Revised from November 9, 2023

To: NEPOOL Budget & Finance Subcommittee

From: ISO-NE Market and Credit Risk Department

Date: May 28, 2025

Subject: PFP-FA Instructional Memo

Executive Summary

On June 1, 2018, a fundamental design change to the Forward Capacity Market (FCM), known as Pay For Performance (PFP) became effective. PFP alters the risk profile for Capacity Supply Obligations (CSOs); thus the Financial Assurance (FA) methodology must change as well.

This memo will serve as a guide to the FA impacts of PFP and how to calculate the new FA requirement. The ISO also developed a basic FCM Delivery FA Model (Excel file) designed to help participants approximate their Delivery FA requirements. The model may need to be modified by the end user to accommodate unique scenarios.

Background

Filed in 2014 and becoming effective on June 1, 2018, the PFP FCM structure is intended to better align generators' incentives with the FCM's goals of having reliable capacity for the region.

The PFP market design breaks monthly capacity payments into two independent revenue streams: capacity base payments and capacity performance payments. The capacity base payment is made to any resource having a CSO. The capacity performance payment is linked to a resource's actual performance during capacity scarcity conditions. If a resource delivers more capacity than its share of the system's requirements during a capacity scarcity condition, it will get a positive capacity performance payment; if it delivers less capacity than its share, it will receive a negative capacity performance payment. Positive and negative capacity performance payments are calculated based on the capacity performance payment rate, which is specified in the Tariff.

Effect on Financial Assurance

PFP changed the way the ISO assesses FA for the FCM. The PFP design introduces the possibility that resources with CSOs will have obligations (owe money) to the market in the case of underperformance. Since all obligations must be collateralized through the posting of financial assurance under the ISO Financial Assurance Policy (FAP), beginning on June 1, 2018, a Market Participant with a CSO will be required to add "FCM Delivery FA" to its total Financial Assurance requirements.

FCM Delivery FA is constructed to cover three types of risk: (1) payment of obligations already incurred in a past delivery month; (2) exposure to payment obligations arising from negative capacity performance payments in the current delivery month; and (3) the potential that losses may continue to accrue against a defaulted CSO up to the

annual stop-loss in any Capacity Commitment Period prior to a Market Participant being able to close the position and that the defaulted position is sold at a loss.

FCM Delivery FA Calculation

The monthly FCM Delivery FA requirement is calculated using the formula below. Note that the formula and explanations below reflect changes filed on March 1, 2018[1], January 26, 2021[2], March 2, 2022[3] and December 3, 2024[4].

The FCM Delivery Calculation will vary depending on the peak stop-loss obligations of the Market Participant (MP) and the Available Corporate Liquidity of the (MP) or its guarantor. MPs will be placed into one of three risk categories (i.e. High, Medium or Low Risk) based on the following assessment.

> If an MP's Available Corporate Liquidity (ACL) ≥ sum of its 3 largest stop-losses within the current month plus the next five months, the MP will be Low Risk,
>
> Else if an MP's ACL ≥ sum of its 2 largest stop-losses, the MP will be Medium Risk,
>
> Else if an MP's ACL < sum of its 2 largest stop-losses, the MP will be High Risk

Consider the following CSO portfolio from June to December 2025:

Month	June	July	August	September	October	November	December
CSO	10 MW	9 MW	8 MW	9 MW	10 MW	8 MW	8 MW
ABR	0.89	0.89	0.89	0.89	0.6	0.6	0.69
CWAP	0.15	0.15	0.15	0.15	0.4	0.4	0.37
Monthly Stop-loss	$124,000	$111,600	$99,200	$111,600	$124,000	$99,200	$99,200

For FCA 16 covering June 2025 thru May 2026, the auction starting price is $12.40. The Monthly Stop-loss is calculated by multiplying the CSO MW for the applicable month by the FCA Auction Starting Price x 1,000. When two months in the 6 month window of consideration have equal monthly stop-losses, the earlier month will be used.

In the Example, June and October are tied for the Peak Monthly Stop-loss, but since June is the earlier month, it is considered the largest monthly stop-loss, followed by October, then July (note July is tied with September, but July is the earlier month). For purposes of calculating which risk category, we must know the sum the top two and top three stop-losses.

