*** and the PJM ***OASIS Users Guide.***
- PJM conducts a Simultaneous Feasibility Study of the FTR request and notifies the Transmission Customer of TSR and FTR status via OASIS.
- Firm Point-to-Point Transmission Customers notify PJM of acceptance or rejection of TSRs and their associated FTRs via OASIS.

### 5.3.1 Rules and Guidelines

The following is a list of business rules and guidelines concerning Firm Point-to-Point FTRs:

- All Point-to-Point FTR requests must pass a Simultaneous Feasibility Test before being given PJM approval.
- PJM can approve all, part, or none of the FTR request based on the results of the Simultaneous Feasibility Test.
- The path for each Point-to-Point FTR is defined from the source to the sink, as specified in the TSR.
- The MW value of each Firm Point-to-Point FTR may be up to the megawatts of the Firm Transmission Service being provided.
- Firm Point-to-Point Transmission Service Customers must enter the amount of FTRs they desire in the "FTRs Requested" field on the OASIS Buy page. This value is considered an "up to" amount. Therefore, a Transmission Customer should enter the maximum amount of the FTRs that they desire, not to exceed the capacity value of the transaction.
- A Transmission Customer requesting Firm Point-to-Point Transmission Service that does not want FTRs should enter a "0" in the "FTRs Requested" field on the OASIS Buy page.
- Prior to placing the transaction in the Accepted status, PJM enters the amount of FTRs awarded in the "FTRs Award" field in OASIS.
- For Firm Point-to-Point Transmission Service out of or through the PJM RTO, the Source is either the generation resource within the PJM RTO or the interconnection with the sending Control Area; and the sink of delivery is the point of interconnection with the receiving Control Area.
- The duration of each Firm Point-to-Point FTR is the same as the associated Firm Transmission Service, which may be one year (starting at the beginning of any month), one month (starting the first day of the month), one week (Monday through Sunday), or one day (hours 1 through 24).
- If an approved FTR spans multiple planning periods, the FTR is technically only approved until the end of the first Planning Period. Prior to each new Planning Period, PJM re-evaluates all FTRs for feasibility. If FTR reductions are required due to infeasibility, then the FTRs are reduced in proportion to

their MW value and level of impact on the binding constraint in the Simultaneous Feasibility Test.

- An FTR associated with long term (1 year or more) Firm Point-to-Point Transmission Service will be allocated on a first come first served basis if the request falls outside the Annual open enrollment window. If the request can be considered within the annual open enrollment window, then the request will be processed on the same priority as Network Integration Service-based requests.

## 5.5 Reassignment of Financial Transmission Rights (FTRs)

During this transitional period, if load shifts within the transmission zone, FTRs will be reallocated. As load shifts from one LSE to another within a transmission zone, a proportionate share of the FTRs defined to sink into the zone are forfeited by the LSE that loses load.

FTRs allocated for the transition period will be reassigned on a proportional basis within a transmission zone or load aggregation zone as load switches between LSEs within the transition period. The reassignment of FTRs is an automatic process, which is conducted by PJM as frequently as necessary. An LSE that loses load will lose a pro-rata share of their FTRs in proportion to the amount of load lost.

The total set of FTRs lost by LSEs losing load in a transmission zone or load aggregation zone will be reallocated to LSEs gaining load in the zone or load aggregation zone in proportion to each LSE's MW load gain relative to the total load shifted in the zone or load aggregation zone. The FTRs are awarded to the LSE subject to simultaneous feasibility.

# Section 6: FTR Auctions

Welcome to the *FTR Auctions* section of the ***PJM Manual for Financial Transmission Rights***. In this section, you will find the following information:

- A general overview of the PJM FTR Auctions (see "*FTR Auctions Overview*").
- How the winning quotes are determined (see "*Determining the Winning Quotes*").
- A description of the Long-term FTR Auction time line (see "*Long-term FTR Auction Time Line*").
- A description of the Annual FTR Auction time line (see "*Annual FTR Auction Time Line*").
- A description of the Monthly FTR Auction time line (see "*Monthly FTR Auction Time Line*").
- A description of the FTR Auctions business rules (see "*FTR Auctions Business Rules*").
- A description of the credit requirements for PJM's FTR Auctions (see "*FTR Auctions Credit Business Rules*").
- A description of the process for Terminating and Liquidating FTR Positions for Credit Defaults (see "*FTR Termination and Liquidation*").

## 6.1 FTR Auctions Overview

Throughout the year, PJM oversees the process of selling and buying FTRs through FTR Auctions. Market Participants purchase FTRs by participating in Long-term, Annual and Monthly FTR Auctions.

- *Long-term FTR Auction* – PJM conducts a Long-term FTR process of selling and buying FTRs through a multi-round process for FTRs for three consecutive Planning periods immediately subsequent to the Planning Period during which the Long-term FTR Auction is conducted. The capacity offered for sale in Long-term FTR Auctions shall be the residual system capability after the assumption that all Auction Revenue Rights allocated in the immediately prior Annual Auction Revenue Rights allocation process are self-scheduled into FTRs, which shall be modeled as fixed injections and withdrawals in the Long-term FTR Auction. The Long-term FTR Auction is a multi-round auction consisting of three rounds. In each round 1/3 of the feasible FTR available capability is awarded. FTRs that are purchased in one round may be offered for sale in later rounds.
- *Annual FTR Auction* - The Annual FTR Auction offers for sale the entire transmission entitlement that is available on the PJM system on an annual basis. The Annual FTR Auction is a multi-round auction consisting of four rounds. In each of the four rounds, 25% of the feasible FTR capability of the entire PJM system is awarded. FTRs that are purchased in one round may be offered for sale in subsequent rounds. *Monthly FTR Auctions* - In each

calendar month, Monthly FTR Auctions provide a method of auctioning the residual FTR capability that remains on the PJM Transmission System after the Long-term and Annual FTR Auction is conducted. The Monthly FTR Auctions are single-round auctions, where the residual FTR capability is awarded. The Monthly FTR Auctions also allow Market Participants an opportunity to offer for sale any FTRs that they currently hold. An auction participant must own any FTR that is offered for sale. In the Monthly FTR Auctions, Market Participants may bid to buy or offer to sell FTRs that have the following terms:

- One month for any of the next three months remaining in the planning period.
- Three months for any of the quarters remaining in the planning period where Planning Period Quarter 1 covers June, July and August; Planning Period Quarter 2 covers September, October and November; Planning Period Quarter 3 covers December, January and February; and Planning Period Quarter 4 covers March, April and May.

