

To: Market Participants
From: Market & Credit Risk Department
Date: ~~October 07, 2016~~ September 11, 2017
Subject: FTR Financial Assurance Methodology

This memorandum exhibits details of the ISO's proposed Financial Assurance (FA) methodology for incorporating the Balance of Planning Period (BoPP) Auctions into the Financial Transmission Rights (FTR) market. The primary change to the FTR FA calculation allows awarded FTR MWs from different auctions to net if the MWs are from the same or opposite path, same class type and contract month. The Settlement Risk Financial Assurance (SRFA) requirements are based on the netted MWs. In order to have a proper netting mechanism, we introduced a new variable called "unsettled FTR obligation" in the FTR financial assurance calculation. The unsettled FTR obligation reflects the net present value of an FTR portfolio for each Market Participant. In addition, we propose to change how the proxy value is calculated. Finally, FTR FA will be updated when there is an FTR auction being cleared (e.g. monthly basis).

As the ISO does today, during the FA review process for FTR auctions, if a Market Participant does not have enough FA to support all their FTR bid/offer stacks, all their FTR bids/offers will be rejected from clearing as a result, which includes both monthly auction and BoPP auctions. After all the auctions clear, there is a chance that a Market Participant with FTR positions could be in FA default due to the Mark-to-Market change of the existing portfolio. In such a scenario the Market Participant would go through the normal FA default process and is allowed to cure their default in 24 hours. They will be suspended from the market if they fail to cure in 24 hours consistent with the current process.

Methodology Assumptions:

1. Position Netting

- Only exact FTR contracts can be netted (Buy and Sell, or prevailing flow and counterflow FTRs having the same or opposite path, same class type and contract month can net).
 - Example 1:
 - A Market Participant has been awarded the same or opposite contract path in three different auctions for the same contract month and class type:
 - Auction #1 Buy 40 MW B -> A @ -\$23
 - Auction #2 Buy 60 MW B -> A @ -\$27
 - Auction #3 Buy 70 MW A -> B @ \$64
 - The net MWs after each auction will be:
 - Auction #1 -40 MW A -> B
 - Auction #2 -100 MW A -> B
 - Auction #3 -30 MW A -> B

- The negative net MWs indicate that the Market Participant is holding a counterflow position.
- Example 2:
 - A Market Participant has been awarded the same or opposite contract path in the three different auctions for the same contract month and class type:
 - Auction #1 Buy 60 MW A -> B @ \$50
 - Auction #2 Sell 40 MW A -> B @ \$60
 - Auction #3 Buy 30 MW B -> A @ -\$75
 - The net MWs after each auction will be:
 - Auction #1 60 MW A -> B
 - Auction #2 20 MW A -> B
 - Auction #3 -10 MW A -> B
 - The negative net MWs indicate that the Market Participant is holding a counterflow position.

2. Calculating Proxy Value

- Inputs for the proxy value calculation will be:
 - Monthly average DALMP congestion component (DALMPC) calculated for each p-node for the last 36 complete months
 - Separate proxy for on-peak and off-peak FTRs.
- For each p-node source and sink path combination the DALMPC difference (Δ_{LMPC}) will be calculated ($\Delta_{LMPC} = DALMPC(sink) - DALMPC(source)$).
 - This calculation will be repeated for each of the previous 36 sample months.
 - The standard deviation of 36 Δ_{LMPC} values will be calculated. One for on-peak and one for off-peak hours.
 - The multiples of standard deviation of 36 Δ_{LMPC} will be used as the proxy value for the path.
 - Annual and monthly (including BoPP) FTRs may have different multipliers.
 - Prevailing flow and counterflow FTRs may have different multipliers.
 - The initial multipliers are shown in the following table:

Monthly	Annual	Counterflow Risk Factor
1.645	1.645 0.475	1.20

- For p-nodes with insufficient historical LMP data, zonal LMPs will be used.
 - New p-nodes assigned to new load zones will utilize a designated proxy p-node

3. Unsettled FTR Obligation

- The unsettled FTR obligation for all the most recently awarded FTR MWs is zero because their Mark-To-Market (MTM) value is zero.
 - The unsettled FTR obligation for the existing position is equal to the net present value of the position assuming that the position can be liquidated at the most recent clearing price. The unsettled FTR obligation can be calculated recursively: it is equal to last unsettled FTR obligation plus the change in incremental value due to the latest auction clearing price. The change in incremental value can be calculated as the product of the absolute price difference between two most recent clearing prices and the existing net MWs. The sign convention of

net MWs is that negative means holding a counterflow position, and positive means holding a prevailing flow position. If the absolute clearing price difference goes up, the counterflow position is out of money, and it requires more financial assurance. On the other hand, the prevailing flow position is in the money, it requires less financial assurance.