Month	Top 2	Top 3
June	$124K	$124K
October	$124K	$124K
July	NA	$111.6K
Total	$248K	$359.6K

To complete the Calculation, we need to obtain the Available Corporate Liquidity which is the sum of the following:

1. Unrestricted Cash and Cash Equivalents

[1] Docket No. ER18-944-000.
[2] Docket No. ER21-943-000.
[3] Docket No. ER22-1167-000.
[4] Docket No. ER24-3071-000.

2. Marketable Securities and money market instruments
3. Undrawn Committed Credit Facilities not expiring within 3 months of applicable financial statements
4. Excess Financial Assurance

Items 1 – 3 are obtained from the Participant's or the Participant's Guarantor's financial statements (not the sum of the two). Excess financial assurance is calculated as any financial assurance provided by the Designated FCM Participant in an acceptable form (in accordance with Section X) that is:

- Covering its FCM Delivery Financial Assurance obligations.
- Plus any financial assurance provided by the Designated FCM Participant in excess of its total Financial Assurance Obligations

Consider the following Example:

	Participant	Guarantor	Available Corporate Liquidity
1. Cash	$100 K	$200K	$200K
2. Marketable Securities	$50 K	$100K	$100K
3. Undrawn Committed Credit Facilities	$0	$50K	$50K
4. Excess Financial Assurance	$20K	$0	$20K
Available Corporate Liquidity	$170K	$350K	$370K

In this example, the participant only has $170K of Available Corporate Liquidity on a stand-alone basis. To qualify as medium risk, the Available Corporate Liquidity would need to be equal to or greater than $248K as calculated above. Since it is below or less than the two largest monthly stop-losses, the participant would be considered High Risk if it did not have a guarantor. With the guarantor, the Available Corporate Liquidity is $370K, exceeding the sum of the 3 largest stop-losses. Thus, with the guarantor, this participant is considered low risk.

Now that the Risk Category has been determined, FCM Delivery FA is calculated as follows:

[1] Low Risk: DFAMW x PE x max [(ABR – CWAP), 0.1] x SF – IMC – MCC
[2] Medium Risk: Low Risk + Peak Monthly Stop-Loss x max(ABR – CWAP, 0.1) for the applicable month
[3] High Risk: Medium Risk + Second Largest Monthly Stop-Loss x max(ABR – CWAP, 0.1) for the applicable month

DFAMW (delivery financial assurance MW) is the summation of CSOs of each resource in the participant's portfolio excluding resources that have reached their annual stop-loss[5] (SLF) and excluding the Energy Efficiency designated portion of demand resources. If the calculated DFAMW is less than zero, then DFAMW is set equal to zero.

PE (potential exposure) is a monthly value calculated for the Designated FCM Participant's portfolio as the difference between the Capacity Supply Obligation weighted average Forward Capacity Auction Starting Price and the Capacity Supply Obligation weighted average capacity price for the portfolio, excluding the Capacity Supply Obligation of any resource that has reached the annual stop-loss as described in Section III.13.7.3.2 of Market Rule 1 and, excluding the Capacity Supply Obligation associated with any Energy Efficiency measures. The Forward Capacity Auction Starting Price shall correspond to that used in the Forward Capacity Auction corresponding to the current Capacity Commitment Period and the capacity prices shall correspond to those used in the calculation of the Capacity Base Payment for each Capacity Supply Obligation in the delivery month.

[5] The annual stop loss flag tracks if the performance payment of a resource has reached its annual stop-loss as defined in the Tariff. If a resource hits its annual stop-loss limit, it is waived from its future financial obligation in the remaining capacity commitment period. Resources which reach their annual stop loss will be designated with a stop-loss flag (SLF = 1).

ABR (average balancing ratio) is the duration-weighted average of all of the system-wide Capacity Balancing Ratios calculated for each system-wide Capacity Scarcity Condition occurring in the relevant group of months in the three Capacity Commitment Periods immediately preceding the current Capacity Commitment Period. Three separate groups of months shall be used for this purpose: June through September, December through February, and all other months. Until data exists to calculate this number, the temporary ABR for June through September shall equal 0.90; the temporary ABR for December through February shall equal 0.70; and the temporary ABR for all other months shall equal 0.60. As actual data becomes available for each relevant group of months, calculated values for the relevant group of months will replace the temporary ABR values after the end of each group of months each year until all three years reflect actual data.

