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Admitted in: DC, MD, NY

April 8, 2020

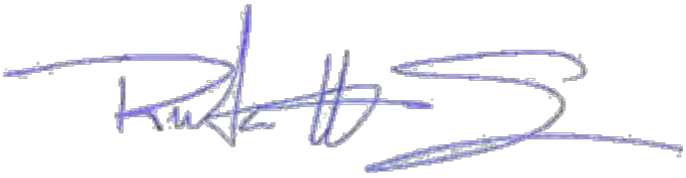
The Honorable Kimberly Bose
Secretary
Federal Energy Regulatory Commission
888 First St., NE
Washington, DC 20426

Re: Complaint of XO Energy LLC vs. PJM Interconnection, L.L.C.,
Docket No. EL20-____-000

Dear Secretary Bose:

Please find attached for filing the Complaint of XO Energy LLC against PJM Interconnection, L.L.C. in Docket No. EL20-____-000. If you have any questions regarding this filing, please do not hesitate to contact the undersigned.

Sincerely,



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UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

XO Energy LLC	)	
v.	)	Docket No. EL20-____-000
	)	
PJM Interconnection, L.L.C.	)	

COMPLAINT OF XO ENERGY, LLC

XO Energy LLC, together with XO Energy MA, LP and XO Energy MA2, LP (collectively, "XO Energy" or "Complainant") submit this complaint against PJM Interconnection, L.L.C. ("PJM") because the Financial Transmission Right ("FTR") forfeiture rule (the "FTR Forfeiture Rule") is unjust and unreasonable, and the rule has been implemented in a manner that is inconsistent with Commission orders and the existing tariff. The current implementation is so broad that it captures competitive market conduct and leads to less efficient market outcomes. XO Energy submits this complaint pursuant to section 206 of the Federal Power Act (the "FPA"), 16 U.S.C. § 824e (West 2010 & Supp. 2017), section 306 of the FPA, 16 U.S.C. § 825e, and Rule 206 of the Federal Energy Regulatory Commission's ("FERC" or the "Commission") Rules of Practice and Procedure, 18 C.F.R. § 385.206 (2019).

The Commission should (i) reject PJM's implementation of the FTR Forfeiture Rule made through a compliance filing on April 18, 2017,[1] as amended on June 2, 2017,[2] which has yet to be approved by the Commission; and (ii) either (a) replace the rule with a structured market

[1] *PJM Interconnection, L.L.C.*, Compliance Filing concerning FTR Forfeiture Rule, Docket Nos. EL14-37-001 and ER17-1433-000 (filed April 18, 2017) (the "Compliance Filing").

[2] *PJM Interconnection, L.L.C.*, Docket No. ER17-1433 at Attachment A (filed June 2, 2017) (the "Amended Compliance Filing") (the Compliance Filing and the Amended Compliance Filing are sometimes collectively referred to herein as the "PJM Compliance Filing.")

monitoring scheme, or (b) modify the existing rule and the market monitoring function, all as set forth herein.

I. EXECUTIVE SUMMARY

A. The FTR Forfeiture Rule Cannot Detect Financial Leverage or Assess Intent

The FTR Forfeiture Rule was implemented to address concerns about potential market manipulation that could arise from a market participant's leveraged portfolio.[3] A leveraged portfolio exists when the net benefits to a market participant's portfolio of FTRs exceeds the net losses of its portfolio of virtual transactions on a given constraint. A critical defect of the FTR Forfeiture Rule is that, at the very outset, it fails to consider whether a market participant has financial leverage, rendering the rule unjust and unreasonable. As discussed in Section V. A. of this complaint, if financial leverage does not exist, further scrutiny of a market participant's activity is unnecessary.

Any forfeiture rule must also be coupled with a structured market monitoring function that can assess whether sufficient credible evidence of intent exists. There is no such thing as a properly designed automatic forfeiture rule; any forfeiture rule should only relinquish profits from conduct that, if combined with sufficient credible evidence of intent, would constitute a potential violation. In Order 670, the Commission found that a fundamental component of any alleged manipulation claim is whether the market participant acted with sufficient scienter or intent.[4] FERC has consistently framed its Anti-Manipulation Rule as a "principles-based" enforcement regime; there

[3] *See PJM Interconnection, L.L.C.*, Transmittal Letter, Docket ER01-773-000 (filed Dec. 22, 2000).

[4] *Prohibition of Energy Market Manipulation*, Order No. 670, FERC Stats. & Regs. ¶ 31,202, *reh'g denied*, 114 FERC ¶ 61,300 (2006) (Order No. 670); *see also* 18 C.F.R. Part 1c (2019).

are no bright-line rules for liability nor is there an enumerated list of activities that constitute fraud.[5] Although the presence of financial leverage can be easily determined (see Section V. A. of this complaint), a comprehensive, fact-specific examination is necessary to identify sufficient evidence of intent. PJM's forfeiture rule has been implemented in a manner that ignores this critical component, a market monitoring function that cannot be detected by a rule.

Dr. David Patton of Potomac Economics, the market monitor for three of the six FERC-regulated independent system operators and regional transmission organizations (collectively, "ISOs" or, individually, an "ISO"), together with the Electric Reliability Council of Texas ("ERCOT"), has long recognized a thoughtful approach to the examination of any potentially manipulative behavior,[6] having stated:

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[5] Fleishman, R. and Varnado, P, *Perspective on FERC's Enforcement Programme as it Relates to Energy Market Manipulation*, *The Guide to Energy Market Manipulation*, 1st ed. London: Global Competition Review at 19 (2018).

[6] I try to figure out why they are losing money[,] whether it is the energy component or the congestion component, are they contributing to congestion and then if they are contributing to congestion and losing money, I am still not even close to identifying whether this is manipulation. I then evaluate the bidder offer price, and I say, 'What has the real-time price been at this point during these types of hours for the last few days or a week or more,['] and if the virtual transactor is putting in an offer price that represents a reasonable expectation of the real-time price, then I say 'That is what I expect competitive virtual traders to do.'

On the other hand, if they are putting in a virtual load, and saying, 'I'm willing to buy at $100 when the real-time price has been $30,' or you are willing to buy 1,000, basically an offer price, that is forcing the transaction to clear and then the transaction is losing money. Then you start to have an indication or you have a pretty good indication that you might have manipulation.

All of those things have to be the case.

Then we have to do some other evaluations of how that affected positions they may have and so forth to get a manipulation finding.

See PJM Interconnection, LLC, Docket No. EL14-37-000, Technical Conference Transcript at 63-65: 7-5 (Jan. 7, 2015) ("Technical Conference Transcript").

> My personal opinion is almost nobody is [engaging in manipulation] because [market participants] recognize that it is easy to spot and having your FTRs forfeited has reputational effects plus it doesn't exempt you from having FERC Enforcement come after the fact and impose a penalty on you.
>
> If we live in a world where nobody is doing this, then you would want to be pretty content that you are designing a forfeiture [rule] that is very surgical and you know you are catching somebody who is actually engaged in bad behavior before you start [f]orfeiting FTR revenues.[7]
>
> Obviously, my position, generally, is we believe this sort of rule is more harmful than it is helpful.[8]

In stark contrast, PJM's forfeiture rule is based simply on the fact that a market participant holds both FTR and virtual portfolios:

> Market participants must recognize that, regardless of motives, virtual transactions can and do have an impact on the value of FTRs . . . The FTR forfeiture rule ensures that no party can increase FTR profits by using virtuals.[9]

It is impossible for a market participant to measure (even retrospectively) the negative impact of the rule and modify its behavior accordingly: market participants do not have access to the data upon which forfeiture determinations are made and, worse yet, are subject to assessments more than two months after the activity in question. Furthermore, although the IMM contends that the rule "ensures that no party can increase FTR profits by using virtuals," the flawed implementation of the rule actually imposes a financial penalty (see Section V. of this complaint).

The market monitor has taken the stance that "it makes sense . . . to err on the side of over-enforcing rather than under-enforcing" because "there is no reason to believe that having a strong

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[7] Technical Conference Transcript at 64-65:19-5.

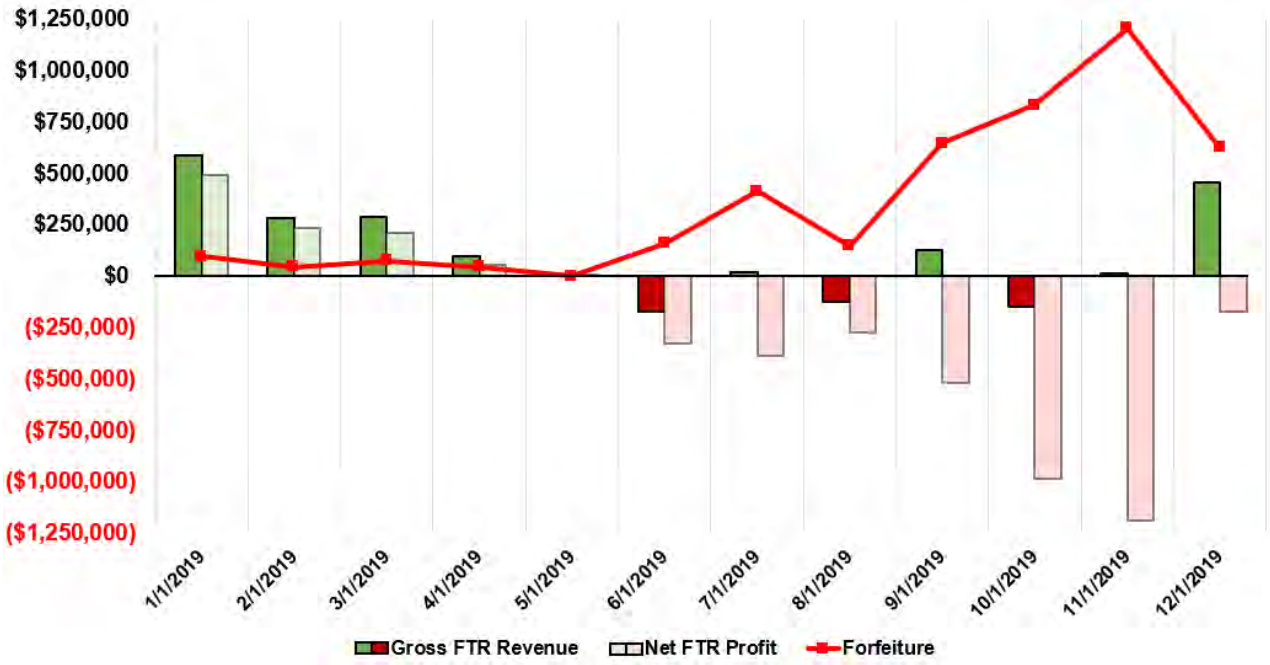
[8] *Id.* at 115:3-4.

[9] *PJM Interconnection, LLC*, Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM, Docket Nos. EL14-37-001 and ER17-1433-000 (filed Aug. 19, 2019) (emphasis added) ("August 2019 IMM Answer").

FTR Forfeiture Rule has had any consequences whatsoever."[10] This posture stands in stark contrast to the experience of market participants as well as the overall market results. The current FTR Forfeiture Rule has resulted in market inefficiencies by penalizing financial market participants whose virtual activity is profitable. In addition, market participants with physical positions are unable to hedge their physical load or generation positions.

Over the course of 2019, XO Energy forfeited $4.3 million, while its gross FTR revenue over the same period was $1.4 million, resulting in a net FTR loss of $2.9 million (see Figure 1).

Figure 1: XO Energy Monthly Gross and Net FTR Revenue and Forfeiture Amount (2019)



Because the forfeiture rule is indiscriminately punitive, XO Energy's only recourse was to withdraw from the virtual market altogether, which it did on December 18, 2019. Exelon Corporation ("Exelon") and NextEra Energy Marketing, LLC ("NextEra") ceased virtual trading

[10] Technical Conference Transcript at 14:9-23.

as well, though the IMM dubbed their exit as "hyperbolic, self-serving and misleading."[11] As depicted in Figure 1, XO Energy was harmed by the rule, however, the cumulative impact is more alarming: virtual transactions, which are essential to a well-functioning and efficient market,[12] will diminish as participants continue to decrease due to the flawed implementation of the rule.

Furthermore, as Exelon stated:

> [T]he FTR Forfeiture Rule is overly restrictive and has created barriers for load serving entities to manage their portfolios . . . The FTR Forfeiture rule effectively constrains the ability of load serving entities to manage risk and hedge their portfolios which may ultimately increase consumer costs.[13]

B. PJM's FTR Forfeiture Rule Captures Legitimate Hedging Activity

When compared to a market that does not have a forfeiture rule (e.g., ERCOT), there is evidence to suggest that PJM's FTR Forfeiture Rule deters virtual transactions from being used as a tool for hedging physical assets. ERCOT encourages the use of virtual transactions, specifically the point-to-point obligation bid ("PTP"), as a tool to hedge physical assets.[14] In contrast, physical participants in PJM that are attempting to hedge their physical assets with virtual transactions have been retroactively impacted by the FTR Forfeiture Rule and are now deterred from hedging.

The 2018 ERCOT State of the Market Report ("SOM") analyzed the use of PTPs as both a hedging mechanism as well as a tool to arbitrage day-ahead and real-time congestion, noting:

> PTP obligations are financial transactions purchased in the day-ahead market. Although PTP obligations do not themselves involve the direct supply of energy, PTP obligations

[11] August 2019 IMM Answer at 6.

[12] *See* Technical Conference Transcript at 100-101: 11-13 (Patton, D. testifying).

[13] *See* PJM, *FTR Forfeiture Rule Changes Problem/Opportunity Statement* (Feb. 7, 2018) ("Exelon Problem Statement"), available at https://www.pjm.com/-/media/committees-groups/committees/mic/20180207/20180207-item-07a-ftr-forfeiture-rule-changes-problem-statement.ashx.

[14] ERCOT's PTP (analogous to the UTC in PJM) is a well-developed product, however, unlike PJM, all points that are available for CRRs are also made available to it.

> allow a participant to buy the network flow from one location to another. When coupled with a self-scheduled generating resource, the PTP obligation allows a participant to serve its load while avoiding the associated real-time congestion costs between the locations. Other PTP obligations are scheduled by financial participants seeking to arbitrage locational congestion differences between the day-ahead and real-time markets.[15]

Potomac Economics highlighted the importance of hedging energy and congestion exposure to physical participants through the use of PTPs for both load and generation:

> Real-time load in ERCOT may be hedged through the day-ahead market, either by purchasing energy in the market or by self-scheduling generation coupled with PTP 'transfers' to the load. To estimate the volume of hedging activity, energy purchases are added to the volume of PTPs … with load that source or sink in Load Zones…the percentage of real-time load hedged increased to 89%, similar to the amount seen in 2017.[16]
>
> For all PTP obligations that source at a generator location, the capacity up to the actual generator output is considered to be hedging the real-time congestion associated with generating at that location.[…] generation hedging comprised most of the volume of PTP obligations purchased. The remaining volumes of PTP obligations are not directly linked to a physical position and are assumed to be purchased primarily to arbitrage anticipated price differences between two locations.[17]

Potomac Economics' analysis underscores the viability of ERCOT's hedging product, which is used by physical participants seeking to hedge their load and generation. Potomac Economics has taken steps to quantify and distinguish hedging activity from speculative arbitraging activity.

A market participant that trades both virtual transactions and FTRs (or, in the case of ERCOT, CRRs) will continually assess whether it is economically rational to settle all or a portion of its CRR portfolio in the real-time market. For example, a participant will forgo the revenue associated with its FTR portfolio that is settling in the day-ahead market in exchange for the

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[15] Potomac Economics, *2018 State of the Market Report for the ERCOT Electricity Markets* at 30-31 (June 2019) available at https://www.potomaceconomics.com/wp-content/uploads/2019/06/2018-State-of-the-Market-Report.pdf ("2018 ERCOT SOM").

[16] 2018 ERCOT SOM at 31.

[17] *Id.* at 36

opportunity to settle at a higher real-time price. Acknowledging this hedging opportunity, Potomac Economics, ERCOT's market monitor, described PTP obligations as a complement to CRRs:

> Purchases of PTP obligations comprise a significant portion of day-ahead market activity. They are similar to, and can be used to complement Congestion Revenue Rights (CRRs). […] Participants buy PTP obligations by paying the difference in prices between two locations in the day-ahead market. The holder of the PTP obligation then receives the difference in prices between the same two locations in the real-time market. Hence, a participant that owns a CRR can use its CRR proceeds from the day-ahead market to buy a PTP obligation between the same two points in order to transfer its hedge to real-time.[18]

This legitimate hedging activity would be captured by PJM's FTR Forfeiture Rule, erroneously triggering a forfeiture, because the rule does not test for leverage. When a participant shifts its entire FTR position on a constraint into the real-time market, the participant relinquishes its receipt of day-ahead revenue in exchange for the opportunity to settle at the real-time price. In this instance, a participant does not have leverage and there would be no day-ahead FTR revenue to forfeit. If a participant clears only a portion of its FTR portfolio in the real-time market, then the participant risks triggering a leverage test and forfeiting the portion of its FTR portfolio that still settles at the day-ahead price. Even with a check for leverage, an automatic forfeiture rule gives rise to an all or nothing scenario that deters economically rational behavior because a participant's intent is not examined. As a result, a physical asset owner is discouraged from pursuing a rational hedging strategy, that is, settling a portion of its CRR portfolio in the day-ahead market and a portion in the real-time market. It is imperative that any forfeiture rule not only detect leverage, but that the market monitor be engaged to differentiate between hedging and speculative trading behavior.

[18] *Id.* at 34.

Furthermore, not only does ERCOT encourage the use of virtual transactions in order to facilitate hedging, but physical participants largely dominate the use of PTP obligations. In 2018, 64% of all PTP volume in ERCOT was attributable to physical participants:

> Physical parties are those that have actual real-time load or generation, whereas financial parties have neither. Financial parties purchased 36% of the total volume of PTP obligations in 2018.[19]

In contrast, physical participants in PJM represented only 4% of the up-to congestion transaction ("UTC") volume in 2018 (down from 8% in 2017) and 20% of the virtual incremental offer ("INC") and decremental bid ("DEC") volume (down from 40% in 2017).[20] The overall transaction volume has decreased by almost 50% from 2017 to 2018.

In September 2017, PJM retroactively billed forfeitures in accordance with the PJM Compliance Filing. The monthly FTR forfeiture impact to physical and financial participants is highlighted in Figure 2. Exelon and NextEra confirmed that the FTR Forfeiture Rule captured legitimate, economically rational hedging activity.[21]

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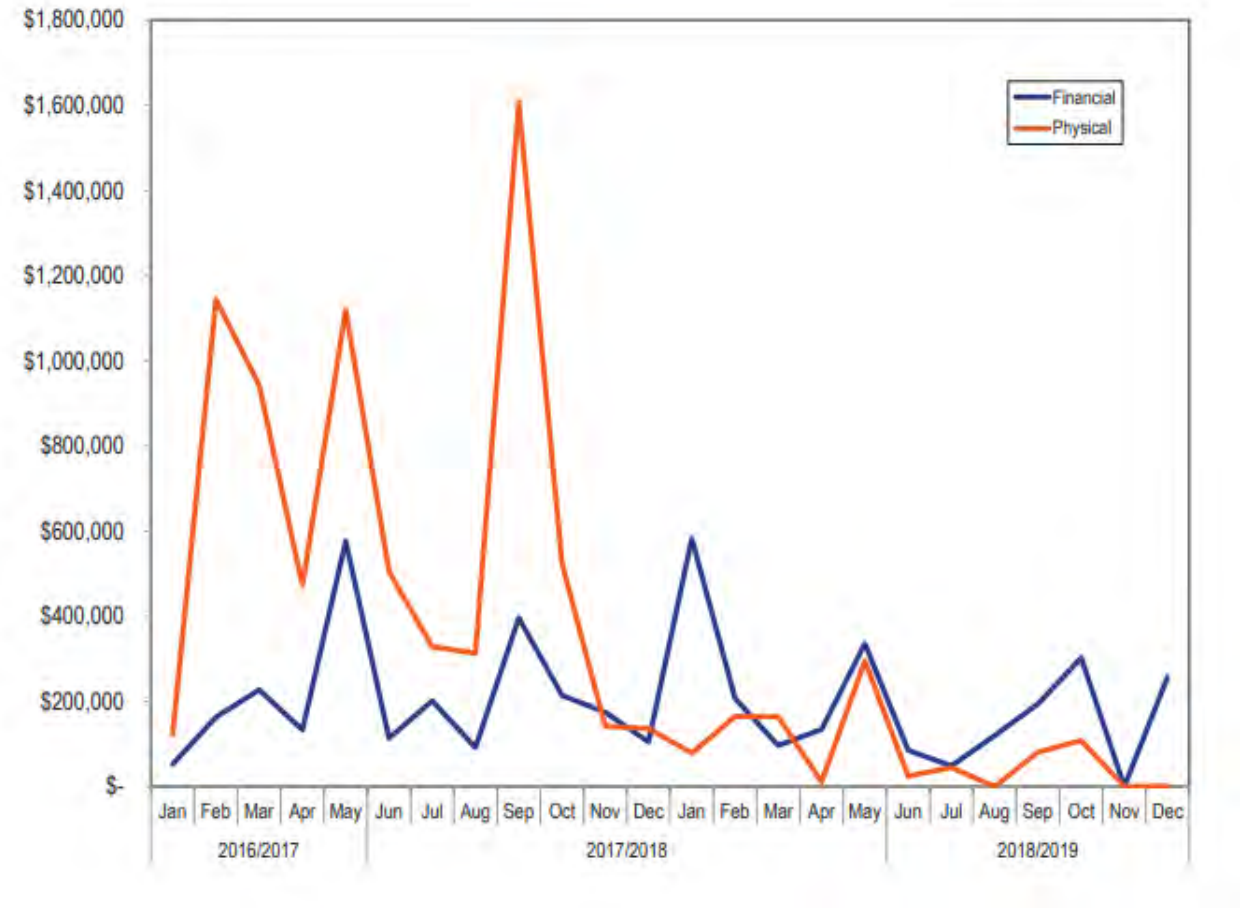
[19] *Id.* at 36.

[20] Monitoring Analytics, LLC, *2018 State of the Market Report for PJM (Volume 2: Detailed Analysis)* at 167, available at https://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2018/2018-som-pjm-volume2.pdf.

[21] *See* Exelon Problem Statement, supra n. 13.

Figure 2: Monthly FTR forfeitures for physical and financial participants



On February 22, 2018, PJM reduced the number of biddable node location at which UTCs could be transacted from 431 points (i.e., a limited set of generation nodes and EHV points together with Load Zones, Hubs and Interfaces) to 49 (i.e., Hubs, Residual Load Zones and Interfaces). Although the original set of available UTC nodes was arbitrarily defined, it provided some opportunity for hedging. The reduction to such a limited set of biddable nodes has effectively eliminated the use of the UTC as a hedging tool, although this form of hedging is encouraged in ERCOT. If the UTC nodes were instead aligned with the points at which INCs and DECs are transacted, the UTC product in PJM would be similar to the PTP obligation in ERCOT, facilitating hedging for physical participants, however, the PJM FTR Forfeiture Rule would capture and deter this legitimate hedging activity. In order to encourage legitimate hedging while at the same time

capturing potentially manipulative behavior, PJM's FTR Forfeiture Rule should be changed to detect financial leverage when a participant holds physical assets and engages in virtual transactions. Any leveraged activity that appears to be speculative, after accounting for physical assets, must then be examined in order to determine whether there is sufficiently credible evidence of manipulative intent.

C. The FTR Forfeiture Rule Should Either be Replaced or Significantly Revised

XO Energy respectfully requests that FERC either direct PJM to:

1. Abandon the FTR Forfeiture Rule and adopt a structured market monitoring approach similar to that used in the Midcontinent Independent System Operator ("MISO");[22] or
2. Amend the FTR Forfeiture Rule so that it tests for financial leverage and, since it is not possible to implement a properly defined automatic forfeiture rule, require PJM to develop a structured market monitoring function that is capable of assessing a participant's behavior for sufficient credible evidence of intent in order to determine whether a potential violation occurred.

If FERC orders PJM to amend the existing rule and develop a market monitoring function that is capable of assessing a participant's behavior for sufficient credible evidence of intent in order to determine whether a potential violation occurred, it is also imperative that certain other defects are rectified, namely:

[22] Although PJM and California Independent System Operator ("CAISO") have implemented forfeiture rules, this is not the only approach that has been adopted by the FERC-regulated ISOs. MISO, New York Independent System Operator, Southwest Power Pool, Inc. and ISO New England Inc. use their market monitoring function to provide surveillance in lieu of a rule that oftentimes captures rational economic behavior.

a. The FTR Forfeiture Rule fails to consider a portfolio approach to FTRs, which is inconsistent with FERC's principles regarding the use of a portfolio approach for virtual transactions;

b. The FTR Impact Test used in the FTR Forfeiture Rule is inherently flawed; [23]

c. Under the FTR Forfeiture Rule, forfeitures that are based upon the total day-ahead marginal congestion component ("MCC") and total FTR cost are not just and reasonable;

d. The FTR Forfeiture Rule's counterflow FTR implementation violates the PJM Compliance Filing and is significantly flawed;

e. PJM's application of the FTR Forfeiture Rule's virtual portfolio test (the "Virtual Portfolio Test") has significant inconsistencies; and

f. The persistent lack of transparency to the data used in the application of the FTR Forfeiture Rule prevents a market participant from reasonably responding to the forfeitures that it incurs.

II. CORRESPONDENCE AND COMMUNICATIONS

Please direct all communications and correspondence regarding this complaint to the following individuals:

[23] PJM, *FTR Forfeiture FERC Order MIC Update* at 7 (Feb. 8, 2017), available at https://www.pjm.com/-/media/committees-groups/committees/mic/20170208/20170208-item-10-ftr-forfeiture-ferc-order-feb-2017.ashx; PJM. *FTR Forfeitures* at 2 (May 2, 2018), available at https://www.pjm.com/-/media/committees-groups/committees/mic/20180502/20180502-item-08b1-ftr-forfeitures.ashx (the "May 2018 FTR Presentation") (together, the descriptions in each presentation are referred to as the "FTR Impact Test"). Exelon and NextEra moved to lodge these two PJM documents in the docket considering PJM's Compliance Filing. *See PJM Interconnection, LLC*, Motion to Lodge, Docket Nos. ER17-1433-000 and EL14-37-001 (filed Jul. 1, 2019).

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** Designated to receive service pursuant to Rule 203(b)(3) of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.203(b)(3) (2019).

III. DESCRIPTION OF COMPLAINANT AND RESPONDENT

The affiliates of XO Energy, a Delaware entity headquartered in Pennsylvania, transact in the markets operated by the various ISOs, including virtual transactions and FTRs in PJM. Specifically, XO Energy MA, LP and XO Energy MA2, LP are PJM market participants affected by the FTR Forfeiture Rule.

PJM is a non-profit public benefit corporation organized under the laws of the State of Delaware with its principal place of business in Valley Forge, Pennsylvania. Pursuant to the PJM Open Access Transmission Tariff (the "Tariff"), PJM provides open access transmission service and administers organized wholesale markets in all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia. All references to the Tariff are intended to encompass the identical, parallel provisions in the Amended and Restated Operating Agreement of PJM Interconnection L.L.C. (the "Operating Agreement").

IV. BACKGROUND

A. The Purpose of FTRs in PJM

FTRs are financial contracts that entitle their holders to day-ahead hourly congestion

revenue, as measured between the location at which power is injected into the system (the "source") and the location at which it is withdrawn (the "sink").[24] FTRs can be bought or sold in the PJM-administered auctions, or through bilateral transactions, years in advance of a planning period.[25] The hourly economic value of an FTR is based upon the difference between day-ahead congestion prices at the source and sink designated in the FTR.[26]

An FTR may be either "prevailing flow" or "counterflow."[27] A "prevailing flow" FTR has a source and sink that run in the same direction as congestion on the grid.[28] The holder of a prevailing flow FTR agrees to pay a fixed amount and to receive the difference in day-ahead price between the source and sink during the relevant hours of the planning period.[29] A "counterflow" FTR has a source and sink that run in the opposite direction of congestion on the grid.[30] The holder of a counterflow FTR receives a fixed amount and pays the difference in day-ahead price between the source and sink during the relevant hours of the planning period.[31] Since FTRs are settled based upon differences in day-ahead prices at the source and sink, changes in prices during a given

[24] PJM, *PJM Manual 06: Financial Transmission Rights* at § 1.1 (Revision: 23; Effective Date: Sept. 1, 2019) ("PJM Manual 06").

[25] PJM Manual 06 at § 1.1.

[26] *Id.* at § 1.2.

[27] PJM, *Market Settlements – Advanced (FTR/ARR Module)* at 8-9 (May 24, 2017) ("2017 Market Settlement Training"), available at https://www.pjm.com/-/media/training/nerc-certifications/markets-exam-materials/advanced/financial-transmission-rights-auction-revenue-rights.ashx?la=en.

[28] 2017 Market Settlement Training at 8.

[29] *See* PJM, FTR Revenue Stakeholder Report at 5-9 (April 30, 2012) ("2012 FTR Stakeholder Report"), available at https://hepg.hks.harvard.edu/files/hepg/files/20120430-ftr-revenue-stakeholder-report.pdf.

[30] 2017 Market Settlement Training at 9.

[31] *See* 2012 FTR Stakeholder Report at 5-9.

hour at the source and/or sink can affect the payments FTR holders receive or pay during that hour of a planning period.[32]

B. Procedural Background

i. Commission Investigation in Docket No. EL14-37

On August 29, 2014, the Commission initiated an investigation pursuant to section 206 of the FPA to determine, *inter alia*, whether PJM's application of the FTR Forfeiture Rule was just and reasonable with regard to UTCs.[33] In connection with the August 29, 2014 Order, Commission staff convened a technical conference on January 7, 2015 (the "January 7, 2015 Technical Conference"), after which parties, including XO Energy, filed comments.[34]

On January 19, 2017, the Commission issued an order finding that PJM's then-existing design, implementation and application of the FTR Forfeiture Rule under the Tariff, Attachment K Appendix, namely, Sections 5.2.1(b) and (c), was unjust and unreasonable.[35] As a result, the Commission directed PJM to "submit a compliance filing within 90 days of the date of this order to modify Section 5.2.1(c) of its Tariff to: (1) evaluate the net impact of a market participant's entire portfolio of virtual transactions on its FTR positions; (2) measure the portfolio's net impact using the load-weighted reference bus; (3) revise the threshold for triggering forfeiture to reflect the previous two changes; and (4) consider all virtual transactions held by entities that share common ownership as part of the same portfolio."[36] The Commission further directed PJM to

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[32] *Id.*

[33] *See PJM Interconnection, L.L.C.*, 148 FERC ¶ 61,114 (2014) (the "August 29, 2014 Order").

[34] *PJM Interconnection, L.L.C.*, Post-Technical Conference Comments of XO Energy LLC, Docket No. EL14-37-000 (filed May 29, 2015).

[35] *PJM Interconnection, L.L.C., et al.,* 158 FERC ¶ 61,038 at P 23, 56 (2017) (the "January 19, 2017 Order").

[36] January 19, 2017 Order at P 62.

"implement a trigger threshold based on the total MW limit of a binding constraint related to the FTR path. Specifically, to trigger a forfeiture, the net flow across a given constraint attributable to a participant's portfolio of virtual transactions must meet two criteria: (1) the net flow must be in the direction to increase the value of an FTR; and (2) the net flow must exceed a certain percentage of the physical limit of a binding constraint."[37]

ii. The PJM Compliance Filing in Docket ER17-1433, as Amended, Remains Pending Before the Commission

On April 18, 2017, PJM submitted its proposed revisions to Section 5.2.1 of the Tariff. Specifically, PJM (i) modified Section 5.2.1(b) to implement a portfolio approach in order to evaluate the net impact of a market participant's entire portfolio of virtual transactions on its FTR positions; (ii) amended Section 5.2.1(c) to utilize a load-weighted reference bus and implement an "appreciable percentage" test with respect to a binding constraint; and (iii) inserted new Section 5.2.1(d) to implement the FTR Impact Test. Since the inception of the FTR Forfeiture Rule (and prior to the implementation of the FTR Impact Test), PJM used the FTR Candidate Selection Criteria.[38] The FTR Candidate Selection Criteria was never included in the Tariff, Operating Agreement or Manuals; it was mentioned in PJM and IMM stakeholder presentations as well as PJM's presentation to the Commission during the January 7, 2015 Technical Conference.[39]

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[37] *Id.* at P 60.

[38] *See* Monitoring Analytics, *FTR Education* at 17 (Jan. 28, 2014) ("2014 IMM FTR Education"), available at https://pjm.com/-/media/committees-groups/committees/mic/20140218-ftr/20140218-ftr-forfeiture-education.ashx; PJM, *Application of the PJM Forfeiture Rule to Virtual Transactions (INCs, DECs and UTCs)* at 7 (Jan. 7, 2015) ("PJM's Technical Conference Presentation"), available at https://www.ferc.gov/CalendarFiles/20150106125038-Bresler,%20PJM.pdf. The test is referred to as the "FTR Candidate Selection Criteria."

[39] *See* PJM's Technical Conference Presentation, *supra.*

In support of its proposed revisions to Section 5.2.1 of the Tariff, PJM proposed a two-step process regarding FTR forfeitures:

> First, PJM will look to see if the Effective FTR Holder's Virtual Transactions have an appreciable impact on the physical limit of any binding constraint. Second, once PJM determines that a binding constraint is appreciably impacted by an Effective FTR Holder's Virtual Transactions, PJM will determine if the net flow increases the value of an FTR by $0.01 or greater.[40]

In order to address the first step in the process, PJM proposed the revision of Section 5.2.1(c) as follows:

> For purposes of Section 5.2.1(b), an Effective FTR Holder's Virtual Transaction portfolio shall be considered if the absolute value of the attributable net flow across a Day-ahead Energy Market binding constraint relative to the Day-ahead Energy Market load weighted reference bus between the Financial Transmission Right delivery and receipt buses exceeds an appreciable percentage, as defined in the PJM Manuals, of the physical limit of such binding constraint.[41]

In order to address the second step in the process, PJM proposed the implementation of the new FTR Impact Test at Section 5.2.1(d):

> For purposes of Section 5.2.1(c) a binding constraint shall be considered if the binding constraint has a $0.01 or greater impact on the absolute value of the difference between the Financial Transmission Right delivery and receipt buses.[42]

The FTR Impact Test served to replace the FTR Candidate Selection Criteria, though it was never included in the Tariff, Operating Agreement or Manuals. The seemingly minor addition of Section 5.2.1(d) modified the impact test from a series of distribution factor ("DFAX") thresholds to a new $0.01 impact test. The Commission did not direct PJM to change its then-current method of determining which FTR paths would be forfeited, however, PJM addressed this in response to what it characterized as the Commission's "fairly prescriptive" directives:

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[40] Compliance Filing at 4.

[41] *Id.* at 3.

[42] *Id.*

> The Commission's directives concerning use of the portfolio approach, applying the forfeiture rule to all FTRs, and use of the load-weighted average reference bus for determining power flows were fairly prescriptive and PJM's proposed language in section 5.2.1(b) and (c) reflects the changes required by the Commission.[43]

On May 9, 2017, XO Energy, Alphataraxia Palladium LLC ("Alphataraxia"), and VECO Power Trading, LLC ("VECO") filed protests to the Compliance Filing[44] and, subsequently, the IMM filed its answer.[45] On June 2, 2017, PJM filed its Amended Compliance Filing to restate Section 5.2.1(c) as follows:

> For purposes of Section 5.2.1(b), an Effective FTR Holder's Virtual Transaction portfolio shall be considered if the absolute value of the attributable net flow across a Day-ahead Energy Market binding constraint relative to the Day-ahead Energy Market load weighted reference bus between the Financial Transmission Right delivery and receipt buses exceeds the physical limit of such binding constraint by the greater of 0.1 MW or ten percent, or such other percentage under certain circumstances further defined in the PJM Manuals.[46]

In response, XO Energy, the Financial Marketers Coalition, and VECO filed protests to the Amended Compliance Filing.[47]

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[43] *Id.* at 4.

[44] *See PJM Interconnection, L.L.C.*, Motion to Intervene and Protest of XO Energy LLC, Docket No. ER17-1433 at 8 (filed May 9, 2017) ("May 2017 Protest"); *PJM Interconnection, L.L.C.*, Motion to Intervene and Protest of Alphataraxia Palladium LLC, Docket No. ER17-1433 (filed May 9, 2017); *PJM Interconnection, L.L.C.*, Motion to Intervene and Protest of VECO Power Trading, LLC, Docket No. ER17-1433 (filed May 9, 2017).

[45] *PJM Interconnection, L.L.C.*, Answer and Motion to Leave for Answer of the Independent Market Monitor for PJM, Docket No. ER17-1433 (filed May 31, 2017).

[46] Amended Compliance Filing at 3.

[47] *See PJM Interconnection, L.L.C.*, Protest of XO Energy LLC, Docket No. ER17-1433 (filed June 23, 2017); *PJM Interconnection, L.L.C.*, Motion to Intervene and Protest of the Financial Marketers Coalition, Docket No. ER17-1433 (filed June 23, 2017); *PJM Interconnection, L.L.C.*, Protest of Amended Compliance Filing of VECO Power Trading, LLC, Docket No. ER17-1433 (filed June 23, 2017).

iii. PJM Stakeholders Challenged the FTR Impact Test in the PJM Stakeholder Process

Throughout the stakeholder process, Complainant together with other PJM market participants expressed concern that the FTR Impact Test violated the Commission's January 19, 2017 Order. In February 2018, Exelon introduced a problem statement requesting a review of the then current FTR Forfeiture Rule. In particular, Exelon stated:

> The sponsors of this problem statement contend that the FTR Forfeiture Rule is overly restrictive and has created barriers for load serving entities to manage their portfolios ... The FTR Forfeiture rule effectively constrains the ability of load serving entities to manage risk and hedge their portfolios which may ultimately increase consumer costs.[48]

Although Exelon's proposal to modify the FTR Impact Test received widespread support in the Market Implementation Committee ("MIC"),[49] certain parties expressed concern regarding the modification of any rule related to FTRs in the wake of the GreenHat Energy LLC default. Ultimately, the proposal failed in the Markets and Reliability Committee ("MRC").

iv. PJM Implemented Tariff Revisions without Commission Approval

The Commission has not ruled on PJM's April 18, 2017 and June 2, 2017 proposed Tariff revisions, however, on September 21, 2017, PJM began implementing these revisions retroactive to January 19, 2017.[50] This implementation has resulted in significant costs to market participants, as described in this complaint. On July 1, 2019, Exelon and NextEra filed a Motion to Lodge, the

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[48] *See* Exelon Problem Statement, *supra* n. 13.

[49] PJM, *Minutes of the Market Implementation Committee* at 2 (Nov. 7, 2018, approved Dec. 12, 2018) ("November 2018 MIC Minutes"), available at https://www.pjm.com/-/media/committees-groups/committees/mic/20181107/20181107-minutes.ashx.

[50] *See* PJM, *Market Settlements Subcommittee Meeting Minutes* at 1 (Sept. 21, 2017, approved Oct. 30, 2017) ("September 21, 2017 MSS Minutes"), available at https://www.pjm.com/-/media/committees-groups/subcommittees/mss/20170921/20170921-minutes.ashx.

first activity in the docket since July 14, 2017.[51]

V. COMPLAINT

When presented with a complaint pursuant to section 206 of the FPA, the Commission's analysis is two-fold. First, the Commission must determine whether the jurisdictional rate, rule or practice at issue is just and reasonable and not unduly discriminatory.[52] Second, if the Commission finds that the rate, rule or practice is unjust and unreasonable and/or unduly discriminatory, then the Commission must set a just and reasonable rate, rule or practice.[53]

The FTR Forfeiture Rule is unjust and unreasonable because it fails to test for financial leverage and is so broad that it captures competitive market conduct. There is no such thing as a properly defined automatic forfeiture rule; any forfeiture rule should only relinquish profits from conduct that, if combined with sufficient credible evidence of intent, would constitute a potential violation. As described below, a market participant can only increase the value of its FTRs using virtual transactions if its FTR portfolio on a given constraint is larger than its virtual portfolio. Furthermore, in addition to financial leverage, it is critical that a market participant acted with scienter, that is, the participant intended to lose money on its virtual portfolio in order to increase the value of its FTR portfolio.

