Attachment 3

NTA Time Series Analysis

VSPC Quarterly Meeting
July 16, 2025

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Contents

- Review of Docket 7081 Engagement to Date
- Review of data from VELCO
- Overview of Northern and Northwest area peak days
- Review effects of:
  - EV charging control on depth/duration of peak loads
  - Impact of PP7 revisions on line ratings and critical load level increases
  - Existing/proposed storage on peak loads

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Review of VELCO's Analysis

- VELCO has performed many iterations of load flows in the Northern and NW VT study areas to determine critical load levels under N-1-1 contingency with subtransmission tripping where appropriate.

- This analysis expanded the original findings in the LRP to include a duration of overloads:
  - *Northern area Winter Peak Day: Need peak of 75 MW load reduction from 8:00-12:00 & 17:00-21:00*
  - *Northwest area Summer Peak Day: Need peak of 80 MW load reduction from 18:00 – 22:00*
  - *Northwest area Winter Peak Day: Need peak of 40 MW load reduction from 18:00 – 19:00*

- This summary provided an upper bound on energy reduction needed. Further analysis of time series load data determined that actual energy/load reduction needs are smaller than initially understood.

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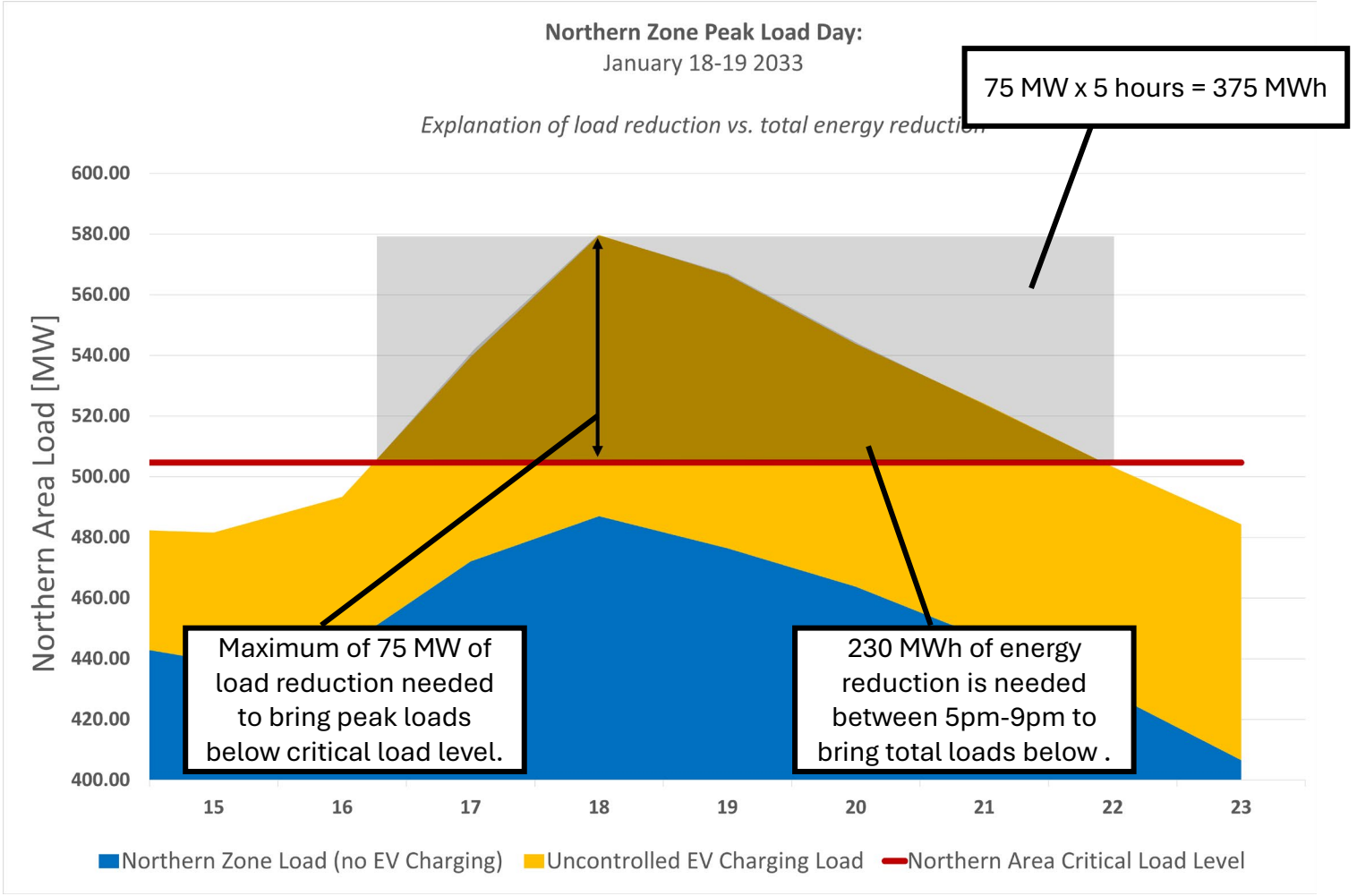
Energy vs. Power

- Power is the height of the load above critical load levels, or the amount of load reduction needed at any moment to have a reliable system.
- Energy measures how much load reduction you need over a certain period of time to address these concerns.
  - *ie: 75 MW x 5 hours = 375 MWh*
- We need to understand each of these to determine which solutions are viable.
- Modern NTAs are finite duration unlike energy efficiency and reconductoring lines.



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Review of VELCO's Analysis

Docket 7081 defines non-transmission alternative analysis as:

an analysis to identify cost-effective and viable [non-transmission alternatives] to address a Reliability Deficiency that provide Equivalence, compare those alternatives to the likely Transmission-only alternative(s) to address the deficiency, and evaluate which alternative is the best choice to address the deficiency. Such identification and analysis also shall include viable alternatives to address the deficiency that encompass both Transmission and non-transmission elements

TABLE 2
SUMMARY OF BULK SYSTEM REGIONAL GROUPING & TRANSMISSION SOLUTIONS

SUMMARY OF BULK SYSTEM REGIONAL GROUPING & TRANSMISSION SOLUTIONS	ESTIMATED TRANSMISSION PROJECT COST	SCREENED IN OR OUT OF FULL NTA ANALYSIS	LEAD & AFFECTED DISTRIBUTION UTILITIES
NORTHERN AREA • Install a new 115 kV line between Essex and Williston • N-1-1 contingency causing thermal overload and voltage collapse exposure • Affected transformers: Queen City, Tafts Corner, Barre • Timing is 2032 based on winter *VT Roadmap* forecast	**$120M** (115 kV line) **3x $11M** (Transformer)	**SCREENED IN** 75 MW of load reduction in northern area by 2033. Greater load reduction needed over time.	LEAD: **GMP** AFFECTED: **ALL VT**
NORTHWEST AREA (including northern area) • Rebuild West Rutland to Middlebury 115 kV line • N-1-1 contingency causing thermal overload • Affected transformers: Middlebury • Timing is 2029 based on summer *VT Roadmap* forecast	**$215M** (115 kV line) **$13M** (Transformer)	**SCREENED IN** 80 MW of load reduction in northwest area by 2033. Greater load reduction needed over time.	LEAD: **GMP** AFFECTED: **ALL VT**

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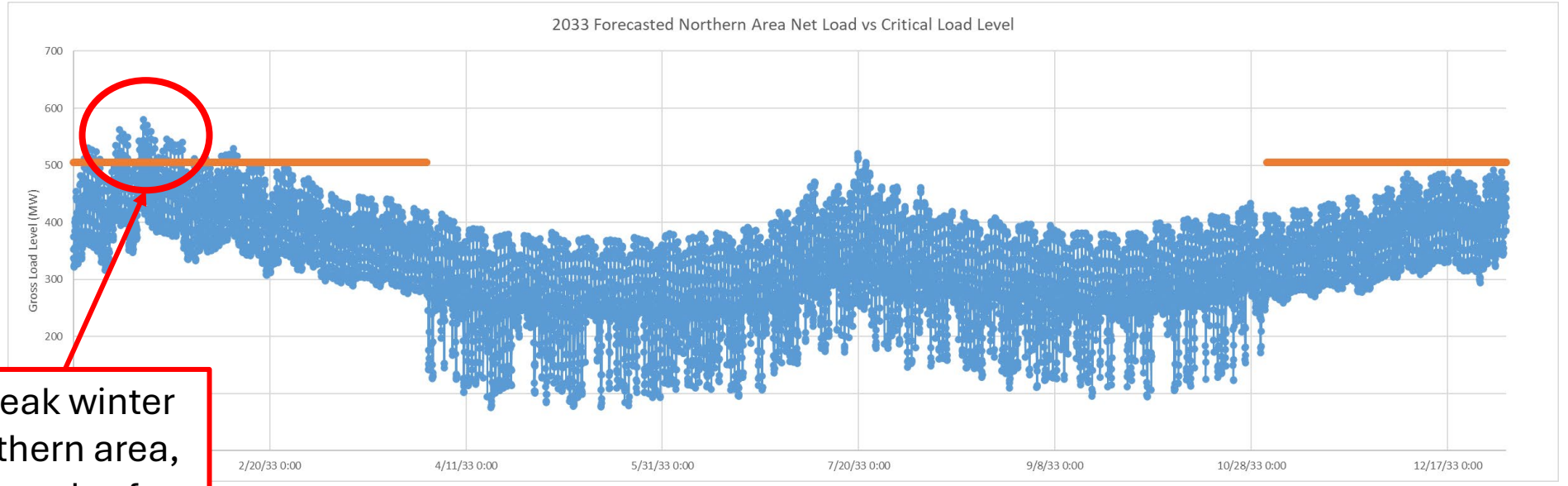
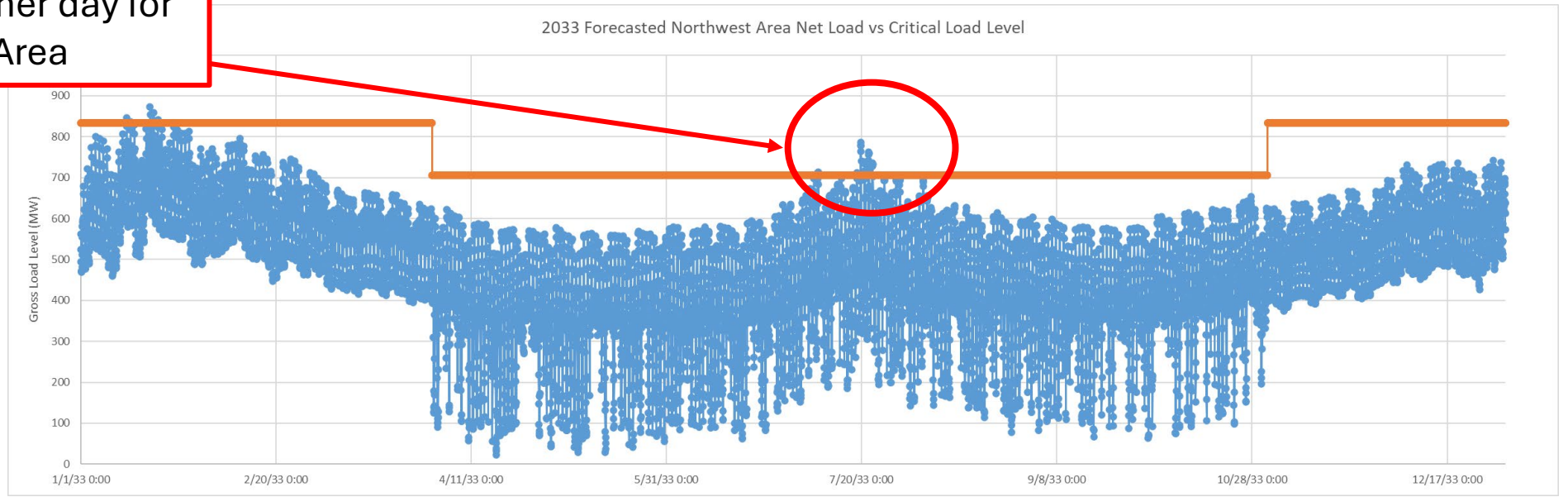
Review of VELCO's Analysis



