

## SECTION 8 – FINANCIAL TRANSMISSION AND AUCTION REVENUE RIGHTS

Financial Transmission Rights (FTRs) and Auction Revenue Rights (ARRs) give transmission service customers and PJM members an offset against congestion costs in the Day-Ahead Energy Market. An FTR provides the holder with revenues, or charges, equal to the difference in congestion prices in the Day-Ahead Energy Market across the specific FTR transmission path. An ARR is a related product that provides the holder with revenues, or charges, based on the price differences across the specific ARR transmission path that result from the Annual FTR Auction. FTRs and ARRs provide a hedge against congestion costs, but neither FTRs nor ARRs provide a guarantee that transmission service customers will not pay congestion charges. ARR and FTR holders do not need to physically deliver energy to receive ARR or FTR credits and neither instrument represents a right to the physical delivery of energy.

In PJM, FTRs have been available to network service and long-term, firm, point-to-point transmission service customers as a hedge against congestion costs since the inception of locational marginal pricing (LMP) on April 1, 1998. Effective June 1, 2003, PJM replaced the allocation of FTRs with an allocation of ARRs and an associated Annual FTR Auction.<sup>1</sup> Since the introduction of this auction, FTRs have been available to all transmission service customers and PJM members. Network service and firm point-to-point transmission service customers can take allocated ARRs or the underlying FTRs through a self scheduling process. On June 1, 2007, PJM implemented marginal losses in the calculation of LMP. Since then, FTRs have been valued based on the difference in congestion prices rather than the difference in LMPs.

Firm transmission service customers have access to ARRs/FTRs because they pay the costs of the transmission system that enables firm energy delivery. Firm transmission service customers receive requested ARRs/FTRs to the extent that they are consistent both with the physical capability of the transmission system and with ARR/FTR requests of other eligible customers.

The *2008 State of the Market Report* focuses on the annual ARR allocations, the Annual FTR Auctions and the Monthly Balance of Planning Period FTR Auctions during two FTR/ARR planning periods: the 2007 to 2008 planning period which covers June 1, 2007, through May 31, 2008, and the 2008 to 2009 planning period which covers June 1, 2008, through May 31, 2009. The *2008 State of the Market Report* also analyzes the results of the 2009 to 2012 Long Term FTR Auction that covers three consecutive planning periods: June 1, 2009 through May 31, 2010, June 1, 2010 through May 31, 2011 and June 1, 2011 through May 31, 2012.

<sup>1</sup> 87 FERC ¶ 61,054 (1999).

## Overview

### Financial Transmission Rights

#### Market Structure

- **Supply.** PJM operates an Annual FTR Auction for all control zones in the PJM footprint. PJM conducts Monthly Balance of Planning Period FTR Auctions for the remaining months of the planning period, to allow participants to buy and sell any residual transmission capability. PJM also runs a Long Term FTR Auction for the three consecutive planning years immediately following the planning year during which the Long Term FTR Auction is conducted. The first Long Term FTR Auction was conducted during the 2008 to 2009 planning period and covers three consecutive planning periods between 2009 and 2012. In addition, PJM administers a secondary bilateral market to allow participants to buy and sell existing FTRs. FTR products include FTR obligations and FTR options. FTR options are not available in the Long Term FTR Auction. For each time period, there are three FTR products: 24-hour, on peak and off peak. FTRs have terms varying from one month to three years. FTR supply is limited by the capability of the transmission system to accommodate simultaneously the set of requested FTRs and the numerous combinations of FTRs. The principal binding constraints limiting the supply of FTRs in the 2009 to 2012 Long Term FTR Auction include the East Sayre – North Waverly and the Farmers Valley – Two Mile lines. The principal binding constraints limiting the supply of FTRs in the Annual FTR Auction for the 2008 to 2009 planning period include the Double Toll Gate – Old Chapel line and the AP South Interface.<sup>2</sup> Market participants can also sell FTRs. In the 2009 to 2012 Long Term FTR Auction, total FTR sell offers were 15,757 MW. In the Annual FTR Auction for the 2008 to 2009 planning period, total FTR sell offers were 83,453 MW, down from 117,199 MW during the 2007 to 2008 planning period. In the Monthly Balance of Planning Period FTR Auctions for the first seven months (June through December 2008) of the 2008 to 2009 planning period, there were 1,436,957 MW of FTR sell offers.
- **Demand.** There is no limit on FTR demand in any FTR auction. In the 2009 to 2012 Long Term FTR Auction, total FTR buy bids were 803,911 MW. In the Annual FTR Auction for the 2008 to 2009 planning period, total FTR buy bids were 2,181,273 MW, down from 2,223,687 MW during the 2007 to 2008 planning period. Total FTR self scheduled bids were 72,851 MW for the 2008 to 2009 planning period, an increase from 71,360 MW for the 2007 to 2008 planning period. In the Monthly Balance of Planning Period FTR Auctions for the first seven months (June through December 2008) of the 2008 to 2009 planning period, total FTR buy bids were 7,593,736 MW.

<sup>2</sup> During calendar years 2004 and 2005, PJM conducted the phased integration of five control zones. Four of these, American Electric Power (AEP), The Dayton Power & Light Company (DAY), Duquesne Light Company (DLCO) and Dominion, were eligible for direct allocation FTRs during the 2006 to 2007 planning period, but not the 2007 to 2008 or the 2008 to 2009 planning period. For additional information on the integrations, their timing and their impact on the footprint of the PJM service territory, see the 2008 State of the Market Report, Volume II, Appendix A, "PJM Geography."

- **FTR Credit Issues.** Six participants had FTR related payment obligations in default in 2008. Three of those participants had defaulted on their FTR related payment obligations in 2007. There were four participants who defaulted in 2007, after accounting for collateral. The magnitude of the defaults was the result of both the size of the FTR positions defaulted and of the PJM credit policies, which did not require sufficient collateral to cover the participants' losses. The 2007 defaults made it clear that PJM credit policies related to FTRs and particularly to counter flow FTRs were inadequate. PJM made multiple filings in 2008 to reform its credit policies, focusing particularly on ensuring an appropriate level of credit to cover positions acquired by market participants in counter flow FTRs. The defaults also raised potential market gaming issues, which were addressed, in part, in a PJM filing.<sup>3</sup> These are being investigated.
- **Patterns of Ownership.** The ownership concentration of cleared FTR buy bids resulting from the 2008 to 2009 Annual FTR Auction was low to moderate for FTR obligations and high for FTR options. The level of concentration is only descriptive and is not a measure of the competitiveness of FTR market structure as the ownership positions resulted from a competitive auction. In order to evaluate the ownership of prevailing flow and counter flow FTRs, the Market Monitoring Unit (MMU) categorized all participants owning FTRs in PJM as either physical or financial. Physical entities include utilities and customers which primarily take physical positions in PJM markets. Financial entities include banks and hedge funds which primarily take financial positions in PJM markets. Physical entities own more than half of prevailing flow Annual FTRs while financial entities own almost three quarters of counter flow Annual FTRs. The ownership of all Annual FTRs is about evenly split between physical and financial entities. Financial entities own almost two thirds of prevailing flow Long Term FTRs and more than half of counter flow Long Term FTRs. Financial entities own about 61 percent of all Long Term FTRs. Financial entities own two thirds of prevailing flow and about three quarters of counter flow Monthly Balance of Planning Period FTRs. Overall, financial entities own about 70 percent of all Monthly Balance of Planning Period FTRs.

### Market Performance

- **Volume.** The 2009 to 2012 Long Term FTR Auction cleared 52,369 MW (6.5 percent of demand) of FTR buy bids and 1,010 MW (6.4 percent) of FTR sell offers. For the 2008 to 2009 planning period, the Annual FTR Auction cleared 204,349 MW (9.4 percent) of FTR buy bids, down from 208,637 MW (9.4 percent of demand) for the 2007 to 2008 planning period. The Annual FTR Auction also cleared 4,534 MW (5.4 percent) of FTR sell offers for the 2008 to 2009 planning period, down from 6,495 MW (5.5 percent) for the 2007 to 2008 planning period. For the first seven months of the 2008 to 2009 planning period, the Monthly Balance of Planning Period FTR Auctions cleared 545,189 MW (7.2 percent) of FTR buy bids and 183,322 MW (12.8 percent) of FTR sell offers.

<sup>3</sup> PJM Interconnection, L.L.C. made a filing under section 205 of the Federal Power Act to amend section 15.2 of the PJM Operating Agreement concerning defaults on short FTR portfolios in Docket No. ER08-455-000, (January 18, 2008).

- **Price.** In the 2009 to 2012 Long Term FTR Auction, 90.7 percent of the Long Term FTRs were purchased for less than \$1 per MWh and 94.5 percent for less than \$2 per MWh. The weighted-average prices paid for Long Term buy-bid FTRs were \$0.76 per MWh for 24-hour FTRs, \$0.10 per MWh for on peak FTRs and \$0.01 per MWh for off peak FTRs. For the 2008 to 2009 planning period, 83.5 percent of the Annual FTRs were purchased for less than \$1 per MWh and 88.8 percent for less than \$2 per MWh. For the 2008 to 2009 planning period, the weighted-average prices paid for annual buy-bid FTR obligations were \$1.96 per MWh for 24-hour FTRs, \$0.55 per MWh for on peak FTRs and \$0.26 per MWh for off peak FTRs. Comparable, weighted-average prices paid for annual buy-bid FTR obligations for the 2007 to 2008 planning period were \$0.35 per MWh for 24-hour FTRs and \$0.57 per MWh for on peak FTRs and \$0.47 per MWh for off peak FTRs. The weighted-average prices paid for 2008 to 2009 planning period annual buy-bid FTR obligations and options were \$0.69 per MWh and \$0.24 per MWh, respectively, compared to \$0.47 per MWh and \$0.37 per MWh, respectively, in the 2007 to 2008 planning period.<sup>4</sup> The weighted-average price paid for buy-bid FTRs in the Monthly Balance of Planning Period FTR Auctions for the first seven months of the 2008 to 2009 planning period was \$0.35 per MWh, compared with \$0.21 per MWh in the Monthly Balance of Planning Period FTR Auctions for the full 12-month 2007 to 2008 planning period.
- **Revenue.** The 2009 to 2012 Long Term FTR Auction generated \$38.93 million of net revenue for all FTRs. The Annual FTR Auction generated \$2,422.55 million of net revenue for all FTRs during the 2008 to 2009 planning period, up from \$1,698.03 million for the 2007 to 2008 planning period. The Monthly Balance of Planning Period FTR Auctions generated \$62.2 million in net revenue for all FTRs during the first seven months of the 2008 to 2009 planning period.
- **Revenue Adequacy.** FTRs were 100 percent revenue adequate for the 2007 to 2008 planning period. FTRs were paid at 99.6 percent of the target allocation level for the first seven months of the 2008 to 2009 planning period. Congestion revenues are allocated to FTR holders based on FTR target allocations. PJM collected \$1,354.8 million of FTR revenues during the first seven months of the 2008 to 2009 planning period and \$2,059.2 million during the 2007 to 2008 planning period. For the first seven months of the 2008 to 2009 planning period, the top sink and top source with the highest positive FTR target allocations were the AP Control Zone and the Western Hub, respectively. Similarly, the top sink and top source with the largest negative FTR target allocations were the Northern Illinois Hub and the Pepco Control Zone, respectively.

<sup>4</sup> Weighted-average prices for FTRs in the Long Term FTR Auction, Annual FTR Auction and Monthly Balance of Planning Period FTR Auctions are the average prices weighted by the MW and hours in a time period (planning period or month) for each FTR class type: 24-hour, on peak and off peak. For example, FTRs in the 2008 to 2009 Annual FTR Auction would be weighted by their MW and the hours in that time period for each FTR class type: 24-hour (8,760 hours), on peak (4,064 hours) and off peak (4,696 hours).

## Auction Revenue Rights

### Market Structure

- **Supply.** ARR supply is limited by the capability of the transmission system to simultaneously accommodate the set of requested ARRs and the numerous combinations of feasible ARRs. The principal binding constraints that limited supply in the annual ARR allocation for the 2008 to 2009 planning period were the AP South Interface and the Cedar Grove — Clifton line. A new ARR product was added for the 2007 to 2008 planning period. Long Term ARRs are in effect for 10 consecutive planning periods and are available in Stage 1A of the annual ARR allocation. Residual ARRs were also introduced and are available to holders with prorated Stage 1A or 1B ARRs if additional transmission capability is added during the planning period.
- **Demand.** Total demand in the annual ARR allocation was 140,668 MW for the 2008 to 2009 planning period with 64,546 MW bid in Stage 1A, 27,291 MW bid in Stage 1B and 48,831 MW bid in Stage 2. This is down from 150,822 MW for the 2007 to 2008 planning period with 62,220 MW bid in Stage 1A, 31,063 MW bid in Stage 1B and 57,539 MW bid in Stage 2. ARR demand is limited by the total amount of network service and firm point-to-point transmission service.
- **ARR Reassignment for Retail Load Switching.** When retail load switches among load-serving entities (LSEs), a proportional share of the ARRs and their associated revenue are reassigned from the LSE losing load to the LSE gaining load. ARR reassignment occurs only if the LSE losing load has ARRs with a net positive economic value. An LSE gaining load in the same control zone is allocated a proportional share of positively valued ARRs within the control zone based on the shifted load. There were 10,017 MW of ARRs associated with approximately \$353,300 per MW-day of revenue that were reassigned in the first seven months of the 2008 to 2009 planning period.

### Market Performance

- **Volume.** Of 140,668 MW in ARR requests for the 2008 to 2009 planning period, 112,011 MW (79.6 percent) were allocated. There were 64,520 MW allocated in Stage 1A, 26,685 MW allocated in Stage 1B and 20,806 MW allocated in Stage 2. Eligible market participants self scheduled 72,851 MW (65.0 percent) of these allocated ARRs as Annual FTRs. Of 150,822 MW in ARR requests for the 2007 to 2008 planning period, 107,992 MW (71.6 percent) were allocated. There were 62,211 MW allocated in Stage 1A, 29,444 MW allocated in Stage 1B and 16,337 MW allocated in Stage 2. Eligible market participants self scheduled 71,360 MW (66.1 percent) of these allocated ARRs as Annual FTRs.
- **Revenue.** As ARRs are allocated to qualifying customers rather than sold, there is no ARR revenue comparable to the revenue that results from the FTR auctions.

- **Revenue Adequacy.** During the 2008 to 2009 planning period, ARR holders will receive \$2,361.3 million in ARR credits, with an average hourly ARR credit of \$2.41 per MWh. During the 2008 to 2009 planning period, the ARR target allocations were \$2,361.3 million while PJM collected \$2,484.8 million from the combined Annual and Monthly Balance of Planning Period FTR Auctions through December 31, 2008, making ARRs revenue adequate. During the 2007 to 2008 planning period, ARR holders received \$1,640.5 million in ARR credits, with an average hourly ARR credit of \$1.73 per MWh. For the 2007 to 2008 planning period, the ARR target allocations were \$1,640.5 million while PJM collected \$1,736.1 million from the combined Annual and Monthly Balance of Planning Period FTR Auctions, making ARRs revenue adequate.
- **ARR Proration.** When ARRs were allocated for the 2008 to 2009 planning period, some of the requested ARRs were prorated as a result of binding transmission constraints. For the 2008 to 2009 planning period, no ARRs were prorated in Stage 1A of the annual ARR allocation. In Stage 1B, the only constraint affecting the ARR allocation was the Cedar Grove — Clifton line. There were 605.4 MW of Stage 1B ARRs denied to participants whose requested ARRs affected that binding transmission constraint. For the 2007 to 2008 planning period, no ARRs were prorated in Stage 1A of the annual ARR allocation. In Stage 1B, the only constraint affecting the ARR allocation was the Cedar Grove — Clifton line. There were 1,159.3 MW of Stage 1B ARRs denied to participants whose requested ARRs affected that binding transmission constraint.
- **ARRs and FTRs as a Hedge Against Congestion.** The effectiveness of ARRs and FTRs as a hedge against actual congestion can be measured several ways. The first is to compare the revenue received by ARR holders to the congestion costs experienced by these ARR holders. The second is to compare the revenue received by FTR holders to the total congestion costs within PJM. The final and comprehensive method is to compare the revenue received by all ARR and FTR holders to total actual congestion costs in the Day-Ahead Energy Market and the balancing energy market within PJM. During the 2007 to 2008 planning period, total ARR and FTR revenues hedged 97.4 percent of the congestion costs within PJM. For the first seven months of the 2008 to 2009 planning period, all ARRs and FTRs hedged 97.2 percent of the congestion costs within PJM.

## Conclusion

The annual ARR allocation and the FTR auctions provide market participants with hedging instruments. These instruments can be used for hedging positions or for speculation. The Long Term FTR Auction, the Annual FTR Auction and the Monthly Balance of Planning Period FTR Auctions provide a market valuation of FTRs. The FTR auction results for the 2008 to 2009 planning period were competitive and succeeded in providing all qualified market participants with equal access to FTRs. The MMU recommends that the rules for ARR reassignment when load shifts should address the fact that in the case of ARRs self scheduled as FTRs, the underlying FTRs do not follow the load while the ARRs do.

ARRs were 100 percent revenue adequate for both the 2007 to 2008 and the 2008 to 2009 planning periods. FTRs were paid at 100 percent of the target allocation level for the 12-month period of the 2007 to 2008 planning period, and at 99.6 percent of the target allocation level for the first seven months of the 2008 to 2009 planning period.

The total of ARR and FTR revenues hedged 97.4 percent of the congestion costs in the Day-Ahead Energy Market and the balancing energy market within PJM for the 2007 to 2008 planning period and 97.2 percent of the congestion costs in PJM in the first seven months of the 2008 to 2009 planning period. The ARR and FTR revenue adequacy results are aggregate results and all those paying congestion charges were not necessarily hedged at that level. Aggregate numbers do not reveal the underlying distribution of FTR holders, their revenues or those paying congestion.

Revenue adequacy must be distinguished from the adequacy of FTRs as a hedge against congestion. Revenue adequacy is a narrower concept that compares the revenues available to cover congestion across specific paths for which FTRs were available and purchased. The adequacy of FTRs as a hedge against congestion compares FTR revenues to total congestion on the system as a measure of the extent to which FTRs hedged market participants against actual, total congestion across all paths, regardless of the availability or purchase of FTRs.

PJM faced substantial participant defaults in 2007 and 2008 as a result of participant counter flow positions in the FTR markets and inadequate participant financial resources. The magnitude of the defaults was the result of both the size of the FTR positions defaulted and of the PJM credit policies, which did not require sufficient collateral to cover the participants' losses. PJM also faced additional defaults in 2008. PJM has taken steps to address the credit issue. The defaults also raised potential market gaming issues, which were addressed, in part, in a PJM filing. These are being investigated.

## ***Financial Transmission Rights***

While FTRs have been available to eligible participants since the 1998 introduction of LMP, the Annual FTR Auction was first implemented for the 2003 to 2004 planning period. Since the 2006 to 2007 planning period, the auction has covered all control zones.

FTRs are financial instruments that entitle their holders to receive revenue or require them to pay charges based on locational congestion price differences in the Day-Ahead Energy Market across specific FTR transmission paths. Effective June 1, 2007, PJM added marginal losses as a component in the calculation of LMP.<sup>5</sup> The value of an FTR reflects the difference in congestion prices rather than the difference in LMPs, which includes both congestion and marginal losses. Auction market participants are free to request FTRs between any pricing nodes on the system, including hubs, control zones, aggregates, generator buses, load buses and interface pricing points. FTRs are available to the nearest 0.1 MW. The FTR target allocation is calculated hourly and is equal to the product of the FTR MW and the congestion price difference between sink and source that occurs in the Day-Ahead Energy Market. The value of an FTR can be positive or negative depending on the sink minus source congestion price difference, with a negative difference resulting in a liability for the holder. The FTR target allocation represents what the holders would receive if sufficient revenues are collected to fund FTRs.

Depending on the amount of FTR revenues collected, FTR holders with a positively valued FTR may receive congestion credits between zero and their target allocations. FTR holders with a negatively valued FTR are required to pay charges equal to their target allocations. When FTR holders receive

<sup>5</sup> For additional information on marginal losses, see the 2008 State of the Market Report, Volume II, Section 2, "Energy Market, Part 1," at "Real-Time Annual LMP Loss Component."

their target allocations, the associated FTRs are fully funded. The objective function of all FTR auctions is to maximize the bid-based value of FTRs awarded in each auction.

FTRs can be bought, sold and self scheduled. Buy bids are FTRs that are bought in the auctions; sell offers are existing FTRs that are sold in the auctions; and self scheduled bids are FTRs that have been directly converted from ARRs.