The clearing mechanism of the FTR Auctions will maximize the quote-based value of FTRs awarded in each auction. Auction Revenue Rights (ARRs) are the mechanism by which the proceeds from the FTR Auctions are allocated. The proceeds from the Annual FTR Auction are distributed to ARR holders. All Long-term and monthly auction revenues are first allocated among ARR holders in proportion to the holder‘s deficiencies from the Annual FTR Auction. Any monthly auction revenues remaining after this allocation are treated as excess congestion charges and are distributed starting with Stage Two as described in the “Market Settlements” section.

FTRs are awarded in the FTR Auctions for the following products:

- FTRs can be either options or obligations for the Annual and monthly FTR Auctions and obligations only for the Long-term FTR Auctions.
- An on-peak FTR product valid for hours ending 0800 to 2300 weekdays, except NERC holidays.
- An off-peak FTR product valid for hours ending 2400 to 0700 on weekdays and for hours ending 0100 to 2400 on weekends and NERC holidays.
- A 24-hour FTR product valid for hours ending 0100 to 2400 on all days.

FTRs that are awarded in FTR Auctions have the following characteristics:

- FTRs hedge the FTR holder against congestion payments to PJM when energy delivery is consistent with the FTR’s definition.
- FTRs do not hedge the FTR owner against payment for losses.
- FTRs acquired in the Long-term FTR Auctions have a term of one year or three years.
- FTRs acquired in the Annual FTR Auction have a term of one year.
- FTRs acquired in the Monthly FTR Auctions have a term of one month for any of the next three individual months remaining in the planning period or planning period quarter for any full planning period quarter remaining in the planning period.

- FTRs acquired in the FTR Auctions entitle the holder to credits for transmission congestion charges for the term of the purchased FTR.
- Valid FTR sources and sinks in the Long-term and Annual FTR Auctions are limited to available hubs, zones, aggregates, generators, and interface buses (subject to simultaneous feasibility).
- Valid FTR sources and sinks in the Monthly FTR Auction are limited to available hubs, zones, aggregates, generators, and interface buses for bids that cover any month beyond the next month, including bids that cover Planning Period Quarters. Valid FTR sources and sinks in the Monthly FTR Auctions for bids that cover the single calendar month period immediately following the month in which the monthly auction is conducted are any available single bus or combination of buses for which an LMP is calculated and posted(subject to simultaneous feasibility). The list of buses includes available hubs, zones, aggregates, interface buses and single generator and load buses. The list of available sources and sinks for each auction will be posted before the start of the bidding window.
- Only a subset of paths will be eligible for FTR Option bids in the Annual and Monthly FTR Auctions in order to prevent potential auction clearing performance issues. FTR Option bids are not available in the Long-term FTR Auctions.
- FTRs in all FTR Auctions may be designated from injection buses outside PJM and withdrawal locations outside PJM ***OR*** buses with injections and withdrawals within PJM.
- In the Annual FTR Auction, an ARR holder may self-schedule an FTR Obligation (up to the ARR MW reservation amount) into the Annual FTR auction as a “price-taker” auction buy bid. The self-scheduled FTR must have exactly the same source and sink points as the ARR. This feature can only be used in Round 1 and must be for a 24-hour FTR Obligation product. 25% of the MW amount self-scheduled in Round 1 will clear in each round.
- In all FTR Auctions, FTRs can be reconfigured, meaning that the FTR auction not only allows Market Participants to purchase the FTRs offered into the auction by sellers, but also enables buyers to purchase FTRs that are different from any of the FTRs offered into the auction by sellers.
- Quotes in the Auctions with a $0 bid price are allowed in the auctions. However, because such bids can cause serious performance degradation to the FTR software and have no impact on the algorithm’s objective function, the following rule will be applied: $0 bids will not be awarded on paths with a clearing price of $0.

## 6.2 Determining the Winning Quotes

The winning quotes are determined by the set of simultaneously feasible FTRs with the highest total auction value, as determine by the bids of the buyers and taking into account the reservation prices of the sellers.

- The valuation of the awarded FTRs during the auction is based on the quotes submitted into each FTR Auction. Therefore, the set of quotes that maximizes the quote-based value of the awarded FTRs to the Market Participants that would receive them is the winning set.
- This ensures that PJM awards the set of FTRs and allocates them among auction participants in such a way that the value-based transmission utilization is maximized.

The FTR Auctions will calculate the clearing prices for all FTR Obligations at all buses, regardless of whether they are bought or sold in the auction. The FTR Auctions will calculate the clearing prices of FTR Options for all valid FTR Option paths, regardless of whether they are bought or sold in the auction.

- The clearing price of any FTR Obligation can be computed directly from the nodal prices.
- The clearing price of an A-to-B FTR Obligation is equal to the negative of the clearing price of a B-to-A FTR Obligation. This is not true for the FTR Options since the clearing prices of FTR Options are never negative.
- The clearing price of an FTR Option Buy Bid will never be less than zero.
- The clearing price of an FTR Option will always be greater than or equal to the clearing price of an FTR Obligation for the same path.
- The clearing price of an FTR Option is a function of the shadow price of each binding constraint and cannot be computed directly from the nodal prices.
- To ensure feasibility, each constraint is monitored for limit violation by the worse case combination of awarded FTR Options. Counterflow created by an FTR Option is ignored.

The major steps performed to determine the winning quotes include:

- *Step One* - Downloading data for the FTR market user database.
- *Step Two* - Solving the linear program problem.
- *Step Three* - Checking the simultaneous feasibility of the FTR auction solution.
- *Step Four* - Repeating Steps 2 and 3.
- *Step Five* - Uploading the results to the FTR MUI.

After determining the winning quotes, settlements occur. Winning bidders pay market price for FTRs acquired in the auction; FTR sellers are paid market price for the FTRs they surrender to PJM. This settlement is separate from the transmission congestion settlements.

## 6.3 Long-term FTR Auction Time Line

- PJM initiates, directs, and oversees the following process for the Long-term FTR Auction. The Long-term FTR Auction consists of three rounds. The first round shall be conducted approximately 11 months prior to the start of the three planning period term covered by the relevant Long-term FTR Auction and the second and third round shall be conducted approximately 3 and 6 months after the first round respectively. In each round 1/3 of total capability available in the Long-term FTR Auction shall be offered for sale.
- PJM opens the Bidding Period for each round and Market Participants may submit bids to purchase and offers to sell FTRs.
- The Bidding Period for each round of the Long-term FTR Auction will be open for three business days, closing at 1700 (Eastern Prevailing Time) on the last day.
- PJM performs the FTR auction clearing analysis.
- Within five business days of the Bidding Period closing, PJM posts FTR auction results on the MUI.

## 6.4 Annual FTR Auction Time Line

- PJM initiates, directs, and oversees the following process for the Annual FTR Auction. The Annual FTR Auction must be conducted prior to the June Monthly FTR Auction. Annually, PJM conducts a multi-round auction that consists of four (4) rounds:
- PJM opens the Bidding Period for each round and Market Participants may submit bids to purchase and offers to sell FTRs.
- The Bidding Period for each round of the Annual FTR Auction will be open for three business days, closing at 1700 (Eastern Prevailing Time) on the last day.
- PJM performs the FTR auction clearing analysis.
- Within two business days after the close of the Bidding Period for each round PJM posts FTR auction results on the MUI.

