# 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 first 10 months of the 2017/2018 planning period, after the reallocation of balancing congestion and M2M payments, ARR and self scheduled FTR revenue offset 61.6 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 September 15, 2016, FERC ordered PJM to address the allocation of congestion credits in the FTR Market, portfolio netting within the FTR Market and the use of historical resources for the Annual ARR allocation process.[3] PJM made a compliance filing on November 14, 2016.[4] Under the order, PJM allocates the costs of balancing congestion and market to market payments to load and exports effective June 1, 2017, for the 2017/2018 planning period. Under the order, PJM allocates all excess congestion revenue from the day-ahead market to FTR Holders and allocates excess auction revenue to FTR Holders. FERC ordered the continued use of portfolio netting with the corresponding cross subsidies among participants in the FTR Market. FERC directed PJM to replace generation to load paths based on retired generation with generation to load paths based on existing generation resources.

If the original PJM FTR design 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 March* focuses on the Monthly Balance of Planning Period FTR Auctions for the 2016/2017 and 2017/2018 planning periods, specifically covering January 1, 2017, through March 31, 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.
- 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.

3 See 156 FERC ¶ 61,180 (2016).
4 See Compliance Filing concerning Modifications to ARR and FTR Provisions, Docket No. EL16-6 (November 14, 2016).

# 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 first 10 months of the 2017/2018 planning period, PJM allocated a total of 33,167.3 MW of residual ARRs, down from 35,034.9 MW in the first 10 months of the 2016/2017 planning period, with a total target allocation of $15.9 million for the first 10 months of the 2017/2018 planning period, up from $7.0 million for the first 10 months of the 2016/2017 planning period.

- **ARR Reassignment for Retail Load Switching.** There were 41,271 MW of ARRs associated with $310,900 of revenue that were reassigned in the first 10 months of the 2017/2018 planning period. There were 38,194 MW of ARRs associated with $426,200 of revenue that were reassigned for the first 10 months of the 2016/2017 planning period.

### Market Performance

- **Revenue Adequacy.** For the first 10 months of the 2017/2018 planning period, the ARR target allocations, which are based on the nodal price differences from the Annual FTR Auction, were $479.2 million, while PJM collected $623.6 million from the combined 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 first 10 months of 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 61.6 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.** 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 first 10 months of the 2017/2018 planning period, total participant FTR sell offers were 4,030,595 MW, up from 3,965,903 MW for the same period during the 2016/2017 planning period.

- **Demand.** The total FTR buy bids from the Monthly Balance of Planning Period FTR Auctions for the first 10 months of the 2017/2018 planning period decreased 4.6 percent from 18,651,409 MW for the same time period of the prior planning period, to 17,795,538 MW.

- **Patterns of Ownership.** For the Monthly Balance of Planning Period Auctions, financial entities purchased 74.8 percent of prevailing flow and 79.5 percent of counter flow FTRs for January through March of 2018. Financial entities owned 63.1 percent of all prevailing and counter flow FTRs, including 54.7 percent of all prevailing flow FTRs and 73.7 percent

of all counter flow FTRs during the period from January through March, 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 March 31, 2018, total FTR forfeitures were $11.1 million.
- **Credit Issues.** There were three collateral defaults in the first three months of 2018, for a total of $606,938. All defaults were cured promptly.

## Market Performance

- **Volume.** In the first ten months of the 2017/2018 planning period Monthly Balance of Planning Period FTR Auctions cleared 2,410,593.7 MW (13.5 percent) of FTR buy bids and 1,037,534.0 MW (25.7 percent) of FTR sell offers.
- **Price.** The weighted average buy bid cleared FTR price in the Monthly Balance of Planning Period FTR Auctions for the first 10 months of the 2017/2018 planning period was $0.12, down from $0.13 per MW for the same period in the 2016/2017 planning period.
- **Revenue.** The Monthly Balance of Planning Period FTR Auctions generated $37.4 million in net revenue for all FTRs for the first 10 months of the 2017/2018 planning period, up from $31.3 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 first 10 months of 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 first 10 months of the 2017/2018 planning period, physical entities made $76.6 million in profits, while receiving $195.9 million in returned congestion from self scheduled FTRs, and financial entities made $202.2 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 |
|---|---|---|
| 2018/2021 Long Term | 6/2/2017 | 12/12/2017 |
| 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 all congestion revenue in excess of FTR target allocations be distributed to ARR holders on a monthly basis. (Priority: High. New recommendation. 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.[5] (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.)
- 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.)

## 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

5 See "PJM Manual 6: Financial Transmission Rights," Rev. 18 (Sep. 1, 2017) at 55.

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 limited the allocation of ARR capacity, and FTRs, through outage selection to manage FTR funding. This resulted in a 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.

Load should never be required to subsidize payments to FTR Holders, regardless of the reason. Such subsidies have been suggested repeatedly.[6] The FERC order of September 15, 2016, introduced a subsidy to FTR Holders at the expense of ARR holders.[7] 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 is 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 holders can expect a decrease in ARR revenues and an increase in the volatility of ARR revenues under the new rules. ARR revenues were significantly reduced for the 2017/2018 FTR Auction, the first auction under the new rules. ARRs and self scheduled FTRs offset 61.6 percent of total congestion costs for the first ten months of the 2017/2018 planning period rather than the 65.3 percent offset that would have occurred under the prior rules, a difference of $69.1 million. There was a significant drop in the offset from December 2017 to March 2018, as a result of high congestion in January 2018. ARR revenue is fixed at annual auction prices, but FTR revenue increases with congestion. The 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.

6 See FERC Dockets Nos. EL13-47-000 and EL12-19-000.

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

If these allocation 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 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.

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.

PJM used a more conservative approach to modeling the transmission capability for the 2014/2015 through 2016/2017 planning periods compared to the 2013/2014 planning period. PJM simply used higher outage levels and included additional constraints, both of which reduced system capability in the FTR auction model. The result was a significant reduction in Stage 1B and Stage 2 ARR allocations, and a corresponding reduction in the available quantity of FTRs, an increase in FTR prices, an increase in ARR target allocations and an increase in congestion revenues not assigned to ARRs. The market response to the reduced supply of FTRs was increased bid prices, increased clearing prices and reduced clearing quantities. For the 2017/2018 planning period PJM assigned all balancing congestion and M2M payments to load and exports. As a result, PJM also reversed course and increased the availability of Stage 1B and Stage 2 FTRs, but still reserves judgement in outage selection for improved FTR funding. The market response to the increased supply of FTRs was lower bid prices and clearing prices.

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. 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 decreased ARR target allocations resulting from 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 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.

If netting within portfolios were eliminated and the payout ratio were calculated correctly, the payout ratio in the 2013/2014 planning period would have been 87.5 percent instead of the reported 72.8 percent. The MMU recommends that netting of positive and negative target allocations within portfolios be eliminated.

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 result of removing portfolio netting and applying a payout ratio to counter flow FTRs would have increased the calculated payout ratio in the 2013/2014 planning period from the reported 72.8 percent to 91.0 percent. For the 2014/2015, 2015/2016 and 2016/2017 planning periods the payout ratio was 100 percent. 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. Auction revenue from the sale of FTRs in the Long Term FTR Auction is 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 $337.2 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.[8] 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

8 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.

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. 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.[9] 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.

## 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.[10] Stage 1A ARRs can give LSEs the ability to offset their congestion costs, through the return of congestion revenues, on a long-term

9 "PJM Manual 6: Financial Transmission Rights," Rev. 18 (Sep. 1, 2017) at 31; "IARRs for RTEP Upgrades Allocated for 2016/2017 Planning Period," <http://www.pjm.com/~/media/markets-ops/ftr/annual-arr-allocation/2016-2017/2016-2017-iarrs-for-rtep-upgrades-allocated.ashx>.

10 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.

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:

- **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.[11]
- **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.

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.[12] 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.[13]

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 physical transmission system can support the approved set of ARRs. In making simultaneous feasibility determinations, PJM utilizes a power flow model of security constrained dispatch based on assumptions about generation and transmission outages.[14] 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

11 See "PJM Manual 6: Financial Transmission Rights," Rev. 18 (Sep. 1, 2017) at 22.

12 *Id.* at 21.

13 *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>.

14 "PJM Manual 6: Financial Transmission Rights," Rev. 18 (Sep. 1, 2017) at 55–56.

MW and in inverse proportion to their impact on binding constraints, except Stage 1A ARRs:

**Equation 13- 1 Calculation of prorated ARRs[15]**

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

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.[16] PJM replaced retired units with operating generators, termed qualified replacement resources (QRRs).[17]

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 and 2016/2017 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

15 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>.
16 156 FERC ¶ 61,180 (2016).
17 See FERC Docket No. EL16-6-003.

