Financial Transmission and Auction Revenue Rights

In an LMP market, the lowest cost generation is dispatched to meet the load, subject to the ability of the transmission system to deliver that energy. When the lowest cost generation is remote from load centers, the physical transmission system permits that lowest cost generation to be delivered to load. This was true prior to the introduction of LMP markets and continues to be true in LMP markets. Prior to the introduction of LMP markets, contracts based on the physical rights associated with the transmission system were the mechanism used to provide for the delivery of low cost generation to load. Firm transmission customers who paid for the transmission system through rates or through bilateral contracts received the low cost generation.

After the introduction of LMP markets, financial transmission rights (FTRs) were introduced to permit the loads which pay for the transmission system to continue to receive the benefits of access to remote low cost generation in the form of revenues which offset congestion to the extent permitted by the transmission system.[1] Financial transmission rights and the associated revenues were directly provided to loads in recognition of the fact that loads pay for the transmission system which permits low cost generation to be delivered to load. Another way of describing the result is that FTRs and the associated congestion revenues were directly provided to loads in recognition of the fact that, as a result of LMP, load pays too much for generation. The excess payments are defined to be congestion. Under LMP, load pays locational prices which result in load payments in excess of generation revenues. These excess payments are congestion revenues. Congestion revenues are the funds available to offset congestion costs in an LMP market.[2] Congestion is defined to be load payments in excess of generation revenues. Congestion revenues are the source of the funds to pay FTRs. In an LMP system, the only way to ensure that load receives the benefits associated with the use of the transmission system to deliver low cost energy is to use FTRs, or an equivalent mechanism, to pay back to load the difference between the total load payments and the total generation revenues. FTRs were the mechanism selected in PJM to pay congestion revenues back to load. The only way to ensure that load receives the benefits associated with the use of the transmission system to deliver low cost energy is to ensure that all congestion revenues are returned to load. Congestion revenues are defined to be equal to the sum of day ahead and balancing congestion. FTRs are one way to do that.

Effective April 1, 1999, FTRs were introduced with the LMP market, there was a real-time market but no day-ahead market, and FTRs returned real-time congestion revenue to load. Effective June 1, 2000, the day-ahead market was introduced and FTRs returned total congestion including day-ahead and balancing congestion to load. Effective June 1, 2003, PJM replaced the direct allocation of FTRs to load with an allocation of Auction Revenue Rights (ARRs). Under the ARR construct, the load still owns the rights to congestion revenue, but the ARR construct allows load to either claim the FTRs directly (through a process called self scheduling), or to sell the rights to congestion revenue in the FTR auction in exchange for a revenue stream based on the auction clearing prices of the FTRs. Under the ARR construct, all FTR auction revenues should belong to the load and all of the congestion revenues should belong to those that purchase or self schedule the FTRs.

The current ARR/FTR design does not serve as an efficient way to ensure that load receives all the congestion revenues or has the ability to receive the auction revenues associated with rights to all the potential congestion revenues. Total ARR and self scheduled FTR revenue offset 98.1 percent of total congestion costs including congestion in the Day-Ahead Energy Market and the balancing energy market for the 2016/2017 planning period, before the allocation of balancing congestion and M2M payments to load. For the 2017/2018 planning period, after the reallocation of balancing congestion and M2M payments, ARR and self scheduled FTR revenue offset 50.7 percent of total congestion. One of the reasons for this inefficiency is the link, established by PJM member companies in their initial FTR filings prior to the opening of the PJM market, between congestion revenues and specific generation to load transmission paths. The original filings, made before PJM members had any experience with LMP markets, retained the contract path

1 See 81 FERC ¶ 61,257 at 62,241 (1997).
2 See *id.* at 62, 259–62,260 & n. 123.

based view of congestion rooted in physical transmission rights. In an effort to protect themselves, the PJM utilities linked the payment of FTRs to specific, physical contract paths from specific generating units to specific load zones. That linkage was inconsistent with the appropriate functioning of FTRs in a nodal, network system with locational marginal pricing but it served as a reasonable approximation in the early years, although that is no longer true. The ARR allocation in 2015 continued to be based on those original physical generation to load paths, an illustration of the inadequacy of that approach and a source of the issues with the FTR model in 2015.

On October 19, 2015, PJM filed proposed revisions to the ARR/FTR Market to address cross subsidies among market participants caused by portfolio netting and by over allocation of Stage 1A ARR rights based on historic rather than actual system use. Among the issues raised, but not directly addressed, by PJM's filing was the issue of FTR funding adequacy and the steps PJM had taken to guarantee full funding of FTRs, at the expense of ARR holders, by conservatively modeling, and thereby under allocating, ARR rights.[3] PJM indicated that its unilateral efforts to fully fund FTRs resulted in cost shifts among participants "that is unjust and unreasonable and must be remedied for future ARR allocations."[4] On December 28, 2015, in response to PJM's October 15, 2015, filing, FERC issued an order establishing a technical conference to address the cost shifting.[5] [6] The technical conference was held on February 4, 2016.

On September 15, 2016, FERC ordered PJM to allocate balancing congestion to load, rather than to FTRs, to modify PJM's Stage 1A ARR allocation process and to continue to use portfolio netting.[7]

On March 30, 2018, PJM filed a proposal to allocate surplus day-ahead congestion charges and surplus FTR auction revenue that remain at the end of the Planning Period to ARR holders, rather than to FTR holders. Surplus congestion revenue should be allocated to ARR holders because surplus day-ahead congestion and surplus auction revenue are associated with unallocated ARR capacity. This residual capacity is unallocated as a result of PJM's conservative modeling designed to improve FTR funding. Had this surplus allocation been implemented in the 2017/2018 planning period, as originally contemplated, the percent of congestion offset by ARRs and FTRs would have increased from 50.7 percent to 76.8 percent. On May 31, 2018, FERC issued an order accepting PJM's proposal.

If the original PJM FTR approach had been designed to return congestion revenues to load without use of the generation to load paths, many of the subsequent issues with the FTR design would have been avoided. The design should simply have provided for the return of all congestion revenues to load. Now is a good time to address the issues of the FTR design and to return the design to its original purpose. This would eliminate much of the complexity associated with ARRs and FTRs and eliminate unnecessary controversy about the appropriate recipients of congestion revenues.

The *2018 Quarterly State of the Market Report for PJM: January through June* focuses on the 2018/2021 Long Term FTR Auction, the 2018/2019 Annual FTR Auction and the 2017/2018 Monthly Balance of Planning Period FTR Auctions for the 2016/2017 and 2017/2018 planning periods, specifically covering January 1, 2017, through June 30, 2018.

Table 13-1 The FTR auction markets results were competitive

Market Element	Evaluation	Market Design
Market Structure	Partially Competitive	
Participant Behavior	Competitive	
Market Performance	**Competitive**	**Flawed**

- Market structure was evaluated as partially competitive because while purchasing FTRs in the FTR Auction is voluntary, issues have been identified with the assignment of system capability between ARRs and FTRs. It is also not clear, in a competitive market, why the ownership structure of Long Term FTRs, particularly the three year product, is so highly concentrated.

3 See PJM's October 19, 2015 Filing at 13-15.
4 See *id.* at 15.
5 See 153 FERC ¶ 61,344 at P 48.
6 See *id.* at 46.
7 See 156 FERC ¶ 61,180 (2016).

- Participant behavior was evaluated as competitive because there was no evidence of anticompetitive behavior.
- Market performance was evaluated as competitive because it reflected the interaction between participant demand behavior and the expected system capability that PJM made available for sale as FTRs. It is not clear, in a competitive market, why FTR purchases by financial entities remain persistently profitable.
- Market design was evaluated as flawed because there are significant flaws with the basic ARR/FTR design. The market design is not an efficient or effective way to ensure that all congestion revenues are returned to load. ARR holders' rights to congestion revenues are not defined clearly enough. ARR holders cannot determine the price at which they are willing to sell rights to congestion revenue. Issues have been identified with the share of system capability made available for sale as FTRs by PJM.

Overview

Auction Revenue Rights

Market Structure

- **Residual ARRs.** If ARR allocations are reduced as the result of a modeled transmission outage and the transmission outage ends during the relevant planning year, the result is that residual ARRs may be available. These residual ARRs are automatically assigned to eligible participants the month before the effective date. Residual ARRs are only available on paths prorated in Stage 1 of the annual ARR allocation, are only effective for single, whole months and cannot be self scheduled. Residual ARR clearing prices are based on monthly FTR auction clearing prices. Residual ARRs with negative target allocations are not allocated to participants. Instead they are removed and the model is rerun.

  In the 2017/2018 planning period, PJM allocated a total of 39,596.4 MW of residual ARRs, up from 35,034.9 MW in the 2016/2017 planning period, with a total target allocation of $17.5 million for the 2017/2018 planning period, up from $7.0 million for the 2016/2017 planning period.

- **ARR Reassignment for Retail Load Switching.** There were 44,823 MW of ARRs associated with $339,500 of revenue that were reassigned in the 2017/2018 planning period. There were 44,056 MW of ARRs associated with $492,500 of revenue that were reassigned for the 2016/2017 planning period.

Market Performance

- **Revenue Adequacy.** For the 2017/2018 planning period, the ARR target allocations, which are based on the nodal price differences from the Annual FTR Auction, were $562.7 million, while PJM collected $601.2 million from the combined Long Term, Annual and Monthly Balance of Planning Period FTR Auctions, making ARRs revenue adequate. ARRs have historically been fully funded by the revenue collected from the Annual FTR Auction. As a result, ARRs do not receive revenue collected from the long term or monthly auctions. For the 2016/2017 planning period, the ARR target allocations were $914.2 million while PJM collected $941.5 million from the combined Annual and Monthly Balance of Planning Period FTR Auctions.
- **ARRs as an Offset to Congestion.** ARRs did not serve as an effective way to return congestion revenues to load. Total ARR and self scheduled FTR revenue offset only 73.3 percent of total congestion costs, which include congestion in the Day-Ahead Energy Market and the balancing energy market, for the 2011/2012 planning period through the 2016/2017 planning period, under the previous allocation of balancing congestion. In the 2017/2018 planning period, in which balancing congestion and M2M payments were directly assigned to load, total ARR and self scheduled FTR revenues offset 50.7 percent of total congestion costs. Under the new rules for surplus congestion revenue allocation, ARRs and self scheduled FTRs would have offset 76.8 percent of total congestion costs. The goal of the FTR market design should be to ensure that load has the rights to 100 percent of the congestion revenues.

Financial Transmission Rights

Market Structure

- **Supply.** The principal binding constraints limiting the supply of FTRs in the 2018/2021 Long Term FTR Auction include the Wattisville-Wallops Tap Line in DPL and the Staley-Lafayette Flowgate. The principal binding constraints limiting the supply of FTRs in the Annual FTR Auction for the 2018/2019 planning period include the Vermillion-Tilton Energy Center and Westwood-NW Tap flowgates.

  In a given auction, market participants can sell FTRs that they have acquired in preceding auctions. In the Monthly Balance of Planning Period FTR Auctions for the 2017/2018 planning period, total participant FTR sell offers were 4,401,873 MW, up from 4,342,320 MW for the same period during the 2016/2017 planning period.

- **Demand.** In the 2018/2021 Long Term FTR Auction, total FTR buy bids were 2,052,820 MW, down 5.7 percent from 2,176,871 MW the previous planning period. There were 2,907,583 MW of buy and self scheduled bids in the 2018/2019 Annual FTR Auction, up 33.6 percent from 2,176,871 MW the previous planning period. The total FTR buy bids from the Monthly Balance of Planning Period FTR Auctions for the 2017/2018 planning period decreased 5.0 percent from 20,144,884 MW for the same time period of the prior planning period, to 19,138,752 MW.

- **Patterns of Ownership.** For the 2018/2021 Long Term FTR Auction, financial entities purchased 72.0 percent of prevailing flow FTRs and 76.5 percent of counter flow FTRs. For the 2018/2019 Annual FTR Auction, financial participants purchased 66.9 percent of all prevailing flow FTRs and 84.2 percent of all counter flow FTRs. For the Monthly Balance of Planning Period Auctions, financial entities purchased 74.4 percent of prevailing flow and 80.1 percent of counter flow FTRs for January through June of 2018. Financial entities owned 63.2 percent of all prevailing and counter flow FTRs, including 54.9 percent of all prevailing flow FTRs and 73.7 percent of all counter flow FTRs during the period from January through June, 2018.

Market Behavior

- **FTR Forfeitures.** FTR forfeitures were not billed after January 19, 2017, pending retroactive implementation of a new FTR forfeiture rule until the September bill, when PJM began retroactive billing under the new FTR forfeiture rule. In the period without FTR forfeiture bills, no information on forfeitures was provided to participants and behavior could not be adjusted. For the period of January 19, 2017, through June 30, 2018, total FTR forfeitures were $12.0 million.

- **Credit Issues.** There were three collateral defaults in the first six months of 2018 not involving GreenHat Energy, LLC, for a total of $606,938. All collateral defaults were cured promptly. There were three payment defaults in the first 6 months of 2018 not involving GreenHat Energy, LLC for a total of $19,963, which resulted in the default of Amerigreen Energy, Inc. on June 12, 2018.[8] On June 21, 2018, GreenHat Energy, LLC was declared in default for two collateral calls totaling $2.8 million and two payment defaults totaling $3.9 million.[9] GreenHat held a large FTR position which, according to current tariff provisions, will be liquidated in the closest FTR auctions coinciding to the effective dates of the positions held.[10] The net gain or loss of these liquidated positions will be added to the total default amount that will then be allocated to PJM members according to OA sections 15.1.2A(1) and 15.2.2. On July 26, 2018, PJM filed a waiver request at FERC asking that PJM only be required to liquidate FTRs for the prompt months to allow Member discussion on how to proceed with GreenHat's large FTR portfolio.[11]

Market Performance

- **Volume.** The 2018/2021 Long Term FTR Auction cleared 345,506 MW (16.8 percent) of FTR buy bids, up 16.3 percent from 297,083 MW (13.6 percent) in the 2017/2020 Long Term FTR Auction. The Long Term

8 Daugherty, Suzanne, Email sent to the MC, MRC, CS and MSS email distribution list, "PJM Member Default – Amerigreen Energy, Inc.," (June 13, 2018).
9 Daugherty, Suzanne, Email sent to the MC, MRC, CS, and MSS email distribution list, "Notification of GreenHat Energy, LLC Payment Default," (June 22, 2018).
10 "PJM Manual 6: Financial Transmission Rights," Rev. 20 (June 1, 2018) at 47.
11 See "Request of PJM Interconnection, LLC for a waiver effective July 27, 2018," Docket No. ER18-2068 (July 26, 2018).

FTR Auction also cleared 42,555 MW (17.8 percent) of FTR sell offers, compared to 36,782 (17.6 percent), a 16.7 percent increase.

In the Annual FTR Auction for the 2018/2019 planning period 615,254 MW (21.2 percent) of buy and self schedule bids cleared, up 19.9 percent from 615,254 MW (22.3 percent) for the previous planning period. In the 2017/2018 planning period Monthly Balance of Planning Period FTR Auctions cleared 2,608,121.5 MW (13.6 percent) of FTR buy bids and1,149,260.9 MW (26.1 percent) of FTR sell offers.

- **Price.** The weighted average buy bid FTR price in the 2018/2021 Long Term FTR Auction was $0.03 per MW, down from $0.04 per MW for the 2017/2020 planning period. The weighted average buy bid FTR price in the Annual FTR Auction for the 2018/2019 planning period was $0.59 per MW, up from $0.51 per MW in the 2017/2018 planning period. The weighted average buy bid cleared FTR price in the Monthly Balance of Planning Period FTR Auctions for the 2017/2018 planning period was $0.13, up from $0.12 per MW for the same period in the 2016/2017 planning period.
- **Revenue.** The 2018/2021 Long Term FTR Auction generated $29.6 million of net revenue for all FTRs, up from $26.7 million for the 2017/2020 Long Term FTR Auction. The 2018/2019 Annual FTR Auction generated $822.6 million in net revenue, up from $542.2 million for the 2017/2018 Annual FTR Auction. The Monthly Balance of Planning Period FTR Auctions generated $40.3 million in net revenue for all FTRs for the 2017/2018 planning period, up from $32.5 million for the same time period in the 2016/2017 planning period.
- **Revenue Adequacy.** FTRs were paid at 100 percent of the target allocation level for the 2017/2018 planning period. This high level of revenue adequacy was at least partially a result of FERC redefining the FTR congestion calculation to exclude balancing congestion and M2M payments.
- **Profitability.** FTR profitability is the difference between the revenue received for an FTR and the cost of the FTR. In the 2017/2018 planning period, physical entities made $88.4 million in profits, while receiving $224.6 million in returned congestion from self scheduled FTRs, and financial entities made $246.3 million in profits.

Markets Timeline

Any PJM member can participate in the Long Term FTR Auction, the Annual FTR Auction and the Monthly Balance of Planning Period FTR Auctions.

Table 13-2 shows the date of first availability and final closing date for all annual ARR and FTR products.

Table 13-2 Annual FTR product dates

Auction	Initial Open Date	Final Close Date
2019/2022 Long Term	6/4/2018	12/12/2018
2018/2019 ARR	3/5/2018	4/6/2018
2018/2019 Annual	4/10/2018	5/7/2018

Recommendations

- The MMU recommends that the ARR/FTR design be modified to ensure that the rights to all congestion revenues are assigned to load. (Priority: High. First reported 2015. Status: Not adopted.)
- The MMU recommends that Long Term FTR Market be modified so that the supply of prevailing flow FTRs in the Long Term FTR Market is based solely on counter flow offers in the Long Term FTR Market. (Priority: High. First reported 2017. Status: Not adopted.)
- The MMU recommends that the full capability of the transmission system be allocated as ARRs prior to sale as FTRs. Reductions for outages and increased system capability should be reserved for ARRs rather than sold in the Long Term FTR Auction. (Priority: High. First reported 2017. Status: Not adopted.)
- The MMU recommends that all FTR auction revenue be distributed to ARR holders, regardless of FTR funding levels. (Priority: High. First reported 2015. Status: Not adopted.)

- The MMU recommends that, under the current FTR design, all congestion revenue in excess of FTR target allocations be distributed to ARR holders on a monthly basis. (Priority: High. First reported Q1, 2018. Status: Not adopted.)
- The MMU recommends that FTR auction revenues not be used to buy counter flow FTRs for the purpose of improving FTR payout ratios.[12] (Priority: High. First reported 2015. Status: Not adopted.)
- The MMU recommends that all historical generation to load paths be eliminated as a basis for allocating ARRs. (Priority: High. First reported 2015. Status: Not adopted.)
- The MMU recommends that PJM eliminate portfolio netting to eliminate cross subsidies among FTR market participants. (Priority: High. First reported 2012. Status: Not adopted. Rejected by FERC.)
- The MMU recommends that PJM eliminate subsidies to counter flow FTRs by applying the payout ratio to counter flow FTRs in the same way the payout ratio is applied to prevailing flow FTRs. (Priority: High. First reported 2012. Status: Not adopted.)
- The MMU recommends that PJM eliminate geographic cross subsidies. (Priority: High. First reported 2013. Status: Not adopted.)
- The MMU recommends that PJM apply the FTR forfeiture rule to up to congestion transactions consistent with the application of the FTR forfeiture rule to increment offers and decrement bids. (Priority: High. First reported 2013. Status: Adopted 2017)
- The MMU recommends that PJM examine the mechanism by which self scheduled FTRs are allocated when load switching among LSEs occurs throughout the planning period. (Priority: Low. First reported 2011. Status: Not adopted.)
- The MMU recommends that PJM improve transmission outage modeling in the FTR auction models, including the use of probabilistic outage modeling. (Priority: Low. First reported 2013. Status: Not adopted.)
- The MMU recommends that PJM reduce FTR sales on paths with persistent overallocation of FTRs including clear rules for what defines persistent overallocation and how the reduction will be applied. (Priority: High. First reported 2013. Status: Partially adopted, 2014/2015 planning period.)
- The MMU recommends that PJM report correct monthly payout ratios to reduce understatement of payout ratios on a monthly basis. (Priority: Low. First reported 2012. Status: Adopted 2016.)
- The MMU recommends that PJM review the FTR liquidation process. (Priority: High. New recommendation. Status: Not adopted.)

12 See "PJM Manual 6: Financial Transmission Rights," Rev. 20 (June. 1, 2018) at 55.

Conclusion

The annual ARR allocation should be designed to ensure that the rights to all congestion revenues are assigned to firm transmission service customers, without requiring contract path physical transmission rights that are impossible to define and enforce in LMP markets. The fixed charges paid for firm transmission services result in the transmission system which provides physically firm transmission service which results in the delivery of low cost generation which results, in an LMP system, in load paying congestion revenues.

After the introduction of LMP markets, financial transmission rights (FTRs) permitted the loads which pay for the transmission system to continue to receive the benefits of firm low cost generation delivered using the transmission system, in the form of revenues which offset congestion. Financial transmission rights and the associated revenues were directly provided to loads in recognition of the fact that loads pay for the transmission system which permits low cost generation to be delivered to load and loads pay congestion. Another way of describing the result is that FTRs and the associated revenues were directly provided to loads in recognition of the fact that load pays locational prices which result in load payments in excess of generation revenues which are the source of congestion revenues in an LMP market. In other words, load payments in excess of generation revenues are the source of the funds used to pay FTRs. In an LMP system, the only way to ensure that load receives the benefits associated with the use of the transmission system to deliver low cost energy is to use FTRs to pay back to load the difference between the total load

payments and the total generation revenues, which equals total congestion revenues.

With the creation of ARRs, FTRs no longer serve their original function of providing firm transmission customers the financial equivalent of physically firm transmission service. With the creation of ARRs and the creation of FTRs as a derivative product, the purchasers of FTRs do not pay for firm transmission service, do not have the right to financially firm transmission service and do not have the right to revenue adequacy.

As a result of the creation of ARRs and other changes to the design, the current ARR/FTR design does not serve as an efficient way to ensure that load receives the rights to all the congestion revenues and has the ability to receive the auction revenues associated with all the potential congestion revenues.

Total ARR and self scheduled FTR revenue offset 63.8, 86.5 and 98.1 percent of total congestion costs including congestion in the Day-Ahead Energy Market and the balancing energy market for the 2014/2015, 2015/2016 and 2016/2017 planning periods. The results for 2016/2017 resulted from the FTR Market expecting higher congestion than was realized. Day-ahead congestion was down 19.3 percent and balancing congestion was down 41.9 percent between the 2015/2016 and 2016/2017 planning periods. The FTR auction cleared, relative to realized congestion, at a higher relative price in 2016/2017 than in 2014/2015.