There are two FTR hedge type products: obligations and options. An obligation provides a credit, positive or negative, equal to the product of the FTR MW and the congestion price difference between FTR sink (destination) and source (origin) that occurs in the Day-Ahead Energy Market. An option provides only positive credits and options are available for only a subset of the possible FTR transmission paths.

There are three FTR class type products: 24-hour, on peak and off peak. The 24-hour products are effective 24 hours a day, seven days a week, while the on peak products are effective during on peak periods defined as the hours ending 0800 through 2300, Eastern Prevailing Time (EPT) Mondays through Fridays, excluding North American Electric Reliability Council (NERC) holidays. The off peak products are effective during hours ending 2400 through 0700, EPT, Mondays through Fridays, and during all hours on Saturdays, Sundays and NERC holidays.

FTR buy bids and sell offers may be made as obligations or options and as any of the three class types. FTR self scheduled bids are available only as obligations and 24-hour class types, consistent with the associated ARRs.

## Market Structure

Prior to implementation of the Annual FTR Auction, only network service and long-term, firm, point-to-point transmission service customers were able to directly obtain Annual FTRs. Now all transmission service customers and PJM members can participate in the Long Term FTR Auction, the Annual FTR Auction and the Monthly Balance of Planning Period FTR Auctions.

### Supply

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 Balance of Planning Period FTR Auctions.<sup>6</sup> The Annual FTR Auction includes the ability to directly convert allocated ARRs into self scheduled FTRs. Total FTR supply is limited by the capability of the transmission system to simultaneously accommodate the set of requested FTRs and the numerous combinations of FTRs that are feasible. For the Annual FTR Auction, known transmission outages that are expected to last for two months or more are included, while known outages of five days or more are included for the Monthly Balance of Planning Period FTR Auctions as well as any outages of a shorter duration that PJM determines would cause FTR revenue inadequacy if not modeled.<sup>7</sup> But, the auction process does not account for the fact that significant transmission outages, which have not been provided to PJM by transmission owners prior to the auction date, will occur during

6 PJM. "Manual 6: Financial Transmission Rights," Revision 11 (August 1, 2008), p. 34.

7 PJM. "Manual 6: Financial Transmission Rights," Revision 11 (August 1, 2008), p. 49.

the periods covered by the auctions. Such transmission outages may not be planned in advance or may be emergency in nature. FTRs can be traded between market participants through bilateral transactions.

During the 2008 to 2009 planning period, binding transmission constraints prevented the award of all requested FTRs in the Long Term FTR Auction, the Annual FTR Auction and Monthly Balance of Planning Period FTR Auctions.<sup>8</sup> Table 8-1 and Table 8-2 list the top 10 binding constraints along with their corresponding control zones in the Long Term FTR Auction and the Annual FTR Auction, respectively. They are listed in order of severity, irrespective of auction round. For each of the top 10 binding constraints, a numerical ranking in order of severity for each auction round is also listed. The order of severity is determined by the marginal value of the binding constraint. The marginal value measures the value gained by relieving a constraint by 1 MW. The marginal value is computed and generated in the optimization engine for both on peak and off peak hours.<sup>9</sup> Table 8-1 and Table 8-2 demonstrate the marginal value for on peak hours only.

**Table 8-1 Top 10 principal binding transmission constraints limiting the Long Term FTR Auction: Planning periods 2009 to 2012<sup>10</sup>**

Constraint	Type	Control Zone	Severity Ranking by Auction Round	
			1	2
East Sayre - North Waverly	Line	PENELEC	NA	1
Farmers Valley - Two Mile	Line	PENELEC	59	2
Branchburg - Readington	Line	PSEG	1	4
Lewis - Motts - Cedar	Line	AECO	2	5
Doubs - Mount Storm	Line	500	3	3
Roseland	Transformer	PSEG	4	NA
Branchburg	Transformer	PSEG	5	9
Montezuma-Bondurant	Flowgate	External	6	40
Rising	Flowgate	External	7	6
Arnold-Hazleton	Flowgate	External	45	7

<sup>8</sup> Binding constraints for Monthly Balance of Planning Period Auctions are posted to the PJM Web site in monthly files at <http://www.pjm.com/markets-and-operations/ftr/auction-user-info/historical-ftr-auction.aspx>.

<sup>9</sup> PJM. "Manual 6: Financial Transmission Rights," Revision 11 (August 1, 2008), p. 52.

<sup>10</sup> The transmission facilities that were not constrained during a certain auction round are listed as NA (not applicable).

**Table 8-2 Top 10 principal binding transmission constraints limiting the Annual FTR Auction: Planning period 2008 to 2009<sup>11</sup>**

Constraint	Type	Control Zone	Severity Ranking by Auction Round			
			1	2	3	4
Double Toll Gate - Old Chapel	Line	AP	NA	5	1	1
AP South	Interface	AP	2	1	2	2
Bedington - Black Oak	Interface	AP	1	3	5	4
Krendale - Seneca	Line	AP	15	10	3	7
Bedington	Transformer	AP	3	2	4	3
Doubs	Transformer	AP	4	4	6	5
Quinton - Roadstown	Line	AECO	10	6	33	22
Kammer	Transformer	AEP	5	7	7	6
East Towanda	Transformer	PENELEC	6	8	9	13
Mahans Lane - Weirton	Line	AP	13	13	11	8

### Long Term FTR Auction

During the 2008 to 2009 planning period, a new Long Term FTR Auction was introduced.<sup>12</sup> PJM conducts a Long Term FTR Auction for the three consecutive planning periods immediately following the planning period during which the Long Term FTR Auction is conducted. The capacity offered for sale in Long Term FTR Auctions is the residual system capability after the assumption that all ARRs allocated in the immediately prior annual ARR allocation process are self scheduled as FTRs. These ARRs are modeled as fixed injections and withdrawals in the Long Term FTR Auction. Future transmission upgrades are not included in the model. The Long Term FTR Auction consists of two rounds. In each round 50 percent of the feasible FTR available capability is awarded.<sup>13</sup>

- **Round 1.** The first round is conducted approximately 11 months prior to the start of the term covered by the Long Term FTR Auction. Market participants make offers for FTRs between any source and sink. These offers can be 24-hour, on peak or off peak FTR obligations. FTR option products are not available in Long Term FTR Auctions.
- **Round 2.** The second round is conducted approximately 4 months after the first round. FTRs purchased in the first round may be offered for sale in the second round.<sup>14</sup>

FTRs obtained in the Long Term Auctions may have terms of one year or a term of three years.

<sup>11</sup> The Double Toll Gate – Old Chapel line was not constrained during the first auction round and is listed as NA (not applicable).

<sup>12</sup> PJM Interconnection, L.L.C., PJM Interconnection, L.L.C. submits revisions to its Open Access Transmission Tariff and the Amended and Restated Operating Agreement pursuant to Section 205 of the Federal Power Act. The proposed revisions modify the FTR auction rules in the PJM Interchange Energy Market by establishing a Long Term FTR Auction process, Docket No. ER08-1016-000, (May 28, 2008).

<sup>13</sup> PJM. "Manual 6: Financial Transmission Rights," Revision 11 (August 1, 2008), p. 34.

<sup>14</sup> PJM. "Manual 6: Financial Transmission Rights," Revision 11 (August 1, 2008), p. 37.

## Annual FTR Auction

Each April, PJM conducts an Annual FTR Auction during which all eligible market participants may bid on FTRs for the next planning period consistent with total transmission system capability, excluding the FTRs approved in prior Long Term FTR Auctions. The auction takes place over four rounds with 25 percent of the feasible transmission system capability awarded in each round:

- **Round 1.** Market participants make offers for FTRs between any source and sink. These offers can be 24-hour, on peak or off peak FTR obligations or FTR options. Locational prices are determined by maximizing the net revenue based on offer-based value of FTRs.<sup>15</sup> Any transmission service customer or PJM member can bid for available FTRs. ARR holders wishing to directly convert their previously allocated ARRs into self scheduled FTRs must initiate that process in this round. One quarter of each self scheduled FTR clears as a 24-hour FTR in each of the four rounds. Self scheduled FTRs must have the same source and sink as the corresponding ARR. Self scheduled FTRs clear as price-taking FTR bids that are not eligible to set auction price.
- **Rounds 2 to 4.** Market participants make offers for FTRs. Locational prices are determined by maximizing the offer-based value of FTRs cleared. FTRs purchased in earlier rounds can be offered for sale in later rounds.

By self scheduling ARRs as price-taking bids in the Annual FTR Auction, customers with ARRs receive FTRs for their ARR paths. ARR holders are guaranteed that they will receive their requested FTRs. ARRs can be self scheduled only as 24-hour FTR obligations. ARR holders that self schedule ARRs as FTRs still hold the associated ARR. Self scheduling transactions net out such that the ARR holder buys the FTR in the auction, receives the corresponding revenue based on holding the ARR and is left with ownership of the FTR as a hedge. The following is an illustrative example of self scheduling ARRs as FTRs. An ARR holder has received an allocation of 1 MW from source A to sink B. The ARR holder self schedules the 1 MW allocated ARR as an FTR. In the Annual FTR Auction, the price for a 1 MW FTR from A to B is \$100. The ARR holder pays \$100 to buy the 1 MW FTR in the Annual FTR Auction, but receives a \$100 ARR target credit based on the associated 1 MW ARR. In addition, the ARR holder obtains the corresponding FTR target allocation as a hedge.

## Monthly Balance of Planning Period FTR Auctions

The Monthly Balance of Planning Period FTR Auctions make available the residual FTR capability on the PJM transmission system after the Long Term and Annual FTR Auctions are concluded. They are single-round monthly auctions that allow any transmission service customers or PJM members to bid for any FTR or to offer for sale any FTR that they currently hold. Market participants can bid for or offer monthly FTRs for any of the next three months remaining in the planning period, or quarterly FTRs for any of the quarters remaining in the balance of the planning period. FTRs in the auctions can be either obligations or options and can be 24-hour, on peak or off peak products.<sup>16</sup>

<sup>15</sup> Long Term, Annual and Monthly Balance of Planning Period FTR Auctions determine nodal prices as a function of market participants' FTR bids and binding transmission constraints. An optimization algorithm selects the set of feasible FTR bids that produces maximum net revenue, thus maximizing the value of transmission assets. A feasible set of FTR bids is a set that does not impose a flow on any transmission facility in excess of its rating.

<sup>16</sup> PJM. "Manual 6: Financial Transmission Rights," Revision 11 (August 1, 2008), pp. 34-35.

Under the auction rules, market participants may bid to buy or offer to sell FTRs that have the following two terms. The first term is for one month for any of the next three months remaining in the planning period. For example, if the auction is conducted in May, any FTR valid for the months of June, July and August is included in the auction. The second term is for three months for any of the quarters remaining in the planning period (if technically feasible within the specified market time frame). For example, for planning period quarter 1 (Q1), the auction period would be June, July and August. For planning period quarter 2 (Q2), the auction period would be September, October and November. Similarly, December, January and February would be for planning period quarter 3 (Q3) and March, April and May would be for planning period quarter 4 (Q4). For example, an auction held in May would have all four quarters available, while an auction held in June would include quarter 2, quarter 3 and quarter 4, but not quarter 1.

### Secondary Bilateral Market

Market participants can buy and sell existing FTRs through the PJM-administered, bilateral market, or market participants can trade FTRs among themselves without PJM involvement. Bilateral transactions that are not done through PJM can involve parties that are not PJM members. PJM has no knowledge of bilateral transactions that are done outside of PJM's secondary bilateral market system.

For bilateral trades done through PJM, the FTR transmission path must remain the same; FTR obligations must remain obligations and FTR options must remain options. However, an individual FTR may be split up into multiple, smaller FTRs, down to increments of 0.1 MW. FTRs can also be given different start and end times, but the start time cannot be earlier than the original FTR start time and the end time cannot be later than the original FTR end time.

### *Demand*

Under current rules, participants may submit unlimited bids for FTRs for any single auction round in the Annual FTR Auction or for any single Monthly Balance of Planning Period FTR Auction.

## FTR Credit Issues

### *Default*

Six participants had FTR related payment obligations in default in 2008. Three of those participants had defaulted on their FTR related payment obligations in 2007. There were four participants who defaulted in 2007, after accounting for collateral. The magnitude of the defaults was the result of both the size of the FTR positions defaulted and of the PJM credit policies, which did not require sufficient collateral to cover the participants' losses. The 2007 defaults made it clear that PJM credit policies related to FTRs and particularly to counter flow FTRs were inadequate. PJM made multiple filings in 2008 to reform its credit policies, focusing particularly on ensuring an appropriate level of credit to cover positions acquired by market participants in counter flow FTRs. The defaults also

raised potential market gaming issues, which were addressed, in part, in a PJM filing.<sup>17</sup> These are being investigated.

In October 2007, Exel Power Sources, L.L.C. defaulted on September obligations and subsequently defaulted on obligations, including some in 2008, with a total net default value of approximately \$5.3 million, after collateral. In December 2007, Power Edge, L.L.C. defaulted on November obligations and subsequently defaulted on additional obligations in 2008 with a total default value of about \$51.8 million, not accounting for the related funds currently held by PJM. Del Light, Inc. and PJS Capital, L.L.C. also defaulted in January 2008, with total net default value of about \$0.2 million and \$0.6 million.<sup>18</sup> Chien Energy and Lehman Brothers Commodity Service, Inc. defaulted with total net default values of about \$80,000 and \$14.6 million respectively.

The defaults made it clear that PJM credit polices related to FTRs and particularly to counter flow FTRs were inadequate. The defaults also raised potential market gaming issues, which were addressed, in part, in a PJM filing.<sup>19</sup> These are being investigated.

Prevailing flow FTRs hedge congestion on a path. Participants purchase prevailing flow FTRs for a positive price with the expectation that the FTR revenues will exceed the cost of the FTRs. Counter flow FTRs expose the owner to paying congestion on a path. Participants receive a payment to take counter flow FTRs with the expectation that the payment will exceed the FTR charges they must pay. The risk of a prevailing flow FTR is generally limited to the purchase price, although risk could increase if congestion reversed. The risk of a counter flow FTR derives from the underlying congestion and is, therefore, not limited to a fixed payment. The risk is substantially greater for a counter flow FTR than for a prevailing flow FTR.

### **FTR Credit Rules**

Under credit rules in place during 2007, PJM required participants in FTR auctions to meet defined credit requirements linked to the value of the FTRs. PJM calculated the FTR credit requirement for each market participant using FTR cost and a measure of the historical congestion on the FTR path for the planning period, discounted by 30 percent. The 30 percent adjustment did not apply to counter flow FTRs. PJM calculated a total FTR credit requirement for each market participant, which must be maintained to participate in the FTR auctions.<sup>20</sup>

On December 20, 2007, PJM notified its members that it had declared Power Edge in default for failure to pay its invoice of December 7, 2007, and estimated that this would create a significant liability for the PJM membership collectively.<sup>21</sup> As a result of the default by Power Edge in December 2007, it became clear that the credit rules were inadequate, particularly with respect to the credit requirements for counter flow FTR positions. PJM had already begun the stakeholder process to modify the credit rules, but the modified rules had not yet been filed with the Commission or approved.

<sup>17</sup> PJM Interconnection, L.L.C. made a filing under section 205 of the Federal Power Act to amend section 15.2 of the PJM Operating Agreement concerning defaults on short FTR portfolios in Docket No. ER08-455-000, (January 18, 2008).

<sup>18</sup> Additional information on the defaults is available on the PJM Web Site at <http://www.pjm.com/about-pjm/member-services/default-notification.aspx>.

<sup>19</sup> PJM Interconnection, L.L.C. made a filing under section 205 of the Federal Power Act to amend section 15.2 of the PJM Operating Agreement concerning defaults on short FTR portfolios in Docket No. ER08-455-000, (January 18, 2008).

<sup>20</sup> For the complete FTR Auction credit business rules, see PJM, "Manual 6: Financial Transmission Rights," Revision 11 (August 1, 2008), pp.38-42.

<sup>21</sup> See PJM e-mail notification of the default posted on its Website at: <http://www.pjm.com/about-pjm/member-services/~media/about-pjm/member-services/default-notification/20071220-mc-email-power-edge-default.ashx>. Additional updates on this and other credit issues can be found on PJM's Website at: <http://www.pjm.com/about-pjm/member-services/default-notification.aspx>.

PJM filed a complaint with the FERC against Power Edge and its affiliates as well as related claims in the United States District Court for the District of Delaware.<sup>22</sup> PJM continues to retain collateral posted by Power Edge's affiliates and to restrict trading privileges in PJM by such affiliates. In response, Power Edge's affiliates filed suit at the FERC and in the Eastern District of Pennsylvania, seeking an order requiring PJM to return their collateral and restore their trading privileges.<sup>23</sup> All of these proceedings are currently pending.

In an effort to prevent or mitigate the harm from future defaults, PJM has actively sought to reform its credit policies. On December 26, 2007, PJM proposed revisions to improve its credit requirements for FTR market participants, which the Commission approved by order issued March 25, 2008.<sup>24</sup> The revisions changed the calculation period for the FTR credit requirement to a monthly from an annual basis and the calculation and allocation of offsets for ARR credits to monthly rather than annually. The credit calculation sums only the months with positive net credit requirements and applies a generic 10 percent adjustment to historical values of both prevailing flow FTRs and counter flow FTRs to account for likely differences from historical experience.

PJM submitted an additional filing on January 31, 2008, to the FERC to increase the credit requirement for market participants with net counter flow FTR positions, which the Commission also approved in the March 25th Order.<sup>25</sup> PJM's revised policy adds to the credit requirements for net counter flow positions an amount equal to the net price of the portfolio multiplied by two, and if the counter flow position is also not well diversified geographically, multiplied by three instead.

On January 18, 2008, PJM submitted a filing intended to confirm PJM's authority to set off a company's FTR default against FTR market revenues that PJM would otherwise have paid to the defaulting company's affiliates and to apply such affiliates' posted security to the default to the extent that the security relates to the company's FTR positions, but the March 25th Order rejected this proposal.<sup>26</sup>

The credit requirements for Long Term FTRs are the same as the credit requirements for Annual FTRs. The credit requirements are based on each month of each FTR. Long Term FTR credit requirements will be recalculated each year as a new set of historical data is prepared for the upcoming annual auction.<sup>27</sup>

PJM's current tariff rules allow some PJM market participants a significant amount of unsecured credit on the basis of PJM's evaluation of their credit worthiness, following the approved guidelines for this review. The MMU recommends the elimination of unsecured credit, over an appropriate transition period, based on the MMU's view of PJM's role in evaluating the credit worthiness of complex corporate entities and due to a concern about inappropriate shifts of risks and costs among the membership.

22 PJM filed a complaint against Accord Energy LLC, et al., in Docket No. EL08-44-000 (March 7, 2008); PJM filed a complaint and demand for jury trial versus Mark Gorton, et al., in the United States District Court for the District of Delaware in Case No. 1:99-inc-9999 (April 16, 2008).

23 BJ Energy LLC, et al., filed a complaint against PJM in Docket No. EL08-49-000 (April 17, 2008); BJ Energy LLC, et al., filed a first amended complaint versus PJM in the United States District Court for the Eastern District of Pennsylvania in C.A. No. 08-cv-3649-NS (November 7, 2008).

24 PJM filed proposed revisions to the PJM Credit Policy ("Attachment Q") in Docket No. ER08-376-000 (December 26, 2007); *PJM Interconnection, L.L.C.*, 122 FERC ¶ 61,279 ("March 25" Order).

25 PJM filed proposed revisions to Attachment Q in Docket No. ER08-520-000.

26 PJM filed a proposed amendment to PJM OA § 15.2 in Docket No. ER08-455-000.

27 *PJM Interconnection, L.L.C.*, PJM Interconnection, L.L.C. submits revisions to its Open Access Transmission Tariff and the Amended and Restated Operating Agreement pursuant to Section 205 of the Federal Power, Docket No. ER08-1016-000, (May 28, 2008).

On January 3, 2009, PJM proposed tariff revisions that would reduce the per member allowance of unsecured credit by two-thirds, limit the unsecured credit allowance for a family of affiliates to an aggregate \$150 million, eliminate unsecured credit allowances for FTR trading activity, shorten settlement periods by transitioning to weekly from monthly billing for invoice line items that represent most of PJM's billings, and allow PJM to close and liquidate a member's FTR positions after a declaration of that member's default.<sup>28</sup> This proposal is currently pending before the FERC.

### *Patterns of Ownership*

The overall ownership structure of FTRs and the ownership of prevailing flow and counter flow FTRs are evaluated.

The ownership concentration of cleared FTR buy bids resulting from the 2008 to 2009 Annual FTR Auction was low to moderate for FTR obligations and high for FTR options. This ownership information is descriptive and is not necessarily a measure of actual or potential FTR market structure issues, as the ownership positions result from competitive auctions. The percentage of FTR ownership shares may change when FTR owners buy or sell FTRs in the Monthly Balance of Planning Period FTR Auctions or secondary bilateral market.

