Amendment to Remove RER from the ISO-NE ESI Proposal

NEPOOL Markets Committee

March 11, 2020

AGO proposes to remove RER from the ESI Design

Purpose: This amendment eliminates RER.

Method: Strike all language on RER-90 & RER-240.

RER should be removed from ESI design.

- RER not needed to comply with NPCC reliability standards.
- ISO-NE has not demonstrated that RER improves system reliability.
  - Impact analysis suggests RER not needed in the future.
  - RER rarely, if ever, would have been needed in the past.
- Link between RER & fuel security is weak
  - System is generally more reliability in winter than summer.
  - Reserve deficiencies are negligibly higher during periods with high NG prices.
- Removing RER saves customers $52-$153 million each year.
- Removing RER does not disrupt other ESI components.

RER not required to comply with NPCC reliability requirements

- NPCC Directory 5 was updated on September 27, 2019, clarifying *existing* requirements. Some textual changes, but no fundamental shift in requirements or obligations.
  - No change to Ten-Minute or Thirty-Minute Reserve restoration requirements.
  - No change in possible methods to mitigate a Reserve Deficiency.
- New England has maintained reliability since 2012 with existing mitigation approaches.
  - Since 2012, NPCC has offered seven methods to mitigate Ten-Minute Reserve deficiencies and five methods to mitigate Thirty-Minute Reserve deficiencies.
- As underlying NPCC requirements and restoration methods have remained the same since 2012, it is unclear why RER90 / RER240 are *now* required for reliability.
  - Extra-commitments, *a la* RER, are permissible, but not obligatory.
  - Existing operator actions are sufficient.

Comparison of NPCC language provided in Appendix 1.

RER has not been shown to improve system reliability

- Impact Analysis suggests that ESI is not necessary for reliability.
  - Adding ESI increases fuel availability; but **fuel availability ≠ reliability.** [1]
- Review of historic reserve deficiencies suggests that threat is overstated – especially in the context of winter fuel security.
- ESI without RER still offers a middle ground between no change to rules and the full ESI design.
  - Adding ESI reduces system tightness but has little effect on reliability.
  - Removing RER *does* lead to a tighter system, compared to full ESI, but a system which is still reliable. [2]

[1] Impact Analysis Draft Report Appendix II, Section E (rev1)
[2] See MA AGO Markets Presentation, February 2020, Slides 7-8.

Impact Analysis suggests that RER is not needed to run a reliable system in the future

- Analysis Group simulated 116,640 hours of winter operation and 39,600 hours of non-winter operation – under variety of configurations. [1]
  - Across all scenarios, model results indicate 3 hours of winter scarcity under current market rules ("CMR") and no scarcity in non-winter months (0.0026% in winter hours; 0% non-winter).
    - Well below past frequency, indicating that the CMR would comply with existing requirements. (*see following slides*)
    - 3 hours occur only in the Frequent Winter in the "Shock HQ 5 Days" scenario.
  - Under ESI, model results indicated no scarcity, with or without RER.
- Results imply that ESI *may help* maintain reliable system operation, but that it is not strictly necessary. RER even less useful.

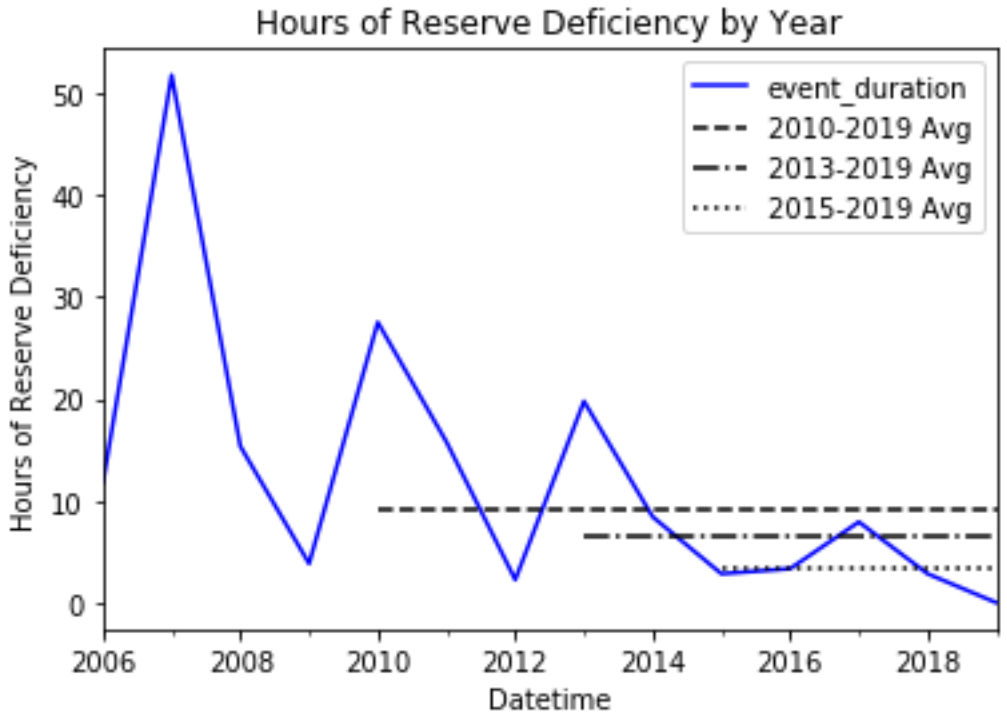
Caveat: Impact Analysis is an *economic* model not a *reliability* model, but it *does* model scarcity, and it's the only modeling we have.

