REVIEW OF MITIGATION OF FORWARD CAPACITY AUCTION DELIST BIDS

POTOMAC ECONOMICS

External Market Monitor
for ISO-NE

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LIST OF EXHIBITS

I. EXECUTIVE SUMMARY

The Internal Market Monitor ("IMM") reviews certain Static and Retirement Delist Bids prior to each Forward Capacity Auction ("FCA") as part of its efforts to mitigate supply-side market power from existing resources. The IMM's review is intended to ensure that a delist bid price is consistent with the resource's costs of accepting a Capacity Supply Obligation ("CSO"). In accordance with the Tariff, the External Market Monitor ("EMM") reviews the IMM's mitigation of delisting and new resources for each FCA.[1] The NEPGA Members requested the EMM to report on its assessment of delist bids starting with FCA-8.

This report provides our conclusions regarding key trends in the submission of delist bids, the reasonableness of the IMM's review and mitigation of delist bids, and the overall effects of the mitigation. This report will improve significantly on the transparency of the supply-side market power mitigation process.

Evaluation of the IMM's Review and Mitigation of Delist Bids

Most (70 percent) of the delist bid capacity that was submitted by generators from FCA-8 to FCA-12 was capped (i.e., received an IMM-Determined Price that limits the resource's bid). However, most of the resources that received an IMM-determined price voluntarily reduced their bids below the IMM-determined Price or retired via the Non-Priced Retirement ("NPR") path, so only 18 percent of the delist bid capacity was actually bid at the IMM-determined price, including:

- 19 percent of the 7.2 GW generation resources reviewed in FCA-8
- 27 percent of the 7.8 GW generation resources reviewed in FCA-9
- 16 percent of the 0.9 GW generation resources reviewed in FCA-10
- 0 percent of the 1.4 GW generation resources reviewed in FCA-11
- 0 percent of the 2.6 GW generation resources reviewed in FCA-12.

The following factors led to large variations in the amount of delist bids over the period:

- The level over which delist bids are subject to review by the IMM (i.e. the Dynamic Delist Bid Threshold or DDBT) was very low ($1 per kW-month) in FCA-8, leading to a large amount of delist bids being submitted and reviewed. In subsequent auctions, the DDBT increased to $3.94 to $5.50 per kW-month, greatly reducing the amount of capacity that was subject to mitigation.
- The introduction of Pay-For-Performance ("PFP") rules in FCA-9 led to an initial wave of increased delist bids, many of which reflected extreme risk aversion, leading to a large amount of capacity that received an IMM-determined price and/or was mitigated. PFP-

[1] See Market Rule I Section III.2.A.2.2.(d).

related costs continue to be a significant component of delist bids, but suppliers have become better at assessing the risk of PFP-related costs.

The IMM's methodology for reviewing delist bids has been based on reasonable criteria and consistent with the Tariff provisions. The IMM has reviewed large numbers of cost submissions from market participants that exhibit an upward bias. In its reviews of Net Going Forward Costs, the IMM has frequently denied or modified costs that were unsupported or that could not be avoided by not selling capacity. In its reviews of the Capacity Performance Charge and Risk Premium components, the IMM has capped resources at IMM-determined prices that appear to have been more than adequate to account for PFP-related costs. Overall, the IMM has generally done well in balancing: (a) its role of exercising due diligence to ensure cost submissions are not over-estimated against (b) the need to allow resources to reflect legitimate costs in the delist bids.

Summary of the Effects of Mitigation on FCA Results

We evaluated the direct impact of the mitigation on outcomes in FCA-8 to FCA-12 and found:

- Only 18 percent of the delist bid capacity submitted was entered into the auction at the IMM-determined price (i.e., mitigated).
- However, less than one percent of the bids were entered into the auction at the IMM-determined price *and* affected the market outcomes because their mitigation affected whether they cleared in the FCA.
- The direct effects of the market power mitigation were *de minimus* in all five of these FCAs.

However, the mitigation may have had substantial indirect effects. In FCA-8 and FCA-9, several resources were retired using the NPR path after receiving an IMM-determined price. Some of these resources may have been retired because the mitigation rules prevented them from exercising market power by raising their delist bids above competitive levels. However, the mitigation rules did not prevent them from using the NPR path to withhold supply. To remedy this deficiency, the Commission approved mitigation measures to limit the exercise of market power from the NPR path after FCA-10.

II. INTRODUCTION

The purpose of the supply-side mitigation rules is to limit suppliers from exercising market power by raising prices above competitive levels. The Internal Market Monitor's ("IMM") review of delist bids is intended to mitigate supply-side market power in the capacity market. The IMM's reviews mitigate supply-side market power by preventing resources from exiting the market when capacity prices are higher than the cost of acquiring a Capacity Supply Obligation ("CSO").

The Tariff requires the External Market Monitor ("EMM") to review the "quality and appropriateness of" the IMM's mitigation of offers to supply capacity from delisting resources prior to each Forward Capacity Auction ("FCA"). NEPGA in its July 20, 2018 letter requested *"[t]he EMM prepare a report for NEPOOL stakeholders providing more transparency into the de-list bid mitigation process and recommending potential improvements to the mitigation of Forward Capacity Auction de-list bids, as appropriate".* NEPGA's letter also included specific questions regarding the quantity and type of resources that submitted delist bids and the IMM's determinations.[2]

This report discuss our review of the IMM's delist bid mitigation, and is organized as following:

- Section III summarizes the delist bids submitted from FCA-8 to FCA-13 and discusses key drivers of differences between delist bids and IMM-determinations.
- Section IV analyzes the impact of mitigation on FCA prices.

[2] The NEPGA letter further requested:

"1. A list of how many static and retirement delist bids have been reviewed by the IMM for each capacity commitment year starting with FCA-8;

2. Such list should include a breakdown by resource type using the categories in the ORTP rules (unless such breakdown would reveal individual information, in which case the EMM shall use its discretion to combine resource types);

3. The average (mean and median) % difference between the submitted number and the final number for each resource type for each year; and

4. General information on the common bases for the mitigation of offers, the historical consequences of mitigation on competitive FCA outcomes, and other factors relevant to the evaluation of mitigation in the FCA."

