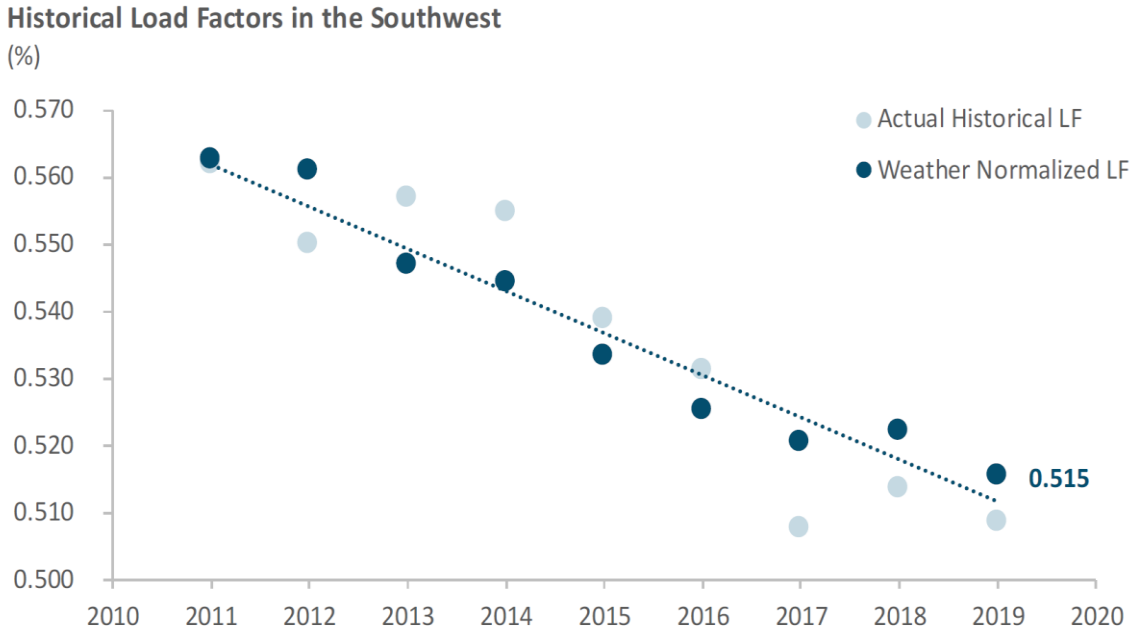
TEP/UNSE Resource Planning Advisory Council Meeting

July 7, 2023

TEP's Plan for Assessing Resource Adequacy

- Our approach is still being refined and tested
- Will rely on a body of evidence, including:
  1. Traditional application of a planning reserve margin (PRM), but …
     - increased beyond the historic level of 15% to account for increasing variability in supply and demand, and
     - enhanced by use of ELCCs to determine capacity credits for variable renewable energy and energy-limited storage resources (see E3 study for TEP balancing area)

ELCCs will also help TEP evaluate proposals for resource procurement and ensure adequate reliability planning as we prepare for each summer



Source: Resource Adequacy in the Desert Southwest

Planning reserve margin targets vary considerably across Western utilities

- **Reserve margin requirements throughout the Western Interconnection generally vary between 13% and 20%**
- **Variations between utilities are driven by a number of factors:**
  - Different **system characteristics**
  - Different **accounting conventions**
  - Different **methodologies**
  - Different assumptions regarding **market support**
- **Most utilities rely on loss-of-load-probability modeling as the basis for establishing a PRM requirement, but some are stipulated based on rules of thumb**
  - Utilities that have recently adopted LOLP modeling have generally found that increases in PRM requirements have been needed

Utility	PRM	References
Arizona Public Service Co	15%	APS 2020 IRP
Avista Corporation	16%	Avista 2021 Electric IRP
California Public Utilities Commission[1]	20-24%	CPUC PSP
El Paso Electric Company[2]	13%	EPE 2021 IRP
Idaho Power Company	15.5%	IPC 2021 IRP
Northwestern Energy	16%	NWE 2020 Supply Plan
NV Energy	16%	NVE IRP
PacifiCorp	13%	PacifiCorp 2023 IRP
Portland General Electric[3]	N/A	PGE 2023 IRP
Public Service Company of New Mexico	18%	PNM 2020 IRP
Public Service Company of Colorado	18-20%	PSCo 2021 ERP
Puget Sound Energy	21-24%	PSE 2021 IRP
Sacramento Municipal Utilities District	15%	SMUD 2018 IRP
Salt River Project	16%	SRP 2023 ISP
Tucson Electric Power	15%	TEP 2020 IRP

