LES Resource Adequacy Position

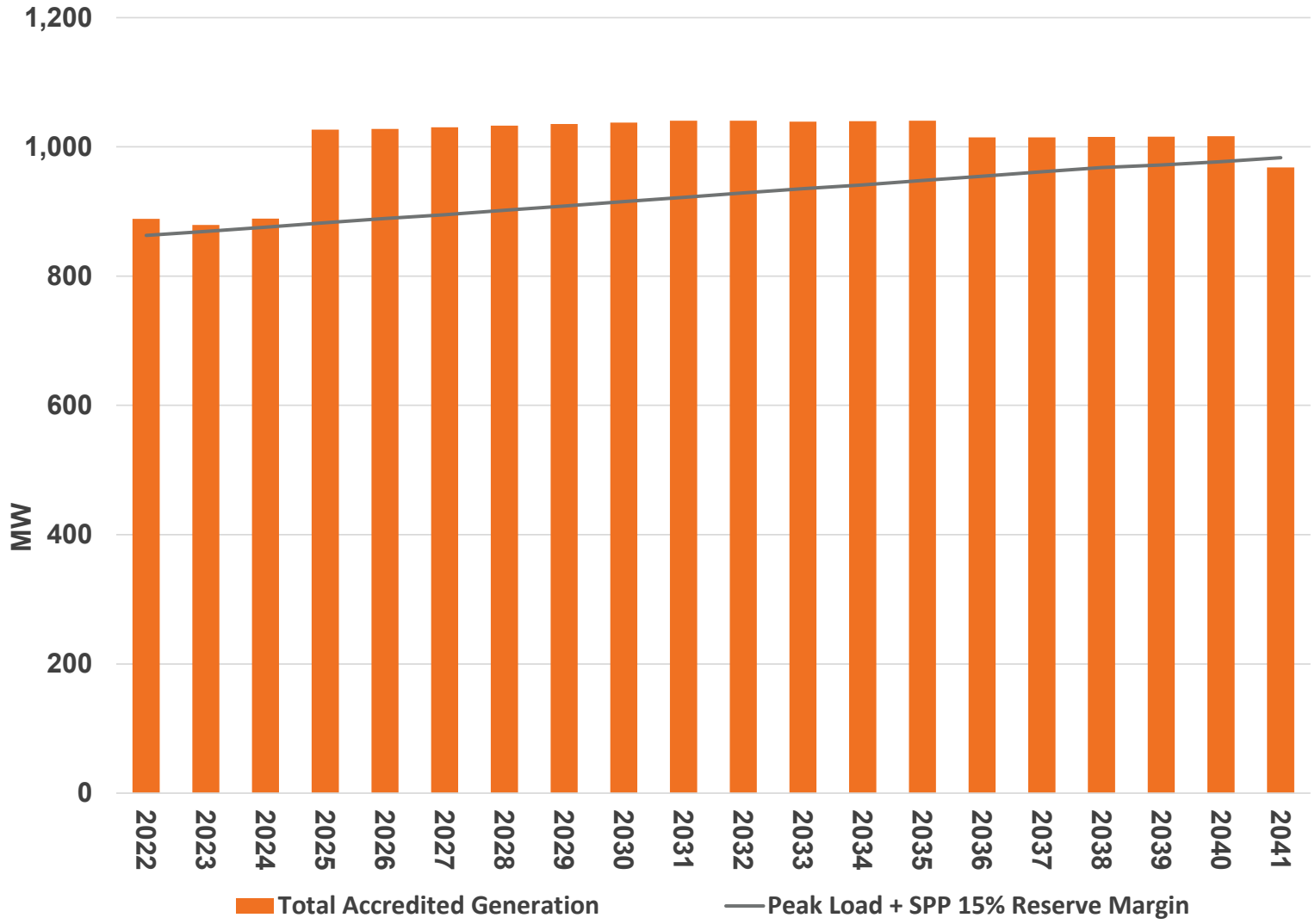
Scott Benson
Manager, Resource & Transmission Planning

March 21, 2025

Background Information

Background

2022 Load & Capability (Planning Reserve Margin = 15%)



Background
Near-Term Resource Plan

October 2022

- LES IRP identifies near-term resource plan, projected to come within 200 MW of meeting 2040 goal:
  - Eliminate or mitigate coal, looking for the most opportune time to do so.
  - Maintain existing natural gas units.
  - Retain wind portfolio.
  - Pursue new solar resource, not for resource adequacy, but to begin preparing for coal removals.

April 2024

- Reviewed solar project work to date – conducted by both LES and external consultant – with Operations & Power Supply Committee, including identification of potential locations and preliminary site design.
- Cautioned committee that pending SPP resource adequacy rule changes could impact the viability of solar, so LES had recently placed this work on pause to allow the SPP process to play out.

August 2024

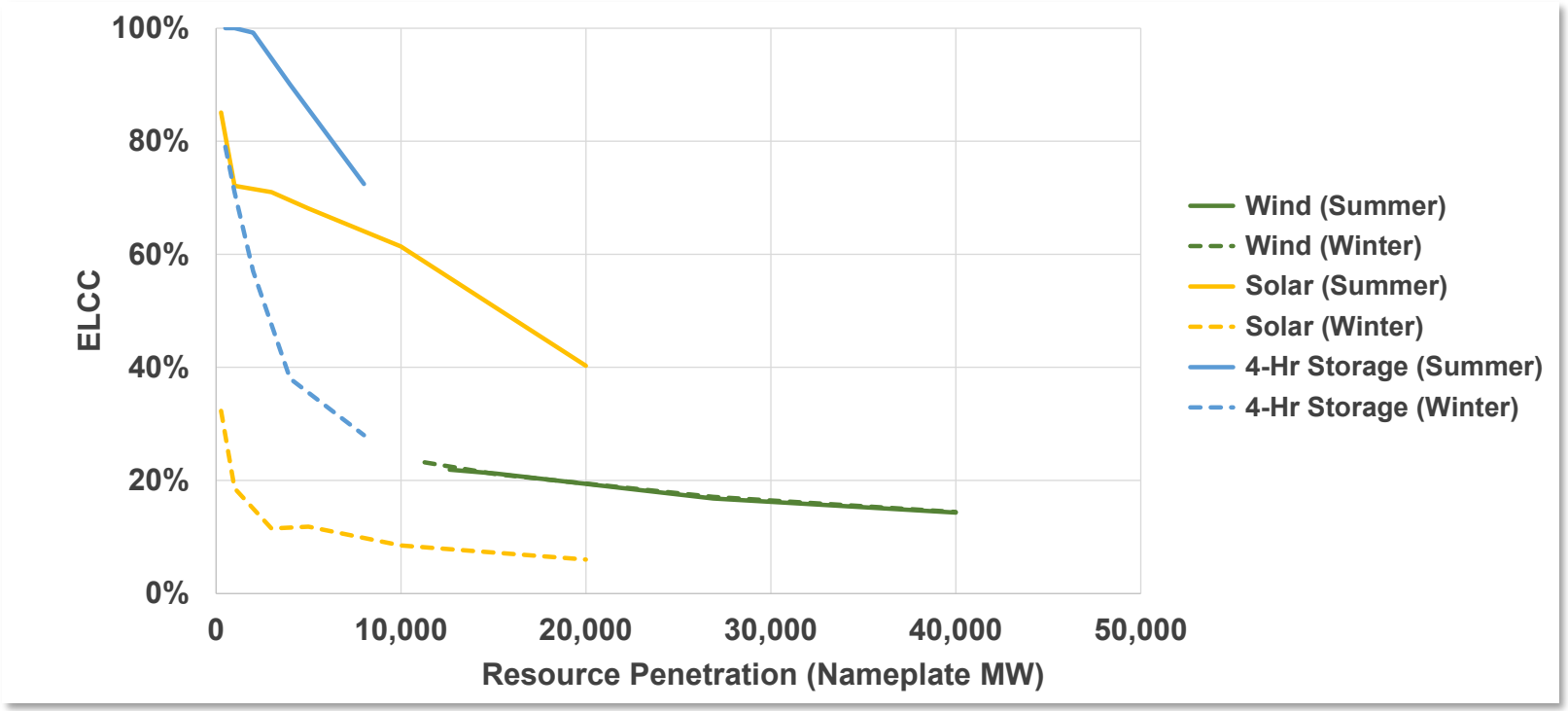
- New SPP resource adequacy rules are finalized and approved by SPP BOD; as expected, impacts require LES to reevaluate its near-term resource plan.

Background

New SPP Resource Adequacy Rules Proposed for 2026

Effective Load Carrying Capability (ELCC)

Derated accreditation of non-dispatchable resources to reflect diminished load-serving benefits as penetration of like resources increases.



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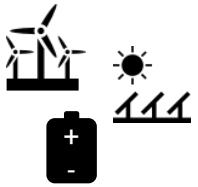

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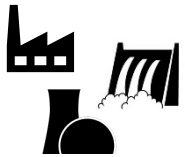

Performance Based Accreditation (PBA)

Derated accreditation of dispatchable resources to reflect historical forced outages, including winter-only fuel-related outages, over the last seven years.

