Proposed Methodology to Remove Capacity Resources in the MARS model to Calculate Target Reserve Margins in the Calculation of the NYCA Installed Reserve Margin (IRM).

SUMMARY

Pursuant to the NYSRC's Procedure for Establishing New York Control Area Installed Capacity Requirements (Policy 5), capacity is removed from zones west of the Central-East (CE) interface that have excess capacity when compared to their forecast peaks until a study point IRM is reached. This paper demonstrates that the procedure should be revised to one based upon removing capacity on a proportional basis across upstate zones.

The existing Policy 5 methodology determines the minimum amount of capacity that would be required to achieve a reliable system. However, by dictating that the capacity be removed from capacity rich zones west of Central East, it implicitly assumes that the NYCA could only maintain reliability when loosing capacity[1] that is located in the excess capacity zones, west of CE. As such, the IRM calculation results in an unrealistically low installed reserve margin.

The proposed methodology removes capacity proportionally to the capacity of each zone, which is consistent with the locational based characteristics of the market.

Through a series of examples, the remainder of this paper compares the impact of the current methodology with a proposed removal methodology (Proportional Methodology). The examples show that capacity loss in areas or zones where there is a resource need creates an erratic move of the IRM and when the capacity loss is critical it will cause a jolt to a higher IRM when using the existing methodology. The examples also show that the Proportional Methodology results in an estimated Installed Reserve Margin that remains closer to representing the amount of capacity that is required under a variety of retirement scenarios and transmission improvements. As such, it provides a much more stable and accurate short and long term assessment of the NYCA capacity needs.

We concluded that Policy 5 should be revised to adopt the Proportional Methodology starting with the 2011 IRM calculation.

Example Model Description:

The example below best describes the dynamic of the calculations for the IRM and the LCR. The load and capacities were chosen to augment and demonstrate the significant difference between the current and the proposed methodologies. This example is an analogy of the interaction of two areas, one with excess capacity representing Zones A, C, and D in the NYCA system, and another representing Zones E, F, G, H, and I[2]. The

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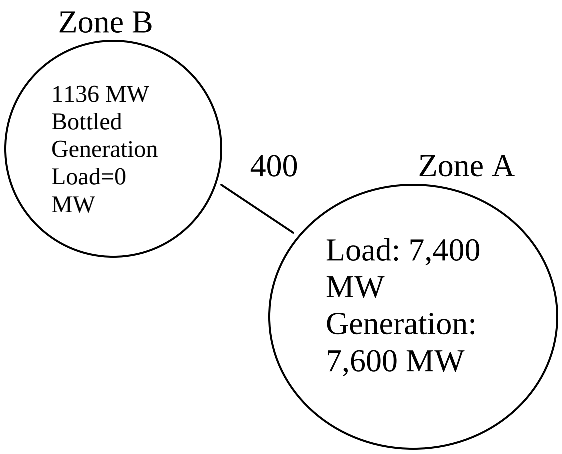
[1] For example, capacity could be lost when a capacity resource retires or decides to sell its capacity to a neighboring pool.

[2] Similarly, the two areas could represent Zones J, J1, and J2 (see last IRM model), where J1 and J2 are areas with bottled generation.

connection between the two areas could represent the Central East interface or a line between areas that contains bottled generation[3] to a load area. Note that the system shown below can be simplified by assuming that 400 MW of generation in Zone B will reach the load in Zone A, as shown in example 1.



These specific examples assume that there are no Localities in the system for simplification purposes.

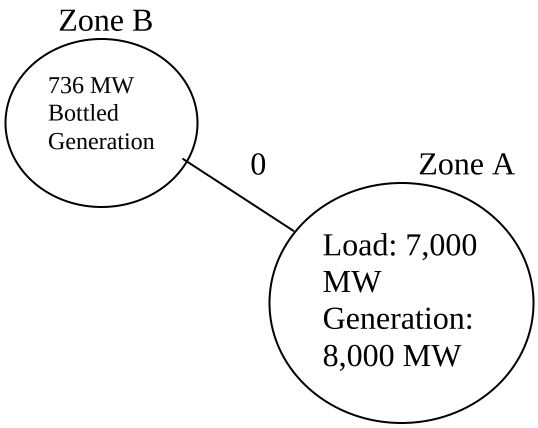
EXAMPLES

The following are a series of extreme examples that illustrate and calculate the differences between the existing and proposed methodologies for the IRM analysis. :[4]

