

CAR-SA

Advanced Energy United Conceptual Amendments

June 2026



Summary of Amendments

- **Amendment 1—Weather Year Weighting Adjustment:** ISO's weather-year weighting proposal may overstate the frequency of sustained winter cold snaps that drive storage derating.
- **Conceptual Amendment:** ISO should replace peak-day weighting of tail events with multi-day event metrics that capture the duration of consecutive days, which better represent winter cold-snaps.
- **Amendment 2—Intertie Modeling:** ISO's proposed flat import-capacity block may understate the timing of import deliveries that support critical storage charging.
- **Conceptual Amendment:** ISO should use neighboring system operators load shapes capturing hourly import profiles for the intertie that reflect when energy is actually available and likely to be delivered.
- **(*New) Amendment 3—Storage Charging Adjustment:** ISO's proposed adjustment improves storage accreditation but likely still understates its rMRI since it overlooks charging energy during multi-day events.
- **Conceptual Amendment:** ISO should treat storage resources as energy-limited resources (EL3), removing Type 3 hours, until the model can fully capture realistic off-peak charging opportunities and state-of-charge impacts.

Why We Are Bringing Amendments

- ISO-NE's seasonal accreditation reforms will shape whether the capacity market sends an appropriate investment signal for flexible resources like storage and DR.
- The capacity market can only send efficient investment signals and spur the build out of flexible resources if capacity accreditation fairly values resources. ISO's proposal may fail to support efficient investment, steer new resource entry away from New England, and raise concerns over resource adequacy, clean energy targets, and affordability.
- **Accreditation should measure expected reliability contribution under realistic system conditions that reflects real-world operations, behaviors, and inputs.**

Amendment 1:

Weather Year Weighting Adjustment

Amendment 1: Weather Year Weighting Adjustment

- **Key point—ISO’s proposal overlooks timing and duration of events, which matters for weighting:** For weighting weather years, the ISO proposes to use full historical profiles based on their contribution to the *high daily peak-load distribution*, rather than based on the *frequency of the multi-day cold-snap blocks* within those years. Peak load days are only a single dimension of many that influence adequacy and accreditation, so using that alone leads to a misleading weighting for selecting winter weather in the context of how it impacts resource adequacy. The *timing and duration* of those extreme cold days matter at least as much if not more.
- **ISO’s approach likely over-states winter risk:** ISO proposes to weigh the 2003/2004 weather year as a 2.71% probability, and that year accounts for a significant portion of overall EUE (which drives MRI values). Yet, as FirstLight demonstrates, the probability of a *multi-day* (e.g. 5 days) cold weather event in that year is far less than 2.71%, suggesting ISO’s proposal overweighs that year.
- **Result of ISO’s proposal—storage disproportionately penalized:** Energy storage in particular will be undervalued if the model improperly assumes more frequent/severe long-duration reliability events than is realistic. The more severe or frequent the extended cold-snap, the fewer opportunities storage has to charge, making storage less available during MRI hours and lowering its MRIC value.

Amendment 1: Weather Year Weighting Adjustment

- **Conceptual amendment:** ISO should adjust its weather year weighting according to how frequently *multi-day events* occur, not based on distributions of peak load days (which may be isolated/spread apart). Capturing the temporal/durational component of cold days in weather year weighting is a crucial input to a fair and accurate weighting since in winter, the primary driver of EUE (and MRIC values) is during multi-day cold-snaps.
- FirstLight's proposal for the 5 coldest 5-day cold blocks seems reasonable, but United is open to any metric that better captures the temporal and durational elements of the cold weather events.

Amendment 2:

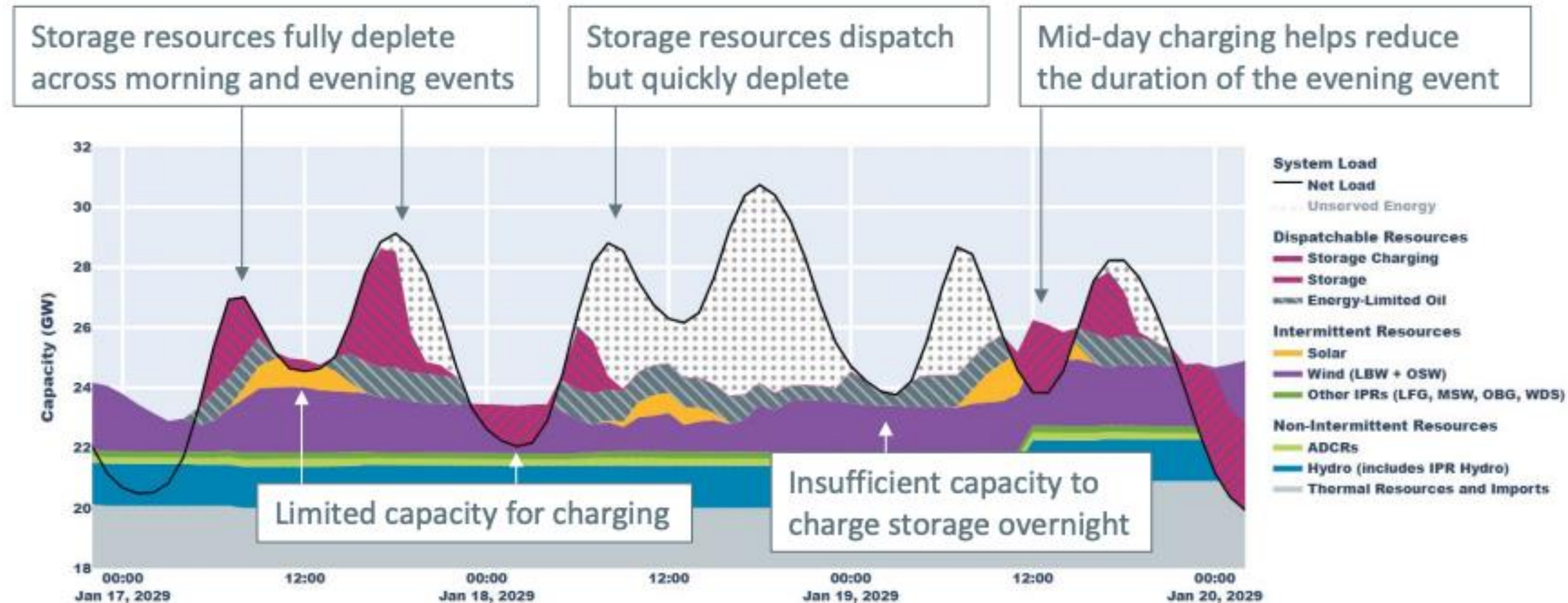
Intertie Modeling

Amendment 2: Intertie Modeling

- **ISO's modeled ties underestimate charging opportunities for storage:** The proposed flat block of capacity overlooks the empirical profile of those ties, i.e. when energy from that tie is actually being delivered, which is often overnight and critically during Type 3 MRI hours, which would allow storage to recharge.
- Firm capacity (estimated as the tie benefit) is treated as a thermal unit 'at the border' – the key point is that the value of the tie is proxied as a *flat* block of firm capacity akin to any other thermal generator (with no fuel limitations).
- Ties may be constrained during coincident peak winter scarcity events, but may have more ability and incentive to deliver overnight when ISO-NE prices are very high. This could turn one modeled 96-hour duration event into several shorter events, materially improving storage rMRI and better reflecting real-world **operations**.

Amendment 2: Intertie Modeling

Multiple Day Event – Add Dispatchable Resources



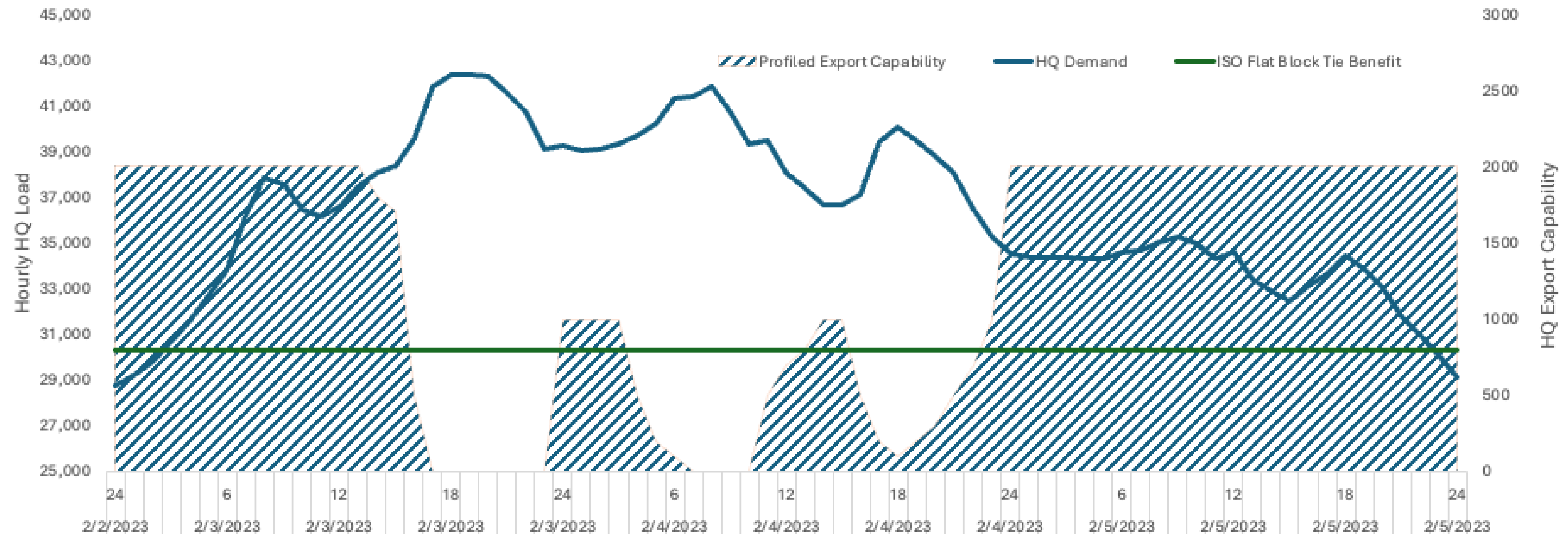
Source:
[ISO-NE, Slide 26](#)