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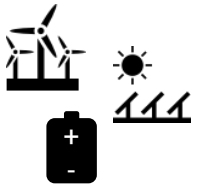
New SPP Resource Adequacy Rules Proposed for 2026



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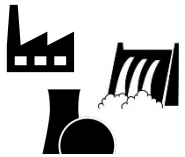

Performance Based Accreditation (PBA)

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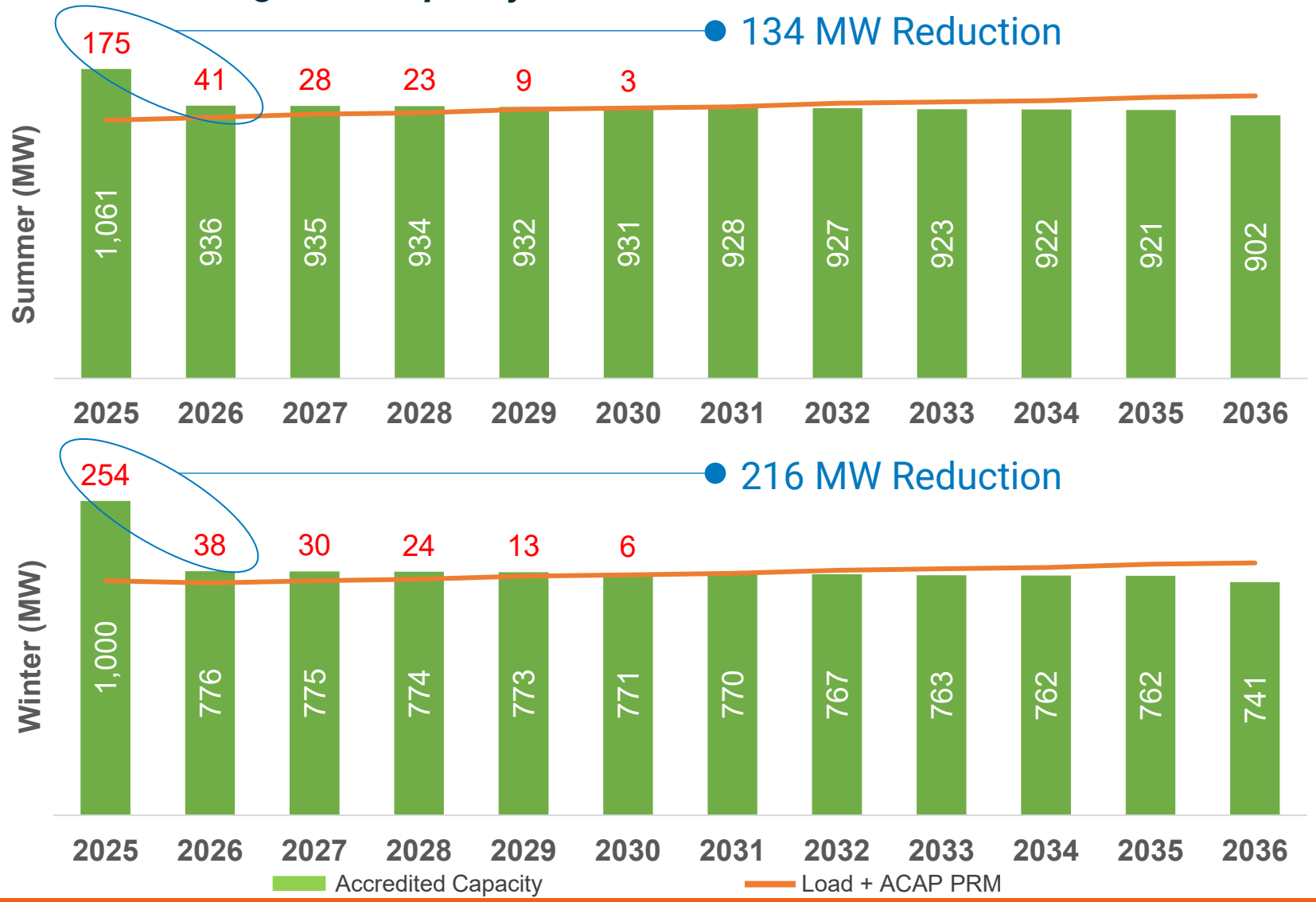
Accredited Capacity Planning Reserve Margin (ACAP PRM)

New SPP reserve margin requirement (peak load + X%) for both the summer and winter seasons.

Resource Adequacy Position

LES Load & Capability

Not Including 2025 Capacity Sales

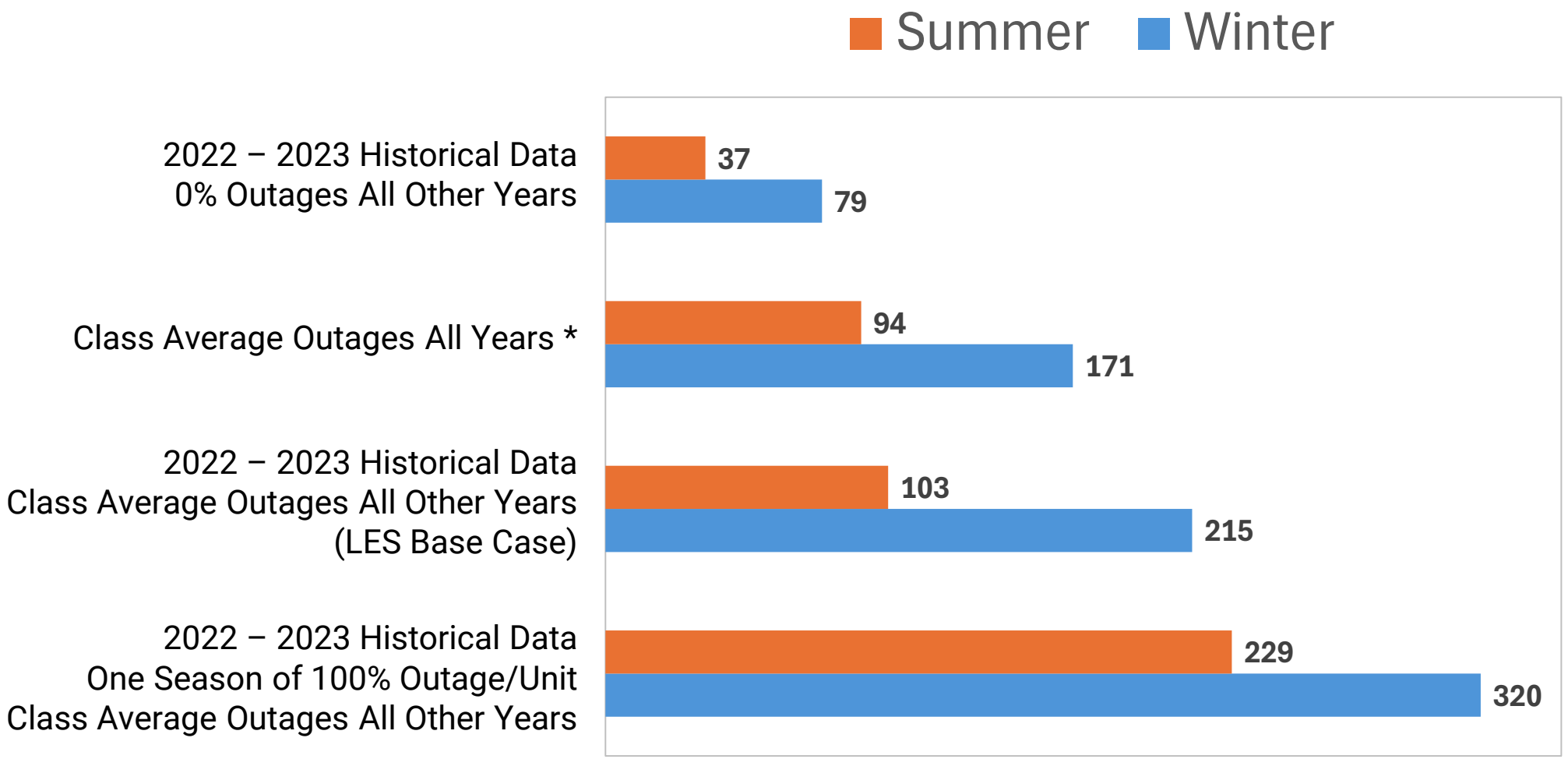


Numerous competing changes between 2025 and 2026 (LES load, SPP reserve margin, etc.), but key reductions in excess capacity are as follows:

Metric	Summer	Winter
PBA	103	215
ELCC	24	10
Total	**127**	**225**

Performance Based Accreditation Volatility

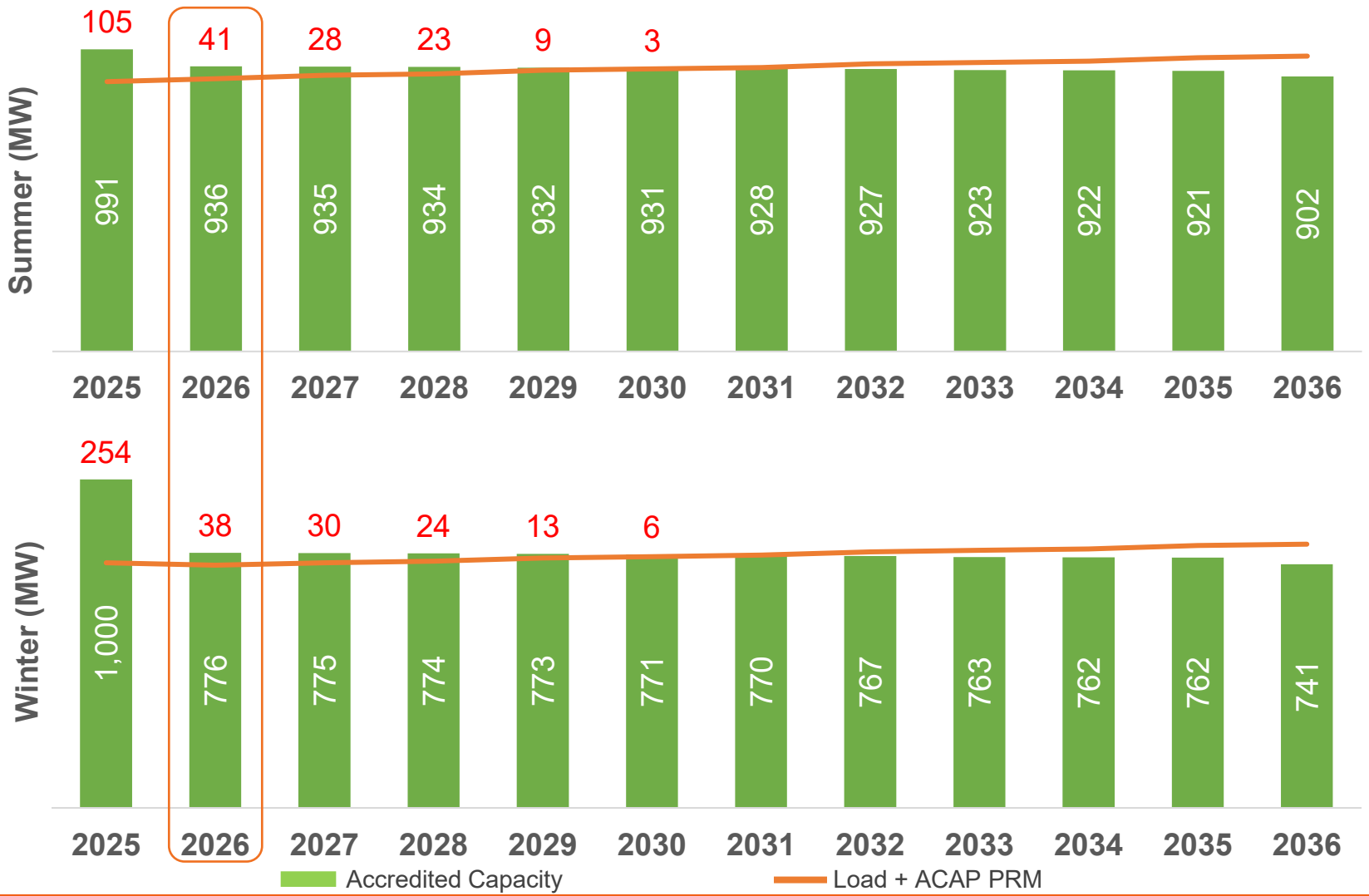
2029 Total LES Reduction in Accredited Capacity (All Applicable Resources)



To help mitigate this volatility, PS plans to incorporate a minimum buffer of 50 MW on top of its base case, or roughly half of this difference.

* Provided only for comparison purposes; 2022 – 2023 historical data must be included in 2029 capacity calculation.

LES Load & Capability



Targeting a minimum of 50 MW of excess capacity, LES' "need year" becomes **2026** for both the summer and winter seasons.

Previous near-term resource plan was about achieving the decarbonization goal while maintaining a future path to resource adequacy.

Now our focus must be achieving resource adequacy while maintaining a future path to the decarbonization goal.