Focus on peak winter day for Northern area, peak summer day for NW Area



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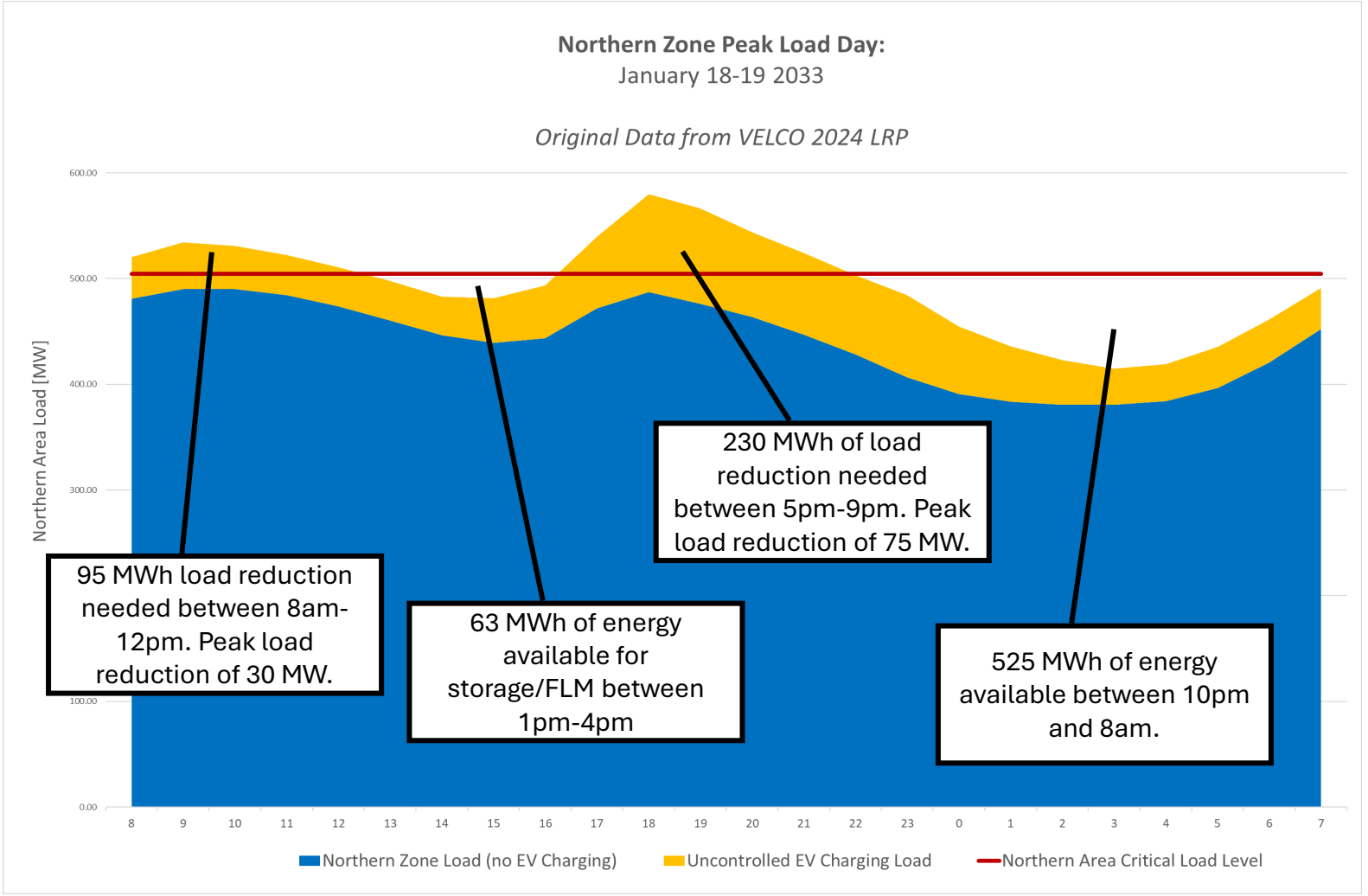
Overview of Northern Area Winter Peak

- Plotted 24-hour peak day from 8am – 8am to shows impacts of EV charging overnight
- 4 hours of load reduction needed in the morning, 5 hours needed in the evening due to uncontrolled EV charging loads
- **Lack of natural load dip in the middle of the day leaves little energy to preposition storage or FLM following morning peak.**



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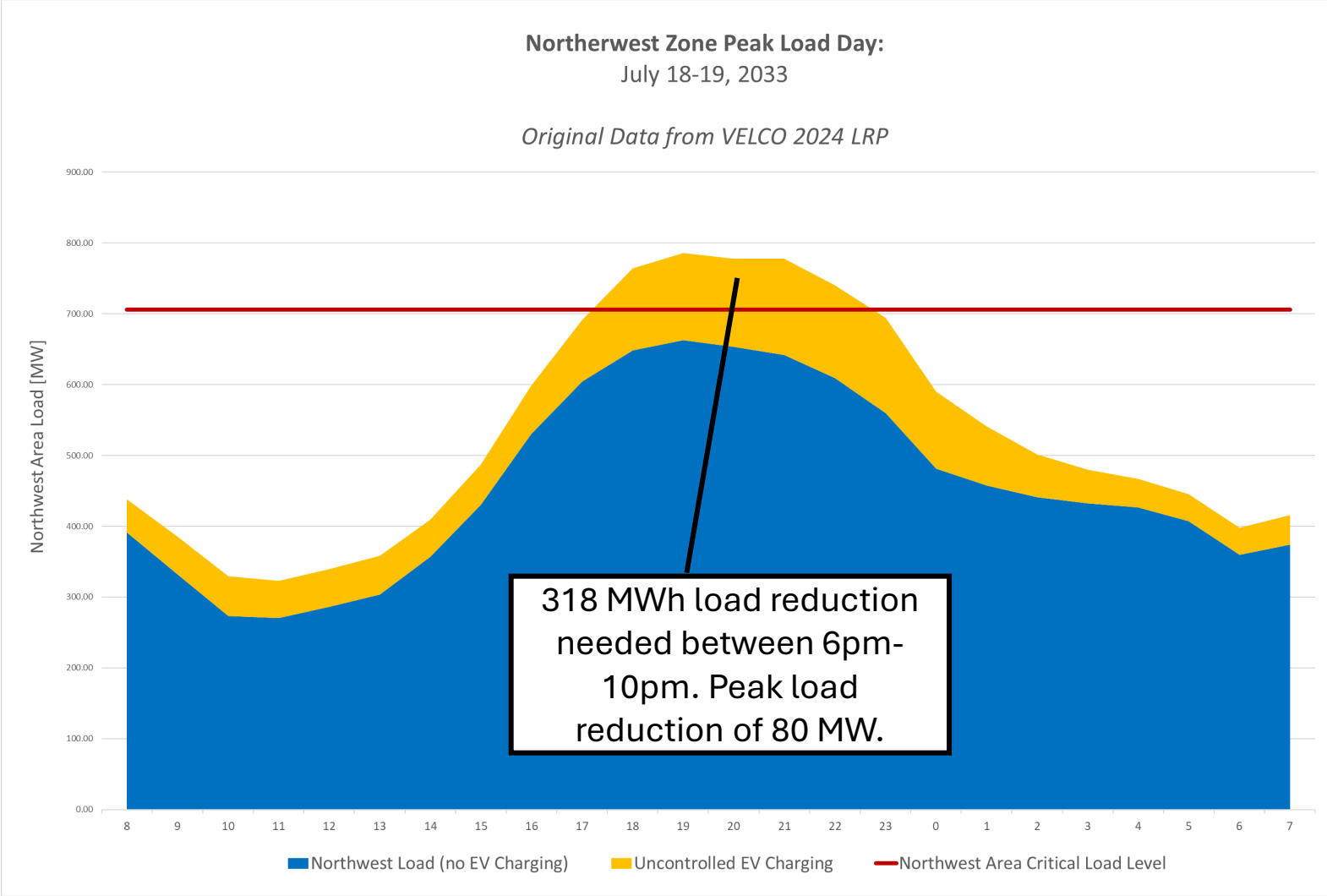
Overview of Northwest Area Summer Peak

- Summer provides less on an energy challenge due to the large load reduction in the middle of the day from solar production.

