Options in Adjusting External Area Representations in the 2019 IRM Study - Revised

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NYSRC – Installed Capacity Subcommittee

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Refresh

- **Each year, the NYISO updates the external area representations (Ontario, Quebec, New England, and PJM interconnection) for the IRM study.**
  - To start this process, the data is provided by each external control area.
  - This process includes removal of the neighbors EOP steps and then adjustments to the data in accordance with Policy 5 if the neighboring LOLEs are better (lower) than their loss of load criteria.
  - The adjustments are meant to prevent “over reliance” on the NYISO’s neighbors when establishing the IRM study’s calculated Installed Reserve Margin (IRM).
  - A total import limit of 3,500 MW has been placed on the amount of emergency assistance that New York can rely on from all external areas when setting the IRM.

Purpose

- During the 9/5/18 ICS meeting, the NYISO made a presentation on External Area Modeling. The purpose of the presentation was to provide additional detail and analysis regarding the impact of applying updates to the external area representations for the 2019/20 IRM.
  - The NYISO explained that updating the External Area Modeling produced a 1.1% decrease in the IRM that was not intuitive. The adjustment applied per policy 5 to ensure that the External Control Areas' LOLE is no better than their criteria, did not meaningfully reduce the reserve margins in certain External Control Areas. As a result, the reserve margins available in the External Control Areas could be delivered as emergency assistance to NYCA, decreasing the IRM.
- The ICS asked the NYISO to evaluate additional adjustments to the external areas that can be applied per Policy 5, and report on its findings.
- The purpose of today's presentation is for the NYISO to share the analysis completed to date and facilitate further discussion on the preferred path forward for the 2019/20 IRM and beyond.

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Policy 5 Adjustments

- NYSRC Policy 5 Section 3.5.6 External Control Area Load and Capacity Models states in relevant part:
  - "In addition, an external Control Area's LOLE assumed in the IRM Study cannot be lower than its own LOLE criterion and its reserve margin can be no higher than the external Control Area's minimum requirement."
- The NYISO has annually had to adjust several of the External Control Areas, per policy 5, to ensure their LOLE is no better than their criteria.
- Adjustments to reserve margins, however, have not been needed in recent history.

Approach

- The NYISO worked with a NYSRC consultant, as requested by the ICS, to determine options for completing the external area replacement for this year.
- Policy 5 does not dictate what method would be used to drive neighbors LOLE to criterion or drive their reserve margin levels to the minimum requirement.
- Discussions with the NYSRC consultant focused on two items.
  - The order of changes to the externals, current practice is; a) remove EOPs, b) add load to get LOLE to criteria, if needed, and c) adjustments to reserve margins, if needed.
  - The current method for adding load to externals to complete items b and c of the previous bullet, is to add load proportional to existing load in each zone.
- Five study cases were developed to test the impacts of the above parameters.

Study Cases

1. First, remove EOPs. Load is then scaled proportional to existing load to meet the LOLE criterion and adjust reserve margins if needed to be no higher than the published minimum requirement.
2. Same approach as Case 1. However, this analysis uses the mod-mdmw table to add loads. The mod-mdmw table is necessary to adjust multiple load shapes; which will be needed for the cases below.
3. Change the order of adjustment steps. Load is scaled proportional to existing load to meet the LOLE criterion first, then remove EOPs, lastly adjust reserve margins if needed to be no higher than the published minimum requirement.
4. First, remove EOPs. Load is then scaled proportional to excess capacity in each zone to meet the LOLE criterion and adjust reserve margins if needed to be no higher than the published minimum requirement.
5. Change the order of adjustment steps. Load scaled proportional to excess capacity in each zone to meet the LOLE criterion first, then remove EOPs, lastly adjust reserve margins if needed to be no higher than the published minimum requirement.