## 6.5 Monthly FTR Auction Time Line

PJM initiates, directs, and oversees the Monthly FTR Auctions. In each calendar month, PJM conducts a single round auction. The following timeline defines open, close and clearing dates for all Monthly FTR Auctions.

- The bid and offer period for monthly FTR auctions shall be open for three consecutive business days in the month preceding the first month for which FTRs are being auctioned, closing the third day at 1700 (Eastern Prevailing Time).
- PJM performs the FTR auction clearing analysis.
- Within five business days of the Bidding Period closing, PJM posts FTR auction results on the MUI.

## 6.6 FTR Auctions Business Rules

The following information summarizes the business rules for PJM's FTR Auctions:

- Market Participants must be a PJM Member or a PJM Transmission Customer to be eligible to submit bids or offers into FTR Auctions.
- Market Participants cannot submit offers to sell FTRs that they do not own at the time of the submittal.
- Invalid quotes into the auction are rejected. These quotes may be resubmitted and if time stamped as received by PJM before the close of the Bidding Period are included in the auction.

## 6.7 FTR Auctions Credit Business Rules

The following information summarizes the business rules for credit requirements for PJM's FTR Auctions:

- A **Credit Requirement** will be calculated for all FTR auction products. All auction products will have their credit requirements based on all of the months in the period.
- **Total FTR Credit Requirement.** For each Participant with FTR activity, PJM shall calculate an FTR Credit Requirement based on FTR cost less a discounted historical value. FTR Credit Requirements shall be further adjusted by ARR credits available and by an amount based on portfolio diversification, if applicable. The requirement will be based on individual monthly exposures which are then used to derive a total requirement.
- The FTR Credit Requirement shall be calculated by first adding for each month the FTR Monthly Credit Requirement Contribution for each submitted, accepted, and cleared FTR and then subtracting the monthly value of any ARRs held by the Participant for that month. The resulting twelve monthly subtotals represent the expected value of net payments between PJM and the Participant for FTR activity each month during the Planning Period. Subject to later adjustment by an amount based on portfolio diversification, if applicable, the FTR Credit Requirement shall be the sum of the individual positive monthly subtotals, representing months in which net payments to PJM are expected.
- **Total FTR Credit Limit.** Market Participants must have established a Total FTR Credit Limit prior to bidding in any FTR Auction. Credit requests should be made to PJM's Treasury Department at least two weeks prior to opening of the first round of bidding for the auction. Credit previously established with PJM for general market activity will not be available for FTR Auctions unless the Market Participant specifically makes such a request to the PJM Treasury Department and confirms it with the FTR Markets group.
- **Available Credit.** For each auction, PJM will establish an Available Credit for each market Participant. The Available Credit will equal the Market Participant's Total FTR Credit Limit less the Market participant's Total FTR Credit Requirement immediately prior to the auction.

- **The Credit Requirement for a Market Participant's bids may not exceed its Auction Credit Limit.** If, during any auction round, the total Credit Requirement for a Market Participant's previously accepted and currently submitted aggregate bids exceeds the Market Participant's Available Credit, all currently submitted bids will be rejected. PJM will attempt to work with bidders to increase credit during the auction process, if desired, but cannot guaranty doing so in a particular timeframe. It is highly unlikely that any increase in credit can be accomplished in the final day of a bidding round.
- Individual FTR Credit Requirement

  The Credit Requirement for individual FTRs will be calculated as:

$$\begin{aligned} &\textit{Price of the bid for that FTR} \\ &\textit{Less : Revenue Offset for that FTR} \end{aligned}$$

> **Note**: The sum of the Monthly Credit Requirements for all of a Market Participant's FTRs will be offset by the total monthly value of the Market Participant's ARRs

- The Revenue Offset for Obligations will be calculated as the difference between the expected monthly LMP values at the source and sink nodes, adjusted by a 10% discount or adder. Expected LMP values will be the weighted monthly average historical value over three years for the path using the following weightings: 50% most recent year, 30% prior year; 20% second prior year. Expected values will be calculated separately for on-peak, off-peak, and 24-hour FTRs.
- Negative historical value paths will have a 10% adder incorporated into the Revenue Offset. Positive historical value paths will have a 10% discount incorporated into the Revenue Offset.
- The Revenue Offset for Options will be calculated the same as for Obligations, except that it will be set to zero for FTRs with a negative historical value.
- In order to facilitate member calculation of the historical values, PJM will post the monthly weighted average historical values for each node (PJM will extrapolate values for nodes without a full three years of historical price data). The FTR historical value is the historical weighted average value over three years using the following weightings: 50% - most recent year; 30% - second year; 20% - third year. Members may then calculate the historical value (including discount or adder) for every path they intend to bid on, and thus will be able to calculate their own credit requirement prior to bidding.
- Upon request, PJM will return to the participant any collateral that is no longer required for the FTR auctions; however, PJM reserves the right to establish a maximum frequency of returns, which maximum shall not be less frequent than once per calendar quarter.
- **Credit Requirements may be reviewed and changed as needed.** Credit exposure for all participants may be reviewed as needed by PJM to determine if the Credit Requirement for the Market Participant has increased. Historical values for FTR paths will change annually which may result in increased Credit

Requirements. If the Credit Requirement exceeds credit currently in place, the party must increase its credit for its FTR obligations.

- Credit release schedule. Credit will be released according to the following schedule:
- The full amount of monthly credit will be released after the billing date for that month of activity
- Credit responsibility for an FTR that is traded within PJM's eFTR system remains with the original party unless and until the receiving party ("3rd party") establishes, consistent with the PJM credit policy, sufficient credit with PJM and agrees through confirmation of the FTR trade within the eFTR system that it meet in full the credit requirements associated with the traded FTR.