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

### Figure 13-1 Historic Stage 1B and Stage 2 ARR Allocations from the 2011/2012 through 2017/2018 planning periods

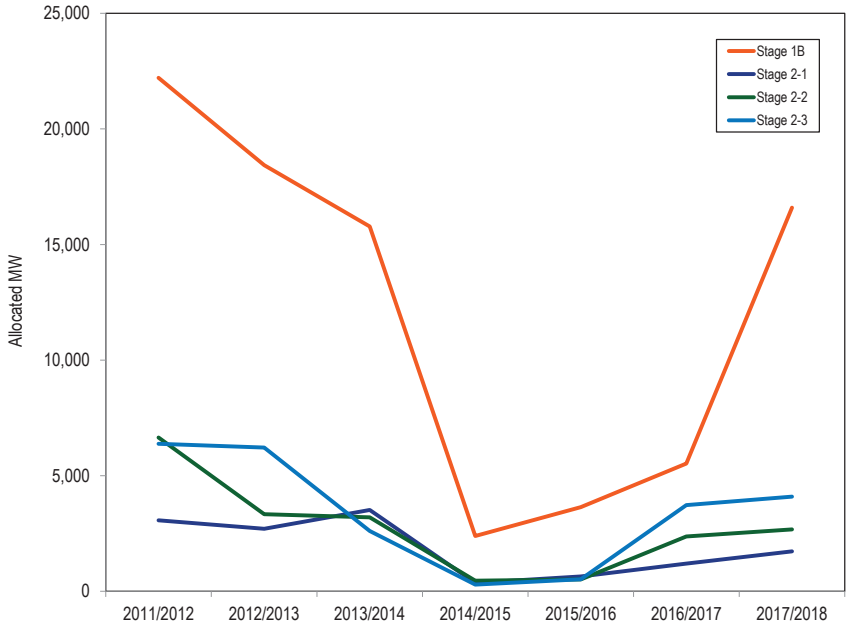



Table 13-3 shows the ARR allocations for the 2011/2012 through 2017/2018 planning periods.

### Table 13-3 Historic Stage 1B and Stage 2 ARR Allocations from the 2011/2012 through 2017/2018 planning periods

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

## 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.[18] 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 41,271 MW of

18 See "PJM Manual 6: Financial Transmission Rights," Rev. 18 (Sep. 1, 2017) at 28.

ARRs associated with $310,900 of revenue that were reassigned for the first ten months of 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 March 2018.

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

| | ARRs Reassigned (MW-day) | | ARR Revenue Reassigned [Dollars (Thousands) per MW-day] | |
|---|---|---|---|---|
| Control Zone | 2016/2017 (12 months) | 2017/2018 (10 months) | 2016/2017 (12 months) | 2017/2018 (10 months) |
| AECO | 451 | 398 | $4.0 | $2.8 |
| AEP | 1,952 | 2,061 | $11.8 | $11.7 |
| APS | 1,617 | 1,542 | $33.4 | $18.3 |
| ATSI | 8,415 | 5,372 | $45.8 | $17.6 |
| BGE | 2,213 | 2,603 | $131.5 | $55.8 |
| ComEd | 3,468 | 4,098 | $113.9 | $69.2 |
| DAY | 821 | 1,427 | $2.4 | $2.6 |
| DEOK | 3,335 | 3,809 | $19.1 | $20.3 |
| DLCO | 5,464 | 5,798 | $12.9 | $17.9 |
| DPL | 1,538 | 1,701 | $31.3 | $33.1 |
| Dominion | 55 | 13 | $0.2 | $0.1 |
| EKPC | 0 | 0 | $0.0 | $0.0 |
| JCPL | 1,105 | 1,035 | $3.7 | $2.1 |
| Met-Ed | 825 | 615 | $6.8 | $5.1 |
| PECO | 3,468 | 3,095 | $8.8 | $10.2 |
| PENELEC | 1,150 | 641 | $17.3 | $6.7 |
| PPL | 4,055 | 3,240 | $5.0 | $3.1 |
| PSEG | 1,640 | 1,350 | $23.0 | $16.6 |
| Pepco | 2,419 | 2,332 | $21.3 | $17.9 |
| RECO | 65 | 141 | $0.1 | $0.0 |
| Total | 44,056 | 41,271 | $492.5 | $310.9 |

## 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.[19] 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 first 10 months of the 2017/2018 planning period, PJM allocated a total of 33,167.3 MW of residual ARRs with a target allocation of $15.9 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.

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

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 |
| Total | 26,876.0 | 9,661.2 | 35.9% | $8,004,796 |

# Market Performance

## 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.[20] 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 2017/2018 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 both ARRs and FTRs for the entire planning period and an associated reduction in ARR and FTR funding.

## 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 13-6 shows the value of 2016/2017 and 2017/2018 allocated ARRs at FTR prices from both planning periods. For example, in the 2017/2018 planning period, ARRs allocated in that planning period are expected to be worth a total of $545.2 million. The MMU calculates that the same allocated ARRs, but at 2016/2017 planning period prices, would have been worth $1,139.8 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, resulting from PJM's modeling decisions following the allocation of balancing congestion to load and exports. The predicted increased in value to ARR holders from shifting balancing congestion out of FTR funding did not occur, and in fact ARR holders can expect to receive less total revenue and more volatility while FTR Holders experience increased profits and revenue stability.[21]

Table 13-6 ARR Revenue at 2016/2017 and 2017/2018 planning period FTR prices

| | 2016/2017 ARRs | 2017/2018 ARRs |
|---|---|---|
| 2016/2017 Value | $907,756,156 | $454,527,372 |
| 2017/2018 Value | $1,139,824,163 | $545,229,437 |

20 "PJM Manual 6: Financial Transmission Rights," Rev. 18 (Sep.1, 2017) at 22.

21 *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.

## 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 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.

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 $598.3 million.

Table 13-7 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 first ten months of the 2017/2018 planning periods.

### Table 13-7 Projected ARR revenue adequacy (Dollars (Millions)): Planning periods 2016/2017 and 2017/2018

| | 2016/2017* | 2017/2018** |
|---|---|---|
| Total FTR auction net revenue | $961.1 | $598.3 |
| 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 | $37.4 |
| ARR target allocations | $914.2 | $561.1 |
| ARR credits | $914.2 | $561.1 |
| Surplus auction revenue | $46.9 | $37.2 |
| ARR payout ratio | 100% | 100% |
| FTR payout ratio* | 100% | 100% |

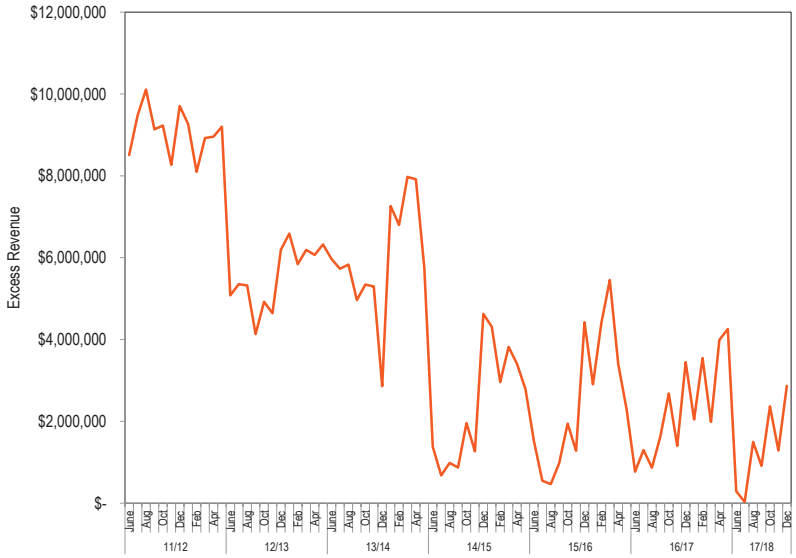
* Shows twelve months for 2016/2017 ** Shows ten months for 2017/2018.

## Auction Revenue

Figure 13-2 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.[22] 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 13-2 Monthly additional ARR revenue: Planning periods 2011/2012 through 2017/2018




22 *See* "PJM Manual 6: Financial Transmission Rights," Rev. 18 (Sep. 1, 2017) at 55.

Table 13-8 shows the auction revenue over ARR target allocations, by planning period, for planning periods 2010/2011 through 2017/2018.

**Table 13-8 Additional Auction Revenue: Planning periods 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** | $18,690,278 |
| Total | $382,185,297 |

*Start of counter flow "buy back"

**Through March 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.[23] 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 reserved for ARRs prior to sale as FTRs.

23 See "PJM Manual 6: Financial Transmission Rights," Rev. 18 (Sep. 1, 2017) 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.[24] 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.[25] 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).[26] 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.

The 2009/2012 and 2010/2013 Long Term FTR Auctions consisted of two rounds.[27] Subsequent Long Term FTR Auctions consist of three rounds. FTRs purchased in prior rounds may be offered for sale in subsequent rounds. FTRs

24 See "PJM Manual 6: Financial Transmission Rights," Rev. 18 (Sep. 1, 2017) at 55.

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

26 116 FERC ¶ 61,077 (2006).