If the Commission properly finds that the current implementation of the FTR Forfeiture Rule is unjust and unreasonable, the Commission must then determine the just and reasonable rate, rule, or practice that should apply. If the Commission decides that the FTR Forfeiture Rule should

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[51] *PJM Interconnection, L.L.C.*, Motion to Lodge and Supplemental Comments of Exelon Corporation and NextEra Energy and Marketing, LLC, Docket Nos. EL14-37-001 and ER17-1433-000 (filed July 1, 2019).

[52] 16 U.S.C. § 824e(a).

[53] *Id.*

be abandoned altogether, the Commission should direct PJM to replace the rule with a structured market monitoring regime similar to the approach used in MISO. If the Commission decides that a forfeiture rule should remain in place, it is imperative that PJM be directed to rectify the rule's critical flaws described below so that it is just and reasonable.

A. Defect 1: The FTR Forfeiture Rule Fails to Test Whether a Market Participant has Financial Leverage and Cannot Detect Intent

In 2000, PJM implemented the FTR Forfeiture Rule to address concerns regarding potential market abuse that could arise from a leveraged portfolio.[54] In order to increase the value of FTRs using virtual transactions, financial leverage must exist in the form of a "leveraged portfolio," which occurs when a market participant's FTR portfolio on a given constraint is larger than its virtual portfolio.

During the January 7, 2015 Technical Conference, the IMM testified that:

> The goal of the FTR Forfeiture Rule . . . was and is to prevent manipulation of the market by market participants, taking frequently, losing, and relatively small virtual positions in order to make larger FTR positions profitable or more profitable.[55]

In fact, PJM's examples clearly demonstrate how financial leverage plays a key role in the manipulation of FTR profits.[56] The Commission agreed that financial leverage plays a part in the determination of manipulation.[57] The Commission must now affirmatively include financial leverage as a condition to the application of the FTR Forfeiture Rule. XO Energy notes that outside

[54] *See PJM Interconnection, L.L.C.*, Transmittal Letter, Docket ER01-773-000 (Dec. 22, 2000).

[55] Technical Conference Transcript at 13: 6-11.

[56] PJM's Technical Conference Presentation at 4-5.

[57] January 19, 2017 Order at P 80.

positions (i.e., positions other than FTR positions benefiting from virtual transactions) have always been outside the scope of the FTR Forfeiture Rule.

Economists have explained that, in the context of virtual transactions and FTRs, leverage is critical to the "successful" manipulation of an FTR position.[58] Leverage can easily be revealed when evaluating FTRs and virtual transactions together as portfolios. Although the current implementation of the FTR Forfeiture Rule evaluates virtual transactions as portfolios, it fails to apply the same principle to FTRs. Therefore, the current implementation is unjust and unreasonable because if fails to check for leverage and the possibility that a position could, in fact, benefit from its virtual activity.

If a market participant seeks to manipulate its FTR profits, it must have an FTR position on a constraint that exceeds its virtual position. If an FTR position is less than or equal to a participant's virtual position, the losses on the virtual position will outweigh the perceived increase in profits on the FTR position. If the FTR position is held in order to hedge physical load or generation, then a leverage test should compare the FTR portfolio on a constraint to the combined virtual and physical positions on a constraint. Without the physical positions, the FTR portfolio would be evaluated against the virtual position only, which may appear to be leveraged when it is not.

With a larger FTR position on a constraint, a participant can attempt to increase the shadow price of the constraint with virtual transactions, understanding that its losses between the real-time and day-ahead markets will be sufficiently leveraged by its FTR position. A forfeiture rule that does not account for leverage results in the erroneous forfeiture of alleged profits and the

[58] *See, e.g.,* Ledgerwood, S. and Pfeifenberger, J., *Using Virtual Bids to Manipulate the Value of Financial Transmission Rights*, Electr. J. 26(9) (2013).

deterrence of convergence-enhancing behavior in the markets. Furthermore, having a leveraged position alone is insufficient to draw any inference of a market participant's bad intent. A forfeiture rule must be coupled with sufficient credible evidence of intent, where uneconomic market activity is key to such an analysis (i.e., the market participant intended to lose money on its virtual portfolio in order to increase the value of its FTR portfolio).

An example of the assessment of punitive forfeitures to XO Energy appears in Table 1 below. On September 30, 2019, XO Energy incurred forfeitures of $53,861 related to its virtual activity on the Monroe-Lallendorf constraint across six hours.[59]

Table 1: Net Position across Monroe-Lallendorf (September 30, 2019)

Date	Hour Ending	Auction Shadow	DA Shadow	RT Shadow	Net FTR Flow	Net Virtual Flow	FTR Profit	Virtual Profit	Total Profit	Actual Forfeiture
9/30/2019	13	$0.00	$8.95	$0.00	7.7	67.5	$69	-$604	-$535	$4,148
9/30/2019	14	$0.00	$14.76	$0.00	7.7	48.9	$114	-$722	-$608	$10,197
9/30/2019	15	$0.00	$19.76	$0.85	7.7	32.7	$152	-$618	-$466	$8,429
9/30/2019	16	$0.00	$35.57	$107.91	7.7	36.0	$274	$2,604	$2,878	$14,111
9/30/2019	17	$0.00	$29.60	$38.70	7.7	50.9	$228	$463	$691	$16,975
9/30/2019	18	$0.00	$55.42	$133.29	7.7	10.5	$427	$818	$1,244	$0
							$1,263	$1,940	$3,203	$53,861

As Mr. Engle explains in his affidavit, XO Energy's virtual portfolio was much larger than its FTR portfolio across this constraint (indicating that leverage did not exist), however, without first testing for leverage, this virtual activity may appear to be "losing" in order to benefit the FTR position (resulting in a net profit across both positions). In contrast, across all hours on September 30, 2019, XO Energy's virtual and FTR positions were independently profitable overall. During the individual hours when XO Energy's virtual positions were losing, a leveraged position did not exist and, therefore, no benefit was received – yet, XO Energy forfeited nearly $23,000 of alleged profits. During the hours in which the virtual positions were profitable, indicating convergence,

[59] *See* Affidavit of Andrew Engle ("Engle Affidavit") at P 76-90, attached as Exhibit A hereto.

XO Energy forfeited an even greater $31,000 of alleged profits. The actual net profit across both FTR and virtual positions for this constraint was $3,203. The resulting forfeiture was not only punitive, it was inconsistent with any intent to manipulate. Instead, the virtual activity across this constraint was not only efficiency-enhancing, it was economically rational.

It is imperative that the FTR Forfeiture Rule be modified to test for financial leverage. As Mr. Engle explains in his affidavit, the MWh volume subject to potential forfeiture should be calculated based on the difference between the (x) FTR flow on a binding constraint, and (y) virtual flow on a binding constraint.[60] If a participant has real-time load or generation, then (y) will include both virtual and physical flow on a binding constraint. This calculation ensures that the actual profits related to virtual activity are correctly quantified. Positions that are not leveraged cannot profit from a constraint related to virtual activity and, therefore, should not be subject to forfeiture.

B. Defect 2: The FTR Forfeiture Rule's Failure to Use a Portfolio Approach is Inconsistent with the Commission's Principles

The January 19, 2017 Order was the product of proceedings dating back to the August 29, 2014 Order regarding the correct treatment of virtual transactions under the FTR Forfeiture Rule. The Commission held that the 75% rule was unjust and unreasonable because it did not quantify the net impact of a participant's entire portfolio of virtual transactions, rather, it singled out individual transactions.[61] Furthermore, the Commission found that:

> [T]he evaluation of virtual transactions on an individual basis as under the current FTR forfeiture rule does not accurately reflect the net impact of a market participant's overall portfolio of virtual transactions on a constraint related to an FTR position.[62]

[60] Engle Affidavit at P 85-90.

[61] January 19, 2017 Order at P 60.

[62] *Id.* at P 57.

While PJM modified the FTR Forfeiture Rule to include all virtual transactions and to evaluate the net impact of a virtual portfolio on a binding constraint in its Compliance Filing, PJM did not apply the same approach in order to measure the net impact (i.e., benefit or harm) on a participant's portfolio of FTRs with respect to a binding constraint. Without applying a portfolio approach to both virtual transactions and FTRs, it is impossible to check for the existence of leverage and the actual profits that result from a constraint.

While the former FTR Candidate Selection Criteria used a series of DFAX thresholds to determine the FTR paths that were subject to forfeiture, it did not provide a mechanism to measure the net impact of a constraint on a participant's portfolio of FTRs. Without the express direction of the Commission, PJM replaced these criteria with the FTR Impact Test. The FTR Impact Test continues to evaluate FTRs as a single transaction and does not properly account for the net impact from a binding constraint. If a change was warranted, PJM should have followed the same principles the Commission ordered with respect to virtual transactions:

> Under the current rule, when individual transactions are evaluated in isolation, the forfeitures are based on a single transaction's contribution to flow across a constraint. This may lead to forfeitures from some participants who have offsetting positions elsewhere and thus whose virtual transactions did not actually impact the constraint. Likewise, the rule may fail to invoke forfeiture on some participants who do not impact the constraint with a single transaction but have additive positions elsewhere that, on net, do impact the constraint significantly. Thus, PJM's current methodology, which considers each virtual transaction in isolation, does not properly require forfeitures from those participants whose virtual transactions impact their related FTR positions.[63]

These principles can easily be extended to a participant's FTR portfolio in which a single FTR path alone does not adequately account for a participant's net position relative to a binding constraint, as Mr. Engle explains in his affidavit. If the net FTR position across a constraint is not quantified, then any calculations of profits related to that constraint are incorrect. It is unjust and

[63] *Id.* at P 58.

unreasonable to forfeit alleged profits from one or more paths when the net impact to a participant's entire FTR portfolio results in a loss. This punitive scenario occurs when a participant's FTR portfolio is in the opposite direction of its virtual portfolio, indicating that the virtual portfolio could not be used to benefit its FTR positions.

Mr. Engle provides an example of this punitive scenario in his affidavit: in October 2019, XO Energy incurred forfeitures related to the Roxana-Praxair joint flowgate between PJM and MISO. As shown in Table 2, XO Energy determined that its off-peak and on-peak FTR position on this constraint was a net counterflow of 1.3 MW and 0.43 MW, respectively. Throughout October 2019, XO Energy incurred significant forfeitures of over $100,000 from this single constraint during 108 hours in which its FTR portfolio and virtual portfolio were in opposing directions. XO Energy's virtual portfolio was a net prevailing flow of approximately 10 MW across the same hours. As Mr. Engle calculated and explains, XO Energy's FTR portfolio resulted in a net loss of $50,006 from this constraint during these same 108 hours, yet the current rule triggered a forfeiture of $100,104.[64]

Table 2: XO Energy Forfeitures from Roxana-Praxair when FTR and Virtual Portfolios are in opposite directions (October 2019)

Peak Type	FTR Direction	Virtual Direction	FTR Net Position (MW)	Virtual Net Position (MW)	Hours	Constraint Profit	Forfeiture
Off	CounterFlow	PrevalingFlow	-1.30	10.7	81	-$44,189	$87,081
On	CounterFlow	PrevalingFlow	-0.43	10.0	27	-$5,818	$13,023
					108	-$50,006	$100,104

In concept, the rule should only capture profits from the FTR portfolio related to a constraint.[65] In the example set forth above and explained by Mr. Engle, XO Energy incurred a net loss from the Roxana-Praxair constraint, however, the FTR Forfeiture Rule nevertheless calculated a profit to

[64] Engle Affidavit at P 50.

[65] The CAISO CRR Settlement Rule correctly applies this concept.

be forfeited. This outcome is unjust and unreasonable, demonstrating that the current implementation of the FTR Forfeiture Rule cannot stand. The Commission stated that a participant's virtual portfolio must be in the same direction as its FTR position in order to result in a net benefit.[66] A net loss across a portfolio which includes counterflow FTRs cannot meet the Commission's net benefits test, as set forth in the January 19, 2017 Order. It is essential to evaluate both FTRs and virtual transactions as portfolios in order to accurately capture the positions that will benefit from virtual activity.

Table 3, prepared by Mr. Engle and described in his affidavit, summarizes 242 hours of specific examples where forfeitures were incorrectly assessed in October 2019 related to the Roxana-Praxair constraint.[67]

Table 3: Examples of Incorrectly Assessed Forfeitures from Roxana-Praxair (Oct. 2019)

Example	Description	Hours	Total Forfeiture	Constraint Profit
1	Total Forfeitures	242	$142,466	-$88,736
2	Virtual and FTR Portfolios in Different Directions	108	$100,104	-$50,006
3	Convergence (Virtual Acitivity Profitable)	121	$27,978	-$44,197
4	Virtual Flow < 10% of Physical Line Limit	171	$82,109	-$60,720
5	Financial Leverage Not Present	232	$139,986	-$85,180

C. Defect 3: The FTR Impact Test is Inherently Flawed

By implementing the FTR Impact Test at a $0.01 threshold, PJM and the IMM have misinterpreted the Commission's first criterion regarding the trigger of a forfeiture, namely, that "the net flow must be in the direction to increase the value of an FTR …"[68] PJM and the IMM

[66] January 19, 2017 Order at P 60.

[67] See Engle Affidavit at P 42 for the supporting analysis and descriptions of each of these examples. These examples should be evaluated in isolation (e.g., it is possible for a portfolio to be in different directions and also have a flow of less than 10%, but these examples were evaluated separately and not in combination with each other).

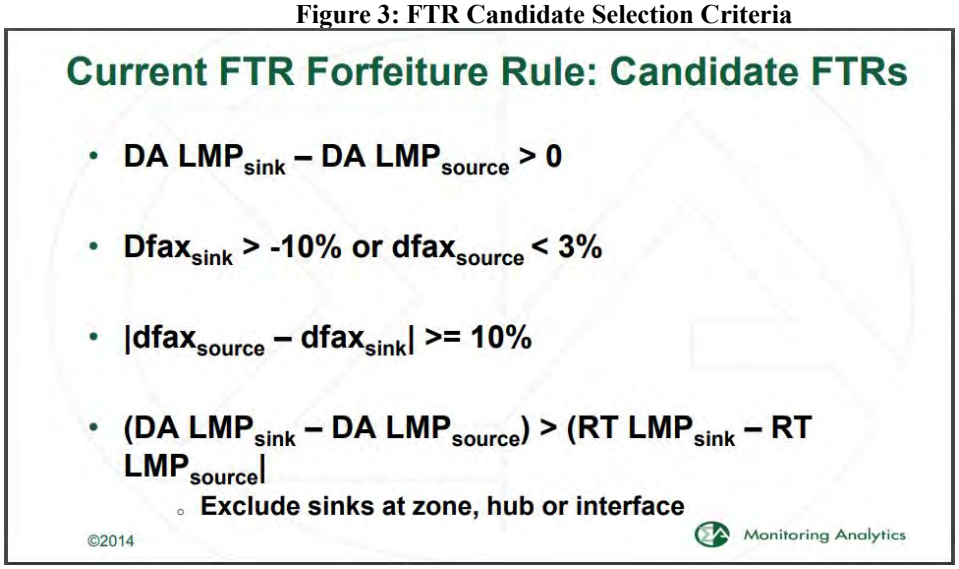
[68] *Id.*

have interpreted this to mean an increase in value of an FTR of $0.01 or more and not simply that a (i) prevailing flow virtual position must sync with a prevailing flow FTR position, and (ii) counterflow virtual position must sync with a counterflow FTR position. This misinterpretation has led to the replacement of the FTR Candidate Selection Criteria with the FTR Impact Test, resulting in a significant increase in the FTR paths that are subject to forfeiture. The Commission has had no basis upon which to determine whether the long-standing FTR Candidate Selection Criteria was appropriate because it had never been included in the Tariff.

1. Former Candidate Selection Criteria

The former FTR Candidate Selection Criteria was based on a series of DFAX thresholds that were intended to filter out coincidental impacts or *de minimis* benefits to FTR paths from a triggered binding constraint. The IMM presented these thresholds to PJM stakeholders on February 18, 2014:[69]

Figure 3: FTR Candidate Selection Criteria



As demonstrated in Figure 3, the first part of the test was designed to capture positive FTR target allocations subject to forfeiture. The second part of the test excluded paths upon which the

[69] 2014 IMM FTR Education at 17.

sink DFAX was greater than -10% and the source DFAX was less than 3%, in order to capture FTR paths that PJM perceived were significantly benefiting from a constraint by sourcing an FTR from the unconstrained side (3% or greater) or sinking at the constrained side (-10% or less). The third part of the test served to confirm that the FTR path DFAX spread between the source and sink was greater than 10%. Finally, the FTR path convergence test captured FTR paths upon which the day-ahead spread diverged from the real-time spread.[70] If all the threshold checks were met, the FTR path forfeited the entire profit of the FTR. The four-part test ensured that only what PJM perceived to be significant impacts or benefits from the constraint were captured.

2. Revision of Screening Criteria into $0.01 Test

Despite the assertions from PJM and the IMM to the contrary, a complete overhaul of the FTR Candidate Selection Criteria was not directed by the Commission, however, the adoption of the FTR Impact Test effectively rendered the FTR Candidate Selection Criteria moot. As presented by the IMM and PJM, the new FTR Impact Test redefines the candidate selection process at an extremely low tolerance threshold. The selection of candidate FTRs is now limited to a convergence test and the FTR Impact Test (see Figure 4). The FTR Impact Test is defined as *(dfax*Shadow Price) FTR Sink – (dfax*Shadow Price) FTR Source >= $0.01* with respect to the constraint triggered in the Virtual Portfolio Test.[71] As the IMM described, this test is used to determine if the virtual activity helps the value of the FTR path by $0.01 or more.[72]

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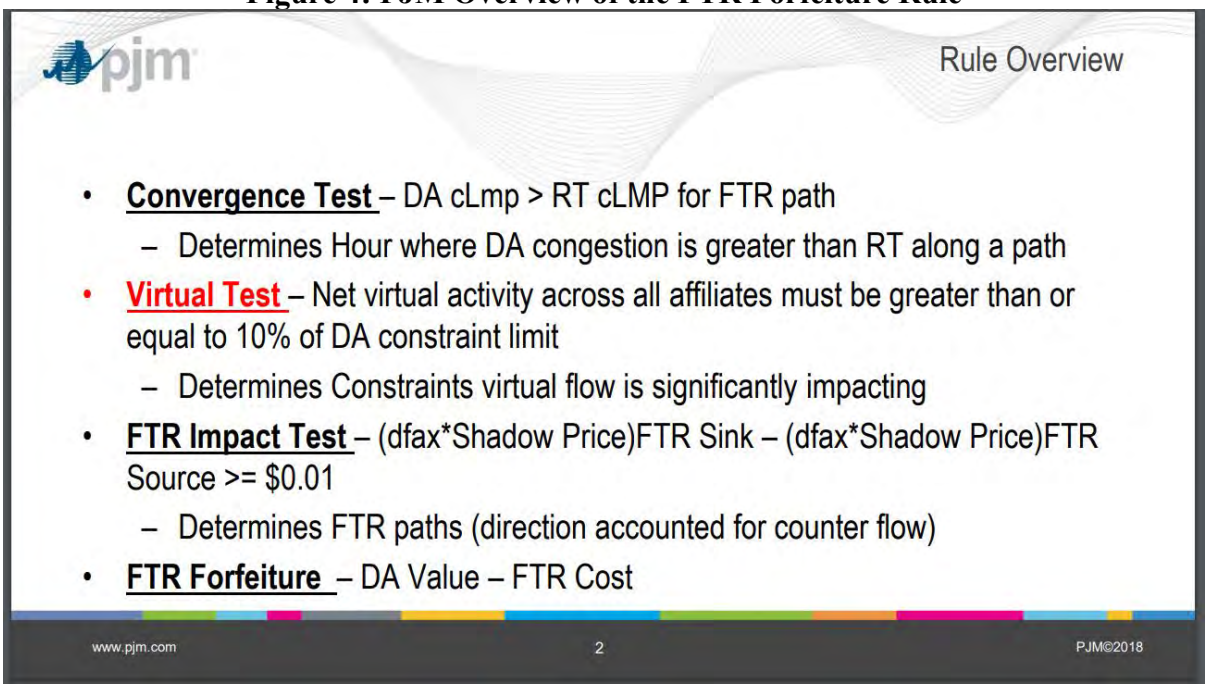
[70] These tests were previously designed to capture prevailing flow impacts only. In order to comply with the Commission's directive, counterflow impacts could easily have been captured by reversing the signs on these tests.

[71] May 2018 FTR Presentation at 2.

[72] Monitoring Analytics, *FTR Forfeiture Rule Education* at 2-3 (April 4, 2018), available at https://pjm.com/-/media/committees-groups/committees/mic/20180404/20180404-item-09-ftr-forfeiture-education.ashx ("April 2018 FTR Presentation").

Figure 4: PJM Overview of the FTR Forfeiture Rule



The series of DFAX thresholds previously used in the FTR Candidate Selection Criteria have been removed and replaced with the FTR Impact Test. The implementation of the FTR Impact Test no longer ensures that clear benefits to FTR paths are captured; rather, it captures any benefit (or increase in value) as small as $0.01 and has lowered the DFAX threshold to 0% in many cases. If each threshold check is true, the participant will forfeit the entire profit of its FTR path.

The new $0.01 threshold is extreme, resulting in the coincidental capture of paths due to the networked nature of the system and not because of a participant's bad behavior. Any reduction in the threshold test degrades the connection between the constraints triggered in the virtual portfolio and those FTR paths that clearly benefit from the constraint. In response to lowering the Virtual Portfolio Test thresholds, PJM warned the Commission that:

> The purpose of the FTR forfeiture rule is to identify instances of Market Participant behavior where the impacts of virtual activity clearly affect that Market Participant's (or its Affiliate's) FTR values and where such activity is not merely coincidental. The 75% threshold is appropriate because virtual activity must significantly affect FTR paths before the rule is triggered. Using a lower threshold would result in FTR forfeitures where such

impacts are merely coincidental given the networked nature of the transmission system.[73] While PJM cautioned the Commission about the reduction of the thresholds used in the virtual transaction test, PJM failed to contemplate the consequences of lowering the thresholds in the FTR Impact Test. As expected, lowering the thresholds results in the coincidental capture of FTR paths due to the networked nature of the transmission system.

While the previous FTR Candidate Selection Criteria took steps to ensure that forfeitures only occurred when there was clear evidence that a path could benefit from a constraint, it failed to evaluate the net direction of a participant's entire portfolio. Despite the IMM's assertions of an improved, logical and algorithmic test, the current FTR Impact Test is still flawed.[74] Although the FTR Impact Test can assess the direction of a single FTR Path, it cannot assess the direction of the entire portfolio. When the direction of the FTR portfolio runs counter to the direction of the virtual portfolio, this leads to incorrect forfeitures.

3. *All Available Data Presented to Stakeholders Demonstrates that the FTR Impact Test is Driving the Substantial Increases in Forfeitures*

Despite several protests from market participants and without the approval of the Commission, PJM provided the following update at the September 21, 2017 Market Settlements Subcommittee ("MSS") meeting:

> PJM has reached agreement with the IMM and has begun performing preliminary analysis dating back to January 19th. Members can request their preliminary values by emailing mss@pjm.com.[75]

As of October 10, 2017, PJM had billed FTR forfeitures for January 2017 and August 2017 in the

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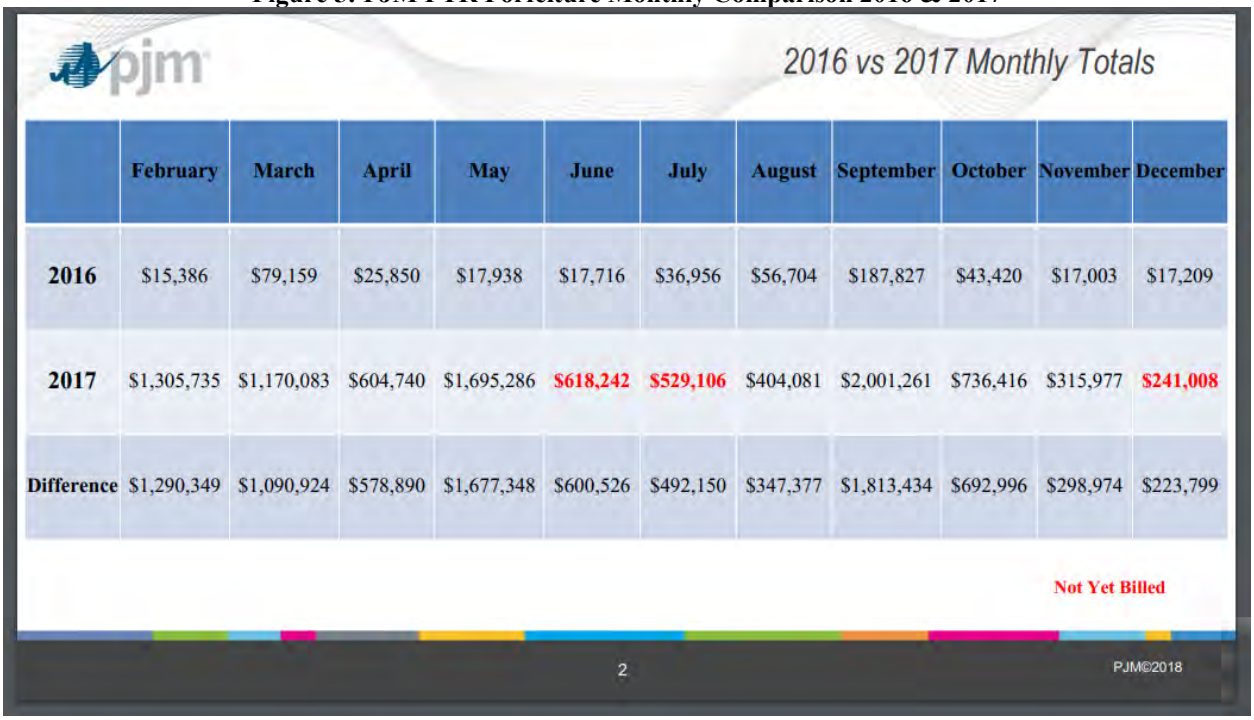
[73] *PJM Interconnection, L.L.C.*, Comments of PJM Interconnection. L.L.C., Docket No. EL14-37-000 at 4 (filed May 29, 2015).

[74] August 2019 IMM Answer at 2; 5.

[75] September 21, 2017 MSS Minutes at 1.

September monthly bill.[76] At the November 16, 2017 MSS meeting, several members requested greater detail on the FTR forfeitures and PJM subsequently presented a table at the January 18, 2018 MSS meeting.[77] Between February 2016 and December 2016, forfeitures totaled $515,168, while between February 2017 and December 2017 (under the new rule), forfeitures totaled $9,621,935 (see Figure 5). This represents over a $9.1 million increase from year to year.[78]

Figure 5: PJM FTR Forfeiture Monthly Comparison 2016 & 2017



	February	March	April	May	June	July	August	September	October	November	December
2016	$15,386	$79,159	$25,850	$17,938	$17,716	$36,956	$56,704	$187,827	$43,420	$17,003	$17,209
2017	$1,305,735	$1,170,083	$604,740	$1,695,286	$618,242	$529,106	$404,081	$2,001,261	$736,416	$315,977	$241,008
Difference	$1,290,349	$1,090,924	$578,890	$1,677,348	$600,526	$492,150	$347,377	$1,813,434	$692,996	$298,974	$223,799

On February 7, 2018, Exelon presented a problem statement that highlighted the effects of the FTR Impact Test and stated:

> PJM responded to FERC and has yet to hear if the revisions are accepted. In the meantime, PJM has begun to claw back revenues from market participants under the new rules. PJM's filing also includes some detail that was not specifically ordered by FERC, like the $.01

[76] *Id.*

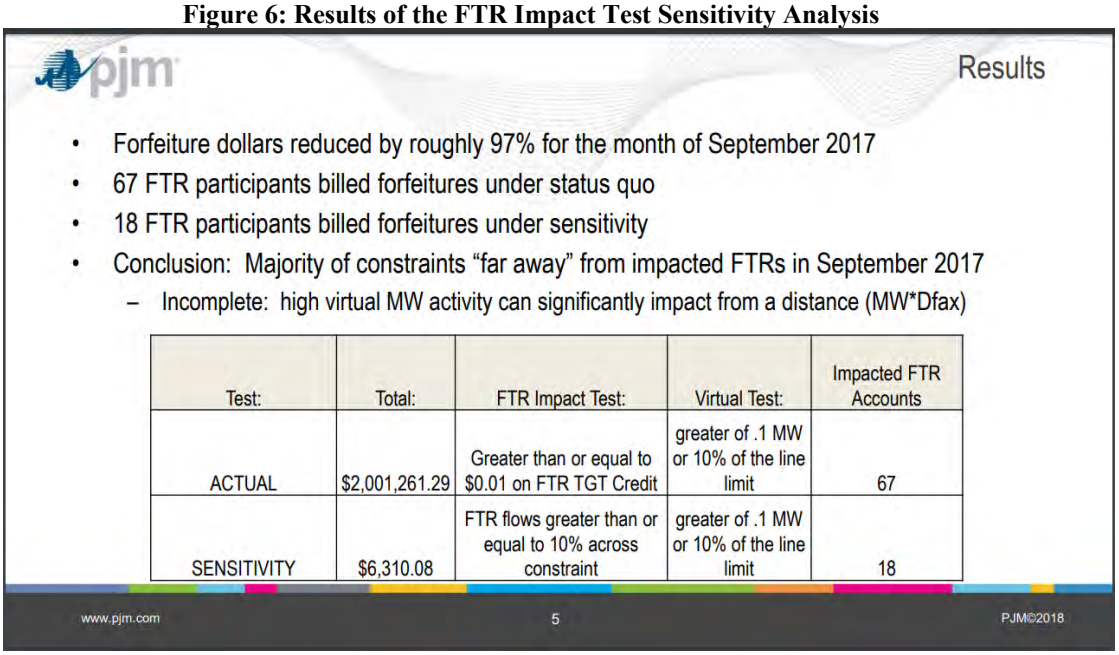
[77] *See* PJM, *FTR Forfeiture Monthly Comparison 2016 & 2017* (Jan. 18, 2018), available at https://www.pjm.com/-/media/committees-groups/subcommittees/mss/20180118/20180118-item-01b-ftr-forfeiture-monthly-totals-comparison-2016-2017.ashx.

[78] *Id.*

> FTR Impact Test which may restrict legitimate activity to manage load serving entities' portfolios. . . The sponsors of this problem statement contend that the FTR Forfeiture Rule is overly restrictive and has created barriers for load serving entities to manage their portfolios.[79]
>
> At the March 7, 2018 meeting, the MIC approved the problem statement and issue charge.[80]

As part of the issue charge, PJM agreed to perform a sensitivity analysis on the FTR Impact Test. On June 6, 2018, PJM presented its findings (see Figure 6), which included the performance of a sensitivity analysis to adjust the FTR impact trigger from (i) greater than or equal to $0.01, to (ii) greater than or equal to net 10% DFAX for September 2017:[81]

Figure 6: Results of the FTR Impact Test Sensitivity Analysis



As highlighted in Figure 6, the results of the FTR impact sensitivity analysis demonstrated a

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[79] *See* Exelon Problem Statement, *supra* n. 13.

[80] PJM, *Minutes of the Market Implementation Committee* at 1 (March 7, 2018, approved April 4, 2018), available at https://www.pjm.com/-/media/committees-groups/committees/mic/20180307/20180307-minutes.ashx.

[81] PJM, *FTR Forfeitures* at 5 (June 6, 2018), available at https://www.pjm.com/-/media/committees-groups/committees/mic/20180606/20180606-item-11b1-ftr-forfeiture-analysis.ashx.

reduction in forfeitures of over $2 million with only 18 participants impacted. PJM concluded that the majority of the constraints triggered in the Virtual Portfolio Test were "far away" or electrically distant from the FTR paths that were forfeited under the FTR Impact Test.[82] Furthermore, at the April 25, 2019 MRC meeting, a second sensitivity analysis was presented by Exelon and NextEra, which demonstrated the effect of lowering the net 10% distribution factor to 5%.[83] This sensitivity analysis indicated a minimal increase in forfeitures and resulted in $9,727 of forfeitures for September 2017.[84]

4. Analysis of the FTR Impact Test and its Effects on Market Participants

Analysis by both XO Energy and other market participants, including Exelon and NextEra, demonstrate that forfeitures have significantly increased since PJM's implementation of the FTR Impact Test. On June 6, 2018, Exelon provided to the PJM MIC examples of specific hours when it incurred substantial forfeitures related to the FTR Impact Test.[85] In particular, during one hour on September 21, 2017, Exelon forfeited in excess of $47,000 across 18 FTR paths that were triggered under the FTR Impact Test due to the *Roxana-Praxair* constraint.[86]

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[82] *Id.*

[83] Nextera Energy Resources; Exelon, *FTR Forfeiture Rule Background* at 7 (April 25, 2019), available at https://pjm.com/-/media/committees-groups/committees/mrc/20190425/20190425-item-03a-ftr-forfeiture-rule-exelon-next-era-veco-presentation.ashx.

[84] *Id.*

[85] *See* Nextera Energy Resources; Exelon, *FTR Forfeiture Rule Education* at 7 (June 6, 2018) ("June 2018 Exelon Presentation"), available at https://www.pjm.com/-/media/committees-groups/committees/mic/20180606/20180606-item-11a-exelon-and-nextera-ftr-forfeiture-rule-education.ashx.

[86] *Id.* at 2.

Table 4: Exelon Forfeitures on September 21, 2017 HE20 related to virtual activity on the Roxana-Praxair constraint

Source	Sink	DFAX	Shadowprice	FTR Impact Test	DA MCC	RT MCC	FTR MW	FTR TA	FTR Cost	Forfeiture
4 QUAD C18 KV QC-1	N ILLINOIS HUB	-0.0063	$26.54	-$0.17	$19.44	$7.07	584.2	$11,357	$1,084	$10,273
4 QUAD C18 KV QC-2	N ILLINOIS HUB	-0.0063	$26.54	-$0.17	$19.44	$7.07	532.3	$10,348	$985	$9,363
20 BRAID24 KV BR-2	N ILLINOIS HUB	-0.0044	$26.54	-$0.12	$5.32	-$0.54	1126.9	$5,994	$803	$5,191
6 BYRON 25 KV BY-1	N ILLINOIS HUB	-0.0041	$26.54	-$0.11	$4.92	$3.74	932.9	$4,589	$1,107	$3,483
6 BYRON 25 KV BY-2	N ILLINOIS HUB	-0.0041	$26.54	-$0.11	$4.92	$3.74	864.7	$4,254	$1,024	$3,230
1 LASALL24 KV LA-2	N ILLINOIS HUB	-0.0041	$26.54	-$0.11	$4.00	-$0.64	826.6	$3,306	$467	$2,839
1 LASALL24 KV LA-1	N ILLINOIS HUB	-0.0041	$26.54	-$0.11	$4.00	-$0.64	804.9	$3,219	$475	$2,744
4 QUAD C18 KV QC-1	COMED_RESID_AGG	-0.0067	$26.54	-$0.18	$19.46	$6.96	128.7	$2,504	$392	$2,113
4 QUAD C18 KV QC-2	COMED_RESID_AGG	-0.0067	$26.54	-$0.18	$19.46	$6.96	128.7	$2,504	$392	$2,113
20 BRAID24 KV BR-1	N ILLINOIS HUB	-0.0044	$26.54	-$0.12	$1.98	-$0.53	1207.7	$2,391	$821	$1,569
12 DRESD18 KV DR-2	N ILLINOIS HUB	-0.0034	$26.54	-$0.09	$1.56	-$0.83	839.4	$1,309	$187	$1,122
1 LASALL24 KV LA-2	COMED_RESID_AGG	-0.0045	$26.54	-$0.12	$4.02	-$0.75	225.3	$905	$197	$708
1 LASALL24 KV LA-1	COMED_RESID_AGG	-0.0045	$26.54	-$0.12	$4.02	-$0.75	224.6	$902	$197	$706
6 BYRON 25 KV BY-1	COMED_RESID_AGG	-0.0045	$26.54	-$0.12	$4.94	$3.63	231.3	$1,142	$443	$699
6 BYRON 25 KV BY-2	COMED_RESID_AGG	-0.0045	$26.54	-$0.12	$4.94	$3.63	225.7	$1,114	$432	$682
AEP-DAYTON HUB	AEP	-0.0005	$26.54	-$0.01	$0.77	$0.16	803.0	$617	$70	$547
12 DRESD18 KV DR-3	N ILLINOIS HUB	-0.0045	$26.54	-$0.12	$0.39	-$0.94	734.1	$286	$250	$36
WESTERN HUB	N ILLINOIS HUB	-0.0285	$26.54	-$0.76	-$2.25	-$5.44	1.9	-$4	-$5	$1
						TOTAL	10422.9	$56,737	$9,320	$47,417

Using publicly-available, market participant-cleared FTR positions data and a DFAX isolation for the *Roxana-Praxair* constraint, XO Energy further analyzed the forfeitures incurred by Exelon.[87] The results of XO Energy's analysis are set forth in Table 4 and explained in Mr. Engle's affidavit. The data in Table 4 demonstrates that almost all of the paths forfeited for hour ending ("HE") 20 had DFAX values of less than 1% and *de minimis* impact from the *Roxana-Praxair* constraint. The FTR Impact Test resulted in the forfeiture of all profits; this implies that the *Roxana-Praxair* constraint was responsible for the entire increase in FTR value. As explained in Mr. Engle's affidavit, a review of both the paths forfeited and the day-ahead binding constraints demonstrates that this was not the case.[88] As shown in the table above, each of the paths had a DFAX below 3% (and most below 1%), which means that they are "far away" or electrically distant, as PJM

[87] A DFAX isolation occurs when a single constraint binds in real-time thus allowing for the DFAX to be calculated using the posted congestion component and shadow price. The isolation for this example was taken from September 11, 2017 at 6:00 AM.

[88] Engle Affidavit at P 12-16.

described. Nevertheless, the FTR Impact Test removed all of the profits from this FTR and the hedge that it provided against congestion. Although each path had a weak connection to the constraint identified in the Virtual Portfolio Test, all of these paths were captured by the FTR Impact Test. This is precisely the issue Exelon addressed in its problem statement, fully supported by the data in Table 4.[89]

D. Defect 4: Total Day-Ahead MCC and Total FTR Cost are No Longer Just and Reasonable Grounds for Forfeitures

Historically, the FTR Forfeiture Rule calculation was based upon the difference between the total day-ahead MCC and the total FTR cost. As Mr. Engle explains, in 2000, when the original FTR Forfeiture Rule was implemented, the data necessary to precisely calculate a constraint's contribution to an FTR's profitability was not available.[90] In order to compensate for the utilization of the total day-ahead MCC and the total FTR cost, DFAX thresholds were selected such that only clearly-benefiting FTR paths were subject to forfeiture. At the time, higher DFAX paths from a constraint might have arguably contributed to higher profitability to an FTR path, thus justifying the forfeiture of the entire profit of an FTR path.

Today, PJM can quantify the impact of a constraint on the day-ahead MCC and FTR target allocations with precision, as evidenced by its use of a $0.01 threshold in the FTR Impact Test. Similarly, a constraint's contribution to the FTR auction prices (i.e., cost or credit) can also be quantified using auction shadow prices and DFAX. PJM does not quantify either of these. PJM's failure to perform such quantification is unjust and unreasonable, subjecting market participants to forfeitures based upon the total day-ahead MCC and total FTR costs when new data can establish the profit or loss derived from a constraint with precision. Furthermore, it is unjust and

[89] *Id.* at P 97-98.

[90] *Id.* at P 8-10.

unreasonable to subject participants to the forfeiture of profits based upon the total day-ahead MCC and total FTR costs when the threshold has been significantly lowered to a $0.01 in lieu of the historical use of DFAX thresholds (i.e., 10%).