III. IMM REVIEW OF DELIST BIDS

A. Overview of the Review of Delist Bids

An existing resource must sell its capacity into the FCA unless it submits a delist bid. The following types of delist bids are subject to review and possible mitigation by the IMM:[3]

- *Static Delist Bid* – For a resource that intends to remove its capacity from the FCM for a single Capacity Commitment Period ("CCP") at or above a certain price.
- *Export Bid* – For a resource that wants to export capacity to a neighboring control area for a single CCP.
- *Retirement Delist Bid* – For a resource that intends to retire from all ISO markets.
- *Permanent Delist Bid* – For a resource that intends to stop selling capacity permanently but to continue selling energy and ancillary services.

The IMM only reviews delist bids that are priced above the Dynamic Delist Bid Threshold ("DDBT"). The DDBT is set slightly below the estimated competitive price from the marginal resource in the target FCA, so delist bids below the DDBT are likely to be inframarginal and unable to raise the prices. This allows the IMM to avoid the administrative burden of reviewing bids from existing resources that are likely to be competitive.

The timeline for the IMM's bid review process is as follows:

- Resources submit their bids along with supporting documentation eight months (for Static Delist Bids and Export Bids) to eleven months (for Retirement and Permanent Delist Bids) prior to the FCA.[4]
- The IMM reviews the submittals and issues determination letters (indicating acceptance or denial of the delist bid) three months after the initial submission.
- The participants have an opportunity to withdraw or reduce Static Delist Bid prices for a period of seven days (bid finalization period) after receiving the determinations.
- IMM publishes the results of the Pivotal Supplier Test seven days prior to the FCA. Only resources that are deemed to be pivotal will be mitigated (i.e. the IMM-determined price is entered for the resource).[5]

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3 Administrative Export Delist Bids and Static (Ambient Air) Delist Bids are vetted through a separate process, while Dynamic Delist Bids are only allowed below the DDBT.

4 See IMM cost workbooks for delisting resources at https://www.iso-ne.com/static-assets/documents/2017/03/new_capacity_resource_models_and_user_guides.zip

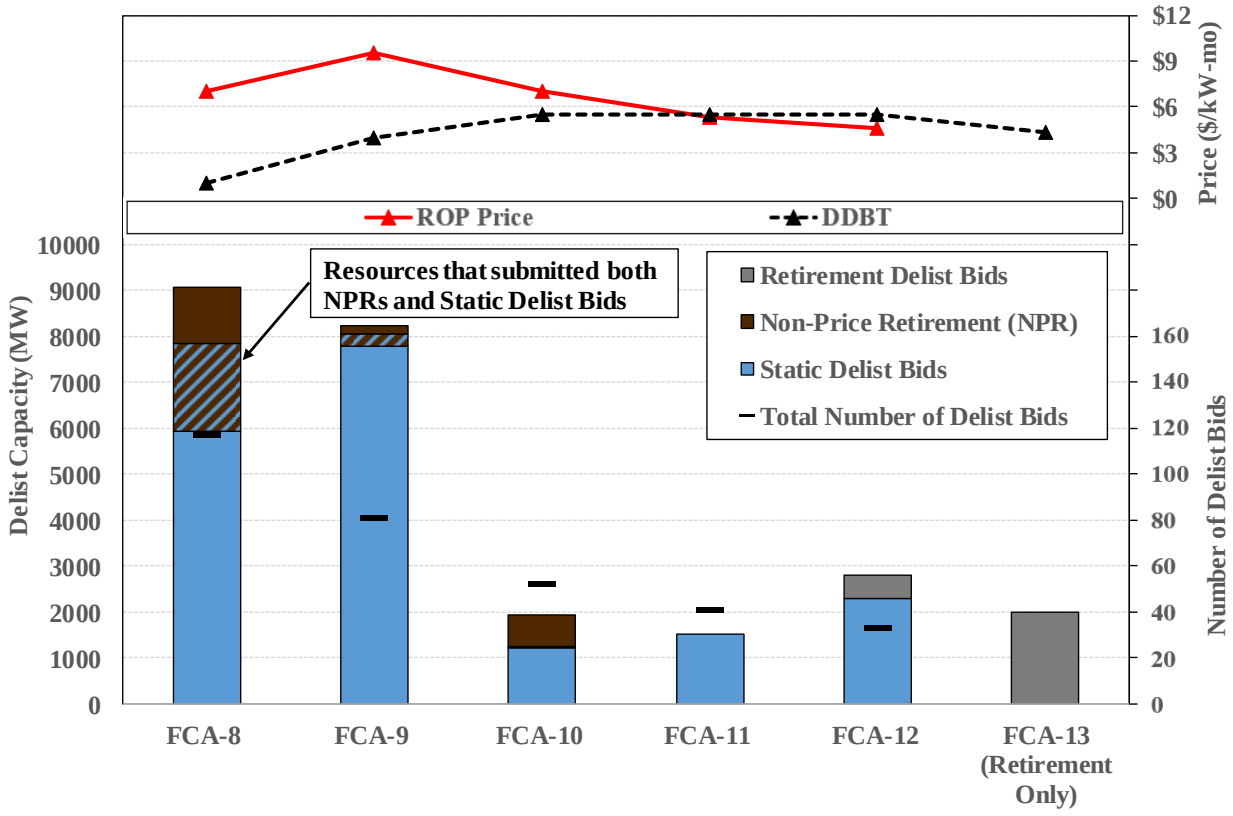
5 The pivotal supplier test is an indicator of whether a supplier could unilaterally exercise market power and increase FCA prices above their competitive levels.

B. Assessment of Delist Bid Reviews in Recent FCAs

The NEPGA letter requested the EMM report provide additional transparency regarding the delist bid submissions and the reviews by the IMM. This section evaluates significant trends in delist bid submissions, the IMM's determinations, and the resource-owners' resulting participation in the capacity auctions. We also discuss likely drivers of the observed trends.