- There is more opportunity to preposition storage and other resources during the day since solar reduces loads well below critical load levels.



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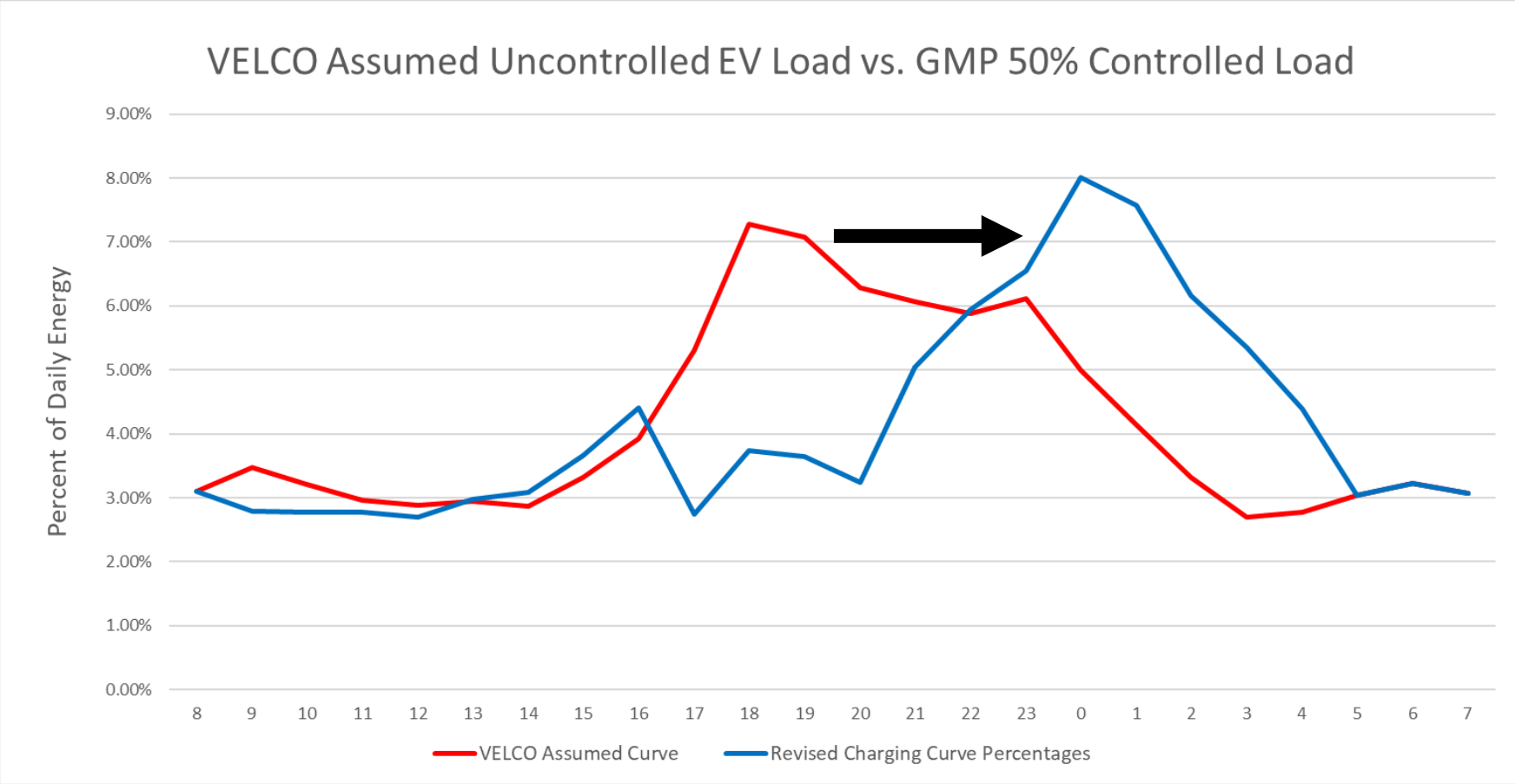
EV Charging Curve Comparison



- 2024 Long Range Plan assumed 0% EV charging Control
- A revised charging management program that can control 50% of EVs in study area can shift peak loads to later in the evening and ensure all cars are charged by morning.

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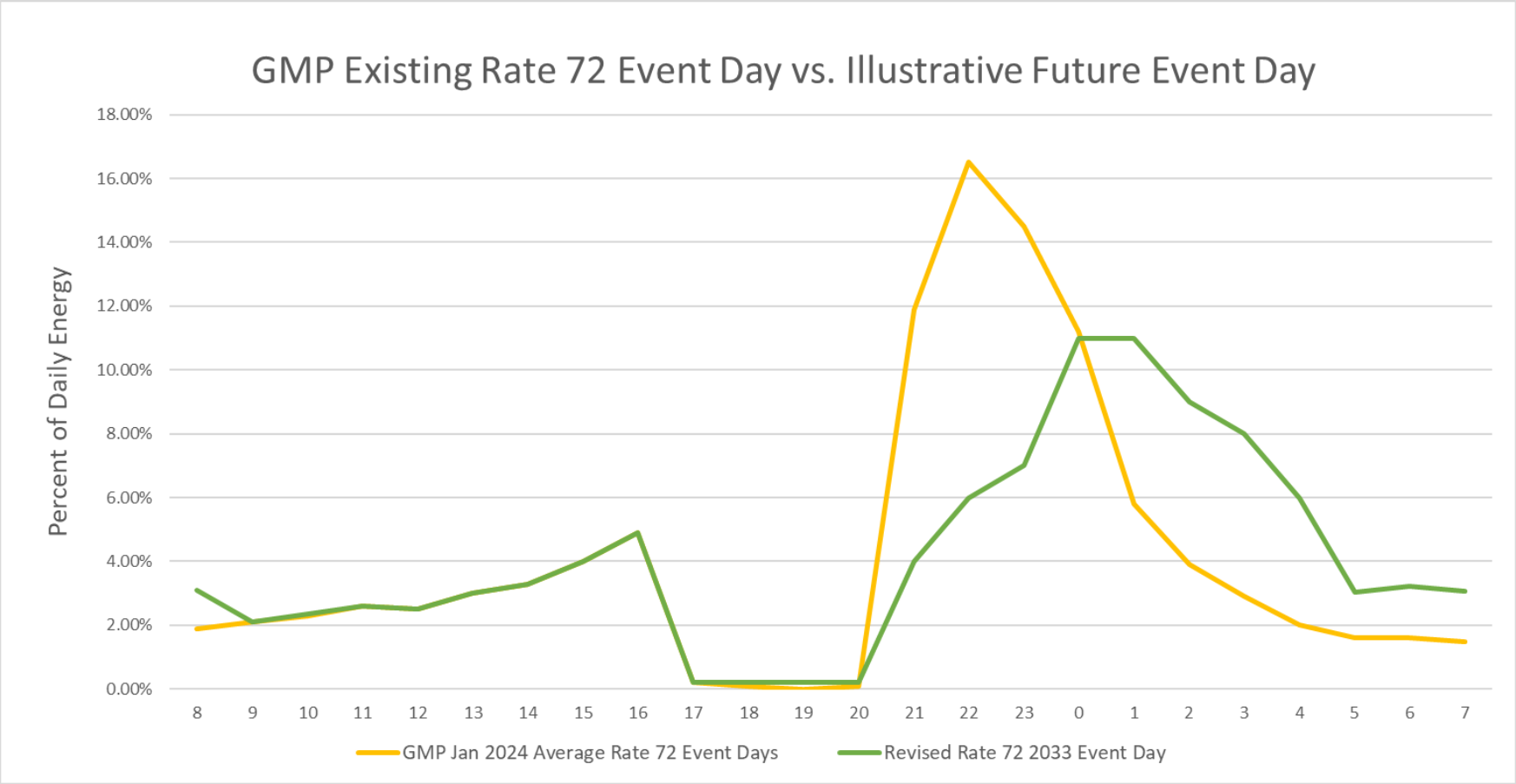
EV Charging Curve Comparison



- GMP's existing charging programs can be redesigned to slow charging bounce back after an event as seen in today's Rate 72 events.

