Comments on Contingency Modeling Enhancements Issue Paper with Technical Paper

Department of Market Monitoring
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The Department of Market Monitoring (DMM) appreciates the opportunity to provide comments on the Contingency Modeling Enhancements Issue Paper and accompanying technical paper.

DMM supports the general approach of including the corrective constraints in the optimization. These constraints should, in principle, allow the ISO to more efficiently manage the 30-Minute contingency requirements through market processes. The proposed solution provides an explicit mechanism within the market that will price the resulting reliability product. We believe this is an improvement over the current practice of relying on minimum online capacity constraints and exceptional dispatch to supplement unit commitments and dispatches made through the regular energy market and residual unit commitment process.

Based on DMM's current understanding of the ISO's proposal, DMM believes that resources should generally be compensated at the locational marginal capacity price (LMCP) for all capacity used to satisfy the corrective constraints. As noted below, we believe mitigation may be appropriate in cases when local or temporal market power may exist.

The ISO is still determining how ancillary service (AS) capacity will be incorporated into the preventive-corrective modeling. DMM believes that all effective AS capacity permissible, given reliability and other restrictions, should be counted towards relieving the corrective constraint. This is consistent with the intended purpose of procuring AS.

While DMM supports the general framework of corrective constraints, we are concerned that LMCPs can be manipulated when resources have local capacity market power.

We elaborate on these issues below.

Comparison to Capacity Only Solution

A possible alternative to the ISO's proposal would be to create a capacity only solution, such as a 30 minute capacity product or a refined AS product. The preventive-corrective constraint can be met by procuring more capacity,[1] reducing flows across a line, or a combination of both. The market optimization will choose this mix so as to minimize the costs of meeting these constraints. This makes the ISO's proposal more efficient than a capacity only solution.

[1] Corrective capacity can be procured either by unloading capacity at a generator, or by moving resources to dispatch levels with higher ramp rates.

To the extent that an AS/capacity requirement is non-dynamic or an AS/capacity region does not match the set of resources effective at relieving the corrective constraint complications could arise. For instance, more capacity may be procured than is required, or the shadow price from the constraint may be applied to more capacity than is effective on the constraint; or the constraint may not be satisfied. These situations would lead to increased costs and potentially more out of market dispatch than under the ISO's proposal.

Compensation of Corrective Capacity

Resources that provide corrective capacity should be paid the LMCP for all capacity contributing to the resolution of the corrective constraint. Doing so will:

- Compensate the capacity that is procured to meet corrective constraints at its market value.
- Create the incentive for resources to maintain and increase flexibility in order to receive increased corrective capacity payments.
- Align incentives to increase corrective capacity payments through increased flexibility with the minimization of system costs.

DMM believes that resources should be compensated for the value their corrective capacity provides to the ISO system. The LMCP, as described in the technical paper, correctly prices the corrective capacity at its locational marginal value.

It is important to note that the LMCP is not simply the opportunity cost of corrective capacity. It is derived from the shadow prices on corrective constraints, which are the amount that system costs would be reduced if the constraint were relaxed by one MW.

If the shadow price is set by a resource reducing energy sales in order to provide corrective capacity, the shadow price will represent the marginal cost to the system of this forgone production, which by definition will cover opportunity cost of the resource. If the shadow price were set by the marginal cost of reducing flows across a constraint, it would represent the cost of re-dispatching to reduce flows. In this case, any resource that does forego energy production will still have its opportunity cost at least covered by its LMCP. In all cases the LMCP will represent the marginal value of corrective capacity at that location.

To illustrate, consider the first example from the technical paper (starting on page 12). The demand for corrective capacity is the preventive line limit minus the corrective limit, 350 MW. The supply of corrective capacity is the marginal cost of providing the corrective capacity.[2] G2 can provide up to 200 MW for $0/MWh, G3 can provide up to another 400 MW for $15/MWh, and the flows on the line can be reduced at a cost of

[2] The marginal costs of corrective capacity are a function of submitted bids, assuming resources bid their marginal energy costs.

$20/MWh for another 550 MW. Figure 1 shows the supply and demand curves for corrective capacity. The market value of corrective capacity is the $15/MWh LMCP.

Even though the G2 corrective capacity has zero marginal costs, it does have positive marginal benefits. If the last MW of corrective capacity G2 provided was not available then system energy costs would increase by $15. If G2 were to provide one more MW of corrective capacity then system energy costs would decrease by $15. Compensating G2 for corrective capacity aligns its incentives to increase capacity, and thus receive more capacity payments, with minimizing system costs.[3]