Near-Term Resource Plan

Preliminary Options Analysis

Pending Hydro Power PPA

Central Nebraska Public Power and Irrigation District

CNPPID Solicitation
Aug 2024

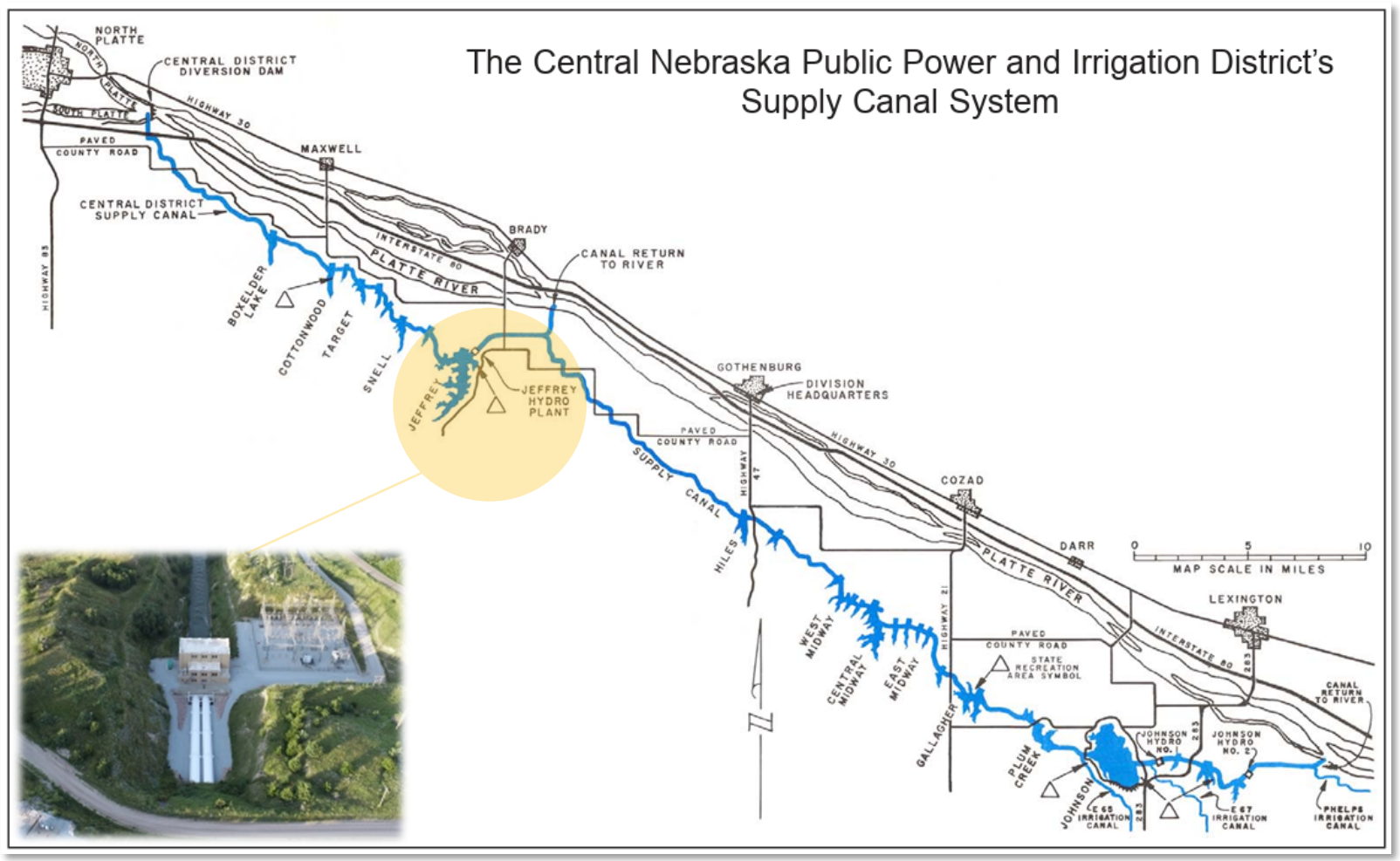
Resource
Jeffrey Hydro Plant

Nameplate Capacity
~ 22 MW

Contract Term
Apr 2025 – Dec 2037

Products

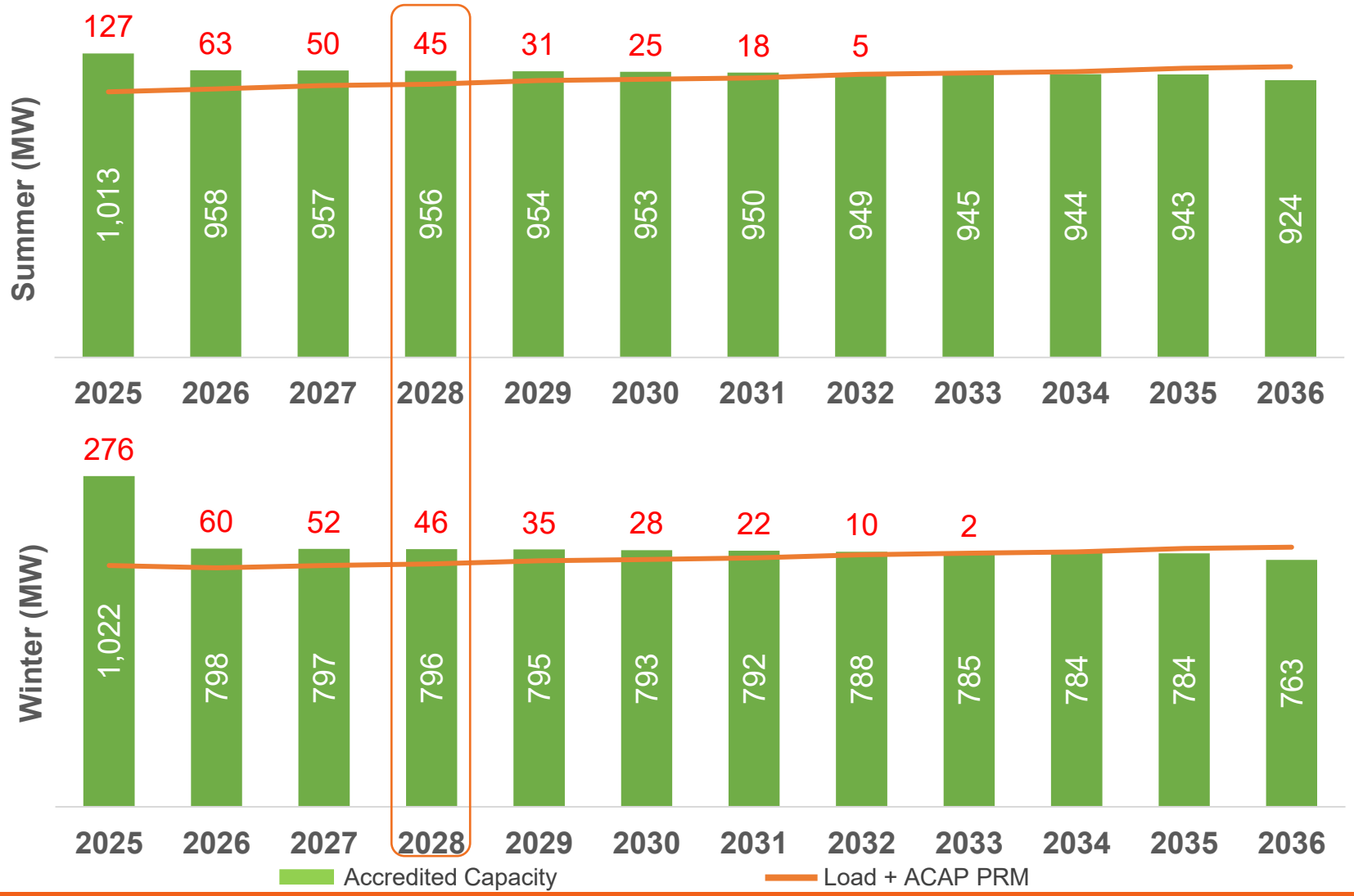
- Capacity
- Energy
- RECs



Source: https://cnppid.com/operations/hydropower

LES Load & Capability

w/CNPPID Hydro (22 MW) @ 2025



Change in Need year
Summer: 2026 → 2028
Winter: 2026 → 2028

Due to relatively small size, hydro addition still leaves a near-term need.

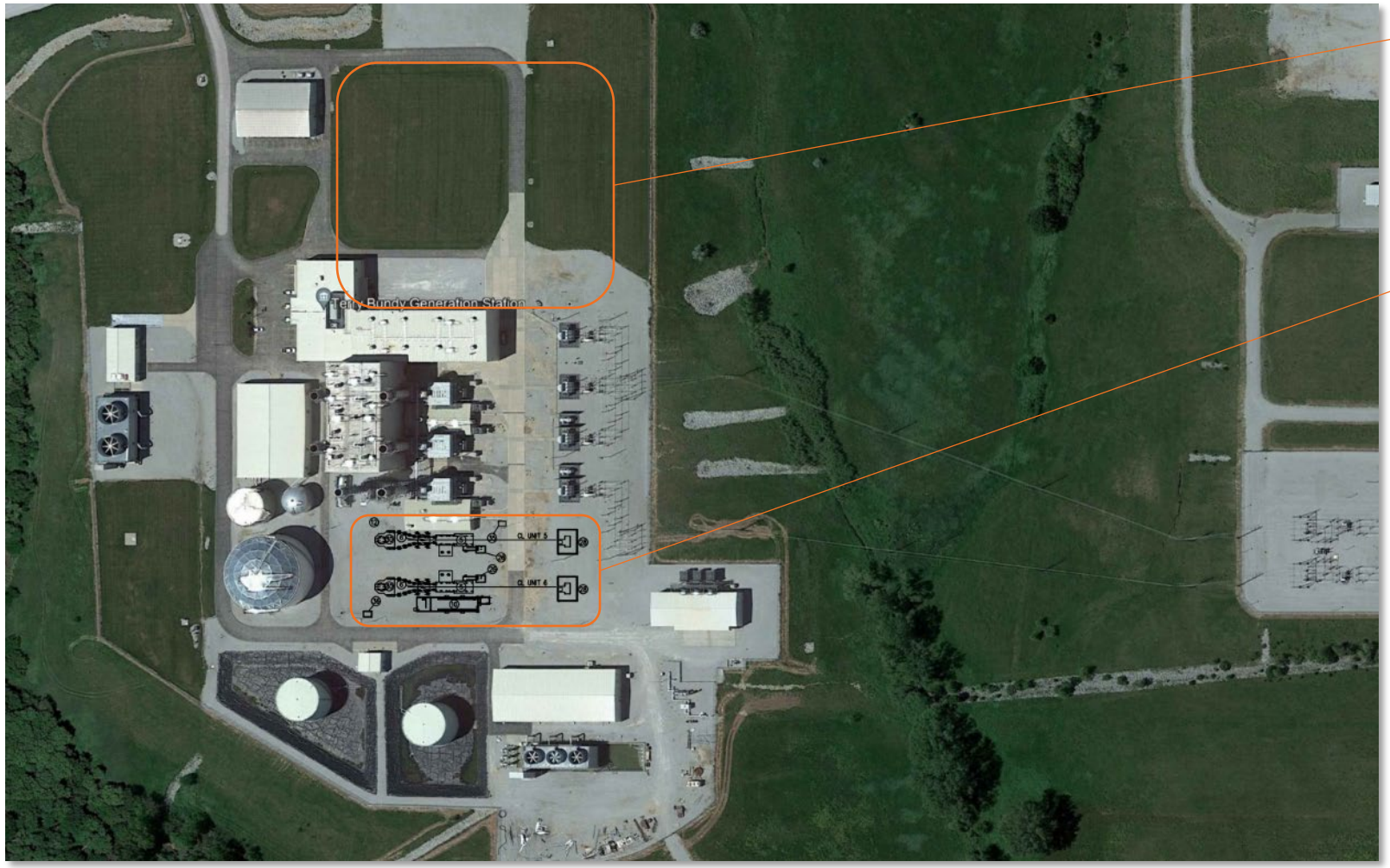
Resource Analysis

Near-Term Options for Additional Capacity

Resource	Approximate Nameplate MW	Tentative Summer COD
TBGS Aero Combustion Turbine (CT) x 2	100	2030
TBGS Frame CT	80	2030
TBGS Reciprocating Engines x 5	90	2030
Wind PPA	100	2028
4-Hr Battery PPA @ Existing Wind Sites	100	2028
Solar PPA	100	2028

*Also, actively pursuing short-term paper capacity contracts as a bridge to some of the above options.

TBGS Additions
Potential Options



Existing space for additional expansion with Frame or Recip. options.

Existing slots for two LM6000 Aero CT units.

Existing site is a huge advantage when it comes to one crucial component of this near-term resource plan…time.

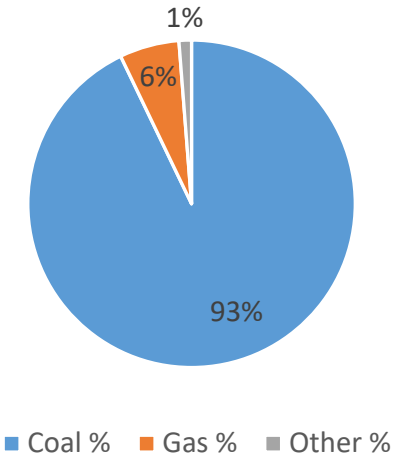
Also looking at the potential for another huge time saver – a used unit.

TBGS Additions
Potential Options

	Capital Cost	Number of Shafts	Portfolio CO2 ↑	Annual Net Revenue *
Recip. Engines *90 MW, 20% CF*	$162M	5	+3%	$1.6M
Aero CTs *100 MW, 13% CF*	$152M	2	+2%	$0.9M
Frame CT *80 MW, 5% CF*	$115M	1	+1%	$0.3M

* Assuming 2023 market conditions.

