2021-2022 IRM Study

Issue Resolution: Study Year Issue

March 24, 2020

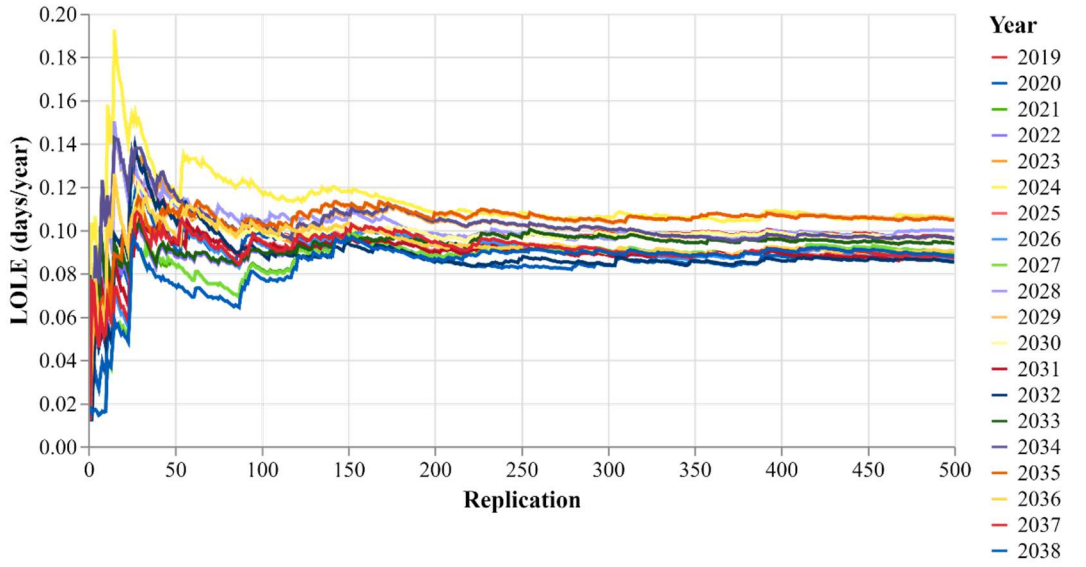
Summary:

During the 2020 IRM study, the NYISO found unexpected volatility when changing the "simulation year" parameter within the GE MARS program. It resulted in a large change in the IRM when running through the parametric study. When this behavior was observed, NYISO reviewed the unexpected results with the Installed Capacity Subcommittee (ICS) and subsequently contacted GE to look into the issue. GE recommended holding the parameter constant in MARS until there was more investigation done on the issue. GE then released a new MARS version with enhanced "simulation year" software options. One of those options allows the "simulation year" to be updated while simultaneously holding the starting weekday of the study (*e.g.,* Monday, Tuesday, Wednesday) constant. Prior to this enhancement, changing the starting weekday of the study resulted in a changing load and intermittent shape profile.

After testing this functionality, the NYISO confirmed that it works as designed. However, volatility when changing the simulation year still remains, but it is muted somewhat. The differing results most likely can be attributed to the other factors that vary when the "simulation year" changes, which were not addressed in the updated version of MARS. These include the underlying profiles of generators and transmission lines such as maintenance, outages and other derates. During this testing, the isolated New York system was also evaluated in an attempt to eliminate the compounding effect of the external systems experiencing the same volatility from the analysis.