- **Model assumes flat profile:** ISO models imports as part of a 'firm' block of thermals/imports with an effectively flat profile across the day (grey wedge bottom of the graphic).
- Flattening that profile into a capacity block may obscure the hours when imports are actually available (which will often exceed the flat profile), such as overnight hours that may allow storage to recharge.

Amendment 2: Intertie Modeling

Profiled Export Availability vs Flat Block

HQ Hourly Load - February 2023 Peak Example



Source:
[HQ Hourly Load](#)

- Hydro-Québec demand is typically lower overnight, creating additional export capability during hours when storage would otherwise recharge. Note: hourly HQ export capability shown is representative, not actual, for a critical period.
- The key is that the ISO proposal converts an import shape that should have more energy available during off peak into an equivalent flat block (green line) and this underestimates energy available from the interties. The figure, a simplification, illustrates HQ would have more export capacity potential overnight.

Amendment 2: Intertie Modeling

Profiled Export Availability vs Flat Block

- **Takeaway—ISO proposal fails to capture *temporal profile/hourly shape of the intertie*:** The key issue is that the ISO approach creates a system with a flat import profile during critical periods, whereas the realistic profile would have increased import availability in off-peak hours, thereby allowing more storage to be charged than the flat profile.
- **ISO's proposal underestimates energy available for charging storage off-peak:** ISO's proposal converts an import shape that should have more energy available during off peak hours (striped blue shading, prior slide) into an equivalent flat block (green line) and this underestimates the available energy for charging storage. ISO's proposal also over-states the tie benefit during peak hours, widening misalignment between expected and modeled results.
- **Conceptual amendment:** Model firm imports using the underlying *hourly import-availability profile* of the tie, aligned with load and scarcity conditions, rather than converting that profile into a flat firm capacity block that ignores when imports are actually available to serve load or support storage charging. The tie resource profile can be derived from the load shape estimated from the underlying regional system model results.

Amendment 3:

Storage Modeling Adjustment

Amendment 3: Storage Charging Adjustment

- **Charging adjustment insufficient:** For storage resources, the ISO's proposed adjustment only addresses a portion of the issue and therefore understates storage rMRI. The ISO adjustment does not actually make the energy *available* to storage resources from longer duration storage assets and EL3 assets; rather it simply takes the Type 3 hours out of the equation.
- **Energy available to charge is overlooked:** The adjustment—merely removing Type 3 hours—has the effect of improving rMRI for storage assets by reducing the number of MRI hours where storage does not add value, but does not actually add energy to the storage assets for use on the second day of an MRI event. In other words, ISO won't count the over-night hours against storage where there was not enough energy to charge storage, but **ISO does not adjust the expected state of charge for the next day to be consistent with the adjustment.**
- **Lack of charging energy in the modeling is systemic:** Similar to the inertia modeling amendment, ISO's charging adjustment continues to understate the value of storage resources to the system to the extent it does not accurately reflect available energy in off peak periods, and the proposed adjustment only partially addresses the issue.