ASSUMPTIONS
Total load: 7,000 MW
Total Generation: 8,736 MW
Zone B bottled generation: 736 MW
Capacity required to meet LOLE criteria: 7800 MW of non-bottled capacity

1) Current Policy 5 Example
To represent bottle generation of 736 MW the line joining zones A and B is set to 0 The unbottled generation in Zone B has been represented as being part of Zone A.
LOLE = 0.09

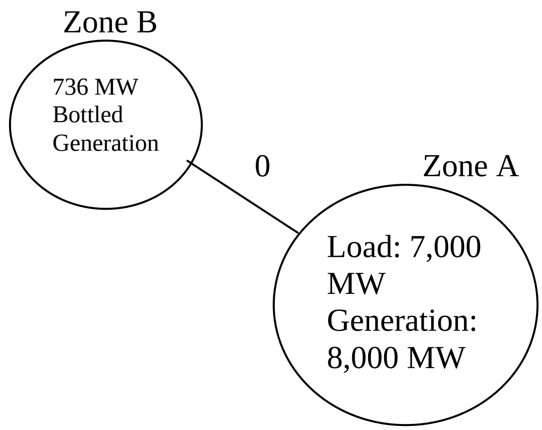
[3] Bottled generation could be deliverable, for example Linden VFT.
[4] The examples assume that there is 1100 MW of bottled generation that is grandfathered as deliverable in the capacity market. This extreme example is used to highlight the differences in methodology. While the NYISO has no areas where capacity is 100% bottled, there are areas where capacity has a higher likelihood of being curtailed due to transmission limits between the generators and the load centers.



In this example, the Policy 5 removal methodology will first remove all capacity from Zone B before removing capacity from Zone A until it meets the LOLE criteria. In the first step removing all the generation in Zone B (736 MW) does not affect the LOLE, thus the LOLE remains at 0.09 days/year. After removing capacity from rich zones the current methodology would remove capacity from the non-rich zones in this case Zone A until an LOLE of 0.1 is reached[5]. This results in removing an additional 200 MW from Zone A and calculating the minimum system reserve margin for this system as 111.4% (7800 MW/ 7000 MW). Therefore, pursuant to Policy 5, 7,800 MW of capacity in the two zones are sufficient to meet the system LOLE criteria.

[5] After removing capacity from the capacity rich zone, this example simply removes capacity from the non capacity rich zone in order to drive the LOLE up to 0.1 days year. The example is appropriate to demonstrate the effect of the Policy 5 method.

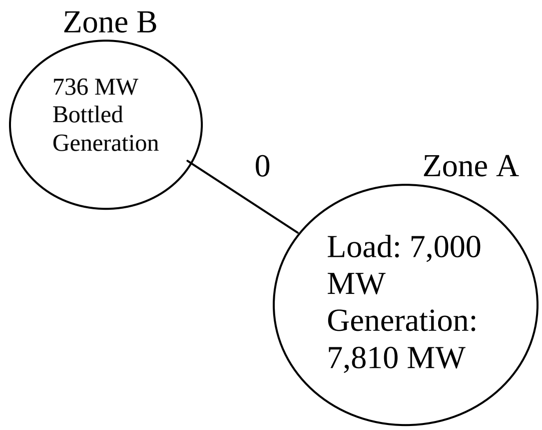
2) Proportional Methodology Example



If we remove generation proportionally to the total generation available in each zone then, for each 100 MW of generation that is removed we will remove 91.6 MW from Zone A and 8.4 MW from Zone B. Once again, LOLE criteria is met when we have removed 200 MW from Zone A. Under the proportional methodology this results in also removing 18 MW from Zone B. In this case 8,518[6] MW of generation is required to meet the system LOLE requirement and the reserve margin is 121.7%.

[6] 7,800 MW from Zone A and 718 MW from Zone B.