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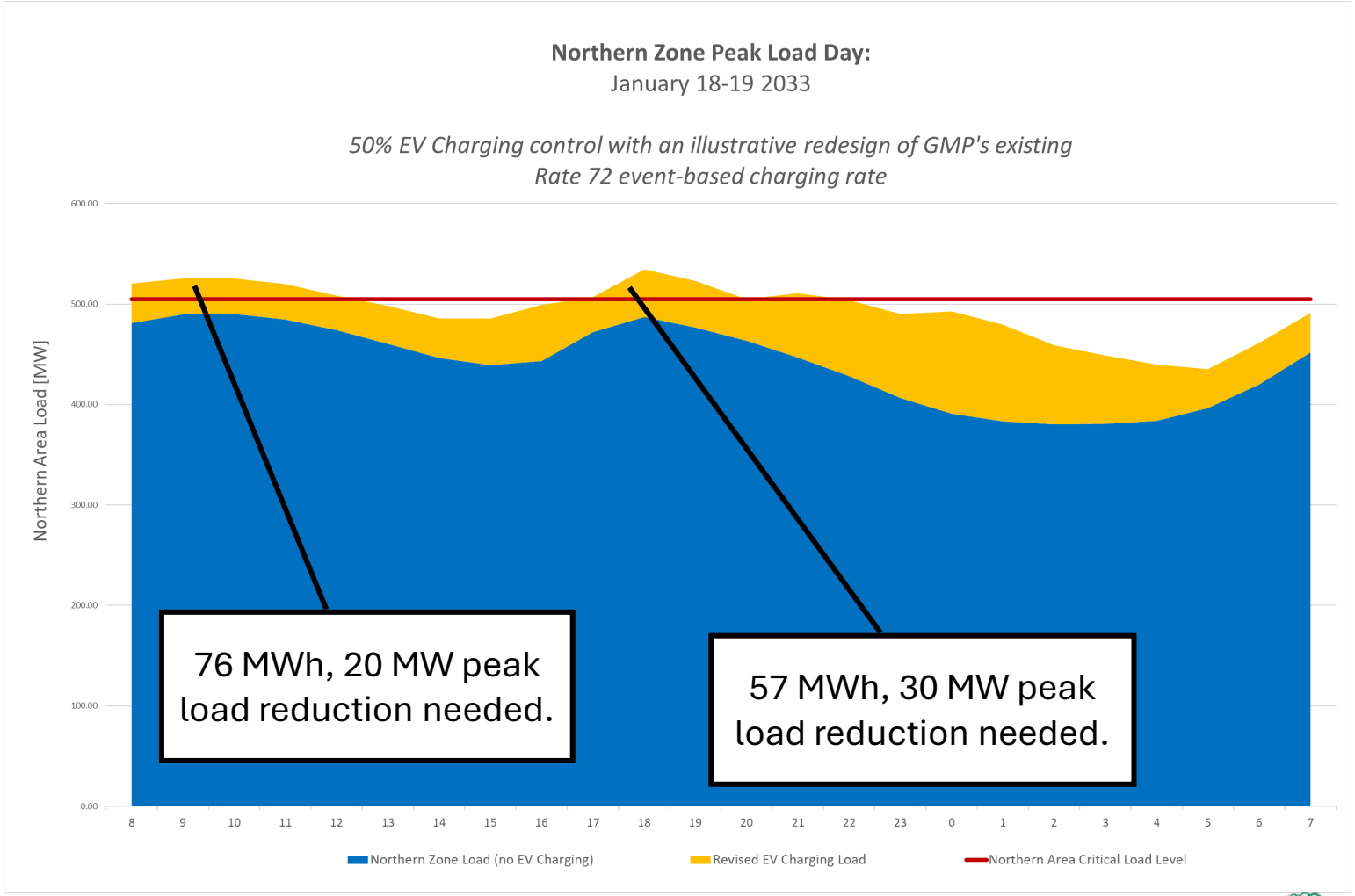
Illustrative Effects of EV Charging Control on Peak Loads

- A redesigned Rate 72 event-based program or TOU tariff could shift charging later into the evening
- Telemetry or TOU rates can slow the ramp rate of charger reconnection post-event and reduce bounce back effect seen today.
- 50% charging control at peak hours can reduce any load reduction requirements on the peak winter day in 2033.
- Energy storage and FLM programs can increase load margins at peak hours to further protect the system.



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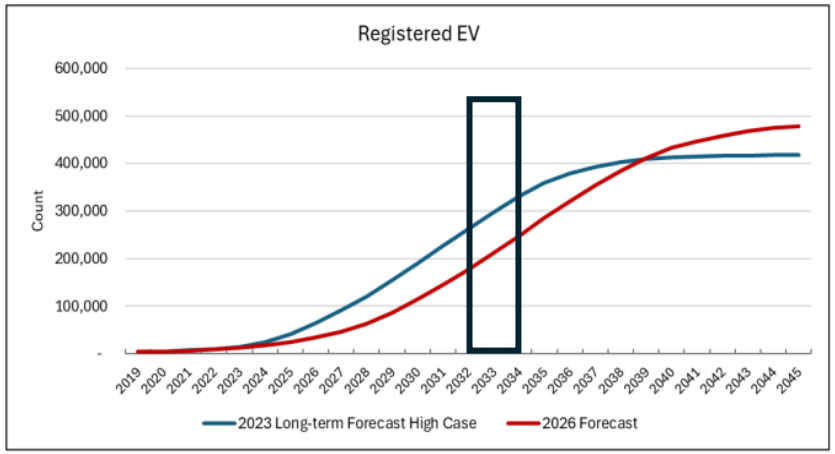
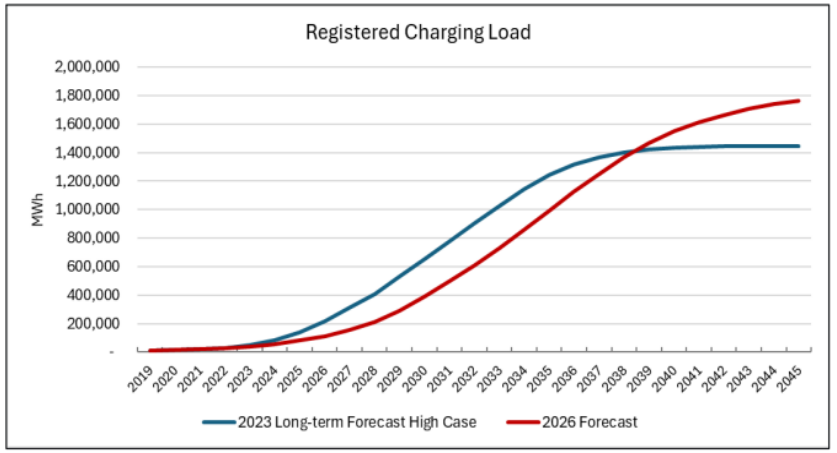
Itron 2026 Revised EV Adoption Sensitivity

Preliminary 2026 Forecast Compared to the Prior Long-term Forecast





2026 Forecast if 2030 (68%) and 2035 (100%) mandates hold

- Strong EV adoption over the prior two years
- Governor rescinded the 2026 mandate (still holding to 2030 mandate)
  - But Trump just revoked California's EV mandate - ?
- 2023 and 2024 EV adoption is more in line with the medium EV forecast scenario

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From June 16, 2025 VSPC Load Forecasting Subcommittee Meeting

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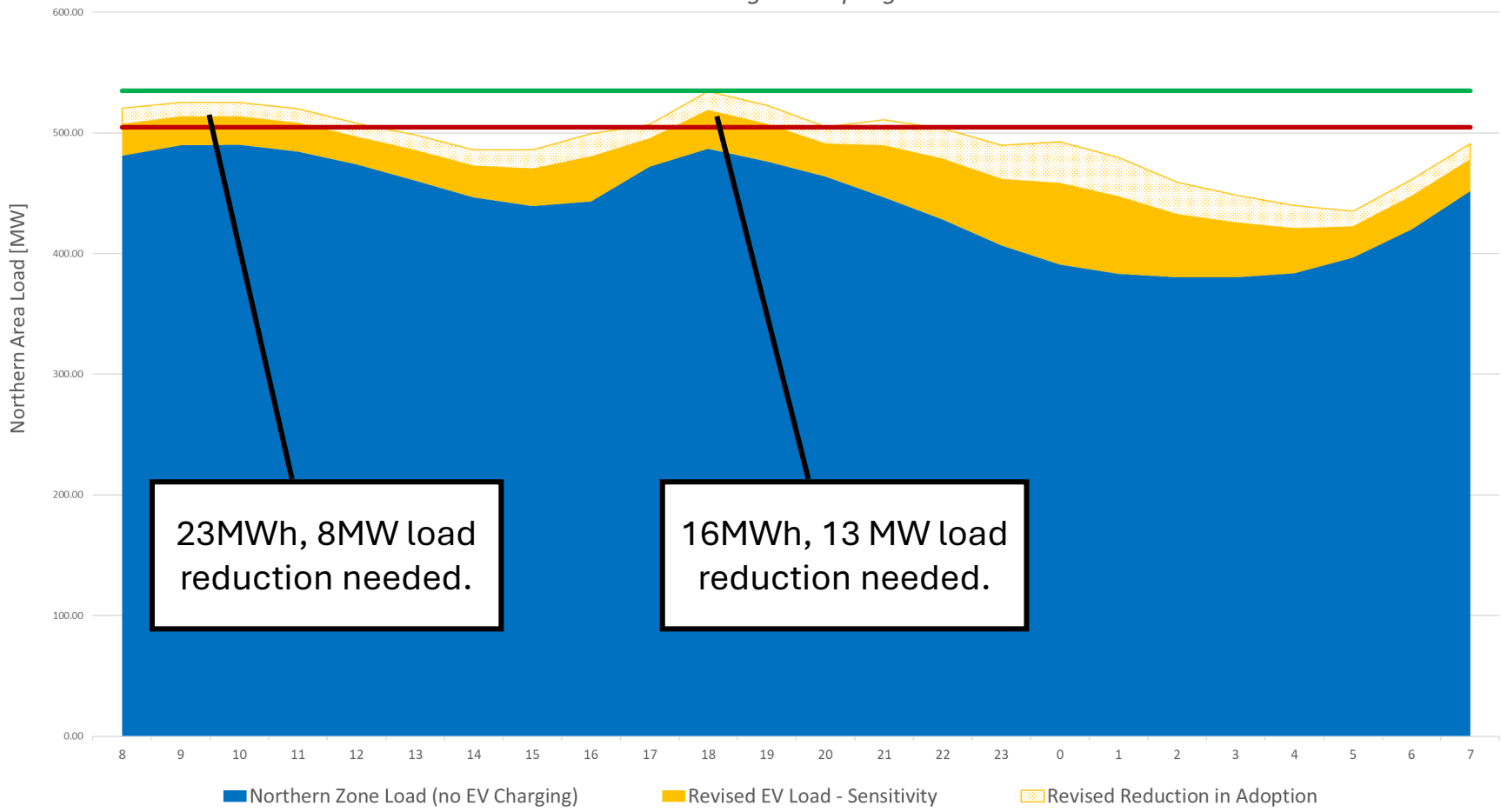
Itron 2026 Revised EV Adoption Sensitivity