[1] Impact Analysis Draft Report Appendix II, Section E (rev1)

Reserve Deficiencies are Uncommon, so the Need for Reserve Restoration Production is Low.

- Based on AGO analysis of past reserve deficiencies, we observe that the system is getting more reliable on an annual basis. [1]
  - Frequency and depth of deficiencies has decreased over time.
  - Significant improvements from other market changes (e.g., EMOF, Dec 2014)

Period	Avg. Annual Shortage Hours	Avg. Shortage as % Year	Shortage Depth (MW)
2010-19	9.06	0.1%	280 MW
2013-19	6.44	0.07%	370 MW
2015-19	3.38	0.04%	183 MW



Metric: sum of all periods with 10- or 30-minute reserve deficiencies at local or system level.
More expansive than last month's metric.

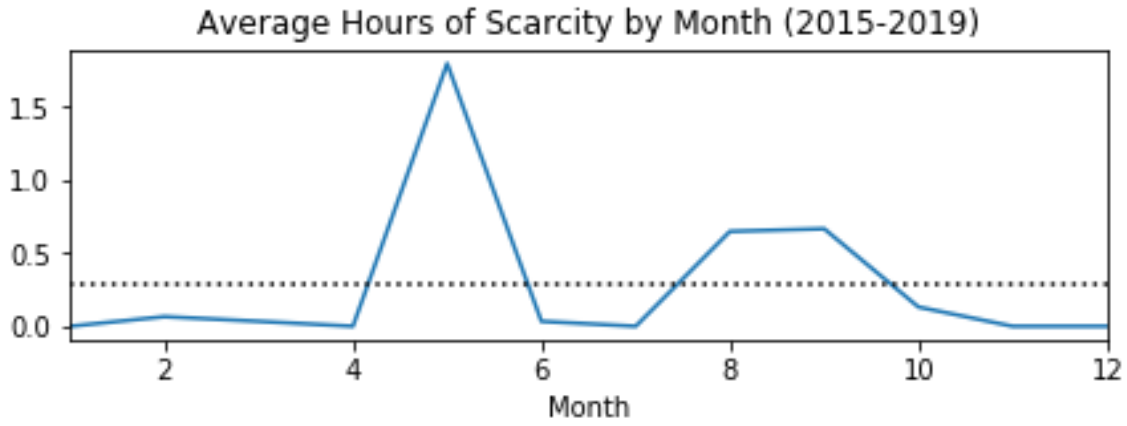
[1] https://www.iso-ne.com/static-assets/documents/2017/01/rcpf_activation_data_2006_10_thru_present.zip

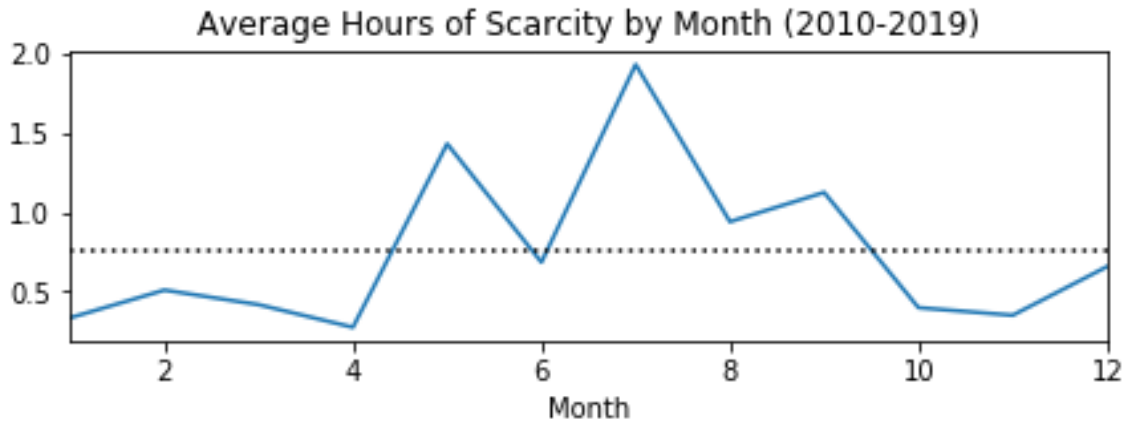
Link between RER & Fuel Security is Weak