While the current implementation of the FTR Forfeiture Rule uses the FTR Impact Test to quantify the dollar impact from a constraint, PJM simply uses this test to determine the direction of an FTR path. For example, if the product of the FTR path DFAX and the day-ahead constraint shadow price is positive (i.e., >= $0.01), the FTR is prevailing flow. If the product of the FTR path DFAX and the day-ahead constraint shadow price is negative (i.e. <= $-0.01), the FTR is counterflow. PJM has chosen to ignore the actual profits associated with a constraint and, in so doing, has continued to subject participants to an unjust volume of forfeitures based upon the unreasonably low $0.01 threshold. Ironically, this $0.01 threshold is driven by the precise dollar impact from a constraint.

The following example, prepared by Mr. Engle and explained in his affidavit, compares the forfeitures that XO Energy incurred on February 11, 2018 (HE 20) under the current forfeiture calculation (i.e., based upon the total day-ahead MCC and the total FTR cost) with the constraint-specific auction and day-ahead congestion values.[91] Table 5 shows the shadow prices for *LAKVEW 138 KV LAK-GRE1* constraint in the respective markets.

Table 5: Constraint Shadow Prices for February 11, 2018 HE 20

Hour Ending	Constraint	Auction Shadow	DA Shadow	RT Shadow	Virtual Portfolio Direction
20	LAKVEW 138 KV LAK-GRE1	$36.90	$11.04	$0.00	Prevailing

Table 6 illustrates the calculation of forfeitures using the total day-ahead MCC and the total FTR cost and results in a forfeiture of $360.

[91] Constraint-specific calculations use the constraint day-ahead and FTR auction shadowprice coupled with DFAX to calculate the precise dollar impact from each constraint. The total day-ahead MCC and the total FTR cost are the summation of all constraint impacts. *Id.* at P 32-36.

Table 6: XO Energy Forfeitures Based on the Total Day-Ahead MCC and Total FTR Cost

#	Source	Sink	Cleared MW	FTR Cost Total	DA MCC Total	RT MCC Total	DFAX	FTR Impact Test	Forfeit	Profit Total	Forfeiture Total
1	WESTERN HUB	AEP-DAYTON HUB	50	-$6.17	-$0.30	$0.00	-0.023	-$0.25	0	$293	$0
2	JUNIATA	CONEMAUGH	50	-$5.63	$1.57	$0.00	0.002	$0.02	1	$360	$360
3	BEDINGTON	BLACKOAK	20	-$5.95	-$0.41	$0.00	0.001	$0.01	0	$111	$0
4	MEADOWBROOK	GREENLAND GAP	20	-$3.62	-$0.17	$0.00	0.000	$0.00	0	$69	$0
									Total	**$833**	**$360**

Table 7 illustrates the calculation of forfeitures using the constraint-specific day-ahead MCC and the constraint-specific FTR cost. Applying the same logic using the constraint-specific prices now results in no forfeiture.

Table 7: XO Energy Forfeitures Based on Constraint-Specific Day-Ahead MCC and Constraint-Specific FTR Cost

#	Source	Sink	Cleared MW	FTR Cost Constraint	DA MCC Constraint	RT MCC Constraint	DFAX	FTR Impact Test	Forfeit	Profit Constraint	Forfeiture Constraint
1	WESTERN HUB	AEP-DAYTON HUB	50	-$0.84	-$0.25	$0.00	-0.023	-$0.25	0	$30	$0
2	JUNIATA	CONEMAUGH	50	$0.07	$0.02	$0.00	0.002	$0.02	0	-$2	$0
3	BEDINGTON	BLACKOAK	20	$0.04	$0.01	$0.00	0.001	$0.01	0	-$1	$0
4	MEADOWBROOK	GREENLAND GAP	20	$0.01	$0.00	$0.00	0.000	$0.00	0	$0	$0
									Total	**$27**	**$0**

The constraint-specific calculation provides the underlying detail to accurately assess an FTR path and overall profitability of the FTR portfolio from the constraint in question. In this example, the flaws in the current approach of assessing forfeitures based on the total day-ahead MCC and total FTR cost quickly become evident. For example, Path 2 (*Juniata – Conemaugh*) which was originally assumed to be profitable as a result of this constraint actually resulted in a loss when evaluated using the constraint-specific values. The FTR Impact Test signaled that Path 2 was increasing the value of the FTR (DA Shadow * DFAX = $0.02), however, when compared to the FTR cost to acquire the FTR (Auction Shadow * DFAX = $0.07), the overall profitability is revealed and results in a loss of $2. While XO Energy's FTR portfolio earned profits of $833 in the aggregate, the profits derived from the constraint in question are a small fraction of the total (i.e., $27). In summary, the use of total day-ahead MCC and FTR costs masks the underlying contributions from constraints and results in a punitive overestimation and incorrect calculation of

profits related to the constraint triggered in the Virtual Portfolio Test.

E. Defect 5: The FTR Forfeiture Rule's Counterflow FTR Implementation Violates the PJM Compliance Filing and is Significantly Flawed

1. PJM's Implementation of Counterflow Forfeitures Violates Its Own Compliance Filing

As XO Energy argued in its May 2017 Protest, the description of counterflow FTRs in PJM's Compliance Filing is opaque due to PJM's retention of historical language that described the eligibility of a prevailing flow FTR to retain positive Transmission Congestion Credits.[92] Transmission Congestion Credits are further described as "a proportional share of the Day-ahead Energy Market Transmission Congestion Charges collected for each constrained hour." [93] By definition, a counterflow FTR does not receive a positive Transmission Congestion Credit, rather it receives a premium in the auction and assumes the obligation of the negative Transmission Congestion Credit from the day-ahead market. The use of the terms "receipt" and "eligibility to receive" a positive Transmission Congestion Credit ignores the existence of counterflow FTRs. Yet, PJM does not ignore counterflow FTRs; instead, PJM calculates the forfeiture based upon auction revenues without modifying the Tariff to permit it to do so. Any forfeiture that contains auction revenues is in violation of section 5.2.1(b). The term "Transmission Congestion Credit" is strictly defined in the Tariff and should not be confused with auction revenues from counterflow FTRs.[94] PJM's current implementation of the FTR Forfeiture Rule does just that: it confuses auction revenues from counterflow FTRs with Transmission Congestion Credits. Furthermore, the language of the Tariff continues to imply that a participant paid a premium in the auction and

[92] May 2017 Protest at 8.

[93] *See* Tariff, Attachment K-Appendix, section 5.2.1(a).

[94] Tariff, Definitions T-U-V at 2.

does not account for revenues or premiums received in the auction.

Regardless of whether or not PJM intended to include counterflow FTRs in the forfeiture calculation, PJM has failed to adequately describe the counterflow FTR eligibility provisions in order to retain the revenues received from an FTR auction. Regrettably, PJM has subjected these auction revenues to forfeiture in the same manner as Transmission Congestion Credits. As evidenced in Table 8 below, XO Energy has forfeited $761,342 of its auction revenues related to its counterflow FTR paths. Furthermore, the majority of the auction revenue forfeitures were incurred using the questionable logic described in the following section (i.e., where the direction of the total auction value is not consistent with the direction of the Virtual Portfolio Test and FTR Impact Test).

2. The Inclusion of Counterflow FTRs in the Forfeiture Calculation Led to Directionally Inconsistent Logic

In the January 19, 2017 Order, the Commission directed PJM to make changes to the FTR Forfeiture Rule such that all FTRs, including counterflow FTRs, would be subject to forfeiture.[95] In response to this directive and in addition to the FTR Impact Test, PJM relaxed the positive target allocation check to be an absolute value rather than a positive value.[96] Furthermore, PJM relaxed the requirement that only costs greater than zero were to be included in the forfeiture calculation.[97] The relaxation of these two requirements has resulted in the forfeiture of counterflow FTRs and auction revenues.[98]

[95] January 19, 2017 Order at P 68.

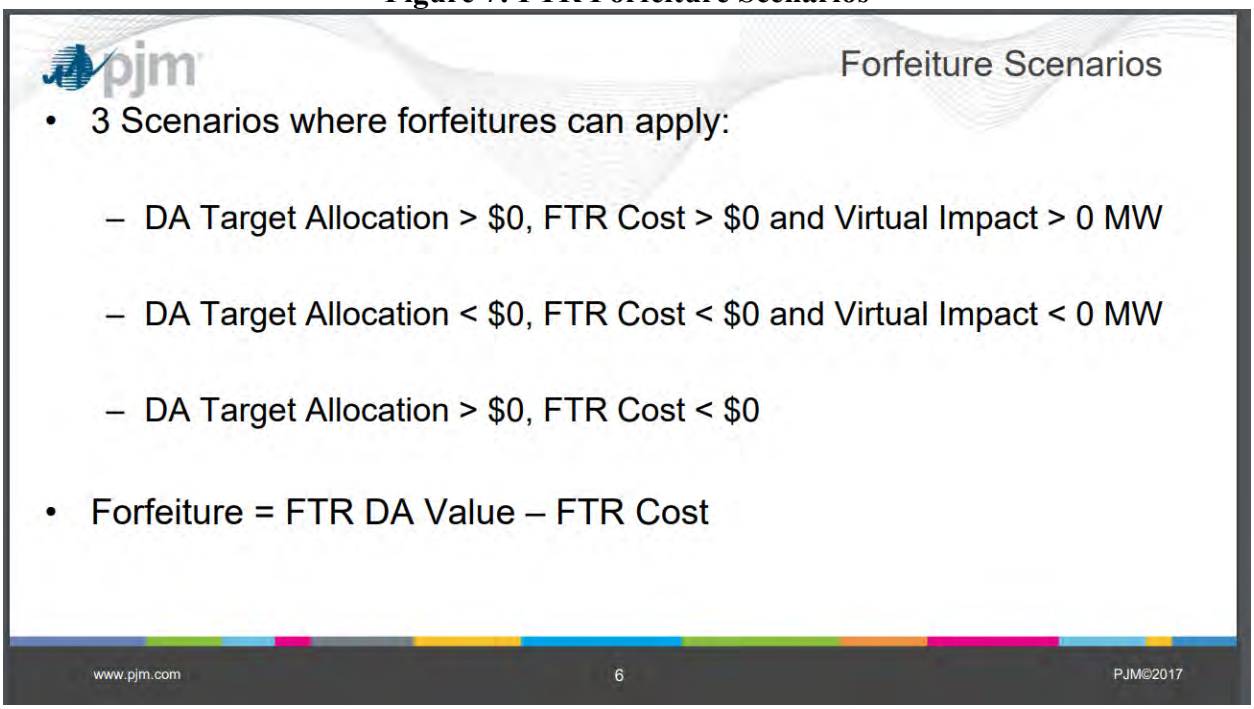
[96] Amended Compliance Filing at 3.

[97] PJM's Technical Conference Presentation at 8.

[98] *Id.*

At the April 12, 2017 MIC meeting, PJM presented "3 Scenarios where forfeitures can apply" (see Figure 7).[99]

Figure 7: FTR Forfeiture Scenarios



The first scenario describes a prevailing flow FTR that receives a positive day-ahead target allocation and paid a premium in the auction (i.e., FTR cost > 0). In this scenario, the Virtual Impact Test identified a prevailing flow virtual position, while the FTR Impact Test signaled that the constraint had a positive impact (i.e., >= $0.01). Exceeding the respective thresholds of each test resulted in the forfeiture of the entire day-ahead target allocation less the FTR cost.

The second scenario describes a counterflow FTR that incurs a liability in the form of a negative day-ahead target allocation and receives a premium in the auction for accepting the risk of a counterflow FTR (i.e., FTR cost < 0). In this scenario, the Virtual Impact Test identified a

[99] PJM, *FTR Forfeiture FERC Order MIC Update* at 6 (April 12, 2017), available at: (http://www.pjm.com/~/media/committees-groups/committees/mic/20170412/20170412-item-17a-ftr-forfeiture-ferc-order-update.ashx).

counterflow virtual position, while the FTR Impact Test indicated that the constraint had a negative impact (i.e., <= $-0.01). As a result, the entire auction revenue in excess of the day-ahead target allocation charge was forfeited.

In the third scenario, multiple illogical outcomes are possible because simply considering the total day-ahead target allocation and the total FTR cost does not adequately capture the FTR relative to the constraints identified in the Virtual Impact Test. PJM has left out the Virtual Impact Test result in the third scenario because both a prevailing flow and counterflow impact can trigger the third scenario. This leads to questionable outcomes because the directions are inconsistent.

For example, if a constraint had a positive or prevailing flow impact on the day-ahead target allocation, it is reasonable to assume that the same constraint incurred a cost (and not a credit) in the auction. Instead, not only is the total positive day-ahead target allocation forfeited, but also the entire auction revenue. Similarly, if a constraint had a negative or counterflow impact on the day-ahead target allocation, it is reasonable to assume that the same constraint received a credit (and did not incur a cost) in the auction. Again, as Mr. Engle explains in his affidavit, not only is the total positive day-ahead target allocation forfeited, but also the entire auction revenue. [100]

PJM emphasized that it is rare for a constraint to change from a prevailing flow constraint in the auction to a counterflow constraint in day-ahead, and vice-versa.[101] The third scenario ignores this and operates as if this is common, thus justifying the forfeiture of counterflow auction revenues when the FTR path, relative to the day-ahead constraint, is prevailing flow and the forfeiture of positive day-ahead target allocations when the FTR path, relative to the day-ahead

[100] This result is demonstrated in Table 6 and Table 7. Path 2 (Conemaugh-Juniata) has a negative total FTR cost and a positive total day-ahead MCC (target allocation). Using constraint-specific values, the same path has a positive FTR cost and a positive day-ahead MCC. *See* Engle Affidavit at P 30.

[101] *See* 2012 FTR Stakeholder Report at 8.

constraint, is counterflow. It is rare, if not impossible, for these revenues to be related to the constraint identified in the Virtual Portfolio Test, however, the revenues continue to be forfeited. Given the $0.01 threshold in the FTR Impact Test, these outcomes frequently occur and lead to unjust and unreasonable forfeitures of revenues not related to the triggered constraint, both in the form of auction revenues and positive day-ahead target allocations. In order to remove these inconsistencies, the rule should be changed to calculate forfeitures based upon the constraint-specific contributions.

Table 8 summarizes the forfeitures XO Energy has incurred under each of the 3 scenarios.

Table 8: XO Energy Forfeitures from January 2018 to December 2019 by Scenario

Scenario	Total Forfeiture	Auction Revenue Forfeiture	Target Allocation Forfeiture
1	$2,374,671	$0	$2,374,671
2	$142,205	$142,205	$0
3	$2,057,161	$619,137	$1,438,024
Total	$4,574,036	$761,342	$3,812,694

F. Defect 6: PJM's Application of the Virtual Portfolio Test has Significant Inconsistencies

XO Energy continues to support the use of a virtual portfolio test in the FTR Forfeiture Rule because it correctly captures a participant's net virtual position on a binding constraint. The Commission's directives were clear and prescriptive regarding the use of a virtual portfolio test.[102] In response, PJM restated Section 5.2.1(c) as follows:

> For purposes of Section 5.2.1(b), an Effective FTR Holder's Virtual Transaction portfolio shall be considered if the absolute value of the attributable net flow across a Day-ahead Energy Market binding constraint relative to the Day-ahead Energy Market load weighted reference bus between the Financial Transmission Right delivery and receipt buses exceeds the physical limit of such binding constraint by the greater of 0.1 MW or ten percent, or such other percentage under certain circumstances further defined in the PJM Manuals.[103]

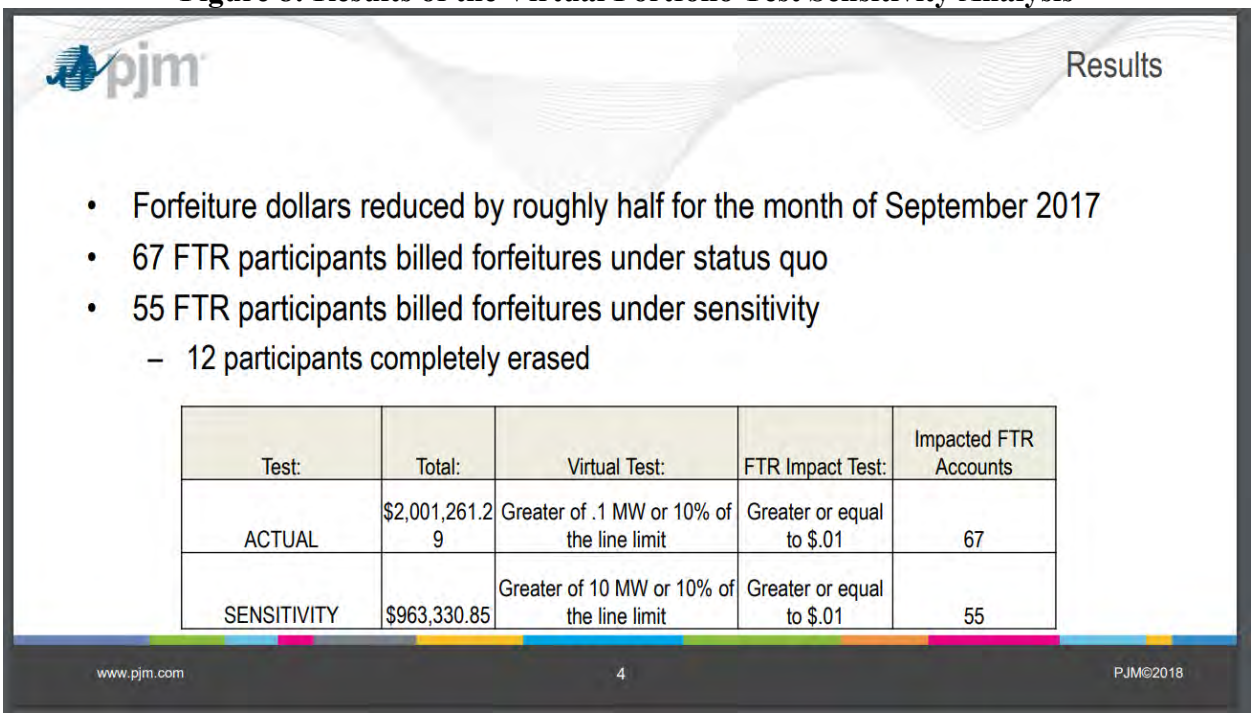
[102] January 19, 2017 Order at P 60, 62.

[103] Amended Compliance Filing at 3.

Following several months of retroactive forfeitures based upon this restatement, Exelon presented a problem statement and subsequently a stakeholder process was launched to evaluate the impacts of PJM changes.[104] During this process, PJM agreed to conduct sensitivity analyses on the Virtual Portfolio Test. The specific sensitivity analysis that PJM ran on the Virtual Portfolio Test was "to adjust Virtual Net Flow trigger from greater of 0.1MW or 10% of DA binding limit to greater of 10MW or 10% of DA binding limit for September 2017."[105]

On May 2, 2018, the results of this test were presented and revealed that over half of the forfeitures incurred in September 2017 were based on MW flow contributions of less than 10 MW (see Figure 8).

Figure 8: Results of the Virtual Portfolio Test Sensitivity Analysis



[104] *See* Exelon Problem Statement, *supra* n. 13.

[105] May 2018 FTR Presentation at 3.

As a result of this sensitivity analysis, PJM discovered an inconsistency in how the "physical" transmission limits for internal constraints and market-to-market ("M2M") constraints are modeled in the day-ahead market. PJM stated they would "shift analysis to look at market-to-market flowgates and DA [firm flow entitlement or] FFE values."[106] In its August 8, 2018 presentation to the MIC, PJM stated that it had discovered a potential inconsistency in the way that M2M flowgates were treated in the FTR Forfeiture Rule compared to an internal constraint.[107] This inconsistency is driven by PJM's use of day-ahead FFEs. The FFE represents the available capacity on a constraint after the flow from the monitoring ISO is removed. The use of FFE implicitly accounts for the flow from the neighboring area and discounts the physical transmission limit. Therefore, the actual physical limit is not used in the FTR Forfeiture Rule, resulting in participants triggering the virtual flow test under unreasonably low MW flow contributions that are substantially lower than 10% of the physical transmission limit. PJM's sensitivity analysis (i.e., significant forfeitures resulted when the MW flow contribution was less than 10MW) confirms this result.

In the example provided by Exelon, Exelon stated that it triggered the FTR Forfeiture Rule by placing a 200 MW Dec bid at the Western Hub and that this represented 10% of the day-ahead FFE resulting in a forfeiture of over $47,000.[108] Relative to the Roxana-Praxair constraint, the Western Hub had a *de minimus* DFAX of -0.003.[109] The 200 MW Dec bid would have resulted in

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[106] *Id*. at 5.

[107] PJM, *FTR Forfeitures* at 2 (August 8, 2018) ("August 2018 PJM Presentation"), available at: https://pjm.com/-/media/committees-groups/committees/mic/20180808/20180808-item-10a-ftr-forfeitures-education.ashx.

[108] *See* June 2018 Exelon Presentation.

[109] The DFAX isolation for Roxana-Praxair was taken from September 11, 2017 at 6:00 AM.

a flow contribution of 0.6 MW, therefore, in order to trigger the 10% threshold, the FFE would have to be 6 MW.[110] The physical limit of the Roxana-Praxair line was 158 MW, indicating that 152 MW was presumed to be flow from MISO. Notably, PJM provided its own hypothetical example of this scenario with very similar characteristics to Exelon's example.[111]

The inconsistency found by PJM is that, while internal constraints use the full physical transmission limit, M2M constraints simply use the residual capability of the physical transmission limit. This results in significant forfeitures related to M2M constraints for virtual activity that does not exceed 10% of the physical limit. In order to remedy this inconsistency, PJM offered its Package A at the September 12, 2018 Market Implementation Committee, excerpted below:[112]

Package A

Under Package A, PJM seeks to modify the existing FTR forfeiture calculation to include loop flow impacts when determining the 10% or greater impact from virtual transaction flow in the DA market on coordinated market-to-market flow gates. Implementing this change will remove the inconsistency between how coordinated market-to-market flow gates are handled by the FTR Forfeiture Rule versus internal constraints. The change will adjust the FTR Forfeiture Rule to account for the total flow across each binding constraint regardless of whether it is coordinated or internal. This change will require updates to Manual 6 only and will be prospective with an estimated implementation date of Q2 2019.

PJM offered further analysis of the forfeitures related to M2M constraints since the "implementation of the January 19, 2017 FERC directive in August 2017" (see Figure 9), stating that:

> Roughly 58% of total forfeitures are related to coordinated market-to-market flow gates. Furthermore, three flow gates account for 32.1% of total forfeitures since the new rules were implemented.[113]

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[110] PJM does not publish the line limits or FFEs that are used in the FTR Forfeiture Rule.

[111] August 2018 PJM Presentation at 9.

[112] *See* PJM, *MIC – FTR Forfeiture Rule Design Changes – Package A* (September 12, 2018), available at https://pjm.com/-/media/committees-groups/committees/mic/20180912/20180912-item-11b-ftr-forfeiture-proposal-summary.ashx.

[113] *Id.*

Figure 9: Historical Loop Flow and Forfeitures on Flowgates (Jan 2017 – Jun 2018)

Market to Market Flowgate Name	Forfeiture Cost Contribution since January 2017	AVG LF Impact
Roxana-Praxair 1 138 kV l/o Wilton Center-Dumont 765 kV	$ 1,794,569.46	142.0
Roxana-Praxair 138 kV l/o Gary Ave-Sheffield 345 kV	$ 1,459,008.39	124.8
Babcock-Stillwell 345 KV l/o Wilton Center-Dumont 765 KV	$ 592,184.11	789.9
Dune Acres- Michigan City 1 138 kv l/o Dumont - Wilton Center 765 KV	$ 341,702.39	167.8
BR Tap-Paradise 161 kV l/o Barkley-Princeton 161 kV	$ 308,476.23	475.5
Michigan City-Trail Creek 138 l/o Michigan City-Bosserman 138	$ 300,216.96	116.8
Stillwell-Dumont 345 l/o Wilton Center-Dumont 765	$ 263,874.90	750.1
Gibson-Petersburg 345 kV l/o Gibson-Bedford 345 kV	$ 253,619.54	230.0
Brokaw-Leroy 138 kV l/o Clinton-Oreana-Goose Creek 345 kV	$ 214,318.14	142.5
State Line-Roxana 138 kV l/o Sheffield 345/138 kV	$ 201,133.96	641.9
Monroe-Lallendorf 345kV l/o Morrocco-AllenJct 345kV	$ 181,207.21	1113.8
Westwood 345/138 BK1 l/o Westwood 345/138 BK2	$ 163,349.60	420.0

At the October 10, 2018 MIC, PJM supplemented its Package A with a sensitivity analysis for four months and the associated reduction in forfeitures given the proposed changes (see Figure 10).[114]

Figure 10: PJM Sensitivity Analysis of Package A

Year	Month	Current Forfeiture	Forfeiture with Proposed Change
2017	May	$1,696,292	$568,631
2017	September	$1,992,267	$845,558
2018	January	$661,947	$334,160
2018	August	$118,959	$112,798

Package A was ultimately combined with Package B and received over 85% support from stakeholders at the MIC.[115] Ultimately, these changes together with the proposed revisions to the FTR Impact Test failed to pass at the April 25, 2018 MRC meeting.[116]

[114] *See* PJM, *MIC – FTR Forfeiture Rule Design Changes – Package A* (Oct. 10, 2018), available at https://www.pjm.com/-/media/committees-groups/committees/mic/20181107/20181107-item-05a-ftr-rorfeiture-proposal-summary.ashx.

[115] November 2018 MIC Minutes at 2.

[116] PJM, *Minutes of the Markets and Reliability Committee* at 2 (April 25, 2019, approved May 30, 2019), available at https://pjm.com/-/media/committees-groups/committees/mrc/20190530/20190530-caa-draft-minutes-mrc-20190425.ashx.

XO Energy supports the use of a virtual portfolio test, however, PJM's Package A proposal is a critical modification to the test. With due diligence, PJM could have revealed the above-described inconsistency long before the FTR forfeitures were initially and retroactively billed. Instead, this issue was overlooked and has resulted in substantial, unnecessary forfeitures related to M2M constraints.

XO Energy has incurred $882,363 in forfeitures related to M2M constraints since January 2018 (see Table 9).

Table 9: XO Energy Forfeitures by Constraint Type for 2018 and 2019

Year	Total	M2M	Internal
2018	$283,181	$86,318	$196,863
2019	$4,290,855	$796,046	$3,494,810
Total	$4,574,036	$882,363	$3,691,672

G. Defect 7: Lack of Data Transparency Prevents a Market Participant from Responding to the Forfeitures

The persistent lack of transparency in the application of the FTR Forfeiture Rule prevents a participant from reasonably responding to the forfeitures that it incurred. By replacing the worst-case bus logic with a virtual portfolio test in order to measure the impact on a constraint, the Commission expected greater transparency. Specifically, the Commission stated that:

> [W]e expect the revised FTR forfeiture rule developed in this proceeding to help address the transparency and consistency concerns expressed by parties such as Vitol. While we will not require PJM to alter its procedures to settle forfeiture in the day after the operating day, we encourage PJM to resolve forfeitures in a reasonably prompt manner.[117]

While the worst-case bus logic was clearly flawed (i.e., the reference bus was selected based upon another participant's activity), the rule continues to lack transparency with respect to

[117] January 19, 2017 Order at P 81.

DFAX and transmission limits. In order to quantify the impact of market participants' activities, the FTR Forfeiture Rule relies heavily upon DFAX, however, the DFAX that are used are never revealed to market participants. Similarly, the transmission limits that are used are never made available to participants. Without these critical data points, participants cannot monitor or respond to the activity that is subject to forfeiture.

As a result of the most recent changes to the FTR Forfeiture Rule, the IMM contends that participants now understand their behavior, leading to a decrease in forfeitures from month-to-month.[118] This viewpoint is in stark contrast with reality: forfeiture results are not reported to market participants until well after the transactional activity occurred, rendering this data useless. In the worst-case scenario, a forfeiture is triggered on the first day of the month and the participant is notified two months later by way of an adjustment to the total FTR credits received. For example, a forfeiture incurred on August 1, 2019 would not be reported until October 5, 2019. It is unreasonable to assume that the same conditions that triggered the forfeiture continue to exist over 65 days after the fact, therefore, any possible reduction in forfeitures is coincidental and not based upon an informed response.

From a timing perspective, neither PJM nor the IMM have attempted to provide forfeiture data to market participants any earlier, or responded favorably to market participants' requests for such information. Once a market participant's bill has been posted by PJM, a more detailed report may be requested from the IMM.[119] Unfortunately, as explained by Mr. Engle, these reports are inadequate to fully understand the causality behind the forfeiture; they simply identify the hour,

[118] Monitoring Analytics, *FTR Forfeiture Rule Discussion* (June 6, 2018), available at https://pjm.com/-/media/committees-groups/committees/mic/20180606/20180606-item-11c-imm-ftr-forfeiture-discussion.ashx.

[119] April 2018 FTR Presentation at 8.

the FTR source and sink, the constraint that triggered the forfeiture, and the total forfeiture. These reports do not include the transmission limit used, the total volume of the virtual portfolio with respect to the transmission limit, or any DFAX for the FTR paths that were forfeited. As Mr. Engle explains in his affidavit, the IMM has repeatedly denied XO Energy's data requests, simply stating that this additional data is confidential.[120]

For comparison, CAISO has a similar rule referred to as the "CRR Settlement Rule." In conjunction with this rule, CAISO provides its market participants with all of the critical information necessary to monitor their own behavior. Specifically, CAISO provides DFAX for each constraint that binds in the day-ahead (IFM) and real-time market (RTED) within three calendar days of the market day. Additionally, CAISO provides the transmission limits for all constraints in the IFM and RTED within three calendar days of the market day.[121]

XO Energy requests that PJM be required to provide all DFAX and transmission limits used in the FTR Forfeiture Rule within three calendar days. This will allow market participants to monitor and react to any forfeitures that would otherwise be incurred.

Data transparency is also critical to facilitating any disputes regarding the accuracy of the calculations performed by the IMM and PJM. By way of example and as explained by Mr. Thompson in his affidavit, in November 2018, XO Energy identified an issue related to the calculation of the hourly FTR cost and emailed the IMM on multiple occasions questioning the forfeiture values set forth in its report.[122] The total forfeiture amount is reported in a manner that

[120] Engle Affidavit at P 114-115.

[121] *See* CAISO Business Practices Manual for Market Instruments at sections 10.2.7 and 10.2.8, *available at* https://bpmcm.caiso.com/BPM%20Document%20Library/Market%20Instruments/BPM_for_Market%20Instruments_V55_clean.doc

[122] *See* Affidavit of Matthew Thompson, attached as Exhibit B hereto ("Thompson Affidavit").

masks the data used in the calculation. The relevant language of the PJM Tariff implies that FTRs are held for 24 hours, however, FTRs can also be held for on-peak and off-peak periods. PJM and the IMM implemented the cost calculation as prescribed by the Tariff without considering the potential for varying time periods of FTRs held.. Therefore, the cost value that was used in the calculation of forfeitures for on-peak and off-peak FTRs was incorrect, as it did not account for whether the FTR was on-peak or off-peak. In March 2019, PJM made a presentation to the MIC on this issue, stating that it had been resolved,[123] however, this resolution was not implemented until the September 2019 billing period.

H. The Commission's Determination of the Applicable Just and Reasonable Rate, Rule or Practice

If the Commission decides that the continued use of the FTR Forfeiture Rule is unjust and unreasonable, the Commission should direct PJM to replace the rule with a structured market monitoring regime similar to that utilized in MISO. If the Commission decides that a forfeiture rule should remain in place, it is imperative that the Commission direct PJM to revise the rule as described in the five steps below so that it is just and reasonable.[124]

[123] *See* PJM FTR Forfeiture Update, MRC Meeting (Mar. 21, 2019), *available at* https://www.pjm.com/-/media/committees-groups/committees/mrc/20190321/20190321-item-07-ftr-forfeiture-presentation.ashx.

[124] These proposed revisions to the FTR Forfeiture Rule are consistent with the rule utilized in CAISO. S*ee* CAISO Business Practice Manual for Congestion Revenue Rights at Attachment I, available at https://bpmcm.caiso.com/BPM%20Document%20Library/Congestion%20Revenue%20Rights/Congestion%20Revenue%20Rights%20BPM%20Version%2024_clean.doc.

Step 1: Calculate the net impact of a market participant's portfolio of INCs, DECs, and UTCs on flows of a binding constraint for each hour.

The first step follows the design of PJM's Virtual Portfolio Test. For each constraint, *c*, that bound in the day-ahead, the rule should calculate the net impact on flow from participant, *p*, that holds a portfolio of INCs, DECs and UTCs using the respective day-ahead shift factors in hour, *h.* The participant's contribution to flow on each day-ahead binding constraint is defined as follows:

$$VirtualFlow_{DA,c,h,p} = \sum_{v \in \{V\}_{h,p}} SF_{DA,c,h,v} * VB_{DA,h,v,p}$$

Where:

$SF_{DA,c,h,v}$ is the day-ahead shift factor of constraint *c* with respect to a virtual award at node *v* during hour *h.*

$\{V\}_{h,p}$ is the set of all nodes which participant, *p*, has virtual awards for hour, *h* and

$VB_{DA,h,v,p}$ is the volume (MW) of virtual awards of the participant at node *v*. Virtual Awards include all cleared INCs, DECs, and UTCs.

All shift factors are with respect to a distributed load reference. A UTC is represented here as a single node, *v,* although the shift factor represents the difference between the sink and source nodes.

Step 2: Determine the hours during which a market participant's portfolio of INCs, DECs and UTCs significantly impacted constraints.

The next step is to compare the net impact of a participant's virtual portfolio ($VirtualFlow_{DA,c,h,p}$) to the physical transmission limit on each constraint in an hour to determine if the participant significantly impacted the flow in a prevailing or counterflow direction. PJM has defined the threshold to determine a significant or appreciable impact, *T,* to be 10% of the

transmission facility limit, L.[125] We propose a prevailing flow check against the day-ahead constraints as follows:

$$VirtualFlow_{DA,c,h,p} > 0 \text{ and } VirtualFlow_{DA,c,h,p} \geq T * L_{DA,c,h}$$

and a counterflow check against day-ahead constraints as follows:

$$VirtualFlow_{DA,c,h,p} < 0 \text{ and } \left|VirtualFlow_{DA,c,h,p}\right| \geq T * L_{DA,c,h}$$

Where:

- T is the threshold percentage
- $L_{DA,c,h}$ is the physical transmission facility limit

Once the constraints and virtual portfolio impacts are identified in Steps 1 and 2, Step 3 determines whether the flow is in the direction to increase the value of an FTR portfolio. These constraints are contained in the sets $\{C\}_{DA,h,p}$.

Step 3: Determine whether the virtual portfolio impacts are in the direction to increase the value of an FTR portfolio.

In order to determine whether the virtual portfolio impacts are in the direction to increase the value of an FTR portfolio, the FTR portfolio for participant, p, must be calculated in the same manner as the virtual portfolios with respect to day-ahead constraints.

Step 3a: Calculate the FTR flow on each day-ahead.

A participant's FTR position on a day-ahead constraint is defined as:

[125] XO Energy support the continued use of this threshold to determine a significant impact, however, XO Energy also support PJM's proposed changes to include loop-flow impacts on Market-to-Market constraints and the associated limits used in day-ahead. *See* PJM, *FTR Forfeiture Rule Design Changes – Package A* (Sept. 12, 2018), available at https://pjm.com/-/media/committees-groups/committees/mic/20180912/20180912-item-11b-ftr-forfeiture-proposal-summary.ashx.

$$FTRFlow_{DA,c,h,p} = \sum_{f \in \{F\}_{h,p}} SF_{DA,c,h,f} * FTR_{h,f,p}$$

Where:

- $SF_{DA,c,h,f}$ is the day-ahead shift factor of constraint c with respect to an FTR path, f, during hour h calculated as $SF_{DA,c,h,sink} - SF_{DA,c,h,source}$
- $\{F\}_{h,p}$ is the set of all FTR paths which participant, p, has for hour, h and
- $FTR_{h,f,p}$ is the volume (MW) of an FTR path, f, that a participant, p, holds for hour h.

Step 3b: Determine whether FTR flow and virtual flow are in the same direction.

Once the FTR flow for each constraint has been calculated, it can be compared to the virtual flow calculated for the constraints that were triggered in Step 2. For each c in $\{C\}_{DA,h,p}$ identified in Step 2, the following checks are applied, and flags set:

i. If $FTRFlow_{DA,c,h,p} > 0$ and $VirtualFlow_{DA,c,h,p} > 0$

then $PrevailingFlow_{DA,c,h,p} = 1$

ii. If $FTRFlow_{DA,c,h,p} < 0$ and $VirtualFlow_{DA,c,h,p} < 0$

then $CounterFlow_{DA,c,h,p} = 1$

Where:

- $PrevailingFlow_{DA,c,h,p}$ is a binary flag indicating both virtual and FTR positions are in the prevailing flow direction
- $CounterFlow_{DA,c,h,p}$ is a binary flag indicating both virtual and FTR positions are in the counter flow direction

Step 3c: Determine if virtual positions are converging DA and RT.

If virtual positions are in the direction to increase the value of an FTR portfolio, a constraint-based convergence check indicates whether this virtual activity was converging DA and RT. The following convergence checks are proposed to ensure that only activity

that diverges DA and RT in the direction to increase the value of FTR positions is subject to forfeiture.

Is $PrevailingFlow_{DA,c,h,p}$ = 1 and $|\Lambda_{DA,c,h}| > |\Lambda_{RT,c,h}|$

Is $CounterFlow_{DA,c,h,p}$ = 1 and $|\Lambda_{DA,c,h}| < |\Lambda_{RT,c,h}|$

Where:

- $\Lambda_{DA,c,h}$ is the day-ahead shadow price for constraint *c* in hour *h*
- $\Lambda_{RT,c,h}$ is the real-time shadow price for constraint *c* in hour *h*

If these checks are true, the constraints and corresponding positions move forward to the next step.

Step 4: Determine whether financial leverage exists and quantify leveraged FTR positions.

A leveraged FTR position exists when the FTR flow on a constraint exceeds the combined virtual and physical flow on a constraint.[126] Therefore, in order to check for the existence of financial leverage, the following checks are applied for prevailing flow leverage ($PrevailingFlow_{DA,c,h,p}$ = 1):

If $FTRFlow_{DA,c,h,p} > VirtualFlow_{DA,c,h,p} + Max(PhysicalFlow_{c,h,p}, 0)$

Then $LeveragedMW_{DA,c,h,p} =$

$$FTRFlow_{DA,c,h,p} - (VirtualFlow_{DA,c,h,p} + Max(PhysicalFlow_{c,h,p}, 0))$$

and the following checks are applied for counterflow leverage ($CounterFlow_{DA,c,h,p}$ = 1):

If $|FTRFlow_{DA,c,h,p}| > |VirtualFlow_{DA,c,h,p} + Min(PhysicalFlow_{c,h,p}, 0)|$

Then $LeveragedMW_{DA,c,h,p} =$

$$|FTRFlow_{DA,c,h,p}| - |VirtualFlow_{DA,c,h,p} + Min(PhysicalFlow_{c,h,p}, 0)|$$

[126] Physical flow will be zero for a financial participant and non-zero for a physical participant.

Where

- $PhysicalFlow_{c,h,p}$ is the day-ahead physical flow across constraint *c* in hour *h* for participant *p.* $PhysicalFlow_{c,h,p}$ includes all generation, load, and bilateral transactions across the related affiliates of participant *p* and represents the corresponding positions the FTR could legitimately hedge.

Step 5: Calculate forfeiture amounts for leveraged FTR positions.

Any leveraged FTR positions identified in Step 4 are subject to forfeiture of the excess profits related to the constraints identified by the preceding steps. Prevailing flow FTR forfeitures are calculated as follows (where $PrevailingFlow_{DA,c,h,p} = 1$):

$$Forfeiture_{DA,c,h,p} = LeveragedMW_{DA,c,h,p} * Max\left(|\Lambda_{DA,c,h}| - |\Lambda_{AUC,c,h,p}|,0\right)$$

Counterflow FTR forfeitures are calculated as follows (where $CounterFlow_{DA,c,h,p} = 1$):

$$Forfeiture_{DA,c,h,p} = LeveragedMW_{DA,c,h,p} * Max\left(|\Lambda_{AUC,c,h,p}| - |\Lambda_{DA,c,h}|,0\right)$$

Where

- $\Lambda_{DA,c,h}$ is the day-ahead shadow price for constraint *c* in hour *h.*
- $\Lambda_{AUC,c,h,p}$ is the Flow-weighted hourly auction shadowprice for constraint *c* in hour *h* across all auctions participant *p* holds an FTR.