In the 2014/2015, 2015/2016 and 2016/2017 planning periods, PJM significantly reduced the allocation of ARR capacity, and FTRs, in order to guarantee full FTR funding. PJM reduced system capability in the FTR auction model by including more outages, reducing line limits and including additional constraints. PJM's modeling changes resulted in significant reductions in Stage 1B and Stage 2 ARR allocations, a corresponding reduction in the available quantity of FTRs, a reduction in congestion revenues assigned to ARRs, and an associated surplus of congestion revenue relative to FTR target allocations. This also resulted in a significant redistribution of ARRs among ARR holders based on differences in allocations between Stage 1A and Stage 1B ARRs. Starting in the 2017/2018 planning period, with the allocation of balancing congestion and M2M payments to load rather than FTRs, PJM increased system capability allocated to Stage 1B and Stage 2 ARRs, but continued to conservatively select outages to manage FTR funding levels.

Load should never be required to subsidize payments to FTR holders, regardless of the reason. Such subsidies have been suggested repeatedly.[13] The FERC order of September 15, 2016, introduced a subsidy to FTR holders at the expense of ARR holders.[14] The order requires PJM to ignore balancing congestion when calculating total congestion dollars available to fund FTRs. As of the 2017/2018 planning period, as a result of the FERC order, balancing congestion and M2M payments are assigned to load, rather than to FTR holders. The Commission's order shifts substantial revenue from load to the holders of FTRs and reduces the ability of load to offset congestion. This approach ignores the fact that loads must pay both day-ahead and balancing congestion and that congestion is defined, in an accounting sense, to equal the sum of day-ahead and balancing congestion. Eliminating balancing congestion from the FTR revenue calculation requires load to pay twice for congestion. Load will have to continue paying for the physical transmission system, will have to continue paying in excess of generator revenues and load will not have balancing congestion included in the calculation of congestion.

These changes were made in order to increase the payout to holders of FTRs who are not loads. In other words, load will continue to be the source of all the funding for FTRs, while payments to FTR holders who did not receive ARRs exceed total congestion on their FTR paths and result in profits to FTR holders.

Load was made significantly worse off as a result of the changes made to the FTR/ARR process by PJM based on the FERC order of September 15, 2016. ARR revenues were significantly reduced for the 2017/2018 FTR Auction, the first auction under the new rules. ARRs and self scheduled FTRs offset 50.7 percent of total congestion costs for the 2017/2018 planning period rather than the 55.6 percent offset that would have occurred under the prior rules, a

13 See FERC Dockets Nos. EL13-47-000 and EL12-19-000.
14 See 156 FERC ¶ 61,180 (2016), *reh'g denied*, 156 FERC ¶ 61,093 (2017).

difference of $124.9 million. There was a significant amount of congestion in January 2018 which adversely affected the congestion offset value of ARRs. ARR revenue is fixed at annual auction prices, but congestion revenue varies with congestion. The net increase in ARR value from the reassignment of balancing congestion and M2M payments to load, as predicted by proponents of the reassignment, did not occur.

If these allocation rules had been in place beginning with the 2011/2012 planning period, ARR holders would have received a total of $1,159.1 million less in congestion offsets from the 2011/2012 through the 2017/2018 planning period. The total overpayment to FTR holders for the 2011/2012 through 2017/2018 planning period would have been $1,315.1 million. The underpayment to load and the overpayment to FTR holders is a result of several factors in the rules, all of which mean the transfer of revenues to FTR holders and the shifting of costs to load. Load is now required to pay for balancing congestion, which significantly increases costs to load and significantly increases revenues paid to FTR holders while degrading the ability of ARRs to provide a predictable offset to congestion costs. PJM will continue to clear counter flow FTRs using auction revenues greater than the ARR target allocations in order to make it possible to sell more prevailing flow FTRs. FTR holders will also receive day-ahead congestion revenues in excess of target allocations. FTR holders will also receive additional auction revenue, which is what FTR holders were willing to pay for FTRs above what is provided to ARR holders through ARR target allocations on defined paths.

Beginning with the 2018/2019 planning period, surplus auction revenue, which is defined as day-ahead congestion revenue and surplus auction revenue remaining after funding FTRs, will be allocated to ARRs pro-rata based on ARR target allocations.[15] This surplus revenue is generated by a failure of the current ARR/FTR construct to make all congestion revenue rights available to load in the form of ARRs. All congestion revenue belongs to ARR holders and PJM's new surplus congestion allocation rule is an attempt to get closer to that goal. However, under the current rules, ARR holders will only have access to this surplus after full funding of FTRs is accomplished, which does not fully recognize ARR holders' primary rights to this surplus congestion revenue. If this rule had been in effect for the 2017/2018 planning period, ARRs and FTRs would have offset 76.8 percent of total congestion rather than 50.7 percent.

Revenue adequacy has received a lot of attention in the PJM FTR Market. There are several factors that can affect the reporting, distribution of and quantity of funding in the FTR Market. Revenue adequacy is misunderstood. FTR holders, with the creation of ARRs, do not have the right to financially firm transmission service and FTR holders do not have the right to revenue adequacy even when defined correctly. Load does have those rights based on load's payment for the transmission system and load's payment of total congestion.

Clearing prices fell and cleared quantities increased from the 2010/2011 planning period through the 2013/2014 planning period. The market response to lower revenue adequacy was to reduce bid prices and to increase bid volumes and offer volumes. In the 2014/2015, 2015/2016 and 2016/2017 planning periods, due to reduced ARR allocations resulting from PJM's actions to manage FTR revenue, FTR volume decreased relative to the 2013/2014 planning period. The reduction in ARR allocations and resulting FTR volume caused, by definition, an improvement in revenue adequacy, and also resulted in an increase in the prices of FTRs. Increased FTR prices resulted in increased ARR target allocations, because ARR target allocations are based on the Annual FTR Auction nodal prices. Beginning in the 2017/2018 planning period, based on the reallocation of balancing congestion and M2M payments to load, PJM reduced outages in the Annual FTR Auction model. This increased FTR capability, but ARR target allocations decreased due to lower FTR clearing prices.

FTR target allocations are currently netted within each organization in each hour. This means that within an hour, positive and negative target allocations within an organization's portfolio are offset prior to the application of the payout ratio to the positive target allocation FTRs. The payout ratios are also calculated based on these net FTR positions. The current method requires those participants with fewer negative target allocation FTRs to subsidize those with

15 163 FERC ¶61,165 (2018).

more negative target allocation FTRs. The current method treats a positive target allocation FTR differently depending on the portfolio of which it is a part. The correct method would treat all FTRs with positive target allocations exactly the same, which would eliminate this form of cross subsidy. This should also be extended to include the end of planning period FTR uplift calculation. The net of a participant's portfolio should not determine their FTR uplift liability, rather their portion of total positive target allocations should be used to determine a participant's uplift charge. The FTR Market cannot work efficiently if FTR buyers do not receive payments consistent with the performance of their FTRs. Eliminating the portfolio subsidy would be a good first step in that direction.

The current rules create an asymmetry between the treatment of counter flow and prevailing flow FTRs. Counter flow FTR holders make payments over the planning period, in the form of negative target allocations. These negative target allocations are paid at 100 percent regardless of whether positive target allocation FTRs are paid at less than 100 percent.

There is no reason to treat counter flow FTRs more favorably than prevailing flow FTRs. Counter flow FTRs should also be affected when the payout ratio is less than 100 percent. This would mean that counter flow FTRs would pay back an increased amount that mirrors the decreased payments to prevailing flow FTRs. The adjusted payout ratio would evenly divide the impact of lower payouts among counter flow FTR holders and prevailing flow FTR holders by increasing negative counter flow target allocations by the same amount it decreases positive target allocations. The FTR Market cannot work efficiently if FTR buyers do not receive payments consistent with the performance of their FTRs. Eliminating the counter flow subsidy would be another good step in that direction. The MMU recommends that counter flow and prevailing flow FTRs be treated symmetrically with respect to the application of a payout ratio.

The overallocation of Stage 1A ARRs results in FTR overallocations on the same facilities. While Stage 1A overallocation has been reduced, Stage 1A ARR overallocation is a source of reduced revenue and cross subsidy.

The MMU recommends that the basis for the Stage 1A assignments be reviewed and made explicit and that the role of out of date generation to load paths be reviewed beyond the replacement of retired generation that was implemented. There is a reason that transmission is not built to address the Stage 1A overallocation issue. PJM's transmission planning process (RTEP) does not identify a need for new transmission because there is, in fact, no need for new transmission associated with Stage 1A ARRs. The Stage 1A overallocation issue is a fiction based on the use of outdated and irrelevant generation to load paths to assign Stage 1A rights that have nothing to do with actual power flows.

In addition to addressing these issues, the approach to the question of FTR funding should also examine the fundamental reasons that there has been a significant and persistent difference between day-ahead and balancing congestion. These reasons include the inadequate transmission outage modeling in the annual and long term FTR auction models; the different approach to transmission line ratings in the day-ahead and real–time markets, including reactive interfaces, which directly results in differences in congestion between day-ahead and real-time markets; differences in day-ahead and real–time modeling including different line ratings, the treatment of loop flows, the treatment of outages, the modeling of PARs and the nodal location of load, which directly results in differences in congestion between day–ahead and real-time markets; the overallocation of ARRs which directly results in a difference between congestion revenue and the payment obligation; geographic subsidies from the holders of positively valued FTRs in some locations to the holders of consistently negatively valued FTRs in other locations; the contribution of up to congestion transactions to the differences between day-ahead and balancing congestion and thus to FTR payout ratios; the payment of congestion revenues to UTCs; and the continued sale of FTR capability on pathways with a persistent difference between FTR target allocations and total congestion revenue. The MMU recommends that these issues be reviewed and modifications implemented. Regardless of how these issues are addressed, funding issues that persist as a result of modeling differences and flaws in the design of the FTR Market should be borne by

FTR holders operating in the voluntary FTR Market and not imposed on load through the mechanism of balancing congestion.

It is not clear, in a competitive market, why FTR purchases by financial entities remain persistently profitable. In a competitive market, it would be expected that profits would be competed away. It is also not clear, in a competitive market, why the ownership structure of long term FTRs is so highly concentrated for the three year product and why participation in the Long Term FTR Auction continues to be very low for the second and third year long term product. The apparent lack of competition to purchase Long Term FTRs (three year product), results in low prices when compared to the resale prices in Annual FTR Auctions. In a competitive market the price of Long Term FTRs would be expected to converge with the prices of Annual FTRs, but there has been a persistent, wide divergence that has made the purchase of Long Term FTRs persistently very profitable.

It has become increasingly clear that the long term FTR auction structure should be significantly modified. The value of congestion rights sold in the long term FTR auction are not available to load via ARRs. The Long Term FTR auction sells congestion rights that are not allocated to ARR holders. These congestion rights are not available to ARR holders in the annual ARR allocation because the outages included in the annual auction are not included in the long term FTR auction model and because scheduled system upgrades are not included in the annual FTR auction model but are included in the long term FTR auction model. Even the additional revenue from the sale of these congestion rights are not returned to ARR holders. An estimate of the value of these congestion rights is based on the difference in price for congestion rights between the annual auction and the long term auction for the same years. The prices in the Long Term FTR Auction are much lower than those in the Annual FTR Auction. The difference in revenue over the previous four planning periods was $361.4 million. There is no reason to continue to fail to assign congestion rights to load and to make it available solely to the purchasers of long term FTRs.

Auction Revenue Rights

ARRs are the financial instruments through which the proceeds from FTR Auctions are allocated to load based on load's payment for the transmission system and for load's payment of congestion. ARR values are based on nodal price differences between the ARR source and sink points in the FTR Auction.[16] These price differences are based on the bid prices of participants in the Annual FTR Auction. The auction clears the set of feasible FTR bids which produce the highest net revenue. ARR revenues are a function of FTR auction participants' expectations of locational congestion price differences and the associated level of revenue adequacy and their assessment of competitive conditions in the FTR Market. ARR revenues are also a function of the level of system capability made available by PJM for sale in FTR auctions. PJM has significant discretion over that level of system capability. The appropriate goals of that discretion need to be defined more clearly in the tariff. PJM has made substantial system capability available in the Long Term FTR Auctions, for example, that was never available to ARR holders.

ARRs are available only as obligations (not options) and only as a 24 hour product. 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 price difference between sink and source, with a negative difference resulting in a liability for the holder. The ARR target allocation represents the revenue that an ARR holder would receive based on the FTR auction price differences. 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 greater than the sum of all ARR target allocations, ARRs are fully funded. If these revenues are less than the sum of all ARR target allocations, available revenue is proportionally allocated among all ARR holders. If there are auction revenues greater than the ARR target allocations, the revenue is currently incorrectly treated as surplus and given to FTR holders. ARR revenues result from the sale of congestion rights that belong to ARR holders.

16 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.

All ARR revenues should therefore be allocated to ARR holders and not used to fund FTRs.

The goal of the ARR/FTR design should be to provide an efficient mechanism to ensure that load receives the rights to all the congestion revenues, and has the ability to receive the auction revenues associated with all the potential congestion revenues whether through self scheduling or selling the rights to FTR holders. The MMU recommends that all FTR auction revenues be allocated to ARR holders.

When a new control zone is integrated into PJM, firm transmission customers in that control zone may 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 not eligible for directly allocated FTRs. Network service users and firm transmission customers cannot choose to receive both an FTR allocation and an ARR allocation. This selection applies to the participant's entire portfolio of ARRs that sink into the new control zone. During this transitional period, the directly allocated FTRs are reallocated, as load shifts between LSEs within the transmission zone.

Incremental ARRs (IARRs) are allocated to customers that have been assigned cost responsibility for certain upgrades included in the PJM's Regional Transmission Expansion Plan (RTEP). These customers as defined in Schedule 12 of the Tariff are network service customers and/or merchant transmission facility owners that are assigned the cost responsibility for upgrades included in the PJM RTEP. PJM calculates IARRs for each regionally assigned facility and allocates the IARRs, if any are created by the upgrade, to eligible customers based on their percentage of cost responsibility. The customers may choose to decline the IARR allocation during the annual ARR allocation process.[17] Each network service customer within a zone is allocated a share of the IARRs in the zone based on their share of the network service peak load of the zone.

17 "PJM Manual 6: Financial Transmission Rights," Rev. 20 (June. 1, 2018) at 31; "IARRs for RTEP Upgrades Allocated for 2016/2017 Planning Period," <http://www.pjm.com/~/media/markets-ops/ftr/annual-arr-allocation/2018-2019/2018-2019-iarrs-for-rtep-upgrades-allocated.ashx>.

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 2003/2004 planning period. The initial allocation covered the Mid-Atlantic Region and the APS Control Zone. For the 2006/2007 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 2007/2008 and subsequent planning periods through the present, all eligible market participants were allocated ARRs.

Supply and Demand

System capability available to ARR holders is limited by the system capability made available in PJM's annual FTR transmission system market model. PJM's annual FTR transmission market model represents annual, expected system capability, modified by PJM to achieve PJM's goal of guaranteeing revenue equal to target allocations for FTRs, and subject to the requirement that all Stage1A ARR requests must be allocated. Stage 1A ARR right requests are guaranteed and system capability necessary to accommodate the rights must be included in PJM's annual FTR transmission system market model.

ARR Allocation

For the 2007/2008 planning period, the annual ARR allocation process was revised to include Long Term ARRs that would be in effect for 10 consecutive planning periods.[18] Stage 1A ARRs can give LSEs the ability to offset their congestion costs, through the return of congestion revenues, on a long-term basis. Stage 1B and Stage 2 ARRs provide a method for ARR holders to have more congestion revenues returned to them in the planning period, but may be prorated. ARR holders can self schedule ARRs as FTRs during the Annual FTR Auction.

Each March, PJM allocates annual ARRs to eligible customers in a three stage process:

18 See *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.

- **Stage 1A.** In the first stage of the allocation, network transmission service customers can obtain ARRs, up to their share of Zonal Base Load, which is the lowest daily peak load in the prior twelve month period increased by load growth projections. The amount of Stage 1A ARRs a participant can request is based on generation to load paths that reflect generation resources that had historically served load, or their qualified replacements if the resource has retired, in the historical reference year for the zone. The historical reference year is the year prior to the creation of PJM markets, which is 1999 for the original zones, or the year in which a zone joined PJM. Firm, point to point transmission service customers can obtain Stage 1A ARRs, up to 50 percent of the MW of firm, point to point transmission service provided between the receipt and delivery points for the historical reference year. Stage 1A ARRs cannot be prorated. If Stage 1A ARRs are found to be infeasible, transmission system upgrades must be undertaken to maintain feasibility.[19]
- **Stage 1B.** Transmission capacity unallocated in Stage 1A is available in the Stage 1B allocation for the planning period. Network transmission service customers can obtain ARRs up to their share of zonal peak load, which is the highest daily peak load in the prior twelve month period increased by load growth projections, based on generation to load paths and up to the difference between their share of zonal peak load and Stage 1A allocations. 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.
- **Stage 2.** Stage 2 of the annual ARR allocation allocates the remaining system capability equally in three steps. 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 up to their total peak network load in that zone. Firm, point to point transmission service customers can obtain ARRs consistent with their transmission service as in Stage 1A and Stage 1B.

19 See "PJM Manual 6: Financial Transmission Rights," Rev. 20 (June 1, 2018) at 22.

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.[20] Participants may seek additional ARRs in the Stage 2 allocation.

Effective for the 2015/2016 planning period, when residual zone pricing was introduced, an ARR will default to sinking at the load settlement point if different than the zone, but the ARR holder may elect to sink their ARR at the zone instead.[21]

ARRs can be traded between LSEs prior to the first round of the Annual FTR Auction. Traded ARRs are effective for the full 12 month planning period.

When ARRs are allocated after Stage 1A, all ARRs must be simultaneously feasible, meaning that the modeled transmission system can support the approved set of ARRs. In making simultaneous feasibility determinations, PJM utilizes a power flow model of security constrained dispatch based on assumptions about generation and transmission outages.[22] PJM adjusts outages, line limits and closed loop interfaces to achieve target revenues. The simultaneous feasibility requirement is intended to ensure that there are adequate revenues collected from the FTR auction to satisfy all ARR obligations. 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, except Stage 1A ARRs:

Equation 13-1 Calculation of prorated ARRs[23]

$$MW = Constraint\ Capability\ x \left(\frac{Individual\ Requested\ MW}{Total\ Requested\ MW}\right) x \left(\frac{1}{MW\ impact\ on\ line}\right)$$

20 *Id.* at 21.
21 *See* "Residual Zone Pricing," PJM Presentation to the Members Committee (February 23, 2012) <http://www.pjm.com/~/media/committees-groups/committees/mc/20120223/20120223-item-03-residual-zone-pricing-presentation.ashx>.
22 "PJM Manual 6: Financial Transmission Rights," Rev. 20 (June. 1, 2018) at 56–57.
23 See the *MMU Technical Reference for PJM Markets*, at "Financial Transmission Rights and Auction Revenue Rights," for an illustration explaining this calculation in greater detail. <http://www.monitoringanalytics.com/reports/Technical_References/references.shtml>.

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 ARR MW that would have a power flow on the binding constraint. The PJM method prorates ARR requests in proportion to their MW value and the impact on the binding constraint. The PJM method prorates only ARRs that cause the greatest flows on the binding constraint. Were all ARR requests prorated equally, regardless of their impact on the binding constraints, the result would reduce allocated ARRs below actually available ARRs.

FERC Order EL16-121: Stage 1A ARR Allocation

FERC ordered PJM to remove retired resources from the generation to load paths used to allocate Stage 1A ARRs.[24] PJM replaced retired units with operating generators, termed qualified replacement resources (QRRs).[25]

The method PJM implemented continues to rely on a contract path based approach. PJM only replaced retired generators, so over allocations may persist due to inaccurate generation to load paths. Existing Stage 1A resources will be given their current allocations, while ARR allocations to QRRs that replace retired Stage 1A resources will be prorated based on the feasibility of these ARRs after existing resources are allocated. As a result of this proration, the new ARRs will have lower priority than the preexisting Stage 1A resources, which could affect the value of the newly assigned ARRs.

FTR Revenue Adequacy and Stage 1B/Stage 2 ARR Allocations

For the 2014/2015, 2015/2016, 2016/2017 and 2017/2018 planning periods, FTR revenue adequacy was over 100 percent. Not every month was revenue adequate, but there was additional revenue from other months to ensure that the planning period was revenue adequate. The last time there were four months of consecutive funding of 100 percent or more was in the 2009/2010 planning period.

This high level of revenue adequacy was primarily a result of PJM actions. PJM's conservative modeling is intended to guarantee that FTR target allocations are, on an annual basis, less than congestion collected on the system by underallocating expected system capability in the ARR/FTR model. PJM's conservative modeling actions included the arbitrary use of higher outage levels and the decision to include additional constraints (closed loop interfaces) both of which reduced system capability in the FTR auction model. PJM's actions led to a significant reduction in the allocation of Stage 1B and Stage 2 ARRs and therefore a reduction in available FTRs.

While PJM's approach to outages in the ARR allocation and in the Annual FTR Auction reduces revenue inadequacy, it does not address the Stage 1A ARR overallocation issue directly because Stage 1A ARR allocations cannot be prorated. PJM's actions have resulted in decreased Stage 1B ARR allocations, decreased Stage 2 ARR allocations and decreased FTR capability for the 2014/2015 through 2016/2017 planning periods. Over these three planning periods PJM modeled fewer outages each subsequent planning period, resulting in more ARR and FTR availability. Following the assignment of balancing congestion and M2M payments to load beginning in the 2017/2018 planning period, PJM further reduced the number of outages taken in the ARR allocation and in the Annual FTR Auction, increasing ARR allocations and FTR availability.

Figure 13-1 shows the historic allocations for Stage 1B and Stage 2 ARRs from the 2011/2012 to 2017/2018 planning periods. There was an 84.9 percent decrease in Stage 1B ARRs allocated and an 88.1 percent decrease in total Stage 2 ARR allocations from the 2013/2014 planning period to the 2014/2015 planning period. Total Stage 1B and Stage 2 ARR allocations increased slightly in the 2015/2016 planning year over the 2014/2015 planning year allocations, from 3,497.6 MW to 5,219.6 MW. But the ARR allocations for the 2015/2016 planning year were still 78.8 percent below 2013/2014 planning period volumes of 34,444.0 MW. For the 2016/2017 planning period there was another relatively small increase in available Stage 1B and Stage 2 capacity from 5,319.6 MW to 12,821.6 MW, but available ARRs were still 48.9 percent

24 156 FERC ¶ 61,180 (2016).
25 See FERC Docket No. EL16-6-003.

below 2013/2014 planning period volumes. After the 2017/2018 planning period, Stage 1B and Stage 2 ARRs returned to historical volumes.

