

To: ISO-NE CAR-SA Team; NEPOOL Markets Committee

CC: NESCOE

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Executive Summary

Advanced Energy United (“United”) proposes shifting ISO-NE’s Winter Storage Heuristic from a 24-hour to a 16-hour baseline, so 16-hour storage receives 100% rMRI and shorter-duration resources are scaled accordingly (analogous to FlatIron’s amendment). The proposal addresses United’s longstanding concern that GE MARS understates the energy realistically available to recharge storage between reliability events, which can undervalue storage’s contribution to system reliability. The 16-hour approach is responsive to ISO’s latest design, straightforward to implement, broadly consistent with existing EL3 treatment, and expected to produce results similar to United’s prior EL3 amendment (which is now retired). United also recommends that the heuristic remain in place until ISO resolves the underlying modeling limitations affecting charging-energy availability.

Background

Throughout the CAR-SA design process, United in collaboration with our consultants Power Advisory, has offered amendments to address evident deficiencies in the ISO’s modeling of energy storage. These amendments share a common objective of addressing the model’s failure to fully capture energy available to recharge storage between periods of system stress. As we approach a critical stage in finalizing the design, the outcomes of the proposed accreditation must reflect resources’ actual reliability contributions unencumbered by modeling constraints. While the ISO’s latest Winter Storage Heuristic Adjustment implicitly recognizes that storage has been undervalued in previous design iterations and is partially responsive to United and other stakeholder feedback, we remain concerned that storage is being undervalued in the winter. We fully support ISO’s MRI approach to accreditation, but that is predicated on the inputs and modeling assumptions used to determine MRI values capture real-world charging opportunities for storage and accurately reflect the reliability value it offers to the system. The impact of ISO’s current proposal is less storage will be built, the system will be overbuilt and leave the system excessively long on capacity, and the additional capacity procured will apply upward pressure on rates for consumers.

Storage accreditation depends heavily on whether the model allows batteries to replenish their state of charge between periods of system stress, and we believe GE MARS understates the

energy realistically available for charging from energy-limited resources, imports, very long-duration resources, and other off-peak energy. Our intertie amendment addressed one part of this problem by proposing to preserve the underlying hourly import profile rather than flattening imports into a capacity block, better reflecting off-peak and overnight energy that could be available to charge storage. We dropped this amendment due to feedback from the ISO that reflecting this in the model pre-filing would be a significant undertaking. Our last EL3 amendment addressed another part by using EL3 treatment as a proxy for charging energy the model cannot otherwise represent, allowing storage to replenish without relying solely on modeled surplus grid energy. These amendments, and our current proposal, all respond to the same underlying concern, which is that the model is too restrictive in representing the energy available to recharge storage between reliability events.

In response to United and other stakeholder feedback, ISO-NE came to the Markets Committee in August with a new proposal to implement a Winter Storage Heuristic, which expressly recognizes the modeled storage curve requires adjustment. Given that development, working through ISO's existing heuristic is cleaner than creating a separate EL3 proxy for storage. **Our proposal, unpacked in this memo, is simply to shift the winter storage heuristic from a 24-hour to a 16-hour baseline, so 16-hour storage receives 100% rMRI and shorter-duration storage is scaled up accordingly.**

The 16-hour heuristic approach is responsive to ISO's latest design, straightforward to implement, and a much better-known quantity, because ISO has already produced the underlying duration/rMRI results. It also produces approximately the same storage accreditation outcome we were seeking through the EL3 amendment. The latest estimates put a 4-hour battery at roughly 30% rMRI under either approach. The 16-hours heuristic proposal also has a logical connection to existing EL3 resource treatment under the current EL3 heuristic, since ISO assumes an EL3 resource that can replenish its fuel inventory within 16 hours receives essentially no material energy-related derate. Given ISO's latest proposal, the 16-hour heuristic proposal is now the simplest, most administrable, and most directly responsive way to address that concern within ISO's own framework.

16-Hour Heuristic Proposal

ISO-NE's proposed storage heuristic applies to the winter rMRI and adjusts rMRI such that a 24-hour energy storage unit receives an rMRI of 100% (excluding the impact of EFORD). In essence, the heuristic is that the unit's unadjusted rMRI is divided by 73% to get to the adjusted column (Transition Adjustment). For all resources with greater than 24 hours storage, the rMRI is capped at 100%.



Duration (Hrs)	Unadjusted Winter	July Proposed Adjustment	Transition Adjustment
2	9%	11%	13%
4	19%	22%	26%
8	36%	43%	50%
12	51%	60%	70%
16	60%	71%	83%
20	67%	79%	92%
24	73%	86%	100%
32	79%	93%	100%
48	84%	99%	100%
60	84%	100%	100%