- Impact Analysis suggests no reliability need for RER going forward.
- Historical periods of reserve deficiency suggest:
  - Winter is *more reliable* than summer.
  - Gas prices have little to do with frequency of reserve deficiency.
- Past experience and prospective modeling indicate weak linkage between scarcity, fuel availability, and winter operation.
- RER may help fuel security, because it inflates ESI procurement quantities, which may increase fuel inventories. No demonstrated link between that increased fuel and improved reliability.
- RER *may* provide other reliability benefits, but does not appear to be particularly responsive to underlying FERC directive.

Historically, reserve shortages are less common in winter months, belying fuel-security justification for RER.

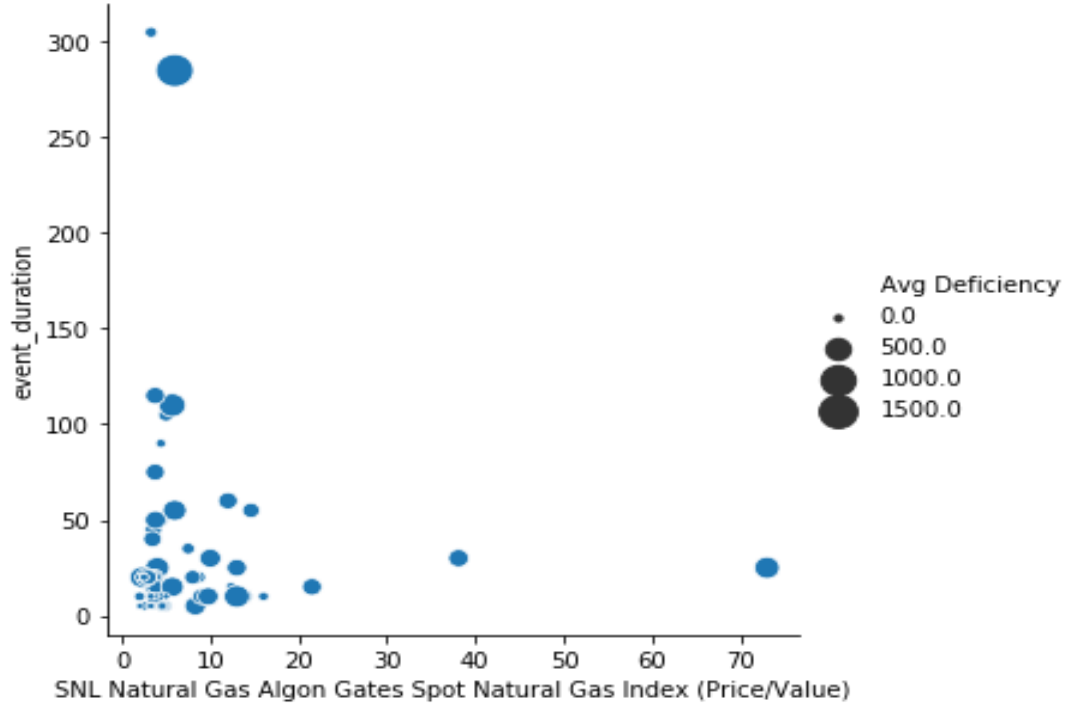
- Reserve shortages are more common in the summer and less common in the winter
- Between 2015-2019,
  - just 20 minutes of reserve deficiency during winter months.
  - duration of reserve shortages in winter months were 92% lower than the annual average.
  - duration of reserve shortages in winter months were 96% lower than June-Sept averages.
- Between 2010-2019,
  - duration of reserve shortages in winter months were 33% lower than the annual average.
  - duration of reserve shortages in winter months were 90% lower than June-Sept averages.