Figure 1 shows the amount of capacity and the number of resources that submitted delist bids (Static, Non-Price Retirement ("NPR"), and Retirement Delist Bids) in FCA-8 through FCA-13.[6] The NPR option allowed existing resources to leave the FCM permanently through a non-priced administrative process, but this was replaced with an option allowing resources to submit Retirement Delist Bids after FCA-10. The figure also shows the Rest-of-Pool ("ROP") clearing prices and the DDBT prices for each FCA.

Figure 1: Capacity and Number of Delist Bids Submitted by FCA
FCA-8 to FCA-13



A "price floor" was used in the first seven forward capacity auctions, and this led to the accumulation of a large capacity surplus (3.2 GW) in FCA-7. In FCA-8, the DDBT ($1 per kW-month) was much lower than the clearing price in FCA-7 ($2.74 per kW-month), leading a large

[6] The figure does not show data on Static Delist Bids in FCA-13, since the publication of such information would tend to undermine competition in the auction.

number of resources to submit delist bids and NPRs in FCA-8. Hence, the elimination of the price floor led to the retirement of 3.1 GW of relatively expensive resources in FCA-8.

In FCA-9, the number of resources submitting delist bids or NPRs remained high despite two developments that would tend to reduce them. First, the retirements that resulted from FCA-8 reduced the amount of relatively high-cost resources by 3.1 GW. Second, the DDBT increased from $1 per kW-month to $3.94 per kW-month, allowing resources to delist in this price range without any review by the IMM. However, the amount of delist bids and NPRs remained high because the introduction of Pay-For-Performance ("PFP") rules increased the risk of selling capacity and because some resources expected PFP charges to offset a significant portion of their capacity revenues. Consequently, a large amount of capacity submitted delist bids in FCA-9 that included significant PFP-related costs.

In FCA-10, the amount of capacity seeking to delist or retire decreased dramatically for at least three reasons. First, the DDBT increased from $3.94 to $5.50 per kW-month, allowing greater flexibility for resources to delist without any review by the IMM. Second, before the auction, there was a perception that the clearing price would be higher than the ultimate clearing price of $7.03 per kW-month, so fewer resources were interested in having the option to delist.[7] Third, just before the submission of delist bids for FCA-10, the IMM filed a proposal to limit the flexibility of resources to reduce their Static Delist Bids during the finalization window by more than $1 per kW-month.[8] Since many resources use this flexibility to reduce their delist bids by more than $1 per kW-month, this filing likely contributed to the drop in number of resources submitting delist bids. Ultimately, the Commission did not approve the IMM's proposal, but this was not known until after the submission of delist bids for FCA-10.

In FCA-11 and FCA-12, the amount of capacity submitting delist bids rose moderately as investors have become more pessimistic about capacity prices in the coming years (compared to expectations leading up to FCA-10). Nonetheless, the amount of delist bids has remained relatively low primarily because the DDBT has remained at $5.50 per kW-month, providing suppliers with significant flexibility without any review by the IMM.

Figure 2 and Figure 3 show the breakdown (by type) of the amount of capacity and number of resources that submitted delist bids in FCA-8 through FCA-12.

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7 Many analysts expected FCA-10 to clear between $9 and $13 per kW-month. See: a) http://platform.mi.spglobal.com/SNL.Services.Application.Common.Service/v1/client?#news/article?id=35374694&KeyProductLinkType=6, b) https://platform.mi.spglobal.com/web/client?auth=inherit#news/article?KeyProductLinkType=2&id=35307439, and c) https://neo.ubs.com/shared/d1uKQWZNqe1fjP/

8 See May 1, 2015 filing by ISO-NE and NEPOOL in docket ER15-1650-000.

Figure 2: Capacity of Static, Retirement and Permanent Delist Bids by Technology Type
FCA-8 to FCA-12