**Portfolio Diversification**

- Subsequent to calculating a tentative cleared solution for an FTR auction (or auction round), PJM shall:
- Determine the FTR Portfolio Auction Value, including the tentative cleared solution. Any Participants with such FTR Portfolio Auction Values that are negative shall be deemed FTR Flow Undiversified. The FTR Portfolio Auction Value for each Participant (or Participant account) is the sum, calculated on a monthly basis, across all FTRs, of the FTR price times the FTR volume in MW.
- Measure the geographic concentration of the FTR Flow Undiversified portfolios by testing such portfolios using a simulation model including, one at a time, each planned transmission outage or other network change which would substantially affect the network for the specific auction period. A list of such planned outages or changes anticipated to be modeled shall be posted prior to commencement of the auction (or auction round). Any FTR Flow Undiversified portfolio that experiences a net reduction in calculated congestion credits as a result of any one or more of such modeled outages or changes shall be deemed FTR Geographically Undiversified.
- For portfolios that are FTR Flow Undiversified but not FTR Geographically Undiversified, PJM shall increment the FTR Credit Requirement by an amount equal to twice the absolute value of the FTR Portfolio Auction Value, including the tentative cleared solution. For Participants with portfolios that are both FTR Flow Undiversified and FTR Geographically Undiversified, PJM shall increment the FTR Credit Requirement by an amount equal to three times the absolute value of the FTR Portfolio Auction Value, including the tentative cleared solution. For portfolios that are FTR Flow Undiversified in months subsequent to the current planning year, these incremental amounts, calculated on a monthly basis, shall be reduced (but not below zero) by an amount up to 25% of the monthly value of ARR credits that are held by a Participant. Subsequent to the ARR allocation process preceding an annual FTR auction, such ARRs credits shall be reduced to zero for months associated with that ARR allocation process. PJM may recalculate such ARR credits at any time, but at a minimum shall do so subsequent to each annual FTR auction. If a reduction in such ARR credits at any time increases the

amount of credit required for the Participant beyond its credit available for FTR activity, the Participant must increase its credit to eliminate the shortfall.

- If the FTR Credit Requirement for any Participant exceeds its credit available for FTRs as a result of these diversification requirements for the tentatively cleared portfolio of FTRs, PJM shall immediately issue a demand for additional credit, and such demand must be fulfilled before 4:00 p.m. on the business day following the demand. If any Participant does not timely satisfy such demand, PJM shall remove that Participant's entire set of bids for that FTR auction (or auction round) and a new cleared solution shall be calculated for the entire auction (or auction round).
- If necessary, PJM shall repeat the auction clearing calculation. PJM shall repeat these portfolio diversification calculations subsequent to any such secondary clearing calculation, and shall require affected Participants to establish additional credit.

FTR Termination and Liquidation

In the event a member fails to meet creditworthiness requirements or make timely payments when due pursuant to the PJM Operating Agreement or PJM Tariff, PJM shall, as soon as practicable after such default is declared, initiate the following procedures to close out and liquidate the FTRs.

a) PJM shall close out the defaulting member's positions as of the date of its default, by unilaterally accelerating and terminating all forward FTR positions.

b) PJM shall post on its website all salient information relating to the closed out portfolio of FTRs.

c) All current planning period FTR positions within the defaulting Members' FTR portfolio will be offered for sale in the next available monthly balance of planning period FTR auction at an offer price designed to maximize the likelihood of liquidation of those positions.

d) FTR positions that do not settle until the next or subsequent planning period will be offered into the next available FTR auction (taking into account timing constraints and the need for an orderly liquidation) where, based on PJM's commercially reasonable expectation, such positions would be expected to clear. In the event that the next scheduled FTR auction is more than two (2) months subsequent to the date that PJM declares a Member in default, a specially scheduled FTR auction may be conducted by the PJM. The entire portfolio of the defaulting Member's FTRs will be offered for sale at an offer price designed to maximize the likelihood of liquidation of those positions.

e) The FTR positions comprising the defaulting Member's portfolio that are offered for sale in a liquidating FTR auction pursuant to the foregoing terms should avoid setting price in the auction at the bid prices with which they were initially submitted.

   In the event that any of the closed out FTRs would set price based on the auction's preliminary solution, then only one-half of each FTR position will be offered for sale and the auction will be re-executed. In the event that any FTR position that has been closed out once again sets price, then all FTRs scheduled to be liquidated will be removed from the affected auction and the auction will be re-executed excluding the

closed out FTR positions. FTR positions that are not liquidated will then be offered in the next available auction or specially scheduled auction, as appropriate.

f) The liquidation of the defaulting Members' FTR portfolio pursuant to the foregoing procedures shall result in a final liquidated settlement amount. The final liquidated settlement amount will be included in calculating a Default Allocation Assessment as described in Section 15.1.2A(I) of Schedule 1 of the PJM Operating Agreement. If the PJM is unable to close out and liquidate a FTR position under the foregoing procedures, the close out shall be deemed void and the defaulting Member shall remain liable for the full final value of its default, such full final value being realized at the normal time for performance of the FTR position.

# Section 7: FTR Secondary Market

Welcome to the *FTR Secondary Market* section of the ***PJM Manual for Financial Transmission Rights***. In this section, you will find the following information:

- An overview of the secondary markets for FTRs (see "*FTR Secondary Markets Overview*").
- A description of PJM's computer application for trading FTRs (see "*The PJM eFTR's Secondary Trading Center*").
- A description of the secondary trading business rules (see "*FTR Secondary Trading Business Rules*").

## 7.1 FTR Secondary Markets Overview

The PJM FTR secondary trading market is a bilateral trading system that facilitates the trading existing FTRs between PJM Members, using a bulletin board system in PJM *e*FTR. The FTR secondary market allows trading of existing FTRs only. FTRs cannot be reconfigured in the secondary market.

- For FTR trades made through *e*FTR, PJM automatically transfers ownership and adjusts the PJM Members' monthly billing statements accordingly.
- You can also trade FTRs independently of *e*FTR. However, PJM has no knowledge of such trades and, therefore, is not able to adjust PJM Members' monthly billing statements appropriately. In fact, it is possible that parties involved in such trades might not be PJM Members.

## 7.2 The PJM eFTR's Secondary Trading Center

Using PJM's *e*FTR, Market Participants can buy and sell FTRs directly with other Market Participants. Market Participants specify trades by transmission paths. An FTR can be split into multiple FTRs on the same path with different MW amounts and different start and ends dates.

The *e*FTR allows you to:

- *View FTR Postings* - You view FTRs that are posted using the Secondary Trading Center web page.
- *Post FTRs For Resale* - When FTRs are initially awarded by PJM, PJM enters the data into the FTR database and posts the FTRs on *e*FTR. Subsequently, the owner of the FTR is able to post the FTR for resale via *e*FTR.
- *Buy and Sell FTRs* - *e*FTR provides a web page called the Secondary Trading Center that allows traders to post a secondary trade and confirm or deny the quotes.

You can find detailed instructions for participating in the secondary market in the FTR Auction User's Guide (available on the PJM Web Site).

## 7.3 FTR Secondary Trading Business Rules

'To buy and sell FTRs through *e*FTR, you must be a PJM Member or a PJM Transmission Customer. To register, use the *e*FTR User Registration Page, which is available on the PJM Web Site.