Northern Zone Peak Load Day:
January 18-19 2033

Shows the effects of EVs being adopted at 66% of forecasted rate in 2033 with a revised charging management program



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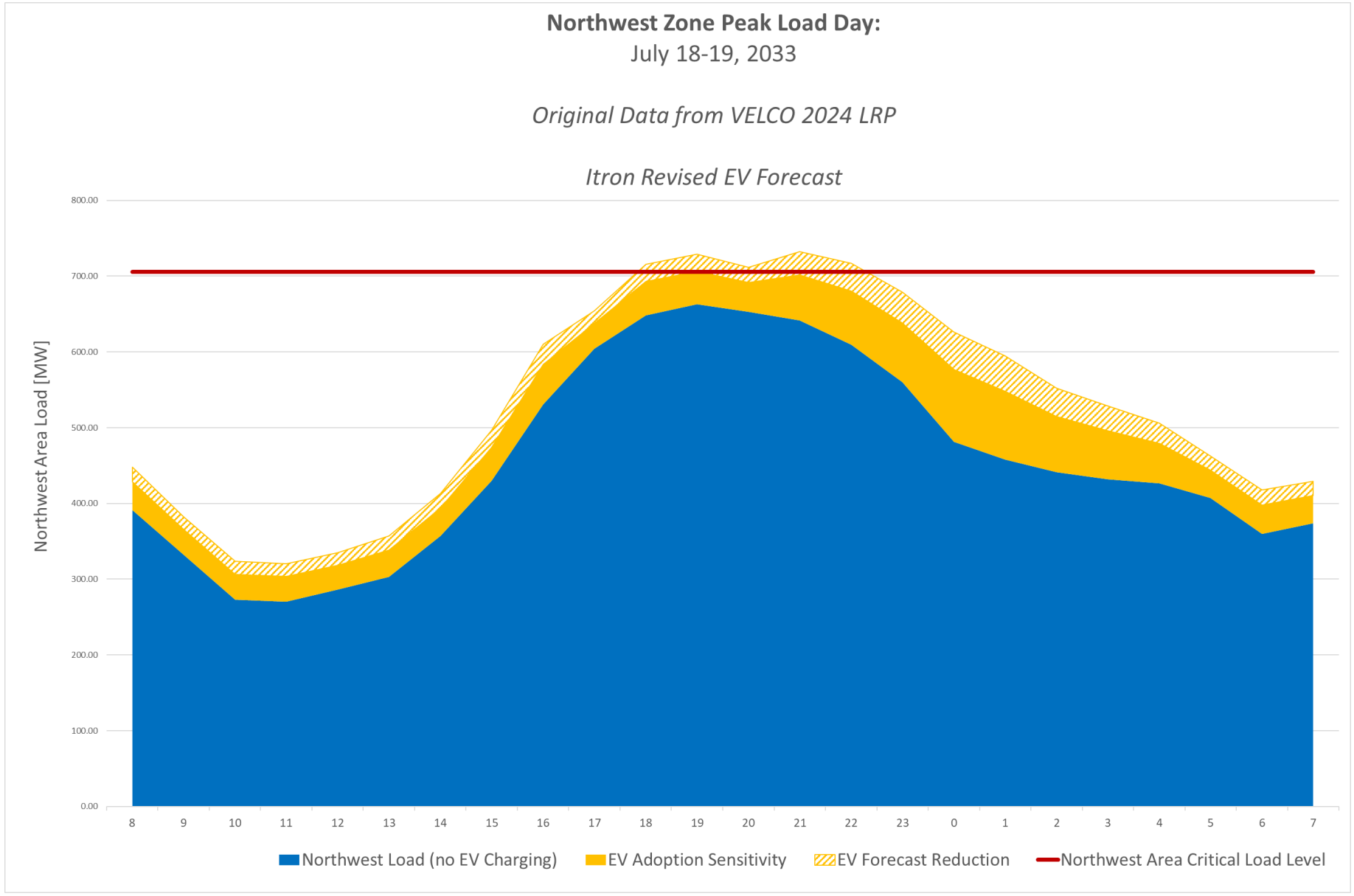
Itron 2026 Revised EV Adoption Sensitivity



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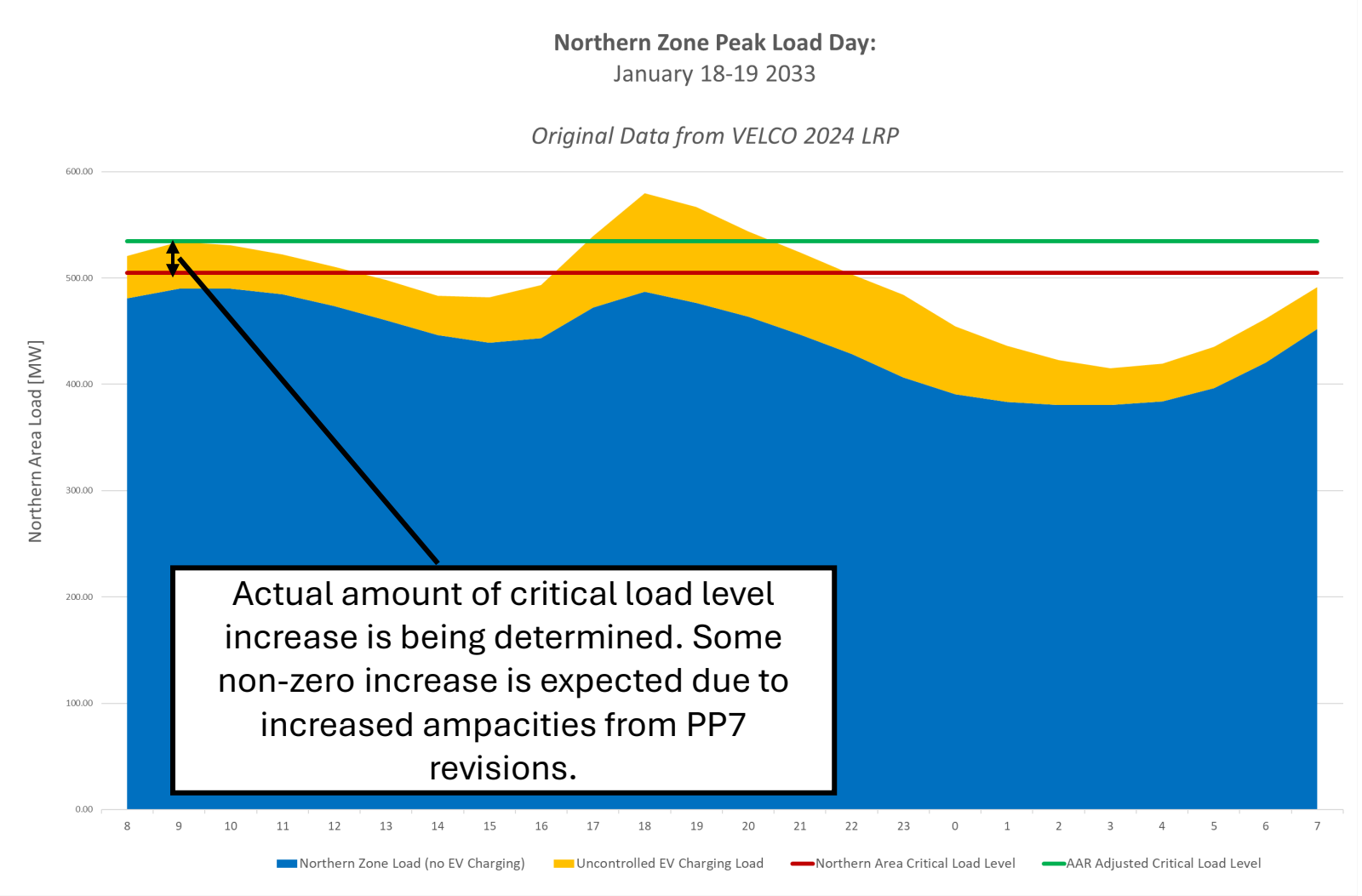
Illustrative Effects of PP7 Revisions on Critical Load Levels

- FERC Order 881 will be operational by EOY 2026. ISONE revising Planning Procedure 7 to better align planning rating methodology with ambient air ratings.
- Winter peaks are driven by cold temperatures which drive heat pump loads and make EV charging less efficient. At colder ambient temperatures, conductors have a higher ampacity rating.
- Increasing critical load by relatively small amounts dramatically reduces the energy needed for load reduction.



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Illustrative Effects of PP7 Revisions on Critical Load Levels

- Winter planning ratings for all transmission and subtransmission elements will be based on a 20°F basis by 2033, rather than the current 50°F basis.

- Winter operational ratings will be based on real-time ambient air ratings by 2033, likely increasing capacity on peak winter days due to cold-temperature driven peak loads.