Figure 13-1 Historic Stage 1B and Stage 2 ARR Allocations: 2011/2012 through 2018/2019

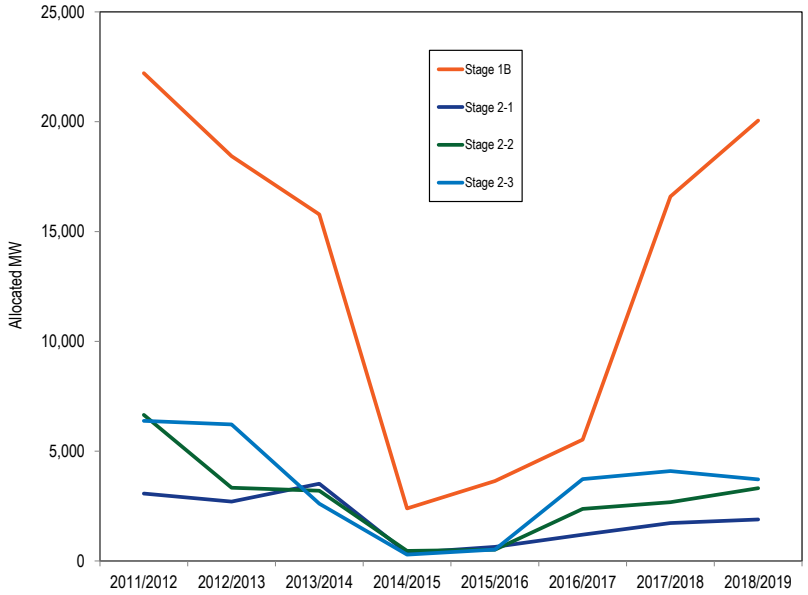


Table 13-3 shows the ARR allocations for the 2011/2012 through 2018/2019 planning periods.

Table 13-3 Historic Stage 1B and Stage 2 ARR Allocations: 2011/2012 through 2018/2019

Stage	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019
Stage 1A	64,159.9	67,299.6	67,861.4	68,837.7	71,874.0	69,089.1	70,874.7	70,181.8
Stage 1B	22,208.3	18,431.7	15,782.0	2,389.6	3,643.1	5,525.7	16,592.3	20,053.6
Stage 2-1	3,072.5	2,700.6	3,519.2	360.9	643.8	1,197.1	1,725.0	1,892.3
Stage 2-2	6,652.6	3,334.3	3,200.0	455.9	511.2	2,368.8	2,675.0	3,313.8
Stage 2-3	6,382.6	6,218.7	2,611.8	291.2	521.5	3,730.0	4,093.0	3,716.0
Total Stage 2	16,107.7	12,253.6	9,331.0	1,108.0	1,676.5	7,295.9	8,493.0	8,922.1
Total Allocations	102,475.9	97,984.9	92,974.4	72,335.3	77,193.6	81,910.7	95,960.0	99,157.5

ARR Reassignment for Retail Load Switching

PJM rules provide that when load switches between LSEs during the planning period, a proportional share of associated ARRs that sink in a given control or load aggregation zone is automatically reassigned to follow that load.[26] ARR reassignment occurs daily 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. ARRs are reassigned to the nearest 0.001 MW and may be reassigned multiple times over a planning period. Residual ARRs are also subject to reassignment. This practice supports competition by ensuring that the offset to 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, the self scheduled FTRs do not follow load that shifts while the ARRs do follow load that shifts, and this may result in lower value of the ARRs for the receiving LSE compared to the total value held by the original ARR holder.

There were 44,056 MW of ARRs associated with $492,500 of revenue that were reassigned in the 2016/2017 planning period. There were 44,823 MW of ARRs associated with $339,500 of revenue that were reassigned for the 2017/2018 planning period.

Table 13-4 summarizes ARR MW and associated revenue reassigned for network load in each control zone where changes occurred between June 2016 and May 2018.

26 See "PJM Manual 6: Financial Transmission Rights," Rev. 20 (June 1, 2018) at 29-30.

Table 13-4 ARRs and ARR revenue automatically reassigned for network load changes by control zone: June 2016 through May, 2018

	ARRs Reassigned (MW-day)		ARR Revenue Reassigned [Dollars (Thousands) per MW-day]	
Control Zone	2016/2017 (12 months)	2017/2018 (12 months)	2016/2017 (12 months)	2017/2018 (12 months)
AECO	451	438	$4.0	$3.2
AEP	1,952	2,271	$11.8	$13.0
APS	1,617	1,660	$33.4	$19.7
ATSI	8,415	6,235	$45.8	$20.6
BGE	2,213	2,688	$131.5	$57.7
ComEd	3,468	4,519	$113.9	$77.0
DAY	821	1,565	$2.4	$2.8
DEOK	3,335	4,318	$19.1	$23.4
DLCO	5,464	5,995	$12.9	$18.5
DPL	1,538	1,865	$31.3	$36.5
Dominion	55	13	$0.2	$0.1
EKPC	0	0	$0.0	$0.0
JCPL	1,105	1,146	$3.7	$2.4
Met-Ed	825	678	$6.8	$5.6
PECO	3,468	3,226	$8.8	$11.1
PENELEC	1,150	696	$17.3	$7.3
PPL	4,055	3,447	$5.0	$3.2
PSEG	1,640	1,495	$23.0	$18.6
Pepco	2,419	2,423	$21.3	$18.9
RECO	65	147	$0.1	$0.0
Total	44,056	44,823	$492.5	$339.5

Residual ARRs

Residual ARRs are available if transmission system capability is added during the planning period after the annual ARR allocation if the additional transmission system capability was not accounted for in the annual ARR allocation. Residual ARRs are effective on the first day of the month in which the additional transmission system capability is available and through the end of the planning period. For the following planning period, these Residual ARRs are available as ARRs in the annual ARR allocation. Residual ARRs are a separate product from incremental ARRs.

Stage 1 ARR holders have a priority right to Residual ARRs, which cannot be declined. Beginning with the June 2017 monthly auction, Residual ARRs that would have cleared with a negative target allocation are not assigned to participants.[27] Effective August 1, 2012, Residual ARRs are also available for eligible participants when a transmission outage was modeled in the Annual ARR Allocation, but the transmission facility becomes available during the modeled year. Residual ARRs awarded due to outages are effective for single, whole months and cannot be self scheduled. Residual ARR target allocations are based on the clearing prices from FTR obligations in the relevant monthly auction, may not exceed zonal network services peak load or firm transmission reservation levels and are only available up to the prorated ARR MW capacity as allocated in the Annual ARR Allocation.

Table 13-5 shows the Residual ARRs (cleared volume) allocated to participants, along with the target allocations (bid and requested) from the effective month. In the 2017/2018 planning period, PJM allocated a total of 39,596.4 MW of residual ARRs with a target allocation of $17.5 million. In the 2016/2017 planning period planning period, PJM allocated a total of 35,034.9 MW of residual ARRs, up from 30,118.1 MW for the 2015/2016 planning period. Residual ARRs had a total target allocation of $7.0 million for the 2016/2017 planning period, down from $7.7 million for the 2015/2016 planning period. In prior planning years, PJM's modeling of excess outages resulted in the allocation of some ARRs that could have been allocated in Stage 1B being allocated as Residual ARRs on a month to month basis without the option to self schedule.

Table 13-5 Residual ARR allocation volume and target allocation: 2018

Month	Available Volume (MW)	Cleared Volume (MW)	Cleared Volume	Target Allocation
Jan-18	8,482.2	3,230.5	38.1%	$2,374,862
Feb-18	6,294.5	3,374.1	53.6%	$4,487,761
Mar-18	12,099.3	3,056.6	25.3%	$1,142,173
Apr-18	9,525.1	3,090.4	32.4%	$660,302
May-18	5,259.6	3,339.7	63.5%	$966,525
Total	41,660.7	16,091.3	38.6%	$9,631,623

27 See FERC Letter Order, "Revisions to cease awarding negative Residual Auction Revenue Rights," Docket No. ER17-1057 (April 5, 2017).

Market Performance

Volume

Table 13-6 shows the MW of ARR allocations for each round of the 2017/2018 and 2018/2019 planning periods. The percent cleared for the 2018/2019 planning period increased by 6.3 percentage points, indicating more requested ARRs cleared, while the total cleared volume increased by 3.3 percent.

Table 13-6 Annual ARR Allocation volume: 2017/2018 and 2018/2019

Planning Period	Stage	Round	Requested Count	Requested Volume (MW)	Cleared Volume (MW)	Cleared Volume	Uncleared Volume (MW)	Uncleared Volume
2017/2018	1A	0	26,182	70,944	70,875	99.9%	69	0.1%
	1B	1	16,465	43,487	16,592	38.2%	26,895	61.8%
	2	2	6,394	22,473	1,725	7.7%	20,748	92.3%
		3	6,168	22,116	2,675	12.1%	19,441	87.9%
		4	5,279	21,668	4,093	18.9%	17,575	81.1%
		Total	17,841	66,257	8,493	12.8%	57,764	87.2%
	Total		60,488	180,688	95,960	53.1%	84,728	46.9%
2018/2019	1A	0	29,763	70,187	70,182	100.0%	5	0.0%
	1B	1	17,496	37,203	20,054	53.9%	17,149	46.1%
	2	2	6,553	20,327	1,892	9.3%	18,435	90.7%
		3	5,039	19,420	3,314	17.1%	16,106	82.9%
		4	5,405	19,731	3,716	18.8%	16,015	81.2%
		Total	16,997	59,478	8,922	15.0%	50,556	85.0%
	Total		64,256	166,868	99,158	59.4%	67,710	40.6%

Stage 1A Infeasibility

Stage 1A ARRs are allocated for a 10 year period, with the ability for a participant to opt out of any planning period. PJM conducts a simultaneous feasibility analysis to determine the transmission upgrades required to ensure that the long term ARRs can remain feasible. The rules provide that if a simultaneous feasibility test violation occurs in any year, PJM will identify or accelerate any transmission upgrades to resolve the violation and these upgrades will be recommended for inclusion in the PJM RTEP process.[28] But such transmission upgrades are not actually built.

There is a reason that transmission is not actually built to address the Stage 1A overallocation issue. PJM's transmission planning process (RTEP) does not identify a need for new transmission associated with Stage 1A overallocations because there is, in fact, no need for new transmission associated with Stage 1A ARRs. The Stage 1A overallocation issue is a fiction based on the use of outdated and irrelevant generation to load paths to assign Stage 1A rights that have nothing to do with actual power flows. This continues to be true even with the replacement of retired generating units.

For the 2018/2019 planning period, Stage 1A of the Annual ARR Allocation was infeasible. As a result, modeled system capability, in excess of actual system capability, was provided to the Stage 1A ARRs and added to the FTR auction. According to Section 7.4.2 (i) of the OATT, the capability limits of the binding constraints rendering these ARRs infeasible must be increased in the model and these increased limits must be used in subsequent ARR and FTR allocations and auctions for the entire planning period, except in the case of extraordinary circumstances.

The result of this required increased capability in the models is an overallocation of ARRs for the entire planning period. Table 13-7 shows the MW quantity and count of overloaded facilities and the reasons for the modeled overload. In order to eliminate the infeasibilities for the requested Stage 1A ARR allocations, PJM was required to raise the modeled capacity limits on 76 facility/contingency pairs, 29 of which were internal to PJM and the rest were in MISO, a total of 7,374 MW.[29]

Table 13-7 Stage 1A overloaded facility reasons and MW

Reason	Type	MW	Count
Network Load	M2M Flowgate	2,556	35
Network Load	Pseudo Tie Flowgate	93	3
Transmission Outage	Internal PJM	3,622	29
Transmission Outage	M2M Flowgate	1,103	9

28 "PJM Manual 6: Financial Transmission Rights," Rev. 20 (June 1, 2018) at 22.

29 *PJM 2018/2019 Stage 1A Over allocation notice*, PJM FTRs, <http://www.pjm.com/-/media/markets-ops/ftr/annual-arr-allocation/2018-2019/2018-2019-stage-1a-over-allocation-notice.ashx?la=en> (June 13, 2018).

Figure 13-2 shows the predicted and estimated impact of Stage 1A infeasibilities on funding for the 2012/2013 through 2017/2018 planning periods, as well as the predicted impact on funding for the 2018/2019 planning period. The predicted funding is based on the infeasible ARR MW and the nodal price of the source and sink in the Annual FTR Auction. The estimated funding is calculated assuming every infeasible ARR MW is self scheduled, and uses the hourly congestion LMP values of the applicable day-ahead hours. In the 2016/2017 planning period, Stage 1A ARR infeasibilities accounted for $293.5 million in estimated over allocation. Predicted funding impacts are decreased in the 2017/2018 and 2018/2019 planning periods from the previous two planning periods, but still higher than the planning periods prior to the 2015/2016 planning period. PJM's newly implemented Qualified Replacement Resource rules may slightly reduce revenue inadequacy from Stage 1A ARRs, but do not eliminate the actual issues with historical Stage 1A resources.

Figure 13-2 Stage 1A Infeasibility funding impact

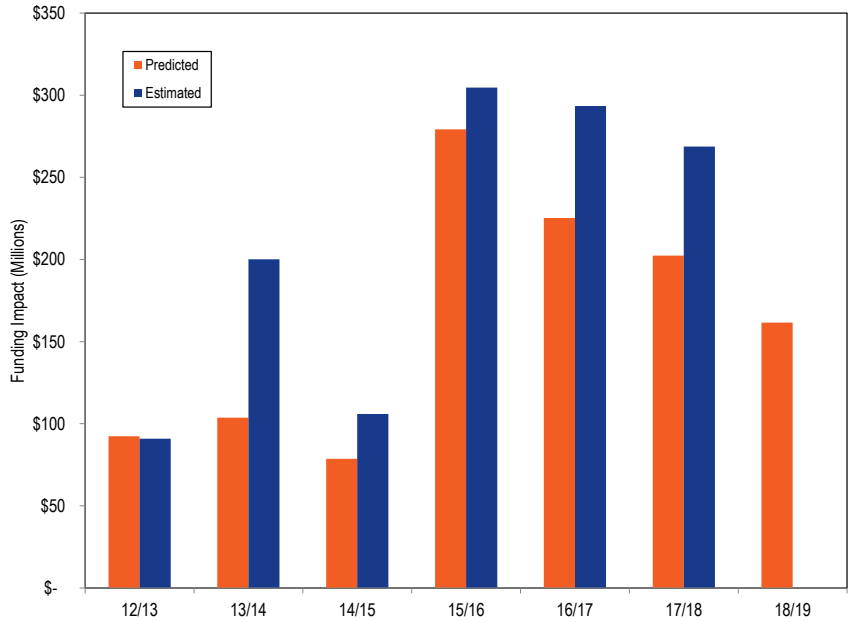


Table 13-8 shows the MW of retired generation sources for Stage 1A ARRs, the QRR MW assigned by PJM for all resources and the replacement MW that were considered rate-based.

Table 13-8 Qualified Replacement Resource results: 2018/2019

Zone	Historical Retired	Replacement (All)	Replacement (Rate-based)
AEP/DAY	7,287.1	6,250.4	1,838.3
ATSI	2,367.3	1,599.4	50.4
ComEd	5,646.8	4,451.2	4.5
DEOK	1,435.4	1,486.2	57.6
Dominion	1,507.0	1,204.3	1,015.3
DLCO	834.0	211.7	0.0
EKPC	198.1	229.3	0.0
Midatlantic	15,128.7	12,976.3	375.9
Total	34,404.4	28,408.8	3,342.0

Revenue

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

Table 13-9 shows the value of 2016/2017, 2017/2018 and 2018/2019 allocated ARRs at FTR prices from those planning periods. For example, in the 2017/2018 planning period, ARRs allocated in that planning period are expected to be worth a total of $1,147.1 million. The MMU calculates that the same allocated ARRs, but at 2016/2017 planning period prices, would have been worth $2,824.6 million. This substantial reduction in expected revenue from the same set of ARRs is a result of a significant reduction in FTR prices, and therefore ARR revenue, despite PJM's modeling decisions following the allocation of balancing congestion to load and exports. This trend continues to a lesser degree for the 2018/2019 ARR allocation. ARRs allocated for 2018/2019 are expected to be valued at $2,062.3 million, at 2016/2017 prices, before the reallocation of balancing congestion, would have been worth $3,149.8 million. The predicted net increase in value to ARR holders from shifting balancing congestion out of FTR funding did not occur in the 2018/2019 market results. Instead, ARR holders can now expect to

incur volatile, unexpected costs during the planning year while FTR holders experience increased profits and revenue stability during the planning year.[30]

Table 13-9 ARR Revenue at 2016/2017, 2017/2018 and 2018/2019 FTR prices

	2016/2017 ARRs	2017/2018 ARRs	2018/2019 ARRs
2016/2017 Value	$1,676,721,685	$2,824,564,581	$3,149,768,923
2017/2018 Value	$752,854,215	$1,147,082,005	$1,672,977,223
2018/2019 Value	$948,594,430	$1,384,260,419	$2,062,334,358

Revenue Adequacy

Revenue adequacy for ARRs must be distinguished from the adequacy of ARRs as an offset to total congestion. Revenue adequacy is a narrower and less relevant concept that compares the revenues available to ARR holders to the value of ARRs as determined in the Annual FTR Auction. ARRs have been revenue adequate for every auction to date. Customers that self schedule ARRs as FTRs have the same revenue adequacy characteristics as all other FTRs. ARRs can be revenue adequate at the same time that ARRs only return half of congestion to load.

Total net FTR auction revenue for the 2016/2017 planning period, before accounting for self scheduling, load shifts or residual ARRs, was $941.5 million. The FTR auction revenue collected pays ARR holders' credits. During the 2017/2018 planning period, total net FTR auction revenue was $601.2 million.

Table 13-10 lists projected ARR target allocations from the Annual ARR Allocation and net revenue sources from the Long Term, Annual and Monthly Balance of Planning Period FTR Auctions for the 2016/2017 planning period and the 2017/2018 planning periods.

30 *See* "Post-Technical Conference Comments of DC Energy, LLC; Inertia Power, LP; Saracen Energy East LP; and Vitol Inc.," Docket No. EL16-6 (March 15, 2016) at 28.

Table 13-10 Projected ARR revenue adequacy (Dollars (Millions)): 2016/2017 and 2017/2018

	2016/2017	2017/2018
Total FTR auction net revenue	$961.1	$601.2
Annual FTR Auction net revenue	$909.0	$542.2
Long Term FTR Auction net revenue	$20.8	$18.6
Monthly Balance of Planning Period FTR Auction net revenue	$31.3	$40.3
ARR target allocations	$914.2	$562.7
ARR credits	$914.2	$562.7
Surplus auction revenue	$46.9	$38.5
ARR payout ratio	100%	100%
FTR payout ratio	100%	100%

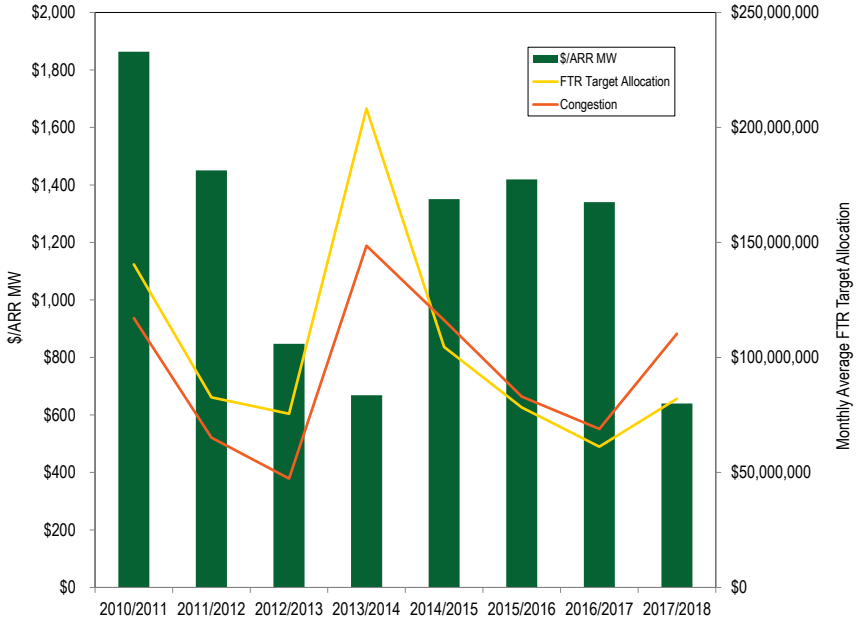
Figure 13-3 shows the dollars per ARR MW held for each month of the 2010/2011 planning period through the 2017/2018 planning period. The dollars per ARR MW held do not include self scheduled FTRs' target allocation related payouts, but do include Residual ARRs starting in August 2012.

FTR prices increased in the 2014/2015 Annual FTR Auction in part as as a result of reduced supply caused by PJM's assumption of more outages in the model used to allocate Stage 1B and Stage 2 ARRs. The increased FTR prices resulted in an increase in dollars paid per ARR MW. For the 2014/2015 planning period, the total dollars per MW of ARR allocation was $11,279, while the previous planning period resulted in a dollars per MW of $6,692, a 68.5 percent increase in payment per allocated ARR MW. Some of the ARR MW lost from proration were provided in the Residual ARR process, but the residual allocations are not comparable to the ARRs awarded in the annual process because residual ARR allocations change each month and cannot be self scheduled as FTRs. For the 2015/2016 planning period, the dollars per MW of ARR allocation was $10,641.54. For the 2016/2017 planning period, the dollars per MW of ARR allocation were $10,411.

The dollar per MW value of ARRs for the 2017/2018 planning period decreased 38.6 percent from the previous planning period. ARR value was expected to increase in the 2017/2018 planning period from higher FTR prices paid in expectation of increased revenue with no balancing congestion offset, but this increased value did not materialize. FTRs buyers paid less in total and

on a per MW basis. Figure 13-3 shows that the total congestion and FTR target allocations increased from last planning period, primarily from a very high congestion in January 2018, but that ARR value was significantly lower. Load is now paying balancing congestion costs, not accounted for in this figure, reducing revenue received by ARR holders while not receiving the asserted benefit of higher ARR value that proponents of balancing congestion reallocation had asserted would be forthcoming.