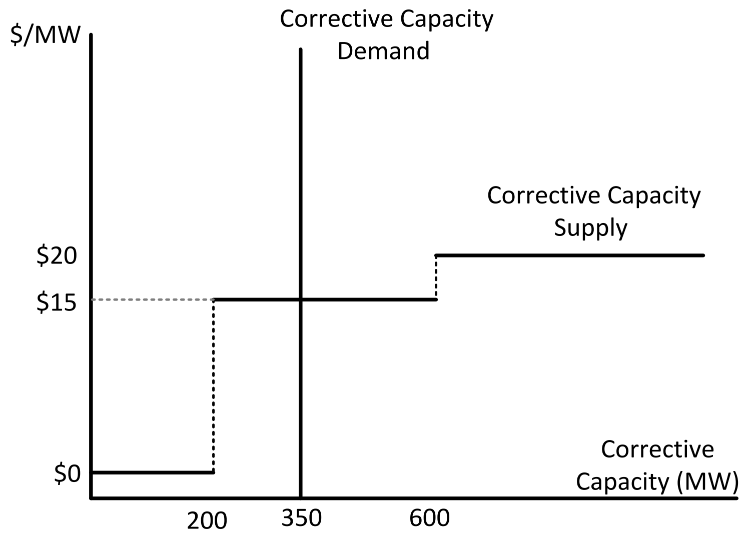

Figure 1 - Implied Supply and Demand for Corrective Capacity

Restrictions on Available Corrective Capacity

All AS capacity permissible and effective on the corrective constraint should be counted as supplying corrective capacity. Furthermore, DMM is generally opposed to any measures that would further restrict capacity from being used for, or force capacity to be used as, corrective capacity. Such restrictions would reduce the options available to the optimization, reduce the efficiency of the solution, and increase costs. They may also introduce opportunities to manipulate corrective capacity supply, LMCPs, and energy LMPs through the co-optimized solution.

[3] In the ISO's example the total system costs would remain the same as G2 adds corrective capacity reducing energy costs by $15 and increasing capacity payments by $15 up to the point where it would add 151 MW. At this point it would reduce capacity payments to zero and have saved 150MW*$15/MW in energy costs. It is easy to imagine a less extreme circumstance where the market level corrective capacity supply curves have more segments and total system costs are reduced in a more incremental rather than binary way. Also, if the demand for corrective capacity is uncertain, as it will be given the dynamic nature of the constraints, there is a probability that demand will be less than or equal to 350 MW in which case the LMCP will equal $0/MW. An increase in G2's ability to provide corrective capacity can both increase its expected capacity payments and reduce expected overall system costs due to more instances of $0 LMCPs and reduced energy costs.

Potential for Local Market Power in Corrective Capacity

The inclusion of corrective constraints into the market optimization may create the opportunity for resources to raise the LMCP by bidding below their marginal energy costs. This strategy exists under both the proposed compensation schemes.

Current local market power mitigation (LMPM) measures will apply to the corrective constraints congestion impact on energy LMPs. However, current LMPM will not be able to detect or mitigate potential market power in corrective capacity. Because a resource's capacity "bid" is determined inversely to its energy bid, it can increase its capacity bid by lowering its energy bid. In areas with locally constrained corrective capacity, this could create the opportunity for exercising local capacity market power.

To illustrate, consider again the first example from the technical paper. The LMCP is the decrease in system costs of marginally relaxing the corrective constraint as calculated from the energy bids, in this case, $15/MWh ($50 - $35). What would happen if G3 had bid $30.01/MWh? The dispatch would not change, but the LMCP would now be $19.99/MWh ($50 - $30.01). G3 can unilaterally set the LMCP without changing dispatch bounded only by the LMP at node A.

			Base Bids		Strategic Bids		
Gen	P^0	ΔP^{kc}	**LMP**	**LMPC**	**LMP**	**LMPC**	**Gain**
G1	700	-	$30	$0	$30	$0	$0.00
G2	250	200	$50	$15	$50	$19.99	$998.00
G3	250	150	$50	$15	$50	$19.99	$748.50

Table 1 - Manipulating LMCP with Lower Energy Bids Example 1

Consider also a slight variation on the second example in the technical paper. Instead of just one generator at node A, what if there were generators G1a bidding 500 MW at $20/MWh and G1b bidding 300 MW at $30/MWh. The base dispatch would award G1a 500MW and G1b 50MW. The LMP at node A would be $30/MWh. The market results at node B would be the same as the technical paper. The LMCP is also still $20/MWh ($50 - $30). Assume that G1b and G2 are controlled by the same Scheduling Coordinator (SC). The SC can manipulate the LMCP by reducing its bid to $20.01/MWh. The LMCP would now be $29.99/MWh. The SC would lose $9.99/MWh on the 50 MW of energy it sells at node A, but gain $9.99/MWh on the 200 MW of corrective capacity it sells at node B.

			Base Bids		Strategic Bids		
Gen	P^0	ΔP^{kc}	**LMP**	**LMPC**	**LMP**	**LMPC**	**Gain**
G1a	500	-	$30	$0	$20.01	$0	-$4,995.00
G1b	50	-	$30	$0	$20.01	$0	-$499.50
G3	650	200	$50	$20	$50.00	$29.99	$1,998.00
						Net Gain for SC	**$1,498.50**

Table 2 - Manipulating LMCP with Lower Energy Bids Example 2

The current LMPM operates by reducing energy bids down to estimated marginal costs under conditions where local energy market power may be exercised. This will not mitigate local capacity market power which can be exercised by reducing energy bids. Measures to detect and mitigate this potential strategy need to be considered.

Physical Withholding Through Bid-in Ramp Rates

The wholesale electricity industry is increasingly introducing market elements that explicitly procure and value ramp. In addition to the current proposal there exists a proposal for an additional spot market ramp product (the Flexible Ramping Product) and forward procurement of ramp in the bilateral RA market as well as potentially through a centralized capacity market. Currently, physical generators have the option to bid-in their ramp rate at a value not to exceed their maximum ramp rate. DMM views the ramp rate as a physical characteristic of a resource and not a market mechanism that should be varied based on market conditions. It is, in light of increased demand and explicit valuation of ramping energy, a mechanism that can easily be used to physically withhold ramping energy from the markets. DMM recommends that the option to bid in a resource's ramp rate be eliminated prior to implementing any additional market instruments that require and value ramping energy.