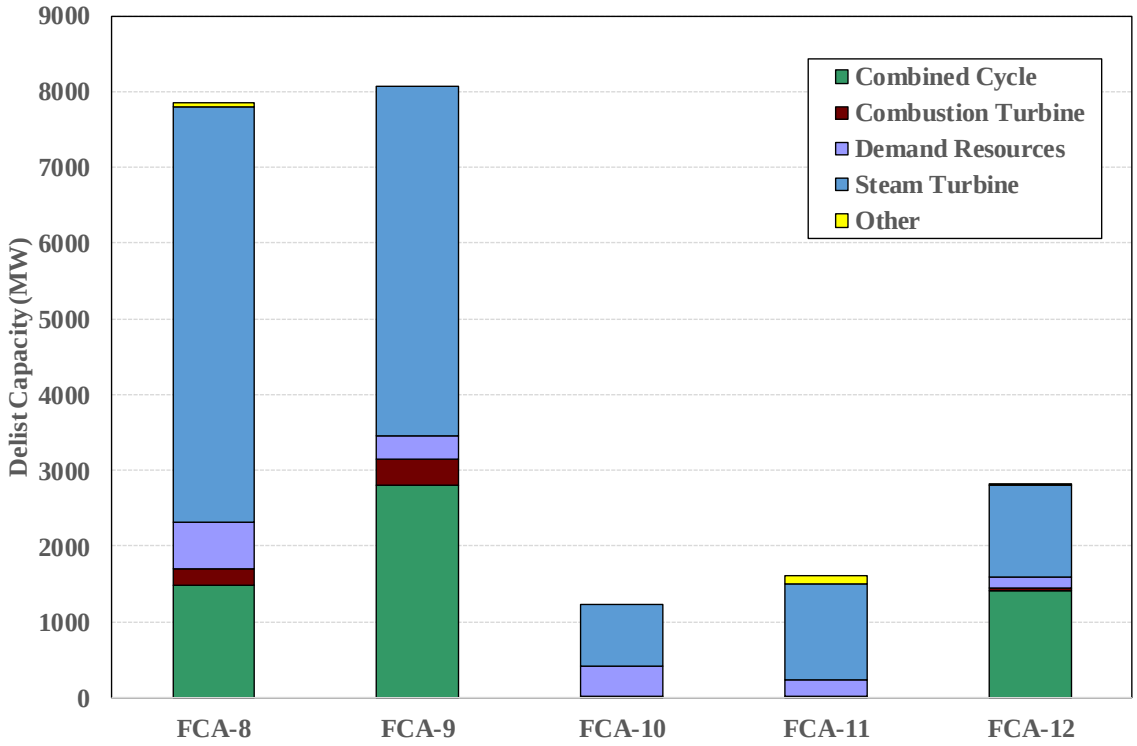
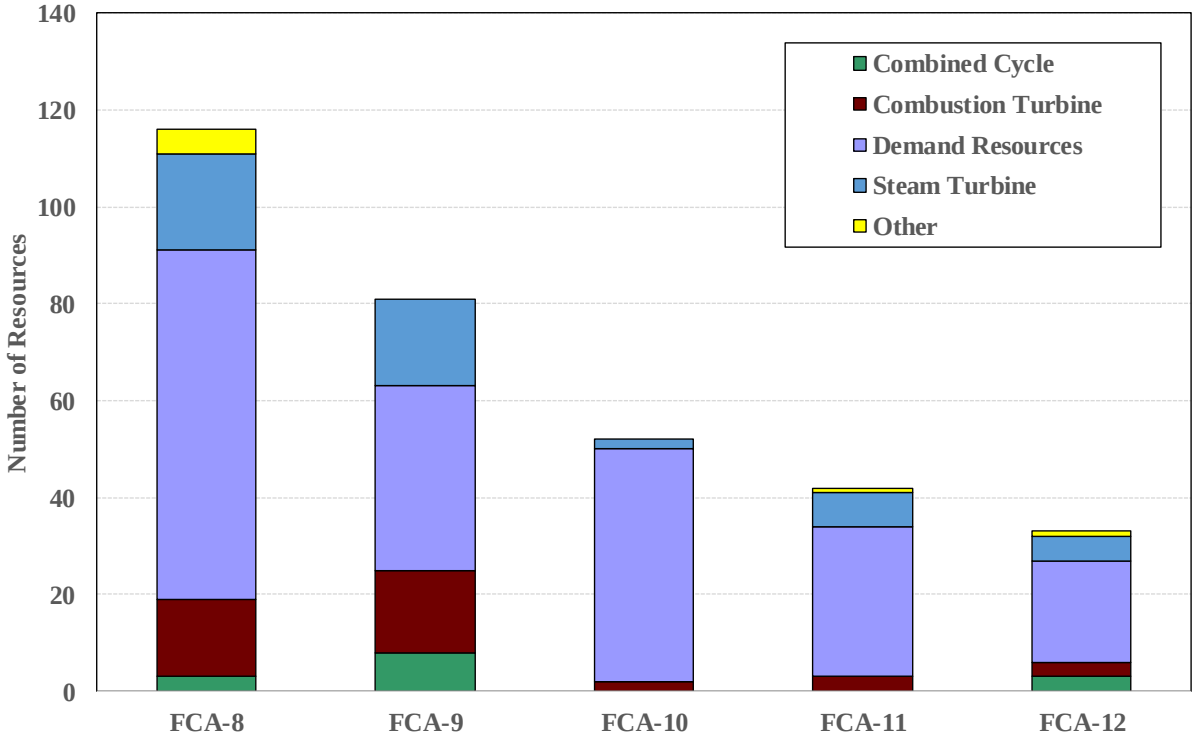


Figure 3: Number of Static, Retirement and Permanent Delist Bids by Technology Type
FCA-8 to FCA-12