Target Reserve Margins

Control Area	Published Margin [1]	Source
New England[2]	17.6%	ISO_NE ICR, LSR, & Capacity Requirement values…, Jan/16
PJM Interconnect	15.9%	2017 PJM Reserve Requirement Study, 10/12/17
Ontario	17.7%	Ontario RM Requirements for 2018-2020, 12/21/17
Quebec	N/A	

1. The NYISO pulled this information as an approximation of minimum reserve margins. These reserve margins reflect the EOPs used by the External Control Areas. Similar to the NYCA IRM process, the reserve margins may also be dependent on locational requirements.
2. New England will publish an update to this Margin in the next few weeks.

Study Case Results (full details in Appendix A)

External Control Area LOLEs and Margin Levels										
Year:	2018 FBC		2019 PBC							
Case:	**2018 FBC (18.2%)**		**Starting Case* (15.0%)**		**Finish Existing - Case 1 (15.6%)**		**Use Mod-MDMW - Case 2 (15.4%)**		**α to Excess Cap - Case 4 (16.4%)**	
Area	Annual LOLE	Reserve Level	Annual LOLE	Reserve Level	Annual LOLE	Reserve Level	Annual LOLE	Reserve Level	Annual LOLE	Reserve Level
_PJM_MA_	0.146	**116.0%**	0.017	**124.6%**	0.467	**115.9%**	0.398	**115.9%**	0.145	**115.2%**
ISONE	0.108	**113.8%**	0.000	**145.4%**	0.135	**117.6%**	0.108	**117.0%**	0.109	**116.5%**
IESO	0.104	**134.0%**	0.000	**143.5%**	0.639	**117.7%**	0.560	**117.7%**	0.551	**117.7%**
_HQ_	0.110	**144.1%**	0.000	**148.0%**	0.103	**138.3%**	0.103	**131.7%**	0.103	**131.7%**
_HQ_(winter)	-	**99.9%**	-	**107.9%**	-	**100.9%**	-	**100.5%**	-	**100.5%**

*The starting case is the parametric PBC with externals replaced, but prior to any Policy 5 adjustments.

Study Case Results –continued

External Control Area LOLEs and Margin Levels								
Year:	2018 FBC		2019 PBC					
Case:	**2018 FBC (18.2%)**		**Starting Case* (15.0%)**		**EOPs 2nd, α to load - Case 3 (yy.y%)**		**EOPs 2nd, α to Excess Cap - Case 5 (yy.y%)**	
Area	Annual LOLE	Reserve Level	Annual LOLE	Reserve Level	Annual LOLE	Reserve Level	Annual LOLE	Reserve Level
_PJM_MA_	0.146	**116.0%**	0.017	**124.6%**				
ISONE	0.108	**113.8%**	0.000	**145.4%**				
IESO	0.104	**134.0%**	0.000	**143.5%**				
_HQ_	0.110	**144.1%**	0.000	**148.0%**				
_HQ_(winter)	-	**99.9%**	-	**107.9%**				

*The starting case is the parametric PBC with externals replaced, but prior to any Policy 5 adjustments

Preliminary Findings – Case 1 and 2

- Given the detailed topology models in the external areas, scaling proportional load to meet the LOLE criteria can create localized LOLE violations (for example in Boston) leaving excess reserves available to provide emergency assistance to the NYCA.
- Therefore, with the detailed topology models, significant additional adjustments to the reserve margins were needed to be applied as per policy 5.
- In addition, scaling proportional load to meet LOLE criteria and then adjusting to the reserve margin, may still result in higher levels of reserves from external areas being available to the NYCA as compared to case 4.

Preliminary Findings – Case 3

- The objective of the case is to evaluate changing the order of the adjustments to first adjust the LOLE, then remove EOPs, and lastly adjust the reserve margins.
- The NYISO is still running this case.
- However, it is expected that the following may be observed. This case is not expected to eliminate the need for the reserve margin adjustment or reduce the magnitude of reserve adjustment.