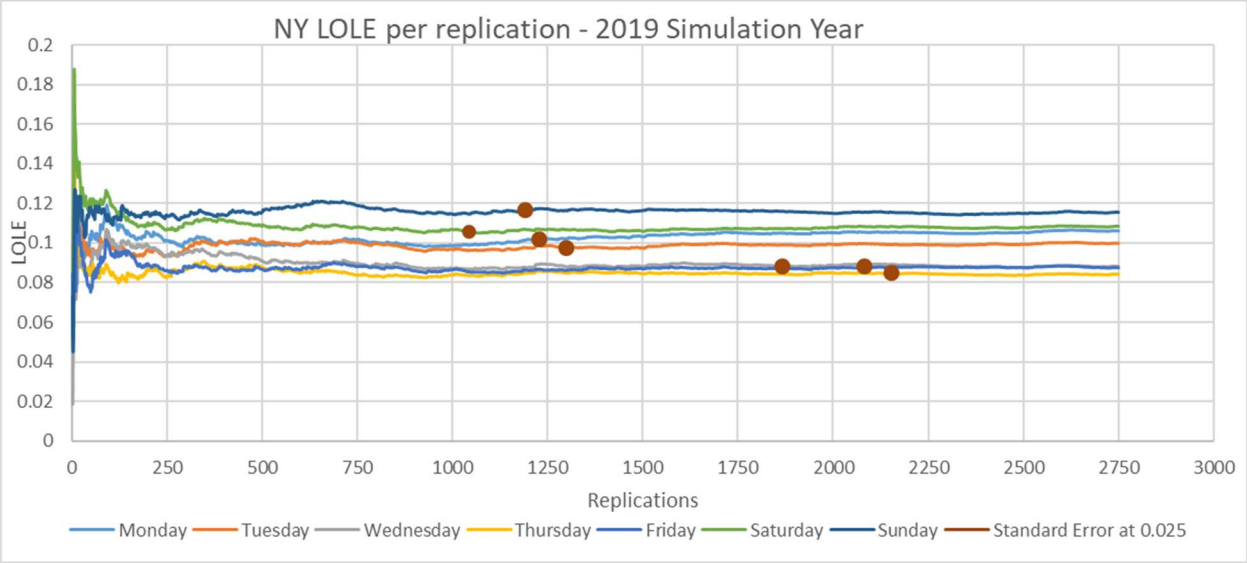
Results:

When GE initially looked into this issue, they produced the following graph showing the year-over-year change when multiple functionalities are turned off. Those functionalities include: (1) No Forced outages in interfaces, (2) No fixed or scheduled maintenance, (3) no Energy limited 1 or 2 units, (4) no thermal derates, (5) fixed values for load modifier units, (6) no units that depend on shapes, and (7) fixed single values for EOP data. With all of these turned off and the Master Input File (MIF) simplified, changing the simulation year produced less Loss of Load Expectation (LOLE) variability, but variability was not eliminated.