CWAP (capacity weighted average performance) is the capacity weighted average performance of the Designated FCM Participant's portfolio and is designed to capture the diversification benefits of multiple-resource portfolios.

The CWAP is calculated assuming that the largest resource in the portfolio is unavailable during the whole period of the scarcity condition and the rest of the resources perform consistent with average historical performance under the past three years of scarcity conditions.

For each resource in the Designated FCM Participant's portfolio, excluding any resource that has reached the annual stop-loss as described in Section III.13.7.3.2 of Market Rule 1 and, excluding the Capacity Supply Obligation associated with any Energy Efficiency measures, and excluding from the remaining resources the resource having the largest Capacity Supply Obligation in the month, the resource's Capacity Supply Obligation shall be multiplied by the average performance of the resource. The CWAP shall be the sum of all such values, divided by the Designated FCM Participant's DFAMW. If the DFAMW is zero, then the CWAP is set equal to one.

The average performance **(AP)** of a resource is the Actual Capacity Provided during Capacity Scarcity Conditions divided by the product of the resource's Capacity Supply Obligation and the equivalent hours of Capacity Scarcity Conditions in the relevant group of months in the three Capacity Commitment Periods immediately preceding the current Capacity Commitment Period. Three separate groups of months shall be used for this purpose: June through September, December through February, and all other months. Until data exists to calculate this number, the temporary average performance for gas-fired steam generating resources, combined-cycle combustion turbines and simple-cycle combustion turbines shall equal 0.90; the temporary average performance for coal-fired steam generating resources shall equal 0.85; the temporary average performance for oil-fired steam generating resources shall equal 0.65; the temporary average performance for all other resources shall equal 1.00. As actual data for each resource becomes available for each relevant group of months, calculated values for the relevant group of months will replace the temporary average performance values after the end of each group of months each year until all three years reflect actual data. The applicable temporary average performance value will be used for new and existing resources until actual performance data is available.

The capacity weighted average performance (CWAP) of a portfolio is calculated (1) excluding the resources that have reached their annual stop losses; (2) excluding the portion of resources designated as Energy Efficiency Demand resources; and (3) assuming that the remaining largest asset (m) in the portfolio is not available.

$$[2]\ \ CWAP = \sum_{i=1}^{n} DFAMW(i) \times \frac{AP(i)}{DFAMW},\ \ where\ SLF(i) = 0\ and\ i \neq m.$$

SF (scaling factor) incorporates the risk of remaining months in a season. Given the seasonal nature of Capacity Scarcity Conditions, the capacity commitment period is divided into three groups: four summer months, three winter months and five shoulder months. During high risk months (summer and winter), the SF is calculated as the square

root of the number of summer or winter months remaining in the seasonal period. For example, the SF will be two (square root of four) in June, and will become one (square root of one) in September. During all the shoulder months, the scaling factor will be one.

IMC (Intra-Month Collateral) equals the amount for PFP penalties incurred during the current month, limited to the maximum PFP penalty less the difference between the current month's collateralization and next month's collateralization. A positive IMC is a credit which will reduce FCM Delivery FA, while a negative MCC will increase FCM Delivery FA. Once a new month begins, IMC resets to zero as it reflects performance payment from only the current month. IMC does not include the capacity base payments as they are part of the weekly billing cycle as of June 1, 2022[6] date.

MCC (monthly capacity charge) equals Monthly Capacity Payments incurred in previous months, but not yet billed. The MCC is estimated from the first day of the current delivery month until it is replaced by the actual settled MCC value when settlement is complete. It subsequently will go to zero once the monthly bill is issued (on the first Monday after the tenth day of the month). A positive MCC is a credit which will reduce FCM Delivery FA, while a negative MCC will increase FCM Delivery FA. MCC does not include the capacity base payments as they are part of the weekly billing cycle as of June 1, 2022[7] date.

Peak Monthly Stop-loss is the largest monthly stop-loss for the Designated FCM Participant that would occur during the period from the current delivery month through the following five consecutive months. Each monthly stop-loss within this period is equal to the sum of the monthly stop-losses of each resource in the Designated FCM Participant's portfolio, as described in Section III.13.7.3.1 of Market Rule 1.