For cleared FTR buy-bid obligations in the 2008 to 2009 Annual FTR Auction, the HHIs were 876 for 24-hour, 1141 for on peak and 1258 for off peak FTR products while maximum market shares were 19 percent for 24-hour, which is associated with a physical entity, 22 percent for on peak, which is associated with a financial entity, and 24 percent for off peak FTR products, which is associated with a financial entity.

For cleared FTR buy-bid options in the 2008 to 2009 Annual FTR Auction, HHIs were 8722 for 24-hour, 2303 for on peak and 2314 for off peak products while maximum market shares were 93 percent for 24-hour, which is associated with a financial entity, 32 percent for on peak, which is associated with a physical entity, and 33 percent for off peak FTR products, which is associated with a financial entity.

In order to evaluate the ownership of prevailing flow and counter flow FTRs, the MMU categorized all participants owning FTRs in PJM as either physical or financial. Physical entities include utilities and customers which primarily take physical positions in PJM markets. Financial entities include banks and hedge funds which primarily take financial positions in PJM markets. International market participants that primarily take financial positions in PJM markets are generally considered to be financial entities even if they are utilities in their own countries. The MMU used available public information to categorize FTR owners.

Table 8-3 presents the 2009 to 2012 Long Term FTR Auction market concentration for cleared FTRs by organization type and FTR direction. The results show that financial entities own almost two thirds of prevailing flow FTRs and more than half of counter flow FTRs. Overall, financial entities own about 61 percent of all Long Term FTRs.

<sup>28</sup> PJM filed proposed revisions to Attachment Q in Docket No. ER09-650-000.

**Table 8-3 Long Term FTR Auction patterns of ownership by FTR direction: Planning periods 2009 to 2012**

Organization Type	FTR Direction		All
	Prevailing Flow	Counter Flow	
Physical	36.7%	41.9%	39.2%
Financial	63.3%	58.1%	60.8%
Total	100.0%	100.0%	100.0%

Table 8-4 presents the Annual FTR Auction market concentration for cleared FTRs in the 2008 to 2009 planning period by organization type and FTR direction. The results show that physical entities own more than half of prevailing flow FTRs while financial entities own almost three quarters of counter flow FTRs. Overall, financial entities own about 54 percent of all Annual FTRs.

**Table 8-4 Annual FTR Auction patterns of ownership by FTR direction: Planning period 2008 to 2009**

Organization Type	FTR Direction		All
	Prevailing Flow	Counter Flow	
Physical	54.2%	28.5%	46.5%
Financial	45.8%	71.5%	53.5%
Total	100.0%	100.0%	100.0%

Table 8-5 presents the Monthly Balance of Planning Period FTR Auction market concentration for cleared FTRs in calendar year 2008 by organization type and FTR direction. The results show that financial entities own two thirds of prevailing flow FTRs and about three quarters of counter flow FTRs. Overall, financial entities own about 70 percent of all Monthly Balance of Planning Period FTRs.

**Table 8-5 Monthly Balance of Planning Period FTR Auction patterns of ownership by FTR direction: January 2008 to December 2008**

Organization Type	FTR Direction		All
	Prevailing Flow	Counter Flow	
Physical	33.3%	25.4%	29.6%
Financial	66.7%	74.6%	70.4%
Total	100.0%	100.0%	100.0%

## Market Performance

### Volume

Table 8-6 shows the 2009 to 2010 Long Term FTR Auction volume by trade type, FTR direction and period type.<sup>29</sup> The total volume was 803,911 MW for FTR buy bids and 15,757 MW for FTR sell offers in the 2009 to 2012 Long Term FTR Auction. The Long Term FTR Auction cleared 52,369 MW (6.5 percent) leaving 751,542 MW (93.5 percent) of uncleared FTR buy bids. There were 1,010 MW (6.4 percent) of cleared FTR sell offers leaving 14,747 MW (93.6 percent) of uncleared FTR sell offers.

**Table 8-6 Long Term FTR Auction market volume: Planning periods 2009 to 2012**

Trade Type	FTR Direction	Period Type	Bid and Requested Count	Bid and Requested Volume (MW)	Cleared Volume (MW)	Cleared Volume	Uncleared Volume (MW)	Uncleared Volume
Buy bids	Counter Flow	Year 1	30,399	89,715	13,221	14.7%	76,494	85.3%
		Year 2	12,342	45,995	7,561	16.4%	38,434	83.6%
		Year 3	11,019	37,891	4,873	12.9%	33,018	87.1%
		Year All	16	106	17	15.9%	89	84.1%
		Total	53,776	173,707	25,672	14.8%	148,035	85.2%
	Prevailing Flow	Year 1	66,689	319,514	15,100	4.7%	304,414	95.3%
		Year 2	29,101	177,507	7,113	4.0%	170,394	96.0%
		Year 3	20,956	128,944	4,380	3.4%	124,564	96.6%
		Year All	220	4,239	104	2.5%	4,135	97.5%
		Total	116,966	630,204	26,697	4.2%	603,507	95.8%
Total			170,742	803,911	52,369	6.5%	751,542	93.5%
Sell offers	Counter Flow	Year 1	2,037	3,499	169	4.8%	3,330	95.2%
		Year 2	839	1,997	214	10.7%	1,783	89.3%
		Year 3	856	1,469	122	8.3%	1,347	91.7%
		Year All	1	5	0	0.0%	5	100.0%
		Total	3,733	6,970	505	7.3%	6,464	92.7%
	Prevailing Flow	Year 1	1,849	4,486	270	6.0%	4,215	94.0%
		Year 2	1,346	2,596	123	4.7%	2,473	95.3%
		Year 3	1,027	1,706	112	6.5%	1,594	93.5%
		Year All	NA	NA	NA	NA	NA	NA
		Total	4,222	8,787	504	5.7%	8,283	94.3%
Total			7,955	15,757	1,010	6.4%	14,747	93.6%

<sup>29</sup> Calculated values shown in Section 8, "Financial Transmission and Auction Revenue Rights," are based on unrounded, underlying data and may differ from calculations based on the rounded values in the tables.

Table 8-7 shows the Annual FTR Auction volume by trade type and FTR direction for the 2008 to 2009 planning period. The total volume was 2,181,273 MW for FTR buy bids and 83,453 MW for FTR sell offers for the 2008 to 2009 planning period. This is down from the total volume of 2,223,687 MW for FTR buy bids and 117,199 MW for FTR sell offers for the 2007 to 2008 planning period.

There were 204,349 MW (9.4 percent) of cleared FTR buy bids and 4,534 MW (5.4 percent) of cleared FTR sell offers for the 2008 to 2009 planning period. This is down from the total of 208,637 MW (9.4 percent) of cleared FTR buy bids and 6,495 MW (5.5 percent) of cleared FTR sell offers for the 2007 to 2008 planning period.

For the 2008 to 2009 planning period, there were 76,586 MW (27.3 percent) cleared out of 280,667 MW counter flow FTR buy bids and 127,763 MW (6.7 percent) cleared out of 1,900,606 MW prevailing flow FTR buy bids. During the 2008 to 2009 planning period, there were 1,522 MW (4.7 percent) cleared out of 32,596 MW counter flow FTR sell offers and 3,012 MW (5.9 percent) cleared out of 50,857 MW prevailing flow FTR offers.

**Table 8-7 Annual FTR Auction market volume: Planning period 2008 to 2009**

Trade Type	FTR Direction	Bid and Requested Count	Bid and Requested Volume (MW)	Cleared Volume (MW)	Cleared Volume	Uncleared Volume (MW)	Uncleared Volume
Buy bids	Counter Flow	52,614	280,667	76,586	27.3%	204,081	72.7%
	Prevailing Flow	211,684	1,900,606	127,763	6.7%	1,772,843	93.3%
	Total	264,298	2,181,273	204,349	9.4%	1,976,924	90.6%
Self-scheduled bids	Counter Flow	378	3,990	3,990	100.0%	0	0.0%
	Prevailing Flow	10,410	68,861	68,861	100.0%	0	0.0%
	Total	10,788	72,851	72,851	100.0%	0	0.0%
Buy and self-scheduled bids	Counter Flow	52,992	284,657	80,576	28.3%	204,081	71.7%
	Prevailing Flow	222,094	1,969,467	196,624	10.0%	1,772,843	90.0%
	Total	275,086	2,254,124	277,200	12.3%	1,976,924	87.7%
Sell offers	Counter Flow	8,273	32,596	1,522	4.7%	31,074	95.3%
	Prevailing Flow	9,566	50,857	3,012	5.9%	47,845	94.1%
	Total	17,839	83,453	4,534	5.4%	78,919	94.6%

Table 8-8 shows that for the 2008 to 2009 planning period, eligible market participants converted 72,851 MW of ARRs out of a possible 112,011 MW into Annual FTRs. In comparison, during the 2007 to 2008 planning period, eligible market participants converted 71,360 MW of ARRs out of a possible 107,992 MW.

**Table 8-8 Comparison of self scheduled FTRs: Planning periods 2007 to 2008 and 2008 to 2009**

Planning Period	Maximum Possible		Percent of ARRs Self-Scheduled as FTRs
	Self-Scheduled FTRs (MW)	Self-Scheduled FTRs (MW)	
2007/2008	71,360	107,992	66.1%
2008/2009	72,851	112,011	65.0%

Table 8-9 shows that there were 7,593,736 MW of FTR buy bids and 1,436,957 MW of FTR sell offers for all bidding periods in the Monthly Balance of Planning Period FTR Auctions for the 2008 to 2009 planning period through December 31, 2008. The monthly auctions cleared 545,189 MW (7.2 percent) leaving 7,048,547 MW (92.8 percent) of uncleared FTR buy bids. There were 183,322 MW (12.8 percent) of cleared FTR sell offers leaving 1,253,634 MW (87.2 percent) of uncleared FTR sell offers.

The Monthly Balance of Planning Period FTR Auctions for the full 12-month 2007 to 2008 planning period had a total demand of 11,109,209 MW for FTR buy bids and 2,464,879 MW for FTR sell offers. The monthly auctions cleared 827,980 MW (7.5 percent) of FTR buy bids and 218,508 MW (8.9 percent) of FTR sell offers.

**Table 8-9 Monthly Balance of Planning Period FTR Auction market volume: January 2008 to December 2008**

Monthly Auction	Trade Type	Bid and Requested Count	Bid and Requested Volume (MW)	Cleared Volume (MW)	Cleared Volume	Uncleared Volume (MW)	Uncleared Volume
Jan-08	Buy bids	121,150	655,581	43,616	6.7%	611,965	93.3%
	Sell offers	33,325	153,940	16,239	10.5%	137,700	89.5%
Feb-08	Buy bids	132,654	676,847	48,951	7.2%	627,896	92.8%
	Sell offers	17,347	93,099	11,663	12.5%	81,436	87.5%
Mar-08	Buy bids	130,371	590,524	47,641	8.1%	542,883	91.9%
	Sell offers	36,787	153,283	15,700	10.2%	137,583	89.8%
Apr-08	Buy bids	105,398	427,105	46,282	10.8%	380,822	89.2%
	Sell offers	23,496	101,055	11,477	11.4%	89,577	88.6%
May-08	Buy bids	69,834	331,327	30,660	9.3%	300,667	90.7%
	Sell offers	12,751	51,322	7,823	15.2%	43,499	84.8%
Jun-08	Buy bids	258,681	1,578,046	104,786	6.6%	1,473,260	93.4%
	Sell offers	45,414	237,585	37,798	15.9%	199,788	84.1%
Jul-08	Buy bids	278,209	1,211,784	85,641	7.1%	1,126,143	92.9%
	Sell offers	60,834	243,169	31,798	13.1%	211,371	86.9%
Aug-08	Buy bids	222,740	1,224,054	76,642	6.3%	1,147,412	93.7%
	Sell offers	74,462	262,360	36,615	14.0%	225,744	86.0%
Sep-08	Buy bids	205,073	1,127,274	89,543	7.9%	1,037,731	92.1%
	Sell offers	45,594	202,025	24,642	12.2%	177,382	87.8%
Oct-08	Buy bids	182,669	965,756	69,103	7.2%	896,653	92.8%
	Sell offers	39,073	162,790	16,335	10.0%	146,455	90.0%
Nov-08	Buy bids	160,000	738,336	57,286	7.8%	681,051	92.2%
	Sell offers	32,106	130,895	11,579	8.8%	119,316	91.2%
Dec-08	Buy bids	156,711	748,485	62,188	8.3%	686,298	91.7%
	Sell offers	47,312	198,133	24,555	12.4%	173,578	87.6%
2007/2008	Buy bids	2,015,915	11,109,209	827,980	7.5%	10,281,228	92.5%
	Sell offers	479,109	2,464,879	218,508	8.9%	2,246,371	91.1%
2008/2009*	Buy bids	1,464,083	7,593,736	545,189	7.2%	7,048,547	92.8%
	Sell offers	344,795	1,436,957	183,322	12.8%	1,253,634	87.2%

\* Shows seven months ended 31-Dec-2008

Table 8-10 shows the bid and cleared volume for FTR buy bids in the Monthly Balance of Planning Period FTR Auctions by bidding period for January 2008 through December 2008.

**Table 8-10 Monthly Balance of Planning Period FTR Auction buy-bid bid and cleared volume (MW per period): January 2008 to December 2008**

Monthly Auction	MW Type	Current Month	Second Month	Third Month	Q1	Q2	Q3	Q4	Total
Jan-08	Bid	301,410	126,592	106,864				120,716	655,581
	Cleared	25,820	7,271	5,309				5,217	43,616
Feb-08	Bid	335,163	116,029	107,688				117,967	676,847
	Cleared	31,353	6,255	7,050				4,294	48,951
Mar-08	Bid	305,542	119,701	113,947				51,333	590,524
	Cleared	33,164	6,541	6,893				1,044	47,641
Apr-08	Bid	309,583	117,522						427,105
	Cleared	37,759	8,524						46,282
May-08	Bid	331,327							331,327
	Cleared	30,660							30,660
Jun-08	Bid	423,967	189,183	188,548	137,116	221,329	209,937	207,965	1,578,046
	Cleared	40,813	11,687	11,171	7,730	14,272	9,977	9,137	104,786
Jul-08	Bid	357,395	202,677	81,392		193,734	187,958	188,629	1,211,784
	Cleared	40,994	13,117	5,814		9,013	8,686	8,016	85,641
Aug-08	Bid	379,607	154,227	141,115		175,934	193,429	179,743	1,224,054
	Cleared	40,040	10,660	6,225		5,187	8,166	6,364	76,642
Sep-08	Bid	342,026	164,862	146,930		114,635	183,454	175,368	1,127,274
	Cleared	44,418	9,295	8,773		4,384	12,309	10,364	89,543
Oct-08	Bid	343,978	149,085	135,665			169,046	167,982	965,756
	Cleared	46,209	7,040	4,194			5,123	6,538	69,103
Nov-08	Bid	304,367	97,067	86,861			126,107	123,935	738,336
	Cleared	36,712	4,257	3,232			5,311	7,773	57,286
Dec-08	Bid	287,435	123,385	115,498			79,524	142,643	748,486
	Cleared	32,875	8,251	7,125			3,918	10,019	62,188

Table 8-11 shows the secondary bilateral FTR market volume by hedge type and class type for the 2007 to 2008 and the 2008 to 2009 planning periods. There were 1,665 MW of total bilateral FTR activity for the 2008 to 2009 planning period while there were 2,122 MW during the 2007 to 2008 planning period. There were no option FTRs traded through the PJM secondary bilateral FTR market for the 2008 to 2009 planning period.

**Table 8-11 Secondary bilateral FTR market volume: Planning periods 2007 to 2008 and 2008 to 2009<sup>30</sup>**

Planning Period	Hedge Type	Class Type	Secondary (MW)
2007/2008	Obligation	24-Hour	57
		On Peak	1,239
		Off Peak	216
		Total	1,512
	Option	24-Hour	0
		On Peak	446
		Off Peak	164
		Total	610
	2008/2009	Obligation	24-Hour
On Peak			1,133
Off Peak			0
Total			1,665

<sup>30</sup> The 2008 to 2009 planning period covers the 2008 to 2009 Annual FTR Auction and the Monthly Balance of Planning Period FTR Auctions through December 31, 2008.

**Price**

Table 8-12 shows the cleared, weighted-average prices by trade type, FTR direction, period type and class type for the 2009 to 2012 Long Term FTR Auction. Only FTR obligation products are available in Long Term FTR Auctions. In this auction, weighted-average, buy-bid FTR prices were \$0.16 per MWh while weighted-average sell offer FTR prices were \$0.29 per MWh.

**Table 8-12 Long Term FTR Auction weighted-average cleared prices (Dollars per MWh): Planning periods 2009 to 2012**

Trade Type	FTR Direction	Period Type	Class Type			
			24-Hour	On Peak	Off Peak	All
Buy bids	Counter Flow	Year 1	(\$1.16)	(\$0.64)	(\$0.66)	(\$0.75)
		Year 2	(\$0.88)	(\$0.71)	(\$0.99)	(\$0.84)
		Year 3	(\$0.19)	(\$0.77)	(\$0.83)	(\$0.75)
		Year All	(\$7.72)	(\$5.09)	(\$3.95)	(\$5.72)
		Total	(\$1.03)	(\$0.69)	(\$0.79)	(\$0.78)
	Prevailing Flow	Year 1	\$1.63	\$0.70	\$0.72	\$0.86
		Year 2	\$1.61	\$0.88	\$1.27	\$1.09
		Year 3	\$0.78	\$0.82	\$1.08	\$0.91
		Year All	\$9.97	\$0.11	\$0.22	\$8.71
		Total	\$2.58	\$0.77	\$0.92	\$1.08
Total			\$0.76	\$0.10	\$0.01	\$0.16
Sell offers	Counter Flow	Year 1	NA	(\$0.25)	(\$0.14)	(\$0.21)
		Year 2	NA	(\$0.12)	(\$0.21)	(\$0.17)
		Year 3	NA	(\$1.21)	(\$1.01)	(\$1.08)
		Year All	NA	NA	NA	NA
		Total	NA	(\$0.37)	(\$0.44)	(\$0.41)
	Prevailing Flow	Year 1	NA	\$0.87	\$1.13	\$0.99
		Year 2	NA	\$0.68	\$0.49	\$0.62
		Year 3	NA	\$1.73	\$0.90	\$1.48
		Year All	NA	NA	NA	NA
		Total	NA	\$1.04	\$0.96	\$1.01
Total			NA	\$0.40	\$0.16	\$0.29

The 2009 to 2012 Long Term FTR Auction price duration curve for cleared buy bids in Figure 8-1 shows that 90.7 percent of Long Term FTRs were purchased for less than \$1 per MWh, 94.5 percent for less than \$2 per MWh and 96.1 percent for less than \$3 per MWh. Negative prices occur because some FTRs are bid with negative prices and some winning FTR bidders are paid to take FTRs.

**Figure 8-1 Long Term FTR auction clearing price duration curve: Planning periods 2009 to 2012**

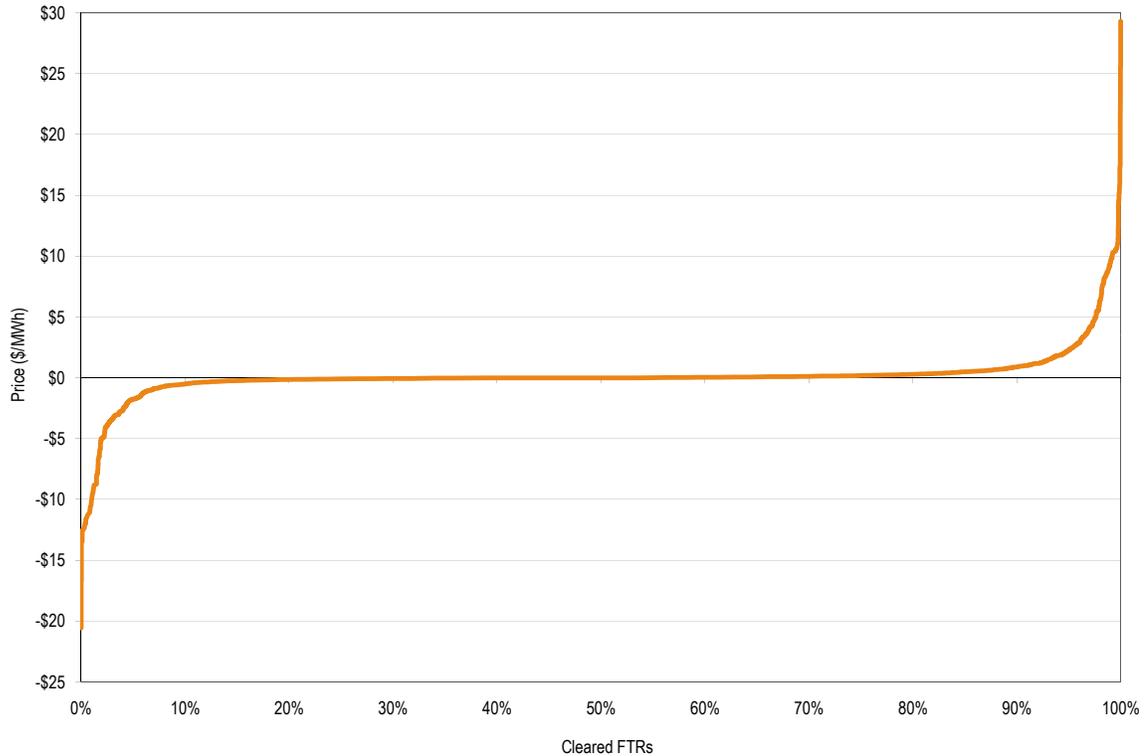


Table 8-13 shows the cleared, weighted-average prices by trade type, FTR direction and class type for Annual FTRs during the 2008 to 2009 planning period. For the 2008 to 2009 planning period, weighted-average, buy-bid FTR obligation prices were \$0.69 per MWh while weighted-average, buy-bid FTR option prices were \$0.24 per MWh. Comparable weighted-average prices for the 2007 to 2008 planning period were \$0.47 per MWh for buy-bid FTR obligations and \$0.37 per MWh for buy-bid FTR options.