Historical CO_2 Emissions (2018 – 2023 Avg)

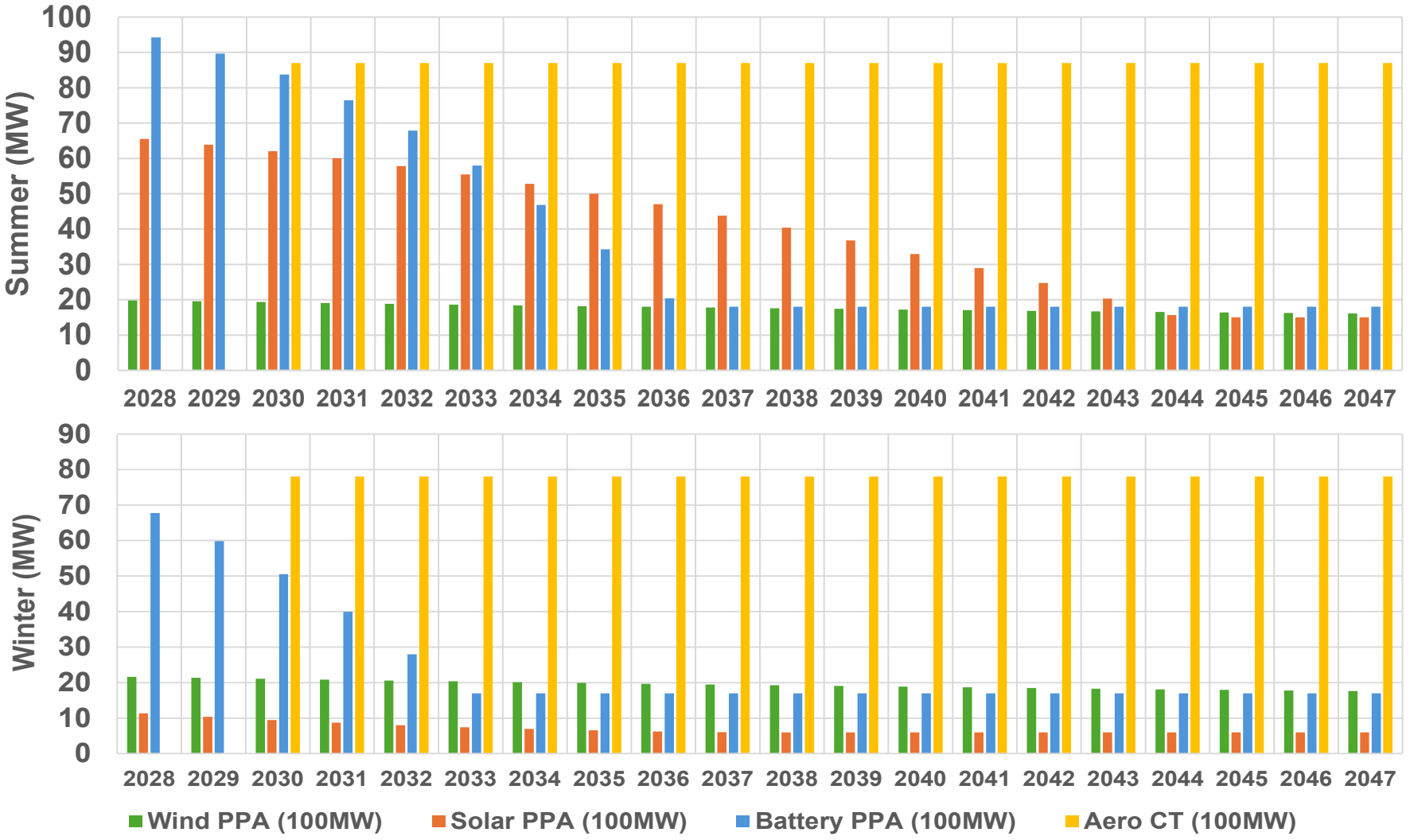


Mid-tier choice in every category, so simplify analysis by choosing Aero CT to represent the broader fleet of natural gas options.

Gas can represent a minor near-term increase in CO2 emissions in exchange for building the capacity to sustain future coal removals.

Resource Analysis

Estimated Accredited Capacity Comparison

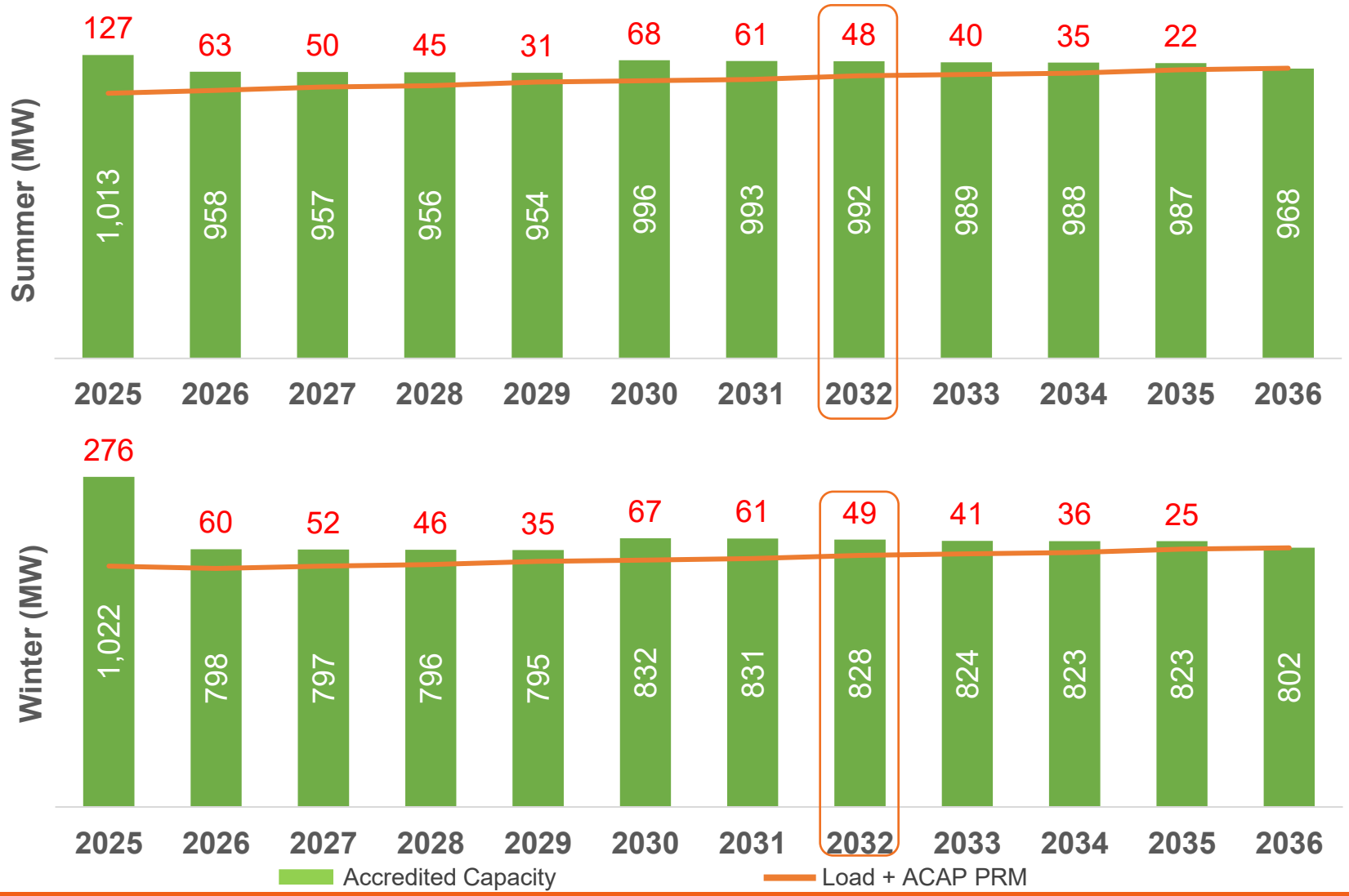


Natural gas accreditation reflects LES' assumptions for the application of PBA.

Wind, solar and battery storage reflect LES' assumptions for the application of ELCC.