27 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).

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.

## 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.

## 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.[28]

## 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.

28 See "PJM Manual 6: Financial Transmission Rights," Rev. 18 (Sep. 1, 2017) at 39.

Table 13-9 presents the monthly balance of planning period FTR auction cleared FTRs for 2018 by trade type, organization type and FTR direction. Financial entities purchased 74.8 percent of prevailing flow FTRs, up 0.8 percentage points, and 79.5 percent of counter flow FTRs, up 0.6 percent, for the year, with the result that financial entities purchased 77.0 percent, down 2.2 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 13-9 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 | 25.2% | 20.5% | 23.0% |
| | Financial | 74.8% | 79.5% | 77.0% |
| | Total | 100.0% | 100.0% | 100.0% |
| Sell Offers | Physical | 30.2% | 35.8% | 32.5% |
| | Financial | 69.8% | 64.2% | 67.5% |
| | Total | 100.0% | 100.0% | 100.0% |

Table 13-10 presents the average daily net position ownership for all FTRs for 2018, by FTR direction.

### Table 13-10 Daily FTR net position ownership by FTR direction: 2018

| | FTR Direction | | |
|---|---|---|---|
| Organization Type | Prevailing Flow | Counter Flow | All |
| Physical | 45.3% | 26.3% | 36.9% |
| Financial | 54.7% | 73.7% | 63.1% |
| 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.[29]

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 facilities where there are auction bids (counter flow FTRs) available to reduce the infeasibility caused by cleared FTRs.[30]

Table 13-11 provides the monthly balance of planning period FTR auction market volume for the entire 2016/2017 and the first ten months of the 2017/2018 planning periods. There were 14,341,511 MW of FTR obligation buy bids and 3,567,354 MW of FTR obligation sell offers for all bidding periods in the first ten months of the 2017/2018 planning period. The monthly balance of planning period FTR auction cleared 2,356,473 MW (16.4 percent) of FTR obligation buy bids and 906,054 MW (25.4 percent) of FTR obligation sell offers.

There were 3,454,027 MW of FTR option buy bids and 463,241 MW of FTR option sell offers for all bidding periods in the Monthly Balance of Planning Period FTR Auctions for the first ten months of the 2017/2018 planning period. The monthly auctions cleared 54,120 MW (1.6 percent) of FTR option buy bids, and 131,480 MW (28.4 percent) of FTR option sell offers.

29 See "PJM Manual 6: Financial Transmission Rights," Rev. 18 (Sep. 1, 2017) at 56.
30 See *id.*

### Table 13-11 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% |
| 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 | 3,305,565 | 14,341,511 | 2,356,473 | 16.4% | 11,985,038 | 83.6% |
| | | Sell offers | 1,881,823 | 3,567,354 | 906,054 | 25.4% | 2,661,300 | 74.6% |
| | Options | Buy bids | 34,337 | 3,454,027 | 54,120 | 1.6% | 3,399,906 | 98.4% |
| | | Sell offers | 63,794 | 463,241 | 131,480 | 28.4% | 331,761 | 71.6% |

* Shows twelve months for 2016/2017; ** Shows ten months ended Mar 31 for 2017/2018

Table 13-12 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 158,913.2MW. The average monthly cleared volume for 2017 was 216,931.5 MW.

### Table 13-12 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 |

Figure 13-3 shows cleared auction volumes as a percent of the total FTR cleared volume by calendar months for June 2004 through March 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 13-3 Cleared auction volume (MW) as a percent of total FTR cleared volume by calendar month: June 2004 through March 2018

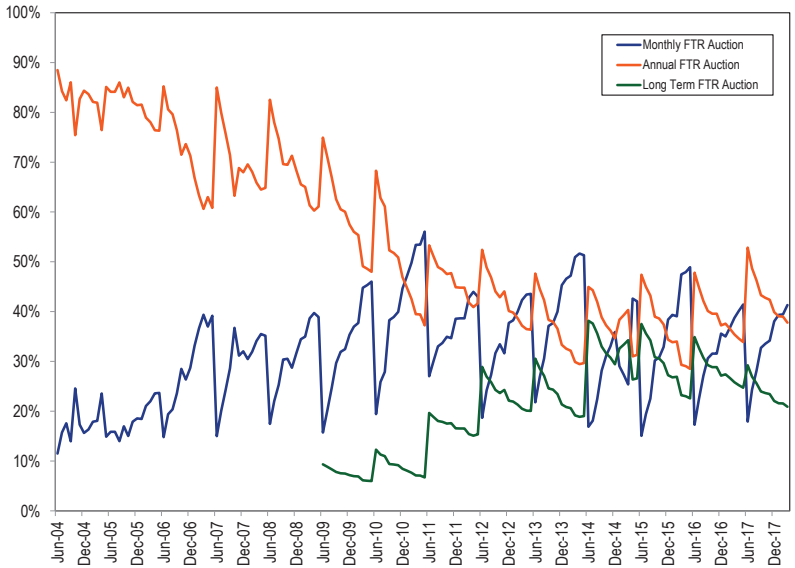


Table 13-13 provides the secondary bilateral FTR market volume for the entire 2016/2017 and 2017/2018 planning periods.

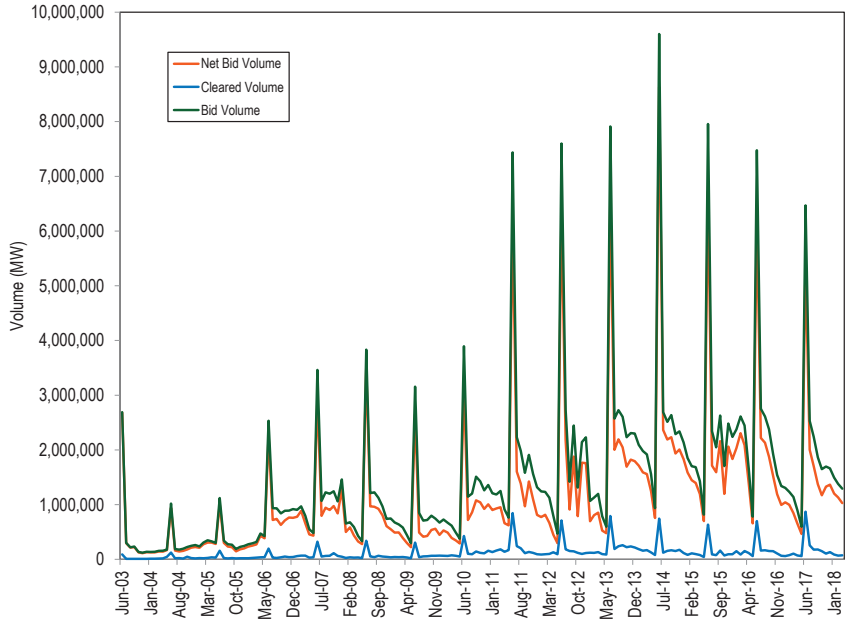
### Table 13-13 Secondary bilateral FTR market volume: Planning periods 2016/2017 and 2017/2018[31]

| 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 | 8,474.6 |
| | | Off Peak | 6,305.4 |
| | | Total | 14,947.4 |
| | Option | 24-Hour | 0.0 |
| | | On Peak | 5.8 |
| | | Off Peak | 5.8 |
| | | Total | 11.6 |

* Shows ten months ended Mar 31 for 2017/2018

Figure 13-4 shows the FTR bid, cleared and net bid volume from June 2003 through March 2018 for Long Term, Annual and Monthly Balance of Planning Period Auctions.[32] 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 13-4 Long Term, Annual and Monthly FTR Auction bid and cleared volume: June 2003 through March 2018




## Price

Table 13-14 shows the weighted average cleared buy bid price in the Monthly Balance of Planning Period FTR Auctions by bidding period for January through March 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 March 2018 was $0.14 per MW, up from $0.10 per MW in the same time last year, a 40.0 percent increase in FTR

31 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.

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

prices. The cleared weighted-average price for the current planning period was $0.12, down 7.7 percent from $0.13 for the previous planning period.

**Table 13-14 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 |

## 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 13-17). 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 13-15 lists FTR profits by organization type and FTR direction for the first ten months of 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 first ten months of the 2017/2018 planning period, companies made profits of $278.7 million. ARR holders who self scheduled FTRs received $195.9 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 13-15 FTR profits and revenues by organization type and FTR direction for the 2017/2018 planning period**

| | FTR Direction | | | | |
|---|---|---|---|---|---|
| Organization Type | Prevailing Flow | Self Scheduled Prevailing Flow | Counter Flow | Self Scheduled Counter Flow | All |
| Financial | $222,597,536 | | ($20,426,658) | | $202,170,878 |
| Physical | $53,761,527 | | ($11,386,464) | | $42,375,064 |
| Physical ARR Holder | $31,027,540 | $202,159,499 | $3,149,182 | ($6,286,442) | $34,176,722 |
| Total | $307,386,603.28 | $202,159,499 | ($28,663,940) | ($6,286,442) | $278,722,663 |

Table 13-16 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 13-16 Monthly FTR profits by organization type for the 2016/2017 and 2017/2018 planning periods

| | 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 |
| Summary for Planning Period 2017/2018 | | | | |
| Total | $42,375,064 | $34,176,722 | $202,170,878 | $278,722,663 |

Table 13-17 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.