Conductor Type	**Current Winter Planning Rating* [A]** (50° F)	**Revised Winter Planning Rating [A]** (20° F)	**Illustrative Winter Operational Rating [A]** (0° F)	**Rating % Increase** *(pre vs. post PP7 Revisions)*
2/0 Cu	406	462	495	13.8%
477 ACSR	799	890	944	11.4%
795 ACSR	1135	1262	1339	11.2%

** Conductor ratings are illustrative*

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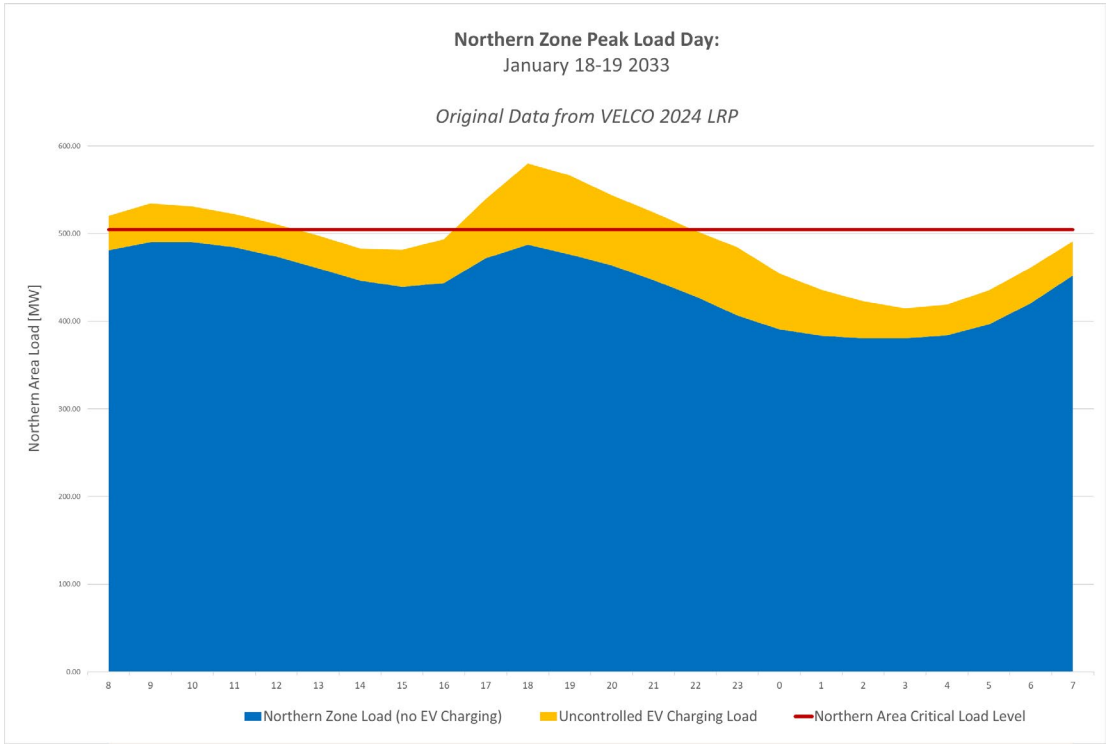
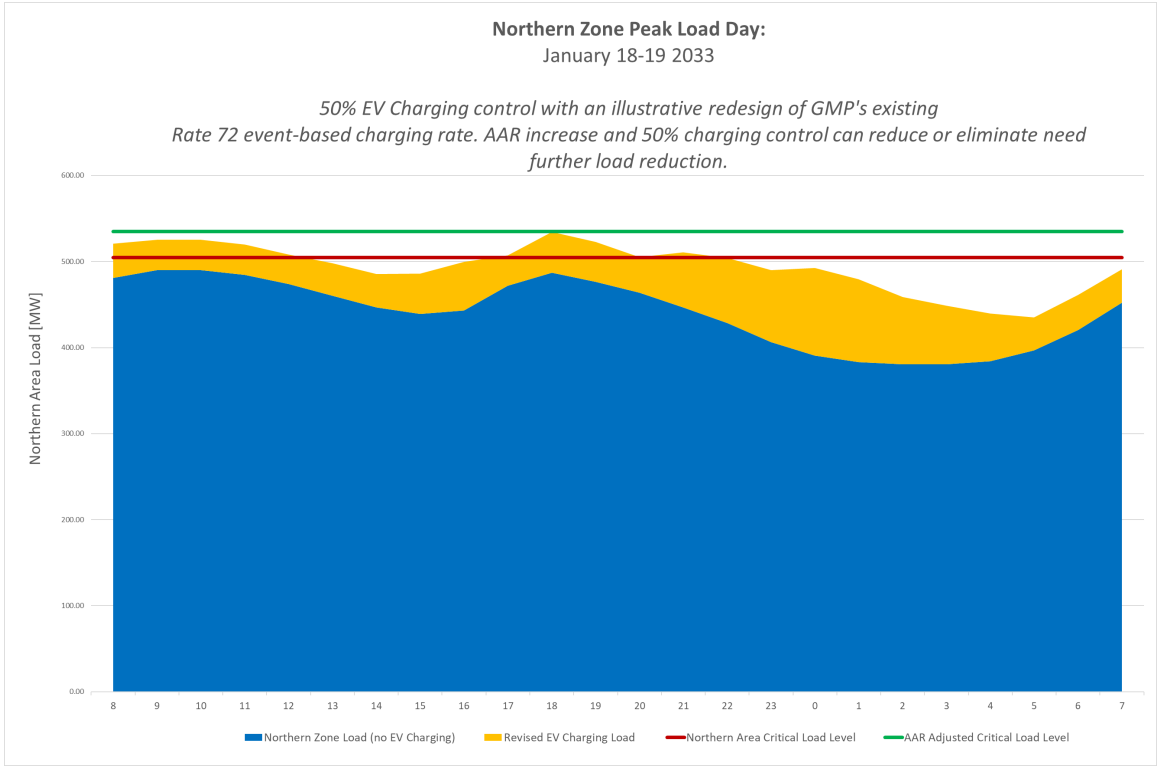
Combining EV Charging Management and PP7 Revisions



No EV Controls and old rating methodology: 75 MW of load reduction needed and 300+ MWh of load management in 1 day



50% EV control and PP7 revision considered: little to no load reduction needed on peak winter day in Northern area

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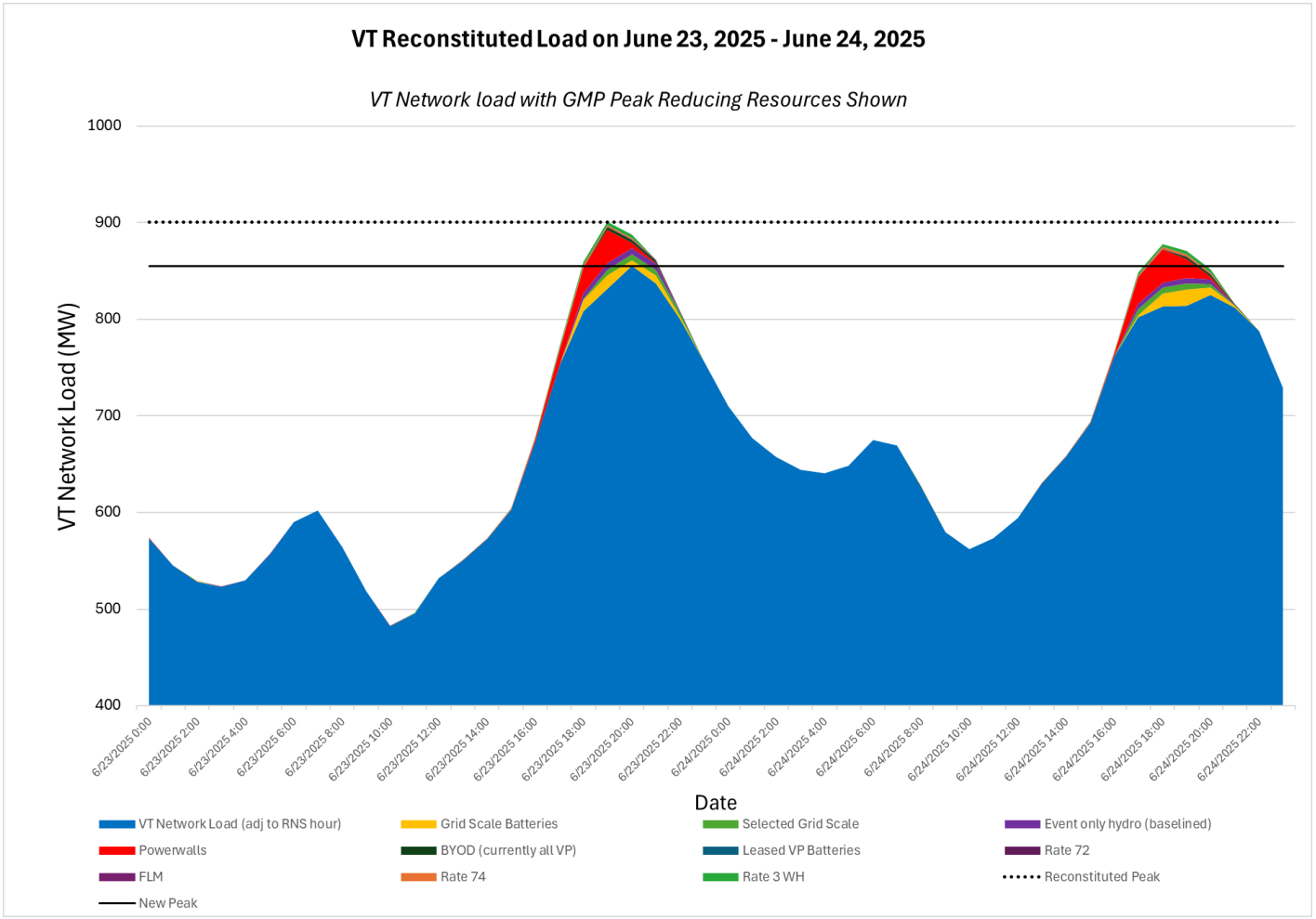
GMP Existing Peak Shaving Resources

- GMP currently has nearly 60 MW of peak shaving resources (storage, EV chargers, FLM, etc.) that is used to reduce GMP's contributions to VT peak loads.
- This regularly shifts loads to later in the evening when loads naturally tend to be lower across the state, potentially reducing other DU's contributions at the new peak hour as well.
- On the coldest days in winter 2033, when an NTA solution is required, GMP would already be peak shaving to reduce its peak contributions.