- Example: If a Market Participant has been awarded the same or opposite contract path in three different auctions with awarded prices and net MWs shown in following table, the unsettled FTR obligation will be that shown in column C.

			$(ABS(A(i-1))-ABS(A(i))) * (B(i-1)) + C(i-1)$
Auction ID	Awarded Price	Net MW	Unsettled FTR Obligation
	A	B	C
111	\$ (23.83)	-40	\$0
222	\$ (27.41)	-100	\$143
333	\$ 64.58	-30	\$3,860

4. Settlement Risk Financial Assurance

- After the auction results are posted, all the cleared MWs will be netted against the MWs with same contract path within the existing portfolio. The SRFA requirement will be updated with new netted MWs and new proxy values. The unsettled FTR obligation for the existing portfolio will be updated with new clearing prices.
- Settlement Risk Financial Assurance (SRFA) is calculated as the product of net MWs, proxy value, and number of hours of the contract month or year.
 - Example: If a Market Participant has 40 net MWs for a path with a proxy value of \$3.6 /MWh, and the number of hours of the contract month is 384, then $SRFA = 40 \times 3.6 \times 384 = \$55,296$.

5. FA Review upon Close of an Auction

- Settlement Risk Financial Assurance (SRFA) requirement will be calculated upon the close of the FTR Auction. The SRFA is evaluated path by path for each Market Participant. The maximum SRFA is the FA requirement for the path.
 - Example:
 - 6 bids for the same or opposite path in the same auction:
 - Bid #1 1 MW B -> A @ -\$50
 - Bid #2 2 MW B -> A @ -\$75
 - Bid #3 3 MW B -> A @ -\$100
 - Bid #4 1 MW A -> B @ \$15
 - Bid #5 2 MW A -> B @ \$10
 - Bid #6 4 MW A -> B @ \$5
 - The proxy value for prevailing flow (A->B) equals to \$2.0/MWh, and counterflow (B->A) equals to \$2.4/MWh.
 - The contract month has 320 hours.
 - If all the counterflow (B->A) is cleared, $SFRA = (1+2+3) \times 2.4 \times 320 = \$4,608$
 - If all the prevailing flow (A->B) is cleared, $SRFA = (1+2+4) \times 2 \times 320 = \$4,480$
 - SRFA requirement will be the maximum of the above two scenarios for each path.
 $SRFA \text{ requirement} = \max(SRFA(B->A), SRFA(A->B)) = \max(4,608, 4,480) = \$4,608$.
- This SRFA requirement will continue at the calculated level until the auction results are posted.

6. Converting Annual Auction Position into Monthly Auction Positions

- The existing annual contract will be broken into 12 monthly contracts after any month inside the year has started to be auctioned. The cost of the annual contract will be broken down evenly across the month in \$/MWh.
 - Example: A calendar year 2016 On-Peak contract having 4,080 hours with an awarded price of \$1,719.31/MW-period. The awarded price will be divided into the 12 month in proportion to number of On-Peak hours for each month as shown below:

Contract	Source	Sink	Buy/Sell	Class Type	Award MW	Award Price (\$)	Block Size (h)	Award Price(\$/MWh)
Y2016	Hub(4000)	Z_SEMASS(4006)	B	Peak	40	1,719.31	4,080	0.421
Jan-16	Hub(4000)	Z_SEMASS(4006)	B	Peak	40	134.85	320	0.421
Feb-16	Hub(4000)	Z_SEMASS(4006)	B	Peak	40	141.59	336	0.421
Mar-16	Hub(4000)	Z_SEMASS(4006)	B	Peak	40	155.08	368	0.421
Apr-16	Hub(4000)	Z_SEMASS(4006)	B	Peak	40	141.59	336	0.421
May-16	Hub(4000)	Z_SEMASS(4006)	B	Peak	40	141.59	336	0.421
Jun-16	Hub(4000)	Z_SEMASS(4006)	B	Peak	40	148.33	352	0.421
Jul-16	Hub(4000)	Z_SEMASS(4006)	B	Peak	40	134.85	320	0.421
Aug-16	Hub(4000)	Z_SEMASS(4006)	B	Peak	40	155.08	368	0.421
Sep-16	Hub(4000)	Z_SEMASS(4006)	B	Peak	40	141.59	336	0.421
Oct-16	Hub(4000)	Z_SEMASS(4006)	B	Peak	40	141.59	336	0.421
Nov-16	Hub(4000)	Z_SEMASS(4006)	B	Peak	40	141.59	336	0.421
Dec-16	Hub(4000)	Z_SEMASS(4006)	B	Peak	40	141.59	336	0.421