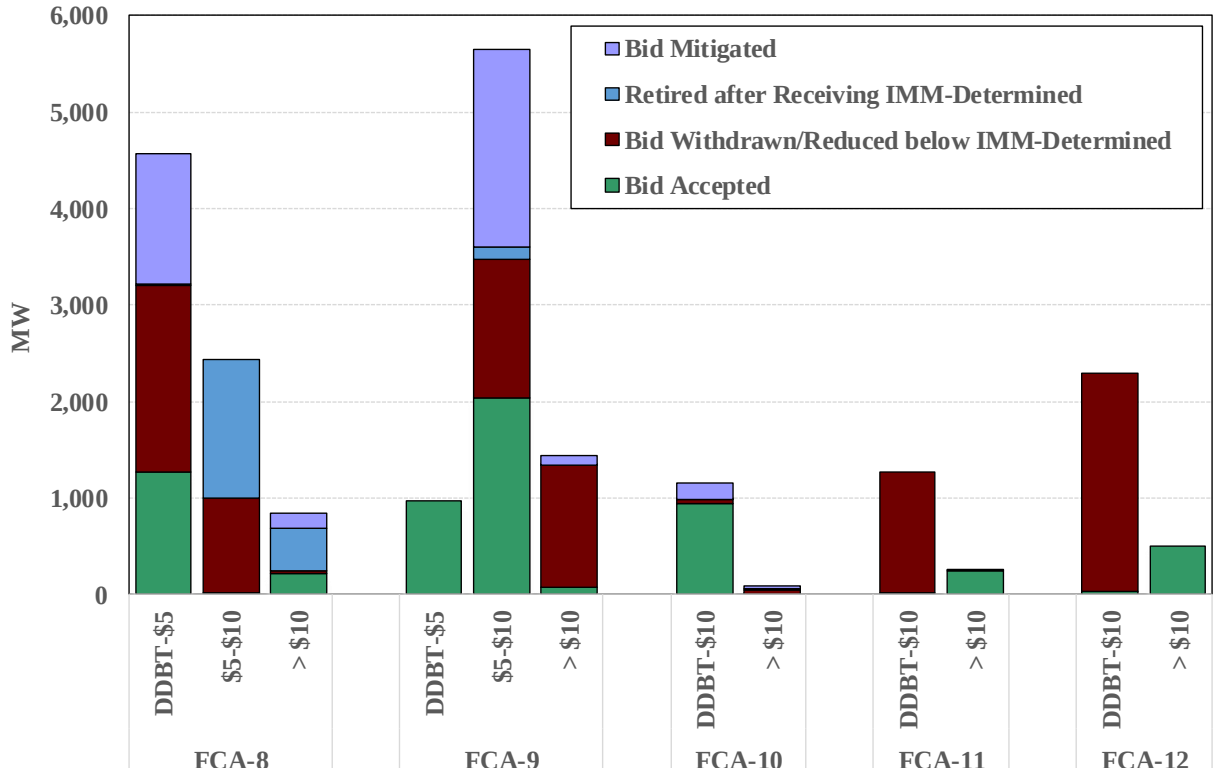


As shown in Figure 1, over 50 percent of the capacity that submitted delist bids was from steam turbines. Steam turbines earn relatively little net revenue from the sale of energy and ancillary services, so the vast majority of their net revenue comes from selling capacity. In addition, the PFP capacity market rules reward flexibility, particularly offline reserve providers, so the introduction of PFP rules in FCA-9 was expected to reduce the capacity revenues for steam units.

The majority of delist bids from FCA-8 through FCA-12 were from relatively small demand resources (average delist bid of 8 MW). Consequently, while demand resources accounted for most delist bids, they accounted for only a small portion of the capacity seeking to delist.

Figure 4 shows the distribution of the delist bid capacity by price tranche in each FCA. The figure also shows the amount of capacity in each tranche that: (a) was accepted by the IMM, (b) was mitigated to an IMM-determined price, (c) received an IMM-determined price but the resource voluntarily reduced its bid or withdrew it entirely before the auction, and (d) retired via the NPR track after receiving an IMM-determined price.

Figure 4: Delist Bid Capacity by Submitted Bid Tranche and by IMM Treatment[9]
FCA-8 to FCA-12



9 The "Bid Accepted" category includes a small amount (<100 MW) of resources whose delist bid was accepted by the IMM but opted to retire using an NPR. In addition, the figure omits a very small amount (12 MW) of non-pivotal suppliers' capacity that received an IMM-determined price but was entered into FCA at the participant-submitted delist bid.

Of the delist bid capacity that was reviewed by the IMM over the last five FCAs, 30 percent was accepted by the IMM while the majority (70 percent) received an IMM-determined price. However, of the resources that received an IMM-determined price, only 26 percent were actually mitigated, while 13 percent retired via the NPR track and the other 61 percent voluntarily withdrew their delist bid or lowered it below the IMM-determined level. The voluntary lowering of delist bids below the IMM-determined level suggests that a large number of delist bids were inflated above competitive levels, but it does not necessarily mean that the resources that submitted inflated delist bids were attempting to exercise market power. Many suppliers may have submitted an inflated delist bid eight months before the FCA to provide flexibility for making a decision closer to the auction.

Of the resources that received an IMM-determined price, the share that was actually mitigated was much larger in FCA-8 (24 percent) and in FCA-9 (43 percent) than in the last three auctions (just 5 percent). The amount of capacity mitigated in FCA-8 and FCA-9 would have been even higher, but several large resources (totaling 2 GW) withdrew their delist bids and opted to retire via the NPR track. In FCA-8, the relatively large amount of mitigation was primarily driven by the low DDBT of $1 per kW-month, which required the IMM to perform a detailed review of many low delist bids, including 4.5 GW priced below $5 per kW-month. In FCA-9, the large amount of mitigation was mainly due to many suppliers submitting delist bids reflecting very high levels of risk aversion when PFP was first introduced. We evaluate the reasons for differences between delist bids and the IMM-determined prices further in Section C.

Table 1 shows the mean and median of the difference between the delist bid and the IMM-determined price for all resources that received an IMM-determined price. This is shown for all resources and by resource type. Resource categories with very few suppliers are aggregated over time to avoid providing resource-specific information.

Table 1: Average Differences between Delist Bids and IMM-Determined Prices
FCA-8 to FCA-12

<table>
<tr><th rowspan="2">Resource Type/ FCA</th><th colspan="2">All Resources</th><th colspan="2">Steam Turbine</th><th colspan="2">Combustion Turbine</th><th colspan="2">Demand Resources</th><th colspan="2">Combined Cycle</th></tr>
<tr><th>Mean</th><th>Median</th><th>Mean</th><th>Median</th><th>Mean</th><th>Median</th><th>Mean</th><th>Median</th><th>Mean</th><th>Median</th></tr>
<tr><td>FCA-8</td><td>31%</td><td>29%</td><td>30%</td><td>24%</td><td>36%</td><td>29%</td><td rowspan="2">28%</td><td rowspan="2">23%</td><td rowspan="5">28%</td><td rowspan="5">27%</td></tr>
<tr><td>FCA-9</td><td>29%</td><td>28%</td><td>31%</td><td>25%</td><td>27%</td><td>32%</td></tr>
<tr><td>FCA-10</td><td>10%</td><td>7%</td><td rowspan="3">22%</td><td rowspan="3">22%</td><td rowspan="3">22%</td><td rowspan="3">24%</td><td rowspan="3">11%</td><td rowspan="3">8%</td></tr>
<tr><td>FCA-11</td><td>21%</td><td>21%</td></tr>
<tr><td>FCA-12</td><td>25%</td><td>26%</td></tr>
</table>

A comparison of the delist bids and IMM-determined prices shows typical differences were higher in FCA-8 and FCA-9 than in subsequent auctions.[10] This reflects that: (a) the lower

[10] The actual mean and median of the difference between participant-submitted and IMM-determined prices are likely to be lower than the values shown in Table 1. Several resources received an IMM-determined price

DDBTs in FCA-8 and FCA-9 led to the review of lower delist bids, so that differentials were larger in percentage terms; (b) many resource-owners expected very high PFP-related costs when PFP was first implemented in FCA-9; and (c) the IMM has spent considerable effort on training and documentation of its methodology, enabling suppliers to better formulate their delist bid cost submissions.