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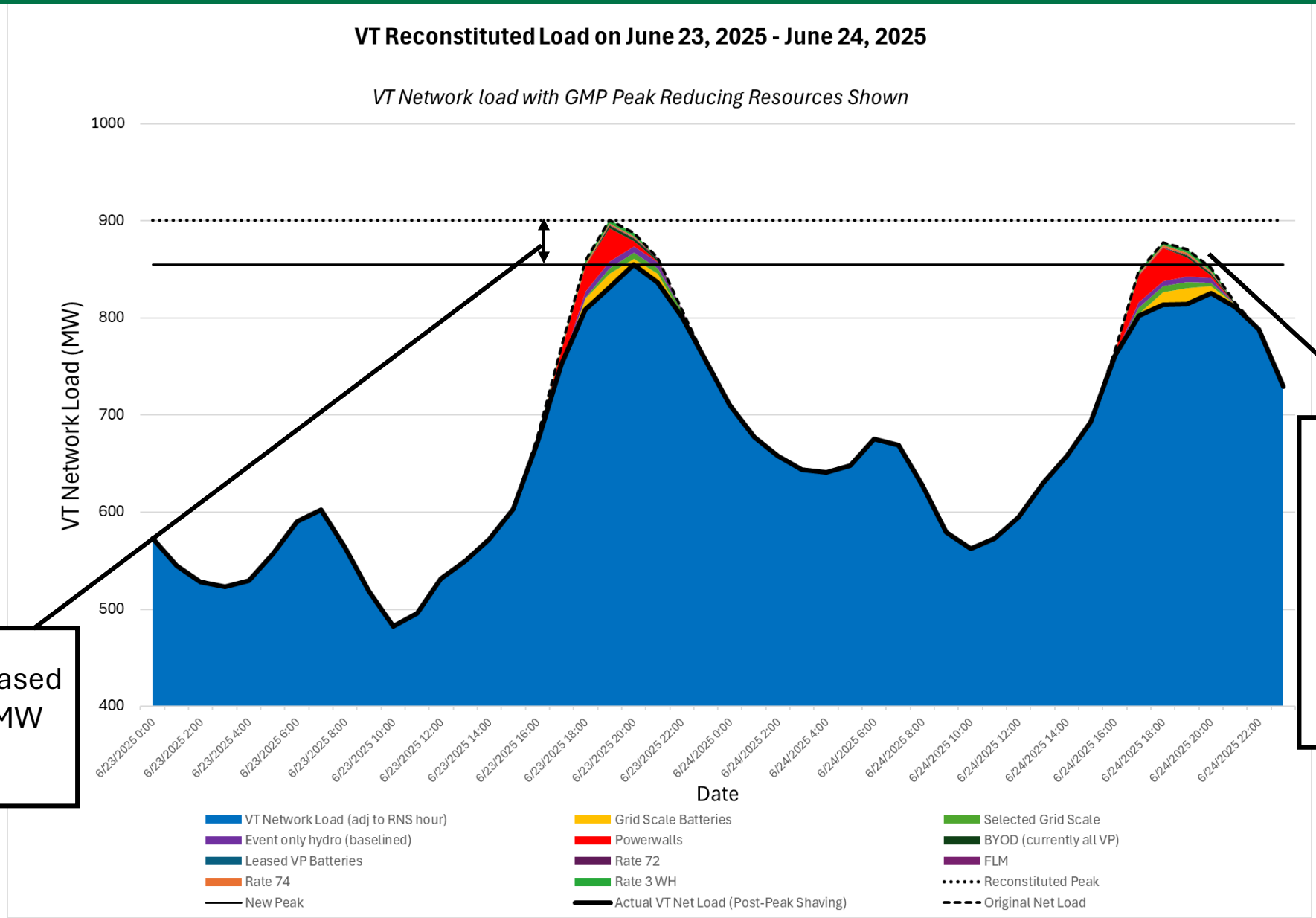
GMP Existing Peak Shaving Resources



GMP resources decreased VT state peak by 45 MW on June 23, 2025.

Peak loads on June 24th remained below June 23 peak due to GMP storage dispatch

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GMP Existing Peak Shaving Resources

- Interconnected, GMP-controlled assets are used for peak shaving today.
- Proposed utility scale storage projects could use a full toll PPA or have controls built into PPA to allow for GMP control during peak loading hours, making these resources available as part of an NTA solution.
- When EV charging control is considered, there is enough active and proposed BESS in the northern area to keep loads below the critical load level.

Active/Proposed Storage Resources in Northern Study Area

Technology	Peak Output [MW]	Capacity [MWh]
Powerwalls	8.8	11.7
Active Utility Scale BESS	18	75
Proposed Utility Scale BESS	63	252

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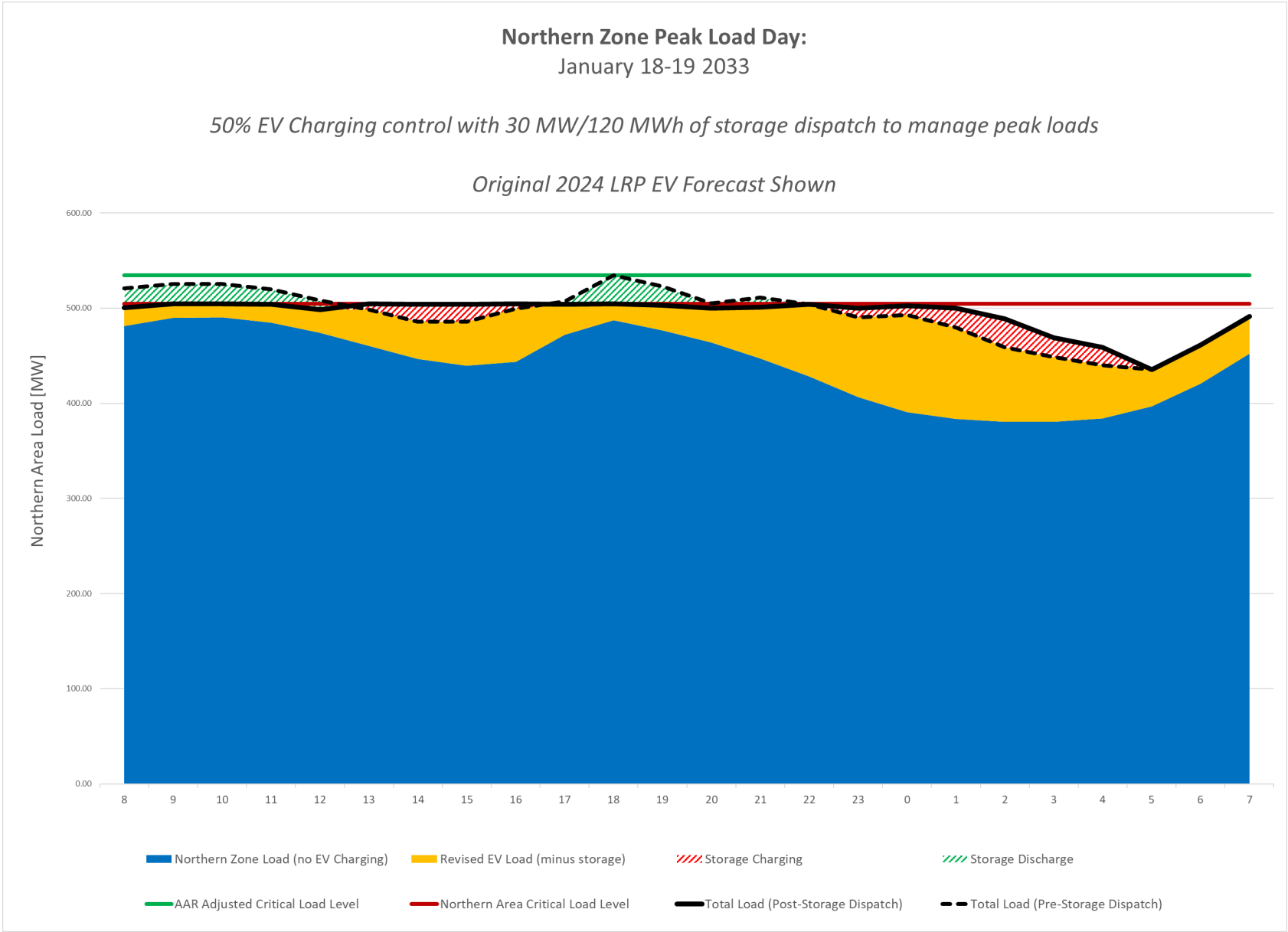
Use of Storage to Reduce Peak Loads

Original EV Forecast

- Modeled an illustrative portfolio of 30 MW/ 120 MWh of peak shaving storage to reduce peak loads.
- This amount of storage is able to keep loads under original critical load level and original EV forecast if dispatched properly.
- There is remaining energy in the early morning to charge more storage to be able to increase margins at some hours of the day.