### Table 13-17 Planning period FTR profits by organization type: 2012/2013 through 2017/2018 planning periods

| | | 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) | $202,170,878 |
| | Excess | ($80,450,357) | ($256,820,253) | $44,410,625 | $11,897,525 | $20,968,663 | |
| | Total | ($16,992,846) | $300,763,064 | $281,102,915 | $53,161,690 | $7,448,839 | $202,170,878 |
| Physical | Profit | ($25,069,434) | $217,693,500 | $65,085,246 | ($16,904,899) | ($11,239,145) | $42,375,064 |
| | Excess | ($83,332,665) | ($104,947,376) | $14,485,066 | $5,072,985 | $10,533,444 | |
| | Total | ($108,402,099) | $112,746,125 | $79,570,312 | ($11,831,914) | ($705,701) | $42,375,064 |
| Physical ARR | Profit | ($40,633,441) | $183,450,850 | $95,609,153 | $39,490,527 | ($117,128,185) | $34,176,722 |
| | Excess | ($128,497,763) | ($316,929,138) | $80,692,482 | $25,484,394 | $44,883,161 | |
| | Total | ($169,131,204) | ($133,478,288) | $176,301,636 | $64,974,921 | ($72,245,025) | $34,176,722 |
| Total | | ($294,526,149) | $280,030,900 | $536,974,863 | $106,304,698 | ($65,501,886) | $278,722,663 |

* Ten months of the 2017/2018 planning period

## Revenue

### Monthly Balance of Planning Period FTR Auction Revenue

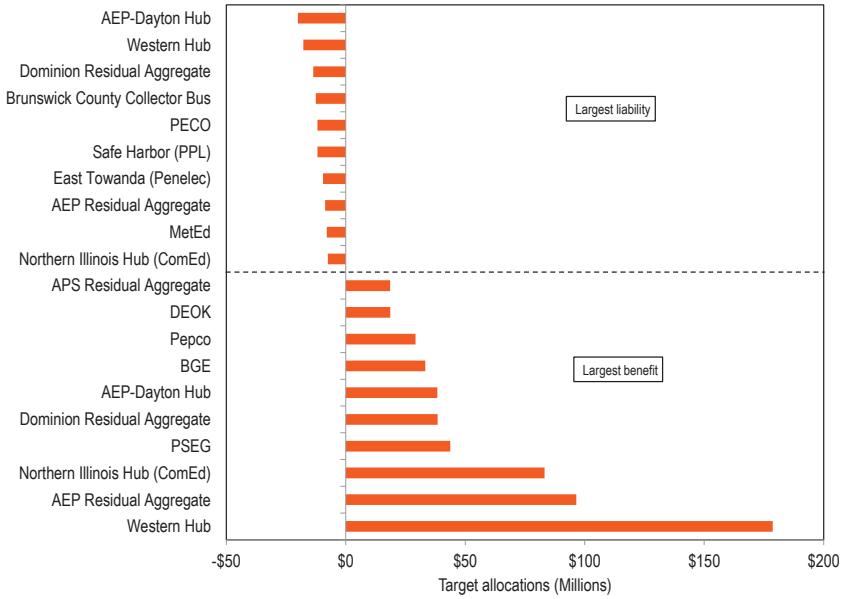
Table 13-18 shows monthly balance of planning period FTR auction revenue by trade type, type and class type for January through March 2018. The Monthly Balance of Planning Period FTR Auctions for the first 10 months of the 2017/2018 planning period netted $37.4 million in revenue, the difference between buyers paying $162.6 million and sellers receiving $125.2 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 13-18 Monthly Balance of Planning Period FTR Auction revenue: 2018

| Monthly Auction | Type | Trade Type | Class Type 24-Hour | On Peak | Off Peak | All |
|---|---|---|---|---|---|---|
| Jan-18 | Obligations | Buy bids | $2,064,395 | $3,326,398 | $1,880,556 | $7,271,349 |
| | | Sell offers | ($1,166,330) | $2,100,570 | $568,999 | $1,503,239 |
| | Options | Buy bids | $0 | $436,831 | $124,595 | $561,427 |
| | | Sell offers | $14,107 | $2,241,105 | $1,851,251 | $4,106,463 |
| Feb-18 | Obligations | Buy bids | $19,605 | $2,333,806 | $1,386,196 | $3,739,608 |
| | | Sell offers | ($73,596) | ($379,460) | ($408,832) | ($861,888) |
| | Options | Buy bids | $0 | $112,477 | $48,121 | $160,598 |
| | | Sell offers | $10,443 | $1,587,969 | $1,091,908 | $2,690,320 |
| Mar-18 | Obligations | Buy bids | ($931,344) | $4,194,358 | $2,656,930 | $5,919,943 |
| | | Sell offers | ($28,037) | $3,554,009 | $632,253 | $4,158,225 |
| | Options | Buy bids | $0 | $281,337 | $130,792 | $412,129 |
| | | Sell offers | $5,795 | $1,219,568 | $675,806 | $1,901,170 |
| 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 | $43,917,113 | $72,050,712 | $39,931,455 | $155,899,280 |
| | | Sell offers | $3,394,748 | $58,879,160 | $34,318,700 | $96,592,608 |
| | Options | Buy bids | $459,242 | $3,798,949 | $2,481,297 | $6,739,488 |
| | | Sell offers | $98,955 | $17,905,668 | $10,623,276 | $28,627,898 |
| | Net Total | | $40,882,653 | ($935,167) | ($2,529,224) | $37,418,261 |

* Shows Twelve Months; ** Shows Ten Months

### Figure 13-5 Ten largest positive and negative FTR target allocations summed by sink: 2017/2018 planning period

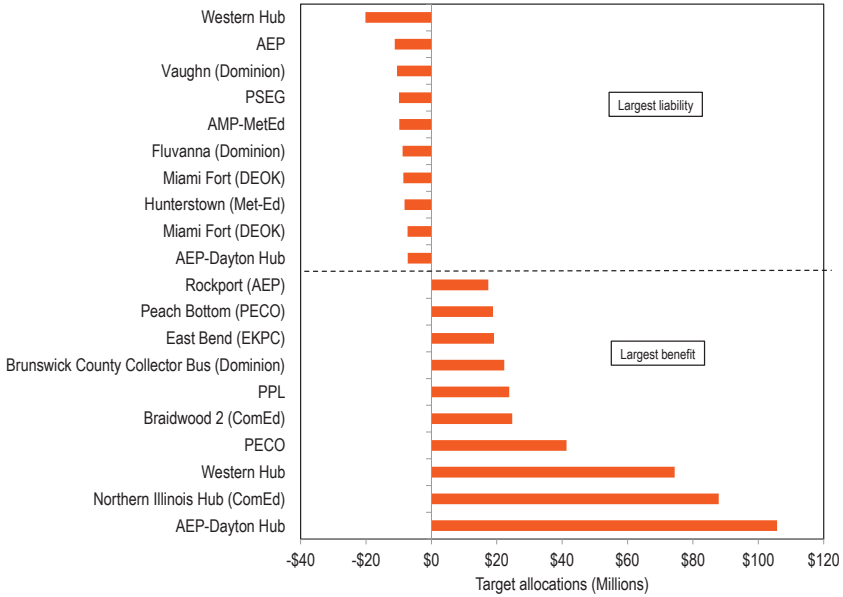



## FTR Target Allocations

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 first 10months of the 2017/2018 planning period. Figure 13-5 shows the 10 largest positive and negative FTR target allocations, summed by sink, for the first 10 months of the 2017/2018 planning period. The top 10 sinks that produced financial benefit accounted for 34.5 percent of total positive target allocations during the 2017/2018 planning period with the Western Hub accounting for 10.7 percent of all positive target allocations. The top 10 sinks that created liability accounted for 14.1 percent of total negative target allocations with the AEP-Dayton Hub accounting for 2.3 percent of all negative target allocations.

Figure 13-6 shows the 10 largest positive and negative FTR target allocations, summed by source, for the first 10 months of the 2017/2018 planning period. The top 10 sources with a positive target allocation accounted for 26.0 percent of total positive target allocations with the AEP-Dayton Hub accounting for 6.3 percent of total positive target allocations. The top 10 sources with a negative target allocation accounted for 11.8 percent of all negative target allocations, with the Western Hub accounting for 2.3 percent.