Amendment 3: Storage Charging Adjustment

- **Proposed Solution—treat ES as EL3 Resource Type:** ISO should consider reclassifying storage resources as EL3 resources in GE MARS until comprehensive/proper modeling corrections can be addressed. This alternative may be a more pragmatic approach to addressing the underlying concerns that are focused more on the root cause of the issue that energy available to charge storage is understated for a variety of reasons. This reclassification effectively incorporates the ISO's proposed adjustment and more because Type 3 hours are taken out of the model, and storage resources are basically assumed to be fully charged each day.
- **Safeguards if needed:** In the absence of model fixes it may be necessary to identify a trigger condition where this adjustment risks over-stating storage value, but until model concerns are addressed it is a very good and more accurate approximation of storage capacity value.
- **Better interim approach:** Until ISO can fix the underlying modeling limitations to properly address concerns around realistic storage charging opportunities, as well as other issues involving the treatment of non-firm energy, tie benefits etc., this proposal would adequately solve those concerns in the first iteration/filing of CAR-SA.

Amendment 3: Storage Charging Adjustment

- Under this amendment, our understanding is that storage resources and EL3 resources would see rMRI values approximated by the EL3 resource accreditation post ISO adjustment. In other words, a 4-hour BESS would see a capacity value akin to a 4-hour EL3 resources adjusted upward by about 18%. Per the tables below, this would yield an rMRI of 0.253 rather than 0.187 per the ISO’s proposal.

Energy Storage Resources Base Accreditation

Duration (Hour)	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24
rMRI(s)	0.243	0.373	0.503	0.645	0.757	0.822	0.911	0.959	0.976	0.982	0.982	0.988	0.988	0.988	0.988	0.988	0.988
rMRI(w)	0.092	0.142	0.187	0.232	0.269	0.325	0.356	0.393	0.427	0.462	0.499	0.544	0.594	0.633	0.665	0.691	0.702

Energy Limited Resources Base Accreditation

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

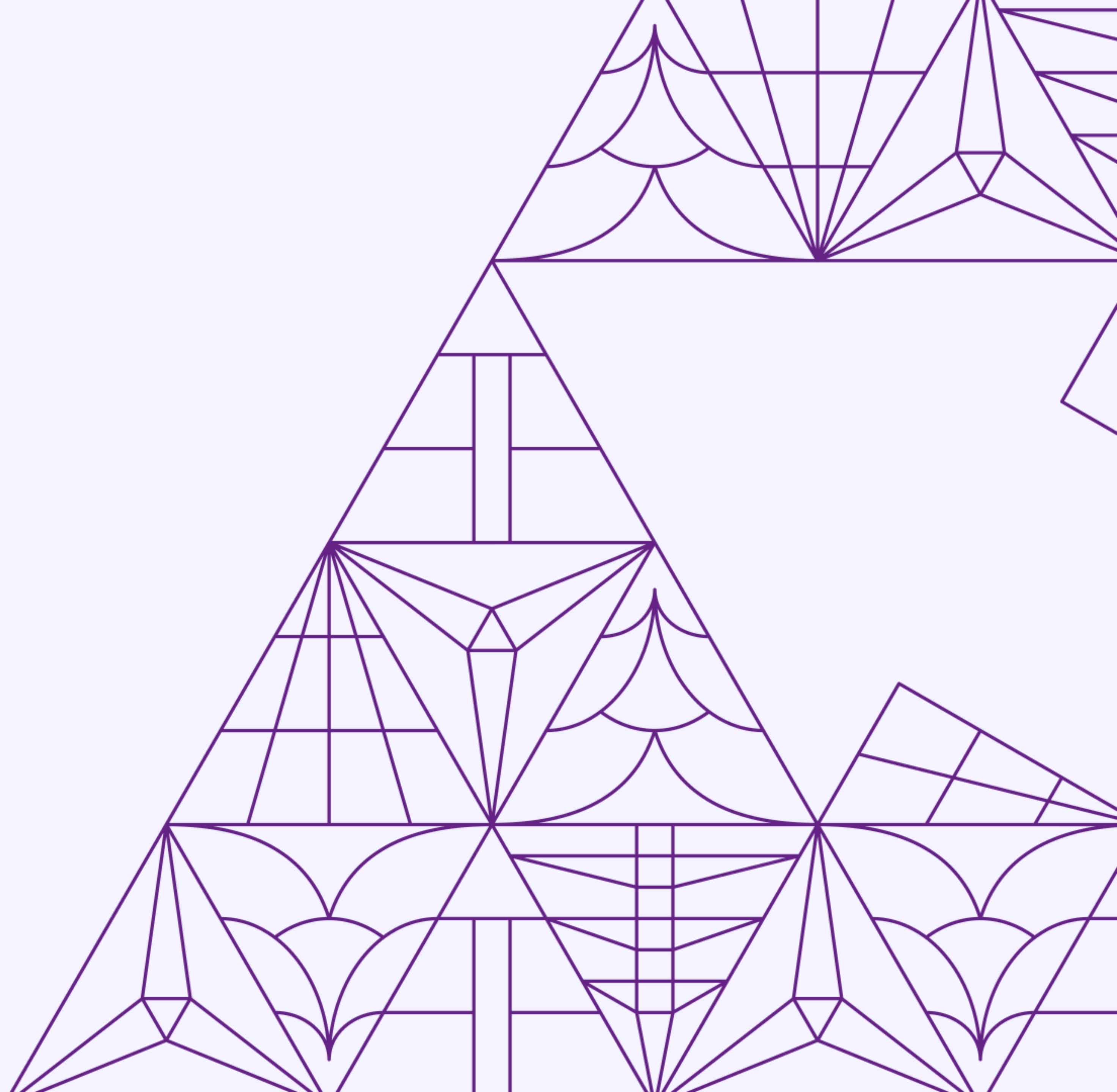
Source: [ISO-NE RAM-IA \(March, 2026\)](#)