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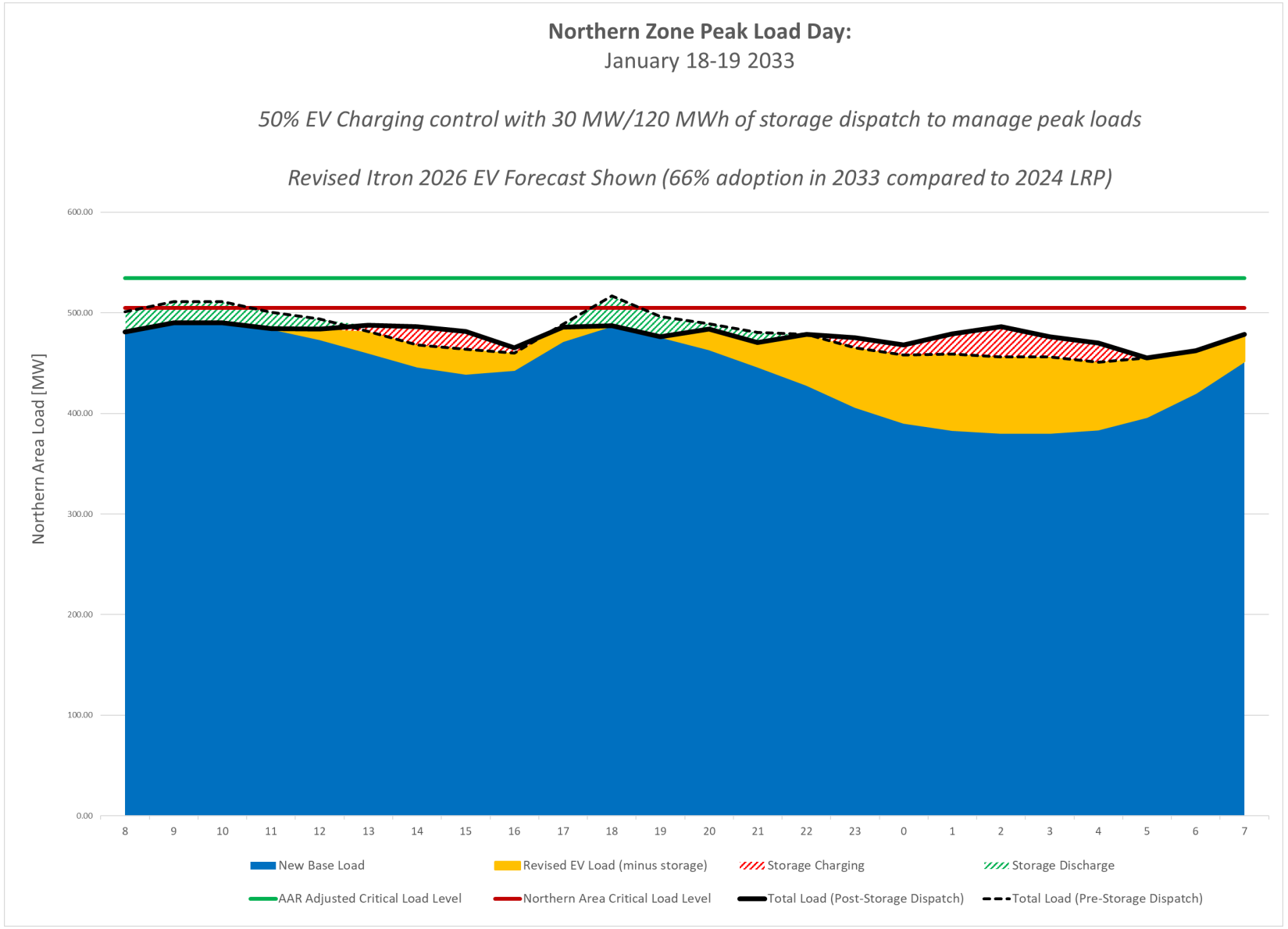
Use of Storage to Reduce Peak Loads

Revised EV Forecast

- Modeled an illustrative portfolio of 30 MW/ 120 MWh of peak shaving storage to reduce peak loads.
- With the current EV forecast from Itron, this amount of storage keeps loads well below original critical load level.
- More storage will be incrementally less beneficial since load shapes remain flat and high post storage dispatch.



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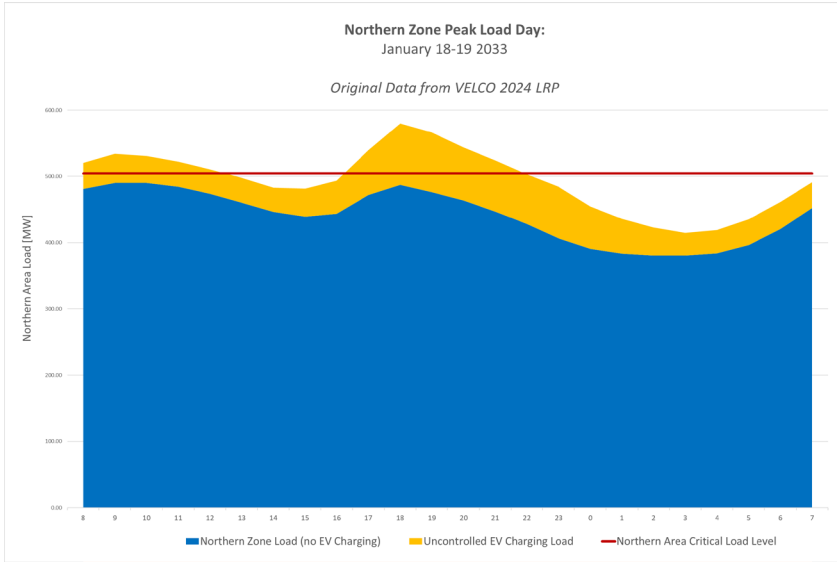
Combining All NTA Solutions



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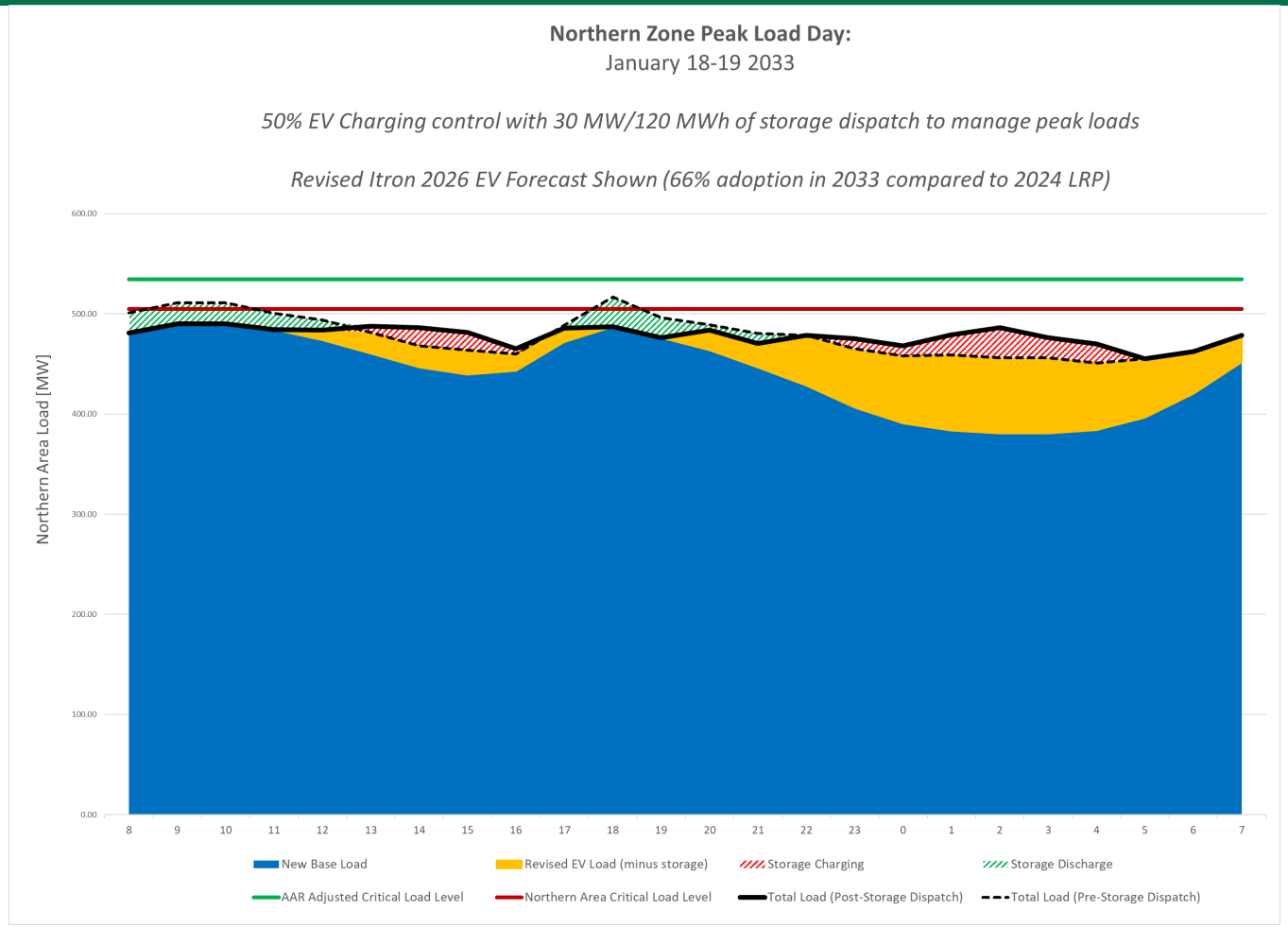

50% EV control, PP7 revisions, storage, EV sensitivities considered: Load remain below critical load level with proper program design and storage dispatch

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Takeaways

- A combination of EV charging controls, PP7 rating increases, and FLM/Storage/other DERs will reduce or eliminate the need for a traditional, wires solution.
- Existing and future storage projects can increase margins between peak load and critical load levels.
- FLM programs allow more load to be shifted away from peak hours than is shown in this presentation
- The NTA process should be must allow for known assumption changes due to updated policy, forecasts, etc.

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Next Steps

- GMP presents time-series NTA analysis at July 17, 2025 VSPC Meeting
- Slides sent out to VSPC members for comment and question
- Define critical load level under revised PP7 ratings basis
- Determine severity of reliability concern with updated 2026 EV forecast
- GMP hosts follow-up meeting for VSPC members to present time-series analysis again and kick off NTA study group
- Reliability report due to DPS/PUC in April 2026

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