Preliminary Findings – Case 4

- Given the detailed topology models in the external areas, scaling load proportional to excess capacity to meet the LOLE criteria, helps to avoid localized LOLE violations reducing excess reserves available to provide emergency assistance to the NYCA.
- This case eliminated the need for the reserve margin adjustment for some external areas (ISO-NE and PJM) and reduced the magnitude of the reserve adjustment for the other areas.
- In addition, scaling load proportional to excess capacity to meet LOLE criteria and then (if necessary) adjusting to the reserve margin, may result in lower levels of reserves from external areas being available to the NYCA as compared to case 1.

Preliminary Findings – Case 5

- The NYISO has not been able to complete this case.

NYISO Recommendation for the IRM FBC

- **For the 2019 IRM, the NYISO recommends that the ICS consider either**
  - Keeping the 2018 external area representations to allow for further discussion on this matter, or
  - Updating the external area representations, by scaling load proportional to excess capacity as described in Case 4.
- **If considered by ICS, the Case 4 methodology represents a change from past practice without the benefit of the ICS's normal review process.**
- **Regardless of the direction recommended by ICS for the 2019 IRM, the NYISO advises that additional discussion is needed to consider the preferred long term approach used for external Control Area modeling.**

Appendix A

External Control Area LOLEs with summer capacities, loads and resulting margins															
Area	2018 IRM Study Final Base Case					IRM 2019 Draft PBC (pre-Policy 5) (IRM=15.0%)					IRM 2019 Draft PBC (post-Policy 5) (IRM=15.2%)				
	Annual LOLE	Summer Capacity (MW)	Summer Load (MW)	Reserve Level	Reserve Margin (MW)	Annual LOLE	Summer Capacity (MW)	Summer Load (MW)	Reserve Level	Reserve Margin (MW)	Annual LOLE	Summer Capacity (MW)	Adjusted Load (MW)	Reserve Level	Reserve Margin (MW)
_PJM_MA_	0.146	193,267	166,588	**116.0%**	26,679	0.017	189,205	151,792	**124.6%**	37,413	0.148	189,205	158,541	**119.3%**	30,664
ISONE	0.108	32,894	28,913	**113.8%**	3,981	0.000	37,094	25,511	**145.4%**	11,583	0.107	37,094	31,934	**116.2%**	5,160
IESO	0.104	31,870	23,781	**134.0%**	8,089	0.000	31,588	22,016	**143.5%**	9,572	0.105	31,588	24,556	**128.6%**	7,032