Thank you.



advancedenergyunited.org
@AdvEnergyUnited

1801 Pennsylvania Avenue NW, Suite 410
Washington, DC 20006



Appendix:

Other Issues

EUE vs LOLE in Assessing MRIC

EUE vs LOLE in Assessing MRIC

- **Issue:** Leading accreditation modeling expert espoused in a [post](#) that the reliability metric used for resource adequacy must be the same that determines accreditation, otherwise it will undercount storage and overlook their capacity contribution. ISO-NE uses LOLE for RAA, but then uses EUE for determining MRI, which could be undervaluing storage.
- **Request:** test if there is a conceptual concern with mixing measures between resource adequacy and resource accreditation. In particular, the concern is that by using EUE to assess capacity value and LOLE to set the reliability target, ISO is creating an inconsistent and unfair outcome for some asset types.
- **Proposed test:** for the near term scenario (winter as an example), take the base results and assume 100 MW of load growth beyond the 'at criteria' load. Based on ISO results for MRIC, this incremental load could logically be met by approximately 500 MW of storage (rMRI ~ 0.19, with small adjustment for NICR). If there is no disconnect introduced by the ISO approach, we would expect that adding 500 MW of storage to meet 100 MW incremental load would maintain approximately the same level of reliability as measured by LOLE. If Kevin Carden is correct, we would expect that the reliability value of storage is under-stated because accreditation is tied to EUE, and as a result the LOLE would fall below 0.05 when the implied amount of storage is used to meet the load growth. In essence, because the storage is under-valued, reliability as measured by LOLE would improve.
- **Implication:** if the system is exactly at criteria in 2030 for example, and load grows by 100 MW for the 2031 auction, MRIC sends a misleading signal because adding 500 MW of storage additions would cause the system to exceed criteria. If true, this is a result of the mismatch in the reliability metric and the accreditation signal. It also implies storage is being under-paid relative to meeting the reliability criteria.

Measuring MCAP via Average vs. Best Performance

Amendment: Measuring MCAP via Average vs. Best Performance

- **Issue:** ISO's proposed MCAP approach appears to rely on a resource's best observed performance during a normalized seasonal temperature window. A single best output may reflect an unusually favorable operating hour, not expected performance during stressed conditions.
- This could inflate MCAP for some resources and increase MRI values relative to resources modeled on more representative expected performance.
- Inconsistent with solar, ADR, profiled resources, and DCAP-limited resources, which appear linked to expected performance under historical profiles, not one best output.

Amendment: Measuring MCAP via Average vs. Best Performance

- **Data Request:** ISO-NE should provide the difference between MCAP and DCAP at a system level. DCAP appears to more fundamentally measure expected availability in critical hours as compared to MCAP.
- **Conceptual amendment:** Replace MCAP with DCAP so that expected performance on peak demand days is based on either actual generation or ECOMAX (adjusted by performance factor).
- This would still measure demonstrated performance when the resource was called upon, but would avoid anchoring accreditation to one best historical hour.
- ISO will need to solve how to identify when a generator is being fully dispatched so that performance datapoint is included in the average MCAP calculation.

DR Profile Composition

Flexibility

Amendment: DR Profile Composition Flexibility

- **Issue:** Demand Response asset composition can change significantly year to year, but ISO's profile methodology may not reflect those changes quickly enough.
- **Core concern:** if a DR provider drops poor performers and enrolls stronger customers, the DRA's historical profile may still reflect the old customer mix. This could suppress rMRI even when the current portfolio is more reliable or better aligned with MRI hours.
- The market should reward DR providers for improving portfolio quality, targeting better load flexibility, and enrolling customers that can perform during reliability-risk hours.
- **Amendment:** Afford DR Providers greater flexibility and optionality to update the composition of their DERA and and update their rMRI values in timely manner.