New York ISO
Independent System Operator

Operating Reserves Modeled in the IRM Study

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Agenda

- Review current model
- Review results from test cases
- Recommendation
- Next steps

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Current Reserves Allocation

- Zone A: 345 MW
- Zone F: 463 MW
- Zone G: 259 MW
- Zone J: 358 MW
- Zone K: 540 MW
- All other zones are currently set to zero

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Re-allocating Reserves

- While reviewing 2021 FBC results, the NYISO identified that EOP activations were being triggered to address zonal deficiencies while reserve capacity was still available
- MARS withholds resource capacity based upon zonal reserve allocation input data, and releases it back to the model in EOP steps 3 and 8.
- In actual operation, reserves would be re-distributed dynamically based upon system needs and resource capabilities
- The ELR fixed injection model currently does not reflect the flexibility to increase output in response to reserve allocations
- NYISO performed a simulation, maintaining total reserve requirements but using an alternative zonal allocation which shifted to generator surplus zones
- This case resulted in a significant reduction in EOP activations while maintaining a 0.1 LOLE
- 5/5 ICS Presentation: https://www.nysrc.org/PDF/MeetingMaterial/ICSMeetingMaterial/ICS%20Agenda%20246/AI%209.5%20-%20Reserves%20in%20the%20IRM%20Study.pdf

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Case 1: LCR Base Case

- **All cases run off of the LCR Final case**
  - The EOP calls between IRM FBC and LCR cases are consistent
- **Distribution based on historic model:**

	Distribution		
	30 min	10 min	Total
A	235	110	345
B	0	0	0
C	0	0	0
D	0	0	0
E	0	0	0
F	0	463	463
G	0	259	259
H	0	0	0
I	0	0	0
J	0	358	358
K	420	120	540

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Case 1: LCR Base Case

- EOP Usage (days):

	LCR Base									
Step	1	2	3	4	5	6	7	8	9	10
JAN	16.85	12.79	12.57	4.27	3.40	3.39	3.39	0.00	0.00	0.00
FEB	23.18	20.71	20.39	8.30	7.09	7.08	7.08	0.00	0.00	0.00
MAR	12.58	10.16	9.64	1.89	1.52	1.52	1.52	0.00	0.00	0.00
APR	3.17	1.15	0.99	0.07	0.05	0.04	0.04	0.00	0.00	0.00
MAY	6.71	3.76	3.59	0.98	0.65	0.65	0.65	0.00	0.00	0.00
JUN	13.90	10.19	9.89	5.74	5.41	5.41	5.41	0.00	0.00	0.00
JUL	15.20	12.97	12.59	7.07	6.54	6.54	6.54	0.15	0.05	0.05
AUG	20.39	18.87	18.71	10.12	9.07	9.05	9.05	0.14	0.05	0.05
SEP	10.58	8.82	8.54	3.11	2.68	2.68	2.68	0.00	0.00	0.00
OCT	28.44	27.31	27.25	20.86	19.90	19.89	19.89	0.00	0.00	0.00
NOV	11.00	10.55	10.37	6.02	5.65	5.65	5.65	0.00	0.00	0.00
DEC	14.95	12.09	11.83	2.02	1.56	1.56	1.56	0.01	0.00	0.00
Total	176.96	149.37	146.38	70.46	63.54	63.46	63.46	0.29	0.10	0.10

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Case 2: Zero Reserves Case

	Distribution		
	30 min	10 min	Total
A	0	0	0
B	0	0	0
C	0	0	0
D	0	0	0
E	0	0	0
F	0	0	0
G	0	0	0
H	0	0	0
I	0	0	0
J	0	0	0
K	0	0	0

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Case 2: Zero Reserves Case

- EOP Usage (days):

	Zero Reserves									
Step	1	2	3	4	5	6	7	8	9	10
JAN	1.54	0.31	0.29	0.29	0.20	0.20	0.20	0.00	0.00	0.00
FEB	4.83	2.04	1.90	1.90	1.45	1.45	1.45	0.00	0.00	0.00
MAR	1.17	0.12	0.10	0.10	0.08	0.08	0.08	0.00	0.00	0.00
APR	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
MAY	0.23	0.04	0.04	0.04	0.03	0.03	0.03	0.00	0.00	0.00
JUN	4.97	2.49	2.45	2.45	2.07	2.07	2.07	0.00	0.00	0.00
JUL	6.28	4.24	4.16	4.16	3.88	3.88	3.87	0.06	0.06	0.06
AUG	8.83	6.47	6.35	6.35	5.86	5.85	5.85	0.06	0.06	0.06
SEP	3.30	1.38	1.34	1.34	1.22	1.22	1.22	0.00	0.00	0.00
OCT	18.24	15.49	15.28	15.28	14.35	14.35	14.35	0.00	0.00	0.00
NOV	6.52	4.11	3.99	3.99	3.61	3.56	3.56	0.00	0.00	0.00
DEC	1.09	0.53	0.48	0.48	0.40	0.40	0.40	0.00	0.00	0.00
Total	57.05	37.22	36.39	36.39	33.16	33.09	33.09	0.12	0.12	0.12