- When an FTR is traded, the associated firm transmission capacity is not reassigned, just the financial entitlements.
- Credit requirements for traded FTRs will be calculated within the *e*FTR system.
- On the secondary market, an FTR can be split into multiple FTRs with different MW amounts and different start and end times than the original FTR. However, an FTR cannot be reconfigured into FTRs with a larger total MW value, earlier start time, later end time, or different path.
- On the FTR secondary market, an FTR Obligation can only be traded as an FTR Obligation and an FTR Option can only be traded as an FTR Option. An FTR Obligation cannot be reconfigured as an FTR Option and an FTR Option cannot be reconfigured as an FTR Obligation.
- FTR MW values can be split in 0.1 MW increments.
- All FTR trades for a given day are locked out at midnight of the current day.
- Once per day, *e*FTR database sends updated FTR information reflecting the previous day's trades to the PJM Market Settlements system for use in preparing reports and monthly billing statements.

# Section 8: Market Settlements

Welcome to the *Market Settlements* section of the ***PJM Manual for Financial Transmission Rights***. In this section, you will find the following information:

- How the proceeds from the Annual FTR Auction are distributed to Auction Revenue Rights holders (see "*Distribution of Annual FTR Auction Revenues*").
- How PJM calculates the settlement of Auction Revenue Rights (see "*Auction Revenue Rights (ARR) Settlement*").
- How PJM calculates Transmission Congestion Credit target allocations for FTR holders (see "*FTR Settlement - Calculating Transmission Congestion Credit Target Allocations*").
- How PJM calculates Transmission Congestion Credits (see "*FTR Settlement - Calculating Transmission Congestion Credits*").
- How excess Transmission Congestion Charges are distributed to FTR holders at the end of each month (see "Distributing Excess Transmission Congestion Charges").

## 8.1 Distribution of Annual FTR Auction Revenues

Long-term, Annual and Monthly FTR Auction revenues are distributed to Auction Revenue Rights holders in proportion to (but not to exceed) the economic value of the ARRs when compared to the Annual FTR Auction clearing prices for FTR Obligations from each round proportionately.

Long-term FTR auction revenues associated with FTRs that cover individual Planning Periods shall be distributed in the Planning Period for which the FTR is effective. Long-term FTR auction revenues associated with FTRs that cover multiple Planning Years shall be distributed equally across each planning period in the effective term of the FTR.

Excess revenues after distribution to ARR holders will be used to fund any shortfall in FTR Target Allocations over the Planning Period.

These funds are accounted for on a monthly basis as Excess Congestion Charges and they are distributed with other Excess Congestion Charges as described in the Section entitled "Distributing Excess Transmission Congestion Charges".

For additional information, refer to the ***PJM Manual for Billing (M-29)*** and the ***PJM Manual for Operating Agreement Accounting (M-28)***.

## 8.2 Auction Revenue Rights (ARR) Settlement

The settlements for Auction Revenue Rights will be based on the clearing prices from each round of the Annual FTR Auction. The amount of the credit that the ARR holder should receive for each round is equal to the MW amount of the ARR (divided by the number of rounds) times the price difference from the ARR delivery point to the ARR source point as shown in the following formula:

$$ARR\ Target\ Allocation = (ARR/\#\ of\ rounds) * \left( LMP_{Delivery} - LMP_{Source} \right)$$

**Note**: The LMP values in the above equation are results for FTR Obligations from the appropriate round of the Annual FTR Auction.

The ARR Target Allocation can be positive or negative. An ARR can be either a benefit or liability to the holder depending on the direction of transmission congestion in the annual auction analysis.

- If sufficient funds are collected in the Annual and Monthly FTR Auctions to satisfy all ARR Target Allocations then the ARR Credits = ARR Target Allocations for all ARR holders.
- The ARR Credits may be prorated proportionately if there are insufficient Annual and Monthly FTR auction revenues collected to cover all of the ARR credits.
- If the ARR Credits are prorated, the difference between ARR Target Allocations and ARR Credits are called ARR Deficiencies. The ARR Deficiencies may be funded by Annual Excess Congestion Charges as explained in the "FTR Settlements" Section.

The settlements for the Annual FTR Auction and the corresponding ARR settlements will be performed on a monthly basis.

For additional information, refer to the *PJM Manual for Billing (M-29)* and the *PJM Manual for Operating Agreement Accounting (M-28)*.

## 8.3 FTR Settlement – Calculating Transmission Congestion Credit Target Allocations

The Transmission Congestion Credit Target Allocation is the amount of credit the FTR holder should receive in each constrained hour due to the value of an FTR.

The PJM OI determines a target allocation of Transmission Congestion Credits for each hour for each FTR by using the following formula:

$$Target\ Allocation = FTR * \left( DALMP_{Delivery} - DALMP_{Receipt} \right)$$

where:

- *FTR* - Financial Transmission Rights between the designated load bus and the designated generation bus, in megawatts
- *DA* $LMP_{Delivery}$ - The Day-ahead Congestion LMP during the hour at the Point of Delivery designated in the FTR
- *DA* $LMP_{Receipt}$ - The Day-ahead Congestion LMP during the hour at the Point of Receipt designated in the FTR

The total target allocation for a Market Participant for each hour is then the sum of the target allocations for all of the Market Participant's FTRs.

Note, if the *DA LMP*$_{Delivery}$ or the *DA LMP*$_{Receipt}$ is an aggregate zone, the following formula is used:

$$Target = FTR * \sum Load\ Percentage_i * \left( DALMP_{Delivery\ -\ i} - DALMP_{Receipt} \right)$$

where:

- *FTR* - Financial Transmission Rights between the designated Load Aggregation Zone and the designated bus, in megawatts
- *Load Percentage* - The percentage of the load at time of annual peak associated with each individual load bus in the Load Aggregation Zone designated in the FTR

For additional information, refer to the *PJM Manual for Billing (M-29)* and the *PJM Manual for Operating Agreement Accounting (M-28)*.

## 8.4 FTR Settlement - Calculating Transmission Congestion Credits

The PJM OI compares the total of all Transmission Congestion Credit target allocations to the total Transmission Congestion Charges for the PJM Control Area in each hour resulting from the Day-ahead Market and from the Real-time Market.

- If the total of the target allocations is less than the total of the Transmission Congestion Charges, the Transmission Congestion Credit for each FTR is equal to its target allocation. All excess Transmission Congestion Charges are distributed at the end of the month as described later in this section.
- If the total of the target allocations is equal to the total of the Transmission Congestion Charges, the Transmission Congestion Credit for each FTR is equal to its target allocation.
- If the total of the target allocations is greater than the total of the Transmission Congestion Charges, the Transmission Congestion Credit for each FTR is equal to a share of the total Transmission Congestion Charges in proportion to its target allocation. The shortfalls in hourly Transmission Congestion Charges may be offset by excess charges from other hours in the end of the month accounting, as described in the next section.

For additional information, refer to the PJM Manual for *Billing (M-29)* and the PJM Manual for *Operating Agreement Accounting (M-28)*.