Step 6: Examine the profitable activity in order to determine whether there is sufficient evidence of intent.

Steps 1 - 5 address the requirements set forth in the Commission's January 19, 2017 Order and corrects the flaws in the PJM Compliance Filing that lead to unjust and unreasonable outcomes. This approach captures the actual realized profits that occur when a constraint binds in the day-ahead market. A constraint-specific test for convergence ensures that only unprofitable virtual activity coupled with increased flow is subject to further scrutiny. A determination as to whether the virtual portfolio impacts are increasing the value of an FTR portfolio are then made.

Next, checking for financial leverage accurately detects FTR positions that could, in fact, benefit from potentially manipulative behavior.

The final step is to undertake a comprehensive, fact-specific inquiry in order to determine whether there is sufficient evidence of intent. This step cannot be automated and there is no bright-line test that will detect intent. Although Dr. David Patton has discussed his evaluation methods,[127] this can only serve as a guide; PJM and its IMM should be tasked with the development of a fulsome market monitoring function that more carefully scrutinizes participants' behavior prior to administering any forfeitures. If PJM determines that there is sufficient evidence of intent to profit from illegitimate trading activity, the profits calculated in steps 1 – 5 should then be forfeited. If additional action is required, a participant may be referred to the Commission.

If the Commission determines that evidence of intent is not required, it must etsablish a process that accurately quantifies realized profits and does not deter legitimate and economically rational arbitrage or hedging activity. The 5-step process described in this section ensures that outcome.

VI. COMPLAINANT HAS SUFFERED SIGNIFICANT FINANCIAL HARM AS A RESULT OF THE FTR FORFEITURE RULE AND PJM'S IMPLEMENTATION THEREOF

Complainant has suffered significant financial harm as a result of the issues raised in this complaint. Quantification of financial harm from the FTR Forfeiture Rule is difficult to calculate fully; however, Complainant has done so to the best of its abilities, based on the forfeiture amounts reported on its settlement statements. This calculation takes into account only direct forfeitures, and does not consider other impacts, as noted below.

[127] Technical Conference Transcript at 63-65: 7-5.

From January 2018 through December 2019, XO Energy has forfeited nearly $4.6 million under PJM's current implementation of the FTR Forfeiture Rule, as shown in Table 10. Further, throughout the Complaint, XO Energy has quantified the effects of the FTR Forfeiture Rule on its positions.[128] Mr. Engle also provides quantification of XO Energy's financial harm in his affidavit.[129]

Table 10: XO Energy Forfeitures from January 2018 to December 2019 by Month

Month	FTR Auction Cost	DA Target Allocation	Gross FTR Revenue	Forfeiture	Net FTR Profit
201801	$ (129,473)	$ (578,885)	$ (449,412)	$ 15,810	$ (465,222)
201802	$ (798,804)	$ (20,231)	$ 778,573	$ 73,540	$ 705,033
201803	$ (74,832)	$ 83,153	$ 157,985	$ 24,923	$ 133,062
201804	$ 17,039	$ 43,805	$ 26,766	$ 15,536	$ 11,230
201805	$ (24,502)	$ (143,587)	$ (119,085)	$ 1,159	$ (120,244)
201806	$ (5,794)	$ (3,350)	$ 2,444	$ 4,205	$ (1,761)
201807	$ 18,189	$ 13,476	$ (4,713)	$ 6,207	$ (10,920)
201808	$ (13,189)	$ (11,230)	$ 1,959	$ 597	$ 1,362
201809	$ (222,150)	$ (272,217)	$ (50,067)	$ 10,562	$ (60,629)
201810	$ (18,404)	$ 22,416	$ 40,820	$ 99,179	$ (58,359)
201811	$ (72,252)	$ (123,510)	$ (51,258)	$ 24,800	$ (76,058)
201812	$ (107,793)	$ (17,794)	$ 89,999	$ 6,662	$ 83,337
201901	$ (953,245)	$ (362,657)	$ 590,588	$ 95,543	$ 495,045
201902	$ (334,626)	$ (51,970)	$ 282,656	$ 45,704	$ 236,952
201903	$ (367,517)	$ (79,462)	$ 288,055	$ 74,450	$ 213,605
201904	$ (63,661)	$ 32,185	$ 95,846	$ 43,240	$ 52,606
201905	$ (5,347)	$ (1,710)	$ 3,637	$ 6	$ 3,631
201906	$ 524,428	$ 353,713	$ (170,715)	$ 159,443	$ (330,158)
201907	$ 557,446	$ 578,872	$ 21,426	$ 412,300	$ (390,874)
201908	$ 547,733	$ 420,412	$ (127,321)	$ 146,777	$ (274,098)
201909	$ 547,609	$ 677,110	$ 129,501	$ 646,629	$ (517,128)
201910	$ 351,257	$ 200,134	$ (151,123)	$ 833,341	$ (984,464)
201911	$ (597,474)	$ (582,521)	$ 14,952	$ 1,207,023	$ (1,192,070)
201912	$ (485,586)	$ (29,206)	$ 456,380	$ 626,399	$ (170,019)
Total	$ (1,710,947)	$ 146,946	$ 1,857,893	$ 4,574,036	$ (2,716,143)

[128] *See, e.g., supra* at 23-24, 26-27, 37-39.

[129] *See, e.g.,* Engle Affidavit at PP 42, 50, 79-90.

VII. REQUEST FOR RELIEF

As set forth in this Complaint, XO Energy submits that the FTR Forfeiture Rule is unjust and unreasonable, and the rule has been implemented in a manner that is inconsistent with Commission orders and the existing tariff. The Commission should (i) reject PJM's implementation of the FTR Forfeiture Rule made through the PJM Compliance Filing; and (ii) either (a) replace the rule with a structured market monitoring scheme, or (b) modify the existing rule and the market monitoring function, all as set forth herein.

VIII. COMPLIANCE WITH THE REQUIREMENTS OF RULE 206

Pursuant to the requirements of Rule 206 of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.206, Complainant provides the following required information:

A. Identification of Alleged Violation (18 C.F.R. § 206(b)(1)-(3))

The alleged violations and impacts of those alleged violations are discussed fully in Section V, above.

B. Financial Impact (18 C.F.R. § 206(b)(4))

While quantification of the financial impacts of PJM's FTR Forfeiture Rule is difficult, Complainant estimates that it has experienced a loss of approximately $4.6 million. As noted in Section VII above, Complainant has quantified its losses to the best of its abilities throughout the Complaint.

C. Practical and Non-Financial Impact (18 C.F.R. § 206(b)(5))

As discussed herein, the practical and non-financial impacts on Complainant, other market participants and on the market as a whole are significant. A number of market participants, including Complainant, Exelon and NextEra, have ceased virtual trading as a means of avoiding

significant forfeitures on their FTR portfolios.[130] The lack of transparency explained in Section VI.G, *supra*, means that market participants are unable to effectively react to the FTR Forfeiture Rule, and as such, cannot efficiently participate in the markets.

D. Other Proceedings (18 C.F.R. § 206(b)(6))

Pursuant to Rule 206(b)(6) of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.206(b)(6), Complainant states that specific issues in this complaint, including PJM's tariff revisions containing the $0.01 FTR Impact Test, are pending before the Commission in Docket No. ER17-1433-000. This docket considers PJM's Compliance Filing in response to the Commission's January 19, 2017 Order in Docket No. EL14-37-001, which has not been ruled upon by the Commission as of the date of the filing of this Complaint.

E. Specific Relief or Remedy Requested (18 C.F.R. § 206(b)(7))

The specific relief Complainant seeks from the Commission with respect to PJM's FTR Forfeiture Rule is set forth in Section VII above.

F. Exhibits (18 C.F.R. § 206(b)(9))

Complainant provides the following list of exhibits in support of its complaint:

Exhibit A Affidavit of Andrew Engle

Exhibit B Affidavit of Matthew Thompson

Exhibit C Notice of Publication for the Federal Register

Given the coronavirus pandemic, Mr. Engle and Mr. Thompson have signed their affidavits electronically and have not notarized their signatures. XO Energy will re-file these affidavits with the appropriate notarizations once Mr. Engle and Mr. Thompson are able to seek notary services. To the extent necessary, XO Energy moves for leave to submit the Thompson Affidavit and Engle

[130] *See supra* at 5-6.

Affidavit without notarization, until it is able to refile such affidavits.[131]

G. Use of Alternative Dispute Resolution (18 C.F.R. § 206(b)(9))

Complainant has not contacted the Commission's Enforcement Hotline or Dispute Resolution Service and does not believe that the use of these or any other Alternative Dispute Resolution mechanisms under the Commission's supervision would be useful in resolving the disputed issues that give rise to the complaint. Complainant has unsuccessfully sought resolution of the issues raised in this complaint before making this filing, both in other Commission proceedings,[132] and as an active member of PJM's stakeholder community.[133]

H. Form of Notice (18 C.F.R. § 206(b(10))

A form of notice suitable for publication in the Federal Register is attached hereto as Exhibit C.

I. Basis for Fast Track Request (18 C.F.R. § 206(b)(11))

Fast Track process is not requested for this complaint.

J. Service on Complainant, Rule 206(c)

Complainant certifies that copies of the Complaint were served by email on the following individuals:

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[131] *See, Temporary Action to Facilitate Social Distancing,* 171 FERC ¶ 61,004 at P 2 (2020) (exempting OATT filings from notarization requirements). While the Commission's *Social Distancing* order did not address complaints under Section 206, XO Energy believes that waiving notarization requirements in this context is consistent with the spirit of the Commission's order.

[132] *See, e.g., PJM Interconnection, LLC,* Docket Nos. ER17-1433-000, EL14-37-001.

[133] *See* Exelon Problem Statement, *supra* n. 13.

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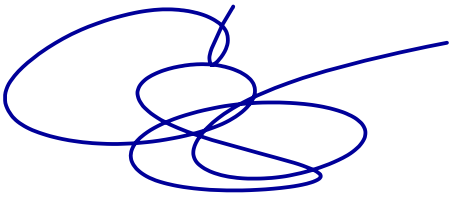
IX. CONCLUSION

WHEREFORE, XO Energy LLC and XO Energy MA, LLC respectfully request that the Commission (i) reject PJM's implementation of the FTR Forfeiture Rule made through the PJM Compliance Filing; and (ii) either (a) replace the rule with a structured market monitoring scheme, or (b) modify the existing rule and the market monitoring function. .

Respectfully submitted,



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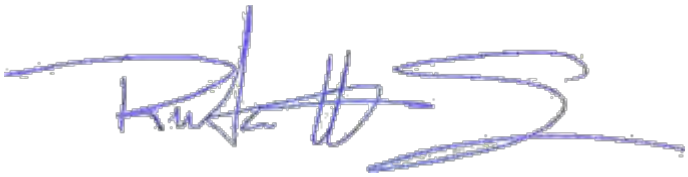

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Dated April 8, 2020

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

XO Energy LLC	)	
v.	)	Docket No. EL20-____-000
	)	
PJM Interconnection, L.L.C.	)	

NOTICE OF COMPLAINT

(issued April [__], 2020)

Take notice that on April 8, 2020, XO Energy, LLC, together with XO Energy MA, LP and XO Energy MA2, LP (collectively, "XO Energy") filed a formal complaint against PJM Interconnection, LLC ("PJM") pursuant to section 206 of the Federal Power Act, and Rule 206 of the Commission's Regulations, alleging that the PJM FTR Forfeiture Rule, including its current implementation by PJM, is not just and reasonable, and is unduly discriminatory.

XO Energy certifies that copies of the complaint were served on the contacts for PJM Interconnection, LLC and Monitoring Analytics, LLC as listed on the Commission's list of Corporate Officials.

Any person desiring to intervene or to protest this filing must file in accordance with Rules 211 and 214 of the Commission's Rules of Practice and Procedure (18 CFR 385.211 and 385.214). Protests will be considered by the Commission in determining the appropriate action to be taken, but will not serve to make protestants parties to the proceeding. Any person wishing to become a party must file a notice of intervention or motion to intervene, as appropriate. The Respondent's answer and all interventions, or protests must be filed on or before the comment date. The Respondent's answer, motions to intervene, and protests must be served on the Complainants.

The Commission encourages electronic submission of protests and interventions in lieu of paper using the "eFiling" link at http://www.ferc.gov. Persons unable to file electronically should submit an original and 5 copies of the protest or intervention to the Federal Energy Regulatory Commission, 888 First Street, NE, Washington, DC 20426.

This filing is accessible on-line at http://www.ferc.gov, using the "eLibrary" link and is available for review in the Commission's Public Reference Room in Washington, DC. There is an "eSubscription" link on the web site that enables subscribers to receive email notification when a document is added to a subscribed docket(s). For assistance with any FERC Online service, please email FERCOnlineSupport@ferc.gov, or call (866) 208-3676 (toll free). For TTY, call (202) 502-8659.

Comment Date: 5:00 pm Eastern Time on (insert date).

Kimberly D. Bose,
Secretary.

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

XO Energy, LLC **v.** **PJM Interconnection, L.L.C.**	**Docket No. EL20-___-000**

AFFIDAVIT OF ANDREW ENGLE

I. Background

1. My name is Andrew Engle and I am an Analyst at XO Energy, LLC ("XO Energy"), with a business address at 1619 New London Road, Landenberg, PA. I graduated from The Pennsylvania State University in 2002 with a Bachelor of Science in Management Information Systems, and in 2008 with a Master of Science in Management Information Systems.

2. My experience in the power industry extends over 17 years, having commenced my career at PJM Interconnection, L.L.C. ("PJM") in 2002 in the Market Monitoring Unit ("MMU"), followed by Monitoring Analytics, PJM's independent market monitor (the "IMM"). In 2011, I left the IMM and joined PJM's Capacity Market Operations group. In 2014, I joined PJM's Real-Time Market Operations group.

3. During my tenure in the MMU, I developed and maintained the algorithm that calculated participant financial transmission right ("FTR") forfeitures on a monthly basis. I was also responsible for creating detailed forfeiture reports for impacted participants, upon their request. I am familiar with many aspects of PJM's FTR forfeiture rule (the "FTR Forfeiture Rule") and the implications of changing the logic.

4. The examples provided in this complaint are largely based upon my experience with the FTR Forfeiture Rule during my employment at PJM and the IMM. It is further complemented by my experience trading virtual transactions and FTRs at XO Energy as well as my analysis of the impacts of the various changes to the FTR Forfeiture Rule. The information set forth in this affidavit is intended to supplement, clarify and support the statements and examples set forth in XO Energy's complaint. Capitalized terms that are used and not otherwise defined herein shall have the meanings ascribed to them in the complaint.

II. FTR Candidate Selection Criteria

5. The former FTR Candidate Selection Criteria played an important part in the FTR forfeiture determination process, yet was never documented in the Tariff. In general, the FTR Forfeiture Rule has never been well documented and continues to be vaguely defined in the Tariff. Further, the rule was not mentioned in any PJM manual until 2013,[1] when changes were made to include UTCs in the forfeiture rule calculation. Even then, the language in the manual simply restated the Tariff provisions with some minor clarifying language to distinguish the treatment of INCs, DECs, and UTCs as well as to specify the selection of the "worst case" reference bus.

6. Since the inception of the FTR Forfeiture Rule, the Tariff only defined the 75% virtual transaction test threshold; there was no indication as to how the threshold would be applied. The 75% threshold was based upon the relaxation of a radial constraint, that is, when a node is completely isolated (i.e., 100% DFAX). The manner in which the threshold was implemented was

[1] *See PJM Manual 06* at 8.6 (Revision: 14; Effective Date: July 1, 2013), available at https://web.archive.org/web/20160910031949/http://pjm.com/~/media/documents/manuals/archive/m06/m06v14-financial-transmission-rights-07-01-2013.ashx.

subject to the discretion of PJM and not transparent to market participants. Similarly, the choice of reference bus was an opaque implementation decision.

7. When the 75% threshold for virtual transactions was triggered, the steps that followed (i.e., to identify FTR paths that would be subject to forfeiture) were loosely defined (e.g., "at or near delivery or receipt buses of the Financial Transmission Right").[2] Although the Tariff included prescriptive language regarding the use of a path-based convergence test to identify FTR paths that would be subject to forfeiture, it otherwise provided little guidance to market participants. This lack of direction resulted in the FTR Candidate Selection Criteria, a process which sought to identify the FTR paths that were "clearly benefiting from a constraint" using a threshold of 10%. Additional filters were also applied, for instance, when an FTR exceeded the 10% threshold, but its source or sink had a relatively small impact.[3] At the time of its implementation, the 10% threshold was selected because it represented a reasonable indication that an FTR was benefiting from a constraint, however, the exact dollar impact could not be quantified.

8. During the early development of the FTR Forfeiture Rule, data with any measurable level of integrity was scarce. DFAX inputs were not available from the day-ahead market clearing engine, requiring an analyst, such as myself, to run offline simulations in a power flow tool called PSS/E. The DFAX that were ultimately used in the test were not exact values from the day-ahead market; they were simply estimates from a PJM planning model. This meant that the precise dollar impacts from each binding constraint could not be calculated for the test, leading to aggregated

[2] *Id.* at 53.

[3] *See* Monitoring Analytics. *FTR Education* at 17 (January 28, 2014) ("2014 IMM FTR Education"), available at https://pjm.com/-/media/committees-groups/committees/mic/20140218-ftr/20140218-ftr-forfeiture-education.ashx.

forfeitures or simply the difference between the total day-ahead MCC at the source and sink of an FTR.

9. In order to improve the accuracy of the data used in the FTR Forfeiture Rule as well as other congestion analysis, I worked on a variety of projects at PJM with the goal of calculating or extracting the actual DFAX used in the day-ahead and real-time market clearing engines. The improvement in the accuracy of the DFAX helped to quantify day-ahead and real-time congestion dollars by constraint with precision. This data is reported in the congestion and marginal losses section of PJM's state of the market reports.

10. Data integrity has evolved in PJM such that DFAX and shadow prices from the market clearing engine can be used to precisely calculate the actual impact from a constraint. Despite this significant development, PJM and the IMM do not utilize this accurate dataset. Instead, this data is used to simply test for direction based on dollar impact (i.e., if a constraint contribution is positive and >= $0.01, the FTR direction is prevailing and, if a constraint contribution is negative and <= -$0.01, the FTR direction is counterflow).

III. FTR Impact Test

11. PJM implemented the FTR Impact Test to improve upon the FTR Candidate Selection Criteria. Instead, this overreaching rule results in substantial, irrational penalties to market participants. For instance, if an FTR path is impacted by a penny from a constraint, that path is not limited to the forfeiture of one penny, but rather risks the forfeiture of the total congestion credit from the day-ahead market together with any revenues it may have received in the auction for accepting the risk of a counterflow FTR. PJM illustrated this point in a stakeholder presentation (see Figure 1).

Figure 1. Examples of FTR Forfeitures Under the New Rules

Examples

Item	FTR 1	FTR 2	FTR 3	FTR 4	FTR 5	FTR 6
FTR Cost	$100	($100)	($100)	$100	$100	$100
FTR DA Value	$150	($50)	$50	$125	($50)	$150
FTR RT Value	$100	($100)	($100)	$130	$100	$100
Virtual Constraint Impact	20%	10%	15%	25%	10%	5%
FTR Constraint Spread	$5	$0.01	$10	$5	$10	$10
Forfeiture	$50	$50	$150	NONE	NONE	NONE

In this example, FTR 2 forfeited $50 of FTR profits by failing the FTR Impact Test, sometimes referred to as the "penny test."[4]

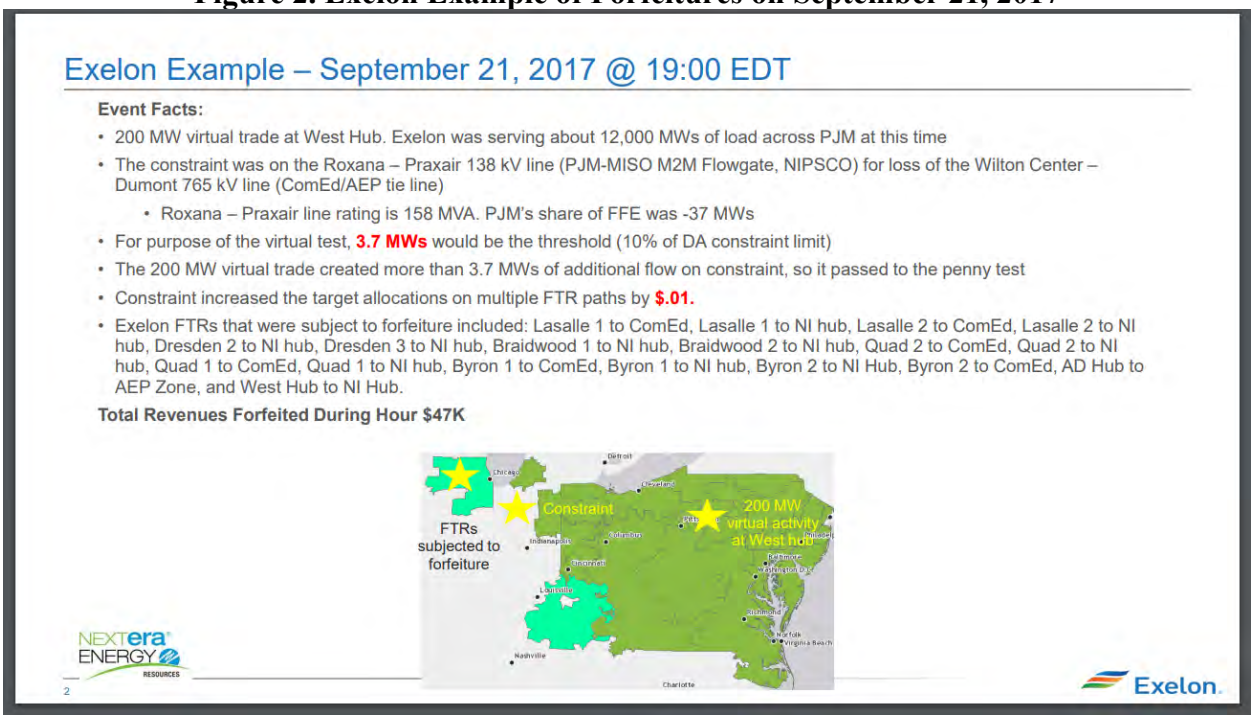
IV. FTR Impact Test and its Effects on Market Participants

During the stakeholder process, Exelon and NextEra also raised concerns about the FTR Impact Test. During a June 6, 2018 MIC presentation, Exelon reviewed an example of one hour on September 21, 2017 during which the company forfeited over $47,000 across 18 FTR paths that were triggered under the FTR Impact Test due to the *Roxana-Praxair* constraint (see Figure 2).[5]

[4] PJM, *FTR Forfeiture FERC Order MIC Update* at 9 (April 12, 2017), available at: (http://www.pjm.com/~/media/committees-groups/committees/mic/20170412/20170412-item-17a-ftr-forfeiture-ferc-order-update.ashx).

[5] *See* Nextera Energy Resources; Exelon, *FTR Forfeiture Rule Education* at 7 (June 6, 2018) ("June 2018 Exelon Presentation"), available at https://www.pjm.com/-/media/committees-groups/committees/mic/20180606/20180606-item-11a-exelon-and-nextera-ftr-forfeiture-rule-education.ashx.

Figure 2. Exelon Example of Forfeitures on September 21, 2017



Due to the lack of forfeiture data provided by the IMM, Exelon and other market participants are burdened with trying to determine what triggered their forfeitures and to what extent their virtual activity contributed to any increase in their FTR profits. The most important data used in the FTR Impact Test and the Virtual Portfolio Test is not provided (i.e., DFAX and transmission limits). Market participants incur large forfeitures without any explanatory data, leading to the observation that the extremely low threshold of the FTR Impact Test is driving these forfeitures.

12. Using publicly available, market participant-cleared FTR position data together with what amounts to our "best guess" as to the data used in the FTR Impact Test (i.e., a DFAX isolation for the *Roxana-Praxair* constraint), XO Energy further analyzed the forfeitures incurred by Exelon as follows:[6]

[6] A DFAX isolation occurs when a single constraint binds in real-time thus allowing for the DFAX to be calculated using the posted congestion component and shadow price. The isolation for this example was taken from September 11, 2017 at 6:00 AM.

Table 1. Exelon Forfeitures on September 21, 2017 HE 20 related to Virtual Activity on the Roxana-Praxair constraint

Source	Sink	DFAX	Shadowprice	FTR Impact Test	DA MCC	RT MCC	FTR MW	FTR TA	FTR Cost	Forfeiture
4 QUAD C18 KV QC-1	N ILLINOIS HUB	-0.0063	$26.54	-$0.17	$19.44	$7.07	584.2	$11,357	$1,084	$10,273
4 QUAD C18 KV QC-2	N ILLINOIS HUB	-0.0063	$26.54	-$0.17	$19.44	$7.07	532.3	$10,348	$985	$9,363
20 BRAID24 KV BR-2	N ILLINOIS HUB	-0.0044	$26.54	-$0.12	$5.32	-$0.54	1126.9	$5,994	$803	$5,191
6 BYRON 25 KV BY-1	N ILLINOIS HUB	-0.0041	$26.54	-$0.11	$4.92	$3.74	932.9	$4,589	$1,107	$3,483
6 BYRON 25 KV BY-2	N ILLINOIS HUB	-0.0041	$26.54	-$0.11	$4.92	$3.74	864.7	$4,254	$1,024	$3,230
1 LASALL24 KV LA-2	N ILLINOIS HUB	-0.0041	$26.54	-$0.11	$4.00	-$0.64	826.6	$3,306	$467	$2,839
1 LASALL24 KV LA-1	N ILLINOIS HUB	-0.0041	$26.54	-$0.11	$4.00	-$0.64	804.9	$3,219	$475	$2,744
4 QUAD C18 KV QC-1	COMED_RESID_AGG	-0.0067	$26.54	-$0.18	$19.46	$6.96	128.7	$2,504	$392	$2,113
4 QUAD C18 KV QC-2	COMED_RESID_AGG	-0.0067	$26.54	-$0.18	$19.46	$6.96	128.7	$2,504	$392	$2,113
20 BRAID24 KV BR-1	N ILLINOIS HUB	-0.0044	$26.54	-$0.12	$1.98	-$0.53	1207.7	$2,391	$821	$1,569
12 DRESD18 KV DR-2	N ILLINOIS HUB	-0.0034	$26.54	-$0.09	$1.56	-$0.83	839.4	$1,309	$187	$1,122
1 LASALL24 KV LA-2	COMED_RESID_AGG	-0.0045	$26.54	-$0.12	$4.02	-$0.75	225.3	$905	$197	$708
1 LASALL24 KV LA-1	COMED_RESID_AGG	-0.0045	$26.54	-$0.12	$4.02	-$0.75	224.6	$902	$197	$706
6 BYRON 25 KV BY-1	COMED_RESID_AGG	-0.0045	$26.54	-$0.12	$4.94	$3.63	231.3	$1,142	$443	$699
6 BYRON 25 KV BY-2	COMED_RESID_AGG	-0.0045	$26.54	-$0.12	$4.94	$3.63	225.7	$1,114	$432	$682
AEP-DAYTON HUB	AEP	-0.0005	$26.54	-$0.01	$0.77	$0.16	803.0	$617	$70	$547
12 DRESD18 KV DR-3	N ILLINOIS HUB	-0.0045	$26.54	-$0.12	$0.39	-$0.94	734.1	$286	$250	$36
WESTERN HUB	N ILLINOIS HUB	-0.0285	$26.54	-$0.76	-$2.25	-$5.44	1.9	-$4	-$5	$1
						TOTAL	10422.9	$56,737	$9,320	$47,417

13. **Description of Table 1**

a. The *DFAX* column sets forth the distribution factor calculated from the DFAX isolation taken from September 11, 2017 at 6:00 AM. This date is closest to the actual forfeiture, when the Roxana-Praxair constraint was the only constraint that bound in real-time. This is the best data that a market participant has access to and can only be used to explain a small subset of constraints.[7]

b. The *Shadowprice* column sets forth the actual value posted by PJM during September 21, 2017 HE 20 from the day-ahead market.

c. The *FTR Impact Test* column sets forth the product of the DFAX and the shadow price, representing the constraint specific impact to the FTR path.

d. The *DA MCC* column sets forth the total day-ahead MCC, representing the sum of

[7] DFAX isolations provide only a small fraction of the data needed to explain forfeitures. They are only available from real-time because it is rare to have a single binding constraint during a single hour in the day-ahead market.

all impacts from day-ahead binding constraints in the hour.

e. The *RT MCC* column sets forth the total real-time MCC, representing the sum of all impacts from real-time binding constraints in the hour.

f. The *FTR MW* column sets forth the MWh sum of all FTR positions effective on this date and hour for the FTR path defined by the *Source* and *Sink* columns.

g. The *FTR Cost* column is the product of the *FTR MW* column and the *Hourly FTR Cost* (not shown), representing the MWh-weighted average cost from one or more auctions.

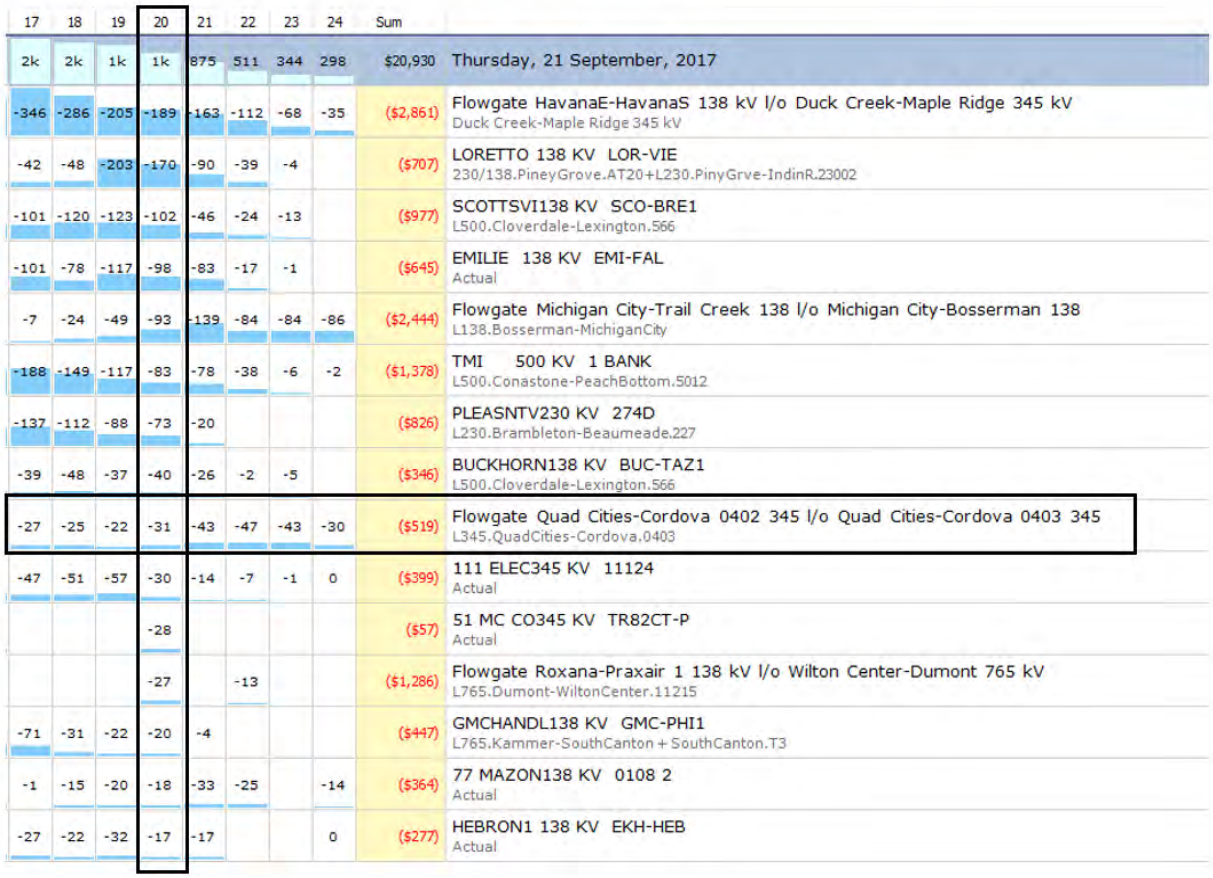
h. The *Forfeiture* column is the difference between the *FTR TA* column and *FTR Cost* columns, representing the total forfeiture for the FTR path.

14. The data set forth in Table 1 demonstrates that almost all of the paths forfeited for HE 20 had DFAX values of less than 1% and *de minimis* impacts from the *Roxana-Praxair* constraint. The FTR Impact Test resulted in the forfeiture of all profits; this implies that the *Roxana-Praxair* constraint is responsible for the entire increase in FTR value. A review of both the paths forfeited and day-ahead binding constraints demonstrates that this is not the case; the FTR value is being driven by unrelated constraints that the Virtual Portfolio Test deemed insignificant.

15. For example, the highest forfeiture occurred on the *4 QUAD C18KV QC1 – N ILLINOIS HUB* path. This path sourced at the Quad Cities 1 Nuclear plant in the ComEd zone and sank at the Northern Illinois Hub. The impact from the *Roxana-Praxair* constraint was a *de minimus* -$0.17, as defined by the FTR Impact Test, yet the total day-ahead MCC across all day-ahead binding constraints was $19.44. Since the FTR Impact Test result was greater than a penny, the entire $19.44 was subject to forfeiture. By reviewing the name of the path against a list of the top 15 binding constraints that occurred during HE 20, the $19.44 value can be explained (e.g., the

Quad Cities – Cordova constraint also bound during HE 20 and this FTR path sourced at Quad Cities (see Figure 3)).

Figure 3. Top 15 Day-Ahead Binding Constraints (September 21, 2017 HE 20)



17	18	19	20	21	22	23	24	Sum	
2k	2k	1k	1k	875	511	344	298	$20,930	Thursday, 21 September, 2017
-346	-286	-205	-189	-163	-112	-68	-35	($2,861)	Flowgate HavanaE-HavanaS 138 kV l/o Duck Creek-Maple Ridge 345 kV Duck Creek-Maple Ridge 345 kV
-42	-48	-203	-170	-90	-39	-4		($707)	LORETTO 138 KV LOR-VIE 230/138.PineyGrove.AT20+L230.PinyGrve-IndinR.23002
-101	-120	-123	-102	-46	-24	-13		($977)	SCOTTSVI138 KV SCO-BRE1 L500.Cloverdale-Lexington.566
-101	-78	-117	-98	-83	-17	-1		($645)	EMILIE 138 KV EMI-FAL Actual
-7	-24	-49	-93	-139	-84	-84	-86	($2,444)	Flowgate Michigan City-Trail Creek 138 l/o Michigan City-Bosserman 138 L138.Bosserman-MichiganCity
-188	-149	-117	-83	-78	-38	-6	-2	($1,378)	TMI 500 KV 1 BANK L500.Conastone-PeachBottom.5012
-137	-112	-88	-73	-20				($826)	PLEASNTV230 KV 274D L230.Brambleton-Beaumeade.227
-39	-48	-37	-40	-26	-2	-5		($346)	BUCKHORN138 KV BUC-TAZ1 L500.Cloverdale-Lexington.566
-27	-25	-22	-31	-43	-47	-43	-30	($519)	Flowgate Quad Cities-Cordova 0402 345 l/o Quad Cities-Cordova 0403 345 L345.QuadCities-Cordova.0403
-47	-51	-57	-30	-14	-7	-1	0	($399)	111 ELEC345 KV 11124 Actual
			-28					($57)	51 MC CO345 KV TR82CT-P Actual
			-27		-13			($1,286)	Flowgate Roxana-Praxair 1 138 kV l/o Wilton Center-Dumont 765 kV L765.Dumont-WiltonCenter.11215
-71	-31	-22	-20	-4				($447)	GMCHANDL138 KV GMC-PHI1 L765.Kammer-SouthCanton + SouthCanton.T3
-1	-15	-20	-18	-33	-25		-14	($364)	77 MAZON138 KV 0108 2 Actual
-27	-22	-32	-17	-17			0	($277)	HEBRON1 138 KV EKH-HEB Actual

16. The FTR value was driven by this constraint, even though the result of the virtual portfolio test indicated that Exelon did not have a significant impact. As a result, substantial profits in excess of those derived from the *Roxana-Praxair* constraint were forfeited.[8] By using an extremely low tolerance, the FTR Impact Test led to the substantial forfeiture of legitimate profits from other constraints.

[8] XO Energy here presents one example, however, the entire set of FTR paths forfeited during this hour can be lumped into this scenario.

17. As further demonstration of the significant erroneous forfeitures that occurred as a result of the FTR Impact Test, XO Energy analyzed its September 2019 forfeitures. The IMM's report indicated that XO incurred the largest single day forfeitures from the *Monroe – Lallendorf* constraint on September 30, 2019.[9] Across six hours in which this constraint bound, XO Energy incurred forfeitures of $53,861. The largest hourly forfeiture occurred in HE 17, totaling $16,975.