3) Effect in the IRM calculation of retiring 190 MW in Zone A for both methodologies

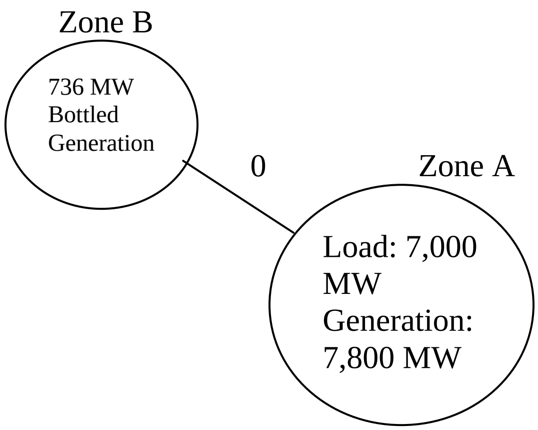


Once there is only 7,810 MW of capacity in Zone A at the start, the initial run just meets the LOLE criteria. The Policy 5 required capacity is calculated at the full 7,800 MW of capacity available in both zones and the reserve margin is set still at 111.4%[7]. Note that the IRM remained the same from example 1.

Under the Proportional Methodology for each 100 MW of generation that is removed we will remove 91.4 MW from Zone A and 8.6 MW from Zone B.[8] The LOLE of 0.1 is reached when 10 MW has been removed from Zone A. Under the proportional methodology this has also resulted in removing 0.94 MW from Zone B. The IRM would be set at 121.93. This is an increase of only 0.23% from the minimum required level set in example 2 without the assumed retirement.

7 7,800 MW of capacity divided by 7,000 MW of load.
8 The proportions have changed because of the 190 MW of retirement from Zone A.

4) Effect in the IRM calculation of retiring 200 MW in Zone A for both methodologies



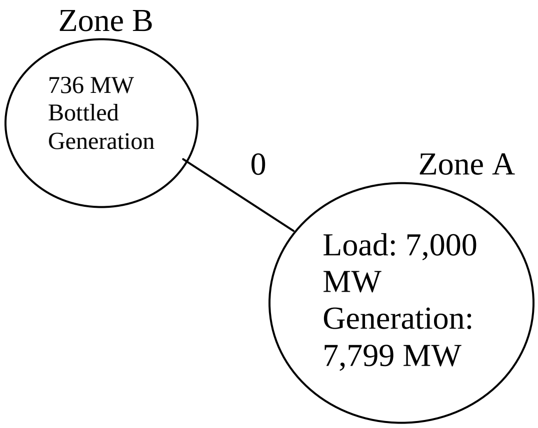
Once there is only 7,800 MW of capacity in Zone A at the start, the initial run just meets the LOLE criteria and there is no capacity removed under Policy 5. Despite having no excess generation in the load zone, this system continues to meet the criteria. Under Policy 5 it is not clear how we proceed when the system just meets criteria before any capacity is removed. If we proceed by removing the bottled capacity then the IRM remains 111.4%. If capacity is not removed from Zone B during the calculation process then the IRM is calculated as 121.94%[9]. This represents a sudden increase of almost 11% in the IRM.

Under the Proportional Methodology the IRM would also increase to 121.94% as the Zone A capacity level drops to 7800 MW from 7810 MW. However, in this case the rise is only 0.01% from the 121.93% shown in example 3.

[9] 8,536 MW of capacity divided by 7,000 MW of load.

4) Effect in the IRM calculation of retiring 201 MW in Zone A for both methodologies

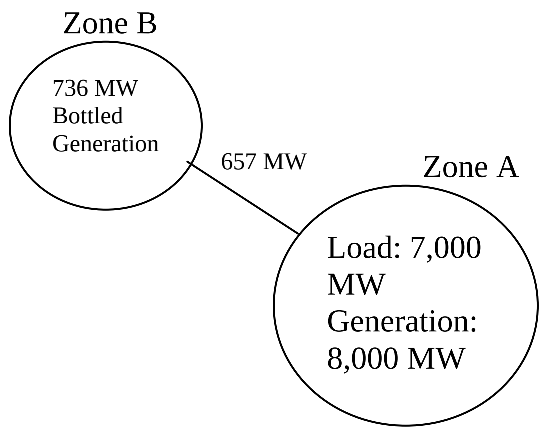
However, problems begin to show when assumptions are changed slightly assuming capacity begins retiring in Zone A. As the capacity level in Zone A declines the calculated reserve margin under Policy 5 remains at 111.4% until the level of installed capacity in Zone A is reduced to less than 7800 MW.