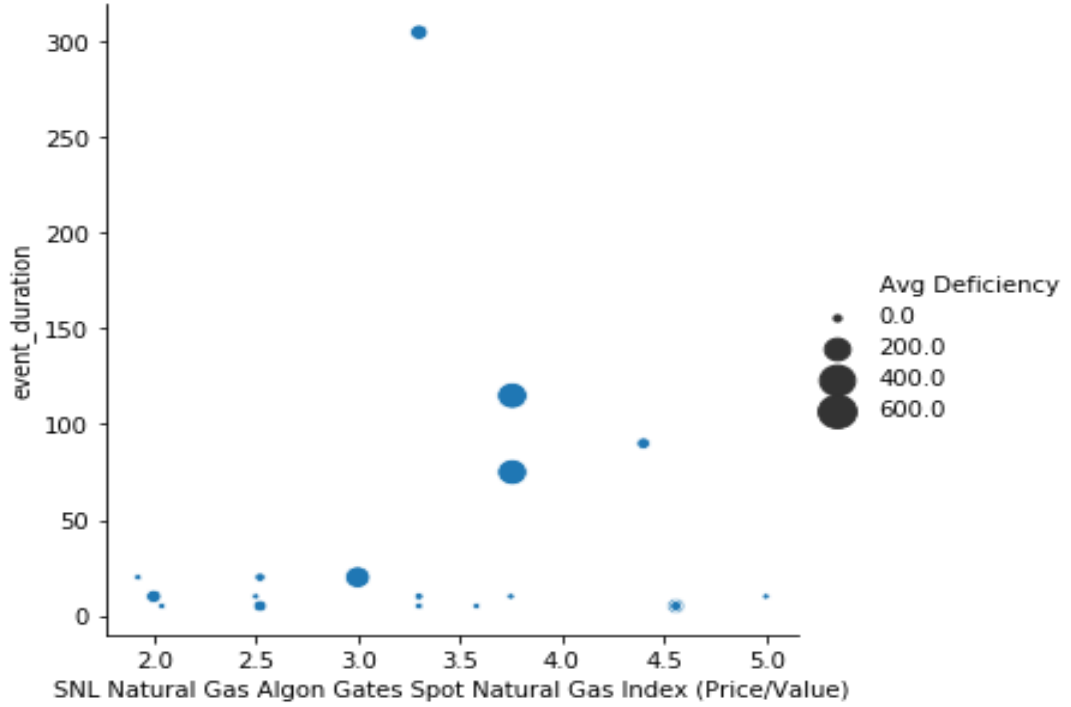
Reserve deficiencies don't appear particularly related to periods with high gas prices.

Deficiencies by Gas Price (2013-2019)



In 2013-19, there were 58 days with AGT prices above $20/MMBtu and 70 minutes of deficiency on these days (RER valuable 0.08% of time – a little higher than the overall 2013-2019 average)

Deficiencies by Gas Price (2015-2019)



Over this period there were 15 days with AGT prices above $20/MMBtu and zero minutes of deficiency at these prices (RER value 0% of time)

Deep Dive on Periods of Reserve Deficiency

- Using ISO-NE data on reserve deficiencies, we calculate hours of scarcity by month [1].
- Marked reduction in duration of deficiencies since December 2014.
  - Perhaps related to Energy Market Offer Flexibility project, which came online December 2014.
- Only 20 minutes of deficiency in winter months since December 2014 (16.92 hours overall).
- No deficiency during the 2017/18 “bomb cyclone” winter
- System had no scarcity during the worst portion of the 2014/15 winter
  - Dec 2014, with 2 hours of deficiency, was relatively mild.
- Winter of 2013/14 “polar vortex” had 6.25 hours of deficiency…
  - …but system performed best in January, when the polar vortex was at its worst.

Hours of Reserve Deficiency by Month & Year

Month / Year	1	2	3	4	5	6	7	8	9	10	11	12
2007	1.75	0.5	0	5.83	11.17	3	0	3.58	17.25	4.5	2.67	1.5
2008	0.25	3.75	1.25	2.5	1.5	1.42	0	0	0	0	1.58	3.08
2009	0.83	0	0	0	0	0.58	0	0.5	0	1.17	0.75	0
2010	0	1.25	2	0.83	4.67	4.92	4.08	4.83	2.92	0.33	1.08	0.58
2011	0.17	1.42	1.17	1.83	0.33	0.17	7.92	0	1.33	0	0.58	0.83
2012	0.75	0	0	0	0.33	0	0.67	0	0	0.33	0.17	0
2013	1.17	0.17	0.33	0	0	1.17	6.67	1	2.17	2.33	1.67	3.08
2014	1.25	1.92	0.5	0.08	0	0.42	0	0.33	1.5	0.33	0	2.08
2015	0	0	0	0	2	0.17	0	0	0.67	0	0	0
2016	0	0	0	0	0	0	0	3.25	0	0.08	0	0
2017	0	0.33	0	0	7	0	0	0	0	0.58	0	0
2018	0	0	0.17	0	0	0	0	0	2.67	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0	0

[1] https://www.iso-ne.com/static-assets/documents/2017/01/rcpf_activation_data_2006_10_thru_present.zip

Removing RER saves $50-142mm/year without affecting system reliability.