Second Largest Monthly Stop-loss is the second largest monthly stop-loss for a Designated FCM Participant that would occur during the period from the current delivery month through the following five consecutive months.

Obligation Month represents the month when the FCM Delivery FA is being assessed. It is always the current month.

Calculation Month depends on the season that the current month is in. During the summer season months of June-September, the calculation month is the earliest month period remaining in the given summer season with the largest DFAMW across all of a Lead Market Participant's resources. During the winter season months December-February, the calculation month is the earliest month period remaining in the winter season with the largest DFAMW across all of a Lead Market Participant's resources. During the shoulder season months, the calculation month is the obligation month.

Examples

This section shows a number of examples illustrating how to calculate the FCM Delivery FA for a variety of different portfolios in diverse (though not exhaustive) circumstances. These examples are to approximate FCM Delivery FA under certain scenarios and some intermediate calculation steps have been rounded to simplify the illustration. In the case of any discrepancy between the examples below and the ISO New England Inc. Financial Assurance Policy, the Financial Assurance Policy shall govern. Please reach out to the Market and Credit Risk contacts listed if you need assistance or have any questions.

[6] Docket No. ER21-943-000.
[7] Docket No. ER21-943-000.

Before diving into financial assurance obligation examples, let's first go over a numerical example on how two important terms (i.e., obligation month and calculation month) are determined. These two terms could impact the FCM Delivery FA calculation below. For example, the Monthly Capacity Charge (MCC), Average Balancing Ratio (ABR), and Scaling Factor (SF) are dependent on the obligation month. While the Delivery Financial Assurance Capacity (DFAMW), Capacity Weighted Average Performance (CWAP), and Potential Exposure (PE) are dependent on the calculation month.

Determining obligation month and calculation month:

Scenario 1:

Current month: June
Details: a participant has DFAMW of 60 MW, 80 MW, 80 MW, and 70 MW for months of June through September in its portfolio respectively
Obligation month: June - which is the current month
Calculation month: July - which is the earliest month in the summer period between June and September that has the largest DFAMW (80MW).

Scenario 2:

Current month: August (all other details remain the same)
Obligation month: August - which is the current month
Calculation month: August - which is the earliest month remaining in the summer period, between August and September that has the largest DFAMW (80MW).

For simplicity, in the following examples, we assume that obligation month and calculation month are same.

[The below cases have been updated, including dollar values]

Case 1: Consider a simple one resource portfolio with a CSO in June, 2025 and assume the following key inputs:

DFAMW =100 MW
CWAP = 0 (i.e., the largest and only resource is not available during the scarcity event hours)
ABR = 0.878 for the month
Forward Capacity Auction Starting Price for FCA15 = $12,400/MW-month
Capacity price for the resource = $2,531/MW-month
Potential Exposure (PE) = $12,400 – $2,531 = $9,869/MW
Peak Monthly Stop-loss = $1,240,000
Second Largest Monthly Stop-Loss = $1,178,000 (second largest CSO Position is 95MW)

Assuming that there are no capacity performance payments in the current or previous month, the IMC and MCC is zero.

The resource has not reached its annual stop loss limit,

SLF = 0
It is the June delivery month so the SF = 2.0

The FA requirement for the month depends on the appropriate risk category the participant falls into:

Low Risk FA = DFAMW x PE x max (ABR – CWAP, 0.1) x SF - IMC - MCC
FA = 100 x $9,869 x max (0.878 – 0.0, 0.1) x 2.0 – $0 – $0
FA = 100 x $9,869 x 0.878 x 2.0 – $0 – $0
FA = $1,732,996

Medium Risk FA = Low Risk FA + Peak Monthly Stop-loss x max(ABR – CWAP, 0.1)
FA = $1,732,996 + $1,088,720 = $2,821,716

High Risk FA = Medium Risk FA + Second Largest Monthly Stop-loss x max(ABR – CWAP, 0.1)
FA = $2,821,716 + $1,034,284 = $3,856,000

Case 2: Consider the previous case with the following change: Add an identically sized resource to the portfolio. Assume the capacity price for the second resource is $6,540/MW-month.