During the 2008 to 2009 planning period, weighted-average sell offer FTR obligation prices were \$0.86 per MWh while weighted-average sell offer FTR option prices were \$0.84 per MWh. Comparable weighted-average prices for the 2007 to 2008 planning period were -\$0.07 per MWh for sell offer FTR obligations and \$0.94 per MWh for sell offer FTR options.

On average during the 2008 to 2009 planning period in the Annual FTR Auction, self scheduled FTRs were priced \$2.14 per MWh higher than buy-bid obligation FTRs. They were also priced \$0.89 per MWh higher than the cleared, weighted-average price of self scheduled FTRs during the 2007 to 2008 planning period.

During the 2008 to 2009 planning period, weighted-average, buy-bid FTR obligation prices were -\$1.06 per MWh for counter flow FTRs and \$1.75 per MWh for prevailing flow FTRs. Weighted-average sell offer FTR obligation prices were -\$0.95 per MWh for counter flow FTRs and \$1.64 per MWh for prevailing flow FTRs during the 2008 to 2009 planning period. On average during the 2008 to 2009 planning period in the Annual FTR Auction, self scheduled counter flow FTRs were priced \$0.53 per MWh higher than buy-bid counter flow obligation FTRs and self scheduled prevailing FTRs were priced \$1.28 per MWh higher than buy-bid prevailing flow obligation FTRs.

**Table 8-13 Annual FTR Auction weighted-average cleared prices by FTR direction (Dollars per MWh): Planning period 2008 to 2009**

Trade Type	Hedge Type	FTR Direction	Class Type			
			24-Hour	On Peak	Off Peak	All
Buy bids	Obligations	Counter Flow	(\$0.84)	(\$1.25)	(\$0.96)	(\$1.06)
		Prevailing Flow	\$2.93	\$1.63	\$1.20	\$1.75
		Total	\$1.96	\$0.55	\$0.26	\$0.69
	Options	Counter Flow	\$0.00	\$0.00	\$0.00	\$0.00
		Prevailing Flow	\$0.37	\$0.46	\$0.19	\$0.35
		Total	\$0.06	\$0.39	\$0.15	\$0.24
Self-scheduled bids	Obligations	Counter Flow	(\$0.53)	NA	NA	(\$0.53)
		Prevailing Flow	\$3.03	NA	NA	\$3.03
		Total	\$2.83	NA	NA	\$2.83
Buy and self-scheduled bids	Obligations	Counter Flow	(\$0.70)	(\$1.25)	(\$0.96)	(\$1.01)
		Prevailing Flow	\$3.01	\$1.63	\$1.20	\$2.42
		Total	\$2.66	\$0.55	\$0.26	\$1.59
Sell offers	Obligations	Counter Flow	(\$1.01)	(\$1.43)	(\$0.66)	(\$0.95)
		Prevailing Flow	\$1.38	\$1.82	\$1.77	\$1.64
		Total	\$1.22	\$0.40	\$0.88	\$0.86
	Options	Counter Flow	NA	NA	NA	NA
		Prevailing Flow	NA	\$0.70	\$3.92	\$0.84
		Total	NA	\$0.70	\$3.92	\$0.84

The 2008 to 2009 planning period price duration curve for cleared buy bids in Figure 8-2 shows that 83.5 percent of Annual FTRs were purchased for less than \$1 per MWh, 88.8 percent for less than \$2 per MWh and 91.5 percent for less than \$3 per MWh. Negative prices occur because some FTRs are bid with negative prices and some winning FTR bidders are paid to take FTRs. The 2008 to 2009 planning period FTR obligation price duration curve for cleared buy bids in Figure 8-2 shows that 82.3 percent of annual FTR obligations were purchased for less than \$1 per MWh, 87.9 percent for less than \$2 per MWh and 90.8 percent for less than \$3 per MWh. The 2008 to 2009 planning period FTR option price duration curve for cleared buy bids in Figure 8-2 shows that 94.8 percent of annual FTR options were purchased for less than \$1 per MWh, 97.4 percent for less than \$2 per MWh and 98.7 percent for less than \$3 per MWh.

**Figure 8-2 Annual FTR auction clearing price duration curves: Planning period 2008 to 2009**

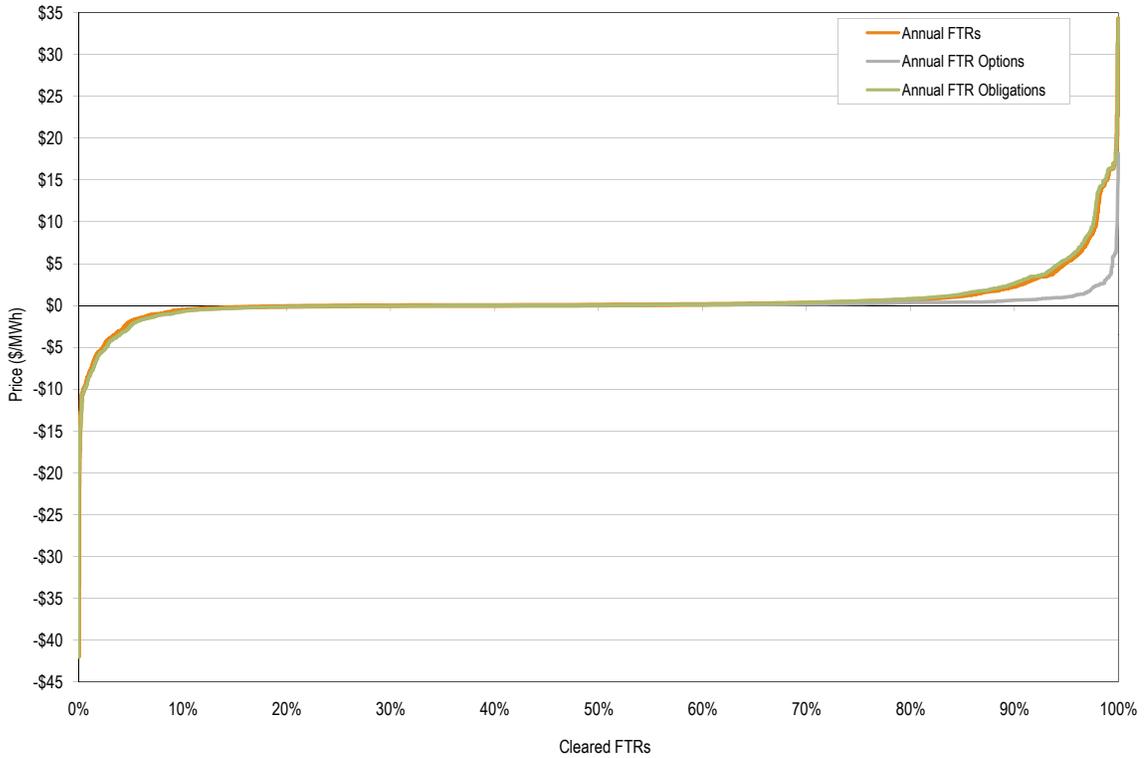


Table 8-14 shows the weighted-average cleared buy-bid price in the Monthly Balance of Planning Period FTR Auctions by bidding period for January 2008 through December 2008. For example, for the June 2008 Monthly Balance of Planning Period FTR Auction, the current month column is June, the second month column is July and the third month column is August. Quarters 1 through 4 are represented in the Q1, Q2, Q3 and Q4 columns. The total column represents all of the activity within the June 2008 Monthly Balance of Planning Period FTR Auction.

The cleared, weighted-average price paid in the Monthly Balance of Planning Period FTR Auctions during the first seven months of the 2008 to 2009 planning period was \$0.35 per MWh, compared with \$0.21 per MWh for the full 12-month 2007 to 2008 planning period.

**Table 8-14 Monthly Balance of Planning Period FTR Auction cleared, weighted-average, buy-bid price per period (Dollars per MWh): January 2008 to December 2008**

Monthly Auction	Current Month	Second Month	Third Month	Q1	Q2	Q3	Q4	Total
Jan-08	\$0.51	\$1.24	\$0.04				\$0.45	\$0.54
Feb-08	\$0.36	\$0.34	\$0.17				\$0.50	\$0.37
Mar-08	\$0.22	\$0.59	\$0.42				\$0.91	\$0.35
Apr-08	\$0.15	\$0.20						\$0.16
May-08	(\$0.03)							(\$0.03)
Jun-08	\$0.16	\$0.22	\$0.03	\$0.85	\$0.46	\$0.74	\$0.55	\$0.46
Jul-08	\$0.24	\$0.55	(\$0.11)		\$0.62	\$0.46	\$0.63	\$0.44
Aug-08	\$0.24	(\$0.08)	\$0.51		\$0.96	\$0.94	\$0.69	\$0.55
Sep-08	\$0.26	\$0.46	\$0.24		\$0.18	\$0.48	\$0.10	\$0.28
Oct-08	\$0.15	\$0.11	\$0.11			\$0.03	\$0.38	\$0.17
Nov-08	\$0.11	\$0.53	\$0.23			\$0.09	\$0.16	\$0.14
Dec-08	\$0.21	\$0.48	\$0.53			(\$0.11)	\$0.16	\$0.20

## Revenue

### Long Term FTR Auction Revenue

Table 8-15 shows Long Term FTR Auction revenue data by trade type, FTR direction, period type, and class type. The 2009 to 2012 Long Term FTR Auction netted \$38.93 million in revenue, with buyers paying \$40.21 million and sellers receiving \$1.28 million.

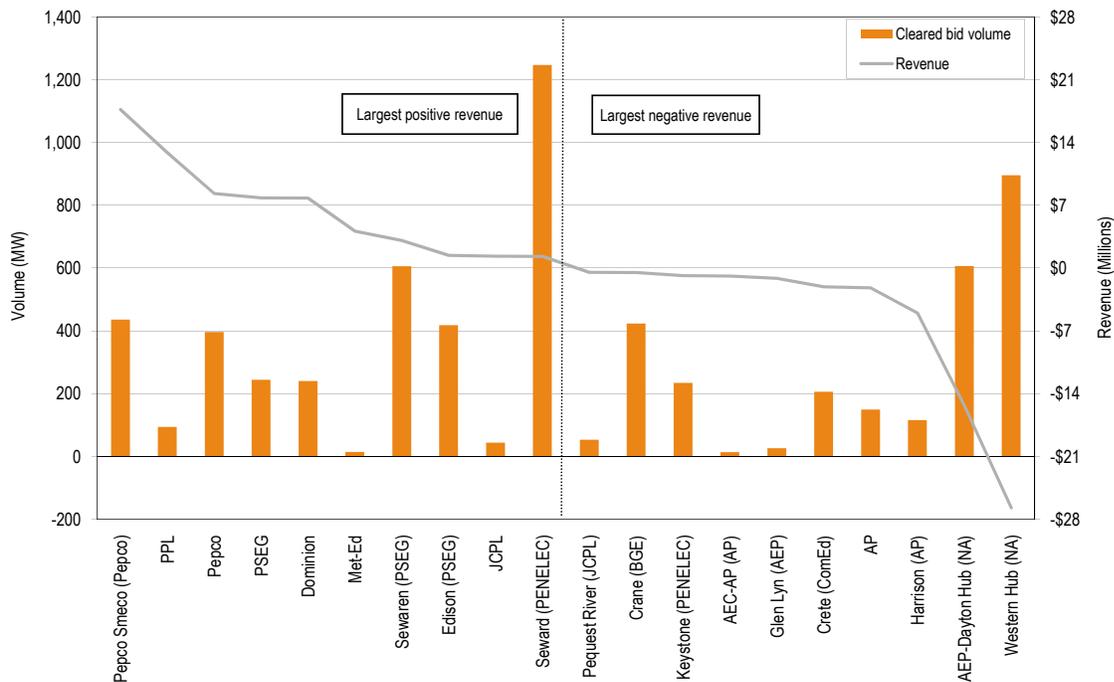
For the 2009 to 2012 Long Term FTR Auction, the counter flow FTRs netted -\$93.96 million in revenue, with buyers receiving \$94.86 million and sellers paying \$0.90 million, and the prevailing flow FTRs netted \$132.90 million in revenue, with buyers paying \$135.08 million and sellers receiving \$2.18 million.

**Table 8-15 Long Term FTR Auction revenue: Planning periods 2009 to 2012**

Trade Type	FTR Direction	Period Type	Class Type			All
			24-Hour	On Peak	Off Peak	
Buy bids	Counter Flow	Year 1	(\$13,841,184)	(\$16,235,257)	(\$17,429,755)	(\$47,506,196)
		Year 2	(\$3,371,015)	(\$12,102,496)	(\$13,645,824)	(\$29,119,334)
		Year 3	(\$366,210)	(\$7,871,455)	(\$8,390,435)	(\$16,628,101)
		Year All	(\$873,245)	(\$313,376)	(\$420,280)	(\$1,606,902)
		Total	(\$18,451,655)	(\$36,522,584)	(\$39,886,293)	(\$94,860,532)
	Prevailing Flow	Year 1	\$19,418,180	\$23,467,067	\$18,607,416	\$61,492,663
		Year 2	\$4,569,526	\$15,361,162	\$15,148,432	\$35,079,120
		Year 3	\$672,352	\$9,513,622	\$7,274,461	\$17,460,435
		Year All	\$20,996,081	\$21,543	\$25,536	\$21,043,160
		Total	\$45,656,139	\$48,363,394	\$41,055,845	\$135,075,378
Total			\$27,204,484	\$11,840,810	\$1,169,552	\$40,214,846
Sell offers	Counter Flow	Year 1	NA	(\$114,252)	(\$36,943)	(\$151,195)
		Year 2	NA	(\$52,649)	(\$107,243)	(\$159,892)
		Year 3	NA	(\$232,483)	(\$356,536)	(\$589,020)
		Year All	NA	NA	NA	NA
		Total	NA	(\$399,384)	(\$500,723)	(\$900,107)
	Prevailing Flow	Year 1	NA	\$549,418	\$608,750	\$1,158,168
		Year 2	NA	\$238,267	\$85,293	\$323,560
		Year 3	NA	\$569,493	\$132,334	\$701,827
		Year All	NA	NA	NA	NA
		Total	NA	\$1,357,178	\$826,377	\$2,183,555
Total			NA	\$957,794	\$325,654	\$1,283,448

Figure 8-3 summarizes total revenue associated with all FTRs, regardless of source, to the FTR sinks that produced the largest positive and negative revenue from the 2009 to 2012 Long Term FTR Auction.<sup>31</sup> The top 10 positive revenue producing FTR sinks accounted for \$65.8 million of the total revenue of \$38.93 million paid in the auction. They also comprised 7.3 percent of all FTRs bought in the auction. The sinks with the highest positive auction revenue are all control zones or large aggregates. The top 10 negative revenue producing FTR sinks accounted for -\$55.2 million of revenue and constituted 5.3 percent of all FTRs bought in the auction.

**Figure 8-3 Ten largest positive and negative revenue producing FTR sinks purchased in the Long Term FTR Auction: Planning periods 2009 to 2012<sup>32</sup>**

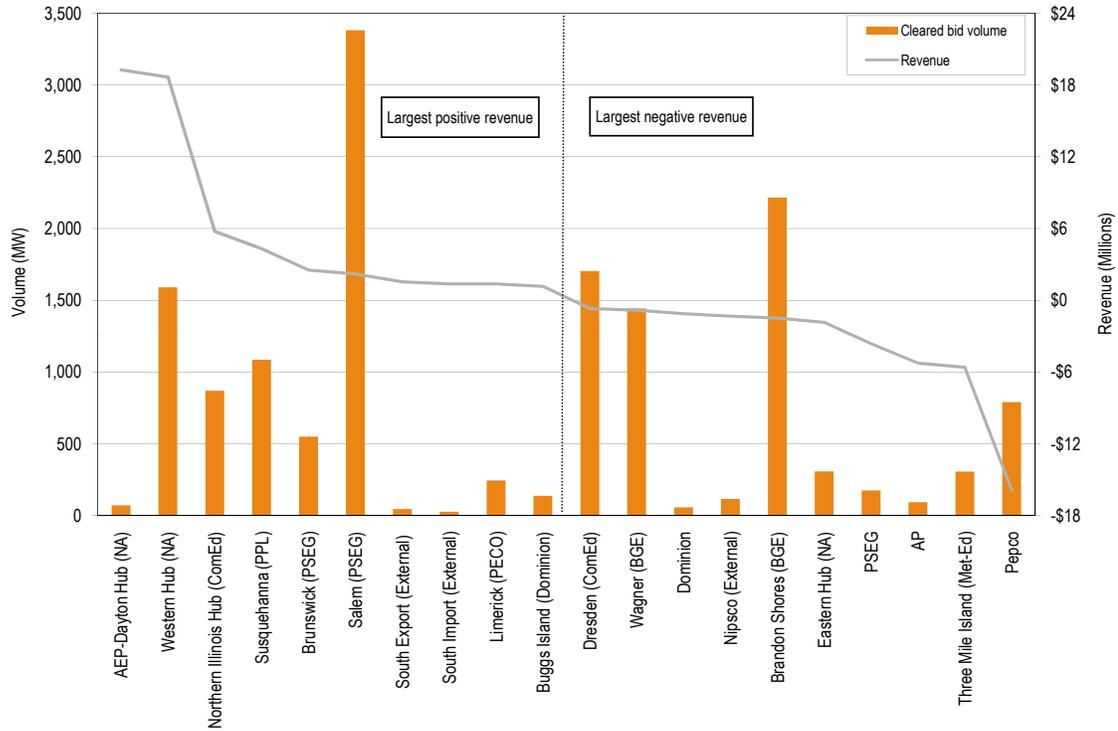


<sup>31</sup> As some FTRs are bid with negative prices, some winning FTR bidders are paid to take FTRs. These are counter flow FTRs. These payments reduce net auction revenue. Therefore, the sum of the highest revenue producing FTRs can exceed net auction revenue.

<sup>32</sup> For Figure 8-3 through Figure 8-10, each FTR sink and source that is not a control zone has its corresponding control zone listed in parentheses after its name. Most FTR sink and source control zone identifications for hubs and interface pricing points are listed as NA because they cannot be assigned to a specific control zone.

Figure 8-4 summarizes total revenue associated with all FTRs, regardless of sink, from the FTR sources that produced the largest positive and negative revenue from the 2009 to 2012 Long Term FTR Auction. The top 10 positive revenue producing FTR sources accounted for \$58.2 million of the total revenue of \$38.93 million paid in the auction. They also comprised 15.6 percent of all FTRs bought in the auction. The top 10 negative revenue producing FTR sources accounted for -\$37.7 million of revenue and constituted 14.0 percent of all FTRs bought in the auction.

**Figure 8-4 Ten largest positive and negative revenue producing FTR sources purchased in the Long Term FTR Auction: Planning periods 2009 to 2012**



### Annual FTR Auction Revenue

Table 8-16 shows Annual FTR Auction revenue data by trade type, FTR direction and class type. For the 2008 to 2009 planning period, the Annual FTR Auction netted \$2,422.55 million in revenue, with buyers paying \$2,442.57 million and sellers receiving \$20.02 million. For the 2007 to 2008 planning period, the Annual FTR Auction netted \$1,698.03 million in revenue, with buyers paying \$1,698.28 million and sellers receiving \$0.25 million.