At this point, the system does not and can not meet the LOLE criteria and has an LOLE higher than 0.1. Generation in Zone B cannot contribute positively to improve the reliability to meet the LOLE criteria.

Therefore until there is less than 7800 MW of capacity in Zone A, the Policy 5 methodology gives the signal that there is substantial excess capacity in the system and there is no significant chance of falling short. However, as examples 1, 3 and 4 show, the Policy 5 methodology can indicate that there are substantial levels of excess when there is actually a very small amount of excess of MW that are contributing to meeting the criteria. With a small increase in retirements of the critical MW, the reserve margin set by Policy 5 shifts to a much higher level of capacity to maintain reliability.

5) Effect in the IRM calculation of unbottling generation located in Zone B in both methodologies



Under this example both methodologies calculate the IRM being 111.4%. The Policy 5 calculation remains the same as shown in example 1.

The Proportional Methodology will remove 79 MW[10] from Zone B and 857 MW from Zone A, yielding a total generation in the system of 7,800 MW, which is the same as in Policy 5. Thus, the IRM is also equal to 111.4%.

[10] 936*(736/8736) = 79 MW. Therefore the remaining capacity in Zone B is 736-79 = 657 MW

Discussions

Throughout, the reserve margin calculated under the proportional shifting methodology is signaling starting in example 2 that there is a relatively small amount of excess reserves (218 MW[11]) relative to the requirement and smoothly falling to zero excess after 200 MW of capacity retires from Zone A. These examples show that over a variety of assumptions the reserve margin calculated under the Proportional Methodology provides a more accurate estimate of the usable excess in the system.

Note that adding transmission or unbottling generation under example 5 has a positive impact in reducing the IRM, such impact did not exist when using the Policy 5 methodology.

The differences in the two methodologies appear stark.

Market Implications
While the New York State Reliability Council and the Installed Capacity Subcommittee are not involved in market issues, the capacity market is the mechanism to assure that the NYISO meets its long term reliability target. For this purpose, assume that the market is covered by the NYISO's statewide capacity market design (i.e. a demand curve that declines from the net cost of new entry at the minimum requirement to zero value of capacity 12 percent beyond the minimum requirement).

Under the Policy 5 methodology and the initial assumptions in example one, the market is 12% long.[12] The result is that the market clearing price is zero or close to zero. As such, it places a relatively low value on capacity and could easily result in signaling existing units to retire or not additional transmission or generation investment required. Since the capacity market does not differentiate between capacity in the two zones, retirements are as likely in Zone A as they are in Zone B. Once 190 MW has retired in Zone A the system is only 10 MW away from just meeting its reliability criteria and 11 MW away from failing to meet its reliability criteria. However, under the Policy 5 methodology the market would appear to be 9.56% [13] long and would provide a capacity price that is less than ½ of the net cost of new entry. The price signal is in no way consistent with precarious capacity situation.

Under the Proportional Methodology and the initial assumptions the market is 2.56% long.[14] The result is a market clearing price of 78.7% the net cost of new entry and consistent with the relative need for new entry. With 190 MW shut down in Zone A the result is that the market is 0.13% long, consistent with the condition that with 10 more MW loss in Zone A and the system will just meet its minimum reliability requirement.

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[11] 8736-8518 requirement = 218 MW

[12] 8,736 MW of capacity divided by the 7,800 MW minimum level of capacity required by the reserve margin.

[13] 8,546 MW of capacity divided by the 7,800 MW minimum level of capacity required by the reserve margin.

[14] 8,736 MW of capacity divided by the 8,518 MW minimum level of capcity required by the reserve margin.

The Policy 5 method of taking capacity from only the capacity rich zones implies a system that is more reliable than it actually might be at the design level.