Figure 13-3 Dollars per ARR MW paid to ARR holders compared to congestion and FTR target allocations: 2010/2011 through 2017/2018

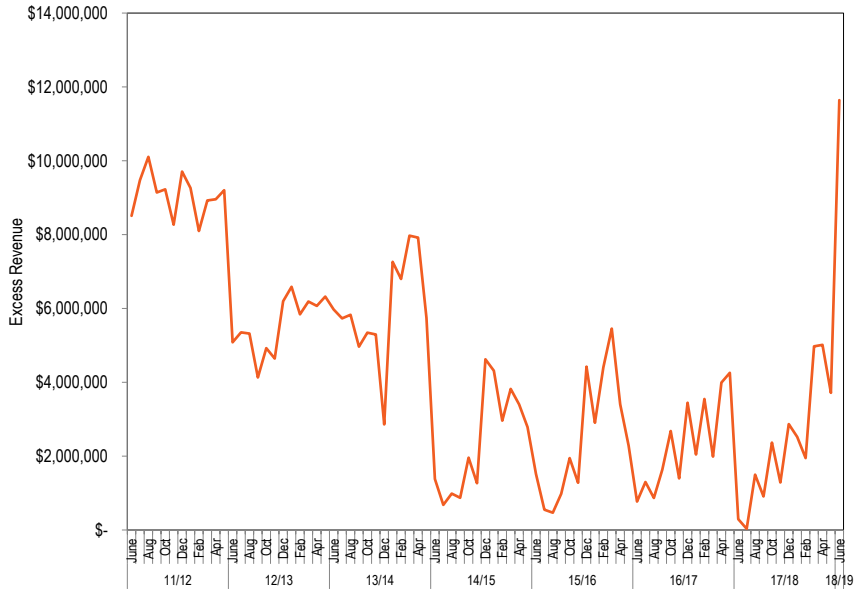


Auction Revenue

Figure 13-4 shows the monthly auction revenue collected each month from FTR auctions above ARR target allocations from the 2011/2012 through 2017/2018 planning periods.

Beginning with the 2014/2015 planning period, market rules allow PJM to decrease prevailing flow target allocations by clearing counter flow FTRs, without making the opposite prevailing flow FTR available, as long as ARRs remain revenue adequate.[31] This allows PJM to use auction revenue to pay prevailing flow FTRs without increasing prevailing flow obligations. The result is to increase FTR funding. This action removes money from the ARR revenue stream and caused the decrease in ARR revenue over ARR target allocations beginning in June 2014. The extra auction revenue is allocated pro rata to FTR holders at the end of the planning period. All FTR auction revenue should be distributed to ARR holders.

Figure 13-4 Monthly additional ARR revenue: 2011/2012 through 2018/2019



31 *See* "PJM Manual 6: Financial Transmission Rights," Rev. 20 (June 1, 2018) at 55.

Table 13-11 shows the auction revenue over ARR target allocations, by planning period, for planning periods 2010/2011 through 2017/2018.

Table 13-11 Additional Auction Revenue: 2010/2011 through 2017/2018

Planning Period	Excess Auction Revenue
2010/2011	$29,704,562
2011/2012	$108,874,342
2012/2013	$66,652,822
2013/2014	$71,687,937
2014/2015*	$29,045,590
2015/2016	$29,612,591
2016/2017	$27,917,175
2017/2018**	$27,419,061
Total	$390,914,080

*Start of counter flow "buy back"
**Through May 31, 2018

Financial Transmission Rights

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, but without guarantee. The value of the day-ahead congestion price differences, termed the FTR target allocation, defines the maximum, but not guaranteed, payout for FTRs. The target allocation of an FTR reflects the difference in day-ahead 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 eligible pricing nodes on the system. For the Long Term FTR Auction a list of available hubs, control zones, aggregates, generator buses and interface pricing points is available. For the Annual FTR Auction and FTRs bought for a quarterly period in the monthly auction the available FTR source and sink points include hubs, control zones, aggregates, generator buses, load buses and interface pricing points. An FTR bought in the Monthly FTR Auction for the single calendar month following the auction may include any bus for which an LMP is calculated in the FTR model used. Effective August 5, 2011, PJM does not allow FTR buy bids to clear with a price of zero unless there is at least one constraint in the auction which affects the FTR path. 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 target allocation 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. FTR holders with a negatively valued FTR are required to pay charges equal to their target allocations. Revenues above that level on individual FTR paths are used to fund FTRs on paths which received less than their target allocations.

Available revenue to pay FTR holders is based on the amount of day-ahead congestion, payments by holders of negatively valued FTRs, Market to Market payments, additional auction revenues available at the end of a month over ARR target allocations and any charges made to day-ahead operating reserves. Depending on the amount of revenues collected, FTR holders with a positively valued FTR may receive congestion credits between zero and a level greater than their target allocations.

FTR funding is not on a path specific basis or on an hour to hour basis. There are widespread cross subsidies paid to equalize payments across paths and across time periods within a planning period. All paths receive the same proportional level of target revenue at the end of the planning period. FTR auction revenues and excess revenues are 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 for 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.

FTRs can be bought, sold and self scheduled. Buy bids are bids to buy FTRs in the auctions; sell offers are offers to sell existing FTRs in the auctions; and self scheduled bids are FTRs that have been directly converted from ARRs in the Annual FTR Auction. Self scheduled FTRs represent a direct return of day-

ahead congestion revenue to load serving entities but not a complete return of congestion revenue to load.

There are two types of FTR 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 classes of FTR 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.

PJM operates an Annual FTR Auction for all participants. In addition, PJM conducts Monthly Balance of Planning Period FTR Auctions for the remaining months of the planning period. PJM also runs a Long Term FTR Auction for the following three consecutive planning years. FTR options are not available in the Long Term FTR Auction. A secondary bilateral market is also administered by PJM to allow participants to buy and sell existing FTRs. FTRs can also be exchanged bilaterally outside PJM markets.

The objective function of all FTR auctions is to maximize the bid based value of FTRs awarded in each auction.

FTR buy bids and sell offers may be made as obligations or options and as any of the three classes. FTR self scheduled bids by ARR holders are available only as obligations for the 24 hour product and only in the Annual FTR Auction.

Market Structure

Supply and Demand

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.[32] FTRs can also be traded between market participants through bilateral transactions. ARRs may be self scheduled as FTRs in the Annual FTR Auction.

Total annual FTR supply is limited by the capability of the transmission system, included in the PJM FTR market model as modified, for example, by PJM assumptions about outages. PJM assumptions are a key factor in determining the supply of ARRs and the related supply of FTRs. In general, the supply of FTRs is consistent with the supply of ARRs, for example in the annual auction. But there is a very significant exception and this exception is inconsistent with the basic logic of the ARR/FTR approach. There is transmission system capability made available in the Long Term FTR Auction to FTR buyers that is not available to ARR holders and ARR holders do not receive the proceeds for the sale of these rights. The result is that the revenues made available to load to offset congestion are understated. The supply of FTRs in the Long Term FTR Auction includes transmission system capability that is not available as ARRs. PJM expands the available transmission capacity for the Long Term FTR Auction above what can be allocated to ARRs by removing all the transmission outages included in the model when allocating ARRs and by including transmission upgrades not previously made available to ARR holders. In addition, the use of generation to load paths as the ARR allocation mechanism creates a gap between transmission system capability and ARR allocations of that capability. Total Monthly FTR Auction capacity is based on the residual capacity available after the long term and annual FTR auctions are conducted.

The MMU recommends that the full transmission capacity of the system be allocated as ARRs prior to sale as FTRs.

32 See "PJM Manual 6: Financial Transmission Rights," Rev. 20 (June 1, 2018) at 38.

Stage 1A ARR requests must be granted, which, as a result of the use of generation to load paths, artificially increases the transmission capacity in the model on affected facilities. The capacity modeled in the Annual ARR Allocation is used as the capacity for the Annual FTR Auction. Depending on assumptions used in the auction transmission model, the total FTR supply can be greater than or less than system capability in aggregate and/or on an element by element basis. When FTR supply is greater than system capability, FTR target allocations will be artificially increased, contributing to FTR revenue inadequacy. Where FTR supply is less than system capability, FTR target allocations will be lower, consistent with an FTR revenue surplus.

PJM can also make further adjustments to the auction model to manage FTR revenues. PJM can assume higher outage levels and PJM can decide to include additional constraints (closed loop interfaces) both of which reduce system capability in the auction model. These PJM actions reduce the supply of available Stage 1B and Stage 2 ARRs, which in turn reduce the number of FTRs available for purchase. PJM made very significant adjustments starting in the 2014/2015 planning period auction model through the 2016/2017 planning period.

For the Annual FTR Auction, known transmission outages that are expected to last for two months or more may be included in the model, while known outages of five days or more may be included in the model 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.[33] The full list of outages selected is publicly posted, but the process by which these outages are selected is not fully explained and PJM exercises significant discretion in selecting outages to accomplish FTR revenue adequacy goals. None of these outages are included in the transmission market model used for the Long Term FTR Auction.

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 the periods covered by the auctions. Such transmission outages may or may not be planned in advance or may be emergency outages.[34] In addition, it is difficult to model in an annual auction two outages of similar significance and similar duration in different areas which do not overlap in time. The choice of which to model may have significant distributional consequences. The fact that outages are modeled at significantly lower than historical levels results in selling too many FTRs which creates downward pressure on revenues paid to each FTR. To address this issue, the MMU has recommended that PJM use probabilistic outage modeling to better align the supply of ARRs and FTRs with actual system capabilities.

Long Term FTR Auctions

In July 2006, FERC issued a Final Rule mandating the creation of long term firm transmission rights in transmission organizations with organized electricity markets (FERC Docket No. RM06-8-000; Order No. 681).[35] FERC's goal was that "load serving entities be able to request and obtain transmission rights up to a reasonable amount on a long-term firm basis, instead of being limited to obtaining exclusively annual rights." Despite that order and inconsistent with the directive in that order, LSEs are not able to request ARRs nor are LSEs guaranteed rights to the revenue from Long Term FTR Auctions in PJM's long term FTR auction market design.

PJM conducts a Long Term FTR Auction for the next three consecutive planning periods. The capacity offered for sale in Long Term FTR Auctions is the residual system capability assuming that all allocated ARRs are self scheduled as FTRs. In addition, PJM expands the available transmission capacity for the Long Term FTR Auction above what can be allocated to ARRs by removing all the transmission outages included in the model when allocating ARRs.

Beginning with Round 2 of the 2019/2022 Long Term FTR Auction, PJM has proposed revisions to the determination of residual system capability made available in the Long Term FTR Auctions. The PJM proposal would revise the determination of ARR rights that are reserved for ARR holders. Rather than simply preserving the ARR cleared capacity from the previous annual

33 See "PJM Manual 6: Financial Transmission Rights," Rev. 20 (June 1, 2018) at 55.

34 See *2018 Quarterly State of the Market Report for PJM: January through June*, Section 12: Transmission Facility Outages.

35 116 FERC ¶ 61,077 (2006).

allocation, PJM would rerun the simultaneous feasibility test for the ARR/FTR market model, without outages, using the previous year's ARR requests, and use the resulting ARRs as the basis for reserving capability for ARR holders in the Long Term FTR Auction. The resulting difference between the revised set of ARRs and ARR/FTR market models' system capability, without outages, would determine the residual capability offered in the Long Term FTR auction. This method will provide ARR holders with a more accurate representation of capacity that will carry into the Annual FTR Auction than is currently preserved, and should provide better value for ARR holders. Under the existing rules, a significant proportion of congestion revenues are assigned to the Long Term FTR Auction without ever having been made available to ARR holders. That outcome is inconsistent with the basic logic of ARRs and inconsistent with the stated intent of the market design.

PJM has proposed to eliminate the YRALL product, which spanned three planning periods. This product was very low volume, not competitive, had highly concentrated ownership, and was highly profitable.

The 2009/2012 and 2010/2013 Long Term FTR Auctions consisted of two rounds.[36] Subsequent Long Term FTR Auctions consist of three rounds. FTRs purchased in prior rounds may be offered for sale in subsequent rounds. FTRs obtained in the Long Term Auctions may have terms of any one year or a single term of all three years. FTR products available in the Long Term Auction include 24 hour, on peak and off peak FTR obligations. FTR option products are not available in Long Term FTR Auctions.

- Round 1. The first round is conducted in the June prior to the start of the term covered by the Long Term FTR Auction and uses PJM's Summer Model build. Market participants make offers for FTRs between any source and sink.
- Round 2. The second round is conducted in September, uses the Summer Model build and follows the same rules as Round 1.
- Round 3. The third round is conducted in December, uses the Fall Model build and follows the same rules as Round 1.

36 FERC approved, on December 7, 2009, the addition of a third round to the Long Term FTR Auction. FERC letter order accepting PJM Interconnection, L.L.C.'s revisions to Long-Term Financial Transmission Rights Auctions to its Amended and Restated Operating Agreement and Open Access Transmission Tariff, Docket No. ER10-82-000 (December 7, 2009).

Table 13-12 shows the top 10 binding constraints for the 2018/2021 Long Term FTR Auction based on the marginal value of on peak hours. The severity ranking is based on the marginal value of the constraint in the simultaneous feasibility test.

Table 13-12 Top 10 principal binding transmission constraints limiting the 2018/2021 Long Term FTR Auction

			Severity Ranking by Auction Round		
Constraint	Type	Control Zone	1	2	3
Wattisville - Wallops Tap	Line	DPL	1	NA	NA
Staley - Lafayette	Flowgate	MISO	232	1	1
Fox - Grovewood	Line	ATSI	NA	2	NA
Hagan - Utica	Line	ATSI	342	9	2
Church - Massey	Line	DPL	NA	3	NA
Michigan City - Trail Creek	Flowgate	MISO	13	32	3
Albany - Garden Plain	Line	ComEd	2	NA	36
East Sayre - East Towanda	Line	Penelec	7	4	4
Cayuga - Nucor	Flowgate	MISO	3	7	NA
Monticello - East Winamac	Flowgate	MISO	4	10	10

Annual FTR Auctions

Annual FTRs are effective beginning June 1 of the planning period through May 31. Outages expected to last two or more months are included in the determination of the simultaneous feasibility for the Annual FTR Auction. ARR holders who wish to self schedule must inform PJM prior to round one of this auction. Any self scheduled ARR requests clear 25 percent of the requested volume in each round of the Annual FTR Auction as price takers. This auction consists of four rounds 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. FTRs in this auction can be obligations or options for peak, off peak or 24 hour periods. FTRs purchased in one round of the Annual FTR Auction can be sold in later rounds or in the Monthly Balance of Planning Period FTR Auctions.

The FTRs sold in the Long Term FTR Auction for a future delivery year may conflict with the ARRs assigned to load in the ARR allocation process when that delivery year is the next one if the ARRs are self scheduled.

Table 13-13 shows the top 10 binding constraints for the 2018/2019 Annual FTR Auction based on the marginal value of on peak hours.

Table 13-13 Top 10 principal binding transmission constraints limiting the Annual FTR Auction: 2018/2019

			Severity Ranking by Auction Round			
Constraint	Type	Control Zone	1	2	3	4
Vermilion - Tilton Energy Center	Flowgate	MISO	1	4	NA	NA
Westwood - NW Tap	Flowgate	MISO	2	1	1	1
Michigan City - Bosserman	Flowgate	MISO	5	5	8	2
Batesville - Hubble	Flowgate	MISO	3	2	3	3
Norris - Crossville	Flowgate	MISO	4	3	4	4
Emilie - Rolling Mill	Line	PECO	6	6	5	5
Brokaw - Gibson	Flowgate	MISO	8	7	12	27
North Champagne - Vermilion	Flowgate	MISO	7	65	39	15
Middletown Jct	Transformer	MetEd	29	8	7	9
Newton	Flowgate	MISO	9	9	6	10

Monthly Balance of Planning Period FTR Auctions

The residual capability of the PJM transmission system, after the Long Term and Annual FTR Auctions are concluded, is offered in the Monthly Balance of Planning Period FTR Auctions. Outages expected to last five or more days are included in the determination of the simultaneous feasibility test for the Monthly Balance of Planning Period FTR Auction. These are single-round monthly auctions that allow any transmission service customer or PJM member 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 planning period. FTRs in the auctions include obligations and options and 24 hour, on peak and off peak products.[37] Beginning with the 2018/2019 planning period, to address performance issues in solving the Monthly Balance of Planning Period Auctions, participants may no longer place bids that overlap three available month periods.[38] For example, participants cannot place a bid for Quarter 1 in the June auction because that quarter overlaps three individual month periods. This change was made to address performance issues when solving the FTR model.

37 See "PJM Manual 6: Financial Transmission Rights," Rev. 20 (June 1, 201) at 39.
38 PJM. "Manual 6: Financial Transmission Rights," Revision 20 (June 1, 2018), p. 40.

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 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.

Patterns of Ownership

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, trading firms 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.

Table 13-14 presents the 2018/2021 long term FTR auction market cleared FTRs by trade type, organization type and FTR direction. The results show that financial entities purchased 72.0 percent of prevailing flow buy bid FTRs and 76.5 percent of counter flow buy bid FTRs with the result that financial entities purchased 74.1 percent of all long term FTR auction cleared buy bids for the 2018/2021 Long Term FTR Auction. Physical entities purchased only 25.9 percent of all available long term FTRs in the 2018/2021 Long Term FTR Auction.

Table 13-14 Long term FTR auction patterns of ownership by FTR direction: 2018/2021

		FTR Direction		
Trade Type	Organization Type	Prevailing Flow	Counter Flow	All
Buy Bids	Physical	28.0%	23.5%	25.9%
	Financial	72.0%	76.5%	74.1%
	Total	100.0%	100.0%	100.0%
Sell Offers	Physical	29.1%	19.5%	25.8%
	Financial	70.9%	80.5%	74.2%
	Total	100.0%	100.0%	100.0%

Table 13-15 presents the annual FTR auction cleared FTRs for the 2018/2019 planning period by trade type, organization type and FTR direction. In the Annual FTR Auction for the 2018/2019 planning period, financial entities purchased 66.9 percent of prevailing flow FTRs, down 10.6 percentage points, and 84.2 percent of counter flow FTRs, up 4.5 percentage points, with the results that financial entities purchased 72.8 percent, up 6.2 percentage points, of all annual FTR auction cleared buy bids for the 2018/2019 planning period.

Table 13-15 Annual FTR Auction patterns of ownership by FTR direction: 2018/2019

			FTR Direction		
Trade Type	Organization Type	Self-Scheduled FTRs	Prevailing Flow	Counter Flow	All
Buy Bids	Physical	Yes	6.2%	1.1%	4.5%
		No	26.9%	14.7%	22.7%
		Total	33.1%	15.8%	27.2%
	Financial	No	66.9%	84.2%	72.8%
	Total		100.0%	100.0%	100.0%
Sell Offers	Physical		28.1%	30.3%	29.1%
	Financial		71.9%	69.7%	70.9%
	Total		100.0%	100.0%	100.0%

Table 13-16 presents the monthly balance of planning period FTR auction cleared FTRs for 2018 by trade type, organization type and FTR direction. Financial entities purchased 74.4 percent of prevailing flow FTRs, down 0.4 percentage points, and 80.1 percent of counter flow FTRs, up 0.6 percent, for the year, with the result that financial entities purchased 76.9 percent, down 0.1 percentage points, of all prevailing and counter flow FTR buy bids in the monthly balance of planning period FTR auction cleared FTRs for 2018.

Table 13-16 Monthly Balance of Planning Period FTR Auction patterns of ownership by FTR direction: 2018

		FTR Direction		
Trade Type	Organization Type	Prevailing Flow	Counter Flow	All
Buy Bids	Physical	25.6%	19.9%	23.1%
	Financial	74.4%	80.1%	76.9%
	Total	100.0%	100.0%	100.0%
Sell Offers	Physical	25.3%	30.5%	27.0%
	Financial	74.7%	69.5%	73.0%
	Total	100.0%	100.0%	100.0%

Table 13-17 presents the average daily net position ownership for all FTRs for 2018, by FTR direction.

Table 13-17 Daily FTR net position ownership by FTR direction: 2018

	FTR Direction		
Organization Type	Prevailing Flow	Counter Flow	All
Physical	45.1%	26.3%	36.8%
Financial	54.9%	73.7%	63.2%
Total	100.0%	100.0%	100.0%

Market Performance

Volume

In an effort to manage FTR revenues, PJM may use normal transmission limits (rather than the inflated limits used in Stage 1A) in the FTR auction model. These capability limits may be reduced if ARR funding is not affected, all requested self scheduled FTRs clear and net FTR auction revenue is positive. If the normal capability limit cannot be reached due to infeasibilities then FTR Auction capability reductions are undertaken pro rata based on the MW of Stage 1A infeasibility and the availability of auction bids for counter flow FTRs.[39]

In another effort to manage FTR revenues, PJM implemented a rule stating that PJM may remove or reduce infeasibilities caused by transmission outages. These outages may be removed only if ARR funding is not impacted and net FTR auction revenue is positive. PJM will only reduce infeasibilities on

39 See "PJM Manual 6: Financial Transmission Rights," Rev. 20 (June 1, 2018) at 56.

facilities where there are auction bids (counter flow FTRs) available to reduce the infeasibility caused by cleared FTRs.[40]

In the 2018/2021 Long Term FTR Auction, 164,911 MW (25.1 percent of demand; 47.7 percent of total FTR volume) of counter flow FTR buy bids cleared, an increase from 133,153 MW and 44.8 percent of total FTR volume. In the same auction, prevailing flow FTR buy bids cleared 180,596 MW (12.9 percent of demand; 52.3 percent of total FTR volume) an increase from 163,931 MW and 55.2 percent of total FTR volume. In the 2018/2021 Long Term FTR Auction, there were 14,352 MW (13.3 percent) of counter flow sell offers and 28,203 MW (21.6 percent) of prevailing flow sell offers cleared.

Table 13-18 Long Term FTR Auction market volume: 2018/2021

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	87,872	298,519	84,499	28.3%	214,021	71.7%
		Year 2	66,734	227,741	55,012	24.2%	172,729	75.8%
		Year 3	40,971	127,769	23,873	18.7%	103,896	81.3%
		Year All	428	2,768	1,528	55.2%	1,241	44.8%
		Total	196,005	656,797	164,911	25.1%	491,886	74.9%
	Prevailing Flow	Year 1	150,441	600,107	90,472	15.1%	509,635	84.9%
		Year 2	113,148	433,669	61,073	14.1%	372,597	85.9%
		Year 3	82,846	330,783	28,551	8.6%	302,232	91.4%
		Year All	5,134	31,464	500	1.6%	30,964	98.4%
		Total	351,569	1,396,023	180,596	12.9%	1,215,428	87.1%
	Total		547,574	2,052,820	345,506	16.8%	1,707,314	83.2%
Sell offers	Counter Flow	Year 1	31,956	68,686	9,805	14.3%	58,881	85.7%
		Year 2	14,374	33,379	4,398	13.2%	28,980	86.8%
		Year 3	1,905	5,780	149	2.6%	5,632	97.4%
		Year All	NA	NA	NA	NA	NA	NA
		Total	48,235	107,845	14,352	13.3%	93,494	86.7%
	Prevailing Flow	Year 1	34,038	82,071	18,847	23.0%	63,224	77.0%
		Year 2	16,073	41,876	8,520	20.3%	33,356	79.7%
		Year 3	2,343	6,867	837	12.2%	6,030	87.8%
		Year All	NA	NA	NA	NA	NA	NA
		Total	52,454	130,813	28,203	21.6%	102,610	78.4%
	Total		100,689	238,659	42,555	17.8%	196,104	82.2%

Figure 13-5 shows the percent of FTR MW cleared and bid and cleared volume, by direction, for each round of the Long Term FTR Auction from the 2015/2018 through the 2018/2021 auction.