- After the annual contract has been converted into 12 monthly contracts, the monthly rule will apply to the FA calculation.

7. Financial Assurance in Flow Month

- During the flow month when part of the contract is being settled, both the unsettled FTR obligation and the SRFA requirements will be depreciated by the percentage of hours that have been settled. Unbilled FTR settlement and unbilled FTR cost will be included in the FTR FA requirements.
 - In other words, the SRFA requirement and the unsettled FTR obligation requirement will lessen over time as the number of unsettled hours in the contract goes down.
 - For example, before April 2016 On-Peak contract being settled, a Market Participant's unsettled FTR obligation and SRFA requirement for the contract are \$100 and \$500 respectively, and the Market Participant paid \$120 for the contract. On April 9, there are 6 x 16 = 96 On-Peak hours being settled. There are total 336 On-Peak hours in the contract. The unsettled FTR obligation for the contract will be adjusted to $100 \times (1 - 96/336) = \71.43 , and SRFA for the contract will be adjusted to $500 \times (1 - 96/336) = \357.14 . Assume the unbilled FTR settlement amount is -\$40, the unbilled FTR cost for settled portion of contract = $120 \times (96/336) = \$34.29$. Before April 2016 On-Peak contract being settled, the total FA = unsettled FTR obligation + SRFA = $100 + 500 = \$600$. On April 9, the total FA = adjusted unsettled FTR obligation + adjusted SRFA + unbilled FTR settlement + unbilled FTR cost = $71.43 + 357.14 - 40 + 34.29 = \422.86 .
- Note that there will be short period of time where a Market Participant's unbilled FTR settlement and unbilled FTR cost will include previous month settlement value plus part of the current month due to the settlement and billing lag. For example, in the above example, unbilled FTR settlement and FTR cost for the March 2016 On-Peak contract will still be included in FTR FA requirements as well.

8. Settlement Risk Financial Assurance Aggregation Rule (Portfolio diversification factor)

- When the SRFAs from different contract months are being aggregated, the following formula will apply: $subTotal\ SRFA = \sqrt{SRFA_1^2 + SRFA_2^2 + \dots + SRFA_n^2}$. That is to say, all the remaining monthly SFRA will first be squared, and then summed up, and in the end, take the square root. In the formula, the n is the number of remaining months that participants have FTR positions.
- Likewise, when aggregating SRFAs from ON PEAK and OFF PEAK FTR class type, ISO-NE will use the following formula: $bTotal\ SRFA = \sqrt{SRFA_{ONPEAK}^2 + SRFA_{OFFPEAK}^2}$.
- For example, if a participant has SRFAs for remaining two months of \$1000 and \$2000 respectively, the subtotal amount will be: $\sqrt{1000^2 + 2000^2} = \sqrt{5000000} = \2236 .
- Likewise, if a participant has SRFAs for ON PEAK and OFF PEAK class type of \$3000 and \$4000 respectively, the subtotal amount will be: $\sqrt{3000^2 + 4000^2} = \sqrt{25000000} = \5000 .

89. Other

- ISO will provide Market Participants the means to calculate their potential FA requirement during the auction window open to close.
 - It is not feasible to publishing the proxy value for all possible bid paths.
 - The ISO, however, can support the publishing of the average DALMPC values for all p-nodes for the most recently completed 36 months.
 - The data set will be updated monthly as new averages are calculated.
 - This data is all that is necessary to calculate proxies.
- In summary, for current month contract, FTR requirements = adjusted unsettled FTR obligation + adjusted SRFA + unbilled FTR settlement + unbilled FTR cost. For prompt month and beyond contract, FTR requirements = unsettled FTR obligation + SRFA.