Table 2. XO Energy Forfeitures on September 30, 2019 HE17 related to Virtual Activity on Monroe-Lallendorf

Source	Sink	DFAX	Shadowprice	FTR Impact Test	DA MCC	RT MCC	FTR MW	FTR TA	FTR Cost	Forfeiture
MITCHELL 1	NEWMARTI138 KV HANN NUG	0.002	$29.60	$0.06	$109.63	$4.98	14.40	$1,579	$19	$1,559
REDLION T1	DUNCANNON	0.003	$29.60	$0.10	$48.16	$2.79	22.00	$1,060	$3	$1,056
PLEA APS26 KV GEN 2	STEMPLE 18 KV STG	0.015	$29.60	$0.45	$37.12	-$1.57	27.50	$1,021	$16	$1,005
PLEA APS26 KV GEN 1	STEMPLE 18 KV STG	0.015	$29.60	$0.45	$37.12	-$1.57	27.50	$1,021	$16	$1,005
BLACKOAK500 KV SVC	CHESWICK24 KV UNIT1	0.017	$29.60	$0.51	$29.61	-$2.92	35.90	$1,063	$67	$996
FTMARTIN22 KV GEN 1	GORDON 138 KV ARDENLF1	0.007	$29.60	$0.20	$38.43	-$1.01	24.50	$942	$41	$900
FTMARTIN22 KV GEN 2	GORDON 138 KV ARDENLF1	0.007	$29.60	$0.20	$38.43	-$1.01	24.50	$942	$41	$900
MITCHELL 1	KAMMER2 15.5 KV KM1	0.003	$29.60	$0.09	$9.25	$3.29	67.50	$624	-$3	$628
BUCKEYE - WEC	CONESVIL24 KV CV6	0.010	$29.60	$0.28	$63.53	$36.30	7.20	$457	-$1	$458
BUCKEYE - WEC	CONESVIL24 KV CV5	0.010	$29.60	$0.28	$63.53	$36.30	7.20	$457	-$1	$458
OAKG APS18 KV GEN 2	TIDD_AEP26 KV CD3	0.010	$29.60	$0.30	$58.84	-$1.56	7.30	$430	$0	$429
OAKG APS18 KV GEN 1	TIDD_AEP26 KV CD3	0.010	$29.60	$0.30	$58.84	-$1.56	7.30	$430	$0	$429
PLEA APS26 KV GEN 2	KAMMER2 26 KV ML2	0.006	$29.60	$0.17	$38.82	-$2.06	9.80	$380	$0	$381
PLEA APS26 KV GEN 1	KAMMER2 26 KV ML2_R	0.003	$29.60	$0.09	$38.82	-$4.96	9.80	$380	$0	$381
CARDIFF 230 KV CARD SVC	DUNCANNON	0.006	$29.60	$0.18	$44.23	$2.64	8.00	$354	-$2	$356
PLEA APS26 KV GEN 1	KAMMER2 26 KV ML1	0.003	$29.60	$0.09	$35.59	-$4.96	9.80	$349	$0	$349
PLEA APS26 KV GEN 1	TIDD_AEP24 KV CD1	0.011	$29.60	$0.33	$40.65	-$1.48	7.70	$313	$0	$313
STEELCTY13 KV BETH CT5	DUNCANNON	0.005	$29.60	$0.15	$41.23	$1.72	6.70	$276	$0	$277
STEELCTY13 KV BETH CT3	DUNCANNON	0.005	$29.60	$0.15	$41.23	$1.72	6.70	$276	$0	$277
STEELCTY13 KV BETH CT1	DUNCANNON	0.005	$29.60	$0.15	$41.23	$1.72	6.70	$276	$0	$277
RIVESVIL138 KV SS LOAD	KAMMER2 15.5 KV KM1	0.008	$29.60	$0.23	$24.61	-$1.72	9.40	$231	-$4	$236
DEERCREE34 KV DEERCRSP	TANNERSC18 KV TC3	0.016	$29.60	$0.46	$5.55	$2.90	25.00	$139	-$83	$222
STEELCTY18 KV BETH 8CC	DUNCANNON	0.007	$29.60	$0.21	$39.99	$1.84	5.20	$208	-$3	$211
FTMARTIN22 KV GEN 2	STEMPLE 18 KV STG	0.018	$29.60	$0.52	$18.64	-$1.08	9.90	$185	$8	$176
FTMARTIN22 KV GEN 1	STEMPLE 18 KV STG	0.018	$29.60	$0.52	$18.64	-$1.08	9.90	$185	$8	$176
Additional 97 Paths	Additional 97 Paths	0.011	$29.60	$0.31	$15.27	-$4.63	453.70	$3,591	$72	$3,519
						TOTAL	851.1	$17,168	$193	$16,975

18. The data set forth in Table 2 evidences the fact that *de minimis* values from the FTR Impact Test resulted in the erroneous forfeiture of substantial profits from other constraints. Across 122 FTR paths, the majority of the forfeitures occurred in the top 25 paths, totaling $13,455. The remaining 97 paths forfeited a total of $3,519. The FTR Impact Test quantified the actual impact from this constraint across the top 25 paths; the average impact was a *de minimis* $0.26. Of greater

[9] *See* Figure 12**Error! Main Document Only.**, *infra*.

significance, the total day-ahead MCC on which the forfeitures were based averaged $40.87. The *Monroe-Lallendorf* constraint was not the driver behind the profits of these FTR paths, rather, these paths were forfeited based upon coincidental and *de minimis* impacts related to the networked nature of the transmission grid. The extremely low threshold of the FTR Impact Test is unjust and unreasonable because it results in substantial forfeitures based upon negligible, if not absent, connections. This low threshold is not the most problematic issue, though, it is the use of the total day-ahead MCC and total FTR cost in the forfeiture calculation, which results in the gross overstatement of the actual profits related to a single constraint.

19. In order to illustrate the actual increase in profits from the *Monroe-Lallendorf* constraint that bound in day-ahead, XO Energy simulated the calculation with the constraint-specific, day-ahead, real-time and auction shadow prices.[10] This result is shown in Table 3.

[10] The *Monroe-Lallendorf* constraint did not bind in any of the auctions in which XO Energy acquired its FTR position. Therefore, the auction shadow price and FTR cost are zero.

Table 3. Simulated Forfeitures Based Upon the Constraint-Specific Contribution from the *Monroe – Lallendorf* Constraint (September 30, 2019 HE 17)

Source	Sink	DFAX	DA Shadow	RT Shadow	DA MCC	RT MCC	FTR MW	FTR TA	FTR Cost	Forfeiture
MITCHELL 1	NEWMARTI138 KV HANN NUG	0.002	$29.60	$38.70	$0.06	$0.08	14.40	$1	$0	$1
REDLION T1	DUNCANNON	0.003	$29.60	$38.70	$0.10	$0.13	22.00	$2	$0	$2
PLEA APS26 KV GEN 2	STEMPLE 18 KV STG	0.015	$29.60	$38.70	$0.45	$0.58	27.50	$12	$0	$12
PLEA APS26 KV GEN 1	STEMPLE 18 KV STG	0.015	$29.60	$38.70	$0.45	$0.58	27.50	$12	$0	$12
BLACKOAK500 KV SVC	CHESWICK24 KV UNIT1	0.017	$29.60	$38.70	$0.51	$0.66	35.90	$18	$0	$18
FTMARTIN22 KV GEN 1	GORDON 138 KV ARDENLF1	0.007	$29.60	$38.70	$0.20	$0.26	24.50	$5	$0	$5
FTMARTIN22 KV GEN 2	GORDON 138 KV ARDENLF1	0.007	$29.60	$38.70	$0.20	$0.26	24.50	$5	$0	$5
MITCHELL 1	KAMMER2 15.5 KV KM1	0.003	$29.60	$38.70	$0.09	$0.12	67.50	$6	$0	$6
BUCKEYE - WEC	CONESVIL24 KV CV6	0.010	$29.60	$38.70	$0.28	$0.37	7.20	$2	$0	$2
BUCKEYE - WEC	CONESVIL24 KV CV5	0.010	$29.60	$38.70	$0.28	$0.37	7.20	$2	$0	$2
OAKG APS18 KV GEN 2	TIDD_AEP26 KV CD3	0.010	$29.60	$38.70	$0.30	$0.40	7.30	$2	$0	$2
OAKG APS18 KV GEN 1	TIDD_AEP26 KV CD3	0.010	$29.60	$38.70	$0.30	$0.40	7.30	$2	$0	$2
PLEA APS26 KV GEN 2	KAMMER2 26 KV ML2	0.006	$29.60	$38.70	$0.17	$0.22	9.80	$2	$0	$2
PLEA APS26 KV GEN 1	KAMMER2 26 KV ML2_R	0.003	$29.60	$38.70	$0.09	$0.11	9.80	$1	$0	$1
CARDIFF 230 KV CARD SVC	DUNCANNON	0.006	$29.60	$38.70	$0.18	$0.24	8.00	$1	$0	$1
PLEA APS26 KV GEN 1	KAMMER2 26 KV ML1	0.003	$29.60	$38.70	$0.09	$0.11	9.80	$1	$0	$1
PLEA APS26 KV GEN 1	TIDD_AEP24 KV CD1	0.011	$29.60	$38.70	$0.33	$0.43	7.70	$3	$0	$3
STEELCTY13 KV BETH CT5	DUNCANNON	0.005	$29.60	$38.70	$0.15	$0.20	6.70	$1	$0	$1
STEELCTY13 KV BETH CT3	DUNCANNON	0.005	$29.60	$38.70	$0.15	$0.20	6.70	$1	$0	$1
STEELCTY13 KV BETH CT1	DUNCANNON	0.005	$29.60	$38.70	$0.15	$0.20	6.70	$1	$0	$1
RIVESVIL138 KV SS LOAD	KAMMER2 15.5 KV KM1	0.008	$29.60	$38.70	$0.23	$0.30	9.40	$2	$0	$2
DEERCREE34 KV DEERCRSP	TANNERSC18 KV TC3	0.016	$29.60	$38.70	$0.46	$0.60	25.00	$12	$0	$12
STEELCTY18 KV BETH 8CC	DUNCANNON	0.007	$29.60	$38.70	$0.21	$0.27	5.20	$1	$0	$1
FTMARTIN22 KV GEN 2	STEMPLE 18 KV STG	0.018	$29.60	$38.70	$0.52	$0.68	9.90	$5	$0	$5
FTMARTIN22 KV GEN 1	STEMPLE 18 KV STG	0.018	$29.60	$38.70	$0.52	$0.68	9.90	$5	$0	$5
Additional 97 Paths	Additional 97 Paths	0.011	$29.60	$38.70	$0.31	$0.41	453.70	$93	$0	$93
						TOTAL	851.1	$199	$0	$199

20. In stark contrast with the calculation derived using the total day-ahead MCC and total FTR cost ($16,975), the actual increase in value across the same 122 paths was $199. The results of this simulation demonstrate that the *Monroe-Lallendorf* constraint had a negligible impact on the value of these FTR paths, however, due to the flaws in forfeiture calculation (i.e., profits were erroneously calculated based on the aggregate impact of all constraints), an exponentially greater forfeiture occurred. Moreover, in this specific case, the use of the day-ahead and real-time shadow prices in the convergence test indicates that these paths were converging under the *Monroe-Lallendorf* constraint and that XO Energy's prevailing flow virtual activity was profitable. The use of the total day-ahead MCC and total real-time MCC in the convergence test incorrectly indicated that these paths were diverging, attributing the divergence to the *Monroe-Lallendorf* constraint. This is further evidence that the forfeiture rule, as implemented by PJM, is severely

flawed, triggering forfeitures when efficiency-enhancing virtual activity can be explained by comparing the day-ahead and real-time constraint shadow prices.

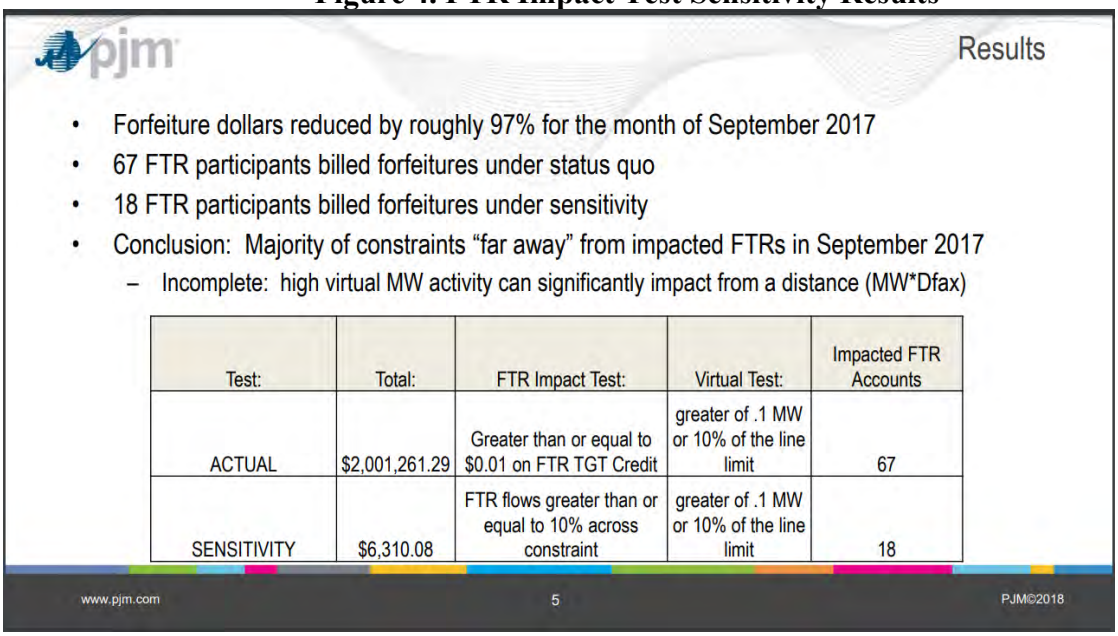
V. PJM Sensitivity Analysis on the FTR Impact Test

21. While the previous examples demonstrate the manner in which the FTR Impact Test captures *de minimus* impacts to FTRs, it is impossible for XO Energy or any other market participant to accurately quantify the cumulative effect that the FTR Impact Test has had since its implementation. The data required to further analyze XO Energy's forfeitures is not disclosed. That said, PJM has conducted sensitivity analysis to quantify the changes from the former FTR Candidate Selection Criteria (i.e., 10% DFAX) to the new FTR Impact Test (i.e., the penny test); this analysis evidences the substantial increase in forfeitures across all market participants.

22. As part of the issue charge related to the Exelon Problem Statement, PJM agreed to perform a sensitivity analysis on the FTR Impact Test. On June 6, 2018, PJM presented its findings, which included the performance of a sensitivity analysis to adjust the FTR impact trigger from (i) greater than or equal to $0.01, to (ii) greater than or equal to net 10% DFAX for September 2017 (see Figure 4).[11]

[11] PJM, *FTR Forfeitures* at 5 (June 6, 2018), available at https://www.pjm.com/-/media/committees-groups/committees/mic/20180606/20180606-item-11b1-ftr-forfeiture-analysis.ashx.

Figure 4. FTR Impact Test Sensitivity Results



23. The results of the FTR Impact Test sensitivity analysis demonstrate a reduction of over $2 million with only 18 participants impacted. PJM concluded that the majority of the constraints triggered in the Virtual Portfolio Test were "far away" or electrically distant from the FTR paths that were forfeited under the FTR Impact Test.[12] Furthermore, at the April 25, 2019 MRC meeting, a second sensitivity analysis was presented by Exelon and NextEra, demonstrating the effect of lowering the net 10% DFAX to 5%.[13] This sensitivity analysis indicated a minimal increase in forfeitures, resulting in $9,727 of forfeitures for September 2017.[14]

24. It unclear why PJM chose to analyze a single month instead of completing a more exhaustive analysis, however, XO Energy posits that additional analysis would support this trend.

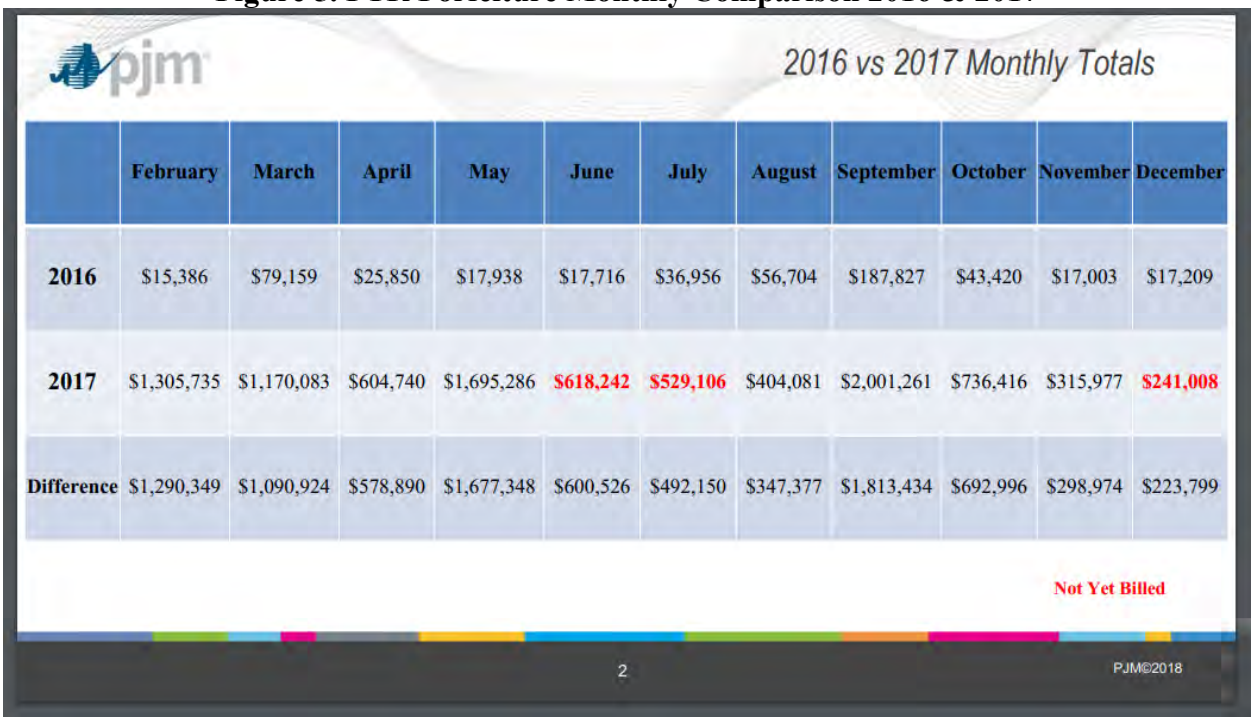
[12] *Id.*

[13] NextEra Energy Resources; Exelon, *FTR Forfeiture Rule Background* at 7 (April 25, 2019), available at https://pjm.com/-/media/committees-groups/committees/mrc/20190425/20190425-item-03a-ftr-forfeiture-rule-exelon-next-era-veco-presentation.ashx.

[14] *Id.*

In fact, the analysis that PJM presented at the January 18, 2018 MSS meeting provides affirmation.[15] Between February 2016 and December 2016, forfeitures totaled $515,168, while between February 2017 and December 2017 (under the new rule), forfeitures totaled $9,621,935. This represents over a **$9.1 million increase** from year to year.[16]

Figure 5. FTR Forfeiture Monthly Comparison 2016 & 2017



2016 vs 2017 Monthly Totals

	February	March	April	May	June	July	August	September	October	November	December
2016	$15,386	$79,159	$25,850	$17,938	$17,716	$36,956	$56,704	$187,827	$43,420	$17,003	$17,209
2017	$1,305,735	$1,170,083	$604,740	$1,695,286	$618,242	$529,106	$404,081	$2,001,261	$736,416	$315,977	$241,008
Difference	$1,290,349	$1,090,924	$578,890	$1,677,348	$600,526	$492,150	$347,377	$1,813,434	$692,996	$298,974	$223,799

Not Yet Billed

2

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25. As a fair comparison, XO Energy contends that PJM should have rerun the 2016 forfeiture calculations with the new rules as well as the 2017 forfeiture calculations with the old rules. At a minimum, the results of the sensitivity analysis warranted more attention from PJM and the IMM.

[15] *See* PJM, *FTR Forfeiture Monthly Comparison 2016 & 2017* (January 18, 2018), available at https://www.pjm.com/-/media/committees-groups/subcommittees/mss/20180118/20180118-item-01b-ftr-forfeiture-monthly-totals-comparison-2016-2017.ashx.

[16] *Id.*

Although PJM and the IMM contend that the underlying data is confidential, CAISO and ERCOT publish this data so that market participants can perform shadow settlement calculations.

VI. Counterflow Logic

26. Historically, the FTR Forfeiture Rule included only prevailing flow FTRs in the forfeiture calculation. A prevailing flow FTR was defined as one that had a DFAX spread that was greater than or equal to 10% across the constraint identified in the virtual transaction test (i.e., the 75% test). Prevailing flow FTRs can also be described as those that have a positive target allocation (congestion credit) and a positive FTR cost, however, there are occasions when a prevailing flow FTR can have a positive target allocation and a negative FTR cost. PJM highlighted these two instances in PJM Manual 06, describing how the forfeiture would be calculated:[17]

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

The first scenario results in the forfeiture of the target allocations minus the FTR cost, however, the second scenario results in a forfeiture of only the positive target allocation.

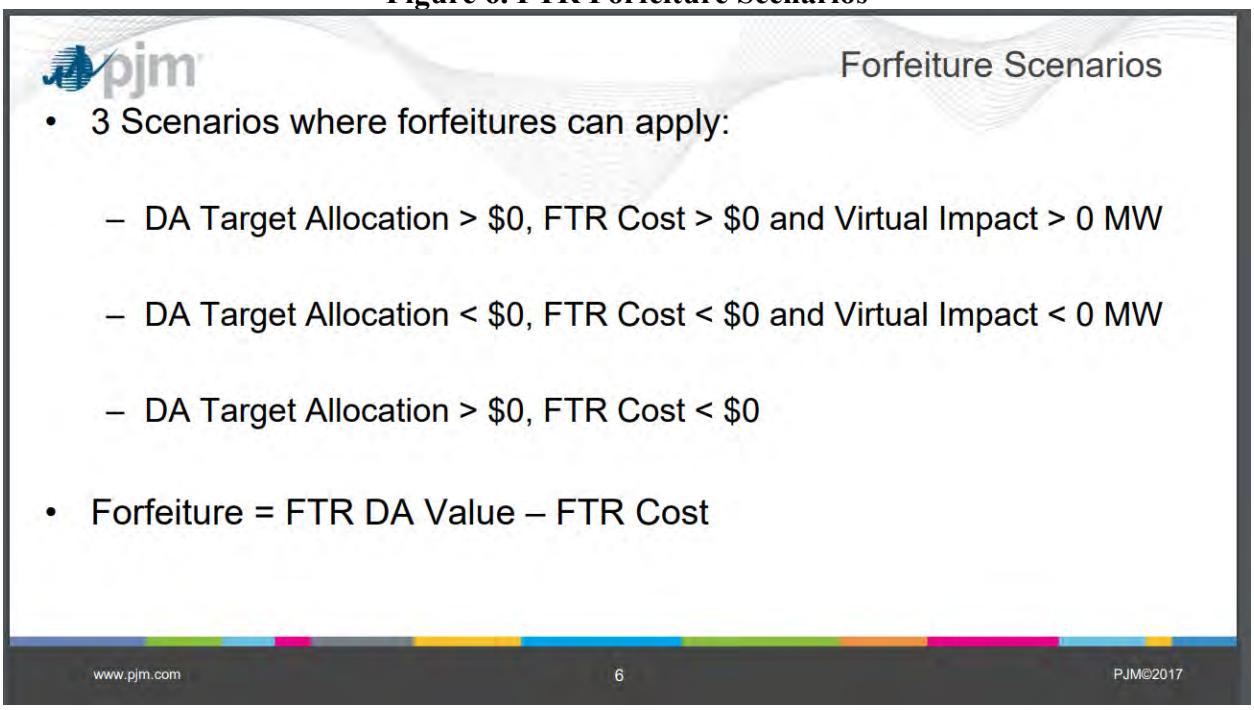
27. If we consider this scenario under the current FTR Forfeiture Rule (i.e., where a prevailing flow impact was identified and the FTR has a positive target allocation and negative auction cost),

[17] PJM Manual 06 at 8.6 ((Revision:17; Effective Date: June 1, 2016) (emphasis added), available at https://pjm.com/-/media/documents/manuals/archive/m06/m06v17-financial-transmission-rights-06-01-2016.ashx.

the negative auction cost will increase the forfeiture value. While modifying the rule to include counterflows FTRs, PJM mistakenly changed the forfeiture calculation for prevailing flow FTRs. Although flawed, the prior logic was at least directionally consistent. The new logic is not directionally consistent, leading to the forfeiture of revenues that cannot be rationally linked to the constraint identified by the Virtual Portfolio Test.

28. PJM described three new scenarios where forfeitures can result (see Figure 6).[18]

Figure 6. FTR Forfeiture Scenarios



29. The first two scenarios are directionally consistent and follow the previously applied logic. The third scenario is not directionally consistent, resulting in unjust and unreasonable forfeitures. If a prevailing flow impact is identified, the FTR cost from the constraint should be assumed to be greater than zero and the forfeiture should be limited to the positive target allocation. If a

[18] PJM, *FTR Forfeiture FERC Order MIC Update* at 6 (April 12, 2017), available at: (http://www.pjm.com/~/media/committees-groups/committees/mic/20170412/20170412-item-17a-ftr-forfeiture-ferc-order-update.ashx).

counterflow impact is identified, the FTR target allocation from the constraint should be assumed to be negative and the forfeiture should be limited to the negative auction cost (credit). PJM's assumption that the FTR benefited from the same constraint in both the auction and the day-ahead market, resulting in the forfeiture of both streams of revenue, is unjust and unreasonable. As shown in Table 4, scenario 3, XO Energy has incurred substantial forfeitures when both the target allocation is positive and the auction cost is negative.

Table 4. XO Energy FTR Forfeitures by Scenario Type

Scenario	Total Forfeiture	Auction Revenue Forfeiture	Target Allocation Forfeiture
1	$2,374,671	$0	$2,374,671
2	$142,205	$142,205	$0
3	$2,057,161	$619,137	$1,438,024
Total	$4,574,036	$761,342	$3,812,694

30. PJM should not be able to assess forfeitures of positive target allocations AND negative auction costs at the same time (i.e., it should only be one or the other). If the calculation was applied by constraint, and the constraint specific target allocation and the constraint specific auction cost were used, the actual profits resulting from the constraint would be revealed; no assumptions would be necessary.[19] This would lead to directionally consistent forfeitures being applied across all scenarios.

VII. Constraint Specific Forfeitures

31. Historically, PJM used a path-by-path approach to determine which individual FTRs should be forfeited. PJM also uses a path-based convergence test, which calculates forfeitures using the total day-ahead MCC and total FTR cost. Continuing to conduct the tests in this manner

[19] See comparison of calculations using total values versus constraint-specific values in Table 6 and Table 7.

is illogical. The Virtual Portfolio Test is designed to detect increased volume on a specific constraint across all transactions. The logical next step is to evaluate FTRs based on the same specific constraint and across all FTRs.

32. By way of example, using the actual forfeitures that XO Energy incurred on February 11, 2018, we can demonstrate how the forfeiture rule could be modified to accurately calculate forfeitures using constraint-specific contributions in lieu of total values. In the February 2018 FTR auction, XO Energy cleared positions on four FTR paths that represented the company's entire portfolio for February. On February 11, 2018, during HE 20, XO Energy's virtual activity triggered the Virtual Portfolio Test, identifying that we had a prevailing flow position on the *LAKVEW 138 KV LAK-GRE1* constraint (see Table 5). This constraint bound in the day-ahead market and the February auction with a shadow price of $11.04 and $36.90, respectively.[20] The constraint did not bind in real-time market during HE 20.[21]

Table 5. Constraint Shadow Prices for February 11, 2018 HE 20

Hour Ending	Constraint	Auction Shadow	DA Shadow	RT Shadow	Virtual Portfolio Direction
20	LAKVEW 138 KV LAK-GRE1	$36.90	$11.04	$0.00	Prevailing

33. After the constraint was identified by the Virtual Portfolio Test, each of the four FTR paths was evaluated to determine whether it was in the direction that would increase the value of the FTR Path. The FTR Impact Test, which quantifies the exact contribution from the constraint, is the determining factor. Paths 2, 3 and 4 each had a positive (i.e., prevailing flow) congestion

[20] The 2018 February FTR auction off-peak shadow price was -$24,783.83. In order to calculate the equivalent hourly shadow price of -$36.90, -$24,783.83 is divided by the number of hours in the month (i.e., 672).

[21] The DFAX used in this example is based on a real-time isolation from February 2, 2018 13:00.

component, but only Path 2 failed the path-based convergence test where the total day-ahead MCC was greater than the total real-time MCC (see Table 6).[22]

Table 6: XO Energy's Forfeitures Using Total Day-Ahead MCC and Total FTR Cost

#	Source	Sink	Cleared MW	FTR Cost Total	DA MCC Total	RT MCC Total	DFAX	FTR Impact Test	Forfeit	Profit Total	Forfeiture Total
1	WESTERN HUB	AEP-DAYTON HUB	50	-$6.17	-$0.30	$0.00	-0.023	-$0.25	0	$293	$0
2	JUNIATA	CONEMAUGH	50	-$5.63	$1.57	$0.00	0.002	$0.02	1	$360	$360
3	BEDINGTON	BLACKOAK	20	-$5.95	-$0.41	$0.00	0.001	$0.01	0	$111	$0
4	MEADOWBROOK	GREENLAND GAP	20	-$3.62	-$0.17	$0.00	0.000	$0.00	0	$69	$0
									Total	**$833**	**$360**

34. After the forfeiture candidates were determined, the forfeiture calculation was based on the difference between the total day-ahead MCC and total FTR cost. For example, the forfeiture of Path 2 is calculated as *($1.57 - -$5.63) * 50 MWh* for a total forfeiture of $360.21.

35. To demonstrate the calculation using constraint-specific values, the total day-ahead MCC, total real-time MCC, and total FTR costs are replaced with the constraint-specific contribution from the *LAKVEW 138 KV LAK-GRE1* constraint. The constraint-specific day-ahead MCC is calculated as the *day-ahead shadow price * DFAX* for each path. The real-time MCC is equal to the *real-time shadow price * DFAX* for each path. The FTR cost is calculated as the *auction shadow price * DFAX* for each path (see Table 7).

Table 7: XO Energy Simulated Forfeitures Based on Constraint-Specific Day-Ahead MCC and Constraint-Specific FTR Cost

#	Source	Sink	Cleared MW	FTR Cost Constraint	DA MCC Constraint	RT MCC Constraint	DFAX	FTR Impact Test	Forfeit	Profit Constraint	Forfeiture Constraint
1	WESTERN HUB	AEP-DAYTON HUB	50	-$0.84	-$0.25	$0.00	-0.023	-$0.25	0	$30	$0
2	JUNIATA	CONEMAUGH	50	$0.07	$0.02	$0.00	0.002	$0.02	0	-$2	$0
3	BEDINGTON	BLACKOAK	20	$0.04	$0.01	$0.00	0.001	$0.01	0	-$1	$0
4	MEADOWBROOK	GREENLAND GAP	20	$0.01	$0.00	$0.00	0.000	$0.00	0	$0	$0
									Total	**$27**	**$0**

36. If the current logic is applied using the constraint-specific contributions, the resulting forfeiture is zero. Path 1 is still excluded because it is in the opposite direction of the virtual

[22] Path 1 was not subject to forfeiture because the FTR Impact Test determined that this path was not in the same direction as the virtual portfolio (i.e., FTR Impact Test <= -$0.01).

portfolio. Each of Paths 2, 3 and 4 fail the convergence test because the constraint did not bind in real-time and the day-ahead MCC was greater than the real-time MCC. This example demonstrates that when constraint-specific values are used, a loss of $2 on Path 2 is calculated and a forfeiture is not triggered. This result counters the original forfeiture calculation of $360 in alleged profits. The same logic would apply to Paths 3 and 4, resulting in losses. The use of the constraint-specific values reveals the actual profits for each FTR path as well as the entire portfolio. The use of the total day-ahead MCC, total real-time MCC and total FTR costs masks these underlying contributions, leading to erroneous forfeitures and the incorrect profit calculation as a result of the constraint triggered in the Virtual Portfolio Test.

VIII. FTR Portfolio Analysis

37. The application of the FTR Forfeiture Rule on a path-by-path basis results in an unjust and unreasonable outcome because the forfeiture calculation does not account for any offsetting positions from other paths and does not quantify the net position or direction of the portfolio of FTRs. As currently implemented, the rule uses path-by-path filters that remove unprofitable FTR paths, FTR paths that are converging, or paths that oppose the direction of the virtual portfolio. All aspects of this implementation are incorrect. The FTR profits from a constraint cannot be determined without accounting for all of the FTRs in the portfolio. The rule incorrectly selects individual paths, leading to poor assessments of profitability and grossly overstated forfeitures. The four-path portfolio example reveals this issue, however, the problem is exacerbated as the number of paths increases.

38. The forfeiture rule does not correctly account for the profits and losses associated with a binding constraint because it does not apply FERC's principles:

> Under the current rule, when individual transactions are evaluated in isolation, the forfeitures are based on a single transaction's contribution to flow across a constraint. This may lead to forfeitures from some participants who have offsetting positions elsewhere and thus whose virtual transactions did not actually impact the constraint. Likewise, the rule may fail to invoke forfeiture on some participants who do not impact the constraint with a single transaction but have additive positions elsewhere that, on net, do impact the constraint significantly. Thus, PJM's current methodology, which considers each virtual transaction in isolation, does not properly require forfeitures from those participants whose virtual transactions impact their related FTR positions.[23]

39. Applying a portfolio approach to the same 4 path example depicted in Table 5, Table 6, and Table 7, reveals the flaw in the path-by-path based logic, which has been in place since the inception of the FTR Forfeiture Rule.

40. The FTR portfolio in Table 8 has a net 1.03 MWh counterflow, resulting in a profit of $27 because the auction shadow price ($36.90) exceeds the day-ahead shadow price ($11.04). This position is not profitable as a result of XO Energy's virtual activity. This position is in the opposite direction to XO Energy's prevailing-flow virtual portfolio and, therefore, no forfeitures be assessed.

Table 8: XO Energy's Net FTR Position on *LAKVEW 138 KV LAK-GRE1*
(Feb. 11, 2018 HE 20)

Hour Ending	Constraint	FTR Flow	Auction Shadow	DA Shadow	FTR Profit	FTR Portfolio Direction	Virtual Portfolio Direction
20	LAKVEW 138 KV LAK-GRE1	-1.03	$36.90	$11.04	$27	CounterFlow	Prevailing

41. The example above demonstrates the steps of a constraint-specific portfolio approach. While this example highlights the errors in the current calculation methods of the rule, the severity becomes more apparent when a complicated example comprised of hundreds of FTR paths is used.

[23] *PJM Interconnection, L.L.C., et al.,* 158 FERC ¶ 61,038 at P 58 (2017) (the "January 19, 2017 Order").

IX. Roxana – Praxair Forfeitures (October 2019)

42. XO Energy acquired positions for October 2019 across three different auctions. In total, XO Energy acquired 922 off-peak paths and 985 on-peak paths. The net flow from XO Energy's portfolio across the *Roxana-Praxair* constraint was 1.3 MWh off-peak and 0.43 MWh on-peak in the counter-flow direction (see Table 9).[24]

Table 9: Net FTR Position across the *Roxana-Praxair* Constraint (October 2019)

Peak Type	Paths	Constraint Name	Net Flow
Off	922	Roxana-Praxair 1 138 kV l/o Wilton Center-Dumont 765 kV	-1.30
On	985	Roxana-Praxair 1 138 kV l/o Wilton Center-Dumont 765 kV	-0.43

43. The majority of these paths were acquired in the 2019/2020 Annual FTR Auction.[25] The *Roxana-Praxair* constraint did not bind in any auction in which XO Energy acquired these positions, indicating that the constraint-specific auction credit to acquire the counterflow position was zero (see Table 10).

[24] The analysis of the *Roxana-Praxair* constraint relies on a DFAX isolation taken from October 12, 2019 17:25.

[25] The total paths per auction do not add up to the total unique paths across all auctions because the same path can be acquired across multiple auctions.

Table 10: XO Energy's Net FTR Position for *Roxana-Praxair* by Auction (October 2019)

Auction	Period	Peak Type	Paths	Net Flow	Auction Shadow
19/20 Annual Auction	All	Off	731	1.97	$0.00
AUG 2019 Auction	Q2	Off	99	-0.12	$0.00
OCT 2019 Auction	OCT	Off	95	-3.15	$0.00
			Total	-1.30	$0.00
19/20 Annual Auction	All	On	814	-0.50	$0.00
AUG 2019 Auction	Q2	On	91	-0.05	$0.00
OCT 2019 Auction	OCT	On	88	0.12	$0.00
			Total	-0.43	$0.00

44. Across 242 hours in October 2019, XO Energy incurred forfeitures of $142,666. This figure represents the company's largest forfeiture on a single constraint during a given month. In order to understand how XO Energy incurred such significant forfeitures, I analyzed each hour and discovered that the company did not receive any profits from the underlying constraint. In order to demonstrate the inherent flaws in the current implementation of the FTR Forfeiture Rule, I grouped each of the 242 hours into five specific examples. The examples are summarized in Table 11 and described in greater detail below.

Table 11: XO Energy Forfeiture Summary from *Roxana-Praxair* (October 2019)

Example	Description	Hours	Total Forfeiture	Constraint Profit
1	Total Forfeitures	242	$142,466	-$88,736
2	Virtual and FTR Portfolios in Different Directions	108	$100,104	-$50,006
3	Convergence (Virtual Acitivity Profitable)	121	$27,978	-$44,197
4	Virtual Flow < 10% of Physical Line Limit	171	$82,109	-$60,720
5	Financial Leverage Not Present	232	$139,986	-$85,180

Example 1: The forfeitures across 242 hours during the month of October 2019 totaled $142,466. The precise calculation of constraint-specific profits across the entire portfolio resulted in a net loss of $88,736. As depicted in Table 12, XO Energy's net FTR position was counterflow, indicating that for every hour this constraint bound in day-ahead, XO Energy incurred a loss. During all 242 hours in which forfeitures incurred, XO Energy incurred a loss from this constraint.

45. To better understand how a forfeiture can occur when a net position results in a loss, I separated XO Energy's net FTR positions across all paths into prevailing flow and counterflow

paths (see Table 12). The constraint-specific revenues associated with each direction are also provided.

Table 12: Breakdown of FTR paths by Direction and Constraint-Specific Revenues from the *Roxana-Praxair* Constraint

Peak Type	Hours	Paths	Prevailing Flow Paths	Prevailing Flow MW	Prevailing Flow Revenue	Counter Flow Paths	Counter Flow MW	Counter Flow Revenue	Net Flow	Net Revenue	Forfeiture
Off	194	922	395	5.9	$365,498	527	-7.2	-$445,802	-1.30	-$80,304	$128,757
On	48	985	408	2.3	$45,501	577	-2.7	-$53,932	-0.43	-$8,431	$13,709
					$410,998			-$499,734		-$88,736	$142,466

46. When the *Roxana-Praxair* constraint binds, a prevailing flow position benefits and a counterflow position is harmed; thus, XO Energy's prevailing flow positions received revenues of $410,998, while the counterflow positions incurred losses of $499,734. The net revenue related to this constraint is the difference between XO Energy's counterflow and prevailing flow paths, or a loss of $88,736. Despite this loss, forfeitures were still incurred because the current rule does not evaluate FTRs as a portfolio, rather, it selects from one bucket while ignoring the other. For example, if a virtual portfolio is in the prevailing flow direction, the current forfeiture targets the revenues from the prevailing flow FTR paths only. The rule ignores counterflow FTRs because they are in the opposite direction of the virtual portfolio. Furthermore, the path-specific filtering logic (i.e., FTR path convergence test, FTR Impact Test, and total profit assessment) further subdivides the prevailing flow FTRs into select sets of FTRs that will be forfeited (see Table 13).

Table 13: XO Energy Forfeitures from *Roxana-Praxair* Constraint (October 3, 2019 HE 7)

FTR Direction	Virtual Direction	Forfeit	Paths	FTR Flow	Total Profit	Constraint Profit	Forfeiture
PrevailingFlow	PrevailingFlow	1	38	5.0	$4,234	$1,161	$4,234
PrevailingFlow	PrevailingFlow	0	357	0.9	-$882	$209	$0
CounterFlow	PrevailingFlow	0	527	-7.2	-$4,779	-$1,671	$0
			922	-1.30	-$1,426	-$301	$4,234

47. Table 13 demonstrates that, in this particular hour (i.e., October 3, 2019 HE 7), only 38 of XO Energy's 395 prevailing flow paths were selected for forfeiture. Of the 5.9 MWh of prevailing flow FTRs, 5 MWh was forfeited; the total profit forfeited for these 38 paths was $4,234. The actual constraint-specific profit across the same 38 paths was $1,161. The current forfeiture rule uses the total day-ahead MCC and the total FTR auction cost to determine the alleged profits, resulting in a gross overstatement of the profits associated with these paths. Furthermore, the path-based forfeiture selection and resulting forfeitures are incorrect. In this hour, XO Energy's portfolio had a net counterflow of 1.3 MWh, resulting in a loss of $301. The $4,234 forfeiture is not only punitive, it is incorrect. The current rule presumes that a participant can increase the value of a subset of FTR paths, while remaining unharmed by its offsetting and losing positions. This is a fundamental flaw in the rule.

48. As shown in Table 13, while XO Energy's prevailing flow positions received $1,370 (i.e., $1,161 + $209) in revenues, the company's counterflow FTRs over-offset the gain with a $1,671 loss. A forfeiture rule that ignores offsetting positions within a portfolio is fundamentally flawed since it results in forfeitures of profits that do not exist. Worse yet, the forfeiture of 5 MWh of prevailing flow across 38 paths is punitive, exacerbating a losing position (see Table 14).

Table 14: Effective Value of FTRs after the Forfeiture of 38 Paths (October 3, 2019 Hour Ending 7)

FTR Direction	Virtual Direction	Forfeit	Paths	FTR Flow	Total Profit	Constraint Profit	Forfeiture
PrevailingFlow	PrevailingFlow	0	357	0.9	-$882	$209	$0
CounterFlow	PrevailingFlow	0	527	-7.2	-$4,779	-$1,671	$0
			884	-6.30	-$5,660	-$1,462	$0

49. After the forfeiture of 5 MWh of prevailing flow across 38 paths, XO Energy's FTR portfolio is now a net counterflow of 6.3 MWh. XO Energy's original loss of $301 across its

portfolio is aggravated by the removal of prevailing flow FTRs, resulting in a loss of $1,462 from this constraint.