Figure 13-5 Long Term FTR Auction bid and cleared volume by round and direction

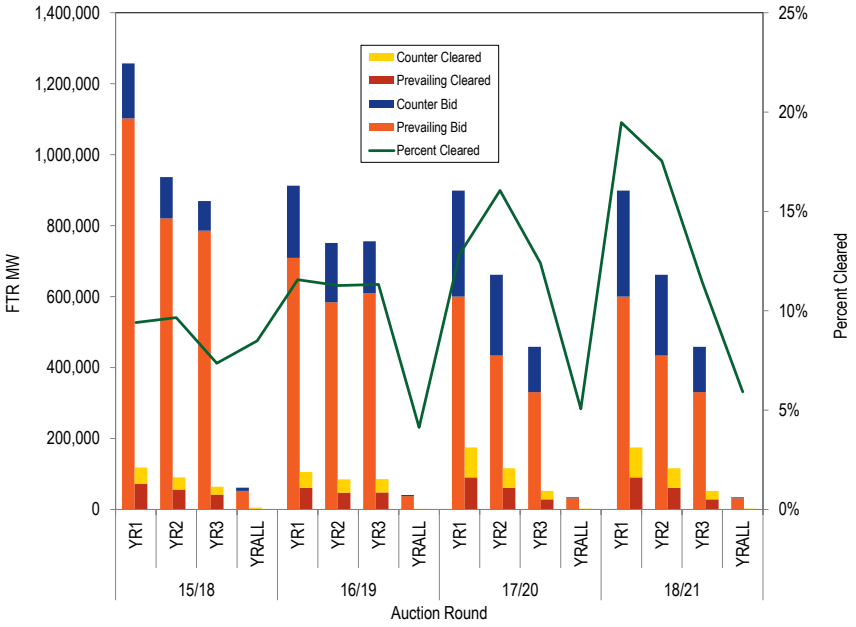


Table 13-19 provides a comparison of cleared FTR obligations (not options) acquired in the Long Term FTR Auctions versus the Annual FTR Auction, for FTRs in the 2014/2015 through 2018/2019 planning periods. A three year FTR is distributed to each individual planning period during its three year effective period. Long term FTRs that are effective in a single planning period were an average of 43.8 percent of total FTR volume in the 2014/2015 through 2018/2019 planning periods.

40 See *id.*

Table 13-19 Long Term and Annual Auction total cleared FTR MW

	Long Term FTR Product (Including YRALL)			Volume (MW)		
Effective Planning Period	YR3	YR2	YR1	Total Long Term	Annual (including self scheduled)	Long Term Percent of Total Cleared
2014/2015	81,666	86,754	131,911	300,330	356,522	45.7%
2015/2016	89,419	99,329	123,400	312,148	355,682	46.7%
2016/2017	97,837	95,637	107,182	300,656	397,258	43.1%
2017/2018	69,161	86,323	108,126	263,609	493,683	34.8%
2018/2019	87,232	109,827	177,018	374,078	395,506	48.6%

Table 13-20 provides the annual FTR auction market volume for the 2018/2019 planning period. Total FTR buy bids were 2,880,105 MW, up 26.2 percent from 2,281,534 MW for the previous planning period. For the 2018/2019 planning period 587,775 MW (20.4 percent) of buy bids cleared, down 1.0 percentage points from 488,734 MW for the previous planning period. There were 348,130 MW of sell offers with 48,545 MW (13.9 percent) clearing for the 2018/2019 planning period. The total volume of cleared buy and self scheduled bids was 615,254 MW, up 19.9 percent from 513,263 MW in the previous Annual FTR Auction.

Table 13-20 Annual FTR Auction market volume: 2018/2019

Trade Type	Type	FTR Direction	Bid and Requested Count	Bid and Requested Volume (MW)	Cleared Volume (MW)	Cleared Volume	Uncleared Volume (MW)	Uncleared Volume
Buy bids	Obligations	Counter Flow	149,479	571,352	208,294	36.5%	363,058	63.5%
		Prevailing Flow	366,227	1,956,181	314,043	16.1%	1,642,137	83.9%
		Total	515,706	2,527,533	522,338	20.7%	2,005,195	79.3%
	Options	Counter Flow	26	2,481	184	7.4%	2,297	92.6%
		Prevailing Flow	28,230	350,091	65,254	18.6%	284,837	81.4%
		Total	28,256	352,572	65,438	18.6%	287,134	81.4%
	Total	Counter Flow	149,505	573,833	208,478	36.3%	365,355	63.7%
		Prevailing Flow	394,457	2,306,272	379,297	16.4%	1,926,975	83.6%
		Total	543,962	2,880,105	587,775	20.4%	2,292,329	79.6%
Self-scheduled bids	Obligations	Counter Flow	114	2,290	2,290	100.0%	0	0.0%
		Prevailing Flow	3,158	25,189	25,189	100.0%	0	0.0%
		Total	3,272	27,479	27,479	100.0%	0	0.0%
Buy and self-scheduled bids	Obligations	Counter Flow	149,593	573,642	210,584	36.7%	363,058	63.3%
		Prevailing Flow	369,385	1,981,370	339,233	17.1%	1,642,137	82.9%
		Total	518,978	2,555,012	549,816	21.5%	2,005,195	78.5%
	Options	Counter Flow	26	2,481	184	7.4%	2,297	92.6%
		Prevailing Flow	28,230	350,091	65,254	18.6%	284,837	81.4%
		Total	28,256	352,572	65,438	18.6%	287,134	81.4%
	Total	Counter Flow	149,619	576,122	210,768	36.6%	365,355	63.4%
		Prevailing Flow	397,615	2,331,461	404,487	17.3%	1,926,975	82.7%
		Total	547,234	2,907,583	615,254	21.2%	2,292,329	78.8%
Sell offers	Obligations	Counter Flow	77,385	161,170	21,442	13.3%	139,728	86.7%
		Prevailing Flow	87,893	174,680	26,548	15.2%	148,132	84.8%
		Total	165,278	335,849	47,990	14.3%	287,860	85.7%
	Options	Counter Flow	2	55	0	0.0%	55	100.0%
		Prevailing Flow	931	12,226	556	4.5%	11,671	95.5%
		Total	933	12,281	556	4.5%	11,725	95.5%
	Total	Counter Flow	77,387	161,224	21,442	13.3%	139,782	86.7%
		Prevailing Flow	88,824	186,906	27,104	14.5%	159,802	85.5%
		Total	166,211	348,130	48,545	13.9%	299,585	86.1%

Figure 13-6 shows the percent of FTR MW cleared and bid and cleared volume, by direction, for each round of the Annual FTR Auction from the 2015/2016 planning period through the 2018/2019 planning period.

Figure 13-6 Annual FTR Auction bid and cleared volume by round and direction

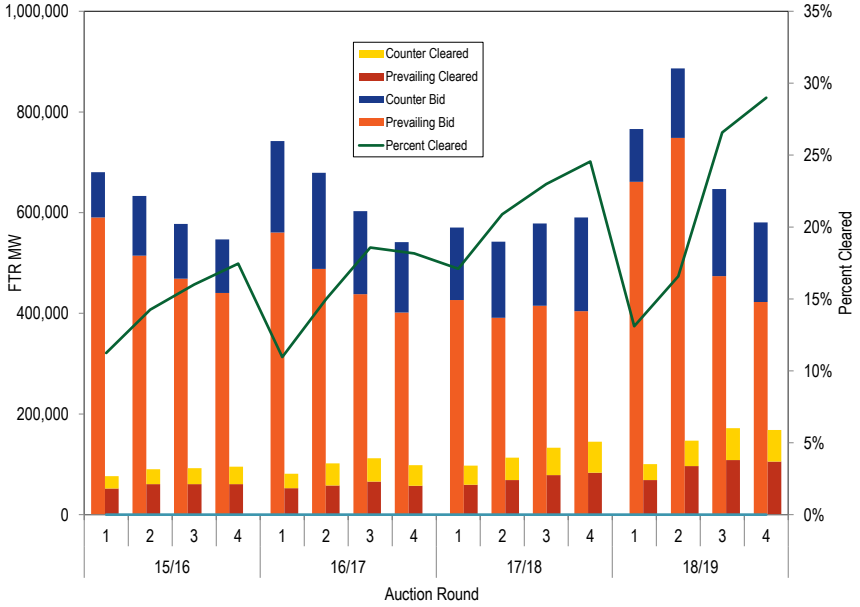


Figure 13-7 shows the bid volumes of the Annual FTR Auctions from the 2009/2010 planning period through the 2018/2019 planning period and the associated planning period payout ratios, represented by the background bars. The payout ratio for the 2018/2019 planning period is shown as dotted background because it is not yet final. Bid volume has not changed significantly with the payout ratio. For on and off peak prevailing flow products, the bid volume in the 2012/2013 planning period decreased 24.3 percent from the 2011/2012 planning period, but then increased 30.5 percent for the 2013/2014 planning period despite an only slightly improved payout ratio. Bid volume for the 2016/2017 planning period was down 15.4 percent from the 2015/2016 planning period, but up 4.4 percent for the 2017/2018 planning period, despite a less conservative FTR annual model. Bid volume for the 2018/2019 planning period was up 32.9 percent from the previous planning period.

Figure 13-7 Annual bid FTR auction volume: 2009/2010 through 2018/2019

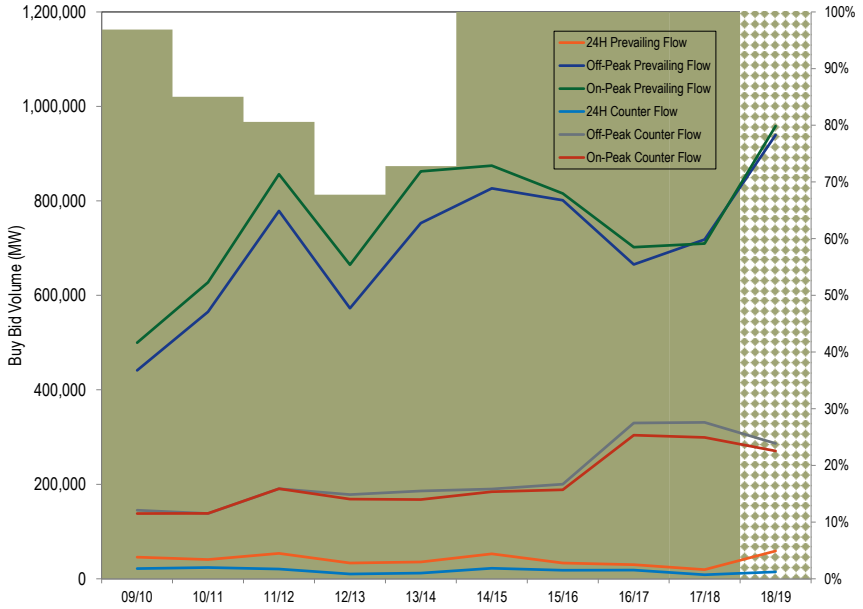


Figure 13-8 shows the cleared volumes of the Annual FTR Auctions from the 2009/2010 planning period through the 2018/2019 planning period and the associated planning period payout ratios, represented by the background bars. The payout ratio for the 2018/2019 planning period is shown as dotted background because it is not yet final. The cleared MW increased from the 2009/2010 planning period through the 2013/2014 planning period, as a market response to lower payout ratios. The 2014/2015, 2015/2016 and 2016/2017 planning period volumes were 19.1 percent, 16.3 percent and 7.0 percent lower than the 2013/2014 volume, as a result of PJM's more restrictive

modeling of Stage 1B and Stage 2 ARRs starting in the 2014/2015 planning period which lead to fewer available FTRs in the Annual FTR Auction and higher prices. In the planning periods since 2014/2015, PJM has allowed more Stage 1B and Stage 2 ARRs to clear, resulting in higher slightly higher cleared volume and increasing prices in the Annual FTR Auction. In the 2017/2018 planning period, PJM ended their conservative outage modeling practices and assigned balancing congestion and M2M payments to load and exports. This created more FTR volume, and allowed for a 13.6 percent increase in cleared volume over the 2013/2014 planning period and a 40.3 percent increase in cleared volume over the 2014/2015 planning period. The 2018/2019 planning period cleared 36.1 percent more than the 2013/2014 planning period, and 19.8 percent more than the previous planning period.

Figure 13-8 Annual Cleared FTR Auction volume: 2009/2010 through 2018/2019

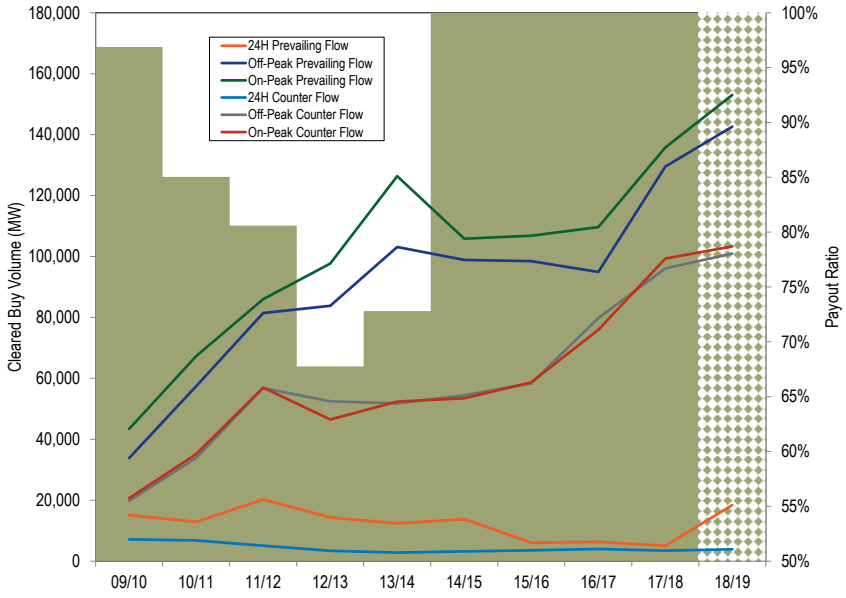


Figure 13-9 shows the proportion of ARRs self scheduled as FTRs for the last eight planning periods. The maximum possible level of self scheduled FTRs includes all ARRs. Eligible participants self scheduled 27,479 MW (27.5 percent) of ARRs as FTRs for the 2018/2019 planning period, up from 24,529 MW (25.4 percent) in the previous planning period.

Figure 13-9 Comparison of self scheduled FTRs: 2009/2010 through 2018/2019

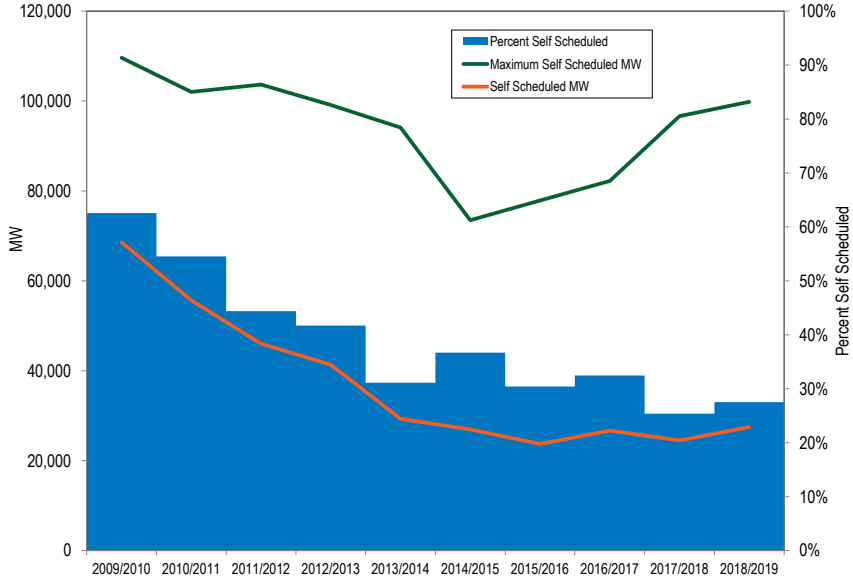


Table 13-21 provides the monthly balance of planning period FTR auction market volume for the entire 2016/2017 and 2017/2018 planning periods. There were 15,443,102 MW of FTR obligation buy bids and 3,898,145 MW of FTR obligation sell offers for all bidding periods in the 2017/2018 planning period. The monthly balance of planning period FTR auction cleared 2,548,608 MW (16.5 percent) of FTR obligation buy bids and 1,001,900 MW (25.7 percent) of FTR obligation sell offers.

There were 3,695,650 MW of FTR option buy bids and 503,728 MW of FTR option sell offers for all bidding periods in the Monthly Balance of Planning Period FTR Auctions for the 2017/2018 planning period. The monthly auctions cleared 59,513 MW (1.6 percent) of FTR option buy bids, and 147,361 MW (29.3 percent) of FTR option sell offers.

Table 13-21 Monthly Balance of Planning Period FTR Auction market volume: 2018

Monthly Auction	Type	Trade Type	Bid and Requested Count	Bid and Requested Volume (MW)	Cleared Volume (MW)	Cleared Volume	Uncleared Volume (MW)	Uncleared Volume
Jan-18	Obligations	Buy bids	253,844	1,130,000	170,619	15.1%	959,380	84.9%
		Sell offers	147,997	271,237	80,121	29.5%	191,116	70.5%
	Options	Buy bids	2,577	364,041	3,301	0.9%	360,740	99.1%
		Sell offers	2,486	21,322	6,036	28.3%	15,286	71.7%
Feb-18	Obligations	Buy bids	244,131	1,060,731	137,853	13.0%	922,878	87.0%
		Sell offers	138,358	217,484	65,466	30.1%	152,018	69.9%
	Options	Buy bids	4,215	317,934	3,596	1.1%	314,338	98.9%
		Sell offers	3,986	28,592	6,650	23.3%	21,942	76.7%
Mar-18	Obligations	Buy bids	227,221	1,011,651	152,521	15.1%	859,130	84.9%
		Sell offers	155,770	230,567	79,273	34.4%	151,294	65.6%
	Options	Buy bids	3,425	279,679	8,849	3.2%	270,831	96.8%
		Sell offers	3,956	33,102	8,441	25.5%	24,661	74.5%
Apr-18	Obligations	Buy bids	184,899	689,988	116,534	16.9%	573,454	83.1%
		Sell offers	111,132	214,221	63,874	29.8%	150,347	70.2%
	Options	Buy bids	1,910	167,957	3,703	2.2%	164,253	97.8%
		Sell offers	2,297	27,710	11,539	41.6%	16,171	58.4%
May-18	Obligations	Buy bids	105,469	411,602	75,600	18.4%	336,002	81.6%
		Sell offers	64,587	116,570	31,971	27.4%	84,598	72.6%
	Options	Buy bids	1,081	73,667	1,689	2.3%	71,978	97.7%
		Sell offers	1,086	12,776	4,342	34.0%	8,434	66.0%
2016/2017*	Obligations	Buy bids	3,910,604	16,452,696	2,250,750	13.7%	14,201,947	86.3%
		Sell offers	1,888,130	3,845,238	843,507	21.9%	3,001,731	78.1%
	Options	Buy bids	83,045	3,692,188	61,247	1.7%	3,630,941	98.3%
		Sell offers	119,139	497,083	161,155	32.4%	335,928	67.6%
2017/2018*	Obligations	Buy bids	3,595,933	15,443,102	2,548,608	16.5%	12,894,494	83.5%
		Sell offers	2,057,542	3,898,145	1,001,900	25.7%	2,896,245	74.3%
	Options	Buy bids	37,328	3,695,650	59,513	1.6%	3,636,138	98.4%
		Sell offers	67,177	503,728	147,361	29.3%	356,366	70.7%

* Shows twelve months for 2016/2017 and 2017/2018

Table 13-22 presents the buy bid, bid and cleared volume of the Monthly Balance of Planning Period FTR Auction, and the effective periods for the volume. The average monthly cleared volume for 2018 was 161,542.5MW. The average monthly cleared volume for 2017 was 216,931.5 MW.

Table 13-22 Monthly Balance of Planning Period FTR Auction buy bid, bid and cleared volume (MW per period): 2018

Monthly Auction	MW Type	Prompt Month	Second Month	Third Month	Q1	Q2	Q3	Q4	Total
Jan-18	Bid	643,771	320,172	234,141				295,956	1,494,040
	Cleared	99,983	37,722	11,515				24,700	173,920
Feb-18	Bid	636,456	268,377	248,032				225,800	1,378,665
	Cleared	84,107	27,386	17,142				12,815	141,449
Mar-18	Bid	583,003	284,088	286,663				137,577	1,291,330
	Cleared	86,588	34,278	25,156				15,349	161,370
Apr-18	Bid	560,527	297,417						857,945
	Cleared	86,446	33,791						120,237
May-18	Bid	485,269							485,269
	Cleared	77,289							77,289
Jun-18	Bid	493,511	316,759	312,871	304,002	331,832	323,220		2,082,195
	Cleared	111,379	44,907	42,084	33,440	32,271	30,907		294,989

Figure 13-10 shows cleared auction volumes as a percent of the total FTR cleared volume by calendar months for June 2004 through June 2018, by type of auction. FTR volumes are included in the calendar month they are effective, with long term and annual FTR auction volume spread equally to each month in the relevant planning period. This figure shows the share of FTRs purchased in each auction type by month. Over the course of the planning period an increasing number of Monthly Balance of Planning Period FTRs are purchased, making them a greater portion of active FTRs. When the Annual FTR Auction occurs, FTRs purchased in any previous Monthly Balance of Planning Period Auction, other than the current June auction, are no longer in effect, so there is a reduction in their share of total FTRs with a corresponding increase in the share of Annual FTRs.