The average difference was particularly low in FCA-10, which may reflect that many suppliers expected that the Commission would accept the IMM's proposal to reduce the flexibility of suppliers to lower their delist bids after the initial submission. The expected lack of flexibility likely tempered the incentive for suppliers to inflate their initial delist bids.

Several key observations can be taken from our evaluation of the IMM's reviews of delist bids since FCA-8:

- The level over which delist bids are subject to review by the IMM (i.e. the DDBT) was very low in FCA-8, leading a large amount of delist bids to receive an IMM-determined price and/or be mitigated. In subsequent auctions, the increased DDBT has greatly reduced the amount of capacity that is subject to mitigation.
- The introduction of Pay-For-Performance ("PFP") rules in FCA-9 led to an initial wave of increased delist bids, many of which reflected extreme risk aversion, leading to a large amount of capacity that received an IMM-determined price and/or was mitigated. PFP-related costs continue to be a significant component of delist bids.
- Most of the capacity that received IMM-determined prices was not ultimately mitigated because (a) some resources were able to retire via the NPR track and (b) many resources voluntarily reduced their delist bids below the IMM-determined level.

We evaluate the reasons for differences between delist bids and the IMM-determined prices further in Section C, while the effects of the mitigation are discussed in Section IV.

C. Assessment of the IMM's Review of Delist Bids in Recent FCAs

This section provides our assessment of the reasonableness of the IMM's reviews of delist bids. A Static Delist Bid price is formulated as the sum of three cost categories.[11]

- *Net Going Forward Cost ("Net GFC")* - This includes all the fixed costs a resource could avoid by not taking on a CSO, including opportunity costs. The GFC of a resource is offset by its projected net revenue from the energy and ancillary service markets ("Infra-

because of mechanical errors in the submitted cost workbooks and/ or due to differences in understanding the formulation of the delist bid price. Hence, the differences between the values that reflect the participants' true costs and IMM-determined prices are likely to narrower.

[11] The IMM has reviewed only one large Retirement Delist Bid from a generation resource through FCA-12. The IMM's assessment of the Retirement Delist Bid was reasonable and did not limit the resource owner's participation in the auction.

marginal rents" or "IMR").[12] Prior to FCA-10, the IMR was adjusted down to reflect the Peak Energy Rent ("PER"), which is the energy market revenue a unit would receive during high priced intervals, and was used to adjust the capacity payments for a resource.

- *Capacity Performance Payment/ Charge ("CPC")* - This is the capacity supplier's expected cost due to underperformance of the resource during shortage events. The CPC is calculated as:

$$CPC = CSO \times PPR \times H \times (A - Br)$$

Where, CSO is the Capacity Supply Obligation

PPR is the Performance Payment Rate

H is the expected number of scarcity condition hours

A is the expected availability of the resource during hours of reserve deficiency

Br is the expected average balancing ratio

- *Risk Premium ("RP")* - The RP includes risks that are analytically supported and are not included in other components of the delist bid. This can include the risk of a significant decrease in the resource's qualified capacity, the risk of a significant increase in shortage hours, and the risk of a significant decrease in performance of resource.

The IMM reviews each of the above components to determine if a delist bid is based on reasonable assumptions. The rest of this section discusses the relative importance of each component in driving the differences between participant-submitted delist bids and IMM-determined prices.

Net Going-Forward Cost Component

The IMM denied portions of the costs submitted in this category for a substantial amount of generation resources (over 10 GW) from FCA-8 through FCA-12. The IMM's differed with the participant-submitted Net GFCs for:

- 76 percent of the 7.2 GW generation resources reviewed in FCA-8
- 45 percent of the 7.8 GW generation resources reviewed in FCA-9
- 0 percent of the 0.9 GW generation resources reviewed in FCA-10
- 31 percent of the 1.4 GW generation resources reviewed in FCA-11
- 31 percent of the 2.6 GW generation resources reviewed in FCA-12.

The IMM's review of the Net GFC component was highly resource-specific, and the most common reasons for the IMM to deny or modify a submitted cost were: (a) lack of documentation supporting the magnitude or probability of incurring the submitted costs, (b) incorrect classification of costs as avoidable, and (c) errors in calculations. When the magnitude of a submitted cost was not well supported, the IMM generally provided a reasonable generic

[12] The IMR is deducted from the GFC only if the delisting resource intends to remove itself from the energy and ancillary services markets if it does not receive a CSO.

proxy value that was conveyed to the resource owner. The process built in a substantial amount of time for resource owners to provide additional information to support the inclusion of a cost or to justify classifying it as avoidable.

Some market participants have asserted that the IMM has under-estimated the plant operating costs that should be included in the Net GFC calculation. We have found the IMM's methodologies to be generally sound and consistent with economic principles, but there may been instances when individual cost inputs were under-estimated by the IMM. One factor that could help reduce the possibility of over-mitigation (i.e., mitigation of a unit below its cost) of static delist bids is the 10 percent mitigation threshold, which is applied in the IMM's review of Retirement Delist Bids. Under this rule, a Retirement Delist Bid is not capped unless the difference between the original delist bid and the IMM-determined price is greater than 10 percent. If this had been in place for Static Delist Bids in FCA-8, it would have reduced the amount of capped capacity by 1.9 GW.[13]

The IMM has reviewed numerous cost submissions from suppliers that have over-estimated their going-forward costs. This was most evident in FCA-8, which was the first auction after seven FCAs of prices clearing at the price floor. During the seven-year period, average compensation for generation resources was $3.02 per kW-month and less than $3 per kW-month in four of the last five years before FCA-8. A large amount (6.1 GW) of generation raised their delist bids in FCA-8 above $3 per kW-month, including:

- 2.3 GW bid above $7 per kW-month,
- 1 GW bid between $5 and $7 per kW-month,
- 1.3 GW bid between $4 and $5 per kW-month, and
- 1.5 GW bid between $3 and $4 per kW-month.