Figure 13-6 Ten largest positive and negative FTR target allocations summed by source: 2017/2018 planning period




## 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.[33] 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.

FTRs are paid from day-ahead congestion revenues. 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 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. For example, the 2013/2014 planning period was not revenue adequate, and thus this uplift charge was collected from FTR participants. There was excess congestion revenue at the end of the 2014/2015 planning period, which was distributed to FTR participants in the same manner that the FTR uplift is applied.

FTR revenues are primarily comprised of hourly congestion revenue, from the day-ahead market.[34] FTR revenues also include additional auction revenue over ARR target allocations, which equal the difference between ARR target allocations and the sum of FTR auction revenues and negative FTR target allocations which are a source of revenue from FTRs with a negative target allocation.

33 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."

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

For the 2014/2015, 2015/2016 and the 2016/2017 planning periods, PJM paid MISO and NYISO a combined $33.2 million, $41.5 million and $43.5 million for redispatch on the designated M2M flowgates. The timing of the addition of new M2M flowgates may reduce FTR funding levels. MISO's ability to add flowgates dynamically throughout the planning period, which were not modeled in any previous PJM FTR Auction, may result in oversold FTRs in PJM, and as a direct consequence, reduce FTR funding.

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.

This step change to high levels of revenue adequacy 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.

Beginning in the 2017/2018 planning period PJM allocated balancing congestion and M2M payments to load, allowing FTR Holders to have more reliable revenue adequacy. The result was to support FTR revenue adequacy with an increased supply of FTRs. The result was lower prices paid for FTRs and therefore a lower dollar per MW value of ARRs.

Table 13-19 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 13-19 Total annual PJM FTR revenue detail (Dollars (Millions)): Planning periods 2016/2017 and 2017/2018

| Accounting Element | 2016/2017 | 2017/2018* |
|---|---|---|
| **ARR information** | | |
| ARR target allocations | $934.3 | $497.2 |
| FTR auction revenue | $962.2 | $623.6 |
| ARR excess | $27.9 | $18.7 |
| **FTR targets** | | |
| Positive target allocations | $929.1 | $1,168.0 |
| Negative target allocations | ($194.1) | ($348.1) |
| FTR target allocations | $735.0 | $819.9 |
| **Adjustments:** | | |
| Adjustments to FTR target allocations | ($0.4) | ($6.1) |
| Total FTR targets | $734.6 | $813.8 |
| **FTR revenues** | | |
| ARR excess | $27.9 | $18.7 |
| **Congestion** | | |
| Net Negative Congestion (enter as negative) | ($16.9) | ($1.2) |
| Hourly congestion revenue | $843.6 | $1,143.7 |
| 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 | $1,176.7 |
| Total congestion credits on bill (includes CEPSW and end-of-year distribution) | $831.4 | $1,176.7 |
| **Remaining deficiency** | ($76.4) | ($265.8) |

* Ten months of 2017/2018 planning period

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 13-20 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.

The total row in Table 13-20 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 13-20 Monthly FTR accounting summary (Dollars (Millions)): Planning period 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) |
| Summary for Planning Period 2017/2018 | | | | | | |
| Total | $1,161.0 | $816.2 | | $1,176.7 | | ($344.8) |

Figure 13-7 shows the original PJM reported FTR payout ratio by month, excluding excess revenue distribution, for January 2004 through December 2017. 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 13-7 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 13-7 FTR payout ratio by month, excluding and including excess revenue distribution: January 2004 through March 2018

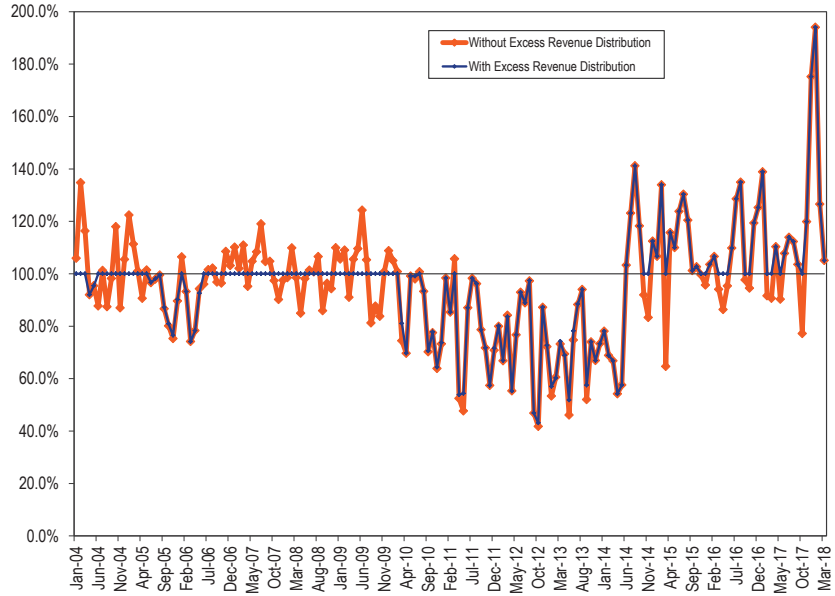



Table 13-21 shows the FTR payout ratio by planning period from the 2003/2004 planning period forward. Planning period 2013/2014 includes the additional revenue from unallocated congestion charges from Balancing Operating Reserves. For the 2014/2015, 2015/2016 and 2016/2017 planning periods, there was 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 13-21 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% |

## 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.

The uplift charge is only applied to, and calculated from, members with a net positive target allocation at the end of the planning period. Members with

a net negative target allocation have their year end target allocation set to zero for all uplift calculations. Since participants in the FTR Market with net positive target allocations are paying the uplift charge to fully fund FTRs, their payout ratio cannot be 100 percent. The end of planning period payout ratio is calculated as the participant's target allocations minus the uplift charge applied to them divided by their target allocations. The calculations of uplift are structured so that, at the end of the planning period, every participant in the FTR Market with a positive net target allocation receives payments based on the same payout ratio. At the end of the planning period and the end of a given month no payout ratio is actually applied to a participant's target allocations. The payout ratio is simply used as a reporting mechanism to demonstrate the amount of revenue available to pay target allocations and represent the percentage of target allocations a participant with a net positive portfolio has been paid for the planning period. However, this same calculation is not accurate when calculating a single month's payout ratio as currently reported, where the calculation of available revenue is not the same.

The total planning period target allocation deficiency is the sum of the monthly deficiencies throughout the planning period. The monthly deficiency is the difference in the net target allocation of all participants and the total revenue collected for that month. The total revenue paid to FTR Holders is based on the hourly congestion revenue collected, which includes hourly M2M, wheel payments and unallocated congestion credits.

Table 13-22 provides a demonstration of how the FTR uplift charge is calculated. In this example it is important to note that the sum of the net positive target allocations is $32 and the total monthly deficiency is $10. The uplift charge is structured so that those with higher target allocations pay more of the deficit, which ultimately impacts their net payout. Also, in this example, and in the PJM settlement process, the monthly payout ratio varies for all participants, but the uplift charge is structured so that once the uplift charge is applied the end of planning period payout ratio is the same for all participants.

For the 2012 to 2013 planning period, the total deficiency was $291.8 million. The top 10 participants with the highest target allocations paid 53.6 percent of the total deficiency for the planning period. All of the uplift money is collected from individual participants, and distributed so that every participant experiences the same payout ratio. This means that some participants subsidize others and receive less payout from their FTRs after the uplift is applied, while others receive a subsidy and get a higher payout after the uplift is applied. In this example, participants 1 and 5 are paid less after the uplift charge is applied, while participants 3 and 4 are paid more.

**Table 13-22 End of planning period FTR uplift charge example**

| Participant | Net Target Allocation | Total Monthly Payment | Monthly Deficiency | Uplift Charge | Net Payout | Payout Change | Monthly Payout Ratio | EOPP Payout Ratio |
|---|---|---|---|---|---|---|---|---|
| 1 | $10.00 | $8.00 | $2.00 | $3.13 | $6.88 | ($1.13) | 80.0% | 68.8% |
| 2 | ($4.00) | $0.00 | $0.00 | $0.00 | ($4.00) | $0.00 | 100.0% | 100.0% |
| 3 | $15.00 | $10.00 | $5.00 | $4.69 | $10.31 | $0.31 | 66.7% | 68.8% |
| 4 | $3.00 | $1.00 | $2.00 | $0.94 | $2.06 | $1.06 | 33.3% | 68.8% |
| 5 | $4.00 | $3.00 | $1.00 | $1.25 | $2.75 | ($0.25) | 75.0% | 68.8% |
| Total | $28.00 | $22.00 | $10.00 | $10.00 | $18.00 | $0.00 | | |

## 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.

## Netting Target Allocations within Portfolios

Currently, FTR target allocations are 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. Elimination of portfolio netting would correctly account for negative target allocations as a source of revenue to pay positive target allocations. It would also apply the payout ratio directly to a participant's positive target allocations before subtracting negative target allocations, rather than applying the payout ratio to a participant's net portfolio. Applying the payout ratio to a participant's net portfolio, results in unequal payout ratios depending on a participant's portfolio construction.