For the 2008 to 2009 planning period, the counter flow FTRs in the Annual FTR Auction netted -\$367.20 million in revenue, with buyers receiving \$373.80 million and sellers paying \$6.60 million, and the prevailing flow FTRs in the Annual FTR Auction netted \$2,789.75 million in revenue, with buyers paying \$2,816.37 million and sellers receiving \$26.62 million.

**Table 8-16 Annual FTR Auction revenue by FTR direction: Planning period 2008 to 2009**

Trade Type	FTR Direction	Class Type			
		24-Hour	On Peak	Off Peak	All
Buy bids	Counter Flow	(\$35,510,737)	(\$166,562,876)	(\$153,077,258)	(\$355,150,871)
	Prevailing Flow	\$354,788,437	\$378,171,307	\$255,569,002	\$988,528,746
	Total	\$319,277,700	\$211,608,431	\$102,491,744	\$633,377,875
Self-scheduled bids	Counter Flow	(\$18,648,667)	NA	NA	(\$18,648,667)
	Prevailing Flow	\$1,827,844,677	NA	NA	\$1,827,844,677
	Total	\$1,809,196,009	NA	NA	\$1,809,196,009
Buy and self-scheduled bids	Counter Flow	(\$54,159,404)	(\$166,562,876)	(\$153,077,258)	(\$373,799,538)
	Prevailing Flow	\$2,182,633,114	\$378,171,307	\$255,569,002	\$2,816,373,423
	Total	\$2,128,473,709	\$211,608,431	\$102,491,744	\$2,442,573,885
Sell offers	Counter Flow	(\$435,226)	(\$3,456,795)	(\$2,710,863)	(\$6,602,884)
	Prevailing Flow	\$8,189,721	\$5,849,792	\$12,578,975	\$26,618,489
	Total	\$7,754,496	\$2,392,998	\$9,868,112	\$20,015,605

Figure 8-5 summarizes total revenue associated with all FTRs, regardless of source, to the FTR sinks that produced the largest positive and negative revenue from the Annual FTR Auction for the 2008 to 2009 planning period. The top 10 positive revenue producing FTR sinks accounted for \$2,059.2 million (85.0 percent) of the total revenue of \$2,422.55 million paid in the auction. They also comprised 28.5 percent of all FTRs bought in the auction. The sinks with the highest positive auction revenue are all control zones or large aggregates. The top 10 negative revenue producing FTR sinks accounted for -\$70.3 million of revenue and constituted 2.5 percent of all FTRs bought in the auction.

**Figure 8-5 Ten largest positive and negative revenue producing FTR sinks purchased in the Annual FTR Auction: Planning period 2008 to 2009**

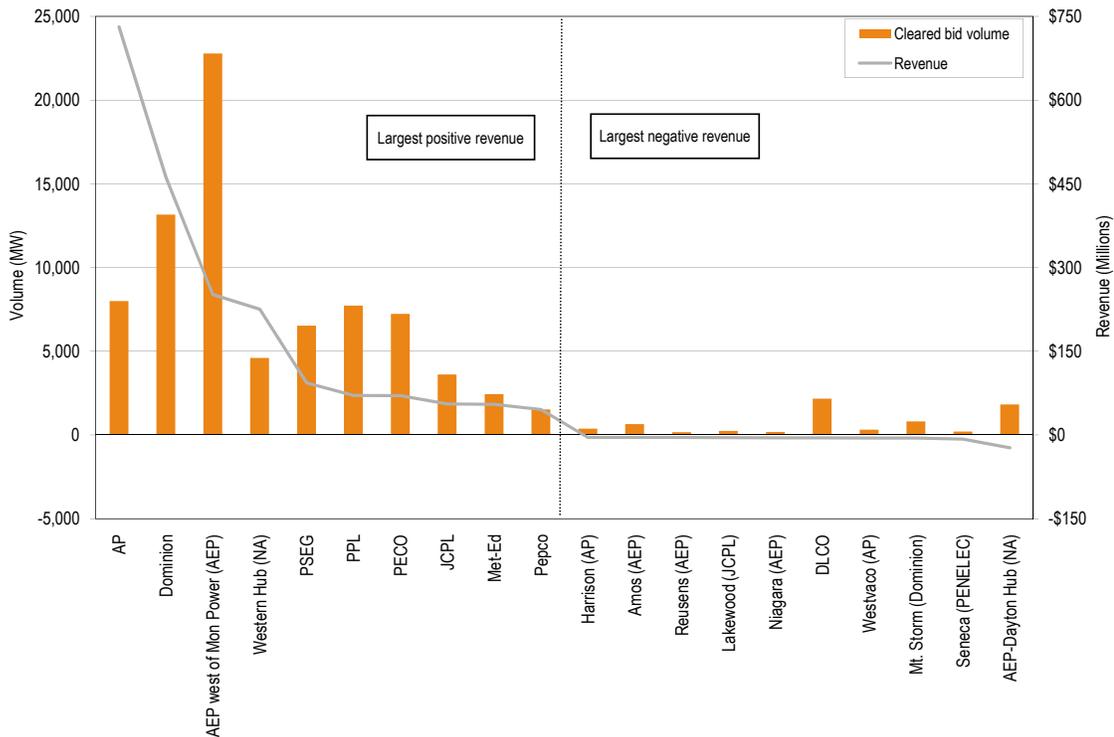
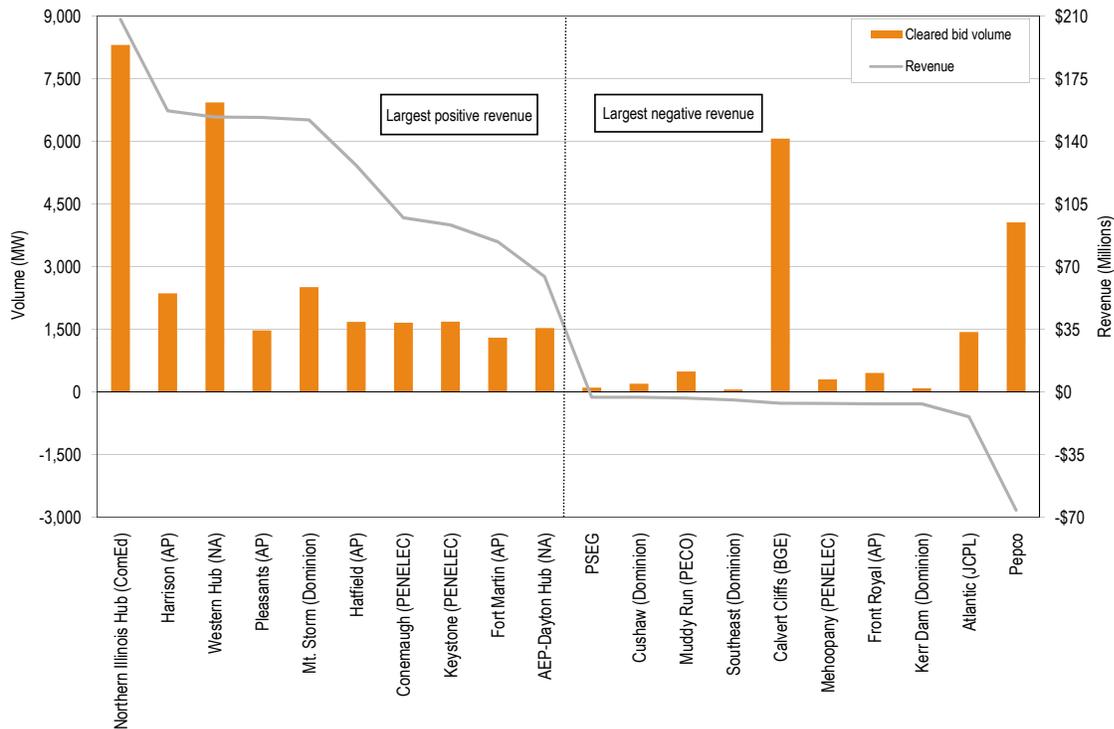


Figure 8-6 summarizes total revenue associated with all FTRs, regardless of sink, from the FTR sources that produced the largest positive and negative revenue from the Annual FTR Auction for the 2008 to 2009 planning period. The top 10 positive revenue producing FTR sources accounted for \$1,290.2 million (53.3 percent) of the total revenue of \$2,422.55 million paid in the auction. They also comprised 10.8 percent of all FTRs bought in the auction. The top 10 negative revenue producing FTR sources accounted for -\$119.6 million of revenue and constituted 4.9 percent of all FTRs bought in the auction.

**Figure 8-6 Ten largest positive and negative revenue producing FTR sources purchased in the Annual FTR Auction: Planning period 2008 to 2009**



**Monthly Balance of Planning Period FTR Auction Revenue**

Table 8-17 shows Monthly Balance of Planning Period FTR Auction revenue data by trade type and class type. For the 2008 to 2009 planning period through December 31, 2008, the Monthly Balance of Planning Period FTR Auctions netted \$62.2 million in revenue, with buyers paying \$114.2 million and sellers receiving \$52.0 million. For the 2007 to 2008 planning period, the Monthly Balance of Planning Period FTR Auctions netted \$38.1 million in revenue, with buyers paying \$89.7 million and sellers receiving \$51.6 million.

**Table 8-17 Monthly Balance of Planning Period FTR Auction revenue: January 2008 to December 2008**

Monthly Auction	Trade Type	Class Type			
		24-Hour	On Peak	Off Peak	All
Jan-08	Buy bids	\$1,056,855	\$5,776,459	\$3,979,264	\$10,812,578
	Sell offers	\$1,189,479	\$3,567,666	\$3,398,388	\$8,155,532
Feb-08	Buy bids	\$3,030,739	\$3,873,706	\$917,766	\$7,822,210
	Sell offers	\$1,069,325	\$3,064,331	\$978,938	\$5,112,594
Mar-08	Buy bids	\$2,925,839	\$2,978,762	\$548,680	\$6,453,282
	Sell offers	\$1,630,066	\$2,032,643	\$705,639	\$4,368,348
Apr-08	Buy bids	\$222,404	\$1,699,081	\$783,372	\$2,704,857
	Sell offers	\$401,052	\$428,663	\$218,783	\$1,048,499
May-08	Buy bids	(\$1,352,053)	\$657,727	\$371,613	(\$322,712)
	Sell offers	\$194,156	(\$493,147)	(\$762,509)	(\$1,061,499)
Jun-08	Buy bids	\$18,533,708	\$11,893,029	\$2,324,087	\$32,750,824
	Sell offers	\$2,442,002	\$11,909,347	\$4,877,680	\$19,229,028
Jul-08	Buy bids	\$9,986,296	\$8,245,240	\$5,558,650	\$23,790,186
	Sell offers	\$852,227	\$3,269,397	\$3,406,768	\$7,528,392
Aug-08	Buy bids	\$757,259	\$14,946,178	\$8,892,488	\$24,595,925
	Sell offers	\$1,776,246	\$5,848,899	\$1,692,072	\$9,317,216
Sep-08	Buy bids	(\$4,042,833)	\$10,865,411	\$8,499,440	\$15,322,018
	Sell offers	\$2,271,207	\$3,028,611	\$1,256,227	\$6,556,044
Oct-08	Buy bids	\$1,465,156	\$3,344,823	\$1,320,191	\$6,130,170
	Sell offers	\$1,794,603	\$775,277	(\$166,592)	\$2,403,289
Nov-08	Buy bids	(\$7,221,561)	\$5,666,678	\$6,118,436	\$4,563,552
	Sell offers	\$66,549	\$1,058,174	\$742,953	\$1,867,675
Dec-08	Buy bids	(\$1,932,730)	\$4,432,711	\$4,514,107	\$7,014,088
	Sell offers	\$83,740	\$2,391,833	\$2,569,387	\$5,044,960
2007/2008	Buy bids	\$19,826,620	\$51,439,514	\$18,442,612	\$89,708,747
	Sell offers	\$19,149,340	\$26,015,184	\$6,443,352	\$51,607,876
2008/2009*	Buy bids	\$17,545,294	\$59,394,071	\$37,227,398	\$114,166,763
	Sell offers	\$9,286,572	\$28,281,538	\$14,378,494	\$51,946,605

\* Shows seven months ended 31-Dec-2008

Figure 8-7 summarizes total revenue associated with all FTRs, regardless of source, to the FTR sinks that produced the largest positive and negative revenue in the Monthly Balance of Planning Period FTR Auctions during the first seven months of the 2008 to 2009 planning period. The top 10 positive revenue producing FTR sinks accounted for \$130.8 million of revenue and 8.0 percent of all FTRs bought in the Monthly Balance of Planning Period FTR Auctions. In the Monthly Balance of Planning Period FTR Auctions during the first seven months of the 2008 to 2009 planning period, there were 1,027 MW cleared bids for FTRs sunk at the new Neptune 230 kV line which generated \$2.5 million of revenue. In the Monthly Balance of Planning Period FTR Auctions during the 2007 to 2008 planning period, there were 6,446 MW cleared bids for FTRs sunk into the new Neptune 230 kV line which generated \$7.1 million of revenue. The top 10 negative revenue producing FTR sinks accounted for -\$80.8 million of revenue and constituted 9.0 percent of all FTRs bought in the auctions. The net market volume sunk into the PECO Control Zone was negative since the total cleared volume of the monthly FTR buy bids sunk into PECO was less than the total cleared volume of the monthly FTR sell offers sunk into PECO.

**Figure 8-7 Ten largest positive and negative revenue producing FTR sinks purchased in the Monthly Balance of Planning Period FTR Auctions: Planning period 2008 to 2009 through December 31, 2008**

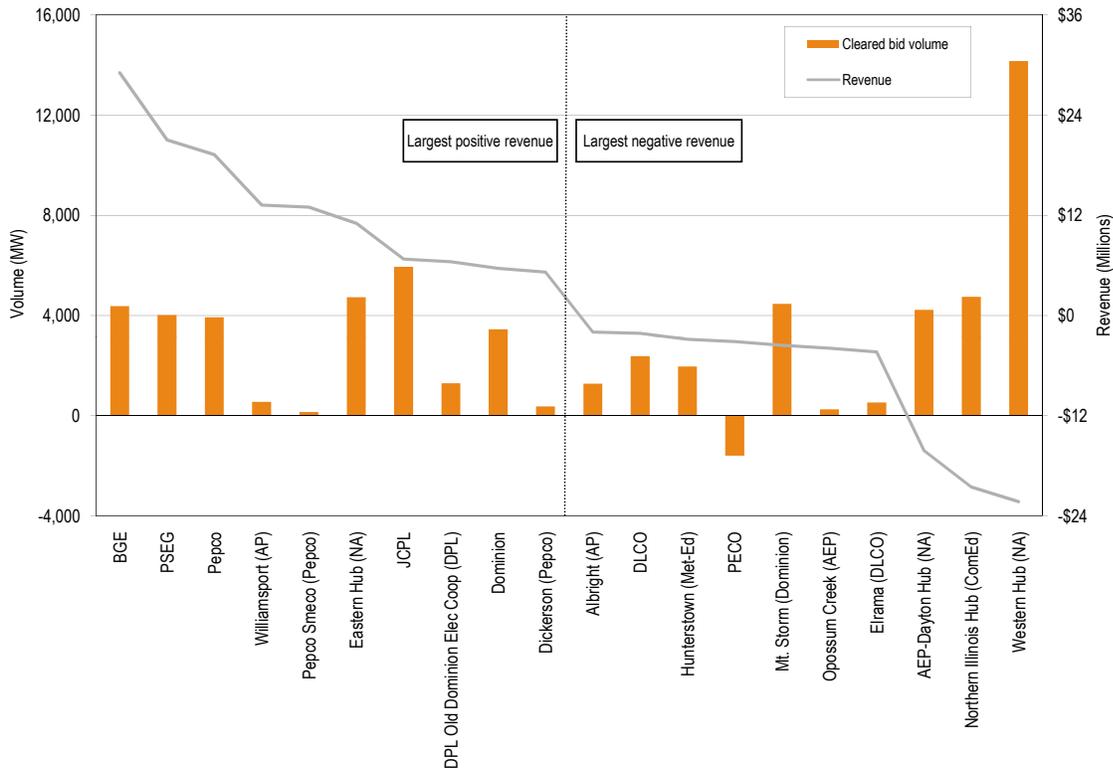
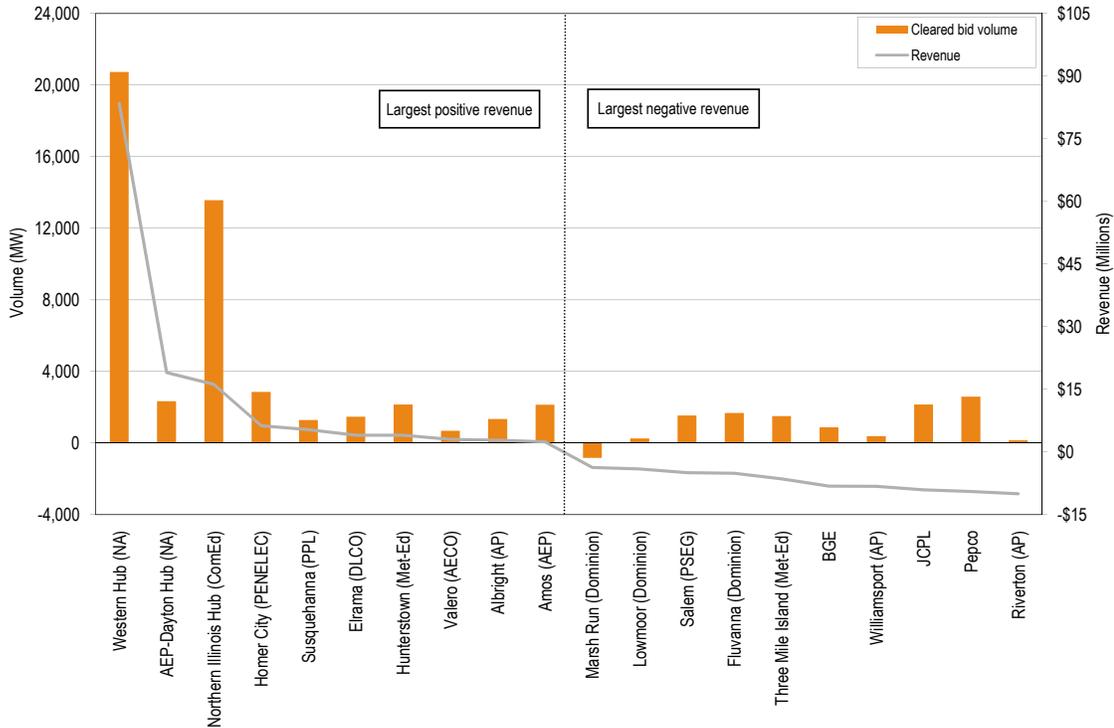


Figure 8-8 summarizes total revenue associated with all FTRs, regardless of sink, from the FTR sources that produced the largest positive and negative revenue from the Monthly Balance of Planning Period FTR Auctions during the first seven months of the 2008 to 2009 planning period. The top 10 positive revenue producing FTR sources accounted for \$146.7 million and 13.4 percent of all FTRs bought in the auctions. The top 10 negative revenue producing FTR sources accounted for -\$69.2 million of revenue and constituted 2.9 percent of all FTRs bought in the auctions.

**Figure 8-8 Ten largest positive and negative revenue producing FTR sources purchased in the Monthly Balance of Planning Period FTR Auctions: Planning period 2008 to 2009 through December 31, 2008**



## Revenue Adequacy

Congestion revenue is created in an LMP system when all loads pay and all generators receive their respective LMPs. When load pays more than the amount that generators receive, excluding losses, positive congestion revenue exists and is available to cover the target allocations of FTR holders. The MW of load exceeds the MW of generation in constrained areas because a part of the load is served by imports using transmission capability into the constrained areas. Generating units that are the source of such imports are paid the price at their own bus which does not reflect congestion in constrained areas. Generation in a constrained area receives the congestion price and all load in the constrained area pays the congestion price. As a result, load congestion payments are usually greater than the congestion-related increase in payments to generation.<sup>33</sup> In general, FTR revenue adequacy exists when the sum of congestion credits is as great as the sum of congestion across the positively valued FTRs.

Revenue adequacy must be distinguished from the adequacy of FTRs as a hedge against congestion. Revenue adequacy is a narrower concept that compares the revenues available to cover congestion across specific paths for which FTRs were available and purchased. The adequacy of FTRs as a hedge against congestion compares FTR revenues to total congestion on the system as a measure of the extent to which FTRs hedged market participants against actual, total congestion across all paths, regardless of the availability or purchase of FTRs.