Figure 13-10 Cleared auction volume (MW) as a percent of total FTR cleared volume by calendar month: June 2004 through June 2018

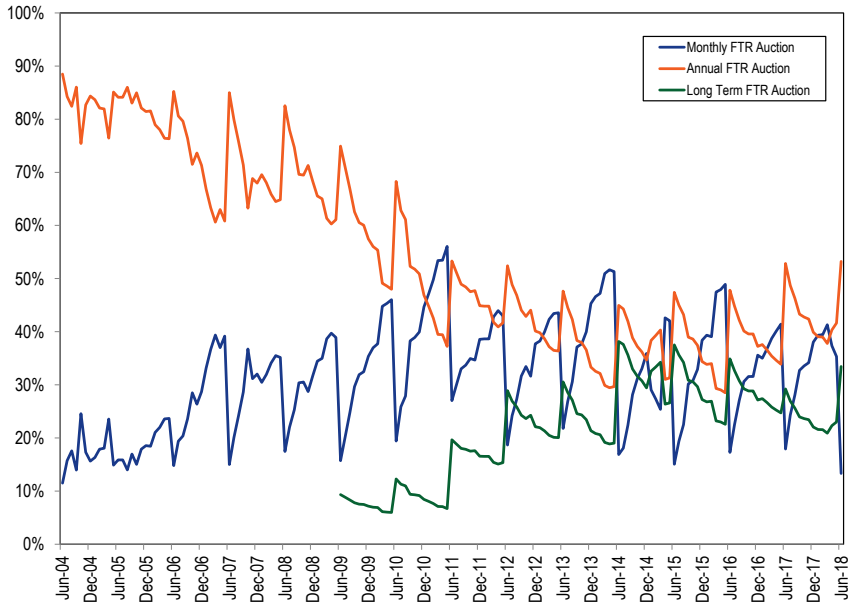


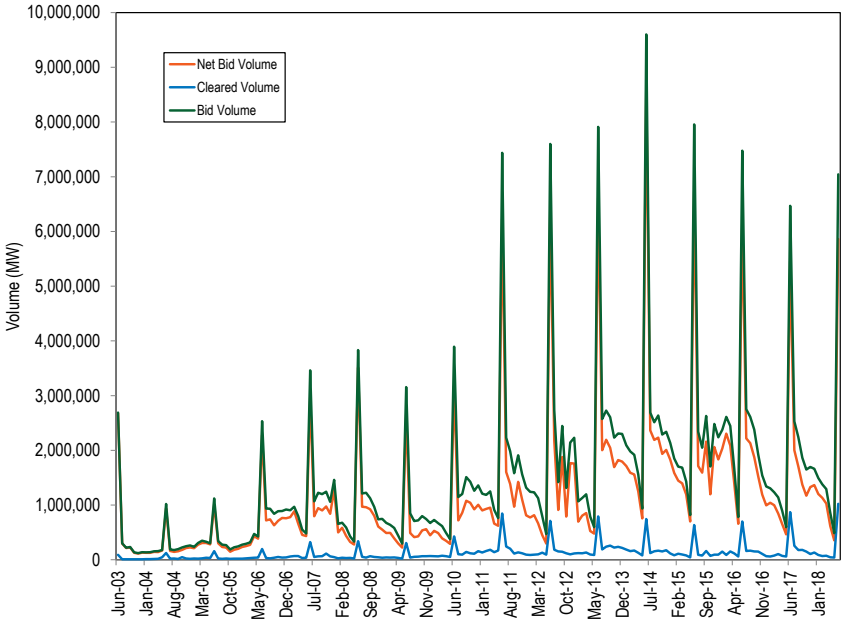
Table 13-23 provides the secondary bilateral FTR market volume for the entire 2016/2017 and 2017/2018 planning periods.

Table 13-23 Secondary bilateral FTR market volume: 2016/2017 and 2017/2018[41]

Planning Period	Type	Class Type	Volume (MW)
2016/2017	Obligation	24-Hour	538.5
		On Peak	7,414.4
		Off Peak	13,955.7
		Total	21,908.6
	Option	24-Hour	0.0
		On Peak	678.0
		Off Peak	104.5
		Total	782.5
2017/2018	Obligation	24-Hour	167.4
		On Peak	8,630.0
		Off Peak	6,755.4
		Total	15,552.8
	Option	24-Hour	0.0
		On Peak	5.8
		Off Peak	5.8
		Total	11.6

Figure 13-11 shows the FTR bid, cleared and net bid volume from June 2003 through June 2018 for Long Term, Annual and Monthly Balance of Planning Period Auctions.[42] Cleared volume is the volume of FTR buy and sell offers that were accepted. The net bid volume includes the total buy, sell and self scheduled offers, counting sell offers as a negative volume. The bid volume is the total of all bid and self scheduled offers, excluding sell offers.

Figure 13-11 Long Term, Annual and Monthly FTR Auction bid and cleared volume: June 2003 through June 2018



Price

Table 13-24 shows the cleared, weighted-average prices by trade type, FTR direction, period type and class type for the 2018/2021 Long Term FTR Auction. Only FTR obligation products (no options) are available in the Long Term FTR Auctions. In this auction, weighted average buy bid counter flow and prevailing flow FTR prices were -$0.41 and $0.44, compared to -$0.42 and $0.41 from the 2017/2020 Long Term FTR Auction. Weighted average sell bid counter flow and prevailing flow FTR prices were -$0.32 and $0.35, compared to -$0.43 for counter flow FTRs and $0.44 for prevailing flow FTRs.

41 The 2016/2017 planning period covers bilateral FTRs that are effective for any time between June 1, 2016 through May 31, 2017, which originally had been purchased in a Long Term FTR Auction, Annual FTR Auction or Monthly Balance of Planning Period FTR Auction.

42 The data for this table are available in *2017 State of the Market Report for PJM*, Volume 2, Appendix H.

Table 13-24 Long Term FTR Auction weighted-average cleared prices (Dollars per MW): 2018/2021

			Class Type			
Trade Type	FTR Direction	Period Type	24-Hour	On Peak	Off Peak	All
Buy bids	Counter Flow	Year 1	($1.05)	($0.31)	($0.53)	($0.44)
		Year 2	($0.96)	($0.30)	($0.53)	($0.42)
		Year 3	($0.77)	($0.22)	($0.45)	($0.34)
		Year All	NA	($0.07)	($0.24)	($0.12)
		Total	($0.98)	($0.28)	($0.51)	($0.41)
	Prevailing Flow	Year 1	$0.84	$0.33	$0.56	$0.47
		Year 2	$0.54	$0.33	$0.57	$0.45
		Year 3	$0.79	$0.24	$0.44	$0.36
		Year All	NA	$0.01	$0.01	$0.01
		Total	$0.73	$0.31	$0.54	$0.44
	Total		$0.14	$0.02	$0.04	$0.03
Sell offers	Counter Flow	Year 1	($0.11)	($0.26)	($0.44)	($0.34)
		Year 2	NA	($0.26)	($0.28)	($0.27)
		Year 3	NA	($0.25)	($0.28)	($0.27)
		Year All	NA	NA	NA	NA
		Total	($0.11)	($0.26)	($0.40)	($0.32)
	Prevailing Flow	Year 1	$0.59	$0.25	$0.43	$0.34
		Year 2	$0.27	$0.26	$0.46	$0.35
		Year 3	NA	$0.37	$0.65	$0.48
		Year All	NA	NA	NA	NA
		Total	$0.44	$0.26	$0.45	$0.35
	Total		$0.38	$0.08	$0.17	$0.12

Figure 13-12 shows the volume-weighted average buy bid price for the Annual FTR Auctions from the 2009/2010 through the 2018/2019 planning periods and the associated planning period payout ratios, represented by the background bars. The payout ratio for the 2018/2019 planning period is shown as dotted background because it is not yet final. From the 2010/2011 planning period to the 2013/2014 planning period FTR prices decreased. The 2014/2015, 2015/2016 and 2016/2017 planning periods 24 hour obligation prices increased 142.5 percent, 210.8 and 260.8 percent from the 2013/2014 planning period. These large price increases were a result of the significant decrease in FTR supply volume during the Annual FTR Auctions which was a result of PJM's decisions to use a more constrained model and its impact on Stage 1B and Stage 2 ARR allocations. The increased prices led to an increase in ARR target allocations for the 2014/2015, 2015/2016 and 2016/2017 planning periods. Prices dropped for the 50.2 percent and 72.3 percent for the 2017/2018 and 2018/2019 planning periods as a result of PJM's change in FTR auction modeling which led to an increase in available capacity in the Annual FTR Auction. The reduced prices reflect in the ARR values.

Figure 13-12 Annual FTR Auction volume-weighted average buy bid price: 2009/2010 through 2018/2019

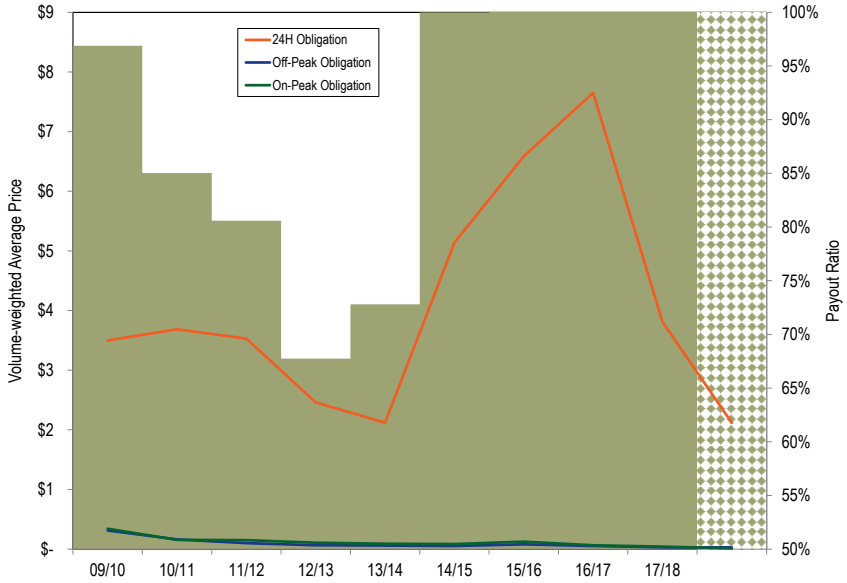


Table 13-25 shows the weighted-average cleared buy bid prices by trade type, FTR product, FTR direction and class type for the Annual FTR Auction for the 2018/2019 planning period. The weighted-average cleared buy bid price in the 2018/2019 Annual FTR Auction was $0.23 per MW, down from $0.24 per MW in the 2017/2018 planning period.

Table 13-25 Annual FTR Auction weighted-average cleared prices (Dollars per MW): 2017/2018

			Class Type			
Trade Type	Type	FTR Direction	24-Hour	On Peak	Off Peak	All
Buy bids	Obligations	Counter Flow	($0.53)	($0.41)	($0.26)	($0.34)
		Prevailing Flow	$1.29	$0.65	$0.37	$0.59
		Total	$0.98	$0.23	$0.11	$0.23
	Options	Counter Flow	$0.00	$0.00	$0.00	$0.00
		Prevailing Flow	$0.10	$0.36	$0.21	$0.28
		Total	$0.10	$0.36	$0.21	$0.28
Self-scheduled bids	Obligations	Counter Flow	($0.10)	NA	NA	($0.10)
		Prevailing Flow	$0.91	NA	NA	$0.91
		Total	$0.82	NA	NA	$0.82
Buy and self-scheduled bids	Obligations	Counter Flow	($0.37)	($0.41)	($0.26)	($0.33)
		Prevailing Flow	$1.07	$0.65	$0.37	$0.64
		Total	$0.89	$0.23	$0.11	$0.29
	Options	Counter Flow	$0.00	$0.00	$0.00	$0.00
		Prevailing Flow	$0.10	$0.36	$0.21	$0.28
		Total	$0.10	$0.36	$0.21	$0.28
Sell offers	Obligations	Counter Flow	($0.87)	($0.51)	($0.29)	($0.41)
		Prevailing Flow	$1.07	$0.52	$0.28	$0.41
		Total	$0.05	$0.07	$0.02	$0.05
	Options	Counter Flow	NA	NA	NA	NA
		Prevailing Flow	$0.00	$0.27	$0.22	$0.24
		Total	$0.00	$0.27	$0.22	$0.24

Table 13-26 compiles the buy bid, buy bid revenue and $/MW of buy bids for the six latest planning periods. In the 2014/2015 planning period the $/MW increased significantly from the 2013/2014 planning period due to PJM's decisions to limit capacity through conservative modeling. In the 2017/2018 Annual FTR Auction, the $/MW decreased to lower than 2013/2014 levels, due in part to the partial relaxation of PJM's conservative modeling practices due to the reassignment of balancing congestion and M2M payments to load and exports. This reduction continued into the 2018/2019 planning period. The reassignment of balancing congestion and M2M payments to load did not increase the per MW value of ARRs as proponents claimed they would.

Table 13-26 Cleared volume, revenue and $/MW: 2012/2013 through 2018/2019 Annual FTR Auction

	Cleared Buy Bid Volume	Percent Cleared	Buy Bid Revenue	Buy Bid Revenue ($/MW)
2012/2013	371,295	14.5%	$627.3	$1,689
2013/2014	420,489	12.8%	$567.6	$1,350
2014/2015	365,843	11.2%	$789.7	$2,159
2015/2016	378,328	15.4%	$948.6	$2,507
2016/2017	420,198	16.2%	$918.0	$2,185
2017/2018	513,263	22.3%	$555.2	$1,082
2018/2019	587,775	20.4%	$833.4	$1,418

Table 13-27 shows the weighted average cleared buy bid price in the Monthly Balance of Planning Period FTR Auctions by bidding period for January through June 2018. For example, for the January Monthly Balance of Planning Period FTR Auction, the current month column is January, the second month column is February and the third month column is March. Quarters 1 through 4 are represented in the Q1, Q2, Q3 and Q4 columns. The total column represents all of the activity within the January Monthly Balance of Planning Period FTR Auction.

The cleared weighted-average price paid in the Monthly Balance of Planning Period FTR Auctions for January through June 2018 was $0.19 per MW, up from $0.11 per MW in the same time last year, a 72.7 percent increase in FTR prices. The cleared weighted-average price for the current planning period was $0.13, up 8.3 percent from $0.12 for the previous planning period.

Table 13-27 Monthly Balance of Planning Period FTR Auction cleared, weighted-average, buy bid price per period (Dollars per MW): 2018

Monthly Auction	Prompt Month	Second Month	Third Month	Q1	Q2	Q3	Q4	Total
Jan-18	$0.07	$0.08	$0.13				$0.18	$0.11
Feb-18	$0.21	$0.16	$0.11				$0.18	$0.18
Mar-18	$0.14	$0.21	$0.22				$0.01	$0.13
Apr-18	$0.26	$0.38						$0.29
May-18	$0.20							$0.20
Jun-18	$0.19	$0.22	$0.22		$0.23	$0.27	$0.20	$0.22

Profitability

FTR profitability is the difference between the revenue received for an FTR and the cost of the FTR for entities that purchase FTRs. For a prevailing flow FTR, the FTR credits are the actual revenue that an FTR holder receives and the auction price is the cost. For a counter flow FTR, the auction price is the revenue that an FTR holder is paid and the FTR credits are the cost to the FTR holder, which the FTR holder must pay. ARR holders that self schedule FTRs do not receive a profit on the transaction. ARR holders that self schedule are trading rights to congestion revenues for a fixed payment. The cost of self scheduled FTRs is zero. ARR holders that self schedule FTRs purchase the FTRs in the Annual FTR Auction, but the ARR holders receive offsetting ARR credits that equal the purchase price of the FTRs.

The fact that FTRs have been consistently profitable for financial entities regardless of the payout ratio raises questions about the competitiveness of the market. Accounting for direct profitability and the distribution of excess congestion, FTR purchases by financial entities were not profitable in 2012/2013 and were profitable in every planning year from 2013/2014 through 2016/2017, and were profitable if summed over the entire period (Table 13-30). It is not clear, in a competitive market, why FTR purchases by financial entities remain persistently profitable. In a competitive market, it would be expected that profits would be competed to zero.

Table 13-28 lists FTR profits by organization type and FTR direction for the 2017/2018 planning period. Some participants classified as physical, such as a company that holds one generator, are not eligible for ARRs but do have a physical presence on the PJM system. Such entities are in the Physical category, while any entity that is eligible for ARRs and holds ARRs are in the Physical ARR holder category. FTR profits are the sum of the daily FTR target allocations, adjusted by the payout ratio minus the daily FTR auction costs for each FTR (not self scheduled) held by an organization. Self scheduled FTRs can have a negative value, depending on the congestion on the FTR path. The FTR target allocation is equal to the product of the FTR MW and congestion price differences between sink and source in the Day-Ahead Energy Market. The FTR credits do not include after the fact adjustments which are very small and do not occur in every month. The FTR credits also do not include any excess congestion revenue distributions made at the end of the planning period. The daily FTR auction costs are the product of the FTR MW and the auction price divided by the time period of the FTR in days. Self scheduled FTRs have zero cost. FTR profitability is the difference between the revenue received for an FTR and the cost of the FTR for entities that purchase FTRs and do not self schedule the FTRs. In the 2017/2018 planning period, companies made profits of $334.7 million. ARR holders who self scheduled FTRs received $224.6 million in congestion revenues. Revenues from self scheduled FTRs are a return of congestion to the load that paid the congestion rather than profits.

Table 13-28 FTR profits and revenues by organization type and FTR direction: 2017/2018

	FTR Direction				
Organization Type	Prevailing Flow	Self Scheduled Prevailing Flow	Counter Flow	Self Scheduled Counter Flow	All
Financial	$280,492,502		($34,174,588)		$246,317,915
Physical	$69,322,226		($15,985,664)		$53,336,562
Physical ARR Holder	$32,186,527	$230,086,601	$2,903,376	($5,507,976)	$35,089,902
Total	$382,001,255.36	$230,086,601	($47,256,876)	($5,507,976)	$334,744,379

Table 13-29 lists the monthly FTR profits for the 2016/2017 and 2017/2018 planning periods by organization type. FTR revenues for ARR holders who self schedule are not included. FTR profits for ARR holders who purchase FTRs in auctions are included.

Table 13-29 Monthly FTR profits by organization type: 2016/2017 and 2017/2018

	Organization Type			
Month	Physical	Physical ARR Holders (no self scheduled)	Financial	Total
Jun-16	($2,861,362)	$803,936	($6,163,265)	($8,220,691)
Jul-16	$289,899	$14,377,883	$570,363	$15,238,146
Aug-16	$3,152,454	($134,167)	$9,898,169	$12,916,455
Sep-16	$5,595,192	$21,054,353	$12,909,228	$39,558,772
Oct-16	$4,111,015	$27,910,195	($3,486,077)	$28,535,133
Nov-16	($3,395,815)	($13,060,493)	($8,477,147)	($24,933,455)
Dec-16	($540,576)	($21,651,681)	($6,540,942)	($28,733,199)
Jan-17	($1,748,872)	($23,130,635)	$82,092	($24,797,415)
Feb-17	($2,264,649)	($9,401,312)	$3,282,949	($8,383,013)
Mar-17	($3,884,155)	($17,055,619)	($673,693)	($21,613,466)
Apr-17	($5,227,387)	($48,799,438)	($7,180,585)	($61,207,410)
May-17	($4,464,887)	($48,041,208)	($7,740,915)	($60,247,010)
Summary for Planning Period 2016/2017				
Total	($11,239,145)	($117,128,185)	($13,519,824)	($141,887,154)
Jun-17	$764,708	$14,045,076	$14,019,198	$28,828,982
Jul-17	($2,987,829)	($2,386,369)	$7,306,611	$1,932,413
Aug-17	($3,234,012)	($8,540,404)	$2,414,244	($9,360,171)
Sep-17	$2,168,231	$21,312,733	$22,644,485	$46,125,449
Oct-17	$777,230	$6,839,934	$14,400,509	$22,017,673
Nov-17	$2,350,616	$2,340,485	$3,244,972	$7,936,074
Dec-17	$820,082	($2,167,396)	$23,681,735	$22,334,421
Jan-18	$32,871,784	$4,692,476	$103,179,520	$140,743,781
Feb-18	$317,895	($3,622,450)	($2,047,899)	($5,352,454)
Mar-18	$8,526,358	$1,662,637	$13,327,501	$23,516,496
Apr-18	$574,714	($4,054,183)	$7,467,985	$3,988,516
May-18	$10,386,785	$4,967,363	$36,679,052	$52,033,200
Summary for Planning Period 2017/2018				
Total	$53,336,562	$35,089,902	$246,317,915	$334,744,379

Table 13-30 FTR profits by organization type: 2012/2013 through 2017/2018

		2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018
Financial	Profit	$63,457,511	$557,583,317	$236,692,290	$41,264,165	($13,519,824)	$246,317,915
	Excess	($80,450,357)	($256,820,253)	$44,410,625	$11,897,525	$20,968,663	$147,413,287
	Total	($16,992,846)	$300,763,064	$281,102,915	$53,161,690	$7,448,839	$393,731,202
Physical	Profit	($25,069,434)	$217,693,500	$65,085,246	($16,904,899)	($11,239,145)	$53,336,562
	Excess	($83,332,665)	($104,947,376)	$14,485,066	$5,072,985	$10,533,444	$67,512,070
	Total	($108,402,099)	$112,746,125	$79,570,312	($11,831,914)	($705,701)	$120,848,632
Physical ARR	Profit	($40,633,441)	$183,450,850	$95,609,153	$39,490,527	($117,128,185)	$35,089,902
	Excess	($128,497,763)	($316,929,138)	$80,692,482	$25,484,394	$44,883,161	$155,628,443
	Total	($169,131,204)	($133,478,288)	$176,301,636	$64,974,921	($72,245,025)	$190,718,345
Total		($294,526,149)	$280,030,900	$536,974,863	$106,304,698	($65,501,886)	$705,298,179

Table 13-30 lists the historical profits by calendar year by organization type beginning in the 2012/2013 planning period, excluding revenue returned through self scheduled FTRs for Physical ARR holding participants. The profits include any end of planning period excess distribution or uplift that will impact total profitability. The excess or uplift is distributed prorata based on positive target allocations.

Revenue

Long Term FTR Auction Revenue

Table 13-31 shows the long term FTR auction revenue data by trade type, FTR direction, period type and class type. The 2018/2021 Long Term FTR Auction netted $29.6 million in revenue, $2.9 million more than the previous Long Term FTR Auction. Buyers paid $52.2 million and sellers received $22.6 million, up $3.8 million and $0.9 million over the previous Long Term FTR Auction. In general, revenue increased $2.9 million over the previous Long Term FTR Auction.