The current method requires those with fewer negative target allocation FTRs to subsidize those with 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. But all FTRs with positive target allocations should be treated in exactly the same way, which would eliminate this form of cross subsidy.

For example, a participant has $200 of positive target allocation FTRs and $100 of negative target allocation FTRs and the payout ratio is 80 percent. Under the current method, the positive and negative positions are first netted to $100 and then the payout ratio is applied. In this example, the holder of the portfolio would receive 80 percent of $100, or $80.

The correct method would first apply the payout ratio to FTRs with positive target allocations and then net FTRs with negative target allocations. In the example, the 80 percent payout ratio would first be applied to the positive target allocation FTRs, 80 percent of $200 is $160. Then the negative target allocation FTRs would be netted against the positive target allocation FTRs, $160 minus $100, so that the holder of the portfolio would receive $60.

If done correctly, the payout ratio would also change, although the total net payments made to or from participants would not change. The sum of all positive and negative target allocations is the same in both methods. The net result of this change would be that holders of portfolios with smaller shares of negative target allocation FTRs would no longer subsidize holders of portfolios with larger shares of negative target allocation FTRs.

Under the current method all participants with a net positive target allocation in a month are paid a payout ratio based on each participant's net portfolio position. The correct approach would calculate payouts to FTRs with positive target allocations, without netting in an hour. This would treat all FTRs the same, regardless of a participant's portfolio. This approach would also eliminate the requirement that participants with larger shares of positive target allocation FTRs subsidize participants with larger shares of negative target allocation FTRs.

Elimination of portfolio netting should also be applied to the end of planning period FTR uplift calculation. With this approach, negative target allocations would not offset positive target allocations at the end of the planning period when allocating uplift. The FTR uplift charge would be based on participants' share of the total positive target allocations paid for the planning period.

Table 13-23 shows an example of the effects of calculating FTR payouts on a per FTR basis rather than the current method of portfolio netting for four hypothetical organizations for an example hour. In this example, there was $45 in congestion revenue collected, which results in a payout ratio of 39.1 percent for positive target allocations when ignoring any contribution by negative or net negative target allocations. With portfolio netting, the total revenue available to pay positive target allocations is $50, which is the $45 in congestion collected plus the $5 generated by the net negative target allocation of Participant 4, which results in a payout ratio of 41.7 percent for net positive target allocations. Without portfolio netting there is $110 in total revenue available, which is the $45 in congestion collected plus the $65 in negative target allocations from all participants, which results in a payout ratio of 61.1 percent for positive target allocations.

The positive and negative TA columns show the total positive and negative target allocations, calculated separately, for each organization. The percent negative target allocations is the share of the portfolio which is negative target allocation FTRs. The net target allocation is the net of the positive and negative target allocations for the given hour. The FTR netting payout column shows what a participant would see on their bill, including payout ratio adjustments, under the current method. The per FTR payout column shows what a participant would see on their bill, including payout ratio adjustments, if FTR target allocations were done correctly. In this example, the actual monthly payout ratio is 41.7 percent. If portfolio netting were eliminated, the actual monthly payout ratio would rise to 61.1 percent.

This table shows the effects of a per FTR target allocation calculation on individual participants. The total payout does not change, but the allocation across individual participants does.

The largest change in payout is for participants 1 and 2. Participant 1, who has a large proportion of FTRs with negative target allocations, receives less payment. Participant 2, who has no negative target allocations, receives more payment.

**Table 13-23 Example of FTR payouts from portfolio netting and without portfolio netting**

| Participant | Positive Target Allocation | Negative Target Allocation | Percent Negative Target Allocation | Net TA | FTR Netting Payout (Current) | No Netting Payout (Proposed) | Percent Change |
|---|---|---|---|---|---|---|---|
| 1 | $60.00 | ($40.00) | 66.7% | $20.00 | $8.33 | ($3.33) | (140.0%) |
| 2 | $30.00 | $0.00 | 0.0% | $30.00 | $12.50 | $18.33 | 46.7% |
| 3 | $90.00 | ($20.00) | 22.2% | $70.00 | $29.17 | $35.00 | 20.0% |
| 4 | $0.00 | ($5.00) | 100.0% | ($5.00) | ($5.00) | ($5.00) | 0.0% |
| Total | $180.00 | ($65.00) | - | $115.00 | $45.00 | $45.00 | - |

## Portfolio Dependent Payout Ratio

Under the current portfolio netting rules, negative target allocations are first netted against positive, and then the payout ratio is applied. This results in two significant problems with the current method. First is that a participant can shield itself from both monthly revenue inadequacy and the end of planning period uplift charge by shrinking the size of their positive target allocations. This is advantageous because the participant can still be profiting from their negative target allocations if they are paid to take counter flow positions and pay back less than they received. Additionally, it results in positive target allocations receiving different payout ratios depending on the composition of the portfolio they are in. All positive target allocation FTR should be treated equally, regardless of the portfolio they are in, and this can only be accomplished by eliminating portfolio netting. Not treating all FTRs equally results in participants with more negative target allocations receiving a subsidy by reducing the effective payout ratio to participants with fewer negative target allocations. The reduced payouts to participants with fewer negative target allocations subsidize increased payout ratios to participants with larger negative target allocations, and is an unbalanced distribution of available congestion revenue collected.

Table 13-24 demonstrates the impact on the payout ratio to positive target allocation FTRs with and without portfolio netting. In the example the total congestion collected is $4,750 and the total net target allocation is $9,500, resulting in a reported payout ratio of 50.0 percent. With portfolio netting, the net target allocation is simply multiplied by the payout ratio to calculate

the congestion revenue a participant receives. For Participant 1, this is $250 multiplied by 0.5 for a total revenue received of $125. The revenue to positive TA column is an indication of how much revenue the positive target allocations, which are the only part of a portfolio receiving available revenue, of a participant need to be paid in order to reach the congestion revenue received. For participant 1, they are effectively being paid $875 of their $1,000 so that the congestion revenue received can be $125. Another way to state this is the participant is effectively paying themselves their negative target allocations first, and then receiving revenue based on their net target allocation. The result of this is that Participant 1's positive target allocations are effectively granted a payout ratio of 87.5 percent simply because they hold negative target allocations, while Participant 3, who holds no negative target allocations, is only paid at a 50.0 percent payout ratio.

**Table 13-24 Change in positive target allocation payout ratio given portfolio construction**

| Congestion = $4,750 Net TA = $9,500 | | | | | With Netting | | | Without Netting | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Participant | Positive Target Allocations | Negative Target Allocations | Net Target Allocations | Reported Payout Ratio | Congestion Revenue Received | Revenue to Positive TA | Calculated Positive TA Payout Ratio | Congestion Revenue Received | Revenue to Positive TA | Calculated Positive TA Payout Ratio |
| 1 | $1,000.00 | ($750.00) | $250.00 | 50.0% | $125.00 | $875.00 | 87.5% | ($204.55) | $545.45 | 54.5% |
| 2 | $750.00 | ($200.00) | $550.00 | 50.0% | $275.00 | $475.00 | 63.3% | $209.09 | $409.09 | 54.5% |
| 3 | $8,700.00 | $0.00 | $8,700.00 | 50.0% | $4,350.00 | $4,350.00 | 50.0% | $4,745.45 | $4,745.45 | 54.5% |
| Total | $10,450.00 | ($950.00) | $9,500.00 | - | $4,750.00 | $5,700.00 | - | $4,750.00 | $5,700.00 | - |

Without portfolio netting all participants are paid at the same effective payout ratio for their positive target allocations. Counting negative target allocations as a source of revenue raises the payout ratio to 54.5 percent. Without portfolio netting, the payout ratio is first applied to positive target allocations, then the participant's negative target allocations are added. The result of this calculation is that each participant is paid an equal 54.5 percent regardless of their portfolio's negative target allocations. In this example Participant 1 pays ends up paying $204.55 into the congestion pot, in net, while Participant 3 is paid 54.5 percent of the positive target allocations, resulting in a payment of $4,745.45. Eliminating portfolio netting is the only way to treat positive target allocations equally across all portfolios, and eliminates the subsidy positive target allocations holders are paying to negative target allocation holders.

## Mathematically Equivalent FTRs

A single FTR can be broken into multiple FTRs. The newly formed set of multiple FTRs can have the same net target allocation as long as the start and end points of the constituent end points are, in net, the same as the original. Opponents of the elimination of FTR netting have claimed that without netting this would no longer be true. However, this assertion does not account for revenues from negative target allocation FTR paths in the mathematically equivalent set of FTRs. Appropriately including these revenues results in mathematical equivalence between the single FTR and that same FTR broken into a constituent set of FTRs with the same start and end point.