FTRs are paid out for each month from congestion revenues, FTR auction revenues and excess revenues carried forward from prior months and distributed back from later months. At the end of a planning period, if some months remain not fully funded, an uplift charge is collected from any FTR market participants that hold FTRs during the planning period based on their pro rata share of total net positive FTR target allocations, excluding any charge to FTR holders with a net negative FTR position for the planning year. For the 2007 to 2008 planning period, FTRs were fully funded and thus no uplift charge was collected. Table 8-18 shows the composition of FTR target allocations and FTR revenues for the 2007 to 2008 and the 2008 to 2009 planning periods, with the latter shown through December 31, 2008. FTR targets are composed of FTR target allocations and associated adjustments. Other adjustments may be made for items such as modeling changes or errors.

FTR revenues are primarily comprised of hourly congestion revenue and net negative congestion. FTR revenues also include ARR excess which is the difference between ARR target allocations and FTR auction revenues. Competing use revenues are based on the Unscheduled Transmission Service Agreement between the New York Independent System Operator (NYISO) and PJM. This agreement sets forth the terms and conditions under which compensation is provided for transmission service in connection with transactions not scheduled directly or otherwise prearranged between NYISO and PJM. Congestion revenues appearing in Table 8-18 include both congestion charges associated with PJM facilities and those associated with reciprocal, coordinated flowgates in the Midwest ISO whose operating limits are respected by PJM.<sup>34</sup> The operating protocol governing the wheeling contracts between Public Service Electric and Gas Company (PSE&G) and Consolidated Edison Company of New York (Con Edison) resulted in a reimbursement of \$2.3 million in congestion charges to Con Edison in the 2008 to 2009 planning period through December 31, 2008.<sup>35,36</sup>

<sup>33</sup> For an illustration of how total congestion revenue is generated and how FTR target allocations and congestion receipts are determined, see Table G-1, "Congestion revenue, FTR target allocations and FTR congestion credits: Illustration," *2008 State of the Market Report*, Volume II, Appendix G, "Financial Transmission and Auction Revenue Rights."

<sup>34</sup> See "Joint Operating Agreement between the Midwest Independent System Operator, Inc. and PJM Interconnection, L.L.C." (November 1, 2007) (Accessed February 24, 2009), Section 6.1 <<http://www.pjm.com/~Media/documents/agreements/joa-complete.ashx>> (1,528 KB).

<sup>35</sup> 111 FERC ¶ 61,228 (2005).

<sup>36</sup> See the *2008 State of the Market Report*, Volume II, Section 4, "Interchange Transactions," at "Con Edison and PSE&G Wheeling Contracts 2008 Update" and Appendix D, "Interchange Transactions" at Table D-1, "Con Edison and PSE&G wheel settlements data: Calendar year 2008."

**Table 8-18 Total annual PJM FTR revenue detail (Dollars (Millions)): Planning periods 2007 to 2008 and 2008 to 2009**

Accounting Element	2007/2008	2008/2009*
<b>ARR information</b>		
ARR target allocations	\$1,651.7	\$1,384.4
FTR auction revenue	\$1,736.1	\$1,458.3
ARR excess	\$84.4	\$73.9
<b>FTR targets</b>		
FTR target allocations	\$2,039.0	\$1,363.9
<b>Adjustments:</b>		
Adjustments to FTR target allocations	(\$6.1)	(\$3.6)
Total FTR targets	\$2,032.9	\$1,360.3
<b>FTR revenues</b>		
ARR excess	\$84.4	\$73.9
Competing uses	\$1.0	\$0.6
<b>Congestion</b>		
Net Negative Congestion	(\$16.3)	(\$36.2)
Hourly congestion revenue	\$2,005.9	\$1,355.3
Midwest ISO M2M (credit to PJM minus credit to Midwest ISO)	(\$15.8)	(\$38.2)
Consolidated Edison Company of New York and Public Service Electric and Gas Company Wheel (CEPSW) congestion credit to Con Edison	(\$2.9)	(\$2.3)
<b>Adjustments</b>		
Excess revenues carried forward into future months	\$516.9	\$22.0
Excess revenues distributed back to previous months	\$0.0	\$8.4
Other adjustments to FTR revenues	\$0.4	\$1.9
Total FTR revenues	\$2,573.7	\$1,385.2
Excess revenues distributed to other months	(\$540.9)	(\$30.4)
Excess revenues distributed to CEPSW for end-of-year distribution	\$0.0	\$0.0
Excess revenues distributed to FTR holders	\$26.3	\$0.0
Total FTR congestion credits	\$2,032.9	\$1,354.8
Total congestion credits on bill (includes CEPSW and end-of-year distribution)	\$2,062.0	\$1,357.2
Remaining deficiency	\$0.0	\$5.5

\* Shows seven months ended 31-Dec-08

FTR target allocations are based on hourly prices in the Day-Ahead Energy Market for the respective FTR paths and equal the revenue required to hedge FTR holders fully against congestion on the specific paths for which the FTRs are held. FTR credits are paid to FTR holders and, depending on market conditions, can be less than the target allocations. Table 8-19 lists the FTR revenues, target allocations, credits, payout ratios, congestion credit deficiencies and excess congestion charges by month. At the end of the 12-month planning period, excess congestion charges are used to offset

any monthly congestion credit deficiencies. FTRs were paid at 100 percent of the target allocation level for the 2007 to 2008 planning period and were paid at 99.6 percent of the target allocation level for the 2008 to 2009 planning period through December 31, 2008.

The total row in Table 8-19 is not the simple sum of each of the monthly rows because the monthly rows may include excess revenues carried forward from prior months and excess revenues carried back from later months. For example, September 2008 FTR revenues are shown as \$152.0 million, which includes revenues from congestion charges for the month, excess revenues carried forward from prior months (\$14.2 million) and excess revenues carried back from later months (\$4.7 million).<sup>37</sup> For the 2007 to 2008 planning period, the total FTR revenues were \$2,059.2 million which is the sum of total FTR credits (\$2,032.9 million) and total excess credits (\$26.3 million). For the first seven months of the 2008 to 2009 planning period, the total FTR revenues were \$1,354.8 million, which equal the total FTR credits (\$1,354.8 million) because there were credit deficiencies of \$5.5 million.

<sup>37</sup> The 2007 *State of the Market Report* incorrectly reported the totals as the simple sum of the monthly rows in Table 8-14.

**Table 8-19 Monthly FTR accounting summary (Dollars (Millions)): Planning periods 2007 to 2008 and 2008 to 2009**

	FTR Revenues	FTR Target Allocations	FTR Credits	FTR Payout Ratio	Credits Deficiency	Credits Excess	
Planning period 2007 to 2008	Jun-07	\$193.0	\$178.1	\$178.1	100%	\$0	\$14.9
	Jul-07	\$227.9	\$178.9	\$178.9	100%	\$0	\$48.9
	Aug-07	\$264.8	\$206.3	\$206.3	100%	\$0	\$58.5
	Sep-07	\$199.0	\$134.2	\$134.2	100%	\$0	\$64.8
	Oct-07	\$192.0	\$130.6	\$130.6	100%	\$0	\$61.4
	Nov-07	\$180.4	\$132.0	\$132.0	100%	\$0	\$48.5
	Dec-07	\$275.7	\$235.3	\$235.3	100%	\$0	\$40.3
	Jan-08	\$277.8	\$238.6	\$238.6	100%	\$0	\$39.2
	Feb-08	\$213.3	\$158.5	\$158.5	100%	\$0	\$54.8
	Mar-08	\$148.1	\$94.8	\$94.8	100%	\$0	\$53.4
	Apr-08	\$185.7	\$155.7	\$155.7	100%	\$0	\$29.9
	May-08	\$216.1	\$189.8	\$189.8	100%	\$0	\$26.3
Summary for Planning Period 2007 to 2008							
Total	\$2,059.2	\$2,032.9	\$2,032.9	100%	\$0	\$26.3	
Planning Period 2008 to 2009 (through December 31, 2008)	Jun-08	\$434.9	\$432.3	\$432.3	100%	\$0	\$2.6
	Jul-08	\$369.4	\$364.2	\$364.2	100%	\$0	\$5.2
	Aug-08	\$139.2	\$125.0	\$125.0	100%	\$0	\$14.2
	Sep-08	\$152.0	\$154.6	\$152.0	98.3%	\$2.6	\$0.0
	Oct-08	\$108.2	\$109.4	\$108.2	98.9%	\$1.2	\$0.0
	Nov-08	\$95.6	\$97.2	\$95.6	98.3%	\$1.6	\$0.0
	Dec-08	\$86.0	\$77.6	\$77.6	100%	\$0	\$8.4
	Summary for Planning Period 2008 to 2009 through December 31, 2008						
Total	\$1,354.8	\$1,360.3	\$1,354.8	99.6%	\$5.5	\$0.0	

FTR target allocations were examined separately. Hourly FTR target allocations were divided into those that were benefits and liabilities and summed by sink and by source for the 2008 to 2009 planning period through December 31, 2008. Figure 8-9 shows the FTR sinks with the largest positive and negative target allocations. The top 10 sinks that produced a financial benefit accounted for 69.1 percent of total positive target allocations during the first seven months of the 2008 to 2009 planning period. FTRs with the AP Control Zone as the sink included 24.3 percent of all positive target allocations. The sinks with the highest positive target allocations are all control zones or large aggregates. The top 10 sinks that created liability accounted for 37.4 percent of total negative target allocations. FTRs with the Western Hub as the sink encompassed 10.3 percent of all negative target allocations.

**Figure 8-9 Ten largest positive and negative FTR target allocations summed by sink: Planning period 2008 to 2009 through December 31, 2008**

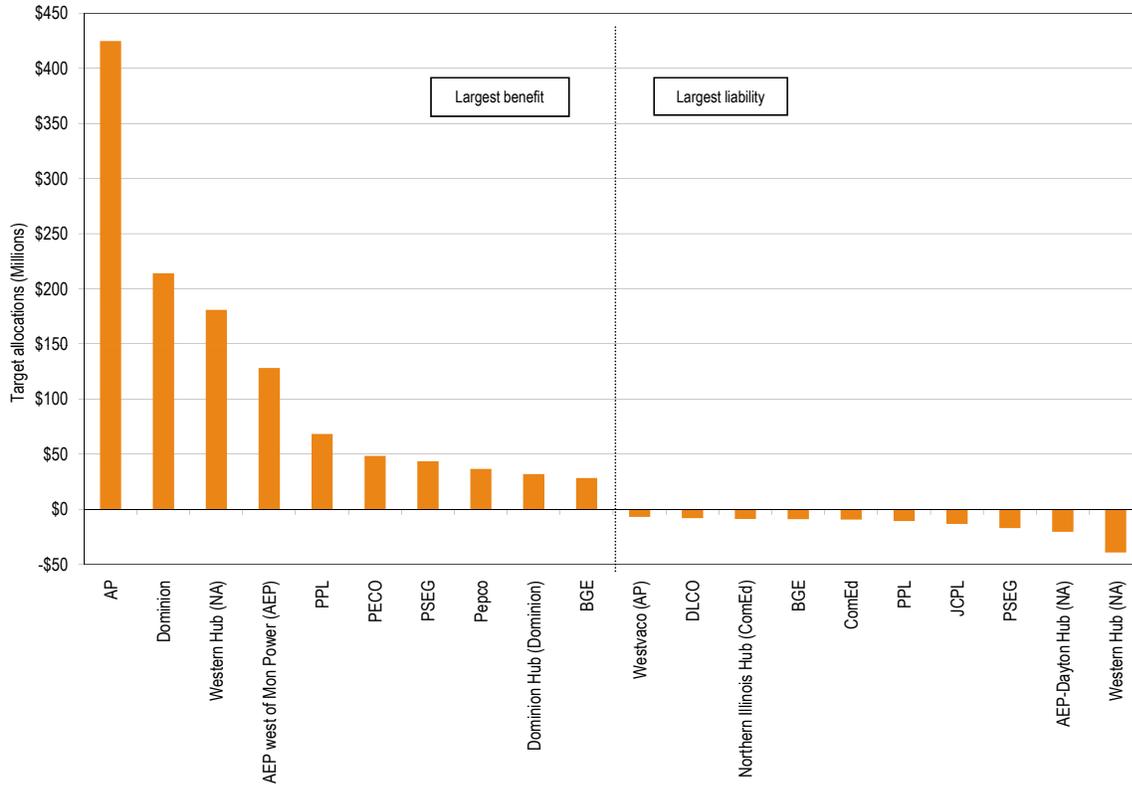
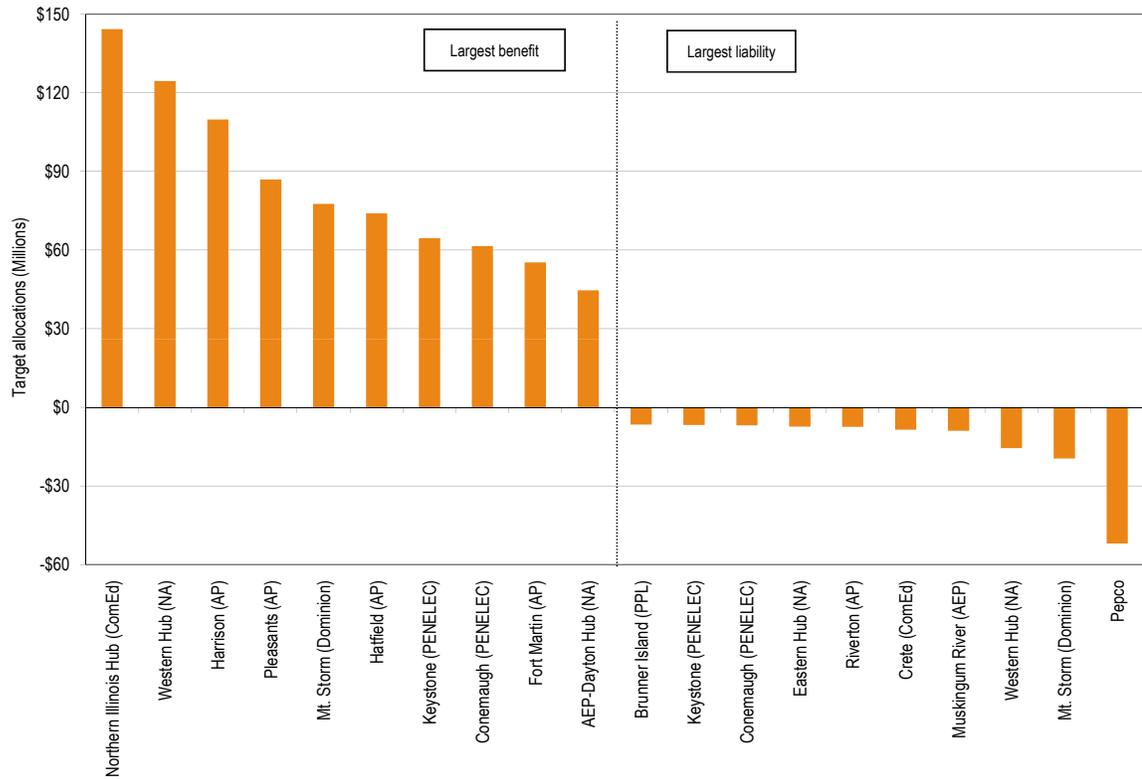


Figure 8-10 shows the FTR sources with the largest positive and negative target allocations during the first seven months of the 2008 to 2009 planning period. The top 10 sources with a positive target allocation accounted for 48.4 percent of total positive target allocations. FTRs with the Northern Illinois Hub as their source included 8.3 percent of all positive target allocations. The top 10 sources with a negative target allocation accounted for 36.6 percent of total negative target allocations. FTRs with the Pepco Control Zone as the source encompassed 13.7 percent of all negative target allocations.

**Figure 8-10 Ten largest positive and negative FTR target allocations summed by source: Planning period 2008 to 2009 through December 31, 2008**



## Auction Revenue Rights

FTRs and ARRs are both financial instruments that entitle the holder to receive revenues or to pay charges based on nodal price differences. FTRs provide holders with revenues or charges based on the locational congestion price differences actually experienced in the Day-Ahead Energy Market while ARRs are financial instruments that entitle their holders to receive revenue or to pay charges based on prices determined in the Annual FTR Auction.<sup>38</sup> These price differences are based on the bid prices of participants in the Annual FTR Auction which relate to their expectations about the level of congestion in the Day-Ahead Energy Market. The auction clears the set of feasible FTR bids which produce the highest net revenue. In other words, ARR revenues are a function of FTR auction participants' expectations of locational congestion price differences in the Day-Ahead Energy Market.

ARRs are available to the nearest 0.1 MW. The ARR target allocation is equal to the product of the ARR MW and the price difference between sink and source from the Annual FTR Auction. An ARR value can be positive or negative depending on the sink-minus-source price difference, with a negative difference resulting in a liability for the holder. The ARR target allocation represents the revenue that an ARR holder should receive. All ARR holders receive ARR credits equal to their target allocations if total net revenues from the Long Term, Annual and Monthly Balance of Planning Period FTR Auctions are greater than, or equal to, the sum of all ARR target allocations. ARR credits can be positive or negative and can range from zero to the ARR target allocation. If the combined net revenues from the Long Term, Annual and Monthly Balance of Planning Period FTR Auctions are less than that, available revenue is proportionally allocated among all ARR holders.

ARRs are available only as obligation hedge type and 24-hour class type products. An ARR obligation provides a credit, positive or negative, equal to the product of the ARR MW and the price difference between ARR sink and source that occurs in the Annual FTR Auction. The 24-hour products are effective 24 hours a day, seven days a week.

When a new control zone is integrated into PJM, the participants in that control zone must choose to receive either an FTR allocation or an ARR allocation before the start of the Annual FTR Auction for two consecutive planning periods following their integration date. After the transition period, such participants receive ARRs from the annual allocation process and are ineligible for directly allocated FTRs.

## Market Structure

ARRs have been available to network service and firm, point-to-point transmission service customers since June 1, 2003, when the annual ARR allocation was first implemented for the 2003 to 2004 planning period. The initial allocation covered the Mid-Atlantic Region and the AP Control Zone. For the 2006 to 2007 planning period, the choice of ARRs or direct allocation FTRs was available to eligible market participants in the AEP, DAY, DLCO and Dominion control zones. For the 2007 to 2008 and subsequent planning periods, all eligible market participants were allocated ARRs.

<sup>38</sup> These nodal prices are a function of the market participants' annual FTR bids and binding transmission constraints. An optimization algorithm selects the set of feasible FTR bids that produces the most net revenue.

## Supply

ARR supply is limited by the capability of the transmission system to simultaneously accommodate the set of requested ARR and the numerous combinations of ARRs that are feasible.

### ARR Allocation

For the 2007 to 2008 planning period, the annual ARR allocation process was revised to include Long Term ARRs that would be in effect for 10 consecutive planning periods.<sup>39</sup> Long Term ARRs can give LSEs the ability to hedge their congestion costs on a long-term basis by providing price certainty throughout the 10 planning period time frame. Long Term ARR holders can opt out of any planning period during the 10 planning period timeline and self schedule their Long Term ARRs as FTRs.

Each March, PJM allocates ARRs to eligible customers in a three-stage process, whereby the first and second stages are each one round and the third stage is a three-round allocation procedure:

- **Stage 1A.** In the first stage of the allocation, network transmission service customers can obtain Long Term ARRs, up to their share of the zonal base load, after taking into account generation resources that historically have served load in each control zone and up to 50 percent of their historical nonzone network load. Nonzone network load is load that is located outside of the PJM footprint. Firm, point-to-point transmission service customers can obtain Long Term ARRs, based on up to 50 percent of the MW of long-term, firm, point-to-point transmission service provided between the receipt and delivery points for the historical reference year. Stage 1A ARR holders can also opt out of any planning period during the 10-planning-period timeline and self schedule their Long Term ARRs as FTRs.
- **Stage 1B.** ARRs unallocated in Stage 1A are available in the Stage 1B allocation. Network transmission service customers can obtain ARRs, up to their share of the zonal peak load, based on generation resources that historically have served load in each control zone and up to 100 percent of their transmission responsibility for nonzone network load. Firm, point-to-point transmission service customers can obtain ARRs based on the MW of long-term, firm, point-to-point service provided between the receipt and delivery points for the historical reference year. These long-term point-to-point service agreements must also remain in effect for the planning period covered by the allocation.
- **Stage 2.** The third stage of the annual ARR allocation is a three-step procedure, with one-third of the remaining system capability allocated in each step of the process. Network transmission service customers can obtain ARRs from any hub, control zone, generator bus or interface pricing point to any part of their aggregate load in the control zone or load aggregation zone for which an ARR was not allocated in Stage 1A or Stage 1B. Firm, point-to-point transmission service customers can obtain ARRs consistent with their transmission service as in Stage 1A and Stage 1B.

<sup>39</sup> See the 2006 State of the Market Report (March 8, 2007) for the rules of the annual ARR allocation process for the 2006 to 2007 and prior planning periods.