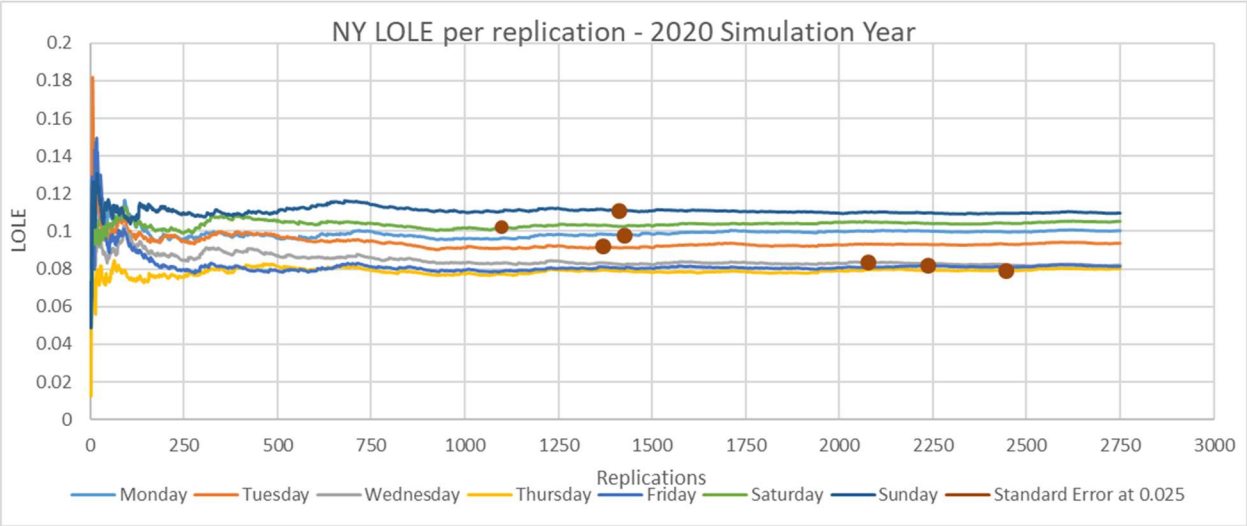


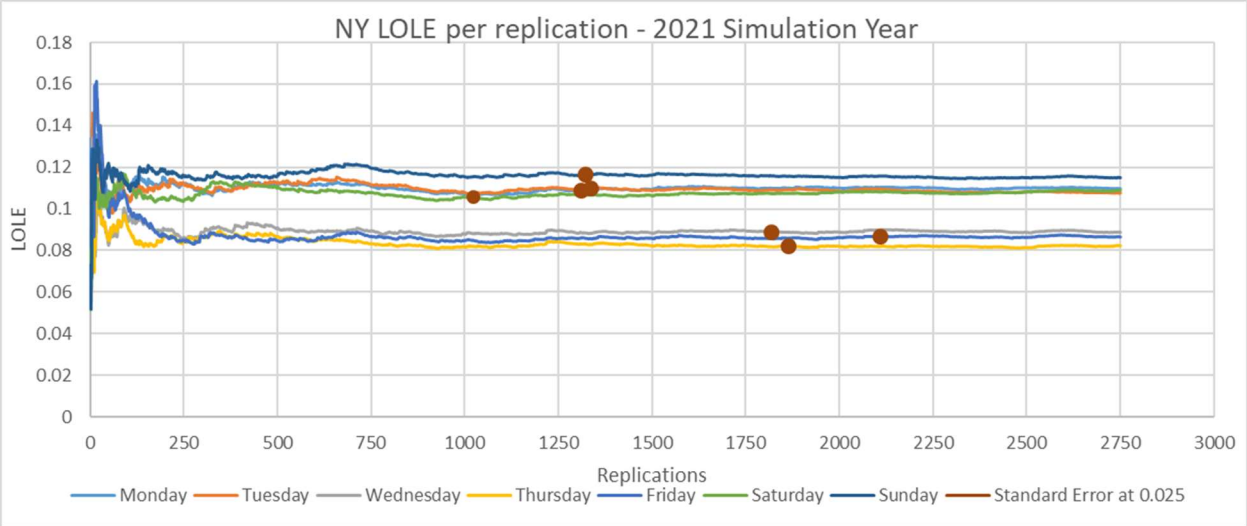
While the results stay close to the LOLE criteria of 0.1, these modifications turn off too much functionality to be a feasible option.[1] Thus, the NYISO does not recommend this approach.

Alternatively, the NYISO examined holding the load and intermittent shapes constant. Controlling the start day, effectively controls the load and intermittent shape inputs. Through this testing, we found that changing the day of the week has an impact on the resulting LOLE. We tested every day of the week for each 2019, 2020, and 2021 and saw the following variations.



[1] For example, the NYSRC IRM study relies upon much of this modeling functionality to determine the IRM, including both fixed and scheduled maintenance.





LOLE Results with interconnected system using the MARS functionality:

Day	2019 LOLE	2020 LOLE	2021 LOLE
Monday	0.10607	0.1003	0.10973
Tuesday	0.09985	0.09362	0.10758
Wednesday	0.0882	0.08198	0.08876
Thursday	0.08422	0.08005	0.08226
Friday	0.08745	0.08135	0.08651
Saturday	0.10842	0.10531	0.10884
Sunday	0.11549	0.10963	0.115

LOLE Results with Isolated New York System using the MARS functionality:

Day	2019 LOLE	2020 LOLE	2021 LOLE
Monday	1.0856	1.08916	1.47789
Tuesday	1.10473	1.10499	3.2518
Wednesday	1.13468	1.13459	1.13231
Thursday	1.16215	1.19175	1.16701
Friday	1.13442	1.14137	1.13663
Saturday	1.17916	1.18912	1.18748
Sunday	1.19264	1.20206	1.19957

The results with an isolated New York System demonstrate that interconnection of the system with external control areas does not really mitigate the impacts of the changing profiles. After seeing the various results, it is clear that there are many moving parts in the MARS model affecting these results, and the NYISO recommends adopting a change to minimize the impact.

Conclusions:

While there does not appear to be a way to completely eliminate the volatility when changing the simulation year, there are a few options available to mitigate the level of volatility. First, the ICS could choose a single simulation year until another option is available. Another option would be holding the start day of the year constant while still changing the simulation year. Based on the testing done, it is recommended that we update the simulation year to 2021 (the traditional IRM Study process before the LOLE variability was identified in the 2020 IRM study) and we fix the weekday of the study at its 2020 IRM Study (*i.e.,* Tuesday) to minimize unexpected LOLE variability in the 2021-2022 IRM Study.