LES Load & Capability

w/CNPPID Hydro (22 MW) + one Aero CT (50 MW) @2030



Change in Need year *

Summer: 2028 → 2032

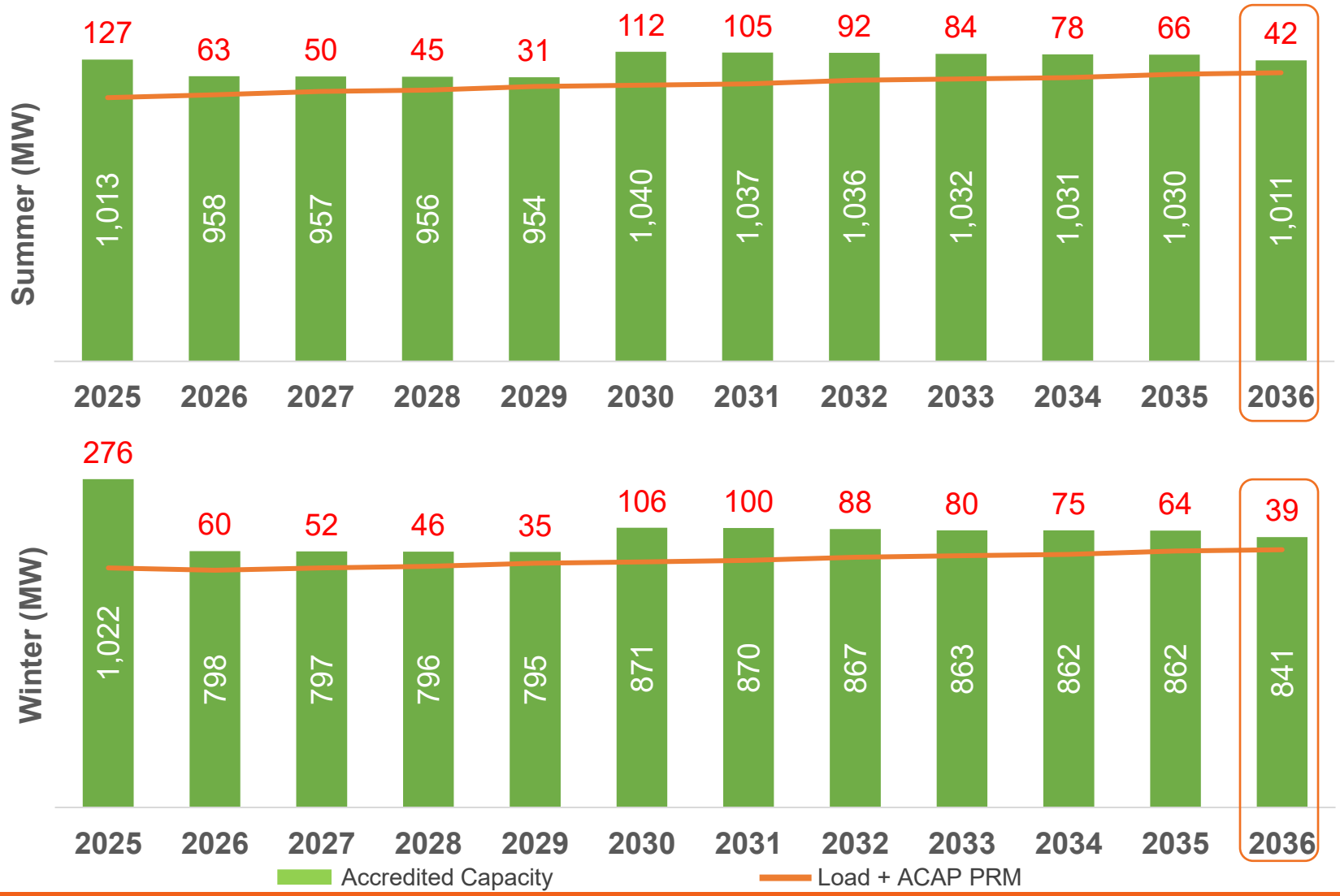
Winter: 2028 → 2032

* Still need to ride through 2029.

One 50 MW Aero CT only moves the need year to 2032, which is still essentially imminent.

LES Load & Capability

w/CNPPID Hydro (22 MW) + two Aero CTs (100 MW) @2030



Change in Need year *

Summer: 2028 → 2036

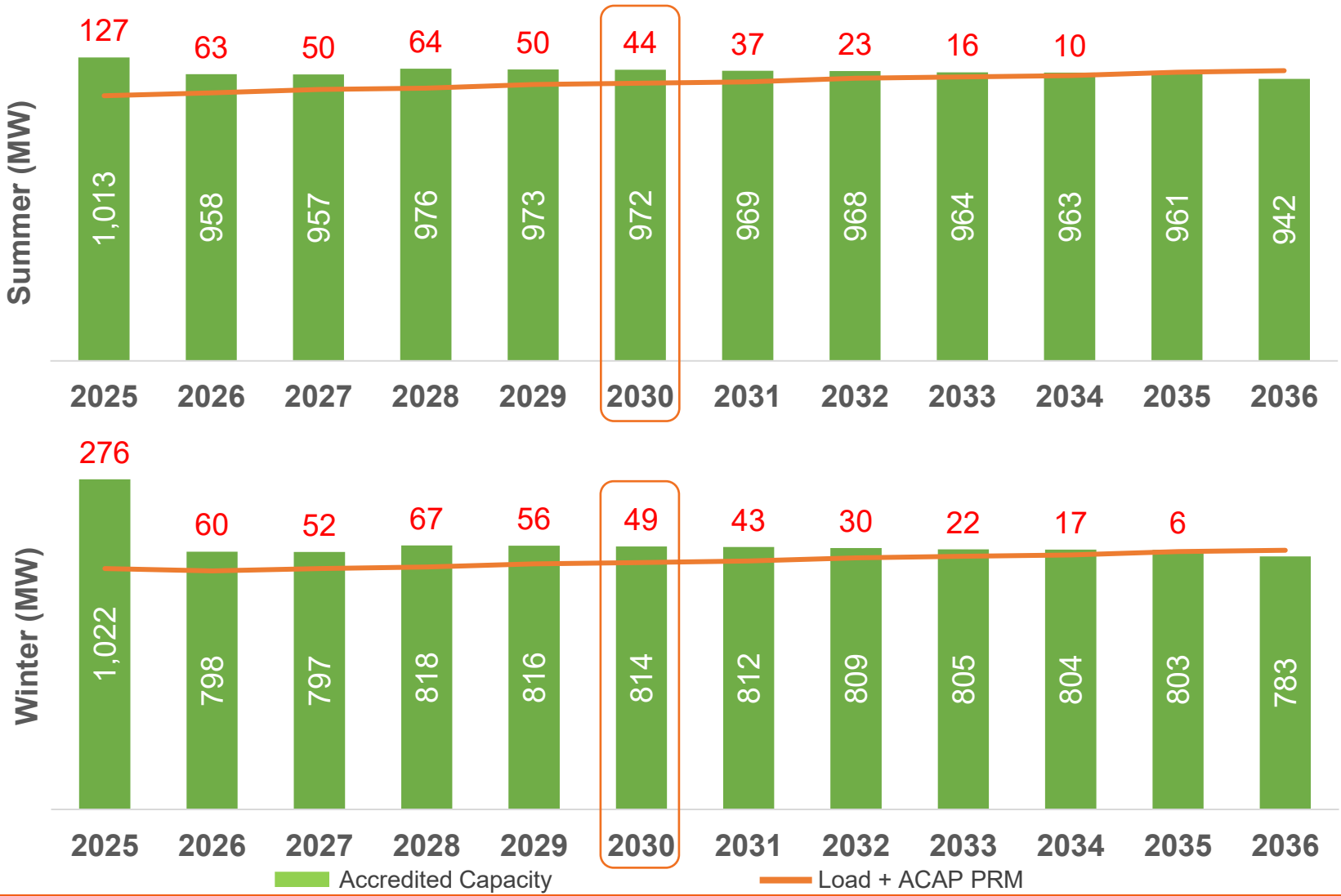
Winter: 2028 → 2036

* Still need to ride through 2029.

100 MW more securely establishes LES' near-term position.

Load & Capability

w/CNPPID Hydro (22 MW) + Wind PPA (100 MW) @ 2028



Change in Need year
Summer: 2028 → 2030
Winter: 2028 → 2030

100 MW Wind PPA only moves the need year to 2030, which is still essentially imminent.

Load & Capability

w/CNPPID Hydro (22 MW) + Wind PPA (400 MW) @ 2028

Change in Need year
Summer: 2028 → 2036
Winter: 2028 → 2036

400 MW more securely establishes LES' near-term position.

Load & Capability

w/CNPPID Hydro (22 MW) + Battery PPA (100 MW) @ 2028

Change in Need year
Summer: 2028 → 2034
Winter: 2028 → 2032

100 MW battery PPA sees reasonable summer season improvement, but winter season need is still essentially imminent.

Load & Capability

w/CNPPID Hydro (22 MW) + Battery PPA (400 MW)

Change in Need year
Summer: 2028 → 2036
Winter: 2028 → 2036

400 MW more securely establishes LES' near-term position, but it also requires summer over-build in the near term.

Load & Capability

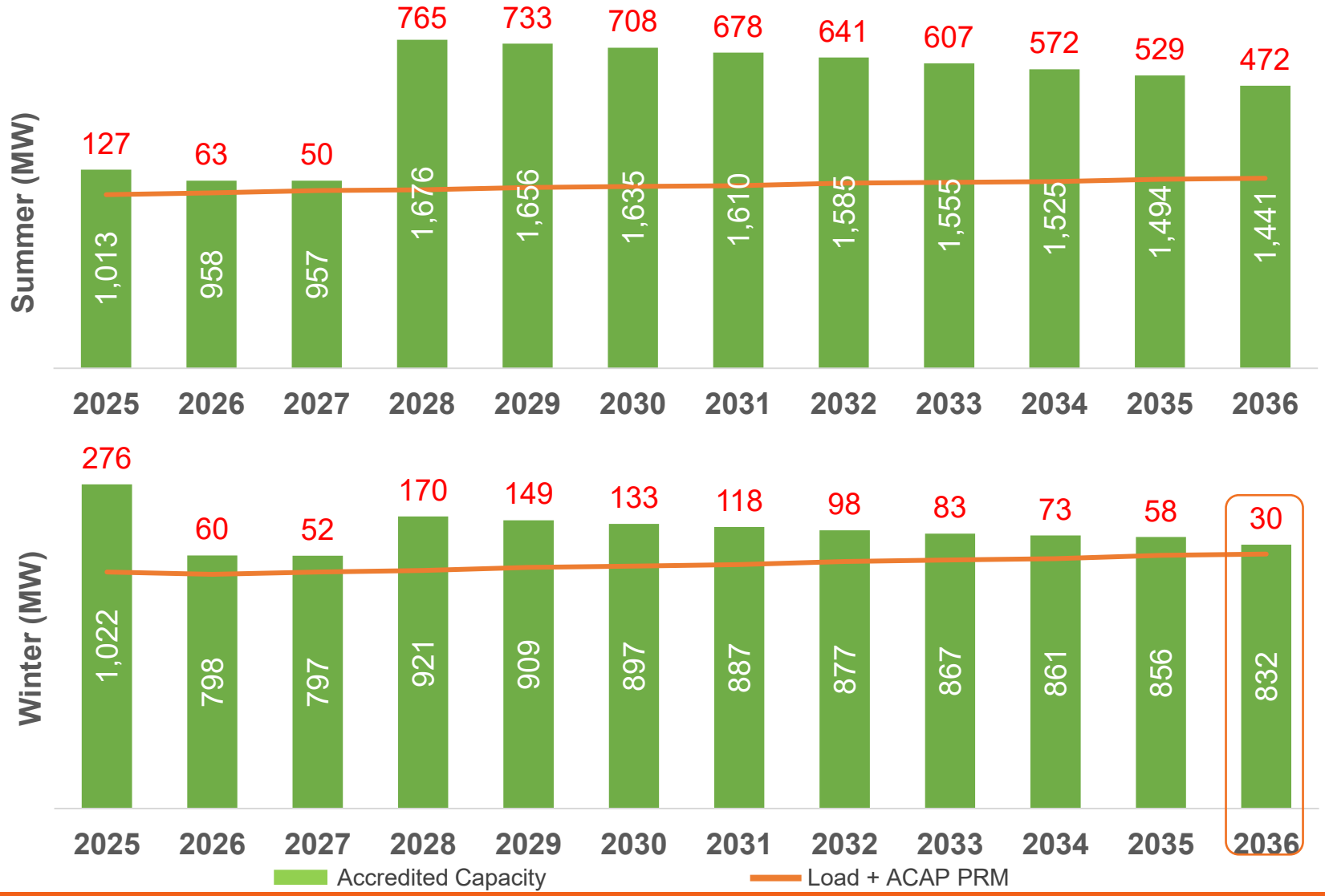
w/CNPPID Hydro (22 MW) + Solar PPA (100 MW) @ 2028