Prior to the start of the Stage 2 annual ARR allocation process, ARR holders can relinquish any portion of their ARRs resulting from the Stage 1A or Stage 1B allocation process, provided that all remaining outstanding ARRs are simultaneously feasible following the return of such ARRs.<sup>40</sup> Participants may seek additional ARRs in the Stage 2 allocation.

ARRs can also be traded between LSEs, but these trades must be made before the first round of the Annual FTR Auction. LSEs trading ARRs must trade all of their ARRs associated with a control zone and their zonal network service peak load is also reassigned to the new LSE. Traded ARRs are effective for the full 12-month planning period.

When ARRs are allocated, all ARRs must be simultaneously feasible to ensure that the physical transmission system can support the approved set of ARRs. In making simultaneous feasibility determinations, PJM utilizes a power flow model of security-constrained dispatch that takes into account generation and transmission facility outages and is based on reasonable assumptions about the configuration and availability of transmission capability during the planning period.<sup>41</sup> This simultaneous feasibility requirement is necessary to ensure that there are sufficient revenues from transmission congestion charges to satisfy all resulting ARR obligations, thereby preventing underfunding of the ARR obligations for a given planning period. If the requested set of ARRs is not simultaneously feasible, customers are allocated prorated shares in direct proportion to their requested MW and in inverse proportion to their impact on binding constraints:

#### **Equation 8-1 Calculation of prorated ARRs**

Individual prorated MW = (Constraint capability) • (Individual requested MW / Total requested MW) • (1 / MW effect on line).<sup>42</sup>

The effect of an ARR request on a binding constraint is measured using the ARR's power flow distribution factor. An ARR's distribution factor is the percent of each requested MW of ARR that would have a power flow on the binding constraint. The PJM methodology prorates those ARR requests with the greatest impact on the binding constraint to avoid prorating more requests but having smaller or minimal impact on the binding constraint. PJM's method results in the prorating of ARRs that cause the greatest flows on the binding constraint instead of those that produce less flow on it. Were all ARR requests prorated equally, irrespective of their proportional impact on the binding constraints, the result would be a significant reduction in market participants' ARRs even when they have little impact on the binding constraints and the reduction of ARRs, and their associated benefits, with primary impacts on unrelated constraints.

40 PJM. "Manual 6: Financial Transmission Rights," Revision 11 (August 1, 2008), pp. 20-23.

41 PJM. "Manual 6: Financial Transmission Rights," Revision 11 (August 1, 2008), pp. 49-50.

42 See the 2008 State of the Market Report, Volume II, Appendix G, "Financial Transmission Rights and Auction Revenue Rights," for an illustration explaining this calculation in greater detail.

### Residual ARR

On June 19, 2007, PJM submitted to the FERC revisions to the OATT to include a new type of ARR known as a residual ARR.<sup>43</sup> On August 13, 2007, the FERC issued an order accepting the revisions to the PJM OATT with an effective date of August 20, 2007.<sup>44</sup> Only ARR holders that had their Stage 1A or Stage 1B ARRs prorated are eligible to receive residual ARRs. Residual ARRs would be available if additional transmission system capability were added during the planning period after the annual ARR allocation. This additional transmission system capability would not have been accounted for in the initial annual ARR allocation, but it enables the creation of residual ARRs. Residual ARRs would be effective on the first day of the month in which the additional transmission system capability is included in FTR auctions and would exist until the end of the planning period. For the following planning period, any residual ARRs would be available as ARRs in the annual ARR allocation process as they would be included in the power flow model. The amount of a residual ARR would be the difference between the ARR holder's Stage 1A or Stage 1B request and their actual prorated Stage 1A or Stage 1B ARR MW. Stage 1 ARR holders have a priority right to ARRs and those holders who had ARRs prorated because of the simultaneous feasibility requirement previously had no recourse from the impact of proration. Residual ARRs are a separate product from incremental ARRs. No residual ARRs have been allocated to date.

### Incremental ARRs

Market participants constructing generation interconnection or transmission expansion projects may request an allocation of incremental ARRs consistent with the project's increased transmission capability.<sup>45</sup> Incremental ARRs are available in a three-round allocation process with a single point-to-point combination requested and one-third of the incremental ARR MW allocated in each round. Incremental ARRs can be accepted or refused after rounds one and two. If accepted, that ARR is removed from availability in subsequent rounds; if it is refused, that ARR is available in the next rounds. Such incremental ARRs are effective for the lesser of 30 years or the life of the facility or upgrade. At any time during this 30-year period, in place of continuing this 30-year ARR, the participant has a single opportunity to replace the allocated ARRs with a right to request ARRs during the annual ARR allocation process between the same source and sink. Such participants can also permanently relinquish their incremental ARRs at any time during the life of the ARRs as long as overall the system simultaneous feasibility can be maintained.

Table 8-20 lists the incremental ARR allocation volume for the 2007 to 2008 and the 2008 to 2009 planning periods. For the 2008 to 2009 planning period, there were 891 MW bids and 100 percent of the bids were cleared. For the 2007 to 2008 planning period, there were 374 MW bids and 100 percent of the bids were cleared.

<sup>43</sup> *PJM Interconnection, L.L.C.*, PJM Interconnection, L.L.C. submits revisions to its Amended and Restated Operating Agreement and Open Access Transmission Tariff pursuant to Section 205 of the Federal Power Act, Docket No. ER07-1053-000 (June 19, 2007).

<sup>44</sup> *PJM Interconnection, L.L.C.*, Letter Order accepting PJM Interconnection, L.L.C.'s June 19, 2007, filing of Second Revised Sheet No. 6A *et al* to the Third Revised Rate Schedule, FERC No. 24 *et al*, Docket No. ER07-1053-000 (August 13, 2007).

<sup>45</sup> PJM. "Manual 6: Financial Transmission Rights," Revision 11 (August 1, 2008), pp. 27-28.

**Table 8-20 Incremental ARR allocation volume: Planning periods 2007 to 2008 and 2008 to 2009**

Planning Period	Bid and Requested Count	Bid and Requested Volume (MW)	Cleared Volume (MW)	Cleared Volume	Uncleared Volume (MW)	Uncleared Volume
2007/2008	13	374	374	100%	0	0%
2008/2009	15	891	891	100%	0	0%

Table 8-21 lists the top 10 principal binding constraints, along with their corresponding control zones in order of severity, that limited supply in the annual ARR allocation for the 2008 to 2009 planning period. The order of severity is determined by the violation degree of the binding constraint as computed in the simultaneous feasibility test.<sup>46</sup> The violation degree is a measure of the MW that a constraint is over the limit for a type of facility; a higher number indicates a more severe constraint.

**Table 8-21 Top 10 principal binding transmission constraints limiting the annual ARR allocation: Planning period 2008 to 2009**

Constraint	Type	Control Zone
AP South	Interface	AP
Cedar Grove - Clifton	Line	PSEG
Amos	Transformer	AEP
Elrama - Mitchell	Line	DLCO
Perryman	Transformer	BGE
Conesville Prep - Conesville	Line	AEP
Lanesville	Transformer	External
Doubs	Transformer	AP
Crane - Windy Edge	Line	BGE
Dresden	Transformer	ComEd

**Demand**

PJM’s OATT specifies the types of transmission services that are available to eligible customers. Eligible customers submit requests to PJM for network and firm, point-to-point transmission service through the PJM Open Access Same-Time Information System (OASIS). ARRs associated with firm transmission service that spans the entire next planning period, outside of the annual ARR allocation window, can also be requested through the PJM OASIS.<sup>47</sup> PJM evaluates each transmission service request for its impact on the system and approves or denies the request accordingly. All approved transmission services can be accommodated by the PJM transmission system. Theoretically, since total eligible ARR demand for the system cannot exceed the combined MW of network and firm, point-to-point transmission service, ARR supply should equal ARR demand if ARR nominations are consistent with the historic use of the transmission system. However, the demand for some ARRs

<sup>46</sup> PJM. "Manual 6: Financial Transmission Rights," Revision 11 (August 1, 2008), pp. 49-50.

<sup>47</sup> PJM. "Manual 6: Financial Transmission Rights," Revision 11 (August 1, 2008), pp. 16-17.

could be left unmet if the same resources are nominated as ARR source points by multiple parties for delivery across shared paths and the result exceeds the stated capability of the transmission system to deliver from those sources to load. The combination might not be simultaneously feasible. When the requested set of ARRs is not simultaneously feasible, customers are allocated prorated shares in direct proportion to their requested MW and in inverse proportion to their impact on binding constraints.

### *ARR Reassignment for Retail Load Switching*

Current PJM rules provide that when load switches among LSEs during the planning period, a proportional share of associated ARRs that sink into a given control or load aggregation zone is automatically reassigned to follow that load.<sup>48</sup> ARR reassignment occurs daily only if the LSE losing load has ARRs with a net positive economic value to that control zone. An LSE gaining load in the same control zone is allocated a proportional share of positively valued ARRs within the control zone based on the shifted load. ARRs are reassigned to the nearest 0.001 MW and any MW of load may be reassigned multiple times over a planning period. Residual ARRs are also subject to the rules of ARR reassignment. This practice supports competition by ensuring that the hedge against congestion follows load, thereby removing a barrier to competition among LSEs and, by ensuring that only ARRs with a positive value are reassigned, preventing an LSE from assigning poor ARR choices to other LSEs. However, when ARRs are self scheduled as FTRs, these underlying self scheduled FTRs do not follow load that shifts while the ARRs do follow load that shifts, and this may diminish the value of the hedge. When load shifts from one LSE to another in newly integrated control zones, directly allocated FTRs with positive economic value follow the load.<sup>49</sup>

Table 8-22 summarizes ARR MW and associated revenue automatically reassigned for network load in each control zone where changes occurred between June 2007 and December 2008. About 10,017 MW of ARRs associated with \$353,300 per MW-day of revenue were automatically reassigned in the first seven months of the 2008 to 2009 planning period. About 14,011 MW of ARRs with \$408,000 per MW-day of revenue were reassigned for the entire 12-month 2007 to 2008 planning period.

<sup>48</sup> PJM. "Manual 6: Financial Transmission Rights," Revision 11 (August 1, 2008), p. 25.

<sup>49</sup> PJM. "Manual 6: Financial Transmission Rights," Revision 11 (August 1, 2008), p. 33.

**Table 8-22 ARR and ARR revenue automatically reassigned for network load changes by control zone: June 1, 2007, to December 31, 2008**

Control Zone	ARRs Reassigned (MW-day)		ARR Revenue Reassigned [Dollars (Thousands) per MW-day]	
	2007/2008	2008/2009	2007/2008	2008/2009
	(12 months)	(7 months)*	(12 months)	(7 months)*
AECO	169	119	\$4.5	\$3.6
AEP	62	10	\$1.6	\$0.1
AP	1,005	456	\$189.5	\$112.0
BGE	2,923	2,623	\$77.2	\$95.3
ComEd	3,800	1,841	\$8.4	\$5.6
DAY	0	1	\$0.0	\$0.0
DLCO	516	188	\$0.7	\$0.9
Dominion	21	4	\$0.0	\$0.3
DPL	1,413	1,131	\$20.4	\$19.7
JCPL	582	653	\$11.3	\$26.4
Met-Ed	3	NA	\$0.1	NA
PECO	44	30	\$1.5	\$0.9
PENELEC	3	NA	\$0.1	NA
Pepco	2,232	2,215	\$48.6	\$57.7
PPL	14	1	\$0.4	\$0.1
PSEG	1,185	732	\$43.3	\$30.6
RECO	40	14	\$0.3	\$0.0
Total	14,011	10,017	\$408.0	\$353.3

\* Through 31-Dec-08

## Market Performance

### Volume

Table 8-23 lists the annual ARR allocation volume by stage and round for the 2007 to 2008 and the 2008 to 2009 planning periods. For the 2008 to 2009 planning period, there were 64,546 MW (45.9 percent of total demand) bid in Stage 1A, 27,291 MW (19.4 percent of total demand) bid in Stage 1B and 48,831 MW (34.7 percent of total demand) bid in Stage 2. Of 140,668 MW in total ARR requests, 64,520 MW were allocated in Stage 1A and 26,685 MW were allocated in Stage 1B while 20,806 MW were allocated in Stage 2 for a total of 112,011 MW (79.6 percent) allocated. Eligible market participants subsequently converted 72,851 MW of these allocated ARRs into Annual FTRs (65.0 percent of total allocated ARRs), leaving 39,159 MW of ARRs outstanding. For the 2007 to 2008 planning period, there had been 62,220 MW (41.3 percent of total demand) bid in Stage 1A, 31,063 MW (20.6 percent of total demand) bid in Stage 1B and 57,539 MW (38.1 percent of total demand) bid in Stage 2. Of 150,822 MW in total ARR requests, 62,211 MW were allocated in

Stage 1A and 29,444 MW were allocated in Stage 1B while 16,337 MW were allocated in Stage 2 for a total of 107,992 MW (71.6 percent) allocated. There were 71,360 MW or 66.1 percent of the allocated ARR converted into FTRs. Immediately after the Stage 1B ARR allocation for the 2008 to 2009 planning period, ARR holders relinquished 26.8 MW of the allocated Stage 1A ARRs and 0.3 MW of the allocated Stage 1B ARRs. In comparison, for the 2007 to 2008 planning period, ARR holders relinquished 9.6 MW of the allocated Stage 1A ARRs and 459.7 MW of the allocated Stage 1B ARRs. The uncleared volume in Table 8-23 includes ARRs that were relinquished.

**Table 8-23 Annual ARR allocation volume: Planning periods 2007 to 2008 and 2008 to 2009**

Planning Period	Stage	Round	Bid and Requested Count	Bid and Requested Volume (MW)	Cleared Volume (MW)	Cleared Volume	Uncleared Volume (MW)	Uncleared Volume
2007/2008	1A	0	7,578	62,220	62,211	100.0%	9	0.0%
		1B	1	3,486	31,063	29,444	94.8%	1,619
	2	2	1,922	19,360	4,043	20.9%	15,317	79.1%
		3	1,466	19,312	5,211	27.0%	14,101	73.0%
		4	1,072	18,867	7,083	37.5%	11,784	62.5%
		Total	4,460	57,539	16,337	28.4%	41,202	71.6%
	Total		15,524	150,822	107,992	71.6%	42,830	28.4%
2008/2009	1A	0	7,845	64,546	64,520	100.0%	26	0.0%
		1B	1	3,147	27,291	26,685	97.8%	606
	2	2	1,691	16,737	6,753	40.3%	9,984	59.7%
		3	1,312	15,464	6,304	40.8%	9,160	59.2%
		4	1,118	16,630	7,749	46.6%	8,881	53.4%
		Total	4,121	48,831	20,806	42.6%	28,025	57.4%
	Total		15,113	140,668	112,011	79.6%	28,657	20.4%

### Revenue

As ARRs are allocated to qualifying customers rather than sold, there is no ARR revenue comparable to the revenue that results from the FTR auctions.

### Revenue Adequacy

The degree to which ARR credits provide a hedge against congestion on specific ARR paths is determined by the prices that result from the Annual FTR Auction. The resultant ARR credit could be greater than, less than, or equal to the actual congestion on the selected path. This is the same concept as FTR revenue adequacy.

Customers that are allocated ARRs can choose to retain the underlying FTRs linked to their ARRs through a process termed self scheduling. Just like any other FTR, the underlying FTRs have a target hedge value based on actual day-ahead congestion on the selected path.

As with FTRs, revenue adequacy for ARR holders must be distinguished from the adequacy of ARR holders as a hedge against congestion. Revenue adequacy is a narrower concept that compares the revenues available to cover congestion across specific paths for which ARRs were available and allocated. The adequacy of ARRs as a hedge against congestion compares ARR revenues to total congestion sinking in the participant’s load zone as a measure of the extent to which ARRs hedged market participants against actual, total congestion into their zone, regardless of the availability or allocation of ARRs.

ARR holders will receive \$2,361.3 million in credits from the Annual FTR Auction during the 2008 to 2009 planning period, with an average hourly ARR credit of \$2.41 per MWh. During the comparable 2007 to 2008 planning period, ARR holders received \$1,640.5 million in ARR credits, with an average hourly ARR credit of \$1.73 per MWh.

Table 8-24 lists ARR target allocations and net revenue sources from the Annual and Monthly Balance of Planning Period FTR Auctions for the 2007 to 2008 and the 2008 to 2009 (through December 31, 2008) planning periods. Annual FTR Auction net revenue has been sufficient to cover ARR target allocations for both planning periods. The 2008 to 2009 planning period’s Annual and Monthly Balance of Planning Period FTR Auctions generated a surplus of \$123.5 million in auction net revenue through December 31, 2008, above the amount needed to pay 100 percent of ARR target allocations. The whole 2007 to 2008 planning period’s Annual and Monthly Balance of Planning Period FTR Auctions generated a surplus of \$95.6 million in auction net revenue, above the amount needed to pay 100 percent of ARR target allocations.

**Table 8-24 ARR revenue adequacy (Dollars (Millions)): Planning periods 2007 to 2008 and 2008 to 2009**

	2007/2008	2008/2009
Total FTR auction net revenue	\$1,736.1	\$2,484.8
Annual FTR Auction net revenue	\$1,698.0	\$2,422.6
Monthly Balance of Planning Period FTR Auction net revenue*	\$38.1	\$62.2
ARR target allocations	\$1,640.5	\$2,361.3
ARR credits	\$1,640.5	\$2,361.3
Surplus auction revenue	\$95.6	\$123.5
ARR payout ratio	100%	100%
FTR payout ratio*	100%	99.6%

\* Shows twelve months for 2007/2008 and seven months ended 31-Dec-08 for 2008/2009

### *ARR Proration*

During the annual ARR allocation process, all ARRs must be simultaneously feasible to ensure that the physical transmission system can support the approved set of ARRs. If all the ARR requests made during the annual ARR allocation process are not feasible, then ARRs are prorated and allocated in proportion to the MW level requested and in inverse proportion to the effect on the binding constraints.<sup>50,51</sup>

When ARRs were allocated for the 2008 to 2009 planning period, some of the requested ARRs were prorated in order to ensure simultaneous feasibility. There were no ARRs prorated in Stage 1A of the annual ARR allocation. The Cedar Grove — Clifton line was the only binding constraint in Stage 1B of the annual ARR allocation, leading to 605.4 MW of proration.

A number of factors caused the proration of requested ARRs on the Cedar Grove — Clifton line. They include an increase in ARR requests for congested paths on the Cedar Grove — Clifton line, general load growth and increased unscheduled transmission flow across the PJM system from external sources.

### *ARR and FTR Revenue and Congestion*

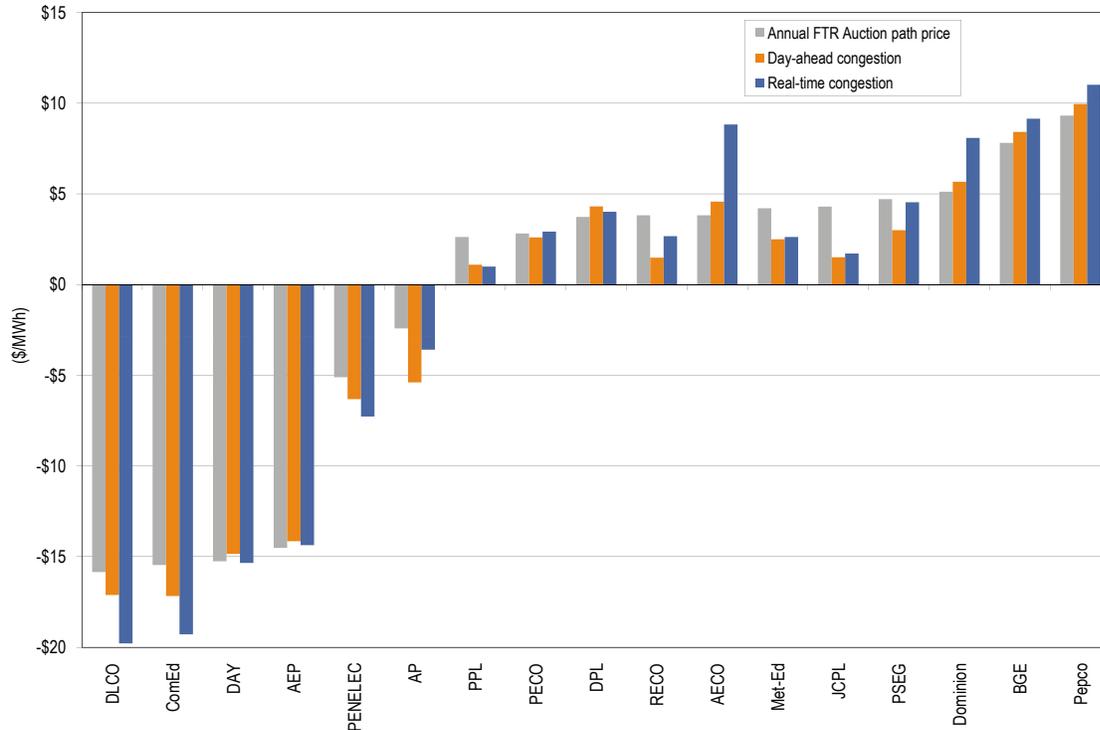
#### **FTR Prices and Zonal Price Differences**

As an illustration of the relationship between FTRs and congestion, Figure 8-11 shows Annual FTR Auction prices and an approximate measure of day-ahead and real-time congestion for each PJM control zone for the 2008 to 2009 planning period through December 31, 2008. The day-ahead and real-time congestion are based on the difference between zonal congestion prices and Western Hub congestion prices. The figure shows, for example, that an FTR from the Western Hub to the PECO Control Zone cost \$2.82 per MWh in the Annual FTR Auction and that about \$2.61 per MWh of day-ahead congestion and \$2.93 per MWh of real-time congestion existed between the Western Hub and the PECO Control Zone. The data show that congestion costs, approximated in this way, were positive for most control zones that are located east of the Western Hub while congestion costs were negative and were more negative than the negative price of FTRs for control zones that are located west of that hub.