- RER is estimated to cost $50-142 million annually [1]
  - Estimates do not include incremental savings associated with avoiding load forecast error or supply uncertainty costs.
- RER offers poor value for money.
  - The cost of RER per MWh of deficiency can be calculated using historic and prospective data on annual RER cost, frequency of reserve deficiencies, and depth of need.
  - RER cost per MWh of scarcity ranges from $20k/MWh to $5.1mm/MWh
    - Well above most estimates of the value of lost load (VOLL).

		Reserve Def.		Cost per MWh	
Period	**Hours**	**Depth (MW)**	**MWh**	**Low RER**	**High RER**
2010-2019	9.06	280	2536	19,714	55,988
2015-2019	3.38	183	619	80,740	229,302
Prospective	3.00	500	1500	33,333	94,667
Prospective	0.06	500	28	1,800,000	5,112,000

Historic Hours & Depth from [2].

Prospective hours from Impact Analysis (3 = Max; 0.06 = avg. across scenarios). Impact Analysis does not note deficiency depth; 500 MW assumed.

[1] Impact Analysis Draft Report, Appendix, Tables 23,25,27-29.
[2] https://www.iso-ne.com/static-assets/documents/2017/01/rcpf_activation_data_2006_10_thru_present.zip

Questions?

NPCC Directory 5 Language

Comparison of October 11, 2012 and September 27, 2019 Versions

NPCC: Restoration of Ten-Minute Reserve

October 11, 2012 (Section 5.2: Restoration of Ten-Minute Reserve)

"If a Balancing Authority becomes deficient in ten-minute reserve or forecasts a deficiency without counting the contribution of either curtailment of interruptible loads that is not part of normal operations, and/or public appeals:

5.2.1 It shall restore its ten-minute reserve as soon as possible and within the duration specified by the appropriate NERC standard"*

September 19, 2019 (R1: Ten-Minute Reserve Requirements)

"If a Balancing Authority becomes deficient in ten-minute reserve or forecasts a deficiency, it shall restore its ten-minute reserve as soon as possible and within the duration specified in the appropriate NERC standard"*.

***NERC BAL-002-2** provides 90 minutes as the Contingency Reserve Restoration Period.

Note: actions to mitigate Ten-Minute Reserve shortages are the same in both versions of Directory 5 (Cf. Appendix B, Section 3.1 (Sep 19, 2019) and Appendix 3, Section 3.1 (October 11, 2012)).

NPCC: Restoration of Thirty-Minute Reserve

October 11, 2012 (Section 5.4: Restoration of Thirty-Minute Reserve)

> "If a Balancing Authority is deficient in thirty-minute reserve for four hours, or if it forecasts a deficiency of any duration beyond a four hour horizon, refer to Appendix 3, Sections 3.6 and 3.7 for guidance on the restoration of thirty-minute reserve."

September 19, 2019 (R2: Thirty-Minute Reserve Requirements)

> "A Balancing Authority deficient in thirty-minute reserve for four hours, or forecasting a deficiency of any duration beyond a four hour horizon, shall eliminate the deficiency if possible, or minimize the magnitude and duration of the deficiency."

Note: actions to mitigate Thirty-Minute Reserve shortages are the same in both versions of Directory 5 (Cf. Appendix B, Section 4.1 (Sep 19, 2019) and Appendix 3, Section 3.6 (October 11, 2012)).

NPCC: Actions to Mitigate Reserve Shortages

- Mitigation Strategies outlined in 2012 and in 2019 are virtually identical. 2019 update to Directory 5 clarifies that:
  - Energy Purchases between BAs are optional.
  - Firm load may not be counted towards Reserve requirements

- NPCC Directory 5 Appendix B Section 3 (Sept 2019) offers seven methods to mitigate Ten-Minute Reserve Deficiencies including:
  - Commit sufficient off-line supply-side resources to create additional ten-minute reserve within the restoration period.
  - Recall exports, recall planned generator outages
  - Count interruptible customer load, count voltage reduction
  - Consider the use of Public Appeals.

- NPCC Directory 5 Appendix B Section 4 (Sept 2019) offers five methods to mitigate Thirty-Minute Reserve Deficiencies including:
  - Obtain additional resources from outside the Balancing Authority
  - Recall planned generator outages, recall exports
  - Count interruptible customer load, count voltage reduction