Table 13-26 shows the effects on a participant with and without portfolio netting under three distinct scenarios. Table 13-25 provides the day-ahead CLMP values for each node used in the example. In this example, a participant can either buy an FTR position directly from A to B or can break it into individual pieces with the net effect of an FTR from A to B with a net target allocation of $5. In this example, there was $3.60 in congestion collected, due to a payout ratio of 72.0 percent and a total payout in each of the three scenarios of $3.60. This payout amount is simply the payout ratio of 72.0 percent multiplied by the net target allocations of $5 in each scenario.

With the elimination of netting, if the additional revenue created by considering positive and negative target allocations separately is disregarded, it appears as if the payout for the same net FTR is significantly different depending on the composition of the FTR. The results of this mistake are payouts of $3.60, -$0.60 and -$25.80 for the same net FTR in each distinct scenario. However, if the negative target allocations are properly accounted for as a source of

revenue when considering congestion collected, the total revenue available increases thereby increasing the payout ratio for each scenario's positive target allocations. The total revenue available is the $3.60 in congestion collected plus the negative target allocations, resulting in revenue available to pay positive target allocations of $3.60, $18.60 and $108.60 with payout ratios to positive target allocations of 72.0 percent (unchanged due to no negative target allocations), 93.0 percent and 98.7 percent. Multiplying these correct payout ratios by the scenario's positive target allocations, and then adding the scenario's negative target allocations results in a net payout of $3.60 for each scenario.

The results of this example demonstrate the mathematical fact that no matter how an FTR path is constructed, as a single FTR or a mathematically equivalent set of FTRs, the total payment the FTR path will be the same. Attempts to disprove this ignore the revenues from the constituent FTR counter flow positions and the resulting change in payout ratio that is experienced by positive target allocations. A net FTR may be constructed in any manner and the resultant total payout will be equivalent with and without portfolio netting.

**Table 13-25 Nodal day-ahead CLMPs**

| Node | DA CLMP |
|---|---|
| A | $20 |
| B | $25 |
| C | $40 |
| D | $100 |
| E | $10 |

**Table 13-26 Mathematically equivalent FTR payments with and without portfolio netting**

| FTR Path(s) | Positive TA | Negative TA | Net TA | Available Revenue Netting | Netting Revenue Received | No Netting Revenue Received (Incorrect) | Available Revenue No Netting | Payout Ratio No Netting | Correct No Netting Revenue Received |
|---|---|---|---|---|---|---|---|---|---|
| A-B | $5.00 | $0.00 | $5.00 | $3.60 | $3.60 | $3.60 | $3.60 | 72.0% | $3.60 |
| A-C, C-B | $20.00 | ($15.00) | $5.00 | $3.60 | $3.60 | ($0.60) | $18.60 | 93.0% | $3.60 |
| A-C, C-E, E-D, D-B | $110.00 | ($105.00) | $5.00 | $3.60 | $3.60 | ($25.80) | $108.60 | 98.7% | $3.60 |

## FERC Order on FTRs: Portfolio Netting

On September 15, 2016, FERC decided that PJM's current practice of portfolio netting was just and reasonable.[35] FERC did not agree that portfolio netting led to subsidization of portfolios with counterflow positions. The MMU and PJM demonstrated that eliminating portfolio netting would eliminate a cross subsidy among FTR portfolios without changing the amount of total revenue available revenue to pay to portfolios. Table 13-23 and Table 13-24 examples demonstrate that portfolio netting in PJM leads to incorrect payments based on participant FTR portfolios. Including portfolio netting in FTR accounting treats FTRs differently depending on the composition of a participant's FTR portfolio.

## Counter Flow FTRs and Revenues

The current rules create an asymmetry between the treatment of counter flow and prevailing flow FTRs. The payout to the holders of counter flow FTRs is not affected when the payout ratio is less than 100 percent. There is no reason for that asymmetric treatment.

For a prevailing flow FTR, the target allocation would be subject to a reduced payout ratio, while a counter flow FTR Holder would not be subject to the reduced payout ratio. The profitability of the prevailing flow FTRs is affected by the payout ratio while the profitability of the counter flow FTRs is not affected by the payout ratio.

Counter flow FTR Holders make payments over the planning period, in the form of negative target allocations. These negative target allocation FTRs are paid at 100 percent regardless of whether positive target allocation FTRs are paid at less than 100 percent.

A counter flow FTR is profitable if the hourly negative target allocation is smaller than the hourly auction payment they received. A prevailing flow FTR is profitable if the hourly positive target allocation is larger than the auction payment they made.

35 See 156 FERC ¶ 61,180 (2016).

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, parallel to the decreased payments to prevailing flow FTRs. The adjusted payout ratio would evenly divide funding between 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.

Table 13-27 provides an example of how the counter flow adjustment method would impact a two FTR system. In this example, there is $15 of total congestion revenue available, corresponding to a reported payout ratio of 75 percent and an actual payout ratio of 87.5 percent. In the example, the profit is shown with and without the counter flow adjustment. As the example shows, the profit of a counter flow FTR does not change when there is a payout ratio less than 100 percent, while the profit of a prevailing flow FTR is reduced. Applying the payout ratio to counter flow FTRs distributes the funding penalty evenly to both prevailing and counter flow FTR Holders.

### Table 13-27 Example implementation of counter flow adjustment method

| | Prevailing A-B 10MW | Counter C-D 10MW |
|---|---|---|
| Auction Cost | $50.00 | ($30.00) |
| Target Allocation | $40.00 | ($20.00) |
| Payout | $30.00 | ($20.00) |
| Profit without revenue inadequacy | ($10.00) | $10.00 |
| Profit after revenue inadequacy | ($20.00) | $10.00 |
| Payout for Positive TA | $35.00 | ($20.00) |
| Profit for Positive TA | ($15.00) | $10.00 |
| Payout after CF Adjustment | $36.67 | ($21.67) |
| Profit after CF Adjustment | ($13.33) | $8.33 |
| Profit Difference | $1.67 | ($1.67) |

Table 13-28 shows the monthly positive, negative and total target allocations.[36] Table 13-28 also shows the total congestion revenue available to fund FTRs, as well as the total revenue available to fund positive target allocation FTR Holders on a per FTR basis and on a per FTR basis with counter flow payout adjustments. Implementing this change to the payout ratio for counter flow FTRs would result in an additional $188.4 million (27.8 percent of difference between revenues and total target allocations) in revenue available to fund positive target allocations for the 2013/2014 planning period. If this change were implemented after excess planning period revenue was distributed, it would not result in additional revenue for the 2014/2015, 2015/2016, 2016/2017 or 2017/2018 planning periods. However, if this change were implemented before excess planning period revenues were distributed, there would be an increase in the revenue available each month to pay prevailing flow FTRs, resulting in a decrease in the amount of excess from previous months that needs to be used to achieve revenue adequacy. This can be seen as a slight difference in the total revenue and adjusted counter flow total revenue columns for February and March 2017 that were not revenue adequate. The result of this would be $3.8 million in additional revenue generated for the 2016/2017 planning period and an increase of $5.4 million for the 2017/2018 planning period.

The result of removing portfolio netting and applying a payout ratio to counter flow FTRs would increase the calculated payout ratio for the 2013/2014 planning period from the reported 72.8 percent to 91.0 percent. For months with no revenue inadequacies there is no change in payout ratio.

36 Reported payout ratio may differ between Table 13-24 and Table 13-28 due to rounding differences when netting target allocations and considering each FTR individually.