Change in Need year *
Summer: 2028 → 2034
Winter: 2028 → 2029

100 MW solar PPA sees reasonable summer season improvement, but winter season impact is negligible.

Load & Capability

w/CNPPID Hydro (22 MW) + Solar PPA (1,100 MW) @ 2028

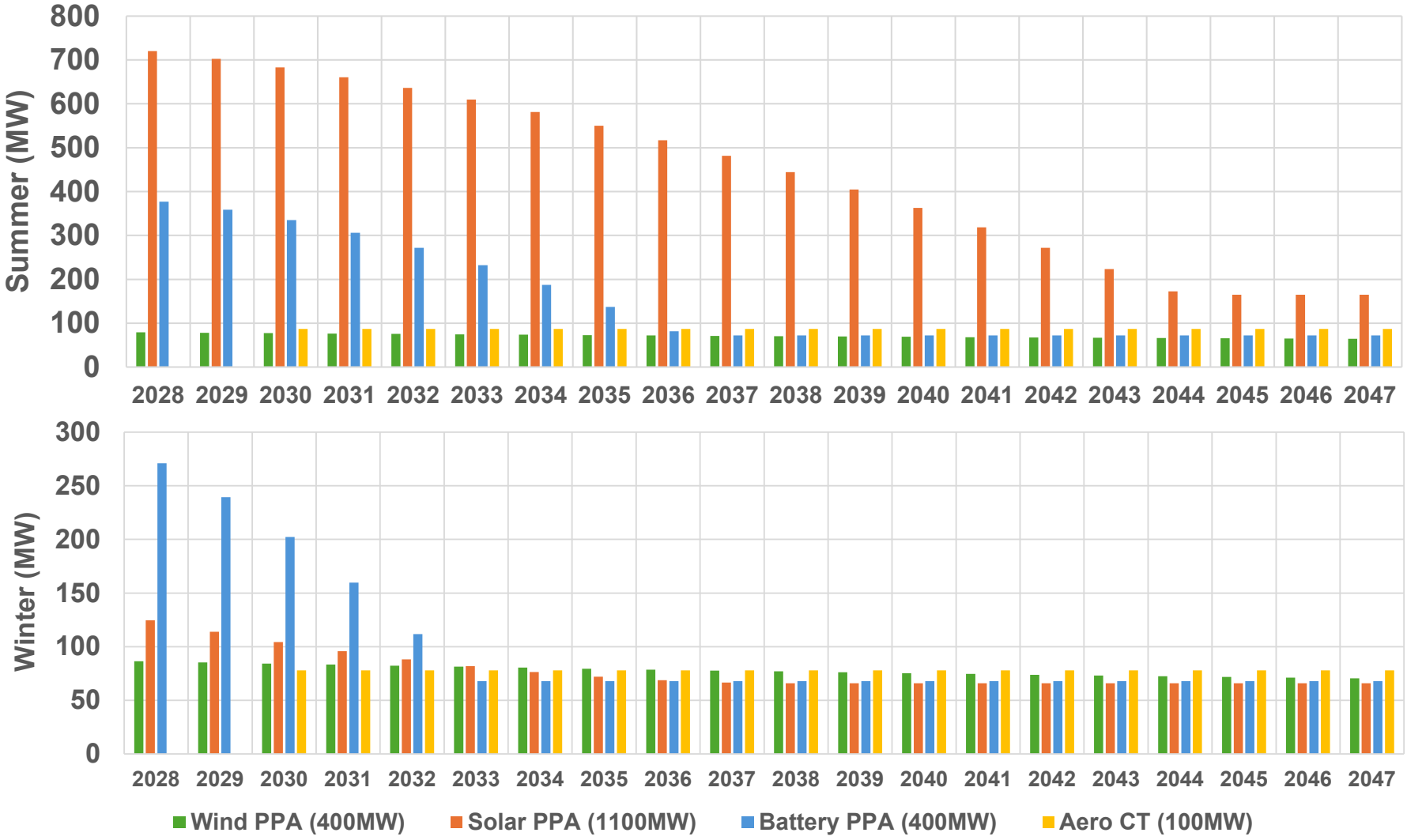


Change in Need year *
Summer: 2028 → 2036+
Winter: 2028 → 2036

1,100 MW more securely establishes LES' near-term position, but it also requires significant long-term summer over-build.

Resource Analysis

Estimated Accredited Capacity Comparison

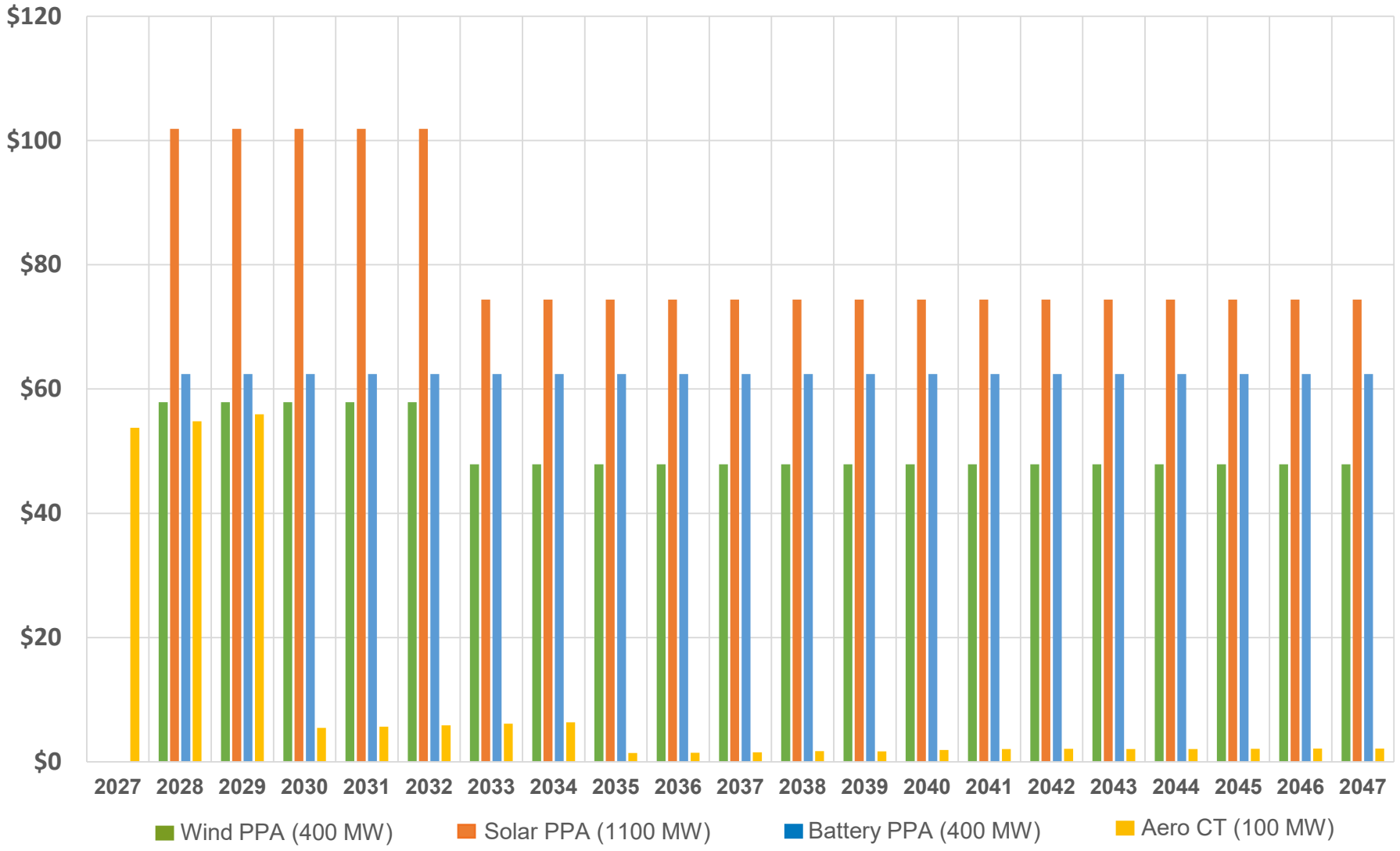


The right amount of wind can provide summer and winter resource adequacy positions comparable to natural gas.