Example 2: Across 108 hours, XO Energy's FTR Portfolio was in the opposite direction of its virtual portfolio, a clear indication that the company's FTRs could not benefit from its virtual activity. Forfeitures should have been assessed, however, XO Energy incurred forfeitures of $100,104.

50. As described in Example 1, the failure to apply a portfolio approach to FTRs results in the incorrect assessment of both direction and profits. While individual FTR paths may be prevailing flow, without incorporating offsetting paths and determining the net direction of the entire FTR portfolio, an assessment of benefit cannot be determined. As evidence, XO Energy incurred forfeitures when its FTR portfolio was in the opposite direction of its virtual portfolio. During 108 hours in October 2019, XO Energy's virtual portfolio was deemed to be prevailing flow, while the company's FTR portfolio was net counterflow. Nevertheless, a subset of XO Energy's prevailing flow FTRs was forfeited, totaling $100,104. Indeed, the company's entire portfolio across all paths resulted in a constraint-specific loss of $50,006 (see Table 15). The scenario illustrated in Table 15 violated the January 19, 2017 Order that virtual and FTR positions must be in the same direction in order to benefit.

Table 15: XO Energy's Forfeitures from the *Roxana-Praxair* Constraint when FTR and Virtual Portfolios are in Opposite Directions (October 2019)

Peak Type	FTR Direction	Virtual Direction	FTR Net Position (MW)	Virtual Net Position (MW)	Hours	Constraint Profit	Forfeiture
Off	CounterFlow	PrevalingFlow	-1.30	10.7	81	-$44,189	$87,081
On	CounterFlow	PrevalingFlow	-0.43	10.0	27	-$5,818	$13,023
					108	-$50,006	$100,104

51. XO Energy should not have incurred $100,104 in forfeitures during hours in which its portfolios were in opposite directions. After examining the hours in which the company's portfolios were in the same direction, I uncovered additional flaws in the forfeiture rule. XO

Energy's portfolios were in the same direction during 134 hours, resulting in an additional forfeiture of $42,362 (see Table 16).

Table 16: XO Energy's Forfeitures from the *Roxana-Praxair* Constraint when FTR and Virtual Portfolios were in the Same Direction (October 2019)

Peak Type	FTR Direction	Virtual Direction	FTR Net Position (MW)	Virtual Net Position (MW)	Hours	Constraint Profit	Forfeiture
Off	CounterFlow	CounterFlow	-1.30	-11.4	113	-$36,115	$41,675
On	CounterFlow	CounterFlow	-0.43	-15.6	21	-$2,614	$686
					134	-$38,729	$42,362

52. The most obvious discrepancy in these forfeitures is that, while XO Energy forfeited $42,362, the actual constraint-specific profit resulted in a loss of $38,729. This loss occurred because XO Energy's positions did not receive auction credits (see Table 10); a net counterflow loses money during each hour this constraint binds in the day-ahead market. The use of total day-ahead and total auction costs overstates the profits, resulting in the incorrect forfeiture of revenues that are not related to this constraint.

53. The determination of convergence at the FTR path level using the total day-ahead MCC and total real-time MCC, results in the incorrect assessment of XO Energy's profitable virtual activity across this constraint. With a counterflow virtual position, a day-ahead shadow price that is greater than a real-time shadow price indicates that the virtual position was profitable; reducing flow on this constraint serves to align the constraint shadow prices. During 101 of the 134 hours in which XO Energy incurred forfeitures, the related virtual activity was profitable, converging the day-ahead and real-time shadow prices (see Table 17).

Table 17: XO Energy's Forfeitures from the Roxana-Praxair Constraint when FTR and Virtual Portfolios are in the Same Direction and Virtual Activity is Profitable (October 2019)

Peak Type	FTR Direction	Virtual Direction	FTR Net Position (MW)	Virtual Net Position (MW)	Hours	Constraint Profit	Forfeiture
Off	CounterFlow	CounterFlow	-1.30	-9.7	84	-$24,704	$20,392
On	CounterFlow	CounterFlow	-0.43	-16.4	17	-$1,931	$462
					101	-$26,634	$20,854

54. During the remaining 33 hours, XO Energy's portfolios were in the same counterflow direction and the day-ahead shadow price diverged from the real-time shadow price (i.e., day-ahead<real-time). During 16 of these hours, XO Energy's virtual position was less than 10% of the physical line limit (see Table 18).

Table 18: XO Energy's Forfeitures from *Roxana-Praxair* Constraint when FTR and Virtual Portfolios are in the Same Direction and Virtual Flow is less than 10% of Physical Limit (October 2019)

Date	Hour Ending	Peak Type	DA Shadow	RT Shadow	Forfeiture	FTR Flow	Virtual Flow	Physical Line Limit	Percent Flow
10/7/2019	2	Off	$66.42	$68.31	$ 506.08	-1.30	-2.40	158	2%
10/11/2019	3	Off	$138.32	$145.53	$ 91.23	-1.30	-10.10	158	6%
10/15/2019	4	Off	$164.13	$749.79	$ 285.72	-1.30	-0.60	158	0%
10/15/2019	5	Off	$229.74	$732.61	$ 251.85	-1.30	-0.20	158	0%
10/15/2019	6	Off	$264.83	$1,056.12	$ 320.67	-1.30	-0.40	158	0%
10/15/2019	7	Off	$322.60	$1,198.25	$ 250.96	-1.30	-8.90	158	6%
10/15/2019	8	Off	$213.71	$291.06	$ 59.18	-0.43	-5.80	158	4%
10/18/2019	2	Off	$147.10	$684.12	$ 768.61	-1.30	-7.10	158	4%
10/18/2019	3	Off	$172.00	$675.65	$1,106.45	-1.30	-6.10	158	4%
10/18/2019	4	Off	$266.10	$560.04	$ 980.50	-1.30	-6.60	158	4%
10/18/2019	5	Off	$372.06	$1,205.43	$ 956.22	-1.30	-14.00	158	9%
10/18/2019	6	Off	$486.47	$1,740.12	$ 883.77	-1.30	-11.60	158	7%
10/18/2019	7	Off	$572.17	$1,290.93	$ 957.06	-1.30	-13.70	158	9%
10/20/2019	11	Off	$312.34	$467.45	$ 11.02	-1.30	-1.80	158	1%
10/20/2019	12	Off	$299.83	$699.17	$ 132.65	-1.30	-2.30	158	1%
10/21/2019	19	Off	$976.88	$1,559.85	$ 69.41	-0.43	-1.20	158	1%

55. The FTR Forfeiture Rule uses the FFE in place of the physical line limit, even though the Tariff language and the January 19, 2017 Order state that the trigger must be a percent of the physical line limit. XO Energy's forfeitures totaled $7,631 during these 16 hours (see Table 19).

Table 19: Summary of Forfeitures from *Roxana-Praxair* Constraint when FTR and Virtual Portfolios are in the Same Direction and Virtual Flow is less than 10% of Physical Limit (October 2019)

Peak Type	FTR Direction	Virtual Direction	FTR Net Position (MW)	Virtual Net Position (MW)	Hours	Constraint Profit	Forfeiture
Off	CounterFlow	CounterFlow	-1.30	-6.1	14	-$4,950	$7,503
On	CounterFlow	CounterFlow	-0.43	-3.5	2	-$510	$129
					16	-$5,460	$7,631

56. Finally, in the remaining 17 hours, the size of XO Energy's virtual portfolio exceeded its FTR portfolio and leverage did not exist. Any perceived gain on the FTR position is outweighed by the losses related to the real-time shadow price being greater than the day-ahead shadow price (see Table 20).

Table 20: XO Energy's Forfeitures from the Roxana-Praxair Constraint when FTR and Virtual Portfolios are in the Same Direction and Financial Leverage Does Not Exist (October 2019)

Date	Hour Ending	Peak Type	DA Shadow	RT Shadow	Forfeiture	FTR Flow	Virtual Flow	Leverage
10/11/2019	7	Off	$230.92	$328.83	$ 114.91	-1.30	-20.40	No
10/18/2019	22	On	$198.14	$1,121.83	$ 48.03	-0.43	-19.40	No
10/18/2019	23	On	$205.43	$937.83	$ 47.70	-0.43	-22.40	No
10/18/2019	24	Off	$198.71	$1,441.20	$ 42.49	-1.30	-17.40	No
10/19/2019	1	Off	$288.86	$1,333.31	$1,655.88	-1.30	-21.60	No
10/19/2019	2	Off	$311.99	$1,983.45	$1,332.44	-1.30	-26.60	No
10/19/2019	3	Off	$315.29	$1,999.34	$1,551.77	-1.30	-27.00	No
10/19/2019	4	Off	$324.45	$1,952.82	$1,390.21	-1.30	-30.30	No
10/19/2019	5	Off	$411.29	$1,859.56	$1,393.55	-1.30	-31.20	No
10/19/2019	6	Off	$424.94	$1,300.83	$1,492.19	-1.30	-27.70	No
10/19/2019	7	Off	$421.33	$1,696.75	$1,945.97	-1.30	-28.90	No
10/19/2019	8	Off	$331.31	$1,315.54	$2,202.06	-1.30	-31.20	No
10/19/2019	10	Off	$254.74	$304.62	$ 499.37	-1.30	-31.20	No
10/20/2019	4	Off	$327.49	$413.29	$ 9.30	-1.30	-21.30	No
10/20/2019	5	Off	$389.38	$634.25	$ 28.00	-1.30	-23.10	No
10/20/2019	6	Off	$390.91	$1,358.58	$ 40.35	-1.30	-23.30	No
10/20/2019	7	Off	$357.96	$1,146.00	$ 82.11	-1.30	-20.50	No

57. XO Energy incurred a significant loss as a result of counterflowing the real-time constraint in the day-ahead market with its virtual portfolio. XO Energy shifted 100% of its FTR position into the real-time market because real-time congestion was extremely volatile; the position incurred a loss. This loss served to discourage virtual activity. XO Energy did not have financial

leverage to offset the loss incurred on its virtual position. Furthermore, even when financial leverage is present, counterflowing a constraint does not ensure profits. A participant has no control over the value of the real-time shadow price. Without this control, there is little incentive to counterflow a constraint in order to improve the profitability of an FTR position, unless the auction revenue or auction shadow price greatly exceeds the volatility of the real-time congestion (i.e., maximum shadow price of $2000). The auction credit related to this constraint was zero, indicating that there was no incentive to counterflow the constraint with the intention of increasing the value of an FTR position. Despite incurring a loss, XO Energy forfeited $13,876 of alleged FTR profits during the same 17 hours (see Table 21).

Table 21: Summary of Forfeitures from *Roxana-Praxair* Constraint when FTR and Virtual Portfolios are in the Same Direction and Financial Leverage Does Not Exist (October 2019)

Peak Type	FTR Direction	Virtual Direction	FTR Net Position (MW)	Virtual Net Position (MW)	Hours	Constraint Profit	Forfeiture
Off	CounterFlow	CounterFlow	-1.30	-25.5	15	-$6,462	$13,781
On	CounterFlow	CounterFlow	-0.43	-20.9	2	-$173	$96
					17	-$6,635	$13,876

58. XO Energy has demonstrated that each of the 242 hours forfeited from the *Roxana-Praxair* constraint during October 2019 was erroneously incurred. Although the failure to use a portfolio approach in order to determine direction caused many of the above-described issues, forfeitures were triggered in the remaining hours when there was (i) profitable, efficiency-enhancing virtual trading, (ii) *de minimus* virtual flow contributions less than 10% of the physical limit, and (iii) no financial leverage. These issues are described in the following 3 examples.

Example 3: During half of the hours when XO Energy forfeited alleged profits, the company's virtual activity was profitable. Convergence is defined using the day-ahead and real-time constraint shadow prices. Prevailing flow virtual activity is profitable when the day-ahead shadow price is less than the real-time shadow price. Counterflow virtual activity is profitable when the day-ahead shadow price is greater than the real-time shadow price. The current forfeiture rule does not a basic test for convergence, leading to $27,978 of incorrectly assessed forfeitures across 121 hours. This example highlights the flaws in the FTR path convergence test based on total day-ahead and total real-time MCC.

59. As described in Example 2, XO Energy incurred forfeitures during hours in which the company's virtual activity was profitable and in the direction to converge day-ahead and real-time shadow prices. The current forfeiture rule uses inefficient, path-based convergence checks that represent the contributions from all constraints rather than the individual constraint that was triggered by the Virtual Portfolio Test. The comparison of the total day-ahead MCC to the total real-time MCC results in the frequent trigger of forfeitures when the total day-ahead MCC exceeds the real time MCC. The use of the total day-ahead and total real-time MCC conceals the underlying specific constraint contribution, leading to forfeitures when the virtual activity on the constraint detected under the Virtual Portfolio Test is, in fact, converging, profitable, and efficiency-enhancing.

60. On October 16, 2019 HE 9, XO Energy forfeited 33 FTR paths for a total of $2,104. Each of these 33 paths failed the path-based convergence check that compared the total day-ahead MCC to the total real-time MCC. If these paths are compared to the constraint-specific day-ahead MCC and real-time MCC, none fail the convergence check. Table 22 illustrates a comparison of the path-based convergence check using total and constraint-specific values.

Table 22: Comparison of the Convergence Check using (i) Total Day-Ahead and Total Real-Time MCC and (ii) Constraint-Specific Day-Ahead and Real-Time MCC from the *Roxana-Praxair* Constraint (October 19, 2019 HE 9)

Source	Sink	DA MCC Total	RT MCC Total	DA > RT Total	Forfeiture	DA Shadow	RT Shadow	DFAX	DA MCC Constraint	RT MCC Constraint	DA > RT Constraint
107 DIXO138 KV DIXONLEE	154 LIBE138 KV COUNTYLF	$22.69	-$0.09	TRUE	$776.73	$232.71	$43.22	-0.0018	-$0.42	-$0.08	FALSE
BATAVIA	120 LOMB138 KV TR74 12	$4.10	-$0.03	TRUE	$119.52	$232.71	$43.22	-0.0008	-$0.18	-$0.03	FALSE
6 BYRON 25 KV BY-1	951 AURO18 KV AR-1	$12.05	-$0.05	TRUE	$106.47	$232.71	$43.22	-0.0007	-$0.16	-$0.03	FALSE
ROCK FALLS	11 FISK 12 KV FK34	$27.64	-$0.40	TRUE	$83.50	$232.71	$43.22	-0.0087	-$2.02	-$0.37	FALSE
ROCK FALLS	11 FISK 12 KV FK31	$27.64	-$0.40	TRUE	$83.50	$232.71	$43.22	-0.0087	-$2.02	-$0.37	FALSE
ROCK FALLS	11 FISK 12 KV FK33	$27.65	-$0.39	TRUE	$82.84	$232.71	$43.22	-0.0086	-$2.01	-$0.37	FALSE
BATAVIA	120 LOMB138 KV TR72 12	$2.70	-$0.03	TRUE	$78.60	$232.71	$43.22	-0.0008	-$0.18	-$0.03	FALSE
951 AURO18 KV AR-2	120 LOMB138 KV TR74 12	$3.24	-$0.02	TRUE	$55.95	$232.71	$43.22	-0.0007	-$0.15	-$0.03	FALSE
H440N 138 KV TR1 12	194 SABR138 KV TR73 12	$14.02	-$0.04	TRUE	$54.34	$232.71	$43.22	-0.0007	-$0.16	-$0.03	FALSE
H440N 138 KV TR1 12	194 SABR138 KV TR71 12	$14.02	-$0.04	TRUE	$54.34	$232.71	$43.22	-0.0007	-$0.16	-$0.03	FALSE
H440N 138 KV TR2 12	194 SABR138 KV TR73 12	$14.02	-$0.04	TRUE	$54.34	$232.71	$43.22	-0.0007	-$0.16	-$0.03	FALSE
ROCHELLE	194 SABR138 KV TR71 12	$14.02	-$0.04	TRUE	$51.68	$232.71	$43.22	-0.0007	-$0.16	-$0.03	FALSE
ROCHELLE	194 SABR138 KV TR73 12	$14.02	-$0.04	TRUE	$51.68	$232.71	$43.22	-0.0007	-$0.16	-$0.03	FALSE
951 AURO18 KV AR-4	120 LOMB138 KV TR72 12	$2.86	-$0.03	TRUE	$51.41	$232.71	$43.22	-0.0008	-$0.18	-$0.03	FALSE
942 NELS18 KV GT1	1 LASALL24 KV LA-1	$33.65	-$0.05	TRUE	$40.24	$232.71	$43.22	-0.0001	-$0.01	$0.00	FALSE
6 BYRON 25 KV BY-2	194 SABR138 KV TR73 12	$3.22	-$0.01	TRUE	$39.03	$232.71	$43.22	-0.0001	-$0.02	$0.00	FALSE
6 BYRON 25 KV BY-1	194 SABR138 KV TR73 12	$3.22	-$0.01	TRUE	$39.03	$232.71	$43.22	-0.0001	-$0.02	$0.00	FALSE
6 BYRON 25 KV BY-1	194 SABR138 KV TR71 12	$3.22	-$0.01	TRUE	$39.03	$232.71	$43.22	-0.0001	-$0.02	$0.00	FALSE
BATAVIA	951 AURO18 KV AR-1	$0.86	-$0.01	TRUE	$34.63	$232.71	$43.22	-0.0001	-$0.03	-$0.01	FALSE
WELLSBORO	908 MOLE34.5 KV MINONKWF	$8.55	$2.71	TRUE	$32.87	$232.71	$43.22	-0.0240	-$5.58	-$1.04	FALSE
951 AURO18 KV AR-1	120 LOMB138 KV TR72 12	$1.84	-$0.02	TRUE	$31.53	$232.71	$43.22	-0.0007	-$0.15	-$0.03	FALSE
NWTN PJM24 KV UN1 IMEA	PRST CE 345 KV UN1 I	$1.70	-$0.02	TRUE	$27.37	$232.71	$43.22	-0.0018	-$0.41	-$0.08	FALSE
COMED	13 CRAWF138 KV ATR57R04	$2.36	-$0.05	TRUE	$24.01	$232.71	$43.22	-0.0002	-$0.04	-$0.01	FALSE
COMED	13 CRAWF138 KV TR74 12	$2.20	-$0.11	TRUE	$22.69	$232.71	$43.22	-0.0014	-$0.32	-$0.06	FALSE
COMED	13 CRAWF138 KV SVC200	$1.99	-$0.05	TRUE	$20.23	$232.71	$43.22	-0.0002	-$0.04	-$0.01	FALSE
COMED_RESID_AGG	13 CRAWF138 KV ATR57R04	$2.33	-$0.04	TRUE	$11.88	$232.71	$43.22	-0.0002	-$0.04	-$0.01	FALSE
COMED_RESID_AGG	13 CRAWF138 KV TR74 12	$2.17	-$0.10	TRUE	$11.22	$232.71	$43.22	-0.0013	-$0.31	-$0.06	FALSE
COMED_RESID_AGG	13 CRAWF138 KV SVC200	$1.96	-$0.04	TRUE	$9.99	$232.71	$43.22	-0.0002	-$0.04	-$0.01	FALSE
WSHORE 69 KV COTU-1	3 POWERT24 KV PO-6	$12.12	$3.75	TRUE	$7.42	$232.71	$43.22	-0.0230	-$5.36	-$0.99	FALSE
SQUABHOL230 KV SVC	908 MOLE34.5 KV MINONKWF	$6.67	$1.65	TRUE	$2.58	$232.71	$43.22	-0.0239	-$5.57	-$1.03	FALSE
539 WVIL138 KV TR73 12	951 AURO13.5 KV AR-6	$0.88	$0.00	TRUE	$2.46	$232.71	$43.22	-0.0001	-$0.03	-$0.01	FALSE
559 WOOD138 KV GVGRF	18 WILL 20 KV WC-4	$0.45	-$0.01	TRUE	$1.79	$232.71	$43.22	-0.0001	-$0.01	$0.00	FALSE
SHAWVILL22 KV UNIT 3	3 POWERT24 KV PO-6	$13.22	$2.16	TRUE	$1.47	$232.71	$43.22	-0.0231	-$5.39	-$1.00	FALSE

61. There were 121 incidents of forfeitures when XO Energy's virtual activity was in the direction to enhance convergence and was therefore profitable. The current rule incorrectly triggered forfeitures of $27,978 as a result of the inefficient use of convergence checks based on the total day-ahead and total real-time MCC.

62. XO Energy incurred forfeitures in 20 hours in which the company's virtual portfolio was profitable as a prevailing flow position, indicating that the real-time shadow price was higher than the day-ahead shadow price (see Table 23).

Table 23: Summary of Forfeitures from *Roxana-Praxair* Constraint when Prevailing Flow Virtual Activity was Profitable (October 2019)

PeakType	Virtual	FTR Net Position (MW)	Virtual Net Position (MW)	Hours	Constraint Profit (FTR)	Constraint Profit (Virtual)	Forfeiture
Off	Prevailing	-1.30	6.4	15	-$16,179	$39,207	$5,476
On	Prevailing	-0.43	4.9	5	-$1,383	$8,490	$1,648
				20	-$17,562	$47,697	$7,124

63. XO Energy incurred forfeitures in 101 hours in which its profitable virtual portfolio was a counterflow in the same direction as its FTR portfolio (see Table 24).

Table 24: Summary of Forfeitures from *Roxana-Praxair* Constraint when Counterflow Virtual Activity was Profitable (October 2019)

PeakType	Virtual	FTR Net Position (MW)	Virtual Net Position (MW)	Hours	Constraint Profit (FTR)	Constraint Profit (Virtual)	Forfeiture
Off	CounterFlow	-1.30	-9.7	84	-$24,704	$186,727	$20,392
On	CounterFlow	-0.43	-16.4	17	-$1,931	$53,927	$462
				101	-$26,634	$240,655	$20,854

64. Table 25 summarizes the day-ahead and real-time shadow prices across the hours in which XO Energy's virtual portfolio was in the direction to increase convergence, yet still incurred forfeitures. For 85 hours, the constraint did not bind in real-time (i.e., shadow price =0), providing further justification that the virtual portfolio direction was efficiency enhancing, profitable, and economically rational. Yet, XO Energy incurred $17,334 in forfeitures. The day-ahead and real-time shadow prices provided the correct incentive to justify the counterflow virtual position and the company's virtual portfolio was profitable during these hours.

Table 25: *Roxana-Praxair* Average Day-Ahead and Real-Time Shadow Prices when Virtual Activity was Profitable in the Counterflow Direction[26]

Row	Virtual Flow	DA Shadow	RT Shadow	Hours	Forfeiture
1	CounterFlow	$215.68	$0.00	85	$17,334
2	CounterFlow	$325.57	$181.71	16	$3,520
3	Total	$233.09	$28.79	101	$20,854

Example 4: During 171 hours, XO Energy's virtual portfolio was less than 10% of the physical transmission limit, yet the company incurred $82,109 in forfeitures. These forfeitures resulted from PJM's inconsistent use of FFEs for M2M constraints, despite the requirement to use the physical transmission limit.

65. During October 2019, XO Energy forfeited $82,109 of purported profits across 171 hours when the company's virtual portfolio was less than 10% of the physical line limit. Furthermore, 59% of these forfeitures occurred during hours when the virtual flow was less than five percent of the physical limit. PJM's inconsistent use of FFEs as the limit caused these improper forfeitures.[27] The use of FFEs triggers forfeitures when a participant's flow is significantly less than 10% of the physical limit. Table 26 provides a breakdown of forfeitures incurred under various percentages of the physical limit. For 26 hours, XO Energy's virtual portfolio was less than 1% of the physical limit, however, $5,023 in forfeitures were incurred.

[26] Row 1 shows the average day-ahead shadow price when the real-time shadow price was zero; row 2 shows the average day-ahead shadow price when the real-time shadow price was non-zero; and row 3 shows the day-ahead and real-time average across all 101 hours.

[27] PJM, *FTR Forfeitures* at 2 (August 8, 2018) ("August 2018 PJM Presentation"), available at: https://pjm.com/-/media/committees-groups/committees/mic/20180808/20180808-item-10a-ftr-forfeitures-education.ashx.

Table 26: Forfeitures when Virtual Flow < 10% of the Physical Limit of *Roxana-Praxair*[28]

Group	Hours	FTR Forfeiture	FTR Constraint Profit	Percent Of Total
<= 1%	26	$5,023	-$9,630	6%
<= 3%	76	$22,201	-$22,103	27%
<= 5%	122	$48,304	-$39,102	59%
<= 7%	141	$58,040	-$49,374	71%
< 10%	171	$82,109	-$60,720	100%

66. Table 27 sets forth the specific hours and virtual flow MWh when XO Energy's virtual portfolio was less than 1%, representing a *de minimis* impact of about 1 MWh or less.

Table 27: Forfeitures Incurred during 26 Hours when Virtual Flow is less than 1% of the Physical Limit of *Roxana-Praxair*

Date	Hour Ending	Peak Type	Virtual Direction	Virtual MW	FTR MW	FTR Forfeiture	FTR Constraint Profit
10/1/2019	10	OnPeak	CounterFlow	-0.80	-0.43	$30	-$102
10/2/2019	4	OffPeak	PrevailingFlow	1.10	-1.30	$21	-$144
10/3/2019	3	OffPeak	PrevailingFlow	1.10	-1.30	$9	-$272
10/3/2019	1	OffPeak	PrevailingFlow	1.10	-1.30	$193	-$694
10/3/2019	2	OffPeak	PrevailingFlow	1.00	-1.30	$11	-$845
10/5/2019	1	OffPeak	PrevailingFlow	1.00	-1.30	$234	-$169
10/5/2019	11	OffPeak	PrevailingFlow	0.00	-1.30	$39	-$257
10/5/2019	8	OffPeak	CounterFlow	-0.10	-1.30	$25	-$340
10/5/2019	10	OffPeak	CounterFlow	-1.00	-1.30	$135	-$281
10/7/2019	6	OffPeak	CounterFlow	-1.20	-1.30	$94	-$183
10/12/2019	4	OffPeak	PrevailingFlow	1.20	-1.30	$127	-$124
10/12/2019	3	OffPeak	PrevailingFlow	1.20	-1.30	$94	-$101
10/12/2019	7	OffPeak	PrevailingFlow	0.30	-1.30	$131	-$187
10/12/2019	8	OffPeak	PrevailingFlow	0.20	-1.30	$299	-$91
10/12/2019	9	OffPeak	CounterFlow	-0.80	-1.30	$502	-$64
10/13/2019	6	OffPeak	CounterFlow	-0.80	-1.30	$387	-$266
10/15/2019	5	OffPeak	CounterFlow	-0.20	-1.30	$252	-$298
10/15/2019	6	OffPeak	CounterFlow	-0.40	-1.30	$321	-$344
10/15/2019	3	OffPeak	CounterFlow	-0.50	-1.30	$6	-$167
10/15/2019	4	OffPeak	CounterFlow	-0.60	-1.30	$286	-$213
10/16/2019	1	OffPeak	PrevailingFlow	0.50	-1.30	$381	-$206
10/17/2019	24	OffPeak	PrevailingFlow	0.60	-1.30	$6	-$61
10/20/2019	18	OffPeak	PrevailingFlow	0.60	-1.30	$423	-$977
10/20/2019	20	OffPeak	CounterFlow	-0.10	-1.30	$472	-$1,400
10/21/2019	7	OffPeak	PrevailingFlow	0.70	-1.30	$475	-$1,426
10/21/2019	19	OnPeak	CounterFlow	-1.20	-0.43	$69	-$419
						$5,023	-$9,630

[28] In this example, the physical line limit of *Roxana-Praxair* is 158 MWh.

Example 5: During 232 hours, XO Energy's virtual portfolio was larger than its FTR portfolio and no leverage was present. Therefore, any benefit to an FTR position is grossly outweighed by a loss on its virtual portfolio. A participant cannot profit from a position that does not have financial leverage.

67. Financial leverage was not present during 232 of the 242 hours that XO Energy incurred forfeitures related to Roxana-Praxair (see Table 28).

Table 28: Forfeitures Incurred during Hours when Financial Leverage Did Not Exist

			Virtual Flow						
Virtual Direction	Peak Type	FTR Flow	Max	Avg	Min	Convergence Hours	Total Hours	FTR Forfeiture	FTR Constraint Profits
PrevailingFlow	Off	-1.3	47.7	10.7	0.0	15	81	$87,081	-$44,189
PrevailingFlow	On	-0.4	21.9	10.0	2.6	5	27	$13,023	-$5,818
CounterFlow	Off	-1.3	-35.8	-12.4	-1.6	77	103	$39,195	-$32,560
CounterFlow	On	-0.4	-30.2	-15.6	-0.8	17	21	$686	-$2,614
						114	232	$139,986	-$85,180

68. As described in Example 2, during any hour in which XO Energy's virtual portfolio was in the opposite direction of its FTR portfolio, it did not have the ability to increase the value of it FTR position and financial leverage did not exist. XO Energy forfeited $100,104 during 108 hours and none of these forfeitures are justified.

69. During 124 hours when XO Energy's FTR and virtual portfolios were in the counterflow direction, financial leverage did not exist, yet $39,882 in forfeitures was incurred. Financial leverage exists when an FTR position is greater than its virtual position. The size of XO Energy's virtual portfolio was never less than its FTR portfolio (see Table 28). XO Energy's off-peak FTR portfolio was a net counterflow of 1.3 MWh, while the smallest virtual portfolio counterflow during any hour was 1.6 MWh. Furthermore, during the 24 hours in which there was no financial leverage, over 75% of the hours of the company's virtual portfolio was profitable. The IMM described the goal of the forfeiture rule as follows:

> The goal of the FTR Forfeiture Rule . . . was and is to prevent manipulation of the market by market participants, taking frequently, losing, and relatively small virtual positions in order to make larger FTR positions profitable or more profitable.[29]

70. The analysis shown in Table 28 is in direct opposition to the goal of the forfeiture rule. XO Energy's virtual position was profitable in over 75% of the hours in which forfeitures incurred and was larger than its FTR position. During any hour in which the company's virtual portfolio incurred a loss, that loss outweighed any increase in FTR profits. Therefore, it was impossible for XO Energy to use its virtual portfolio to increase the value of its FTR portfolio, such that the net profit across both positions was positive.

71. During the remaining 10 hours when leverage was present, the virtual portfolio was *de minimus* and less than 10% of the physical limit (see Table 29). Furthermore, during 7 of the 10 hours, the virtual activity was profitable (i.e., the day-ahead shadow price was greater than the real-time shadow price). Any counterflow virtual activity would serve to lower the day-ahead shadow price such that it would align with the real-time shadowprice.

Table 29: Hours during which Financial Leverage is Present

Date	Hour Ending	Peak Type	Virtual Flow	FTR Flow	Leveraged MW	Auction Shadow	DA Shadow	RT Shadow	Convergence
10/5/2019	8	Off	-0.1	-1.30	-1.20	$0	$262	$46	TRUE
10/5/2019	10	Off	-1	-1.30	-0.30	$0	$217	$0	TRUE
10/7/2019	6	Off	-1.2	-1.30	-0.10	$0	$141	$23	TRUE
10/12/2019	9	Off	-0.8	-1.30	-0.50	$0	$49	$0	TRUE
10/13/2019	6	Off	-0.8	-1.30	-0.50	$0	$205	$0	TRUE
10/15/2019	3	Off	-0.5	-1.30	-0.80	$0	$129	$0	TRUE
10/15/2019	4	Off	-0.6	-1.30	-0.70	$0	$164	$750	FALSE
10/15/2019	5	Off	-0.2	-1.30	-1.10	$0	$230	$733	FALSE
10/15/2019	6	Off	-0.4	-1.30	-0.90	$0	$265	$1,056	FALSE
10/20/2019	20	Off	-0.1	-1.30	-1.20	$0	$1,079	$197	TRUE

72. There were only three hours during which the real-time shadow price was greater than the day-ahead shadow price and virtual activity was unprofitable (see Table 30).

[29] *See PJM Interconnection, LLC,* Docket No. EL14-37-000, Technical Conference Transcript at 13: 6-11 (Jan. 7, 2015) ("Technical Conference Transcript").

Table 30: Overall Profitability during Hours when Leverage was Present

Date	Hour Ending	Peak Type	Virtual Flow	FTR Flow	Auction Shadow	DA Shadow	RT Shadow	FTR Constraint Profit	Virtual Constraint Profit	Net Profit	Forfeiture
10/15/2019	4	OffPeak	-0.6	-1.30	$0	$164	$750	-$213	-$351	-$564	$286
10/15/2019	5	OffPeak	-0.2	-1.30	$0	$230	$733	-$298	-$101	-$399	$252
10/15/2019	6	OffPeak	-0.4	-1.30	$0	$265	$1,056	-$344	-$317	-$660	$321
								-$855	-$768	-$1,623	$858

73. Table 30 demonstrates that, even when a position is leveraged, profits are not ensured. While a counterflow virtual position can be used to lower the day-ahead shadow price by reducing the flow, it cannot control the real-time shadow price at which the flow is settled. A prevailing flow virtual position can utilize bid and offer prices to cap the amount paid, standing to benefit if the real-time shadow price is greater than the day-ahead shadow price. The risks are much different when attempting to use a counterflow virtual position to increase the value of a counterflow FTR position. During hours with extreme volatility, a participant with a counter-flow position would need to be certain that it collected enough auction premium to offset the uncontrollable loss it could incur in real-time in order for its leveraged FTR position to benefit. If a participant received zero auction premium for a position, then the incentive to manipulate the constraint is significantly outweighed by the increased risk of real-time losses.

74. Across both FTR and virtual positions, the net position resulted in a loss of $1,623. This is due, in part, to the volatility of the real-time shadow price, however, it is also dependent on the amount of auction revenue received as a result of acquiring the FTR position. In this case, the FTR portfolio would have been better served in the absence of virtual activity. With a virtual portfolio that was less than the FTR portfolio, a portion of the FTR portfolio settled against the real-time price instead of the day-ahead price (see Table 31). These FTR MWh would have settled at a loss of $250 (see Table 32), however, by transferring a portion of the FTR portfolio to real-time, XO Energy incurred a loss of $1,019. The leveraged FTR MWh shown in Table 33 settled against the day-ahead shadow price for a net loss of $604. The combined loss of $1,019 and $604 equals the net loss of $1,623 across both the virtual and FTR positions shown in Table 30.

Table 31: FTR MWh Settled at Real-Time Price

Date	Hour Ending	Peak Type	FTR Flow	Auction Shadow	RT Shadow	FTR Constraint Profit (RT)
10/15/2019	4	Off	-0.60	$0	$750	-$450
10/15/2019	5	Off	-0.20	$0	$733	-$147
10/15/2019	6	Off	-0.40	$0	$1,056	-$422
						-$1,019

Table 32: FTR MWh Settled at Day-Ahead Price

Date	Hour Ending	Peak Type	FTR Flow	Auction Shadow	DA Shadow	FTR Constraint Profit (DA)
10/15/2019	4	Off	-0.60	$0	$164	-$98
10/15/2019	5	Off	-0.20	$0	$230	-$46
10/15/2019	6	Off	-0.40	$0	$265	-$106
						-$250

Table 33: Leveraged FTR MWh Settled at Day-Ahead

Date	Hour Ending	Peak Type	FTR Flow	Auction Shadow	DA Shadow	FTR Constraint Profit (DA)
10/15/2019	4	Off	-0.70	$0	$164	-$115
10/15/2019	5	Off	-1.10	$0	$230	-$252
10/15/2019	6	Off	-0.90	$0	$265	-$238
						-$604

75. The forfeiture rule is premised upon the supposition that an FTR position will benefit from a lower day-ahead shadow price as a result of counterflowing the constraint. Absent a counterfactual analysis of day-ahead shadow prices with and without XO Energy's virtual position, it is impossible to determine whether the company's position is better or worse with its virtual position. Assuming that a *de minimus* virtual portfolio had very little impact on the day-ahead shadow price, the data presented here demonstrates that the position received no benefit as a result of XO Energy's virtual activity. The net loss across the FTR and virtual position is $1,623. There is no evidence that this position profited, therefore, there should be no forfeitures. Auction revenue was not received from this constraint, so there was no incentive to attempt to increase the value of the FTR position given the risk of settling a portion of the FTR at much higher real-time shadow price.

X. Monroe – Lallendorf Forfeitures (September 2019)

76. XO Energy acquired positions for September 2019 across two different auctions. In total, XO acquired 830 off-peak paths and 902 on-peak paths. XO Energy's net flow from the portfolio across the *Monroe-Lallendorf* constraint was 14.92 MWh off-peak and 7.7 MWh on-peak in the prevailing-flow direction (see Table 34).[30]

Table 34: Net FTR Position across *Monroe-Lallendorf* Constraint (September 2019)

PeakType	Paths	Constraint Name	Net Flow
Off	830	Monroe-Lallendorf 345kV l/o Morrocco-AllenJct 345kV	-14.92
On	902	Monroe-Lallendorf 345kV l/o Morrocco-AllenJct 345kV	-7.70

77. The majority of these paths were acquired in the 2019/2020 Annual FTR Auction.[31] The *Monroe-Lallendorf* constraint did not bind in any auction in which XO Energy acquired these positions, indicating that the constraint-specific auction cost to acquire the prevailing-flow position was zero (see Table 35).

Table 35: XO Energy Net FTR Position across *Monroe-Lallendorf* Constraint by Auction (September 2019)

Auction	Period	PeakType	Paths	Net Flow	Auction Shadow
19/20 Annual Auction	All	Off	731	-14.50	$0.00
AUG 2019 Auction	Q2	Off	99	-0.42	$0.00
			Total	-14.92	$0.00
19/20 Annual Auction	All	On	814	-7.51	$0.00
AUG 2019 Auction	Q2	On	91	-0.19	$0.00
			Total	-7.70	$0.00

78. Across three days and 13 hours in September 2019, XO Energy incurred forfeitures of $63,706. The largest forfeiture occurred on September 30, 2019, totaling $53,861 across five

[30] The analysis of the *Monroe-Lallendorf* constraint relies on a DFAX isolation from September 3, 2019 at 15:00.

[31] The path totals per auction do not add up to the total unique paths across all auctions because the same path can be acquired across multiple auctions.

hours. This day represented the largest daily forfeiture by a single constraint in September 2019. To understand why XO Energy incurred such significant forfeitures, I analyzed each hour during which this constraint bound on September 30, 2019. This included an analysis of XO Energy's FTR positions, separating the net position across all paths into prevailing flow and counterflow paths for each hour (see Table 36).

Table 36: FTR Paths by Direction and Constraint-Specific Revenues from *Monroe-Lallendorf* Constraint (September 30, 2019)

Date	Hour Ending	Peak Type	Paths	Prevailing Flow Paths	Prevailing Flow MW	Prevailing Flow Revenue	Counter Flow Paths	Counter Flow MW	Counter Flow Revenue	Net Flow	Auction Shadow	DA Shadow	Net Revenue	Forfeiture
9/30/2019	13	On	902	546	-21.1	$188.66	356	13.4	-$119.76	-7.7	$0.00	-$8.95	$68.90	$4,148.49
9/30/2019	14	On	902	546	-21.1	$311.13	356	13.4	-$197.51	-7.7	$0.00	-$14.76	$113.63	$10,197.16
9/30/2019	15	On	902	546	-21.1	$416.53	356	13.4	-$264.41	-7.7	$0.00	-$19.76	$152.12	$8,429.16
9/30/2019	16	On	902	546	-21.1	$749.79	356	13.4	-$475.97	-7.7	$0.00	-$35.57	$273.83	$14,111.13
9/30/2019	17	On	902	546	-21.1	$623.95	356	13.4	-$396.08	-7.7	$0.00	-$29.60	$227.87	$16,974.84
9/30/2019	18	On	902	546	-21.1	$1,168.21	356	13.4	-$741.58	-7.7	$0.00	-$55.42	$426.64	$0.00
						$3,458.27			-$2,195.30				$1,262.97	$53,860.78

79. Since a prevailing flow position benefits and a counterflow position is harmed when this constraint binds, it follows that XO Energy's prevailing flow positions received revenues of $3,458, while the counterflow positions incurred a loss of $2,195. The net revenue related to the *Monroe-Lallendorf* constraint is the difference between the counterflow and prevailing flow paths, resulting in a net profit of $1,263,[32] however, XO Energy incurred forfeitures of $53,861 during 5 of the 6 hours in which this constraint bound.