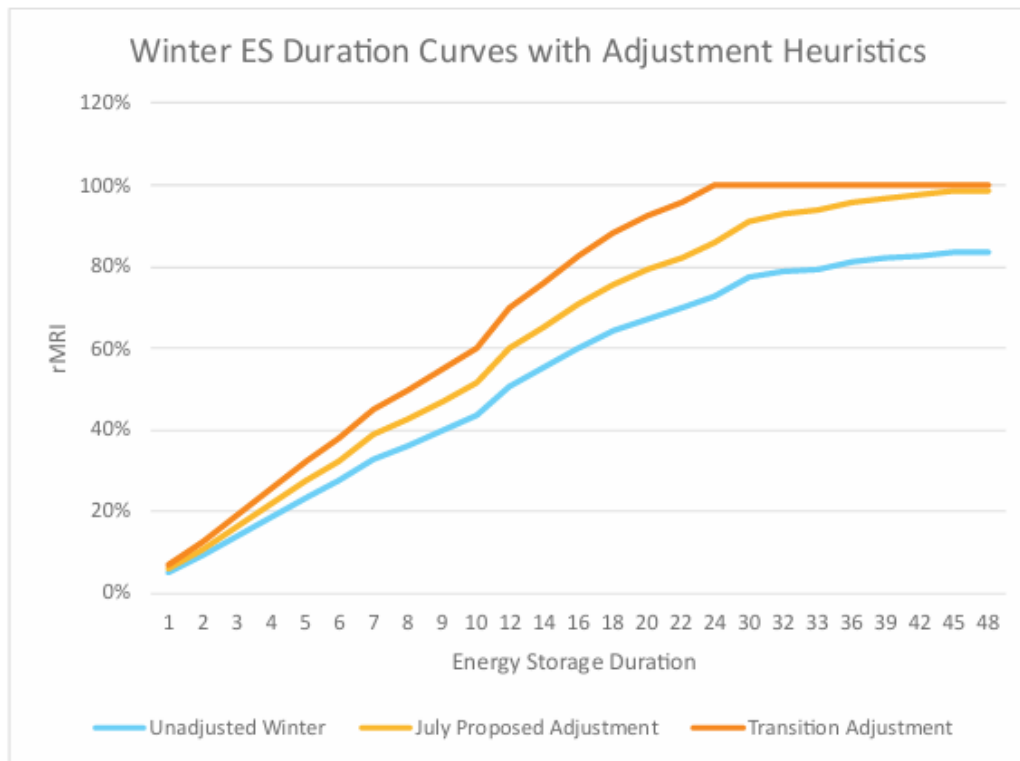
In theory, the ISO's heuristic could be applied to a different duration such as 16 hours, which is the same duration that results in no de-rate for the energy limited thermal resource heuristic (EL3). ISO appears to be testing whether eliminating the Type 3-hour modeling constraint supports replacing the existing EL3 heuristic with a duration-based adjustment similar to the one it has proposed for storage.

EL3 rMRI

Duration (Hour)	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24
rMRI(s)	0.272	0.373	0.509	0.645	0.757	0.840	0.917	0.965	0.982	0.988	0.988	0.988	0.988	0.988	0.988	0.988	0.988
rMRI(w)	0.124	0.193	0.253	0.330	0.391	0.443	0.525	0.583	0.639	0.686	0.728	0.794	0.836	0.847	0.847	0.850	0.850

We understand ISO's concern to be that if a duration such as 16 hours was used as the 'base' for storage adjustments, storage would see a higher rMRI than a similar EL3 resource in some cases. In other words, a 4-hour battery would have an rMRI of 0.31 if a 16-hour standard is used (~ equal to 19% / 60%), whereas an EL3 asset with 4 hours of energy would have an rMRI of about 0.3 (~ equal to 25% / 83.6%). This is contrary to the ISO's general result that an EL3 resource has a better rMRI than an equivalent duration ES resource because it is assumed to fully recharge daily with no reliance on surplus energy from the electricity grid.





It should not be a concern that a 4-hour ES resource has a higher accreditation than a 4-hour EL3 resource. This is realistic because the ES resource can charge or partially charge midday on some portion of events and is therefore more valuable than a 4-hour EL3 resource that is limited to a daily ‘refill’. It is largely an academic concern because ISO has indicated EL3 resources are generally longer duration than existing ES resources (our understanding is the typical EL3 resource is 12 to 16 hours).

Proposal: support using a 16-hour heuristic adjustment rather than ISO’s proposed 24-hour baseline. The rationale is that the rMRI is expected to be very similar to our previous amendment for EL3 (about 0.3 for both cases for a 4-hour BESS). The 16-hour heuristic also has the advantage of being a ‘known quantity’ given the ISO has already produced sufficient information to very confidently know the impact.

It should also be noted that the rationale for both the EL3 approach and the 16-hour heuristic proposal will be informed by the sensitivity results that are forthcoming. The sensitivities materially increase off-peak energy availability and effectively mimic the elimination of type 3 hours in the model. If the rMRI for storage approximates the values from the 16-hour heuristic in these runs, as expected, the rationale for 16 hours rather than 24 hours as the heuristic baseline is better supported. In effect, we are trying to identify the storage rMRI in a world where there are very few charging constraints between events, and we want to test whether the 16-hour heuristic is a reasonable approximation.



In addition, solar and DR, in particular, are impacted by the type 3 hour issue but the ISO does not propose any equivalent adjustment for these resources. Given that the majority of type 3 hours occur in the overnight period, solar and DR rMRIs should improve in the sensitivities. To the extent this expectation turns out to be accurate, equivalent heuristics for these resources should be developed to address the modeling shortfall. This is a sub-issue we are still assessing and have not yet finalized a position on.

Finally, the heuristic should not be time-limited. Rather, the adjustment should continue to apply so long as ISO has not addressed the underlying modeling concerns and accurately reflected energy availability from EL3 resources and the interties. Under ISO's proposal, this heuristic is set to expire with the transition. As storage penetration grows, accurately modeling available energy becomes increasingly important, and the disconnect between the 'true' capacity value of storage and the model result could grow. A time-limited heuristic overlooks that the adjustment is intended to correct an underlying modeling shortcoming, not merely smooth differences during the transition.