Notes
1. The CPUC's requirement is expressed in ICAP terms and corresponds to a "PCAP" PRM of 13%; this requirement will inform LSE's obligations for procurement to meet near-term needs
2. EPE's 13% PRM requirement uses a "PCAP" accounting convention, which results in it being materially lower than requirements expressed using an "ICAP" convention
3. In its latest IRP, PGE does not rely on a PRM requirement, instead relying exclusively on an LOLH standard of 2.4 hrs/yr

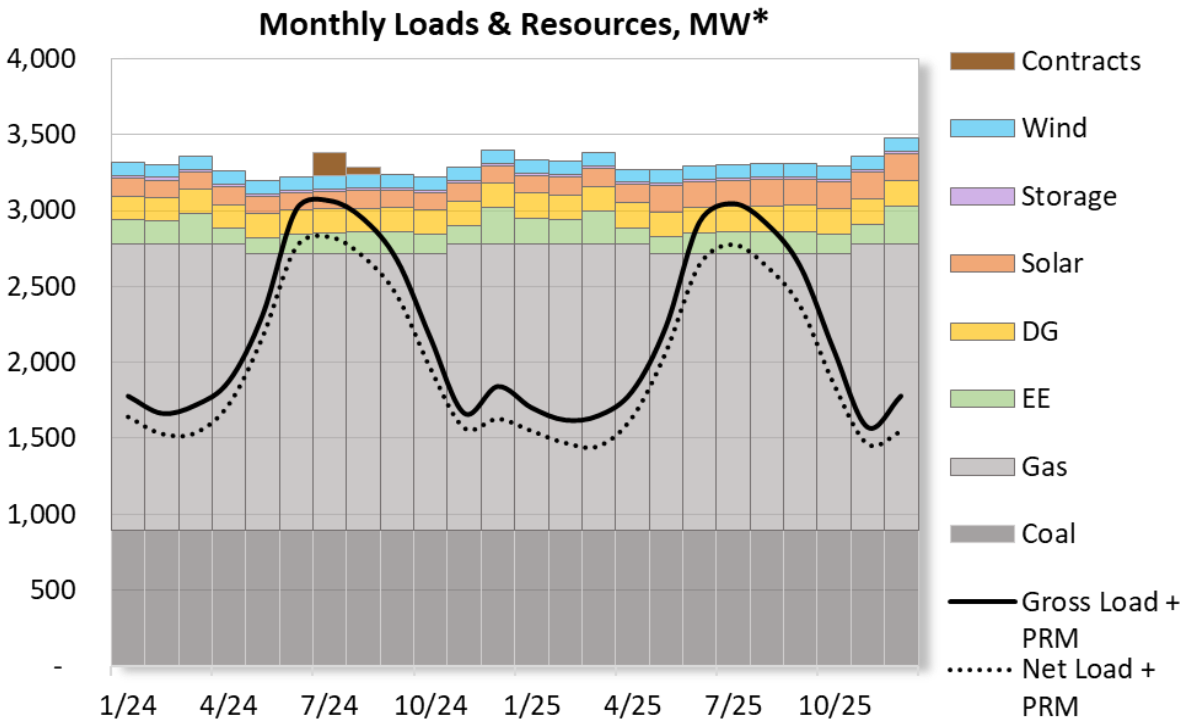
Source: APS IRP website

TEP's Plan for Assessing Resource Adequacy (cont'd)

3. Using Aurora (hourly dispatch model) to evaluate all hours of the 15-year study period for potential shortfalls in supply, assuming different annual weather patterns, load conditions, and market availability
4. Using Aurora to identify periods or conditions when the system becomes insufficiently flexible to reliably or cost-effectively serve all of its load – i.e., *"flex capacity"*
   - Violation of unit ramp rates, operating reserve requirements, etc.
5. Qualitative evaluation of risks and consideration of the strengths and weaknesses of the above methods