## 8.5 Distributing Excess Transmission Congestion Charges

The objective of the monthly excess Transmission Congestion Charge distribution is to cover any deficiency in the share of Transmission Congestion Credits received by each FTR holder during the month as compared to their target allocations for the month.

- *Stage One* - The PJM OI distributes excess Transmission Congestion Charges accumulated during the month to each holder of FTRs in proportion to, but not greater than, any deficiency in the share of Transmission Congestion Charges received by the holder during that month as compared to its total target allocations for the month.

- *Stage Two* - Any remaining excess after the stage one distribution will be used to satisfy any FTR deficiency from previous months within the Planning Period on a pro-rata basis up to the full FTR Target Allocation value.
- *Stage Three* – Any remaining excess after the stage Two distribution will be carried forward to the next month as excess congestion charges.
- *Stage Four* - At the end of the Planning Period, any remaining Excess Congestion Charges will first be used to satisfy any ARR deficiency that may exist. If insufficient funds exist to honor all ARR revenue shortfalls then the funds would be distributed by ratio of the ARR deficiency.
- *Stage Five* - The PJM OI distributes any excess Transmission Congestion Charges remaining after the Stage Four distribution to all FTR holders on a pro-rata basis according to the total target allocations for all FTRs held at any time during the relevant Planning Period.

Any revenue deficient transmission rights (ARRs or FTRs) remaining at the end of the Planning Period are satisfied through a transmission rights uplift charge which is allocated to FTR holders on a pro-rata basis according to their net FTR target allocation position, relative to the total net FTR target allocation positions of all FTR holders in the PJM Interchange Energy Market. An entity with a net negative FTR target allocation position is not subject to transmission rights uplift allocation charges.

For additional information, refer to the *PJM Manual for Billing (M-29)* and the *PJM Manual for Operating Agreement Accounting (M-28)*.

## 8.6 FTR Forfeiture Rule

Section 5.2.1 (b) of the PJM Operating Agreement requires that if a holder of a Financial Transmission Right between specified delivery and receipt buses (i) had an Increment Bid and/or Decrement Bid that was accepted by the Office of the Interconnection for an applicable hour in the Day-ahead Energy Market for delivery or receipt at or near delivery or receipt buses of the Financial Transmission Right or had an Up-to Congestion Bid that was accepted by the Office of the Interconnection for an applicable hour in the Day-ahead Energy Market for a path at or near the path of the Financial Transmission Right and (ii) the result of the acceptance of such Increment Bid, Decrement Bid, or Up-to Congestion Bid is that the difference in Locational Marginal Prices in the Day-ahead Energy Market between such delivery and receipt buses is greater than the difference in Locational Marginal Prices between such delivery and receipt buses in the Real-time Energy Market, then the Market Participant shall not receive any Transmission Congestion Credit, associated with such Financial Transmission Right in such hour, in excess of one divided by the number of hours in the applicable month multiplied by the amount that the Market Participant paid for the Financial Transmission Right in the Financial Transmission Rights Auction.

Section 5.2.1 (c) of the PJM Operating Agreement defines the criteria used to determine if a bus is at or near a Financial Transmission Right delivery or receipt bus.

The FTR forfeiture for increment offers and decrement bids rule is implemented as follows:

- Cleared increment offers or decrement bids are considered at or near a Financial Transmission Right delivery or receipt bus if seventy five percent or more of the energy withdrawn or injected from the cleared offer or bid by a

market participant at that bus, and withdrawn or injected through any cleared virtual or physical transactions, regardless of the market participant that submitted the opposing transaction, at the bus with the largest impact is reflected on the constrained path between the subject market participant's Financial Transmission Right delivery and receipt buses.

The FTR forfeiture for Up-to transaction bids rule is implemented as follows:

- Cleared Up-to congestion transaction bids are considered at or near the participant's Financial Transmission Right if the net distribution factor of the source and sink locations of the up-to congestion bid is greater than or equal to seventy five percent on the constrained path between the subject Financial Transmission Right delivery and receipt buses.

When the above conditions exists, the LMP difference between the source and sink locations of the identified FTR path is greater in the Day-ahead Market than in the Real-time Market, and the FTR auction clearing price of the FTR owned by the participant was positive, the participant forfeits an amount equal to the hourly FTR Target Allocation minus the hourly FTR Auction clearing price for that FTR path.

When either of the above conditions exits, the LMP difference between the source and sink locations of the identified FTR path is greater in the Day-ahead Market than in the Real-time Market, and the FTR auction clearing price of the FTR owned by the participant was negative, the participant forfeits an amount equal to the hourly FTR Target Allocation.

In no case will the forfeit amount be less than $0.

# Section 9: Simultaneous Feasibility Test

Welcome to the *Simultaneous Feasibility Test* section of the ***PJM Manual for Financial Transmission Rights***. In this section, you will find the following information:

- A description of the Simultaneous Feasibility Test (SFT) and how it is performed by the PJM OI (see "*Simultaneous Feasibility Test Overview*").

## 9.1 Simultaneous Feasibility Test Overview

The Simultaneous Feasibility Test (SFT) is a market feasibility test run by PJM that provides revenue adequacy by ensuring that the Transmission System can support the subscribed set of FTRs or ARRs during normal system conditions. If the FTRs or ARRs can be supported under normal system conditions and congestion occurs, PJM will be collecting enough congestion charges to cover the FTRs or ARR credits, thus becoming revenue adequate. The purpose of the SFT is to preserve the economic value of FTRs or ARRs to the holders by ensuring that all FTRs or ARRs awarded can be honored. An SFT is run for each ARR or FTR requested.

The SFT uses a DC power flow model that models the requested firm transmission reservations and expected network topology during the period being analyzed. It is not a system reliability test and is not intended to model actual system operating conditions. FTRs and ARRs for Firm Point-to-Point Service are modeled as generation at the receipt (source) point(s) and load at the delivery (sink) point(s). FTRs and ARRs for Network Integration Service are modeled as a set of generators at the receipt (source) point and a network load at the delivery (sink) point. SFTs are run for yearly, monthly, and weekly analysis periods, when network resource changes are submitted and during the determination of the winning quotes for the Annual FTR Auction and the Monthly FTR auction.

Inputs to the SFT model include:

- all newly-requested FTRs and ARRs for the study period,
- all existing FTRs and ARRs for the study period,
- transmission line outage schedules, thermal operating limits for transmission lines, that are expected to last for 2 months or more will be included in the determination of simultaneous feasibility for the Annual PJM FTR Auction and outages of five days or more shall be included in the determination of simultaneous feasibility for monthly PJM FTR auctions as well as outages of shorter duration that are determined through PJM analysis to be likely to cause FTR revenue inadequacy if not modeled. Simultaneous Feasibility determinations shall take into account outages based on reasonable assumptions about configuration and availability of transmission capability.
- PJM reactive interface limits that are valid for the study period, and
- estimates of uncompensated power flow circulation through the PJM Control Area from other Control Areas.