_HQ_	0.110	34,929	24,239	**144.1%**	10,690	0.000	34,165	23,077	**148.0%**	11,087	0.106	34,165	24,729	**138.2%**	9,436
_HQ_(winter)	-	40,708	40,734	**99.9%**	-26	-	41,866	38,782	**107.9%**	3,083	-	41,866	41,557	**100.7%**	308
PJM Areas															
PJM_EAST	0.077	35,065	33,962	**103.2%**	1,103	0.000	32,608	30,945	**105.4%**	1,663	0.010	32,608	32,321	**100.9%**	287
PJM_CENT	0.000	34,258	25,570	**134.0%**	8,688	0.000	36,888	23,299	**158.3%**	13,589	0.000	36,888	24,335	**151.6%**	12,553
PJM_WEST	0.001	4,946	2,993	**165.2%**	1,953	0.000	6,102	2,727	**223.7%**	3,375	0.000	6,102	2,848	**214.2%**	3,253
PJM_SW	0.145	92,108	84,322	**109.2%**	7,786	0.017	86,345	76,832	**112.4%**	9,513	0.147	86,345	80,249	**107.6%**	6,096
DOMVEPC	0.000	26,891	20,360	**132.1%**	6,531	0.000	27,262	18,551	**147.0%**	8,711	0.000	27,262	19,376	**140.7%**	7,886
ISO-NE Areas															
BHE	0.000	1,125	331	**339.8%**	794	0.000	1,156	292	**395.7%**	864	0.000	1,156	366	**316.1%**	790
ME	0.076	926	1,038	**89.2%**	-112	0.000	1,009	916	**110.2%**	93	0.098	1,009	1,147	**88.0%**	-138
SME	0.000	1,544	747	**206.5%**	796	0.000	1,600	660	**242.7%**	941	0.001	1,600	826	**193.8%**	775
NH	0.002	4,291	2,172	**197.6%**	2,120	0.000	4,401	1,916	**229.7%**	2,485	0.003	4,401	2,399	**183.5%**	2,003
VT	0.073	548	1,325	**41.3%**	-777	0.000	769	1,169	**65.8%**	-400	0.085	769	1,463	**52.5%**	-694
BOSTON	0.103	3,107	6,061	**51.3%**	-2,954	0.000	4,059	5,348	**75.9%**	-1,288	0.098	4,059	6,694	**60.6%**	-2,635
CMA_NEMA	0.103	581	1,795	**32.4%**	-1,214	0.000	620	1,584	**39.1%**	-964	0.098	620	1,983	**31.3%**	-1,363
WMA	0.007	4,997	2,322	**215.2%**	2,674	0.000	5,331	2,049	**260.2%**	3,282	0.020	5,331	2,565	**207.8%**	2,766
SEMA	0.092	3,616	3,066	**117.9%**	550	0.000	3,877	2,705	**143.3%**	1,172	0.105	3,877	3,386	**114.5%**	491
RI	0.004	3,333	2,702	**123.3%**	631	0.000	3,522	2,384	**147.7%**	1,138	0.018	3,522	2,985	**118.0%**	537
CT	0.015	5,376	3,727	**144.3%**	1,649	0.000	5,702	3,288	**173.4%**	2,414	0.027	5,702	4,116	**138.5%**	1,586
SWCT	0.103	2,447	2,478	**98.7%**	-31	0.000	3,996	2,186	**182.7%**	1,809	0.012	3,996	2,737	**146.0%**	1,259
NOR	0.103	253	1,382	**18.3%**	-1,128	0.000	301	1,219	**24.7%**	-918	0.086	301	1,526	**19.8%**	-1,225
LAKEROAD	0.000	751	0	-	751	0.000	751	0	-	751	0.000	751	0	-	751
Note: Draft ICS work product - for discussion purposes only															