Hence, large amounts of capacity were offered in FCA-8 at prices far above levels that had apparently been acceptable for the preceding decade. This illustrates the tendency of many suppliers to submit inflated going-forward cost submissions. Overall, we have found that the IMM has generally done well in balancing: (a) its role of exercising due diligence to ensure cost submissions are not over-estimated against (b) the need to allow resources to reflect legitimate costs in the delist bids.

Capacity Performance and Risk Premium Components

Since the implementation of PFP in FCA-9, the CPC and RP components have become a significant driver of delist bids. The CPC component accounted for most of the differences between the participant-submitted delist bids and IMM-determined prices in FCA-9 through

[13] If a threshold is allowed for static delist bids, it may be appropriate for the IMM to tighten-up certain criteria for scrutinizing input data.

FCA-12. During this period, the IMM recalculated the CPC and RP component for over 8.1 GW (or 67 percent of reviewed capacity) of generation resources, including:

- 60 percent of the 7.8 GW generation resources reviewed in FCA-9
- 2 percent of the 0.9 GW generation resources reviewed in FCA-10
- 89 percent of the 1.4 GW generation resources reviewed in FCA-11
- 85 percent of the 2.6 GW generation resources reviewed in FCA-12.

The IMM differed with the participant-submitted:

- "A" values (expected availability during shortages) for nearly 5.5 GW of generation capacity that submitted unreasonably low or unsupported "A" values.[14] In such cases, the IMM estimated an "A" value using the resource's historical performance during reserve shortage events.
- "H" values (expected number of shortages) for over 3.5 GW of generation resources that submitted unreasonably high estimates of the number of reserve shortage hours. The IMM generally relied on the following information to independently estimate "H": (a) public information from the ISO's resource adequacy modeling on the relationship between the size of the installed capacity surplus and the expected frequency of operating reserve deficiencies, and (b) the amount of capacity that would clear if the resource's bid was marginal.

The RP component of a delist bid relies on several parameters that are also used to estimate the CPC, so the factors discussed above also affected the IMM's review of the RP values. The IMM's approved methodology consists of three specific sources of risk and includes several elements, which in combination are likely to allow suppliers to incorporate any reasonable risk premium.[15] Hence, the IMM's methodology is generally conservative (in the supplier's favor) and adequate to reflect the risks that a capacity supplier is likely to face.

We find that a large number of the participant-submitted delist bids were based on unreasonably high expected costs associated with the PFP rules that were introduced in FCA-9 and that the

14 Several participants failed to consider the seasonality of the resource's performance and scarcity events distribution when developing their "A" values.

15 The methodology used by the IMMto benchmark the submitted risk premia considers the following three sources of risk:

i) risk of greater than expected number of scarcity hours

ii) risk of worse than expected average performance during scarcity hours

iii) risk of experiencing a significant decrease in capacity

The IMM's estimated risk premia relies on several conservative assumptions that include a) use of a high cost of risk ($0.25 per $1 of exposure), b) estimating the Value at Risk ("VAR") at a relatively high level of confidence (95%), c) estimating the risk premium for each resource on a standalone basis (and not considering the portfolio-level covariance of performance), d) treating the performance risk to be independent of "H",

IMM has adopted reasonable methods for estimating these components. Furthermore, the IMM acted reasonably in its consideration of unit-specific factors that might justify higher-than-normal costs.

Better information is becoming available about the costs and risks of selling capacity as market participants gain experience with the PFP rules. After the first six months of market operations under PFP, which began in June 2018, there have been less than three hours of operating reserve shortages, which is far below the expected "H" values that the IMM used in its determinations before FCA-9. However, the IMM used expected "A" values that were much higher than the actual availability of steam turbines that submitted delist bids (which accounted for most delist bid capacity in FCA-9). Nevertheless, since operating reserve shortages have been infrequent since June 2018, the impact of the low availability ("A") on capacity payments was reduced. Overall, the actual PFP-related charges have been 80 percent lower than the corresponding elements of the CPC and RP components for the steam turbines that submitted delist bids in FCA-9.[16] Hence, based on the brief period of operation under the PFP rules, the IMM-determined CPC and RP components appear in retrospect to have been more than adequate to account for PFP-related costs.

Conclusions Regarding the IMM's Reviews

We find that the IMM's methodology for recalculating the delist bids was based on reasonable criteria and consistent with the Tariff provisions. In its reviews of Net Going Forward Costs, the IMM has frequently denied or modified costs that were unsupported or that could not be avoided by not selling capacity. In its reviews of the Capacity Performance Charge and Risk Premium components, the IMM has frequently capped resources and IMM-determined prices that appear to have been more than adequate to account for PFP-related costs.

The IMM has often been in the position of having to review large numbers of cost submissions from market participants that have an incentive to over-estimate those costs. In aggregate, cost submissions have been biased upwards, which has been apparent in several ways:

- 61 percent of generators that have received an IMM-determined price (i.e., been bid capped) have voluntarily bid below the IMM-determined price in the actual auction.
- 56 percent of generators whose bid was fully accepted have chosen to reduce their final delist bid below the originally submitted delist bid in the actual auction.
- Many generators that have received an IMM-determined price (i.e., been bid capped) have engaged in capacity sales that are inconsistent with the costs submitted to the IMM. This was most evident in FCA-8 when 4.6 GW of delist bids were submitted at price levels far above the capacity payment rates they received over the preceding decade.

[16] This assumes that the PFP-related charges during the last six months of the 2018/19 CCP to be the same as the actual charges incurred during the first six months.

Overall, the IMM has generally done well in balancing: (a) its role of exercising due diligence to ensure cost submissions are not over-estimated against (b) the need to allow resources to reflect legitimate costs in the delist bids.

IV. Impact of Mitigation on FCA Prices

In addition to evaluating the reasonableness of the IMM's reviews and determinations, we also evaluated the effects of the mitigation on prices in each FCA. It is important to recognize that when the IMM caps a delist bid with an IMM-determined price, this may or may not affect:

- The actual bid of the supplier; and
- The actual clearing prices in the FCA.