Consistent with PJM Operating and Planning criteria, the SFT evaluates the ability of all system facilities to remain within normal ratings during normal, extended-period operation, while maintaining an acceptable bulk system voltage profile. The system must also be able

to sustain any single contingency event with all system facilities remaining within applicable short-term, emergency ratings while maintaining an acceptable bulk system voltage profile and a maximum bulk system voltage drop of five percent. To ensure feasibility, each constraint is monitored for limit violation by the worse-case scenario combination of awarded FTR options and obligations. Counterflow created by an FTR option is ignored.

PJM may use normal capability limits instead of the increased ARR Stage 1A capability limits in FTR Auctions for all ARR Stage 1A infeasible facilities if ARR funding is not impacted, requested Self Scheduled FTRs are fully cleared, and net FTR Auction revenue is positive. If normal capability limits cannot be achieved then the lowest achievable limit may be used by decreasing capability limits below Stage 1A increased capability limits pro-rata based on the MWs of ARR Stage 1A infeasibility. PJM will only reduce infeasibilities on facilities in which there are auction bids available to reduce infeasibilities.

Before the start of each planning period, PJM will post a list of future transmission outages that are anticipated to cause monthly auction base case infeasibilities. The posted list may include outages that meet the following criteria:

- Transmission outages that have historically caused FTR underfunding.
- Transmission outages on the High Voltage system.
- Transmission outages that create an infeasibility of at least 10%.

PJM may attempt to remove or reduce infeasibilities in FTR Auctions caused by selected modeled transmission outages only if ARR funding is not impacted and net FTR Auction revenues are positive. PJM will only reduce infeasibilities on facilities in which there are auction bids available to reduce infeasibilities. PJM will update the posted list of transmission outages that are anticipated to cause infeasibilities as necessary throughout the Planning Period.

# Section 10: PJM eFTR

Welcome to the *PJM eFTR* section of the ***PJM Manual for Financial Transmission Rights***. In this section, you will find the following information:

- A description of the PJM FTR Auction system (see "*PJM eFTR Overview*").

## 10.1 PJM eFTR Overview

PJM eFTR is an Internet application that allows Market Participants to participate in PJM's FTR Auctions and secondary market. Figure 9.1 presents a conceptual view of the FTR auction subsystems.

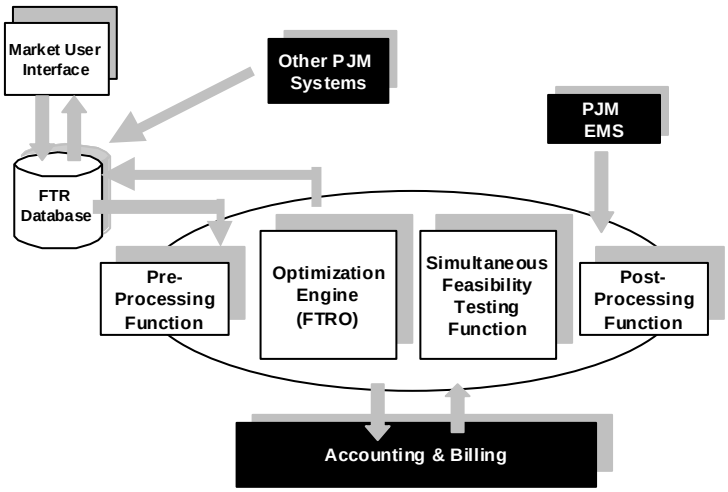


*Exhibit 2: FTR Auction Subsystems*

Offers to sell or bids to purchase FTRs are submitted by Market Participants through the Market User Interface (MUI). All entered quotes are validated and entered into the FTR auction database by the MUI.

In addition to the quotes, other data that is required by the FTR Auctions is provided by other PJM systems. These items include external grid/flow modeling, outage schedules, and facility ratings.

The FTR auction subsystem consists of the following four components:

- *Pre-processing Function* - performs all activities necessary to setup a base case for the evaluation process, including evaluating the quotes and preparing a set of FTRs to be tested for simultaneous feasibility.
- *Optimization Engine (FTRO)* - formulates the Linear Programming (LP) problem including transmission facility limits constraints, generic constraints, and contingencies and solve the LP problem. The objective is to determine the highest valued combination of FTRs to be awarded in the auction that is simultaneously feasible while respecting pre-and post-contingency transmission limits in conjunction with the previously awarded FTRs. FTR offers and bids are cleared based on their comprehensive prices determined by both their bid/offer prices and their relevant impacts on all the binding constraints. This optimization is based on a DC transmission network model.
- *Simultaneous Feasibility Testing Function* - checks the feasibility of the FTR auction solution generated by the optimization module under network contingency conditions. This module performs DC power flow based contingency analysis and identifies those contingencies that cause violations of facility limits. To ensure feasibility, each constraint is monitored for limit violation by the worse-case scenario combination of awarded FTR Options and Obligations. Impacts of counterflows from FTRs Options are taken into account, and counterflow created by an FTR option is ignored. Once identified, constraints corresponding to these contingencies are constructed and the optimization module is called again to solve the FTR auction with the newly identified contingencies included.
- *Post-processing Function* - ensures that the appropriate data items are transferred to the FTR auction database for posting on the MUI and ensures the results are transferred to the accounting and billing subsystems.

# Revision History

### *Revision 14 (7/01/2013):*

Conforming changes to incorporate rules for Residual Zone Pricing as approved by FERC in Docket(s) ER13-347. Residual metered load pricing is effective 6/1/2015. Conforming revisions made to sections 3 and 4.

Added section 8.6 to include conforming changes to incorporate rules for applying FTR Forfeiture Rule to cleared increment offers, cleared decrement bids, and cleared Up-to transactions

Added conforming changes to section 9.1explaining process PJM utilizes to reduce infeasibilities associated with modeled transmission outages.

### *Revision 13 (06/28/2012):*

Added Section headers to entire document.

Section 1.1: Definition and Purpose of FTRs

- Deleted Language on valid source and sink designations for the Monthly FTR Auctions and Long Term and Annual FTR Auctions.