Table 13-31 Long Term FTR Auction Revenue: 2018/2021

			Class Type			
Trade Type	FTR Direction	Period Type	24-Hour	On Peak	Off Peak	All
Buy bids	Counter Flow	Year 1	($16,014,942)	($90,483,112)	($59,016,919)	($165,514,973)
		Year 2	($9,474,029)	($56,290,521)	($39,156,134)	($104,920,683)
		Year 3	($3,164,672)	($20,161,791)	($12,798,173)	($36,124,637)
		Year All	$0	($1,562,132)	($948,434)	($2,510,566)
		Total	($28,653,643)	($168,497,557)	($111,919,660)	($309,070,859)
	Prevailing Flow	Year 1	$23,490,163	$102,541,301	$64,783,731	$190,815,195
		Year 2	$9,924,662	$67,678,319	$46,229,508	$123,832,489
		Year 3	$6,610,577	$24,071,926	$15,852,953	$46,535,457
		Year All	$0	$17,585	$31,960	$49,545
		Total	$40,025,402	$194,309,131	$126,898,152	$361,232,685
	Total		$11,371,759	$25,811,574	$14,978,492	$52,161,826
Sell offers	Counter Flow	Year 1	($5,032)	($8,708,653)	($6,116,001)	($14,829,686)
		Year 2	$0	($2,195,991)	($3,106,910)	($5,302,901)
		Year 3	0	($99,165)	($72,669)	($171,834)
		Year All	NA	NA	NA	NA
		Total	($5,032)	($11,003,810)	($9,295,579)	($20,304,421)
	Prevailing Flow	Year 1	$123,386	$16,832,527	$11,038,243	$27,994,155
		Year 2	$52,545	$7,811,807	$5,276,957	$13,141,309
		Year 3	0	$942,960	$821,353	$1,764,314
		Year All	NA	NA	NA	NA
		Total	$175,931	$25,587,294	$17,136,553	$42,899,778
	Total		$170,899	$14,583,484	$7,840,974	$22,595,357
Total			$11,200,860	$11,228,090	$7,137,519	$29,566,469

Annual FTR Auction Revenue

Table 13-32 shows the Annual FTR Auction revenue by trade type, type, FTR direction and class type. The Annual FTR Auction for the 2018/2019 planning period generated $822.6 million, up 51.7 percent from $542.2 million in the 2017/2018 planning period, and down 9.5 percent from $909.0 million in the 2016/2017 planning period. Counter flow FTR holders received $274.8 million, up 17.9 percent from the previous planning period and prevailing flow FTR holders paid $1,097.4 million, up 43.4 percent from the previous planning period.

The total net of all buy and sell offers in the Annual FTR Auction, not including self scheduled FTRs, was $393.5 million for the 2017/2018 planning period and $624.8 million for the 2018/2019 planning period, a 58.8 percent increase in revenue. The total buy bids were 488,734.1 MW for the 2017/2018 planning period and 587,775.4 MW for the 2018/2019 planning period. The value of FTRs per MW increased from $805.14 for the 2017/2018 planning period to $1,062.99 for the 2018/2019 planning period, a 32.0 percent increase. The per MW value of FTRs in the 2016/2017 planning period was $1,564.83. While the 2018/2019 planning period provided better FTR value than the previous planning period, the expected return to load from the redefinition of balancing congestion did not occur. Load receives lower ARR revenues in addition to the fact that load has to bear 100 percent of the costs of balancing congestion.

FTRs sold in Long Term FTR Auctions are sold at a substantial discount to the same FTR sold in Annual FTR Auctions. Table 13-33 shows the increase in total auction revenue that would have resulted for the 2014/2015 through 2018/2019 planning periods if long term FTRs were sold at annual auction clearing prices. This difference provides a good estimate of the value of the transmission capability made available in the Long Term FTR Auction that is not made available to ARR holders. This capability should be made available to ARR holders in the Annual FTR Auction where it is the most valuable.

Table 13-32 Annual FTR auction revenue: 2018/2019

			Class Type			
Trade Type	Type	FTR Direction	24-Hour	On Peak	Off Peak	All
Buy bids	Obligations	Counter Flow	($18,084,316)	($172,006,373)	($121,204,230)	($311,294,919)
		Prevailing Flow	$208,382,599	$408,672,916	$248,080,676	$865,136,191
		Total	$190,298,282	$236,666,543	$126,876,446	$553,841,272
	Options	Counter Flow	$0	$0	$0	$0
		Prevailing Flow	$2,311,548	$50,740,739	$28,755,261	$81,807,547
		Total	$2,311,548	$50,740,739	$28,755,261	$81,807,547
	Total	Counter Flow	($18,084,316)	($172,006,373)	($121,204,230)	($311,294,919)
		Prevailing Flow	$210,694,147	$459,413,655	$276,835,937	$946,943,738
		Total	$192,609,830	$287,407,282	$155,631,707	$635,648,819
Self-scheduled bids	Obligations	Counter Flow	($2,066,090)	NA	NA	($2,066,090)
		Prevailing Flow	$199,834,942	NA	NA	$199,834,942
		Total	$197,768,852	NA	NA	$197,768,852
Buy and self-scheduled bids	Obligations	Counter Flow	($20,150,407)	($172,006,373)	($121,204,230)	($313,361,009)
		Prevailing Flow	$408,217,541	$408,672,916	$248,080,676	$1,064,971,133
		Total	$388,067,134	$236,666,543	$126,876,446	$751,610,124
	Options	Counter Flow	$0	$0	$0	$0
		Prevailing Flow	$2,311,548	$50,740,739	$28,755,261	$81,807,547
		Total	$2,311,548	$50,740,739	$28,755,261	$81,807,547
	Total	Counter Flow	($20,150,407)	($172,006,373)	($121,204,230)	($313,361,009)
		Prevailing Flow	$410,529,089	$459,413,655	$276,835,937	$1,146,778,681
		Total	$390,378,682	$287,407,282	$155,631,707	$833,417,671
Sell offers	Obligations	Counter Flow	($3,352,510)	($21,072,998)	($14,100,676)	($38,526,185)
		Prevailing Flow	$3,710,307	$28,219,047	$16,835,074	$48,764,428
		Total	$357,796	$7,146,049	$2,734,398	$10,238,243
	Options	Counter Flow	$0	$0	$0	$0
		Prevailing Flow	$0	$329,174	$259,005	$588,179
		Total	$0	$329,174	$259,005	$588,179
	Total	Counter Flow	($3,352,510)	($21,072,998)	($14,100,676)	($38,526,185)
		Prevailing Flow	$3,710,307	$28,548,222	$17,094,079	$49,352,607
		Total	$357,796	$7,475,224	$2,993,402	$10,826,422
Total			$390,020,886	$279,932,058	$152,638,305	$822,591,249

Table 13-33 Estimated additional long term FTR auction revenue at Annual FTR Auction prices

	Long Term FTR Product				
Planning Period	YR3	YR2	YR1	YRALL	Total Difference
2014/2015	$59,598,642	$30,284,173	$52,030,909	$926,989	$142,840,713
2015/2016	$67,896,588	$40,975,278	$9,936,078	$303,082	$119,111,026
2016/2017	$42,378,048	$3,854,373	$11,055,824	$1,079,901	$58,368,147
2017/2018	$6,134,076	($1,841,715)	$12,396,817	$227,524	$16,916,702
2018/2019	$7,872,604	$2,926,457	$13,480,353	($111,226)	$24,168,189
Total	$183,879,959	$76,198,567	$98,899,981	$2,426,270	$361,404,776

Monthly Balance of Planning Period FTR Auction Revenue

Table 13-34 shows monthly balance of planning period FTR auction revenue by trade type, type and class type for January through June 2018. The Monthly Balance of Planning Period FTR Auctions for the 2017/2018 planning period netted $40.3 million in revenue, the difference between buyers paying $182.0 million and sellers receiving $141.7 million. For the entire 2016/2017 planning period, the Monthly Balance of Planning Period FTR Auctions netted $32.5 million in revenue with buyers paying $158.3 million and sellers receiving $125.7 million.

Table 13-34 Monthly Balance of Planning Period FTR Auction revenue: 2018

Monthly			Class Type			
Auction	Type	Trade Type	24-Hour	On Peak	Off Peak	All
Jan-18	Obligations	Buy bids	$1,136,987	$4,908,283	$2,908,181	$8,953,452
		Sell offers	$122,629	$2,557,292	$1,382,114	$4,062,036
	Options	Buy bids	$78,668	$103,035	$214,442	$396,145
		Sell offers	$6,014	$745,064	$596,327	$1,347,404
Feb-18	Obligations	Buy bids	$918,113	$5,745,959	$3,621,458	$10,285,530
		Sell offers	$531,850	$2,330,156	$894,900	$3,756,907
	Options	Buy bids	$2,970	$354,814	$308,893	$666,677
		Sell offers	$6,876	$1,341,491	$981,125	$2,329,492
Mar-18	Obligations	Buy bids	$324,055	$5,623,191	$2,867,153	$8,814,399
		Sell offers	$431,612	$3,296,743	$1,240,118	$4,968,472
	Options	Buy bids	$376,702	$210,189	$136,034	$722,925
		Sell offers	$4,087	$1,480,291	$888,487	$2,372,865
Apr-18	Obligations	Buy bids	$3,805,239	$5,504,318	$3,731,492	$13,041,049
		Sell offers	$408,182	$5,358,307	$3,765,433	$9,531,922
	Options	Buy bids	$94,966	$176,215	$67,420	$338,601
		Sell offers	$7,408	$1,109,406	$787,821	$1,904,636
May-18	Obligations	Buy bids	$902,453	$3,170,886	$1,522,229	$5,595,568
		Sell offers	$53,493	$2,759,329	$1,487,284	$4,300,105
	Options	Buy bids	$334,208	$75,972	$18,038	$428,217
		Sell offers	$537	$501,559	$260,753	$762,849
Jun-18	Obligations	Buy bids	$9,927,013	$17,356,413	$9,803,845	$37,087,271
		Sell offers	$1,853,241	$11,514,997	$7,024,017	$20,392,255
	Options	Buy bids	$8,711	$2,004,778	$1,528,168	$3,541,658
		Sell offers	$129,482	$5,150,031	$3,048,089	$8,327,602
2016/2017*	Obligations	Buy bids	$33,300,850	$74,471,786	$35,210,649	$142,983,284
		Sell offers	$1,054,010	$54,037,503	$22,053,221	$77,144,734
	Options	Buy bids	$370,193	$9,383,661	$5,521,874	$15,275,728
		Sell offers	$587,564	$29,503,924	$18,494,976	$48,586,464
	Net Total		$32,029,469	$314,020	$184,325	$32,527,815
2017/2018*	Obligations	Buy bids	$48,624,806	$80,725,915	$45,185,177	$174,535,897
		Sell offers	$3,856,422	$66,996,797	$39,571,417	$110,424,636
	Options	Buy bids	$888,416	$4,051,136	$2,566,754	$7,506,306
		Sell offers	$106,899	$19,516,633	$11,671,850	$31,295,383
	Net Total		$45,549,900	($1,736,379)	($3,491,336)	$40,322,185

* Shows Twelve Months

FTR Target Allocations

FTR target allocations were examined separately by source and sink contribution. Hourly FTR target allocations were divided into those that were benefits and liabilities and summed by sink and by source for the 2017/2018 planning period. Figure 13-13 shows the 10 largest positive and negative FTR target allocations, summed by sink, for the 2017/2018 planning period. The top 10 sinks that produced financial benefit accounted for 34.6 percent of total positive target allocations during the 2017/2018 planning period with the Western Hub accounting for 11.7 percent of all positive target allocations. The top 10 sinks that created liability accounted for 15.6 percent of total negative target allocations with the PECO zone accounting for 2.2 percent of all negative target allocations.

Figure 13-13 Ten largest positive and negative FTR target allocations summed by sink: 2017/2018

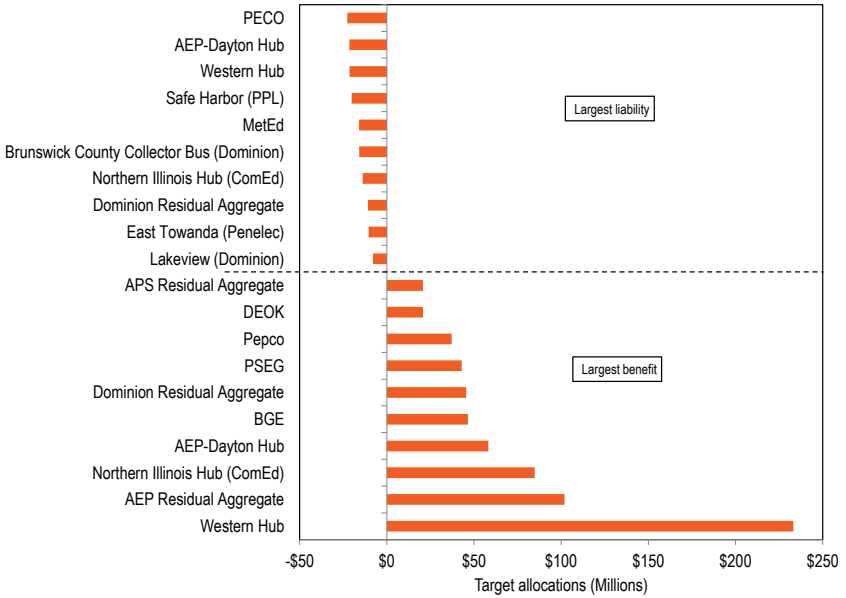
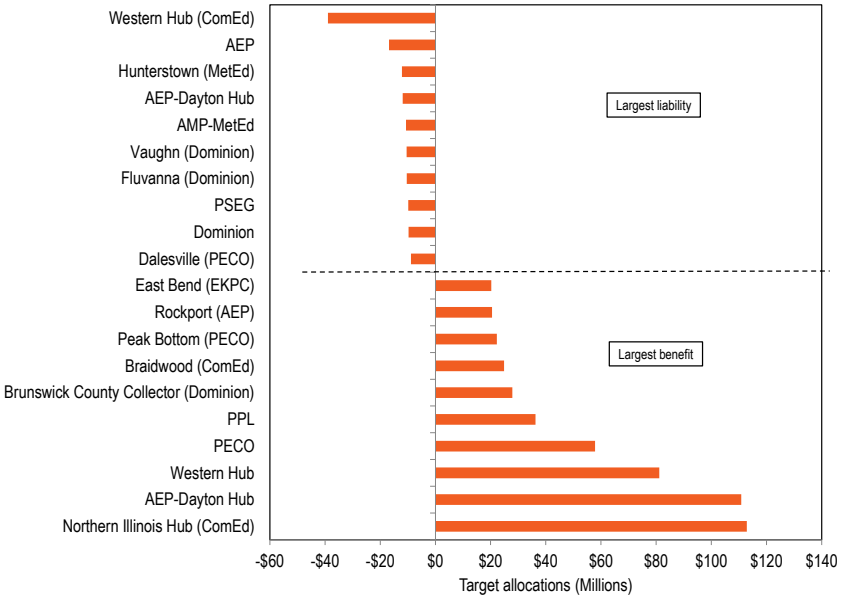


Figure 13-14 shows the 10 largest positive and negative FTR target allocations, summed by source, for the 2017/2018 planning period. The top 10 sources with a positive target allocation accounted for 25.7 percent of total positive target allocations with the Northern Illinois Hub accounting for 5.6 percent of total positive target allocations. The top 10 sources with a negative target allocation accounted for 13.6 percent of all negative target allocations, with the Western Hub accounting for 3.8 percent.

Figure 13-14 Ten largest positive and negative FTR target allocations summed by source: 2017/2018



Revenue Adequacy

Congestion revenue is created in an LMP system when all loads pay their LMP and all generators receive their LMP. When load in a constrained area pays more than the amount that generators receive, excluding losses, positive congestion revenue exists. The load MW exceed the generation MW in constrained areas

because part of the load is served by imports using transmission capability into the constrained areas. That is why load, which pays for the transmission capability, is assigned ARRs to offset congestion in 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 constrained areas receives the congestion price and all load in constrained areas pays the congestion price. As a result, load congestion payments are greater than the congestion related payments to generation.[43] That is the source of the congestion revenue to pay holders of ARRs and FTRs.

FTR revenue adequacy must be distinguished from the adequacy of ARRs/FTRs as an offset for load against total congestion. FTR revenue adequacy, under current PJM rules, is a narrower concept that compares day-ahead congestion revenue to the sum of the target allocations across the specific paths for which FTRs were purchased. A path specific target allocation is not a guarantee of payment. The adequacy of ARRs/FTRs as an offset for load against total congestion compares ARR and self scheduled FTR revenues, minus balancing congestion and M2M payments, to total congestion on the system.

FTR revenues are primarily comprised of hourly congestion revenue, from the day-ahead market, but also include negative FTR target allocations.[44] Day-ahead congestion revenues in excess of FTR payments are carried forward from prior months and distributed back from later months. For example, in June 2014, there was $2.9 million in excess congestion revenue that was carried forward to fund months later in the planning period that may have a revenue shortfall. At the end of a planning period, if some months remain not fully funded, an uplift charge is collected at the end of the planning period from any FTR holders 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. Until the 2018/2019 planning period, at the end of the planning period, surplus congestion revenue after paying any monthly inadequacies, was distributed to FTR participants in the same manner that the FTR uplift is applied.

43 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," *MMU Technical Reference for PJM Markets*, at "Financial Transmission and Auction Revenue Rights."

44 When hourly congestion revenues are negative, it is defined as a net negative congestion hour.

Beginning in the 2018/2019 planning period, surplus congestion revenue, including surplus FTR auction revenue, will be distributed to ARR holders in proportion to their ARR target allocations.[45] Surplus FTR auction revenue is the difference between ARR target allocations and the sum of FTR auction revenues.

PJM initiated this change to surplus congestion revenue to recognize that any surplus revenue is a result of unallocated system capability that belongs to ARRs holders, not FTR holders, who previously received this surplus revenue.

Under the new allocation process, at the end of the planning period, any surplus congestion revenue will first go to ARR holders until they are fully funded relative to their target allocations. The remaining surplus congestion revenue will then go to fully fund FTRs target allocations. All of the remaining surplus congestion revenue will go to ARR holders in proportion to their target allocations.

While the new allocation process returns the value of some of the unallocated rights to ARR holders, it does not fully recognize that ARR holders own the rights to all congestion revenues. Surplus congestion result from the failure to assign rights to all congestion to ARRs.

FERC recognized that "FTRs are not guaranteed to be fully funded, and FTR holders are well positioned to manage and mitigate that risk."[46] FTRs are not guaranteed to be fully funded or over funded from congestion revenue. FTR holders voluntarily enter the market and can price their bids in any way they choose.

FTRs were paid at 100 percent of the target allocation level for the 2014/2015, 2015/2016 and 2016/2017 planning periods. PJM collected $1,457.1 million, $1,003.3 million and $828.7 million of FTR revenues during the 2014/2015, 2015/2016 and the 2016/2017 planning periods. Congestion in January 2014 was extremely high due to cold weather events, resulting in target allocations and congestion revenues that were unusually high for 2014.

45 163 FERC ¶61,165 (2018).

46 *Id.* at P 30 (2018).

This step change to high levels of revenue adequacy beginning in the 2014/2015 planning period was primarily a result of actions taken by PJM to address prior low levels of revenue adequacy. PJM's actions included PJM's assumption of higher outage levels and PJM's decision to include additional constraints (closed loop interfaces) both of which reduced system capability in the FTR auction model. PJM's actions led to a significant reduction in the allocation of Stage 1B and Stage 2 ARRs. For the 2014/2015 planning period, Stage 1B and Stage 2 ARR allocations were reduced by 84.9 percent and 88.1 percent from the 2013/2014 planning period. For the 2015/2016 planning period, Stage 1B and Stage 2 ARR allocations were reduced by 76.9 percent and 82.0 percent from the 2013/2014 planning period. The result of this change in modeling was also that available FTR capacity decreased for the planning period. This decrease resulted in an increase in FTR nodal prices for the Annual FTR Auction. The result was fewer available ARRs, but an increased dollar per MW value for those ARRs.

Table 13-35 presents the PJM FTR revenue detail for the 2016/2017 planning period and the 2017/2018 planning period. In this table, under the new balancing congestion and M2M payment rules, any negative congestion is from day-ahead balancing congestion and does not include balancing. For the 2017/2018 planning period there was $0.5 million and $0.7 million in negative day-ahead congestion in October and November 2017 for a total of $1.2 million in negative day-ahead congestion charged to FTR holders.

Table 13-35 Total annual PJM FTR revenue detail (Dollars (Millions)): 2016/2017 and 2017/2018

Accounting Element	2016/2017	2017/2018
ARR information		
ARR target allocations	$934.3	$573.8
FTR auction revenue	$962.2	$601.2
ARR excess	$27.9	$27.4
FTR targets		
Positive target allocations	$929.1	$1,396.2
Negative target allocations	($194.1)	($411.2)
FTR target allocations	$735.0	$985.0
Adjustments:		
Adjustments to FTR target allocations	($0.4)	($6.2)
Total FTR targets	$734.6	$978.8
FTR revenues		
ARR excess	$27.9	$27.4
Congestion		
Net Negative Congestion (enter as negative)	($16.9)	($1.2)
Hourly congestion revenue	$843.6	$1,323.3
Midwest ISO M2M (credit to PJM minus credit to Midwest ISO)	($43.5)	($6.3)
Adjustments:		
Excess revenues carried forward into future months	$20.4	$15.7
Excess revenues distributed back to previous months	$0.0	$0.0
Other adjustments to FTR revenues	$0.0	$0.0
Total FTR revenues		
Excess revenues distributed to other months	$20.4	$15.7
Net Negative Congestion charged to DA Operating Reserves	$0.0	$0.0
Total FTR congestion credits	$831.4	$1,365.0
Total congestion credits on bill (includes CEPSW and end-of-year distribution)	$831.4	$1,365.0
Remaining deficiency	($76.4)	($370.5)

FTR target allocations are based on hourly prices in the Day-Ahead Energy Market for FTR paths and are defined to be the revenue required to compensate FTR holders for day-ahead congestion on those paths. FTR credits are paid to FTR holders and, depending on market conditions, can be less than the target allocations. Table 13-36 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. Under the new surplus allocation rules, after fully funding FTRs, any remaining revenue is given to ARR holders in proportion to their ARR target allocations.

The total row in Table 13-36 is not the sum of each of the monthly rows because the monthly rows may include excess revenues carried forward from prior months and excess revenues distributed back from later months. September 2016 and October 2016 had revenue shortfalls totaling $2.6 million and $6.1 million, but were fully funded using excess revenue from previous months.