50 PJM. "Manual 6: Financial Transmission Rights," Revision 11 (August 1, 2008), pp. 24-25.

51 See the 2008 State of the Market Report, Volume II, Appendix G, "Financial Transmission Rights and Auction Revenue Rights," for an illustration explaining the ARR prorating method.

**Figure 8-11 Annual FTR Auction prices vs. average day-ahead and real-time congestion for all control zones relative to the Western Hub: Planning period 2008 to 2009 through December 31, 2008**



### Effectiveness of ARR as a Hedge against Congestion

One measure of the effectiveness of ARRs as a hedge against congestion is a comparison of the revenue received by the holders of ARRs and the congestion across the corresponding paths. The revenue which serves as a hedge for ARR holders comes from the FTR auctions while the hedge for FTR holders is provided by the congestion payments derived directly from the Day-Ahead Energy Market and the balancing energy market. Thus, ARRs are an indirect hedge against actual congestion in both the Day-Ahead Energy Market and the balancing energy market.

The comparison between the revenue received by ARR holders and the actual congestion experienced by these ARR holders in the Day-Ahead Energy Market and the balancing energy market is presented by control zone in Table 8-25. ARRs and self scheduled FTRs that sink at an aggregate are assigned to a control zone if applicable.<sup>52</sup> Total revenue equals the ARR credits and the FTR credits from ARRs which are self scheduled as FTRs. The ARR credits do not include the credits for the portion of any ARR that was self scheduled as an FTR since ARR holders purchase self scheduled FTRs in the Annual FTR Auction and that revenue is then paid back to the ARR holders, netting the transaction to zero. ARR credits are calculated as the product of the ARR MW (excludes any self scheduled FTR MW) and the sink-minus-source price difference for the ARR path from the Annual FTR Auction.

<sup>52</sup> For Table 8-25 through Table 8-28, aggregates are separated into their individual bus components and each bus is assigned to a control zone. Aggregates that are external sinks are included in the PJM Control Zone.

FTR credits equal FTR target allocations adjusted by the FTR payout ratio. The FTR target allocation is equal to the product of the FTR MW and the congestion price differences between sink and source that occur in the Day-Ahead Energy Market. FTR credits are paid to FTR holders and, depending on market conditions, may be less than the target allocation. The FTR payout ratio equals the percentage of the target allocation that FTR holders actually receive as credits. The FTR payout ratio was 100 percent of the target allocation for the 2007 to 2008 planning period.

The “Congestion” column shows the amount of congestion in each control zone from the Day-Ahead Energy Market and the balancing energy market and includes only the congestion costs incurred by the organizations that hold ARRs or self scheduled FTRs. The last column shows the difference between the total revenue and the congestion for each ARR control zone sink.

Data shown are for the 2007 to 2008 planning period summed by ARR control zone sink. For example, the table shows that for the 2007 to 2008 planning period, ARRs allocated to the JCPL Control Zone received a total of \$68.5 million in revenue which was the sum of \$35.7 million in ARR credits and \$32.8 million in credits for self scheduled FTRs. This total revenue was \$132.9 million less than the congestion costs of \$201.4 million from the Day-Ahead Energy Market and the balancing energy market incurred by organizations in the JCPL Control Zone that held ARRs or self scheduled FTRs.

**Table 8-25 ARR and self scheduled FTR congestion hedging by control zone: Planning period 2007 to 2008**

Control Zone	ARR Credits	Self-Scheduled FTR Credits	Total Revenue	Congestion	Total Revenue - Congestion Difference	Percent Hedged
AECO	\$27,050,101	\$4,490,071	\$31,540,172	\$60,130,175	(\$28,590,003)	52.5%
AEP	\$3,754,071	\$202,251,131	\$206,005,202	\$243,739,566	(\$37,734,364)	84.5%
AP	\$43,158,145	\$640,618,894	\$683,777,039	\$413,697,338	\$270,079,701	>100%
BGE	\$70,874,793	\$5,361,140	\$76,235,933	\$29,266,225	\$46,969,708	>100%
ComEd	\$13,235,456	\$1,553,338	\$14,788,794	(\$29,855,762)	\$44,644,556	>100%
DAY	\$6,213,543	\$1,680,770	\$7,894,313	\$19,809,086	(\$11,914,773)	39.9%
DLCO	\$1,573,363	\$2,083,428	\$3,656,791	(\$2,805,029)	\$6,461,820	>100%
Dominion	\$21,799,543	\$3,392,005	\$25,191,548	\$72,018,947	(\$46,827,399)	35.0%
DPL	\$12,742,414	\$220,914,957	\$233,657,371	\$535,233,722	(\$301,576,351)	43.7%
JCPL	\$35,696,894	\$32,821,391	\$68,518,285	\$201,449,625	(\$132,931,340)	34.0%
Met-Ed	\$1,521,781	\$38,152,860	\$39,674,641	\$96,271,148	(\$56,596,507)	41.2%
PECO	\$5,914,429	\$53,367,088	\$59,281,517	(\$45,767,283)	\$105,048,800	>100%
PENELEC	\$3,106,417	\$55,416,946	\$58,523,363	\$116,683,242	(\$58,159,879)	50.2%
Pepco	\$45,101,300	\$636,953	\$45,738,253	\$306,713,071	(\$260,974,818)	14.9%
PJM	\$1,032,146	\$13,505,210	\$14,537,356	(\$26,523,041)	\$41,060,397	>100%
PPL	\$1,450,595	\$55,557,156	\$57,007,751	\$7,236,991	\$49,770,760	>100%
PSEG	\$127,392,055	\$17,579,934	\$144,971,989	\$117,052,931	\$27,919,058	>100%
RECO	\$1,951,540	\$0	\$1,951,540	\$10,335,702	(\$8,384,162)	18.9%
Total	\$423,568,586	\$1,349,383,272	\$1,772,951,858	\$2,124,686,654	(\$351,734,796)	83.4%

During the 2007 to 2008 planning period, congestion costs associated with the 107,992 MW of allocated ARR were \$2,124.7 million. As Table 8-8 indicates, 71,360 MW of ARRs were converted into FTRs through the self scheduling option, with 36,632 MW remaining as ARRs. The 36,632 MW of remaining ARRs provided \$423.6 million of ARR credits, representing a hedge of 19.9 percent of the \$2,124.7 million in congestion costs incurred, while the self scheduled FTRs provided \$1,349.4 million of revenue, hedging an additional 63.5 percent of congestion costs. Total congestion hedged by both was \$1,773.0 million, or 83.4 percent. (See Table 8-25.) The effectiveness of ARRs as a hedge depends both on the ARR value which is a function of the FTR auction prices, on congestion patterns in the Day-Ahead and Real-Time Energy Markets and on the FTR payout ratio.

### Effectiveness of FTRs as a Hedge against Congestion

FTRs provide a direct hedge against congestion costs. Table 8-26 compares the total FTR credits and the total FTR auction revenues that sink in each control zone and the congestion costs in each control zone for the 2007 to 2008 planning period. FTRs that sink at an aggregate or a bus are assigned to a control zone if applicable. The “FTR Credits” column represents the total FTR target allocations for FTRs that sink in each control zone from the Annual FTR Auction, the Monthly Balance of Planning Period FTR Auctions and any FTRs that were self scheduled from ARRs, adjusted by the FTR payout ratio. The FTR target allocation is equal to the product of the FTR MW and the congestion price differences between sink and source that occur in the Day-Ahead Energy Market. FTR credits are the product of the FTR target allocations and the FTR payout ratio. The FTR payout ratio was 100 percent of the target allocation for the 2007 to 2008 planning period. The “FTR Auction Revenue” column shows the amount paid for FTRs that sink in each control zone in the Annual FTR Auction, the Monthly Balance of Planning Period FTR Auctions and any self scheduled FTRs. The FTR hedge is the difference between the FTR credits and the FTR auction revenue. The “Congestion” column shows the total amount of congestion in the Day-Ahead Energy Market and the balancing energy market in each control zone. The last column shows the difference between the FTR hedge and the congestion for each control zone.

All FTRs provided a hedge of \$302.8 million against \$1,995.5 million in congestion costs incurred.<sup>53</sup> This demonstrates that all FTRs provided a 15.2 percent hedge against congestion costs in PJM. For example, the table shows that for the 2007 to 2008 planning period, all FTRs sunk in the Pepco Control Zone received a total of \$266.0 million in FTR credits while these FTRs cost \$218.6 million in the FTR auctions. This gives a total FTR hedge of \$47.5 million against \$177.1 million in congestion costs from the Day-Ahead Energy Market and the balancing energy market. This shows a deficit of \$129.7 million in their total FTR hedge position versus the cost of congestion in the Day-Ahead Energy Market and the balancing energy market. It would not be expected that the value of the FTR hedge calculated in this manner would cover all congestion costs as both ARRs and FTRs are available to hedge total congestion. That comparison is provided in Table 8-27.

<sup>53</sup> The congestion costs in Table 8-26, Table 8-27 and Table 8-28 (2007 to 2008 planning period) do not equal the congestion costs in Table 8-25 because the congestion costs for organizations that did not hold ARRs had negative congestion costs that lowered the total congestion costs compared to those of just the ARR holders.

**Table 8-26 FTR congestion hedging by control zone: Planning period 2007 to 2008**

Control Zone	FTR Credits	FTR Auction Revenue	FTR Hedge	Congestion	FTR Hedge - Congestion Difference	Percent Hedged
AECO	\$33,818,154	\$26,487,534	\$7,330,620	\$48,611,136	(\$41,280,516)	15.1%
AEP	\$74,060,394	\$122,461,520	(\$48,401,126)	\$224,108,931	(\$272,510,057)	<0%
AP	\$592,512,119	\$491,764,536	\$100,747,583	\$462,376,328	(\$361,628,745)	21.8%
BGE	\$63,409,285	\$63,365,238	\$44,047	\$74,161,439	(\$74,117,392)	0.1%
ComEd	(\$64,942,926)	(\$30,250,928)	(\$34,691,998)	\$215,858,584	(\$250,550,582)	<0%
DAY	(\$35,353,881)	(\$25,729,852)	(\$9,624,029)	\$17,884,456	(\$27,508,485)	<0%
DLCO	(\$24,829,264)	(\$27,921,904)	\$3,092,640	\$11,410,848	(\$8,318,208)	27.1%
Dominion	\$253,021,344	\$196,207,169	\$56,814,175	\$283,479,504	(\$226,665,329)	20.0%
DPL	\$27,834,839	\$41,345,962	(\$13,511,123)	\$56,034,968	(\$69,546,091)	<0%
JCPL	\$289,812,635	\$87,916,212	\$201,896,423	\$228,011,843	(\$26,115,420)	88.5%
Met-Ed	\$56,186,522	\$56,735,375	(\$548,853)	\$52,663,379	(\$53,212,232)	<0%
PECO	\$42,270,945	\$94,973,373	(\$52,702,428)	(\$55,027,453)	\$2,325,025	>100%
PENELEC	\$242,914,519	\$139,361,603	\$103,552,916	\$186,535,306	(\$82,982,390)	55.5%
Pepco	\$266,025,285	\$218,553,668	\$47,471,617	\$177,145,206	(\$129,673,589)	26.8%
PJM	\$13,724,519	\$13,853,916	(\$129,397)	(\$85,980,478)	\$85,851,081	>100%
PPL	\$53,460,555	\$57,050,864	(\$3,590,309)	(\$14,546,632)	\$10,956,323	>100%
PSEG	\$148,445,275	\$206,565,360	(\$58,120,085)	\$102,416,667	(\$160,536,752)	<0%
RECO	\$6,541,812	\$3,398,262	\$3,143,550	\$10,333,202	(\$7,189,652)	30.4%
Total	\$2,038,912,131	\$1,736,137,908	\$302,774,223	\$1,995,477,234	(\$1,692,703,011)	15.2%

### Effectiveness of ARR and FTRs as a Hedge against Congestion

Table 8-27 compares the revenue for ARR and FTR holders and the congestion in both the Day-Ahead Energy Market and the balancing energy market for the 2007 to 2008 planning period. This compares the total hedge provided by all ARRs and all FTRs to the total congestion costs within each control zone. ARRs and FTRs that sink at an aggregate or a bus are assigned to a control zone if applicable. ARR credits are calculated as the product of the ARR MW and the sink-minus-source price difference for the ARR path from the Annual FTR Auction. The “FTR Credits” column represents the total FTR target allocation for FTRs that sink in each control zone from the Annual FTR Auction, the Monthly Balance of Planning Period FTR Auctions and any FTRs that were self scheduled from ARRs, adjusted by the FTR payout ratio. The FTR target allocation is equal to the product of the FTR MW and congestion price differences between sink and source that occur in the Day-Ahead Energy Market. FTR credits are the product of the FTR target allocations and the FTR payout ratio. The FTR payout ratio was 100 percent of the target allocation for the 2007 to 2008 planning period. The “FTR Auction Revenue” column shows the amount paid for FTRs that sink in each control zone in the Annual FTR Auction, the Monthly Balance of Planning Period FTR Auctions and any ARRs that were self scheduled as FTRs. ARR holders that self schedule FTRs purchased the FTRs in the Annual FTR Auction and that revenue was then paid back to those ARR holders through ARR credits on a monthly basis throughout the planning period, ultimately

netting the transaction to zero. The total ARR and FTR hedge is the sum of the ARR credits and the FTR credits minus the FTR auction revenue. The “Congestion” column shows the total amount of congestion in the Day-Ahead Energy Market and the balancing energy market in each control zone. The last column shows the difference between the total ARR and FTR hedge and the congestion cost for each control zone.

The results indicate that the value of ARRs and FTRs together were less than total congestion costs by about \$52.2 million. During the 2007 to 2008 planning period, the 107,992 MW of cleared ARRs produced \$1,640.5 million of ARR credits while the total of all FTR credits was \$2,038.9 million. Together, the ARR credits and FTR credits provided approximately \$3,679.4 million in total ARR and FTR revenue. When calculating the total ARR and FTR hedge, the cost to obtain the FTRs must be subtracted from the total ARR and FTR revenue. This cost is the total sum of the FTR auction revenues which was \$1,736.1 million for the 2007 to 2008 planning period. The total ARR and FTR hedge equals \$1,943.2 million, a hedge of 97.4 percent of \$1,995.5 million of congestion in the Day-Ahead Energy Market and the balancing energy market. For example, the table shows that all ARRs and FTRs that sink in the AP Control Zone received \$585.1 million in ARR credits and \$592.5 million in FTR credits. After subtracting the cost of the FTRs, the FTR auction revenue of \$491.8 million, the total ARR and FTR hedge was \$685.9 million. Their total hedge was \$223.5 million higher than the \$462.4 million of congestion in the Day-Ahead Energy Market and the balancing energy market.

**Table 8-27 ARR and FTR congestion hedging by control zone: Planning period 2007 to 2008**

Control Zone	ARR Credits	FTR Credits	FTR Auction Revenue	Total ARR and FTR Hedge	Congestion	Total Hedge - Congestion Difference	Percent Hedged
AECO	\$30,399,517	\$33,818,154	\$26,487,534	\$37,730,137	\$48,611,136	(\$10,880,999)	77.6%
AEP	\$235,192,904	\$74,060,394	\$122,461,520	\$186,791,778	\$224,108,931	(\$37,317,153)	83.3%
AP	\$585,103,411	\$592,512,119	\$491,764,536	\$685,850,994	\$462,376,328	\$223,474,666	>100%
BGE	\$75,854,553	\$63,409,285	\$63,365,238	\$75,898,600	\$74,161,439	\$1,737,161	>100%
ComEd	\$22,605,389	(\$64,942,926)	(\$30,250,928)	(\$12,086,609)	\$215,858,584	(\$227,945,193)	<0%
DAY	\$10,283,638	(\$35,353,881)	(\$25,729,852)	\$659,609	\$17,884,456	(\$17,224,847)	3.7%
DLCO	\$1,861,518	(\$24,829,264)	(\$27,921,904)	\$4,954,158	\$11,410,848	(\$6,456,690)	43.4%
Dominion	\$184,589,565	\$253,021,344	\$196,207,169	\$241,403,740	\$283,479,504	(\$42,075,764)	85.2%
DPL	\$24,582,545	\$27,834,839	\$41,345,962	\$11,071,422	\$56,034,968	(\$44,963,546)	19.8%
JCPL	\$44,530,720	\$289,812,635	\$87,916,212	\$246,427,143	\$228,011,843	\$18,415,300	>100%
Met-Ed	\$40,542,857	\$56,186,522	\$56,735,375	\$39,994,004	\$52,663,379	(\$12,669,375)	75.9%
PECO	\$89,541,114	\$42,270,945	\$94,973,373	\$36,838,686	(\$55,027,453)	\$91,866,139	>100%
PENELEC	\$35,825,762	\$242,914,519	\$139,361,603	\$139,378,678	\$186,535,306	(\$47,156,628)	74.7%
Pepco	\$45,765,395	\$266,025,285	\$218,553,668	\$93,237,012	\$177,145,206	(\$83,908,194)	52.6%
PJM	\$15,188,162	\$13,724,519	\$13,853,916	\$15,058,765	(\$85,980,478)	\$101,039,243	>100%
PPL	\$53,816,218	\$53,460,555	\$57,050,864	\$50,225,909	(\$14,546,632)	\$64,772,541	>100%
PSEG	\$142,818,598	\$148,445,275	\$206,565,360	\$84,698,513	\$102,416,667	(\$17,718,154)	82.7%
RECO	\$1,951,540	\$6,541,812	\$3,398,262	\$5,095,090	\$10,333,202	(\$5,238,112)	49.3%
Total	\$1,640,453,406	\$2,038,912,131	\$1,736,137,908	\$1,943,227,629	\$1,995,477,234	(\$52,249,605)	97.4%

Table 8-28 shows that for the 2007 to 2008 planning period, the total ARR and FTR hedge was \$52.2 million less than the total congestion within PJM. All ARRs and FTRs hedged approximately 97.4 percent of the total congestion costs in the Day-Ahead Energy Market and the balancing energy market within PJM. For the first seven months of the 2008 to 2009 planning period, the FTR payout ratio was 99.6 percent of the target allocation. All ARRs and FTRs hedged 97.2 percent of the total congestion costs within PJM for the first seven months of the 2008 to 2009 planning period. The total ARR and FTR hedge position was less than the cost of congestion by \$37.6 million.

**Table 8-28 ARR and FTR congestion hedging: Planning periods 2007 to 2008 and 2008 to 2009<sup>54</sup>**

Planning Period	ARR Credits	FTR Credits	FTR Auction Revenue	Total ARR and FTR Hedge	Congestion	Total Hedge - Congestion Difference	Percent Hedged
2007/2008	\$1,640,453,406	\$2,038,912,131	\$1,736,137,908	\$1,943,227,629	\$1,995,477,234	(\$52,249,605)	97.4%
2008/2009*	\$1,384,429,209	\$1,358,489,527	\$1,458,303,545	\$1,284,615,190	\$1,322,177,077	(\$37,561,887)	97.2%

\* Shows seven months ended 31-Dec-08

<sup>54</sup> The FTR credits do not include after-the-fact adjustments. For the 2008 to 2009 planning period, the ARR credits were the total credits allocated to all ARR holders for the first seven months (June through December 2008) of this planning period, and the FTR Auction Revenue includes the net revenue in the Monthly Balance of Planning Period FTR Auctions for the first seven months of this planning period and the portion of Annual FTR Auction revenue distributed to the first seven months.