80. The current forfeiture rule does not use constraint-specific profits, nor does it evaluate an FTR portfolio as a whole, instead it selects individual FTR paths that are in the same direction as the virtual portfolio. For example, if a virtual portfolio is in the prevailing flow direction, the current forfeiture rule would target the revenues from the prevailing flow FTR paths only, as determined by the FTR Impact Test. The rule ignores counterflow FTRs because they are in the

[32] The constraint-specific net revenue is calculated as the Net Flow * (DA Shadow-Auction Shadow).

opposite direction of the virtual portfolio. Furthermore, the path-specific filtering logic (i.e., convergence, FTR Impact Test, and total profit) subdivides the prevailing flow FTRs into select sets of FTRs that will be forfeited. Finally, the purported profits that are forfeited are based upon the difference between the total day-ahead and total auction costs (see Table 37).

Table 37: XO Energy Forfeitures from *Monroe-Lallendorf* (September 30, 2019 HE 17)

FTR	Virtual	Forfeit	Paths	FTR Flow	Total Profit	Constraint Profit	Forfeiture
PrevailingFlow	PrevailingFlow	1	122	-6.7	$16,975	$199	$16,975
PrevailingFlow	PrevailingFlow	0	424	-14.4	$14,128	$425	$0
CounterFlow	PrevailingFlow	0	356	13.4	-$925	-$396	$0
			902	-7.70	$30,177	$228	$16,975

81. During 546 prevailing flow paths, only 122 were selected for forfeiture (see Table 37). Of the total 21.1 MWh of prevailing flow FTRs, 6.7 MWh were forfeited and the total profit forfeited for these 122 paths was $16,975. The actual constraint-specific profit across the same 122 paths was $199.[33] The forfeiture calculation used the total day-ahead MCC and the total FTR auction cost to determine the purported profits. The resulting forfeiture of $16,975 is not only punitive, it is incorrect. During this single hour, XO Energy's FTR portfolio made a total profit of $30,177, but only $228 can be attributed to the *Monroe-Lallendorf* constraint. Table 38 summarizes the net position across XO Energy's FTR and virtual portfolios, quantifying the actual profits realized during the hours that this constraint bound.

[33] *See* Table 3.

Table 38: Net Position Across XO Energy's FTR and Virtual Portfolios

Date	Hour Ending	Auction Shadow	DA Shadow	RT Shadow	Net FTR Flow	Net Virtual Flow	FTR Profit	Virtual Profit	Total Profit	Actual Forfeiture
9/30/2019	13	$0.00	$8.95	$0.00	7.7	67.5	$69	-$604	-$535	$4,148
9/30/2019	14	$0.00	$14.76	$0.00	7.7	48.9	$114	-$722	-$608	$10,197
9/30/2019	15	$0.00	$19.76	$0.85	7.7	32.7	$152	-$618	-$466	$8,429
9/30/2019	16	$0.00	$35.57	$107.91	7.7	36.0	$274	$2,604	$2,878	$14,111
9/30/2019	17	$0.00	$29.60	$38.70	7.7	50.9	$228	$463	$691	$16,975
9/30/2019	18	$0.00	$55.42	$133.29	7.7	10.5	$427	$818	$1,244	$0
							$1,263	$1,940	$3,203	$53,861

82. During each of the 6 hours, XO Energy's FTR portfolio was profitable and received $1,263. Furthermore, during all 6 hours in which this constraint bound, XO Energy's virtual portfolio was net profitable at $1,940, despite being unprofitable during 3 hours. The total profit across both the company's FTR and virtual positions was $3,203, yet XO Energy forfeited $53,861. Furthermore, XO Energy incurred forfeitures of $31,000 during hours in which our virtual portfolio was profitable, indicating convergence.

83. Finally, during the three hours in which XO Energy's virtual portfolio was not profitable and the day-ahead shadow price and real-time shadow price were diverged, XO Energy forfeited nearly $23,000. During the same three hours, the company's FTR profits from the *Monroe-Lallendorf* constraint was $335, however, XO Energy did not have financial leverage and ultimately a loss was incurred across both the virtual transaction and FTR positions. Without testing for leverage, this virtual activity appears to be "losing" in order to benefit the FTR position (resulting in a net profit across both positions), however, since the virtual position was substantially higher than the FTR position, any perceived profit from the FTRs was outweighed by the virtual loss (see Table 38). For example, in HE 13, the FTR profits of $68.90 are less than the virtual loss of $604.13, resulting in a net loss of $535.23. Despite this net loss, XO Energy forfeited $4,148 during this hour.

84. In summary, across all hours on September 30, 2019, XO Energy's virtual and FTR positions were profitable. During the hours when XO Energy's virtual positions were "losing," a leveraged position did not exist and, therefore, no benefit was received. Nonetheless, XO Energy forfeited nearly $23,000. During the hours in which the virtual positions were profitable, indicating convergence, XO Energy forfeited an even larger $31,000. The actual net profit across both FTR and virtual positions for this constraint was $3,203.

85. In order to remedy the inherent flaws in the current forfeiture rule, the rule should be modified to evaluate FTRs as portfolios and include leverage as the determining trigger of any forfeiture. If leverage is present, the MWh volume subject to forfeiture is calculated as the difference between the (x) FTR flow on a binding constraint and (y) virtual flow on a binding constraint.

86. As a hypothetical example, suppose in HE 15, XO Energy's FTR position was 50 MWh prevailing flow and its virtual position was 32.7 MWh prevailing flow (see Table 39). This position is leveraged by 17.3 MWh, thus any loss on the virtual position is outweighed by the increase in profits on the FTR position, resulting in a net profit across both positions. The leveraged MWh of the FTR position would be forfeited, resulting in a forfeiture of $341.85 (i.e., 17.3 MWh * (day-ahead shadow - FTR auction shadow)) and is the exact profit the FTR position received.

Table 39: Hypothetical Example of Leveraged Position

Date	Hour Ending	Auction Shadow	DA Shadow	RT Shadow	Net FTR Flow	Net Virtual Flow	FTR Profit	Virtual Profit	Total Profit	Forfeiture
9/30/2019	15	$0.00	$19.76	$0.85	50.0	32.7	$988.00	-$618.49	$369.51	$341.85

87. When a participant has leverage, it is rational to choose to settle a portion of the FTR at the real-time price. If a participant does not have leverage and its virtual position is greater or equal

to its FTR position, then it is rational to settle its entire FTR position at the real-time price. By settling all or a portion of the FTR at the real-time price, the participant forgoes the profits it would have received in the day-ahead market. If the participant is correct and the real-time price is greater than the day-ahead price, the position will be more profitable and, in turn, enhance convergence between the day-ahead and real-time markets. If the participant is incorrect, it will give up the day-ahead profits and incur a loss due to the FTR settling at a lower real-time price.

88. In Table 40, the 32.7 MWh of virtual flow effectively moved the same 32.7 MWh of FTR flow to real-time. The day-ahead FTR credit based on the day-ahead shadow price is canceled with the day-ahead charge incurred by the virtual transaction MWh. The result is that 32.7 MWh now settles against the real-time shadow price, with a profit of $27.66.

Table 40: Unleveraged FTR MWh Settled at Real-Time

Date	Hour Ending	FTR Flow	Auction Shadow	RT Shadow	FTR Constraint Profit (RT)
9/30/2019	15	32.7	$0	$0.85	$27.66

89. Table 41 illustrates the day-ahead revenue that is abandoned as a result of moving the position to real-time. Had the FTR settled against day-ahead, the profit would have been $646.15. The difference between 32.7 MWh of FTR flow settled at real-time ($27.66) versus day-ahead ($646.15) is equal to -$618.49, identical to the virtual profit shown in Table 38.

Table 41: Unleveraged FTR MWh Settled at Day-Ahead

Date	Hour Ending	FTR Flow	Auction Shadow	DA Shadow	FTR Constraint Profit (DA)
9/30/2019	15	32.7	$0	$19.76	$646.15

90. Finally, the leveraged MWh are the only remaining portion of the FTR that settles against day-ahead and could benefit from an increased day-ahead shadow price. The resulting profit is calculated as 17.3 MWh * ($19.76-$0.00) or $341.85 (see Table 42), matching the total profit across both positions in Table 39.

Table 42: Leveraged FTR MWh Settled at Day-Ahead

Date	Hour Ending	FTR Flow	Auction Shadow	DA Shadow	FTR Constraint Profit (DA)
9/30/2019	15	17.3	$0	$19.76	$341.85

XI. Hedging

91. In order to evaluate the current state of hedging in PJM, specifically, the hedge provided by FTRs and virtual transactions held by a physical participant, I analyzed the ERCOT market and the extent to which physical participants use virtual transactions to hedge the physical output of their resources. I selected ERCOT because the use of virtual transactions, as an extension of the CRR market, is encouraged in order to facilitate hedging. In its day-ahead market, ERCOT's physical participants represent the largest users of virtual transactions. Furthermore, ERCOT does not utilize a forfeiture rule.

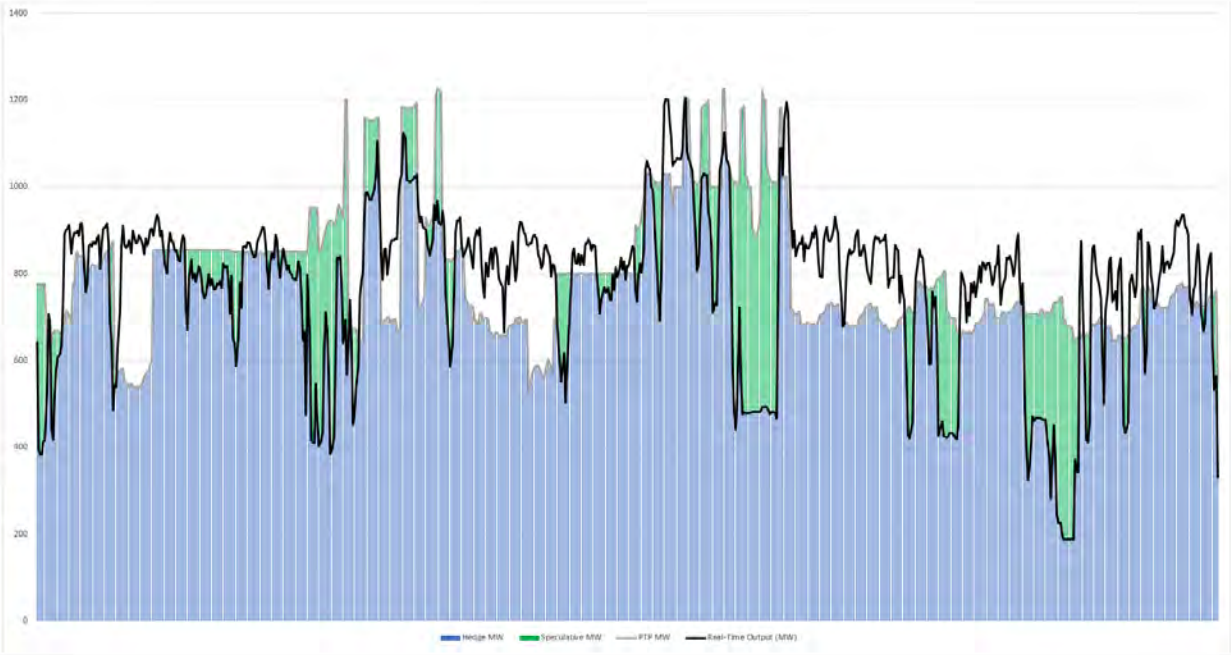
92. My analysis expands upon the evaluation of Potomac Economics, ERCOT's market monitor. I simulated the impact of the current PJM FTR Forfeiture Rule on Exelon's CRR positions in ERCOT for 2018 and 2019. For comparison, I analyzed the impact of XO Energy's proposed approach, which includes a check for financial leverage across both physical and virtual positions, evaluates FTRs as a portfolio, and calculates forfeitures based upon constraint-specific impacts. The results of my analysis are presented here.

93. The point-to-point obligation bid ("PTP") in ERCOT is a virtual transaction that provides a hedge against real-time congestion. This product is predominately used by physical participants, accounting for 64% of the PTP volume in 2018. Potomac Economics reported that the majority of the PTP volume is related to generation hedging by generation owners.[34] A generation owner,

[34] Potomac Economics, *2018 State of the Market Report for the ERCOT Electricity Markets* at 36 (June 2019, available at https://www.potomaceconomics.com/wp-content/uploads/2019/06/2018-State-of-the-Market-Report.pdf (the "2018 ERCOT SOM").

such as Exelon, can use the PTP to hedge the real-time congestion associated with the delivery of generation to a hub or load zone in the same manner that a CRR is used to hedge against the day-ahead congestion associated with the delivery of generation to a hub or load zone. My analysis of Exelon's CRR and PTP activity confirms the statements provided by Potomac Economics. For example, in December 2019, 89% of Exelon's PTP volume sourced at Colorado Bend Energy Center II (CBECII) was used to hedge the real-time output of its CBECII generating station. Figure 7 illustrates the hourly PTP volume sourced at CBECII together with its real-time output. Any volume up to the real-time output is considered a generation hedge, while volume in excess of real-time output is deemed to be speculative.

Figure 7: Hourly PTP Volume as Hedge for Real-Time Output of CBECII (December 2019)

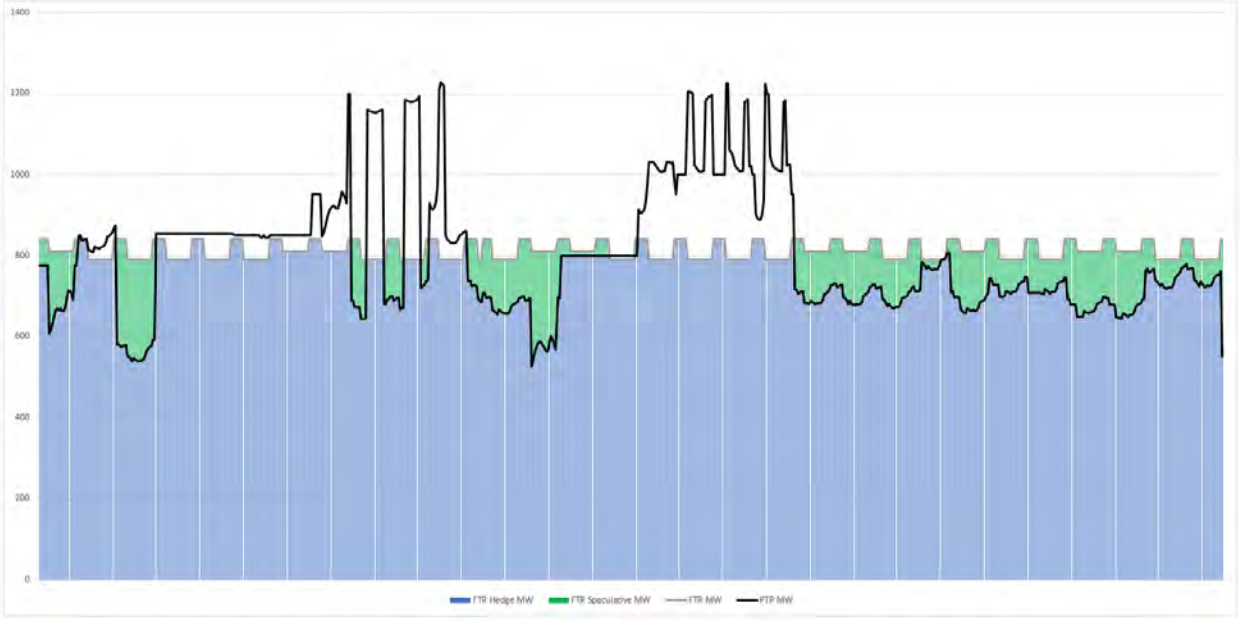


94. ERCOT participants also use PTPs to transfer their CRR hedges from the day-ahead to real-time markets.

> Purchases of PTP obligations comprise a significant portion of day-ahead market activity. They are similar to, and can be used to complement Congestion Revenue Rights (CRRs). […] Participants buy PTP obligations by paying the difference in prices between two locations in the day-ahead market. The holder of the PTP obligation then receives the difference in prices between the same two locations in the real-time market. Hence, a participant that owns a CRR can use its CRR proceeds from the day-ahead market to buy a PTP obligation between the same two points in order to transfer its hedge to real-time.[35]

95. For example, in December 2019, Exelon used the PTP to transfer almost 92% of the CRR volume sourced at CBECII to the real-time market. Figure 8 illustrates the hourly CRR and PTP volume sourced at CBECII. The hourly CRR volume up to the hourly PTP volume is considered to be generation to real-time hedging, while the hourly CRR volume in excess of the hourly PTP volume is deemed to be speculative.

Figure 8: Hourly CRR Volume Transferred to Real-Time using PTP Volume Sourced at CBECII (December 2019)



96. The concepts illustrated in Figure 7 and Figure 8 are critical to understanding how a physical asset owner in ERCOT uses hedging activity to manage its CRR portfolio. It is also

[35] *Id.* at 34.

possible to estimate the volume of virtual transactions being used to hedge a physical asset as well as the volume of CRRs being used to hedge a physical asset, but transferred to the real-time market. In PJM, the forfeiture rule ignores the use of FTRs as a hedge for physical assets, penalizing physical market participants, and fails to recognize the fundamental purpose of an FTR (i.e., to provide a hedge against congestion). Furthermore, a forfeiture rule that does not isolate speculative virtual trading from rational hedging behavior unnecessarily penalizes participants.

97. Exelon defended its use of virtual transactions as a hedging tool in PJM, stating that its FTR portfolio provided a hedge against congestion for delivery to the Northern Illinois hub.

> The FTRs serve a legitimate business purpose of hedging congestion risk between generators and sales at NI hub, while the dec bids serve a legitimate business purpose of flattening a day-ahead to real time position at West hub. The FTR Forfeiture rule effectively constrains the ability of load serving entities to manage risk and hedge their portfolios which may ultimately increase consumer costs.[36]

98. In the September 21, 2017 HE 20 example, Exelon forfeited almost $47,000 across the FTRs that sourced at its nuclear generating stations in the ComEd zone. By comparing the total FTR MWh sourced at each generator to the physical nameplate and summer capacity volume,[37] it is evident that these FTR paths provided a hedge for the output at each generator. A nuclear generator normally operates at or near 100% of its capacity.[38] Assuming the day-ahead output of these facilities is close to the nameplate capacity, FTRs are hedging between 65% and 97% of the

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[36] *See* PJM, *FTR Forfeiture Rule Changes Problem/Opportunity Statement* (Feb. 7, 2018) ("Exelon Problem Statement"), available at https://www.pjm.com/-/media/committees-groups/committees/mic/20180207/20180207-item-07a-ftr-forfeiture-rule-changes-problem-statement.ashx

[37] *See* U.S. Energy Information Administration, *Preliminary Monthly Electric Generator Inventory (based on Form EIA-860M as a supplement to Form EIA-860)*, available at https://www.eia.gov/electricity/data/eia860m/ (December_generator2019.xlsx).

[38] *See e.g.,* United States Nuclear Regulatory Commission, *Power Reactor Status Report for September 21, 2017,* available at https://www.nrc.gov/reading-rm/doc-collections/event-status/reactor-status/2017/20170921ps.html#r3.

physical output of these resources. Furthermore, if the day-ahead output is close to the summer capacity, then these FTRs are hedging between 73% and 100% of the day-ahead output (see Table 43).

Table 43: FTR Volume Hedging Physical Output of Exelon's Nuclear Resources in the ComEd Zone (September 21, 2017 HE 20)

Source	FTR Cleared MW	Nameplate Capacity MW	Summer Capacity MW	FTR Hedge % (Nameplate)	FTR Hedge % (Summer)
1 LASALL24 KV LA-1	1030	1170	1131	88%	91%
1 LASALL24 KV LA-2	1052	1170	1134	90%	93%
12 DRESD18 KV DR-2	839	1009	902	83%	93%
12 DRESD18 KV DR-3	881	1009	895	87%	98%
20 BRAID24 KV BR-1	1187	1225	1183	97%	100%
20 BRAID24 KV BR-2	1148	1225	1154	94%	99%
4 QUAD C18 KV QC-1	713	1009	908	71%	79%
4 QUAD C18 KV QC-2	661	1009	911	65%	73%
6 BYRON 25 KV BY-1	1164	1225	1164	95%	100%
6 BYRON 25 KV BY-2	1090	1225	1136	89%	96%

PJM's FTR Forfeiture Rule does not differentiate between a physical asset owner's rational hedging and speculative behavior. The FTR Forfeiture Rule penalizes physical market participants by exposing their resources to congestion in the day-ahead market that FTRs were designed to hedge against.

99. In order to assess the impact that PJM's FTR Forfeiture Rule would have in ERCOT, I simulated the precise logic used in the PJM Compliance Filing against Exelon's CRR and virtual positions in 2018 and 2019.[39] By using the hourly day-ahead DFAX provided by ERCOT, it is possible to replicate the logic used in PJM, including the results of the FTR Impact Test and Virtual Portfolio Test.[40] The results of this simulation are depicted in Table 44.

[39] *See* ERCOT Market Reports (60-Day DAM Disclosure Report and 60-Day SCED Disclosure Report) available at http://www.ercot.com/mktinfo/reports.

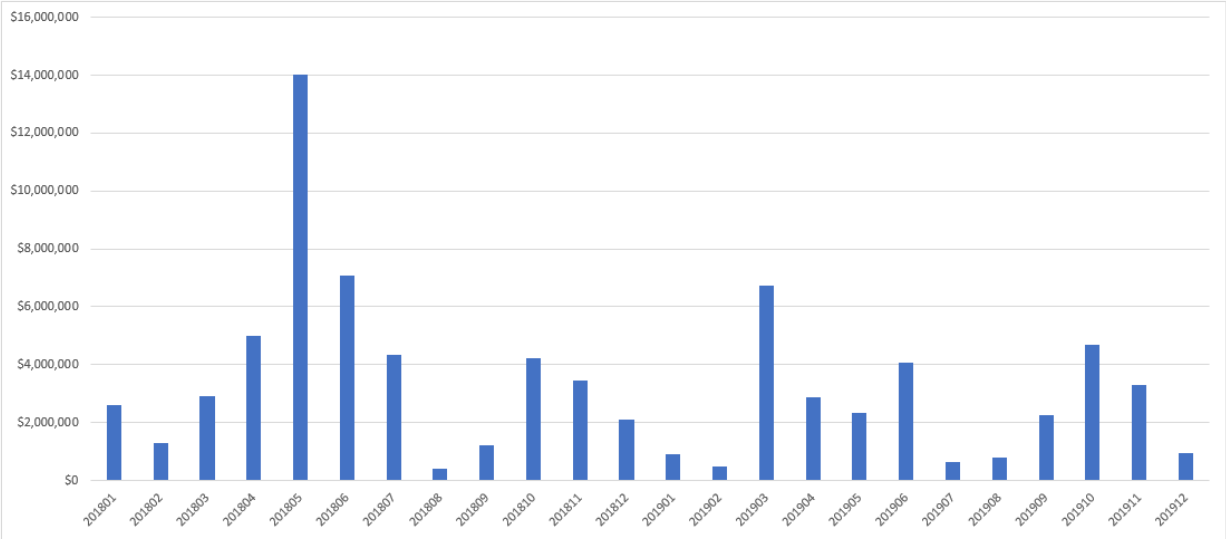
[40] ERCOT provides DAM shift factors for each binding constraint following the DAM clearing. They are provided to all ERCOT market participants available at http://mis.ercot.com/misapp/GetReports.do?reportTypeId=13089.

Table 44: Exelon's Gross FTR Profits versus Simulated FTR Forfeitures Applying PJM's Logic in ERCOT (2018-2019)

Year	FTR Gross Profit	FTR Forfeitures	FTR Net Profit
2018	$52,815,324	$48,640,249	$4,175,075
2019	$23,307,993	$30,107,421	-$6,799,428
Total	$76,123,317	$78,747,670	-$2,624,353

100. Figure 9 illustrates the monthly forfeiture values for 2018 and 2019, which total over $48 million and $30 million, respectively. When applied to Exelon's positions in ERCOT, the FTR Forfeiture Rule removes nearly all of its CRR profits in 2018 and results in the forfeiture of more profits than were actually realized in 2019.

Figure 9: Exelon *Simulated* Monthly CRR Forfeitures using PJM's Forfeiture Logic (2018-2019)



101. Table 45 provides a breakdown of total forfeitures by path type. Thirty-three (33) percent of the total forfeitures were sourcing at a hub and sinking at a load zone. Further, paths sourcing at a generator and sinking at either a hub or load zone represented 41% of the total forfeitures.

Table 45: Exelon Simulated Total Forfeitures by Path Type (2018-2019)

Source	Sink	2018	2019	Total	Percent
Hub	Load Zone	$18,550,196	$7,300,765	$25,850,961	33%
Gen	Hub	$10,695,981	$13,573,808	$24,269,788	31%
Gen	Gen	$5,983,218	$2,695,444	$8,678,661	11%
Gen	Load Zone	$5,273,114	$2,520,573	$7,793,688	10%
Hub	Hub	$4,381,931	$1,889,053	$6,270,985	8%
Hub	Gen	$2,459,575	$1,982,976	$4,442,551	6%
Load Zone	Gen	$1,068,336	$50,828	$1,119,164	1%
Load Zone	Hub	$227,898	$56,854	$284,751	0%
DC Tie	DC Tie	$0	$22,534	$22,534	0%
Gen	DC Tie	$0	$14,587	$14,587	0%
		$48,640,249	$30,107,421	$78,747,670	100%

102. Table 46 provides a further breakdown of the paths sourcing at a generator and sinking at either a hub or load zone. Further, it is subset by the generators where there is a clear reference to ownership by Exelon.[41] Similar to PJM, the paths sourcing at generation at which Exelon owns are providing a hedge against the output and delivery of these resources. These paths represent nearly 80-90% of the forfeitures across paths sourcing at a generator and sinking at a hub or load zone. For example, in both 2018 and 2019, the total forfeitures were roughly 16 million and the forfeitures across these eight specific generators was roughly 13.2 million (82%) in 2018 and 14.3 million (89%) in 2019.

[41] Wolf Hollow II, Colorado Bend II, and Handley 3,4,5 are owned by Exelon Generation (see EIA December_generator2019.xlsx). Frontier is owned by Tenaska, but Exelon purchases 100% of the output. Wolf Hollow I and Colorado Bend Energy Center were sold by Exelon as part of a bankruptcy Settlement and did not have any positions in 2019.

Table 46: Exelon Simulated Forfeitures by Generation Source (2018-2019)

Generator Name	2018	2019	Total
Wolf Hollow II	$8,687,092	$7,019,091	$15,706,183
Colorado Bend II	$1,761,893	$5,004,046	$6,765,939
Frontier	$1,204,905	$350,900	$1,555,804
Handley 3	$357,211	$732,792	$1,090,003
Handley 4	$183,260	$789,653	$972,913
Handley 5	$315,758	$429,706	$745,464
Wolf Hollow I	$601,586	$0	$601,586
Colorado Bend Energy Center	$43,357	$0	$43,357
	$13,155,062	$14,326,188	$27,481,250

103. Table 47 provides a measure of FTRs sourcing at generation Exelon owns and which the hedge is in turn moved to real-time using the PTP Obligation Bid. The numbers provided in Table 47 represent the hourly average FTR MWh held and the percent of FTR MWh transferred to real-time during the hours where a forfeiture occurred on these same paths. For example, in 2019, Exelon used the PTP to move 79% of the FTR MWh sourcing at Colorado Bend II to real-time and would have triggered a forfeiture in doing so.

Table 47: Exelon FTR MW Moved to Real-Time using PTP Obligation Bid (2018-2019)

	2018		2019	
Generator Name	FTR MW	FTR MW Moved to RT (%)	FTR MW	FTR MW Moved to RT (%)
Colorado Bend II	797	75%	883	79%
Wolf Hollow II	665	63%	684	75%
Frontier	437	61%	415	64%
Handley 3	141	13%	162	13%
Handley 4	117	8%	140	7%
Handley 5	82	8%	102	8%
Colorado Bend Energy Center	64	7%	0	0%
Wolf Hollow I	52	3%	0	0%

104. The current logic used in PJM captures the transfer of FTR MW to real-time because it does not differentiate legitimate hedging activity and further does not test for leverage. If a portion of the FTR is moved to real-time then only the remaining portion of the FTR would be leveraged

and not the entire FTR MW. Further, if evaluated as a portfolio, these FTR MWs that are transferred to real-time would appear in the virtual portfolio. The leverage test proposed by XO Energy would account for this and not trigger a forfeiture unless the FTR Portfolio flow exceeds the Virtual Portfolio flow on a constraint. The test for leverage is a critical missing element of the current PJM Forfeiture Rule and by excluding it, legitimate virtual and physical hedging activity is captured.

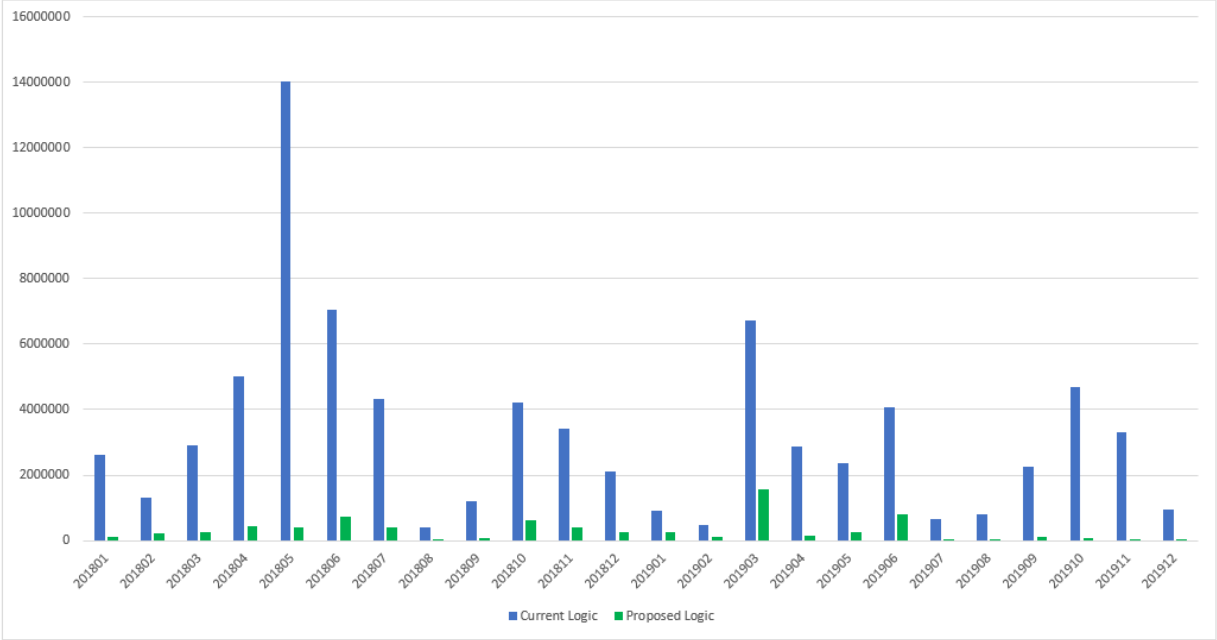
105. In order to validate these concerns, I simulated the proposal from XO Energy, the "5-Step" process that evaluates FTRs as a portfolio, calculates the precise impacts and profits from a constraint, determines convergence by constraint and finally tests for the critical component of leverage. The Virtual Portfolio test remains unchanged and the 10% threshold was used to determine an "appreciable impact" as defined by PJM. The results of this simulation are provided in the following tables and figures. Table 48 provides a comparison of forfeitures under the current logic ($78.7 Million) and the proposed logic from XO Energy ($7.4 million). The proposal from XO Energy results in a reduction of nearly $71.4 million across 2018 and 2019.

Table 48 Exelon Simulated Forfeitures - Comparison of Current Logic to Proposed Logic (2018-2019)

Year	FTR Forfeitures (Current)	FTR Forfeitures (Proposed)	Delta
2018	$48,640,249	$3,950,802	-$44,689,447
2019	$30,107,421	$3,419,186	-$26,688,235
Total	$78,747,670	$7,369,988	-$71,377,682

106. Figure 10 illustrates the monthly forfeitures using the current logic used in PJM compared to the logic proposed by XO Energy.

Figure 10 : Exelon Simulated Monthly CRR Forfeitures using Current Logic and Proposed Logic (2018-2019)



107. Table 49 and Table 50 provide a breakdown of the forfeitures incurred under the current logic and the various triggers used in the proposed logic. This analysis provides the detail needed to understand where the large reduction in forfeitures between the two approaches occurs. The breakdown is by a Direction Test[42], a Divergence Test[43] and a Leverage Test[44]. The Virtual Portfolio test was not changed between the two approaches and the 10% trigger was true for each of these cases.

[42] The direction test indicates that both Virtual portfolio and FTR portfolio are in the same direction.

[43] The divergence test indicates that the day-ahead shadowprice was diverged from real-time shadowprice based on the direction of the virtual portfolio. If prevailing flow, then DA > RT. If counter flow then DA < RT.

[44] The leverage test indicates the FTR Flow on a constraint was greater than the Virtual Flow on the constraint.

Table 49: Exelon Simulated Forfeitures Current Logic and Proposed Logic by Trigger (2018)

Direction Test	Divergence Test	Leverage Test	Percent of Total	Cumulative Percent	Forfeitures (Current)	Forfeitures (Proposed)
0	0	0	0%	0%	$195,979	$0
0	1	0	0%	1%	$93,747	$0
1	0	0	6%	7%	$2,953,022	$0
1	0	1	2%	8%	$867,183	$0
1	1	0	57%	65%	$27,718,403	$0
1	1	1	35%	100%	$16,811,916	$3,950,802
					$48,640,249	$3,950,802

Table 50: Exelon Simulated Forfeitures Current Logic and Proposed Logic by Trigger (2019)

Direction Test	Divergence Test	Leverage Test	Percent of Total	Cumulative Percent	Forfeitures (Current)	Forfeitures (Proposed)
0	0	0	2%	2%	$600,230	$0
0	1	0	0%	2%	$72,587	$0
1	0	0	3%	5%	$825,089	$0
1	0	1	3%	8%	$803,469	$0
1	1	0	44%	51%	$13,122,470	$0
1	1	1	49%	100%	$14,683,578	$3,419,186
					$30,107,421	$3,419,186

108. To summarize Table 49 and Table 50, 65% of the forfeitures incurred in 2018 and 51% of the forfeitures incurred in 2019 would not be triggered under the proposed logic, roughly $47 million. This is a result of the current forfeiture rule's incorrect determination of direction, incorrect determination of divergence or the failure to test for financial leverage. The current logic triggered forfeitures of $290,000 and $673,000 in 2018 and 2019, respectively, when the Virtual Portfolio and FTR Portfolio were in different directions. Next, the current logic triggered forfeitures of $3.8 million and $1.6 million in 2018 and 2019, respectively, when the virtual portfolio was enhancing convergence and profitable. Further, $31 million and $14.6 million in 2018 and 2019, respectively, was triggered when there was no financial leverage present on the constraint which triggered forfeitures. While it may appear that forfeitures occurred under the current logic when all three tests were triggered, the lack of a portfolio approach in the current logic fails to correctly account for leveraged MW (i.e. the difference between the virtual and FTR portfolio flow on a constraint). Finally, the lack of constraint-specific forfeitures based on the day-

ahead and auction shadowprices grossly overstates the profits that were realized. This is evidenced by the difference of over $11 million and $14 million in 2018 and 2019, respectively, compared to the proposed logic which correctly accounts for both leveraged mw and constraint-specific profits that are realized.

109. Finally, the current forfeiture logic makes no distinction between virtual transactions that are purely speculative and those virtual transaction that may be used to hedge a physical asset. As shown in Figure 7 and also confirmed by the ERCOT State of the Market report, a large portion of the PTP MW are used to hedge the real-time physical output of a generator. If this portion that is used to hedge the physical resource was considered a hedge, and only the MW in excess of the real-time output was considered speculative or "virtual", this would impact the transactions that would be included in the Virtual Portfolio Test. Using the definition of hedge or speculative MW provided by Potomac Economics, I simulated the impact of removing any PTP MWs that source at a generator up to the physical real-time output of the generator, leaving only the speculative MW to be included in the Virtual Portfolio test. This effectively treats some virtual transactions like the physical transactions that are currently excluded from the Virtual Portfolio Test in PJM. The results of this sensitivity are presented in Table 51.

Table 51 Exelon Simulated Forfeitures - Comparison of Current Logic, Proposed Logic and Proposed Logic with Virtual Hedge and Speculative MW Distinction (2018-2019)

Year	FTR Forfeitures (Current)	FTR Forfeitures (Proposed)	FTR Forfeitures (Proposed**)	Delta
2018	$48,640,249	$3,950,802	$2,482,207	-$1,468,595
2019	$30,107,421	$3,419,186	$1,846,265	-$1,572,921
Total	$78,747,670	$7,369,988	$4,328,472	-$3,041,516

**Virtual Transactions are subset into Hedge and Speculative. Only speculative MW are included in Virtual Portfolio Test

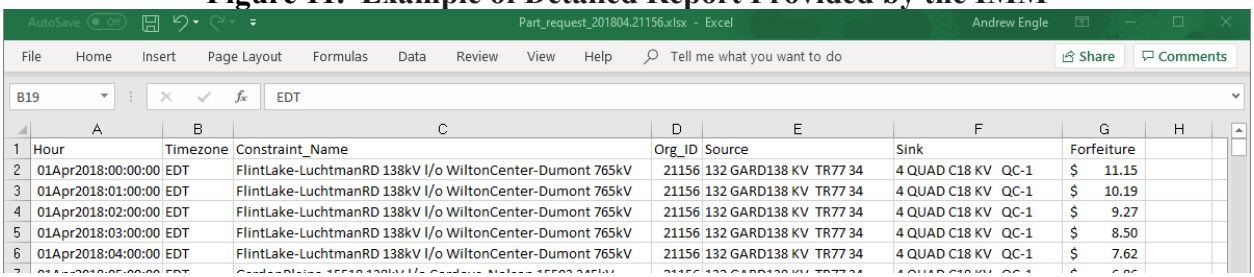
110. Table 51 shows a reduction in forfeitures between the XO Proposal and the XO proposal which attempts to differentiate between speculative and hedging virtual transactions. The reduction was approximately $3 million across both 2018 and 2019. This sensitivity simply reduced the frequency in which the Virtual Portfolio Test was triggered, resulting in less forfeitures. The test for leverage continues to include both Hedge and Speculative Virtual Transactions in order to correctly calculate the FTR MW that are moved to real-time.

111. The conclusions that can be drawn from this simulation are evident. If the current PJM FTR Forfeiture Rule would be applied retroactively in ERCOT, it would most certainly capture legitimate hedging activity and eviscerate any profits that were made in the CRR auction from physical participants rationally using these virtual transaction to hedge physical assets. The mere presence of the FTR Forfeiture Rule in ERCOT would completely eradicate the use of virtual transactions as a hedging mechanism, as it has done in PJM. Contrary to statements from PJM and the IMM that the FTR Forfeiture Rule has had no adverse impacts to the market, this simulation provides the evidence of how the same physical participants that actively hedge their assets in EROCT are more than deterred from hedging in the PJM market. Exelon and NextEra provide further proof that they cannot hedge in PJM and this ultimately harms customers.

XII. Transparency

112. Data transparency continues to be an issue in the FTR Forfeiture Rule. The data used in the test is never provided to participants and the timeliness of the data provided suffers from a significant lag (see Figure 11).