Due to differences between their summer and winter accreditation, solar and battery storage can present a challenge when your winter and summer needs are essentially balanced.

Resource Analysis

Estimated Net Cashflow Comparison ($M)

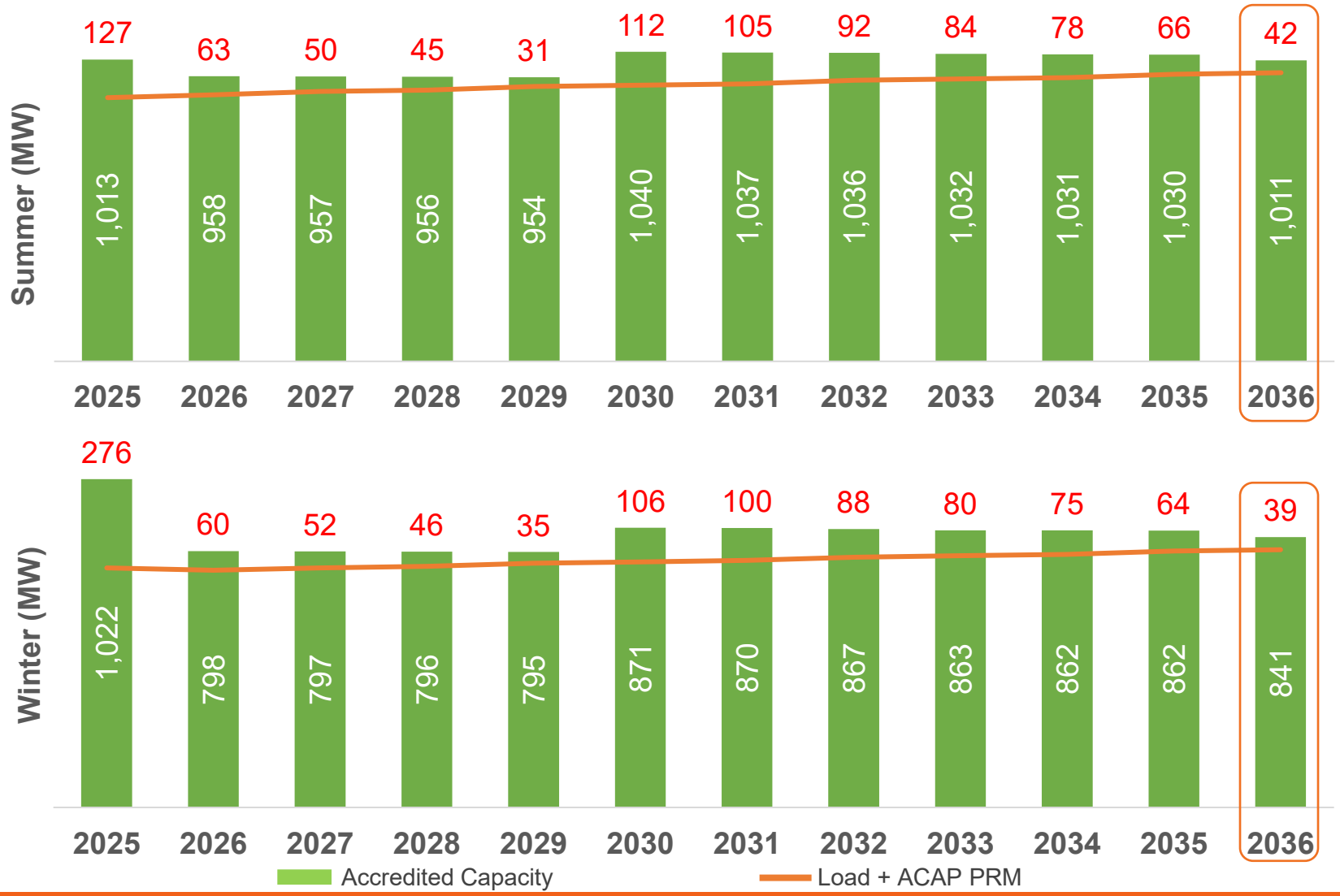


At current PPA prices, the amount of wind, battery and solar resources required to obtain the desired resource adequacy position equates to a significant cost.

* Assuming 2023 market conditions every year.

Load & Capability

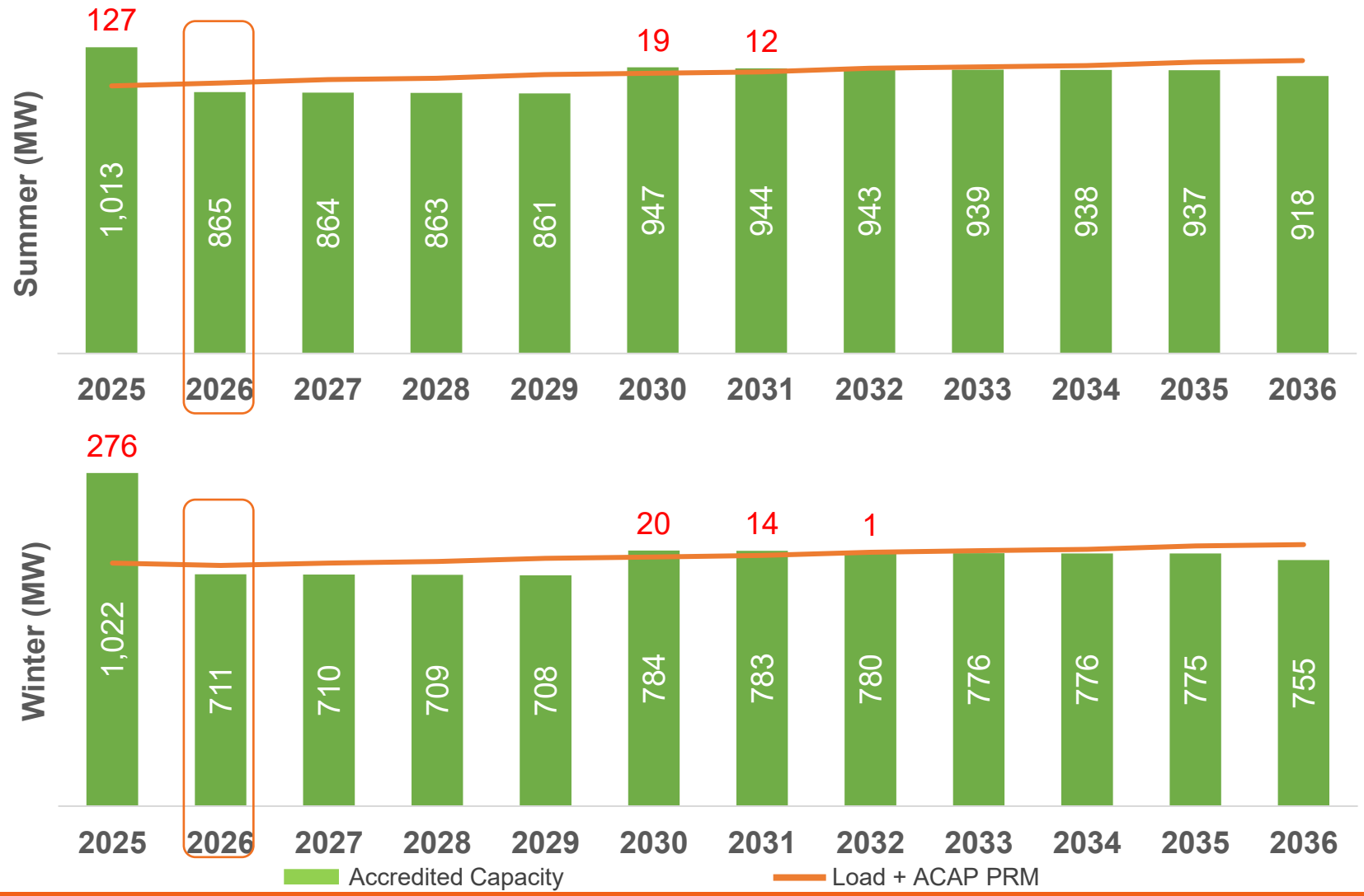
w/CNPPID Hydro (22 MW) + two LM6000 Aero CTs (100 MW) @2030



Based on this preliminary analysis, this would currently appear to be the best option for meeting LES' near-term resource adequacy needs…but does it go far enough?

Load & Capability

w/CNPPID Hydro (22 MW) + two LM6000 Aero CTs (100 MW) – WSEC (103 MW) @ 2026



Change in Need year
Summer: 2036 → 2026
Winter: 2036 → 2026

Although these additions would place LES in a good position today, we can't sustain even the loss of our smallest coal resource.

More is required to stretch beyond simple resource adequacy and again start preparing for future coal removals, just as we did with the 2022 IRP.

Proposed Near-Term Resource Plan

1) Finalize and execute CNPPID hydro contract.

2) Continue to pursue potential near-term paper capacity contract (~ 2026 – 2030).
   Could cure near-term exposure and buy time in case of delays associated with any subsequent resource additions.

3) Continue to investigate other near-term resource options.
   April LES Administrative Board meeting to include a discussion of how these near-term options fit into a long-term resource plan.

Questions?