For this portfolio, we assume that the largest and historically best performing resource is unavailable. Allowing that the resources are independent in availability, that availability follows a binomial distribution, and that the historical average performance of resource two is 90%, the capacity weighted average performance is calculated by formula [2] as:

CWAP = (0.9 x 100)/200 = 0.45.
PE = $13,932 - (100 x $3,980 + 100 x $6,540)/(100 + 100) = $8,672
IMC = $0
MCC = $0
Peak Monthly Stop-loss = $2,480,000
Second Largest Monthly Stop-loss = $2,356,000

In the case of two 100 MW resources, then, the FA requirements would be:

Low Risk FA = DFAMW x PE x max (ABR – CWAP, 0.1) x SF – IMC – MCC
FA = 200 x $8,672 x max (0.878 - 0.45, 0.1) x 2.0 - $0 - $0
FA = 200 x $8,672 x 0.428 x 2.0 - $0 - $0
FA = 1,484,646

Medium Risk FA = Low Risk FA + Peak Monthly Stop-loss x max(ABR – CWAP, 0.1)
FA = $1,484,646 + $2,480,000 x max(0.878 – 0.45 , 0.1)= $2,546,086

High Risk FA = Medium Risk FA + Second Largest Monthly Stop-loss x max(ABR – CWAP, 0.1)
FA = $2,546,086 + $2,356,000 x max(0.878 – 0.45 , 0.1)= $3,554,454

Case 3: Consider the previous case with the following change: Adding one 500 MW resource into the portfolio. Assume a capacity price for the 500 MW resource is $4,654/MW-month.

For this portfolio, given that the 500 MW resource is unavailable, the exposure to penalties is mitigated when both 100 MW resources are available. Assume both 100 MW resources have historical average performance of 90%. The capacity weighted average performance is calculated:

CWAP = (100*0.9 + 100*0.9)/700 = 0.257
PE = $13,932 - (100 x $3,980 + 100 x $6,540 + 500 x $4,654)/(100 + 100 + 500) = $7,573
IMC = 0
MCC = $0
Peak Monthly Stop-loss = $8,680,000
Second Largest Monthly Stop-Loss = 8,556,000

In the case of a portfolio consisting of one 500 MW resource and two 100 MW resources, then the FA requirements would be:

Low Risk FA = DFAMW x PE x max (ABR – CWAP, 0.1) x SF - IMC - MCC
FA = 700 x $7,140 x max (0.878 - 0.257, 0.1) x 2.0 - $0 - $0
FA = 700 x $7,140 x 0.64286 x 2.0 - $0 - $0
FA = $6,207,516

Medium Risk FA = Low Risk FA + Peak Monthly Stop-loss x max(ABR – CWAP, 0.1)
FA = $6,207,516 + $8,680,000 x max (0.878 – 0.257, 0.1) = $11,597,796

High Risk FA = Medium Risk FA + Second Largest Monthly Stop-loss x max(ABR – CWAP, 0.1)
FA = $11,597,796+ $8,556,000 x max (0.878 – 0.257, 0.1) = $16,911,072

Case 4: Consider a case with the same portfolio as in Case 3 but in January (SF = 1.73) with ABR = 0.7.

In this case the FA requirements would be:

Low Risk FA = DFAMW x PE x max (ABR – CWAP, 0.1) x SF - IMC - MCC
FA = 700 x $7,140 x max (0.7 - 0.257, 0.1) x 1.73 - $0 - $0
FA = 700 x $7,140 x 0.443 x 1.73 - $0 - $0
FA = $3,830,417

Medium Risk FA = Low Risk FA + Peak Monthly Stop-loss x max(ABR – CWAP, 0.1)
FA = $3,830,417 + $8,680,000 x max (0.7 – 0.257, 0.1) = $7,675,657

High Risk FA = Medium Risk FA + Second Largest Monthly Stop-loss x max(ABR – CWAP, 0.1)
FA = $7,675,657+ $8,556,000 x max (0.7 – 0.257, 0.1) = $11,465,965

Case 5: Now consider the same portfolio from Case 3 in the December obligation month. Assume the largest resource has already reached its annual stop-loss limit and that the portfolio has a net penalty resulting in a charge for the previous month: MCC = $(1,000,000).