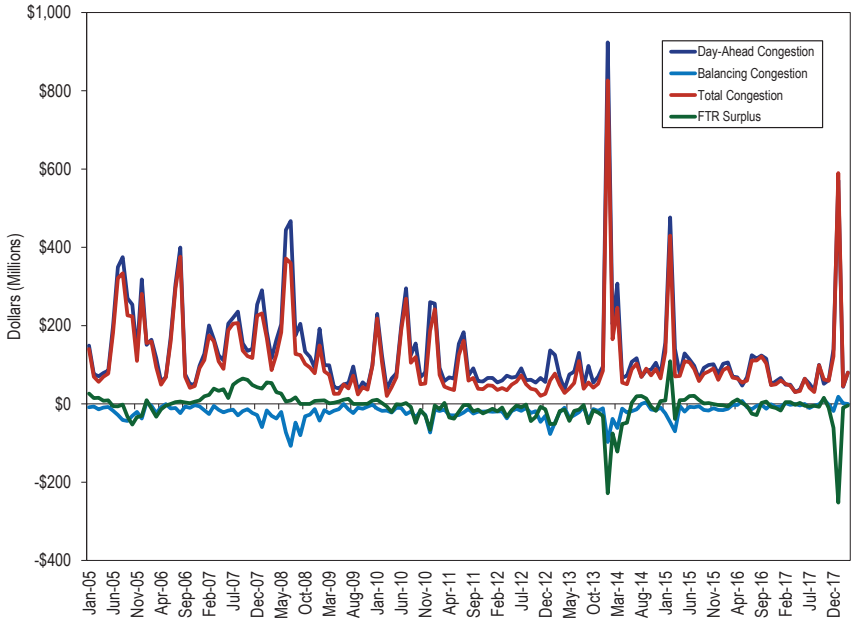
### Table 13-28 Counter flow FTR payout ratio adjustment impacts: Planning period 2016/2017 and 2017/2018

| | Positive Target Allocations | Negative Target Allocations | Total Target Allocations | Total Congestion Revenue | Reported Payout Ratio* | Total Revenue Available | Adjusted Prevailing Flow Payout Ratio | Adjusted Counter Flow Payout Ratio | Adjusted Counter Flow Revenue Available | Additional Revenue Generated |
|---|---|---|---|---|---|---|---|---|---|---|
| Jan-18 | 1,248,068,267.70 | (978,685,670.80) | 269,382,596.90 | 520,193,000.21 | 100.0% | $1,498,878,671 | 100.0% | 100.0% | $1,498,878,671 | $0 |
| Feb-18 | $175,130,650 | ($138,613,552) | $36,517,098 | $45,755,940 | 100.0% | $184,369,492 | 98.2% | 101.8% | $184,369,492 | $0 |
| Mar-18 | $360,630,629 | ($279,282,557) | $81,348,072 | $85,193,265 | 100.0% | $364,475,822 | 98.7% | 101.3% | $364,475,822 | $0 |
| Total 2016/2017 | $2,359,360,349 | ($1,624,936,255) | $734,424,094 | $819,886,355 | 100.0% | $2,444,822,610 | 100.0% | 100.0% | $2,351,900,338 | $3,770,798 |
| Total 2017/2018 | 3,403,340,657.92 | (819,042,738.74) | $1,160,972,926 | $1,160,972,926.35 | 100.0% | $1,980,015,665 | 100.0% | 100.0% | $3,393,069,650 | $5,418,234 |

* Reported payout ratios may vary due to rounding differences when netting

Figure 13-8 shows the FTR surplus, collected day-ahead, balancing and total congestion payments from January 2005 through March 2018. May 2016 had positive total balancing congestion of $7.5 million. March 2015 had balancing congestion of -$70.0 million.

### Figure 13-8 FTR surplus and the collected day-ahead, balancing and total congestion: January 2005 through March 2018




## 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, other participants are allowed to receive a portion of the congestion revenues.

## 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.[37] The MMU has 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.[38] The case has been consolidated with appeals filed by others and is now pending. The Market Monitor and joint petitioners filed an initial brief on July 11, 2017, and a reply brief on October 25, 2017.[39] In the oral argument held April 23, 2018, the MMU argued the balancing congestion issue to the Court.

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

37 See 156 FERC ¶ 61,180 (2016), *reh'g denied*, 156 FERC ¶ 61,093 (2017).
38 U.S. Court of Appeals for the District of Columbia Circuit. *NJBPU v. FERC*, Case No. 17-1106 (March 31, 2017).
39 Joint Opening Brief of Petitioners, Case Nos. 17-1106 et al. (D.C. Cir July 11, 2017); Joint Reply Brief of Petitioners (October 25, 2017).

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 charges if the new rules had been place.

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.

The reallocation of balancing congestion and M2M payments from FTR Holders to load, and the allocation of additional FTR auction revenues to FTR Holders subsidizes FTR Holders at the expense of ARR holders. It is inconsistent with the logic that FTRs are a day-ahead only product because excess auction revenues are not day-ahead revenues and increases the uncertainty of holding an ARR to offset congestion charges.

Table 13-29 shows the congestion offset available to load with and without allocating balancing congestion to load. Table 13-29 also shows the congestion offset available to load under the old and current balancing congestion allocation rules, the change in the congestion offset available to load and the overpayment to FTRs under the old and current rules. The current congestion 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 current revenue is the sum of the ARR credits, adjusted FTR credits and the load share of balancing congestion and M2M payments. The FTR over payment is the excess day-ahead congestion revenue and additional FTR auction revenue FTR Holders received over their FTR target allocations.

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 first ten months of the 2017/2018 planning period was $69.1 million with a $347.4 million overpayment to FTR Holders.

Table 13-29 demonstrates the inadequacies of the current ARR/FTR design even before allocating balancing congestion and M2M payments to load. The goal of the design should be to return 100 percent of the congestion revenues to the load. But the actual results fall well short of that goal.

**Table 13-29 ARR and FTR total congestion offset (in millions) for ARR holders: Planning periods 2011/2012 through 2017/2018**

| | Old | | | | | Current | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Planning Period | ARR Credits | FTR Credits | Total Congestion | Total ARR/ FTR Offset | Percent Offset | New Offset | Old Revenue Received | Current Revenue Received | ARR Holder Change | FTR Over Payment |
| 2011/2012 | $512.2 | $249.8 | $770.6 | $762.0 | 98.9% | 83.3% | $762.0 | $598.6 | ($163.4) | $113.9 |
| 2012/2013 | $349.5 | $181.9 | $575.8 | $531.4 | 92.3% | 68.0% | $531.4 | $275.9 | ($255.5) | $62.1 |
| 2013/2014 | $337.7 | $456.4 | $1,777.1 | $794.0 | 44.7% | 43.2% | $794.0 | $574.1 | ($219.9) | $0.0 |
| 2014/2015 | $482.4 | $404.4 | $1,390.9 | $886.8 | 63.8% | 57.2% | $886.8 | $686.6 | ($200.2) | $400.6 |
| 2015/2016 | $635.3 | $223.4 | $992.6 | $858.8 | 86.5% | 78.2% | $858.8 | $744.8 | ($113.9) | $188.9 |
| 2016/2017 | $640.0 | $169.1 | $824.6 | $809.1 | 98.1% | 89.5% | $809.1 | $727.7 | ($81.4) | $179.0 |
| 2017/2018* | $479.2 | $264.1 | $1,137.4 | $743.3 | 65.3% | 61.6% | $743.3 | $674.2 | ($69.1) | $347.4 |
| Total | $3,436.3 | $1,949.1 | $7,469.0 | $5,385.4 | 72.1% | 64.5% | $5,385.4 | $4,282.0 | ($1,103.3) | $1,291.7 |

* Ten months of 2017/2018 planning period

## Credit Issues

There were three collateral defaults in the first three months of 2018 for a total of $606,938. All defaults were cured promptly.

## 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.[40] 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. The new rule will be more transparent and will depend on an individual participant's net impact on a constraint. FERC also explicitly ordered counter flow FTRs to be considered for FTR forfeiture.

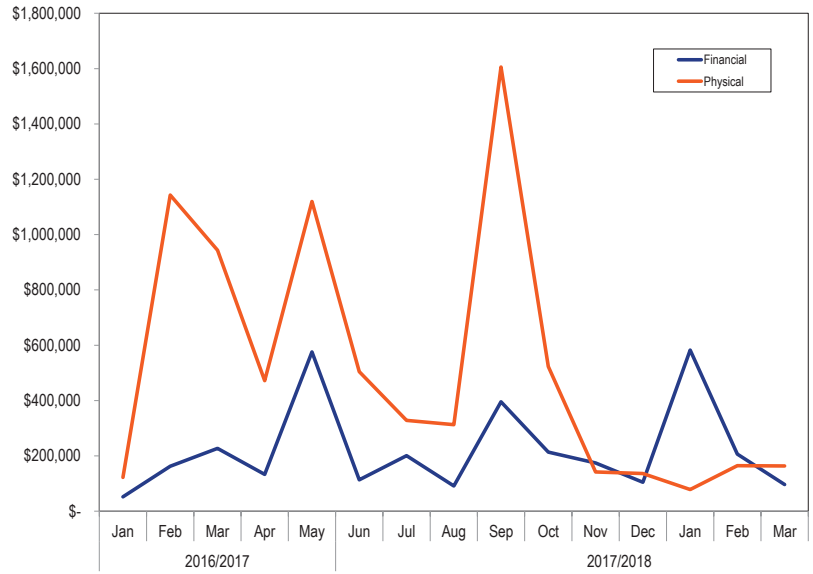
In response to this, PJM determined that no FTR forfeitures would be billed to participants after January 19, 2017, under the prior rules. Instead, participants were retroactively billed their FTR forfeiture amounts based on the new FTR forfeiture rule once it was in place.

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 13-9 shows the monthly FTR forfeitures under the newly established FTR forfeiture rule from January 19, 2017 through March 31, 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 March 31, 2018, total FTR forfeitures were $11.1 million.

**Figure 13-9 Monthly FTR forfeitures for physical and financial participants**




40 See 158 FERC ¶ 61,038 (2017).