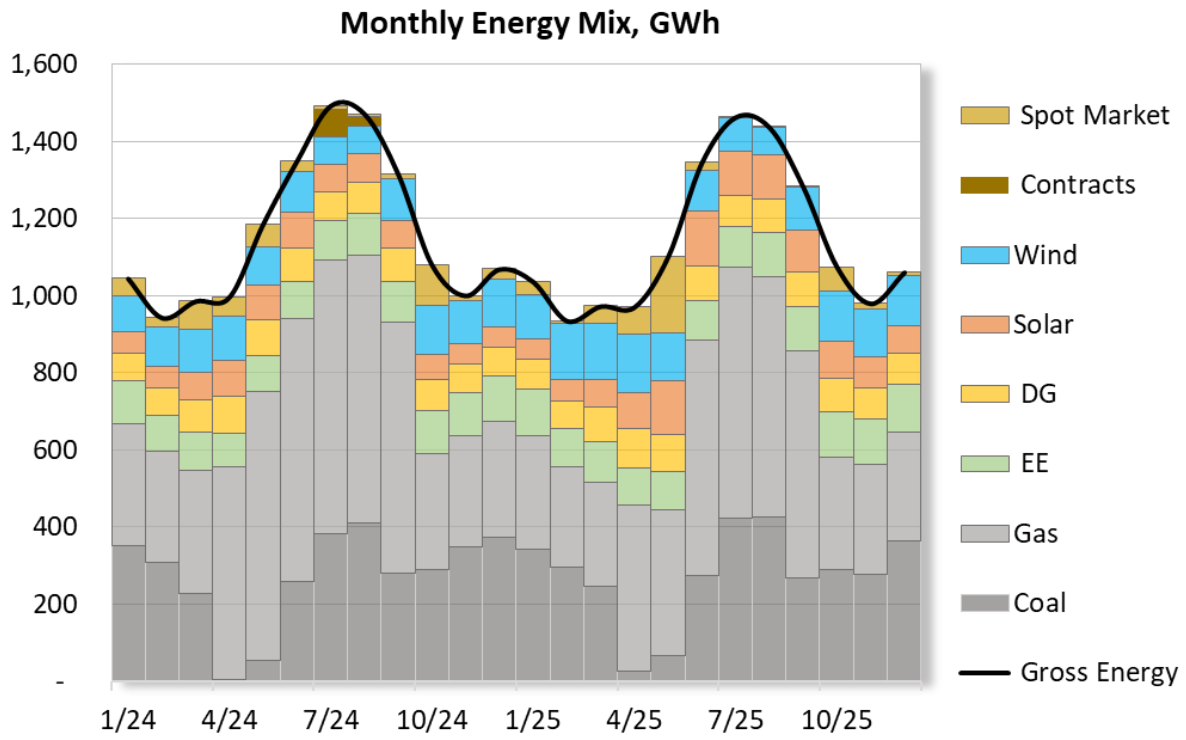
Loads and Resources: Short-Term Outlook

Monthly Capacity



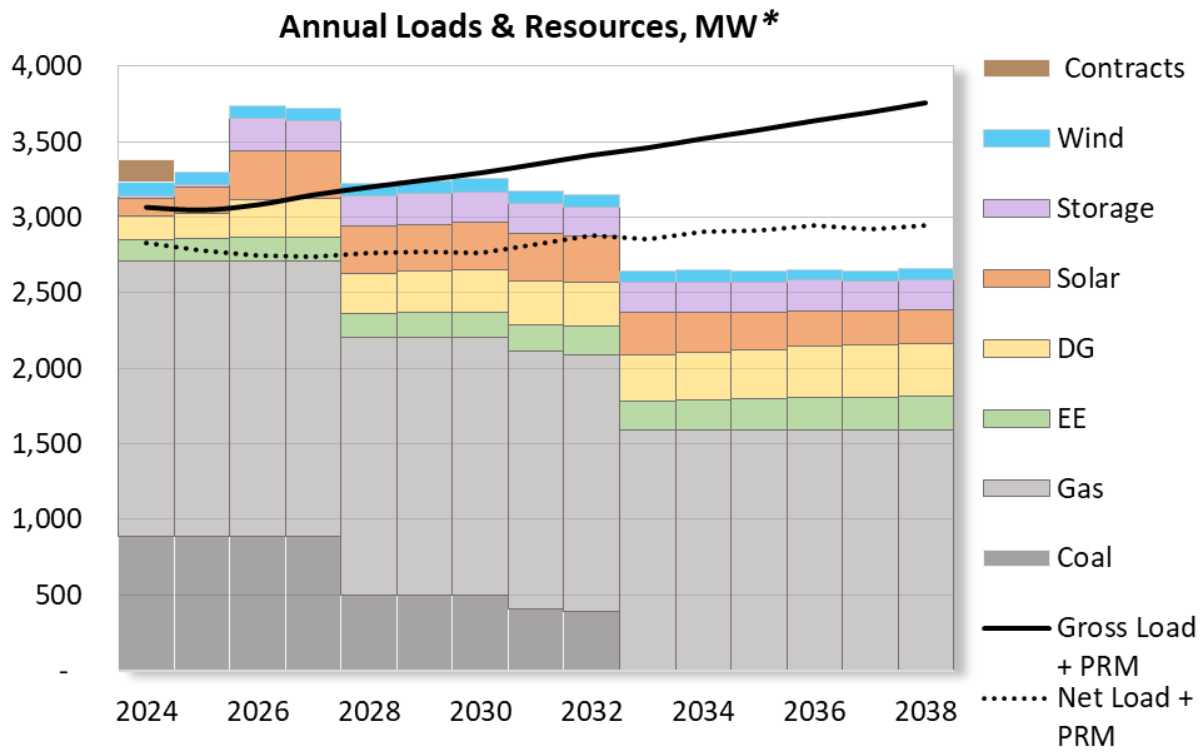