CWAP = (0.9x100)/200 = 0.45
PE = $12,400 - (100 x 3,980 + 100 x $6,540)/(100+100) = $7,140
ABR = 0.7
Given the largest asset no longer contributes to the stop-loss, Peak Monthly Stop-Loss = 2,480,000
Second Largest Monthly Stop-Loss = 2,356,000

The FA requirements would be:

Low Risk FA = DFAMW x PE x max (ABR – CWAP, 0.1) x SF – IMC -MCC

FA = 200 x $7,140 x max (0.7 - 0.45, 0.1) x 2.0 - $0 – (-$1,000,000)
FA = 200 x $7,140 x 0.25 x 2.0 - $0 + $1,000,000
FA = $1,714,000

Medium Risk FA = Low Risk FA + Peak Monthly Stop-loss x max(ABR – CWAP, 0.1)
FA = $1,714,000 + $2,480,000 x max(0.7 – 0.45, 0.1) = $2,334,000

High Risk FA = Medium Risk FA + Second Largest Monthly Stop-loss x max(ABR – CWAP, 0.1)
FA = 2,334,000 + $2,356,000 x max(0.7 – 0.45, 0.1) = $2,923,000

Once the monthly bill is issued, the MCC term goes to zero and the FA requirement becomes:

Low Risk FA = $714,000

Medium Risk FA = $1,334,000

High Risk FA = $1,923,000

Case 6: Now consider the portfolio from Case 2 but now the second resource is subject to a multi-year Capacity Commitment Period election made in a Forward Capacity Auction prior to FCA 9. According to Market Rule III.13.7.3.1, the potential exposure of the second resource is zero. The Forward Capacity Auction starting price used to calculate potential exposure for the second resource shall equal to the capacity clearing price of the same resource.

CWAP = (0.9x100)/200 = 0.45
PE = (100 x $12,400 + 100 x $6,540)/(100 + 100) - (100 x $3,980 + 100 x $6,540)/(100 + 100) = $4,210

Peak Monthly Stop-loss = $2,400,000
Second Largest Monthly Stop-loss = $2,356,000

The FA requirements would be:

Low Risk FA = DFAMW x PE x max (ABR – CWAP, 0.1) x SF - IMC - MCC
FA = 200 x $4,210 x max(0.878 - 0.45, 0.1) x 2.0 - $0 - $0
FA = 200 x $4,210 x 0.428 x 2.0 -$0 - $0
FA = $720,752

Medium Risk FA = Low Risk FA + Peak Monthly Stop-loss x max(ABR – CWAP, 0.1)
FA = $720,752 + $2,400,000 x max(0.878 - 0.45, 0.1) = $1,782,192

High Risk RA = Medium Risk FA + Second Largest Monthly Stop-loss x max(ABR – CWAP, 0.1)
FA = $1,782,192+ $2,356,000 x max(0.878 - 0.45, 0.1) = $2,790,560

Case 7: Now consider a portfolio of 3 demand response resources. Resource A has a CSO of 150 MW, Resource B is an energy efficiency resource with a CSO of 100 MW and Resource C is a mixed type resource which is partially energy efficiency type with a CSO of 50 MW. Assume all three have a capacity price of $2,531/MW-month.

The EE resources would be excluded and the mixed resource would be reduced by the exempt MW amount. Say the CSO for the EE portion of Resource C was 5 MW.

DFAMW = 150 + 0 + (50-5)
DFAMW = 195
ABR = 0.6
CWAP = (1 x 0 + 1 x 0 + 1 x 45)/195 = 0.231
PE = $12,400 – $2,531 = $9,869
SF = 1
IMC = 0
MCC = $0
Peak Stop-Loss = $2,418,000
Second Largest Monthly Stop-Loss = $2,294,000

The FA requirement during a shoulder month would be:

Low Risk FA = DFAMW x PE x max (ABR – CWAP, 0.1) x SF - IMC - MCC
FA = 195 x $9,869 x 0.369 x 1 - $0 - $0
FA = $710,124

Medium Risk FA = Low Risk FA + Peak Monthly Stop-loss x max(ABR – CWAP,0.1)
FA = $710,124 + 2,418,000 x max(0.6 – 0.231, 0.1) = 1,602,366

High Risk FA = Medium Risk FA + Second Largest Monthly Stop-Loss x max(ABR – CWAP, 0.1)
FA = $1,602,366 + $2,294,000 x max(0.6 – 0.231, 0.1) = $2,448,852