Table 13-36 Monthly FTR accounting summary (Dollars (Millions)): 2016/2017 and 2017/2018

Period	FTR Revenues (with adjustments)	FTR Target Allocations	FTR Payout Ratio (original)	FTR Credits (with adjustments)	FTR Payout Ratio (with adjustments)	Monthly Credits Excess/Deficiency (with adjustments)
Jun-16	$60.5	$55.1	100.0%	$60.5	100.0%	($5.4)
Jul-16	$112.1	$87.1	100.0%	$112.1	100.0%	($24.9)
Aug-16	$110.9	$82.2	100.0%	$110.9	100.0%	($28.7)
Sep-16	$117.7	$120.4	97.7%	$120.4	100.0%	$2.6
Oct-16	$104.9	$110.9	94.5%	$110.9	100.0%	$6.1
Nov-16	$45.7	$38.2	100.0%	$45.7	100.0%	($7.4)
Dec-16	$52.9	$42.3	100.0%	$52.9	100.0%	($10.7)
Jan-17	$61.1	$44.0	100.0%	$61.1	100.0%	($17.1)
Feb-17	$47.5	$51.8	91.7%	$51.8	100.0%	$4.4
Mar-17	$44.4	$48.9	90.8%	$48.9	100.0%	$4.6
Apr-17	$28.0	$25.3	100.0%	$28.0	100.0%	($2.6)
May-17	$25.6	$28.4	90.3%	$28.4	100.0%	$2.7
Summary for Planning Period 2016/2017						
Total	$811.3	$734.5		$831.5		($76.4)
Jun-17	$64.8	$60.1	100.0%	$64.8	100.0%	($4.7)
Jul-17	$51.8	$45.4	100.0%	$51.8	100.0%	($6.3)
Aug-17	$35.7	$31.0	100.0%	$35.7	100.0%	($4.7)
Sep-17	$100.5	$93.0	100.0%	$100.5	100.0%	($7.5)
Oct-17	$53.2	$68.8	77.2%	$68.8	100.0%	$15.7
Nov-17	$61.2	$51.0	100.0%	$61.2	100.0%	($10.1)
Dec-17	$142.7	$81.4	100.0%	$142.7	100.0%	($61.3)
Jan-18	$520.2	$268.1	100.0%	$520.2	100.0%	($252.1)
Feb-18	$45.8	$36.1	100.0%	$45.8	100.0%	($9.6)
Mar-18	$85.2	$81.1	100.0%	$85.2	100.0%	($4.1)
Apr-18	$62.4	$55.6	100.0%	$62.4	100.0%	($6.9)
May-18	$125.9	$108.8	100.0%	$125.9	100.0%	($17.1)
Summary for Planning Period 2017/2018						
Total	$1,349.3	$980.5		$1,365.0		($368.8)

Figure 13-15 shows the original PJM reported FTR payout ratio by month, excluding excess revenue distribution, for January 2004 through June 2018. The months with payout ratios above 100 percent have excess congestion revenue and the months with payout ratios under 100 percent are revenue inadequate. Figure 13-15 also shows the payout ratio after distributing excess day-ahead congestion revenue across months within the planning period. If there are excess day-ahead congestion revenues in a given month, the excess is distributed to other months within the planning period that were revenue deficient. The payout ratio for revenue inadequate months in the current planning period may change if excess revenue is collected in the remainder of the planning period. March 2015 had high levels of negative balancing congestion that resulted in a payout ratio of 64.6 percent. However, there was enough excess from previous months to bring the payout ratio to 100 percent. Congestion in December 2017 and January 2018 was high relative to other months in the planning period, resulting in an extremely high payout ratio.

Figure 13-15 FTR payout ratio by month, excluding and including excess revenue distribution: January 2004 through June 2018

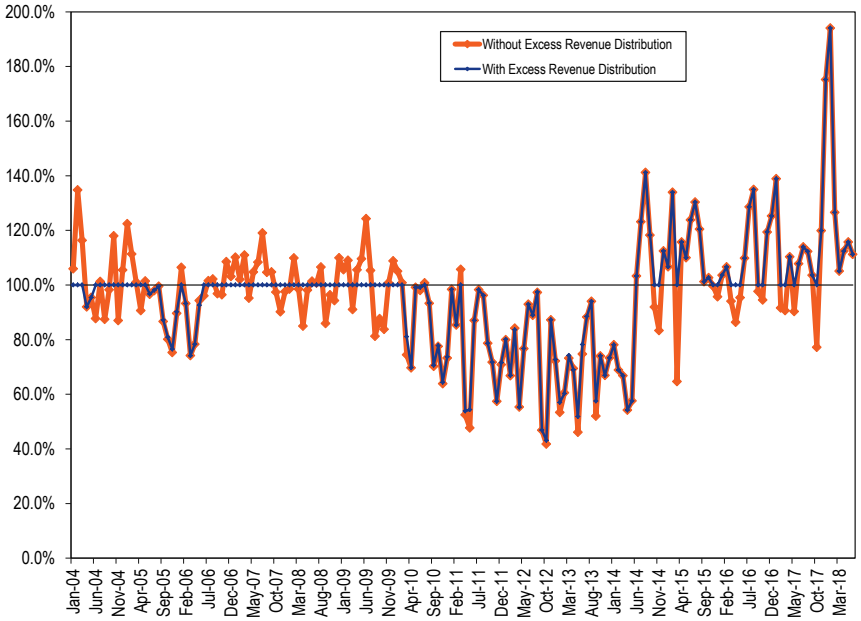


Table 13-37 shows the FTR payout ratio by planning period from the 2003/2004 planning period forward. Planning period 2013/2014 includes the additional revenue from unallocated congestion charges from Balancing Operating Reserves. For the 2014/2015, 2015/2016 and 2016/2017 planning periods, there was excess congestion revenue to pay FTR holders pro rata in proportion to their net positive target allocations, resulting in a payout ratio of 116.2 percent, 106.8 and 113.1 percent for the planning periods.

Table 13-37 PJM reported FTR payout ratio by planning period

Planning Period	FTR Payout Ratio
2003/2004	97.7%
2004/2005	100.0%
2005/2006	90.7%
2006/2007	100.0%
2007/2008	100.0%
2008/2009	100.0%
2009/2010	96.9%
2010/2011	85.0%
2011/2012	80.6%
2012/2013	67.8%
2013/2014	72.8%
2014/2015	100.0%
2015/2016	100.0%
2016/2017	100.0%
2017/2018	100.0%
2018/2019	100.0%

FTR Uplift Charge

At the end of the planning period, an uplift charge is applied to FTR holders. This charge is to cover the net of the monthly deficiencies in the target allocations calculated for individual participants. An individual participant's uplift charge is a pro rata charge, to cover this deficiency, based on their net target allocation with respect to the total net target allocation of all participants with net positive target allocations for the planning period. Participants pay an uplift charge that is a ratio of their share of net positive target allocations to the total net positive target allocations.

Revenue Adequacy Issues and Solutions

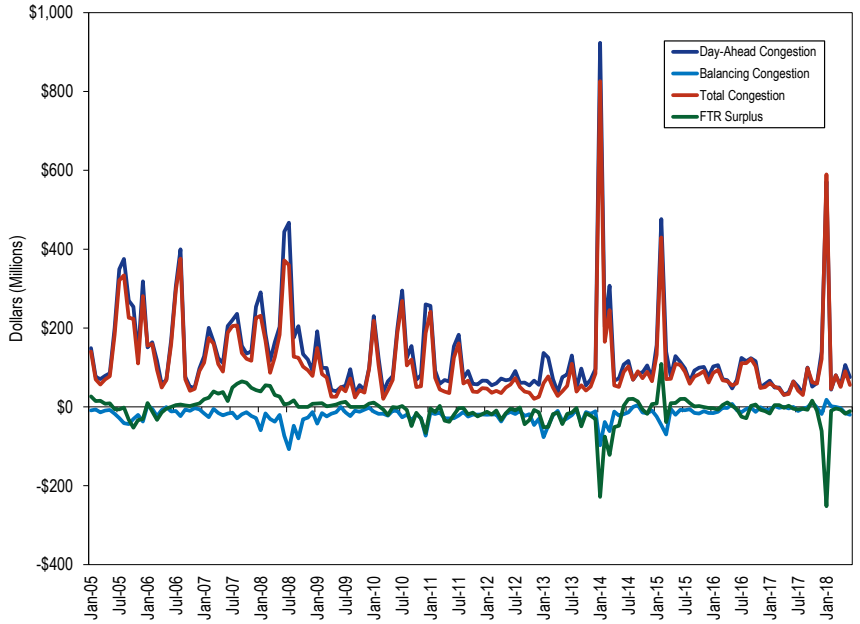
The current ARR/FTR design does not serve as an efficient way to ensure that load receives all the congestion revenues or has the ability to receive the auction revenues associated with all the potential congestion revenues. There are several reasons for the disconnect between congestion revenues and ARR/FTR revenues. The reasons include unavoidable modeling differences, avoidable modeling differences, such as outage modeling decisions, cross subsidies among and between FTR participants ARR holders, the use of generation to load paths rather than a measure of total congestion, and the

failure to provide to ARR holders the full system capability that is provided to FTR purchasers in the Long Term FTR Auction.

The issuance of the September 15, 2016, FERC order increased the gap between congestion revenue and ARR/FTR revenue collected. The result of allocating balancing congestion and M2M payments to ARRs, and allocating excess day-ahead congestion revenue and additional FTR auction revenue to FTR holders solely, increases revenue to FTRs and reduces payments to load. FTR portfolio netting leads to cross subsidies among FTR participants which treat FTRs differently depending on how a participant's portfolio in constructed. Restructuring Stage 1A allocations using QRRs for retired resources is an attempt to fix a flawed system, but retains the core problem which is reliance on generation to load contract path congestion revenue rights rather than on the correct definition of congestion revenues. The rule change does not address the problem with using contract paths, does not address the deficiencies for active units and gives priority to units based on financial, not physical, determinations. The purpose of the FTR/ARR system is to return congestion revenue to load. The current and newly modified rules do not meet this goal. Portfolio netting and the asymmetric treatment of counter flow FTRs continue to be an issue in the FTR market, resulting in discrepancies in payments made to participants based on the construction of their portfolio.[47]

Figure 13-16 shows the FTR surplus, collected day-ahead, balancing and total congestion payments from January 2005 through June 2018. May 2016 had positive total balancing congestion of $7.5 million. March 2015 had balancing congestion of -$70.0 million.

Figure 13-16 FTR surplus and the collected day-ahead, balancing and total congestion: January 2005 through June 2018



47 *2017 State of the Market Report for PJM*, Volume 2, Section 13: FTRs and ARRs

ARRs as an Offset to Congestion for Load

Load pays for the transmission system and contributes congestion revenues. FTRs and later ARRs were intended to return congestion revenues to load. With the implementation of the current FTR/ARR design, the purpose of FTRs has been subverted.

FERC Order on FTRs: Balancing Congestion and M2M Payment Allocation

On September 15, 2016, FERC issued an order removing balancing congestion and market to market (M2M) payments from the FTR funding equation and assigned them, on a load ratio basis, to load and exports.[48] The MMU petitioned the U.S. Court of Appeals for the District of Columbia Circuit to reverse the order and restore the longstanding approach to calculating congestion revenues. The case was consolidated with appeals filed by others. The consolidated appeals were denied in an unpublished opinion issued June 12, 2018.[49]

The new rule for calculating congestion revenues went into effect on June 1, 2017, for the 2017/2018 planning period.

In its compliance filing PJM redefined balancing congestion as balancing congestion plus market to market (M2M) payments between MISO and NYISO. Under the order, load and exports will pay balancing congestion and M2M payments proportionally. Based on the 2011/2012 and subsequent planning periods, load comprises 94.9 percent of all demand. Based on the 2011/2012 and subsequent planning periods, total balancing congestion and M2M payments were $1,607.4 million, so load would have been responsible for an additional $1,103.3 million in balancing congestion and M2M charges if the new rules had been place for that period.

In addition, FERC ordered that all day-ahead congestion revenue in excess of FTR target allocations and additional FTR auction revenue over ARR target allocations, belongs to FTR holders. This further increased the underlying problem with the FTR design and reduced the probability that congestion revenues will be returned to load.

Before the 2018/2019 planning period, the reallocation of balancing congestion and M2M payments from FTR holders to load, and the allocation of additional FTR auction revenues to FTR holders required ARRs to subsidize FTRs.

Beginning with the 2018/2019 planning period, surplus auction revenue, which is defined as day-ahead congestion revenue and surplus auction revenue remaining after funding FTRs, will be allocated to ARRs prorata based on ARR target allocations.[50] This surplus revenue is generated by a failure of the current ARR/FTR construct to make all congestion revenue rights available to load in the form of ARRs. All congestion revenue belongs to ARR holders and PJM's new surplus congestion allocation rule is an attempt to get closer to that goal. However, under the current rules, ARR holders will only have access to this surplus after full funding of FTRs is accomplished, which does not fully recognize ARR holders' primary rights to this surplus congestion revenue. If this rule had been in effect for the 2017/2018 planning period, ARRs and FTRs would have offset 76.8 percent of total congestion rather than 50.7 percent.

Table 13-38 shows the ARR and FTR revenue paid to load, the congestion offset available to load with and without allocating balancing congestion to load and the congestion offset when surplus congestion revenue is allocated to load. The pre 2017/2018 offset is calculated as the ARR credits and the FTR credits excluding balancing congestion and M2M payments, divided by the total congestion and the load share of balancing and M2M payments. The 2017/2018 offset is the sum of the ARR credits, adjusted FTR credits and the load share of balancing congestion and M2M payments. The post 2017/2018 offset is calculated identically to the 2017/2018 offset, but includes any surplus congestion revenue remaining in the planning period. FTRs are fully funded before ARR holders have access to the surplus, so in planning periods with revenue inadequacy there is no difference between 2017/2018 and post 2017/2018. In planning periods that are fully funded, the surplus goes to load, and provides an increased congestion offset.

48 See 156 FERC ¶ 61,180 (2016), *reh'g denied*, 156 FERC ¶ 61,093 (2017).

49 *NJBPU v. FERC*, No. 17-1106 et al., attached memorandum at 3 ("After a thorough review of the record, we conclude that none of petitioners' challenges can overcome the deference we owe FERC. As FERC's order make clear, the Commission adequately considered and reasonably rejected each of the arguments that petitioners advance before the court.")

50 163 FERC ¶61,165 (2018).

The allocation of balancing congestion and M2M payments to load went into effect in the 2017/2018 planning period. If these rules had been in place beginning with the 2011/2012 planning period, ARR holders would have received a total of $1,034.2 million less in congestion offsets from the 2011/2012 through the 2016/2017 planning period. The total overpayment to FTR holders for the 2011/2012 through 2016/2017 planning period would have been $944.4 million. The actual underpayment to load in the 2017/2018 planning period was $124.9 million with a $370.7 million overpayment to FTR holders.

Allocating surplus congestion revenue to load rather than FTRs in the 2017/2018 planning period would have improved the total congestion offset for load to 81.0 percent from 70.3 percent under the old rules or 64.0 percent under the rules that allocated balancing congestion to load. Comparing the pre 2017/2018 rules to the post 2017/2018 rules, load faces a shortfall in congestion revenues of $533.3 million. The shortfall is the net of paying all balancing congestion and M2M payments and receiving surplus congestion revenue. The surplus congestion revenue offset equals $625.8 million.

Table 13-38 ARR and FTR total congestion offset (in millions) for ARR holders: 2011/2012 through 2017/2018

	Revenue				Pre 2017/2018 (Without Balancing)		2017/2018 (Current)		Post 2017/2018 (With Surplus)	
Planning Period	ARR Credits	FTR Credits	Total Congestion	Excess Revenue	Total ARR/FTR Offset	Percent Offset	Current Revenue Received	Percent Offset	New Revenue Received	New Offset
2011/2012	$512.2	$249.8	$770.6	($192.5)	$762.0	98.9%	$598.6	83.3%	$598.6	83.3%
2012/2013	$349.5	$181.9	$575.8	($292.3)	$531.4	92.3%	$275.9	68.0%	$275.9	68.0%
2013/2014	$337.7	$456.4	$1,777.1	($678.7)	$794.0	44.7%	$574.1	43.2%	$574.1	43.2%
2014/2015	$482.4	$404.4	$1,390.9	$139.6	$886.8	63.8%	$686.6	57.2%	$826.2	65.7%
2015/2016	$635.3	$223.4	$992.6	$42.5	$858.8	86.5%	$744.8	78.2%	$787.3	81.9%
2016/2017	$640.0	$169.1	$824.6	$72.6	$809.1	98.1%	$727.7	89.5%	$800.3	97.4%
2017/2018	$427.3	$294.2	$1,297.7	$371.2	$721.5	55.6%	$596.6	50.7%	$967.8	76.8%
Total	$3,384.5	$1,979.1	$7,629.3	($537.6)	$5,363.6	70.3%	$4,204.5	64.0%	$4,830.3	81.0%

Table 13-38 demonstrates the inadequacies of the ARR/FTR design. The goal of the design should be to return 100 percent of the congestion revenues to the load. The actual results continue to fall well short of that goal.

Credit Issues

There were three collateral defaults in the first six months of 2018 not involving GreenHat Energy, LLC, for a total of $606,938. All collateral defaults were cured promptly. There were three payment defaults in the first 6 months of 2018 not involving GreenHat Energy, LLC for a total of $19,963, which resulted in the default of Amerigreen Energy, Inc. on June 12, 2018.[51] On June 21, 2018, GreenHat Energy, LLC was declared in default for two collateral calls totaling $2.8 million and two payment defaults totaling $3.9 million.[52] GreenHat held a large FTR position which, according to current tariff provisions, will be liquidated in the closest FTR auctions coinciding to the effective dates of the positions held.[53] The net gain or loss of these liquidated positions will be added to the total default amount that will then be allocated to PJM members according to OA sections 15.1.2A(1) and 15.2.2. On July 26, 2018, PJM filed a waiver request at FERC asking that PJM only be required to liquidate FTRs for the prompt months to allow Member discussion on how to proceed with GreenHat's large FTR portfolio.[54]

51 Daugherty, Suzanne, Email sent to the MC, MRC, CS and MSS email distribution list, "PJM Member Default – Amerigreen Energy, Inc." (June 13, 2018).
52 Daugherty, Suzanne, Email sent to the MC, MRC, CS, and MSS email distribution list, "Notification of GreenHat Energy, LLC Payment Default," (June 22, 2018).
53 "PJM Manual 6: Financial Transmission Rights," Rev. 20 (June 1, 2018) at 47.
54 See "Request of PJM Interconnection, LLC for a waiver effective July 27, 2018," Docket No. ER18-2068 (July 26, 2018).

FTR Forfeitures

FERC Order on FTR Forfeitures

On January 19, 2017, FERC determined that the application of the current FTR forfeiture rule to INCs, DECs and UTCs was unjust and unreasonable.[55] In their determination, FERC ordered that a method should be developed to consider the net impact of a participant's entire portfolio of virtual bids on a constraint related to an FTR position and ordered that counter flow FTRs be included in FTR forfeiture calculations.

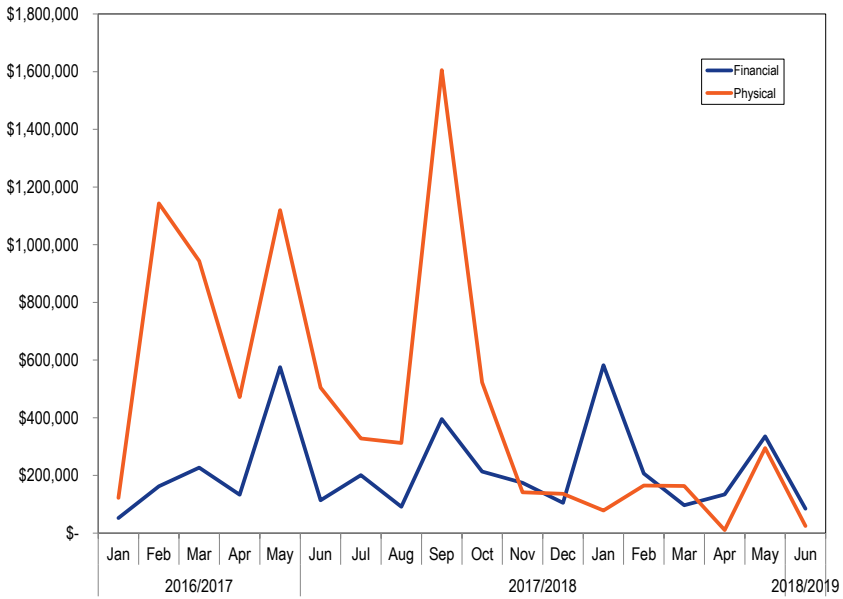
FERC ordered a retroactive effective date and PJM determined that no FTR forfeitures would be billed to participants after January 19, 2017, under the prior rules. Participants were retroactively billed their FTR forfeiture amounts based on the new FTR forfeiture rule once it was in place.

Until January 19, 2017, an FTR holder was subject to forfeiture of any profits from an FTR if it met the criteria defined in Section 5.2.1 (b) of Schedule 1 of the PJM Operating Agreement. If a participant has a cleared increment offer or decrement bid for an applicable hour at or near the source or sink of any FTR they own and the day-ahead congestion LMP difference is greater than the real-time congestion LMP difference the profits from that FTR may be subject to forfeiture for that hour. An increment offer or decrement bid is considered near the source or sink point if 75 percent or more of the energy injected or withdrawn, and which is withdrawn or injected at any other bus, is reflected on the constrained path between the FTR source or sink. This rule only applies to increment offers and decrement bids that would increase the price separation between the FTR source and sink points.

After January 19, 2017, participants were subject to the new FTR forfeiture rule. This rule considers the impact of a participant's net virtual transaction portfolio on all constraints. If a participant's net virtual portfolio impacts a constraint by the greater of 0.1 MW or 10 percent or more of the line limit, and that constraint affects an individual FTR's target allocation by $0.01, the FTR is subject to FTR forfeiture if the net virtual portfolio increased the value of the FTR. FTR forfeitures do not result from net virtual portfolios that decrease the value of their affiliates' FTRs. The forfeiture amount calculation is the hourly profit of the FTR and an FTR cannot forfeit more than once per hour.

Figure 13-17 shows the monthly FTR forfeitures under the newly established FTR forfeiture rule from January 19, 2017 through June 30, 2018. PJM began retroactively billing FTR forfeitures with the September 2017 bill. In the interim period from January 2017 through September 2017 participants did not know what behaviors were causing FTR forfeitures, so they had no way to modify their bidding behavior to avoid FTR forfeitures. After September 2017, FTR forfeitures were down significantly, and stabilized, as participants could now see the effect of their activities on FTR forfeitures. For the period of January 19, 2017, through June 30, 2018, total FTR forfeitures were $12.0 million.

Figure 13-17 Monthly FTR forfeitures for physical and financial participants



55 *See* 158 FERC ¶ 61,038.