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Case 3: Model Reserves where Procured

- Procured reserves scaled down from the market requirement (>2600 MW) to the 1965 MW NYSRC requirement

	Distribution		
	30 min	10 min	Total
A	10.8	61	71.8
B	0	0.6	0.6
C	6.1	21.9	28
D	0	53	53
E	0	0	0
F	2.4	150.5	152.9
G	13.6	62	75.6
H	0	0	0
I	0	0	0
J	436	638.7	1074.7
K	186.1	322.3	508.4

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Case 3: Model Reserves where Procured

- EOP Usage (days):

	Reserves where Procured									
Step	1	2	3	4	5	6	7	8	9	10
JAN	3.55	1.34	1.25	1.18	0.97	0.97	0.97	0.00	0.00	0.00
FEB	8.26	5.00	4.72	4.44	3.67	3.58	3.58	0.00	0.00	0.00
MAR	2.51	0.50	0.39	0.30	0.20	0.20	0.20	0.00	0.00	0.00
APR	0.19	0.10	0.10	0.05	0.03	0.03	0.02	0.00	0.00	0.00
MAY	0.85	0.22	0.20	0.18	0.14	0.14	0.14	0.00	0.00	0.00
JUN	6.27	3.47	3.37	3.23	2.99	2.98	2.98	0.01	0.00	0.00
JUL	7.37	5.48	5.41	5.29	4.78	4.78	4.78	0.20	0.05	0.05
AUG	10.80	8.45	8.16	7.79	7.21	7.17	7.16	0.18	0.05	0.05
SEP	4.44	2.42	2.27	2.07	1.65	1.65	1.65	0.00	0.00	0.00
OCT	21.64	19.32	19.05	18.41	17.55	17.54	17.54	0.00	0.00	0.00
NOV	7.10	5.39	5.27	5.07	4.52	4.51	4.51	0.00	0.00	0.00
DEC	2.34	1.07	0.99	0.90	0.74	0.74	0.74	0.01	0.00	0.00
Total	75.31	52.76	51.16	48.90	44.45	44.30	44.29	0.40	0.10	0.10

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Case 4: Model based on EC Run

- Reserves from Zone A removed and split between Zones F and G:

	Distribution		
	30 min	10 min	Total
A	0	0	0
B	0	0	0
C	0	0	0
D	0	0	0
E	0	0	0
F	117.5	518	635.5
G	117.5	314	431.5
H	0	0	0
I	0	0	0
J	0	358	358
K	420	120	540

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Case 4: Model Based on EC Run

- **EOP Usage (days):**

	EC Run Distribution									
Step	1	2	3	4	5	6	7	8	9	10
JAN	1.54	0.31	0.29	0.29	0.20	0.20	0.20	0.00	0.00	0.00
FEB	4.83	2.04	1.90	1.90	1.45	1.45	1.45	0.00	0.00	0.00
MAR	1.21	0.12	0.11	0.11	0.08	0.08	0.08	0.00	0.00	0.00
APR	0.17	0.09	0.09	0.04	0.02	0.02	0.02	0.00	0.00	0.00
MAY	0.31	0.05	0.05	0.04	0.04	0.04	0.04	0.00	0.00	0.00
JUN	4.98	2.50	2.47	2.46	2.07	2.07	2.07	0.00	0.00	0.00
JUL	6.32	4.28	4.21	4.18	3.89	3.89	3.89	0.15	0.05	0.05
AUG	9.01	6.87	6.75	6.55	6.01	5.98	5.97	0.14	0.05	0.05
SEP	3.40	1.41	1.38	1.36	1.23	1.22	1.22	0.00	0.00	0.00
OCT	18.27	15.51	15.30	15.29	14.36	14.35	14.35	0.00	0.00	0.00
NOV	6.53	4.11	3.99	3.99	3.61	3.56	3.56	0.00	0.00	0.00
DEC	1.09	0.53	0.48	0.48	0.40	0.40	0.40	0.00	0.00	0.00
Total	57.66	37.84	37.00	36.68	33.36	33.25	33.24	0.29	0.10	0.10

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Results Summarized

- Final LCR Case had high EOP usage
  - Those inflated numbers are what spurred this study
- Zero Reserve case increased NYCA LOLE
- Both Cases 3 and 4 had negligible impacts on LOLE
- Case 4 resulted in most reasonable EOP usage
- Both Cases 3 and 4 are supported by Operations

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Recommendation

- Based on the results discussed today, the NYISO recommends using Case 3, modeling reserves based on how they are procured in the NYISO market, for the upcoming 2021 IRM study

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Next Steps

- Implement the case that ICS advises to use
- Report results as part of the Parametric Study

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Questions?

Questions or comments can be sent to IRM@nyiso.com

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- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policymakers, stakeholders and investors in the power system

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