Section 3.2: Firm Point-to-Point Transmission Auction Revenue Rights (ARRs)

- Deleted language for the timeline of TSR/ARR request and approval process for Firm Point to Point Transmission Service

Section 4 Introduction: Annual ARR Allocation

- Removed language on inclusionary topics in Section 4

Section 4.5: Annual Allocation of Auction Revenue Rights (ARRs) – Stage 2

- Added the term available to clarify the type of source node of an ARR request

Section 4.9.2: Regional Transmission Expansion Plan (RTEP) IARRs

- Added clarification of RTEP to heading topics
- Clarified language on the allocation of IARRs to state that PJM will determine the quantity of IARRS to be allocated within 3 months prior to the actual in-service date of the upgrade
- Moved language of effective day and Value of IARRs to separate section (now 4.9.4)

Section 4.9.3: Elective Upgrade IARRs

- Modified Heading Name to Elective Upgrade IARRs

Section 4.9.4: Duration and Value of IARRs

- New section formed to encompass duration and value of IARRs

Section 5.1: FTR Allocation Process for New Load in Zones Associated with Market Growth

- Removed language regarding new member elections in FTR Auctions.

Section 5.3: Firm Point-to-Point Transmission Financial Transmission Rights (FTRs)

- Changed ‘ARR’ to ‘FTR’
- Removed timeline for the TSR/FTR request and approval process for Firm Point-to-Point Transmission Service (Exhibit 3)

Section 6.1: FTR Auctions Overview

- Updated language to reflect 3 Long-Term FTR Auction rounds and that each round will award 1/3 of the feasible FTR available capability.
- Added the term available to clarify the type of valid source and sinks for an FTR Auction.
- Added language that the list of available source and sinks for each auction will be posted before the start of the bidding window.
- Removed language that PJM determines and posts the expected non-simultaneous estimates of available FTR capability for each interface, via the MUI

Section 6.3: Long-Term FTR Auction Time Line

- Updated Long-term FTR Auction Time Line to reflect 3 rounds being conducted as opposed to 2 rounds.

Section 6.7: FTR Auctions Credit Business Rules

- Removed language regarding self-scheduled FTRs having a zero credit requirement
- Clarified language of the credit responsibility of an FTR that is traded.
- Removed additional language of payment and revenue credits as well as credit requirements of transactions involving a 3rd party
- Removed language that allows credit requirement to be reduced by zonal/base load for LSEs for portfolio diversification calculation as language was rejected by FERC.

Section 7.3: FTR Secondary Trading Business Rules

- Added language stating the credit requirements for traded FTRs will be calculated through the eFTR system.

Section 8.3: FTR Settlement – Calculating Transmission Congestion Credit Target Allocations

- Added clarifying text that the DA LMPDelivery and DA LMPReceipt LMPs are the Day-Ahead Congestion LMP.

Section 9.1: Simultaneous Feasibility Test Overview

- Added language indicating the Simultaneous Feasibility determinations shall take outages into account based on reasonable assumptions about configuration and availability of transmission capability.

### *Revision 12 (07/01/2009)*

Section 4: Annual ARR Allocation

- Revised to reflect new rules associated ARR Stage 1 Participation for External LSEs
- Revised to reflect rules associated with historic resource splits for historic load aggregation zone splits.
- Revised to reflect new rules associated with credit responsibility for traded ARRs.
- Revised to reflect new rules associated with IARRs for RTEP projects

Section 6: FTR Auctions

- Revised to reflect removal of prompt month established participant credit requirement exemption.
- Revised to reflect new rules associated with undiversified credit calculation for LSEs.
- Revised to reflect new rules associated with Termination and Liquidation of FTR Positions for Credit Defaults.

### *Revision 11 (08/01/2008)*

- Section 1: Financial Transmission Rights Overview
  - Revised to reflect new rules associated with implementation of Long-term FTR Auctions
- Section 4: Annual ARR Allocation
  - Revised to reflect new rules associated with the implementation of Residual ARRs
  - Revised to reflect rules surrounding Incremental Auction Revenue Rights
- Section 6: FTR Auctions
  - Revised to reflect new rules associated with implementation of Long-term FTR Auctions
  - Revised to reflect rules surrounding FTR Credit
- Section 8: Market Settlements
  - Revised to reflect new rules associated with implementation of Long-term FTR Auctions
  - Revised to reflect rules surrounding distribution of end-of-period excess transmission congestion credit charges
  - Revised to reflect rules surrounding collection and distribution of end-of-period uplift required to fully fund FTRs.

### *Revision 10 (06/01/07)*

Section 1: Financial Transmission Rights Overview

Revised to reflect new rules associated with the implementation Marginal Losses

Section 2: Auction Revenue Rights Overview

Revised to reflect new rules associated with the implementation Marginal Losses

### *Revision 9 (04/04/07)*

Section 4: Annual ARR Allocation

Revised to reflect new rules associated with LTTR filing.

### *Revision 08 (03/08/06)*

Section 4: Annual ARR Allocation

Revised to reflect a clarification of rules for ARR trading.

Section 6: FTR Auctions

Revised to reflect new rule that $0 bids will not be awarded on paths with a clearing price of zero.

Revised to reflect rules surrounding new monthly balance-of-planning-period auction format.

Revised to reflect new annual and monthly auction credit rules.

Revisions were made on the following pages: 24-27, 34-36 and 38-43.

### *Revision 07 (04/15/05)*

Section 4: Annual ARR Allocation

Section 5: Financial Transmission Rights (FTRs) for New Load in Zones Associated with Market Growth

> Revised to reflect to business rule changes approved by FERC, effective March 8, 2005, that allow Point-to-point customers, with long-term firm transmission service used to deliver energy from a designated network resource located outside or within PJM to load located outside or within PJM and that was confirmed and in effect during the historical reference year, to participate in Stage 1 of the Annual Allocation.

### *Revision 06 (12/7/04)*

Section 9: Simultaneous Feasibility Test

> Revised to reflect to clarify the inputs in the SFT (Simultaneous Feasibility Test) Model. The revised business rule provides an overview of the process of including transmission line outage schedules in the SFT model.

### *Revision 05 (02/01/04)*

Revised to reflect the implementation of a new Annual Allocation mechanism. The new business rules outline the procedures under which PJM Network Service Customer may designate sources of Auction Revenue Rights (ARRs) or Financial Transmission Rights (FTRs) that they submit in the Annual Allocation process. The new Annual Allocation method is designed to eliminate the unit-specific capacity requirement related to the Network Service ARR or FTR source designation.

### *Revision 04 (03/15/03)*

Revised to reflect the implementation of Auction Revenue Rights, FTR Options, and multi-period Annual FTR Auction.

### *Revision 03 (06/01/00)*

Revised to reflect the Multi-Settlement Process implementation.

### *Revision 02 (10/18/99)*

Section 3: FTR Auction

Revised subsection '**FTR Auction Overview**' to reflect the change from PJM holidays to NERC Holidays:

- FTRs awarded in the Off-peak auction are valid for hours ending 2400 to 0700 on weekdays and for hours ending 0100 to 2400 on weekends and ***NERC*** holidays.

### *Revision 01 (05/01/99)*

Revised to reflect the FTR auction implementation.

### *Revision 00 (00/00/00)*

This is the revised draft of the PJM Manual 6: Financial Transmission Rights