Figure 11. Example of Detailed Report Provided by the IMM



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B19: EDT

	A	B	C	D	E	F	G	H
1	Hour	Timezone	Constraint_Name	Org_ID	Source	Sink	Forfeiture	
2	01Apr2018:00:00:00	EDT	FlintLake-LuchtmanRD 138kV l/o WiltonCenter-Dumont 765kV	21156	132 GARD138 KV TR77 34	4 QUAD C18 KV QC-1	$ 11.15	
3	01Apr2018:01:00:00	EDT	FlintLake-LuchtmanRD 138kV l/o WiltonCenter-Dumont 765kV	21156	132 GARD138 KV TR77 34	4 QUAD C18 KV QC-1	$ 10.19	
4	01Apr2018:02:00:00	EDT	FlintLake-LuchtmanRD 138kV l/o WiltonCenter-Dumont 765kV	21156	132 GARD138 KV TR77 34	4 QUAD C18 KV QC-1	$ 9.27	
5	01Apr2018:03:00:00	EDT	FlintLake-LuchtmanRD 138kV l/o WiltonCenter-Dumont 765kV	21156	132 GARD138 KV TR77 34	4 QUAD C18 KV QC-1	$ 8.50	
6	01Apr2018:04:00:00	EDT	FlintLake-LuchtmanRD 138kV l/o WiltonCenter-Dumont 765kV	21156	132 GARD138 KV TR77 34	4 QUAD C18 KV QC-1	$ 7.62	

113. Apart from the constraint, the IMM provides no other details as to how it arrived at the paths forfeited or the virtual activity that triggered the virtual portfolio test. When asked to provide the details justifying the forfeitures, the IMM stated that it does not provide the data because it is confidential.

114. The following emails were exchanged shortly after receiving forfeitures for January 2018, February 2018, and March 2018. XO Energy requested details regarding the forfeitures that it had incurred together with the constraint and paths that were forfeited (i.e., the percentage of line flow that triggered the virtual portfolio test, the line rating that was used in the test, and the DFAX of the FTR paths forfeited)

115. During my tenure at the IMM, I routinely provided detailed reports to market participants, which included the DFAX of the virtual transaction that triggered the 75% test and the DFAX of the FTR path that was forfeited. The IMM and PJM have since determined that this data should no longer be provided (see Figure 12).

Figure 12: XO Energy's Correspondence with IMM

Fwd: FTR Forfeiture Participant Report

Andrew Engle <aengle@xo-energy.com> Wed, Jun 6, 2018 at 3:50 PM
To: Seth.Hayik@monitoringanalytics.com
Cc: Shawn Sheehan <ssheehan@xo-energy.com>, Matt Thompson <mthompson@xo-energy.com>

Good Afternoon Seth,

Could you please provide the following additional detail in the forfeiture reports for January - March 2018

1. Percent flow from virtual activity on each constraint in these reports
2. DA line rating for each constraint in these reports
3. DA DFAX, relative to each constraint in these reports, for the Source and Sink of each FTR Path that was forfeited

Also, if we incurred any forfeitures for April and May 2018, could you please send the forfeiture reports with the additional detail included.

Thanks
Andy

Fwd: FTR Forfeiture Participant Report

Seth Hayik <Seth.Hayik@monitoringanalytics.com> Thu, Jun 7, 2018 at 10:25 AM
To: Andrew Engle <aengle@xo-energy.com>
Cc: Shawn Sheehan <ssheehan@xo-energy.com>, Matt Thompson <mthompson@xo-energy.com>

Hi Andy,

Attached is your forfeiture report from April 2018. The May 2018 forfeitures have not been calculated or billed yet so I can't include the report for that month.

As for the additional detail, we don't provide that information. The IMM and PJM discussed what could be included in these reports and what is in the reports is what we agreed could be transmitted to all participants without exposing confidential information.

Let me know if you have any issues with the file.

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Fwd: FTR Forfeiture Participant Report

Andrew Engle <aengle@xo-energy.com> Thu, Jun 7, 2018 at 10:58 AM
To: Seth Hayik <Seth.Hayik@monitoringanalytics.com>
Cc: Shawn Sheehan <ssheehan@xo-energy.com>, Matt Thompson <mthompson@xo-energy.com>, Carey Drangula <cdrangula@xo-energy.com>

Seth.

I don't believe I'm asking for any confidential data, I'm asking for the data that was used in your determination of ours and only our forfeitures.

The exact percent of flow across a line from our positions is not confidential. We can assume its at least 10%, but we want to know the exact percent.
The ems line limits are posted publicly on pjm.com, however the line limits you are using in this test are the DA limits or FFEs, not EMS. If the line limits used in DA are confidential 1 month after the fact and not transparent to participants, this brings into question the just and reasonableness of this test.
The DFAX is an input into your test and were used to determine the $.01 impact test on our FTRs. I'm not requesting the full set of DFAX, I'm requesting the DFAX for the Source and Sink of our positions that were forfeited.

Under the old rule and when requested, participants received DFAX for their virtual positions and FTR positions. My request is inline with the previous FTR forfeiture reports so I ask again to please provide this additional detail.

Thanks
Andy

Fwd: FTR Forfeiture Participant Report

Andrew Engle <aengle@xo-energy.com> Mon, Jun 18, 2018 at 9:26 AM
To: Seth Hayik <Seth.Hayik@monitoringanalytics.com>
Cc: Shawn Sheehan <ssheehan@xo-energy.com>, Matt Thompson <mthompson@xo-energy.com>, Carey Drangula <cdrangula@xo-energy.com>

Hi Seth,
I'm following up on my request for the additional detail related to our forfeitures.

Please let me know if you will not provide this to us.

Thanks
Andy

116. Another significant issue is the timeliness of the data provided by the IMM. The IMM will only provide the data after the monthly bill is sent to market participants. As the email correspondence above demonstrates, as of June 7, 2018, XO Energy had only received forfeitures for the month of April 2018. The forfeitures for May had not been calculated.

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

XO Energy, LLC **v.** **PJM Interconnection, L.L.C.**	**Docket No. EL20-___-000**

AFFIDAVIT OF ANDREW ENGLE

I ANDREW ENGLE have prepared this Affidavit and have knowledge of the matters set forth in the Affidavit and the statements contained therein. I swear to the contents of the Affidavit and the Exhibits attached hereto and attest that the contents are true and correct to the best of my knowledge and belief.

Due to the COVID-19 pandemic, I am unable to prepare a notarized affidavit at this time. A notarized affidavit will be submitted as soon as practicable once the Declaration of National Emergency has been lifted.

I certify that the foregoing is true and correct.

Executed on April 8, 2020.

Andrew Engle

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

XO Energy, LLC **v.** **PJM Interconnection, L.L.C.**	**Docket No. EL20-___-000**

AFFIDAVIT OF MATTHEW THOMPSON

1. My name is Matthew Thompson and I am an Analyst at XO Energy, LLC ("XO Energy"), with a business address at 1619 New London Road, Landenberg, PA. I graduated from The Pennsylvania State University in 2007 with a degree in Economics. My experience in the power industry extends over 13 years, having commenced my career at PJM Interconnection, L.L.C. ("PJM") in the Market Monitoring Unit ("MMU"). During my five-year tenure at the PJM MMU, I analyzed market efficiency and design, implemented new Tariff rules, monitored and enforced anti-competitive behavior, and quantified the impacts of participant actions on prices. While at the PJM MMU, I was responsible for co-publishing the annual and quarterly PJM State of the Market Reports, including the analysis and quantification of various metrics on market efficiency and outcomes.

2. In 2013, I joined XO Energy as an Analyst and regulatory affairs representative, both at FERC and in the ISO stakeholder process. At XO Energy, I support the trading activities of the company by building, maintaining, and utilizing transmission network models to study power flow and pricing. Furthermore, I analyze large sets of historical market data to better understand market fundamentals and predict future market outcomes. In addition, I study market design in the

stakeholder process in order to recommend improvements.

3. PJM and the Independent Market Monitor ("IMM") provide limited details regarding a market participant's FTR forfeitures. This lack of transparency has made it nearly impossible for a participant to understand and audit its forfeitures.

4. Monthly billing statements are accessible to market participants online through the Market Settlements Reporting System or MSRS. Forfeiture data can be found in two reports:

- **Billing Line Item Adjustment Summary Report.** This report includes a *Day-Ahead Transmission Congestion Credit* line item that represents a retroactive charge to a participant for a bill that was settled during the prior two months (see Figure 1).

Figure 1: Billing Line Item Adjustment Summary Report

MSRS Market Settlements Reporting System

pjm Settlement

MSRS Report Viewer

Customer Account: XO Energy MA2, L.P. Report: Billing Line Item Adjustment Summary

Start Date: 12/01/2019 End Date: 12/31/2019 Version: Latest File Type: Select file type.

Display Download Now Add to Cart E-Mail PJM Market Settlements about this report.

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pjm Settlement **Billing Line Item Adjustment Summary**

Customer Account: XO Energy MA2, L.P.

Report Creation Timestamp (EPT): 02/04/2020 2:42:09PM

Billing Period Start: 12/01/2019

Billing Period End: 12/31/2019

4000.01 Customer ID	4000.02 Customer Code	4001.03 Billing Period Start Date	4001.04 Source Billing Period Start Date	4001.05 Billing Line Item ID	4001.06 Billing Line Item Name	3000.86 Adjustment Amount ($)
21156	XOMA2	12/01/2019	11/01/2019	1999	PJM Customer Payment Default Charge	48.54
21156	XOMA2	12/01/2019	11/01/2019	2211	Day-ahead Transmission Congestion Credit	-1,207,218.51

The adjustment amounts displayed on this report are inclusive of any amounts transferred via billing line item transfer agreements into which this account has entered. Please refer to the Billing Line Item Transfer Summary for details of the exact amounts transferred to or from this account.

- **Hourly Transmission Congestion Credits Report.** This report includes the *Hourly FTR Target Credit* for each hour in the month, which represents the total value of all day-ahead congestion spreads to be received by a participant (see Figure 2). These credits are calculated across all FTRs for each hour instead of identifying individual FTR path target credits. In order to determine the hourly forfeiture number, I downloaded both the *Original*

Billed and *Latest Billed* versions of the statement and then manually calculated the difference between the hourly numbers from each bill. By following this tedious process, I was able to calculate XO Energy's total hourly forfeiture value, however, because limited data is available, I was not able to determine the target credits forfeited for specific FTR paths nor the underlying reason for any forfeiture. The difference between XO Energy's *Hourly FTR Target Credits* from the *Original Billed* (version 20191101.000), or -$227.18, and the *Latest Billed* (version 20191201.000), or -$1,223.26, represents the total forfeiture value for that particular hour, or $996.08.

Figure 2: Hourly FTR Target Credit

MSRS Market Settlements Reporting System

pjm Settlement

MSRS Report Viewer

Customer Account: XO Energy MA2, L.P. **Report:** Hourly Transmission Congestion Credits

Start Date: 11/01/2019 **End Date:** 11/30/2019 **Version:** All Billed **File Type:** Select file type.

Display | Download Now | Add to Cart | E-Mail PJM Market Settlements about this report.

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pjm Settlement

Hourly Transmission Congestion Credits

Customer Account: XO Energy MA2, L.P.

Report Creation Timestamp (EPT): 02/04/2020 2:45:41PM

Start Date: 11/01/2019

End Date: 11/30/2019

4000.01 Customer ID	4000.02 Customer Code	4000.05 EPT Hour Ending	4000.06 GMT Hour Ending	2211.11 Total PJM FTR Targets Credits ($)	2211.12 Total PJM FTR Revenues ($)	2211.13 Hourly FTR Target Credit ($)	2211.01 Hourly FTR Credit ($)	2211.02 End-of-Month FTR Credit ($)	4000.07 Version
21156	XOMA2	11/01/2019 01	11/01/2019 05	82,274.420000	81,919.210000	-227.18	-227.18	0.00	20191101.000
21156	XOMA2	11/01/2019 01	11/01/2019 05	82,271.420000	82,949.770000	-1,223.26	-1,223.26	0.00	20191201.000

5. The IMM can also provide a monthly forfeiture report, however, this is not an automated process; a participant must send an email request to the IMM every month. In response to my requests, the IMM emails a Microsoft Excel spreadsheet to me several days or weeks later. While the data provided in this report is more detailed than the information provided by PJM, it is not

sufficient to understand the rationale for any FTR path forfeiture.[1]

6. In November 2018, I formulated an internal process to better understand the accounting of the forfeiture rule. I compiled data for each of XO Energy's FTR paths in order to calculate the hourly FTR cost, *Day-Ahead Transmission Congestion Credit* (*Hourly FTR Target Credit*), and forfeiture amount. I merged this data with the data that I obtained from the IMM reports, namely, the hourly FTR paths that were forfeited, the constraint that triggered each path, and the amount that was forfeited. By comparing my internal calculations with those reported by PJM and the IMM, I discovered that incorrect forfeiture values were being billed and that certain FTRs should not have been forfeited in the first place.

7. On November 29, 2018, I sent an email to the IMM inquiring about these discrepancies; a specific example from XO Energy was included (see Figure 3).

8. On December 3, 2018, the IMM provided the following response (see Figure 3):

> "Under the rules the forfeiture amount is the target allocation – FTR cost. The cost is calculated as the hourly cost of the FTR based on the auction price from which the FTR was purchased. I'm not sure what your FTR Auction Revenue column is, but that number is not matching what is calculated as the hourly cost of the FTR, so that's the difference in our calculations. I do match your FTR target allocation value."

9. On December 3, 2018, I sent a follow up email to the IMM inquiring as to the manner in which XO Energy's cost paid in the FTR auction had been calculated (see Figure 4).

10. On December 4, 2018, the IMM replied, although the specific question about the cost calculation was not addressed (see Figure 4):

> "The forfeiture rule causes a forfeiture of the profits of the FTR, not the target allocation. The forfeiture amount in this case is calculated as target allocation – (-cost), so the forfeiture amount can be greater than the target allocation."

[1] The IMM's report includes the following information: hour (hour of the month), timezone, constraint_name (name of the constraint that triggered the forfeiture), Org_ID (market participant's organization identification), source (the source node of the FTR path forfeited), sink (the sink node of the FTR path forfeited) and forfeiture (the dollar amount of the FTR forfeiture).

11. On December 4, 2018, I determined the source of the calculation errors and was able to replicate each hourly FTR forfeiture value that had been incorrectly calculated by the IMM. I sent another email to the IMM, including a detailed explanation and example (see Figure 5). The IMM did not reply or acknowledge this email.

12. On December 13, 2018, I sent a follow up email to the IMM inquiring as to whether the calculation error issue was being examined and requesting XO Energy's October 2018 forfeiture report (see Figure 6).

13. On December 17, 2018, the IMM replied indicating that "we're looking into the other issue" and attaching the October 2018 forfeiture report (see Figure 6). I did not receive any further correspondence from the IMM regarding the calculation error issue.

Figure 3: XO Energy's November 29, 2018 Correspondence with the IMM

Matt Thompson <mthompson@xo-energy.com> Nov 29, 2018, 2:46 PM

to Seth

Hi Seth,

Could you please walk me through the calculation behind the hourly forfeiture amount? I'm looking at one particular hour and can not figure it out.

In this particular example below, on Feb 8th, 2018 HB1, the FTR path of WESTERN HUB -> AEP-DAYTON HUB forfeited $728.39. The February auction clearing price per MWh was ($11.78), yielding a credit to us of $589 from the auction. The DA congestion spread was $8.40, yielding a FTR Target Allocation of $419.81, for a total revenue of $1,008.81. The constraint that triggered the forfeiture was the Burnham-Munster flowgate. While I agree and understand that under the current set of rules, our virtual portfolio triggered the forfeiture rule for this hour, however, I can not figure out how the resulting $728.39 forfeiture was calculated. Could you please elaborate on how that dollar value was calculated?

Thanks,
Matt

Datetime	Source ID	Sink ID	Source	Sink	Class	Period	Cleared MW	FTR Auction Clearing Price	FTR Auction Clearing Price $/MWh	DA Congestion $/MWh	RT Congestion $/MWh	FTR Auction Revenue	FTR DA Target Allocation	Revenue	Forfeiture Amount	PnL	Constraint_Name
08FEB2018:01:00:00	52457	52450	JUNIATA	CONEMAUGH	OffPeak	FEB	50	-$3,786.19	-$10.76	$0.18	$0.00	-$538.00	$9.00	$547.00	$290.71	$256.29	GARDNERS115 KV GAR-TEX
08FEB2018:01:00:00	51288	34497127	WESTERN HUB	AEP-DAYTON	OffPeak	FEB	50	-$4,147.32	-$11.78	$8.40	$0.00	-$589.00	$419.81	$1,008.81	$728.39	$280.42	Burnham Munster I/o Dumont Wilton Center

Seth Hayik <Seth.Hayik@monitoringanalytics.com> Dec 3, 2018, 8:45 AM

to me

Hi Matt,

Sorry for the delay on this, I was out a few days last week. Under the rules the forfeiture amount is the target allocation – FTR cost. The cost is calculated as the hourly cost of the FTR based on the auction price from which the FTR was purchased. I'm not sure what your FTR Auction Revenue column is, but that number is not matching what is calculated as the hourly cost of the FTR, so that's the difference in our calculations. I do match your FTR target allocation value. I hope that helps at least a little.

Figure 4: XO Energy's December 3, 2018 Correspondence with the IMM

Matt Thompson <mthompson@xo-energy.com> Dec 3, 2018, 9:34 AM

to Seth

Hi Seth,

Thanks for the reply. How are you calculating the cost that we paid in the FTR Auction? According to the FTR Results for the February 2018 auction, XOMA2 acquired the WESTERN HUB -> AEP-DAYTON HUB off-peak FTR for ($4147.32 / MW-month), or ($11.78 / MWh). This would be an hourly cost of ($589.00), or (-4147.32 / 352)*50. If the target allocation numbers from my previous email are correct, how could we forfeit more than the target allocation ($8.40 DALMP * 50 MW = 419.81)? If I'm reading the rule correctly, the forfeiture amount should never be more than the target allocation? Is that correct?

Thanks,
Matt

	A	B	C	D	E	F	G	H	I	J	K	L	M
	FTRID	Class Type	Period Type	Participant	Source Node	Source PNODEID	Sink Node	Sink PNODEID	Trade Type	Hedge Type	Cleared MW	Obligation MCP	Option MCP
2	152211184	OffPeak	FEB	XOMA2	WESTERN HUB	51288	AEP-DAYTON HUB	34497127	Buy	Obligation	30	-4147.32	
	152211219	OffPeak	FEB	XOMA2	WESTERN HUB	51288	AEP-DAYTON HUB	34497127	Buy	Obligation	15	-4147.32	
	152211253	OffPeak	FEB	XOMA2	WESTERN HUB	51288	AEP-DAYTON HUB	34497127	Buy	Obligation	5	-4147.32	
3													

Seth Hayik <Seth.Hayik@monitoringanalytics.com> Dec 4, 2018, 8:44 AM

to me

Hi Matt,

The forfeiture rule causes a forfeiture of the profits of the FTR, not the target allocation. The forfeiture amount in this case is calculated as target allocation – (-cost), so the forfeiture amount can be greater than the target allocation.

Figure 5: XO Energy's December 4, 2018 Correspondence with the IMM

Matt Thompson <mthompson@xo-energy.com>
to Seth, bcc: Shawn, bcc: Joel, bcc: Andrew, bcc: Carey

Hi Seth,

I figured out the differences in our calculations. The difference is that IMM/PJM is not using the correct hourly auction costs. This is because the total $/MW-month is simply being divided by the total number of hours of the month, rather than the number of off-peak or on-peak hours. This number is then assumed to the be the hourly costs. This doesn't add up correctly.

For example, below shows the clearing prices for Jun 2018 for the FTR path JUNIATA -> CONEMAUGH. The $/MW-Month for the OffPeak was $656.64, OnPeak was $590.36, and 24Hour was $1,247.00. Dividing those costs by the number of hours in each class (off/on/24) gives the following actual auction costs paid by XO Energy for each hour of the month:

June 2018	Clearing Price ($/MW-month)	Hours in Month	Clearing Price ($/MWh)
OffPeak	$656.64	384	$1.71
OnPeak	$590.36	336	$1.76
24Hour	$1,247.00	720	$1.73

However, it seems that the hourly FTR cost being used in the forfeiture rule is actually being calculated using the monthly clearing price ($/MW-month) divided by the total number of hours in the entire month (720). In this example, an hourly cost of ($656.64 / 720 = $.91/MWh) for OffPeak, and ($590.36 / 720 = $.82/MWh) for OnPeak seems to be being used instead. From there, the forfeiture amount is then being calculated as Column U (DA Target Allocation) minus Column T (FTR Auction Cost). For Hour Ending 2, the forfeiture was $3.31 - $3.28 = $.03. In this particular case, there should be no forfeiture since the Target Allocation is less than the actual hourly cost (Column S).
For Hour Ending 8, the calculation is $43.00 - $16.40 = $26.60 using the IMM's hourly cost, as opposed to $43.00 - $35.14 = $7.86 by using the actual hourly cost, for a total over-collection of forfeitures of $18.74.

I have gone through each hour over the past 10 months for every path that XO Energy has held, and this calculation holds up.

A	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Datetime	Cleared Price ($/MW-Month)	Month Hours (by Class Type)	Hourly Price $/MWh (Using number of class type hours)	Month Hours (ATC)	Hourly Price $/MWh: IMM Calculation (Using number of ATC hours)	DA Cong Spread	RT Cong Spread	FTR Auction Cost: XO Calculation (Cleared Price / Class Hours) * Cleared MW	FTR Auction Cost: IMM Calculation (Cleared Price / ATC Hours) * Cleared MW	DA Target Allocation (DA Cong Spread * Cleared MW)	PnL: XO Calculation (Target Allocation - FTR Auction Cost)	Constraint_Name Triggering Forfeit	Forfeiture Amount: IMM Calculation	Forfeiture Amount: XO Energy Calculation	Difference
01JUN2018:00:00:00	$656.64	384	$1.71	720	$0.91	$1.71	$0.00	$6.16	$3.28	$6.16	$0.00				
01JUN2018:01:00:00	$656.64	384	$1.71	720	$0.91	$0.92	$0.00	$6.16	$3.28	$3.31	-$2.84	GRACETON230 KV GRA-SAF	$0.03	-$2.84	$2.87
01JUN2018:02:00:00	$656.64	384	$1.71	720	$0.91	$0.99	$0.00	$6.16	$3.28	$3.56	-$2.59	GRACETON230 KV GRA-SAF	$0.28	-$2.59	$2.87
01JUN2018:03:00:00	$656.64	384	$1.71	720	$0.91	$0.78	$0.00	$6.16	$3.28	$2.81	-$3.35				
01JUN2018:04:00:00	$656.64	384	$1.71	720	$0.91	$0.79	$0.00	$6.16	$3.28	$2.84	-$3.31				
01JUN2018:05:00:00	$656.64	384	$1.71	720	$0.91	$1.19	$0.00	$6.16	$3.28	$4.28	-$1.87	GRACETON230 KV GRA-SAF	$1.00	-$1.87	$2.87
01JUN2018:06:00:00	$656.64	384	$1.71	720	$0.91	$2.67	$0.00	$6.16	$3.28	$9.61	$3.46				
01JUN2018:07:00:00	$590.36	336	$1.76	720	$0.82	$2.15	$0.01	$35.14	$16.40	$43.00	$7.86	GRACETON230 KV GRA-SAF	$26.60	$7.86	$18.74
01JUN2018:08:00:00	$590.36	336	$1.76	720	$0.82	$3.76	$0.01	$35.14	$16.40	$75.20	$40.06	FACEROCK69 KV FAROZBR	$58.80	$40.06	$18.74
01JUN2018:09:00:00	$590.36	336	$1.76	720	$0.82	$5.24	$0.01	$35.14	$16.40	$104.80	$69.66	GRACETON230 KV GRA-SAF	$88.40	$69.66	$18.74
01JUN2018:10:00:00	$590.36	336	$1.76	720	$0.82	$5.07	$0.05	$35.14	$16.40	$101.40	$66.26	GRACETON230 KV GRA-SAF	$85.00	$66.26	$18.74
01JUN2018:11:00:00	$590.36	336	$1.76	720	$0.82	$4.91	$4.75	$35.14	$16.40	$98.20	$63.06	ALLENIM 345 KV ALL-RPM	$81.80	$63.06	$18.74
01JUN2018:12:00:00	$590.36	336	$1.76	720	$0.82	$7.82	$0.00	$35.14	$16.40	$156.40	$121.26	GARDNERS115 KV GAR-TEX	$140.00	$121.26	$18.74
01JUN2018:13:00:00	$590.36	336	$1.76	720	$0.82	$9.68	-$0.82	$35.14	$16.40	$193.60	$158.46	GARDNERS115 KV GAR-TEX	$177.20	$158.46	$18.74
01JUN2018:14:00:00	$590.36	336	$1.76	720	$0.82	$7.07	-$34.09	$35.14	$16.40	$141.40	$106.26	LAKVEW 138 KV LAK-GRE1	$125.00	$106.26	$18.74
01JUN2018:15:00:00	$590.36	336	$1.76	720	$0.82	$7.05	-$7.64	$35.14	$16.40	$141.00	$105.86				
01JUN2018:16:00:00	$590.36	336	$1.76	720	$0.82	$2.56	-$0.19	$35.14	$16.40	$51.20	$16.06				
01JUN2018:17:00:00	$590.36	336	$1.76	720	$0.82	$5.08	-$0.13	$35.14	$16.40	$101.60	$66.46				
01JUN2018:18:00:00	$590.36	336	$1.76	720	$0.82	$5.03	-$1.27	$35.14	$16.40	$100.60	$65.46				
01JUN2018:19:00:00	$590.36	336	$1.76	720	$0.82	$1.90	-$1.76	$35.14	$16.40	$38.00	$2.86				
01JUN2018:20:00:00	$590.36	336	$1.76	720	$0.82	-$1.23	$0.16	$35.14	$16.40	-$24.60	-$59.74				
01JUN2018:21:00:00	$590.36	336	$1.76	720	$0.82	-$0.88	$0.40	$35.14	$16.40	-$17.60	-$52.74				
01JUN2018:22:00:00	$590.36	336	$1.76	720	$0.82	-$1.40	$0.46	$35.14	$16.40	-$28.00	-$63.14				
01JUN2018:23:00:00	$656.64	384	$1.71	720	$0.91	-$0.13	$0.00	$6.16	$3.28	-$0.47	-$6.62				

This doesn't really make sense to me because if you were to take the sum of each of the hourly FTR auction costs for the month as calculated by the IMM, you get totally different total costs than what was actually paid for in the auction:

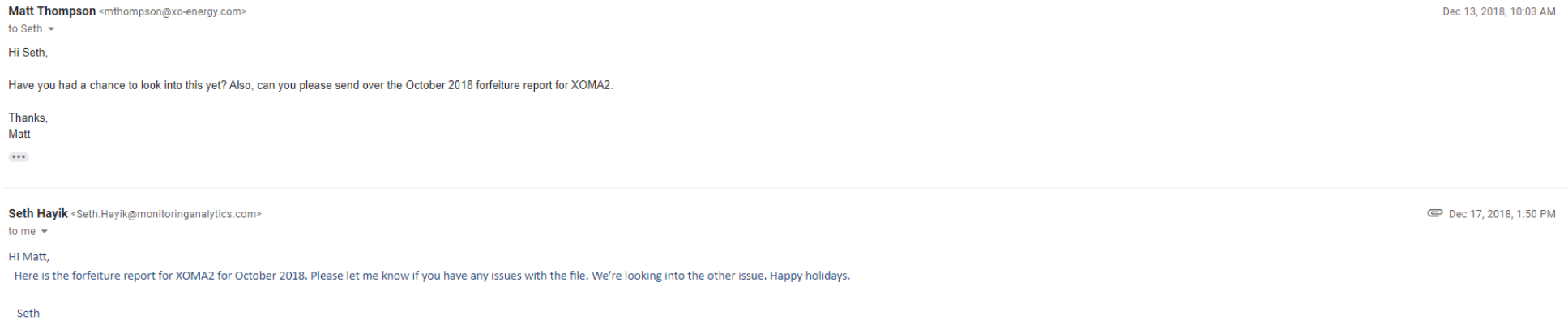
June 2018	Actual Clearing Price ($/MWh)	IMM Calculated Clearing Price ($/MWh)	XO Energy Cleared MW	Actual Total Monthly Cost	IMM Calculated Cost
OffPeak	$1.71	$0.91	3.60	$2,363.90	$1,257.98
OnPeak	$1.76	$0.82	20.00	$11,807.20	$5,510.40
Total Monthly Cost				$14,171.10	$6,768.38

I have attached a spreadsheet with the underlying calculations for JUNIATA -> CONEMAUGH for each hour of the month of June.

Can you please look into this and let me know your thoughts.

Thanks,
Matt

Figure 6: XO Energy's December 13, 2018 Correspondence with the IMM



Matt Thompson <mthompson@xo-energy.com> Dec 13, 2018, 10:03 AM
to Seth

Hi Seth,

Have you had a chance to look into this yet? Also, can you please send over the October 2018 forfeiture report for XOMA2.

Thanks,
Matt

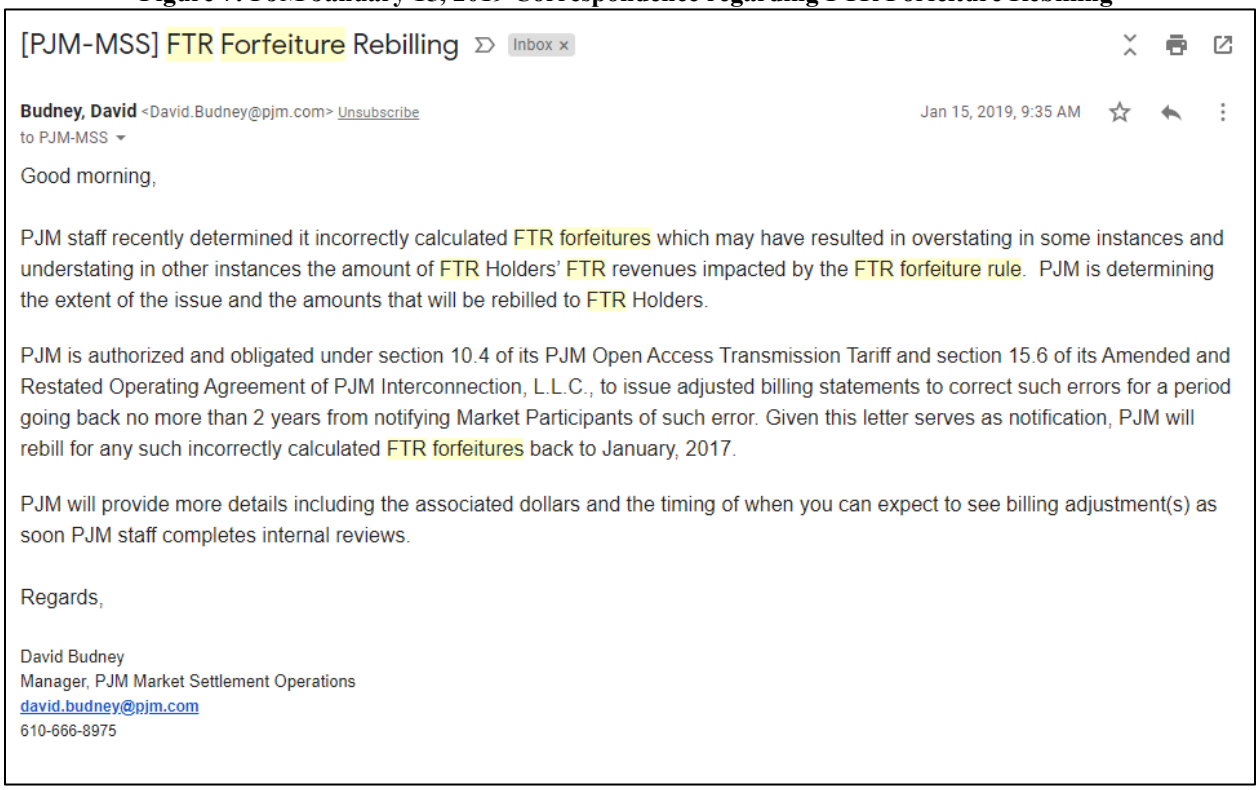
Seth Hayik <Seth.Hayik@monitoringanalytics.com> Dec 17, 2018, 1:50 PM
to me

Hi Matt,
Here is the forfeiture report for XOMA2 for October 2018. Please let me know if you have any issues with the file. We're looking into the other issue. Happy holidays.

Seth

14. On January 15, 2019, following my exchanges with the IMM, PJM sent a market-wide notice to members indicating that an issue with the FTR Forfeiture Rule was being investigated and that billing statement adjustments would be authorized (see Figure 7).

Figure 7: PJM January 15, 2019 Correspondence regarding FTR Forfeiture Rebilling



[PJM-MSS] FTR Forfeiture Rebilling Inbox ×

Budney, David <David.Budney@pjm.com> Unsubscribe
to PJM-MSS
Jan 15, 2019, 9:35 AM

Good morning,

PJM staff recently determined it incorrectly calculated FTR forfeitures which may have resulted in overstating in some instances and understating in other instances the amount of FTR Holders' FTR revenues impacted by the FTR forfeiture rule. PJM is determining the extent of the issue and the amounts that will be rebilled to FTR Holders.

PJM is authorized and obligated under section 10.4 of its PJM Open Access Transmission Tariff and section 15.6 of its Amended and Restated Operating Agreement of PJM Interconnection, L.L.C., to issue adjusted billing statements to correct such errors for a period going back no more than 2 years from notifying Market Participants of such error. Given this letter serves as notification, PJM will rebill for any such incorrectly calculated FTR forfeitures back to January, 2017.

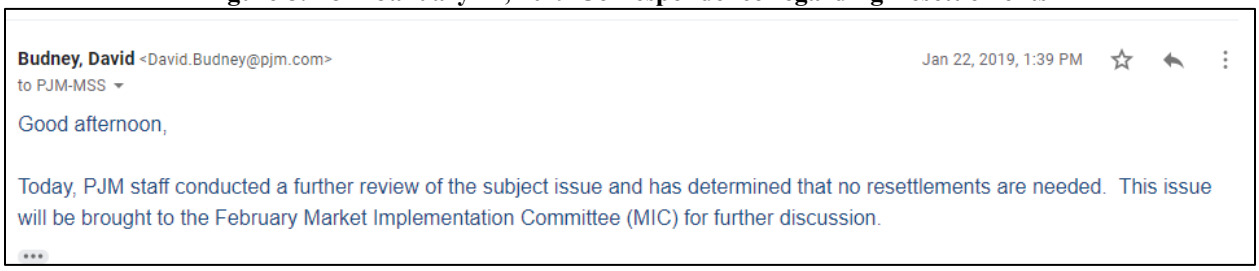
PJM will provide more details including the associated dollars and the timing of when you can expect to see billing adjustment(s) as soon PJM staff completes internal reviews.

Regards,

David Budney
Manager, PJM Market Settlement Operations
david.budney@pjm.com
610-666-8975

15. On January 22, 2019, PJM sent another email to members indicating that, since PJM was following its Tariff language (though flawed), resettlements would not be necessary (see Figure 8).

Figure 8: PJM January 22, 2019 Correspondence regarding Resettlements



Budney, David <David.Budney@pjm.com>
to PJM-MSS
Jan 22, 2019, 1:39 PM

Good afternoon,

Today, PJM staff conducted a further review of the subject issue and has determined that no resettlements are needed. This issue will be brought to the February Market Implementation Committee (MIC) for further discussion.

16. On March 6, 2019, PJM presented a "first read" to modify the Tariff in order to use the

correct number of hours in the FTR forfeiture calculation.[2]

17. On May 7, 2019, PJM members endorsed the proposed changes to the Tariff and Manual, which were subsequently implemented into PJM Settlements in September 2019.

18. For almost 20 years, PJM had been miscalculating the hourly cost for FTRs. Instead of calculating the *number of hours applicable to the period of the FTR*, PJM and the IMM were determining the hourly FTR cost using the *total number of hours in the settlement month.*

19. There are three separate periods during which an FTR can be transacted: during on-peak hours, off-peak hours, and around-the-clock ("ATC"). By way of example, in a given month, there may be 336 on-peak hours, 384 off-peak hours, and 720 ATC hours. PJM clears its FTR auctions in order to determine the $/MWh-period cost of each pricing node. In order to determine the hourly FTR cost for purposes of forfeitures, PJM was simply using the $/MWh-period FTR auction cost of the path and dividing this value by the total number of hours in the month (in this example, 720 to calculate the $/MWh). The correct way to calculate the $/MWh-period cost is to divide by the appropriate number of hours in the period.

20. By way of example, if an FTR path cost $1,000/MWh-period for the month of June, PJM miscalculated the hourly cost of an on-peak FTR as $1,000/720 hours or $1.39/MWh instead of $1,000/336 or $2.98/MWh. This miscalculation resulted in an over-collection of FTR forfeitures for prevailing flow positions and an under-collection of FTR forfeitures for counterflow positions. In the prevailing flow example shown in Figure 9**Error! Reference source not found.**, the hourly FTR target credit is $5.00/MWh. Using PJM's flawed calculations, the participant would erroneously forfeit $3.61/MWh instead of $2.02/MWh.

[2] *See* PJM, *FTR Forfeiture Update* (March 6, 2019), available at https://pjm.com/-/media/committees-groups/committees/mic/20190306/20190306-item-06-ftr-forfeiture-first-read.ashx.

Figure 9: Prevailing Flow Calculation Error

Calculation	Flow Direction	Total Cost $/MW-Period	Hours	Hourly Cost $/MWh	Target Allocation $/MWh	Total Forfeit
Incorrect	Prevailing	$1,000	720	$1.39	$5.00	$3.61
Correct	Prevailing	$1,000	336	$2.98	$5.00	$2.02

For counterflow FTRs, participants did not forfeit enough money (see Figure 10, which illustrates that $0.78/MWh was erroneously forfeited instead of $3.95/MWh).

Figure 10: Prevailing Flow Calculation Error

Calculation	Flow Direction	Total Cost $/MW-Period	Hours	Hourly Cost $/MWh	Target Allocation $/MWh	Total Forfeit
Incorrect	Counter	($2,000)	720	($2.78)	($2.00)	$0.78
Correct	Counter	($2,000)	336	($5.95)	($2.00)	$3.95

These miscalculations also created false positive triggers, resulting in the incorrect forfeiture of FTRs. For example, if the target allocation is now $2.50/MWh, no revenue should be forfeited since the target allocation is less than the hourly cost. Using PJM's incorrect formula (i.e., using the full 720 hours), a participant would forfeit $1.11/MWh (see Figure 11).

Figure 11: False Positive Forfeit - Prevailing Flow

Calculation	Flow Direction	Total Cost $/MW-Period	Hours	Hourly Cost $/MWh	Target Allocation $/MWh	Total Forfeit
Incorrect	Prevailing	$1,000	720	$1.39	$2.50	$1.11
Correct	Prevailing	$1,000	336	$2.98	$2.50	$0.00

Conversely, with counterflow FTRs, revenues were not being forfeited when they should have been. In the example in Figure 12 below, if the target allocation was ($-3.00)/MWh, no revenue would have been forfeited since the target allocation was less than the hourly cost. In this case, $2.95/MWh should have been forfeited.

Figure 12: False Positive Forfeit - Counter Flow

Calculation	Flow Direction	Total Cost $/MW-Period	Hours	Hourly Cost $/MWh	Target Allocation $/MWh	Total Forfeit
Incorrect	Counter	($2,000)	720	($2.78)	($3.00)	$0.00
Correct	Counter	($2,000)	336	($5.95)	($3.00)	$2.95

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

XO Energy, LLC **v.** **PJM Interconnection, L.L.C.**	**Docket No. ER20-___-000**

AFFIDAVIT OF MATTHEW THOMPSON

I MATTHEW THOMPSON have prepared this Affidavit and have knowledge of the matters set forth in the Affidavit and the statements contained therein. I swear to the contents of the Affidavit and the Exhibits attached hereto and attest that the contents are true and correct to the best of my knowledge and belief.

Due to the COVID-19 pandemic, I am unable to prepare a notarized affidavit at this time. A notarized affidavit will be submitted as soon as practicable once the Declaration of National Emergency has been lifted.

I certify that the foregoing is true and correct.

Executed on April 8, 2020.

Matthew Thompson

Document Content(s)