If a supplier submits cost information that is not accepted by the IMM, the supplier is provided with a bid cap known as an "IMM-determined price." If the supplier then chooses to delist at a lower price than the IMM-determined price, then one may conclude that either:

- The mitigation did not affect the actual delist bid of the supplier because if the actual cost of the resource was higher than the IMM-determined price, a competitive supplier would bid the resource at the highest possible level to avoid selling capacity at a loss; or
- The mitigation constrained the supplier's options so its most attractive remaining option is to behave competitively (i.e., submit a delist bid at the actual cost of the resource) even if it would have had an incentive to withhold supply absent the bid cap.

Either way, when a supplier chooses to delist at a lower price than the IMM-determined price level, it indicates that the generator is *not* being required to sell capacity below cost.

Even in cases where the supplier bids at the IMM-determined price, the IMM's mitigation will not have directly affected the FCA clearing prices if:

- The resource did not clear at the IMM-determined price; or
- The resource would have cleared at the unmitigated delist bid price.

In both cases, whether or not the resource clears and the FCA clearing price is unaffected by the IMM's mitigation. Therefore, in addition to summarizing the frequency and reasonableness of the IMM's mitigation, it is very important to estimate the effects of the mitigation on the FCA outcomes.

A. Estimated Direct Effects of the IMM's Mitigation

Table 2 provides a summary of the mitigation and its effects on capacity sales and prices in each of the five FCAs. It provides the following quantities for each FCA:

- *Reviewed Bids* – Amount of delist bid capacity of generators that was reviewed by the IMM.
- *Capped Bids* – Amount that received an IMM-determined price as a share of Reviewed Bids.

- *Mitigated Bids* – Amount that was actually offered into the FCA at the IMM-determined price as a share of Reviewed Bids.
- *Mitigation Led to CSO* – Amount that received a Capacity Supply Obligation as a consequence of being mitigated (i.e., the unit was mitigated and its initial delist bid would not have been accepted) as a share of Reviewed Bids.
- *Estimated ROS Price Impact* – The direct impact on the Rest of System clearing price that resulted from the generating resources in the "Mitigation Led to CSO" category.

Table 2: Summary of Direct Impacts of Mitigation
FCA-8 to FCA-12

Auction	Reviewed Bids (GW)	Capped Bids (%)	Mitigated Bids (%)	Mitigation Led to CSO (%)
FCA-8	7.8	81%	19%	0%
FCA-9	8.1	62%	27%	0.7%
FCA-10	1.2	23%	16%	0.5%
FCA-11	1.5	83%	0%	0%
FCA-12	2.8	81%	0%	0%
5-Year Average	4.3	70%	18%	0%

Table 2 shows that most (70 percent) of the delist bid capacity of generators received an IMM-Determined Price in FCA-8 to FCA-12. However, most of the resources that received an IMM-determined price voluntarily reduced their bids or retired via the NPR path, so only 18 percent of the delist bid capacity in FCA-8 to FCA-12 was actually bid at the IMM-determined price. Moreover, less than one percent of the bids were entered into the auction at the IMM-determined price *and* affected the market outcomes directly because their mitigation affected whether they cleared in the FCA. Ultimately, the direct effects of these additional capacity sales on the Rest-of-System clearing price were de minimis.[17]

The direct price effects of the mitigation were influenced by the pricing rules that were used in each auction. In FCA-8, the clearing price was established using administrative pricing rules for Insufficient Competition.[18] Consequently, the clearing price depended on the *amount* of capacity that was sold by generators, but it was not affected by the delist bid *price* levels of those generators, so using the original participant-submitted delist bid prices for the 1.5 GW of

[17] In FCA-9, the prices in the SEMA/RI zone were administratively determined using the rules for Inadequate Supply, so the mitigation did not directly impact the FCA price in the SEMA/RI zone. The Inadequate Supply rules were applied when the supply from new resources was lower than the new capacity required at the FCA Starting Price.

[18] The Insufficient Competition rules were applied when the existing capacity is less than the requirement and not enough new resources are qualified to assure adequate competition in the FCA.

mitigated capacity would not have altered the FCA prices. In FCA-9 to FCA-12, the clearing price was established under a sloped demand curve, which establishes a consistent inverse relationship between the clearing price and the quantity of capacity sold. Therefore, the direct price effects of the mitigation were also small in the last four FCAs.

B. Additional Effects of the IMM's Mitigation

Although the mitigation did not have significant direct effects on FCA prices, it may have had substantial indirect effects for several reasons. First, as discussed at the beginning of this section, the mitigation may alter the incentives for a supplier that would otherwise have an incentive to exercise market power. This happens when the IMM-determined price is in a relatively price-elastic (i.e., flat) portion of the market supply curve even if the IMM-determined price is higher than the true cost of the resource. In such cases, the supplier knows that if it withholds capacity by offering at the IMM-determined price, the resulting price effect will be too small for the strategy to pay off, leading the supplier to behave competitively. This factor would tend to increase the effectiveness of the mitigation.

Second, the imposition of an IMM-determined price may limit the alternatives of a supplier with market power, leading it to exercise market power in a different manner. For instance, in FCA-8 and FCA-9, several resources were retired using the NPR pathway after receiving an IMM-determined price. Some of these resources may have been retired because the IMM limited their ability to use delist bids to raise the clearing price. There were no market power mitigation rules that would prevent them from using the NPR pathway to withhold the resources. We reviewed the cost submissions for these generators and found the IMM's adjustments to the submitted Net GFCs to be reasonable. It is unclear whether the prices in FCA-8 and FCA-9 would have been lower if these resources had received higher IMM-determined price levels, but we believe the resource owners had incentives to exercise market power and that the NPR path did not include adequate protections against the exercise of market power.[19] To remedy this deficiency, the Commission approved mitigation measures to limit the exercise of market power through the NPR path after FCA-10.

[19] See February 2, 2016 Comments of Potomac Economics in docket ER16-551-000.