Appendix A- continued

External Control Area LOLEs with summer capacities, loads and resulting margins															
Area	Policy 5 adjustment method 1 (IRM=15.6%)					Policy 5 adjustment method 2 (IRM=15.4%)					Policy 5 adjustment method 4 (IRM=16.4%)				
	Annual LOLE	Summer Capacity (MW)	Adjusted Load (MW)	Reserve Level	Reserve Margin (MW)	Annual LOLE	Summer Capacity (MW)	Adjusted Load (MW)	Reserve Level	Reserve Margin (MW)	Annual LOLE	Summer Capacity (MW)	Adjusted Load (MW)	Reserve Level	Reserve Margin (MW)
_PJM_MA_	0.467	189,205	163,248	**115.9%**	25,956	0.398	189,205	163,248	**115.9%**	25,957	0.145	189,205	164,292	**115.2%**	24,913
ISONE	0.135	37,094	31,543	**117.6%**	5,552	0.108	37,094	31,711	**117.0%**	5,383	0.109	37,094	31,851	**116.5%**	5,243
IESO	0.639	31,588	26,838	**117.7%**	4,750	0.560	31,588	26,838	**117.7%**	4,750	0.551	31,588	26,838	**117.7%**	4,750
_HQ_	0.103	34,165	24,700	**138.3%**	9,464	0.103	34,165	25,942	**131.7%**	8,222	0.103	34,165	25,942	**131.7%**	8,222
_HQ_(winter)	-	41,866	41,510	**100.9%**	356	-	41,866	41,647	**100.5%**	218	-	41,866	41,647	**100.5%**	218
PJM Areas															
PJM_EAST	0.029	32,608	33,281	**98.0%**	-673	0.022	32,608	33,272	**98.0%**	-664	0.060	32,608	31,509	**103.5%**	1,099
PJM_CENT	0.000	36,888	25,057	**147.2%**	11,831	0.000	36,888	25,051	**147.3%**	11,837	0.000	36,888	27,909	**132.2%**	8,979
PJM_WEST	0.000	6,102	2,933	**208.0%**	3,169	0.000	6,102	2,932	**208.1%**	3,170	0.001	6,102	3,872	**157.6%**	2,230
PJM_SW	0.463	86,345	82,631	**104.5%**	3,714	0.396	86,345	82,609	**104.5%**	3,736	0.142	86,345	80,059	**107.9%**	6,286
DOMVEPC	0.001	27,262	19,952	**136.6%**	7,310	0.001	27,262	19,946	**136.7%**	7,316	0.004	27,262	21,506	**126.8%**	5,756
ISO-NE Areas															
BHE	0.000	1,156	361	**320.0%**	795	0.000	1,156	362	**319.2%**	794	0.000	1,156	658	**175.7%**	498
ME	0.130	1,009	1,133	**89.1%**	-124	0.103	1,009	1,137	**88.7%**	-128	0.108	1,009	955	**105.7%**	54
SME	0.000	1,600	815	**196.3%**	785	0.001	1,600	819	**195.5%**	782	0.004	1,600	1,059	**151.2%**	542
NH	0.002	4,401	2,369	**185.8%**	2,032	0.002	4,401	2,378	**185.1%**	2,023	0.007	4,401	2,970	**148.2%**	1,431
VT	0.126	769	1,445	**53.2%**	-676	0.098	769	1,451	**53.0%**	-682	0.107	769	1,169	**65.8%**	-400
BOSTON	0.131	4,059	6,612	**61.4%**	-2,553	0.103	4,059	6,637	**61.2%**	-2,577	0.108	4,059	5,348	**75.9%**	-1,288
CMA_NEMA	0.130	620	1,958	**31.7%**	-1,338	0.103	620	1,966	**31.5%**	-1,346	0.108	620	1,584	**39.1%**	-964
WMA	0.015	5,331	2,533	**210.4%**	2,797	0.001	5,331	2,543	**209.6%**	2,788	0.023	5,331	3,441	**154.9%**	1,890
SEMA	0.130	3,877	3,344	**115.9%**	533	0.102	3,877	3,357	**115.5%**	520	0.097	3,877	3,202	**121.1%**	675
RI	0.016	3,522	2,948	**119.5%**	574	0.011	3,522	2,959	**119.0%**	563	0.005	3,522	2,867	**122.8%**	655
CT	0.027	5,702	4,066	**140.2%**	1,636	0.017	5,702	4,081	**139.7%**	1,621	0.033	5,702	4,312	**132.2%**	1,390
SWCT	0.011	3,996	2,703	**147.8%**	1,292	0.007	3,996	2,713	**147.3%**	1,282	0.016	3,996	2,953	**135.3%**	1,042
NOR	0.126	301	1,507	**20.0%**	-1,206	0.098	301	1,513	**19.9%**	-1,212	0.108	301	1,219	**24.7%**	-918
LAKEROAD	0.000	751	0	-	751	0.000	751	0	-	751	0.000	751	318	-	433

Note:

Method 1 - adjust load by ratio of **existing load** and keep reserve margins no higher than published requirement (LOD-DATA table)

Method 2 - adjust load by ratio of **existing load** and keep reserve margins no higher than published requirement (MOD-MDMW table)

Method 4 - adjust load by ratio of **excess capacity** and keep reserve margins no higher than published requirement (MOD-MDMW table)

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Questions?

Questions or comments can be sent to Greg Drake:

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