* Coincident peak

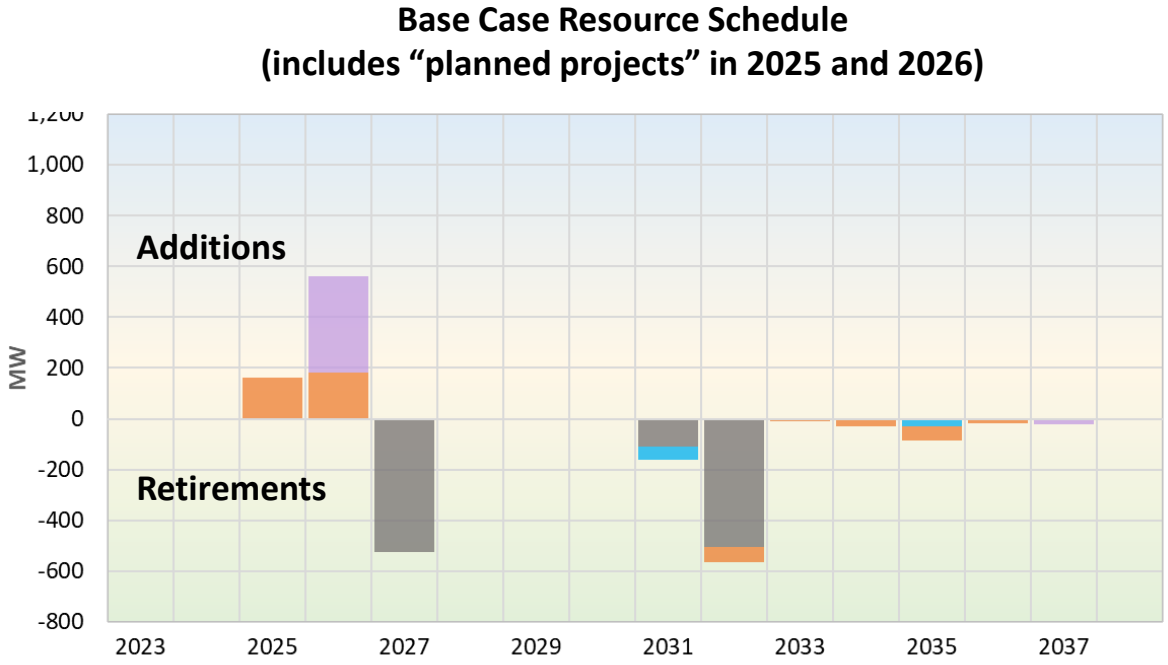
Monthly Energy



Loads and Resources: Long-Term Outlook

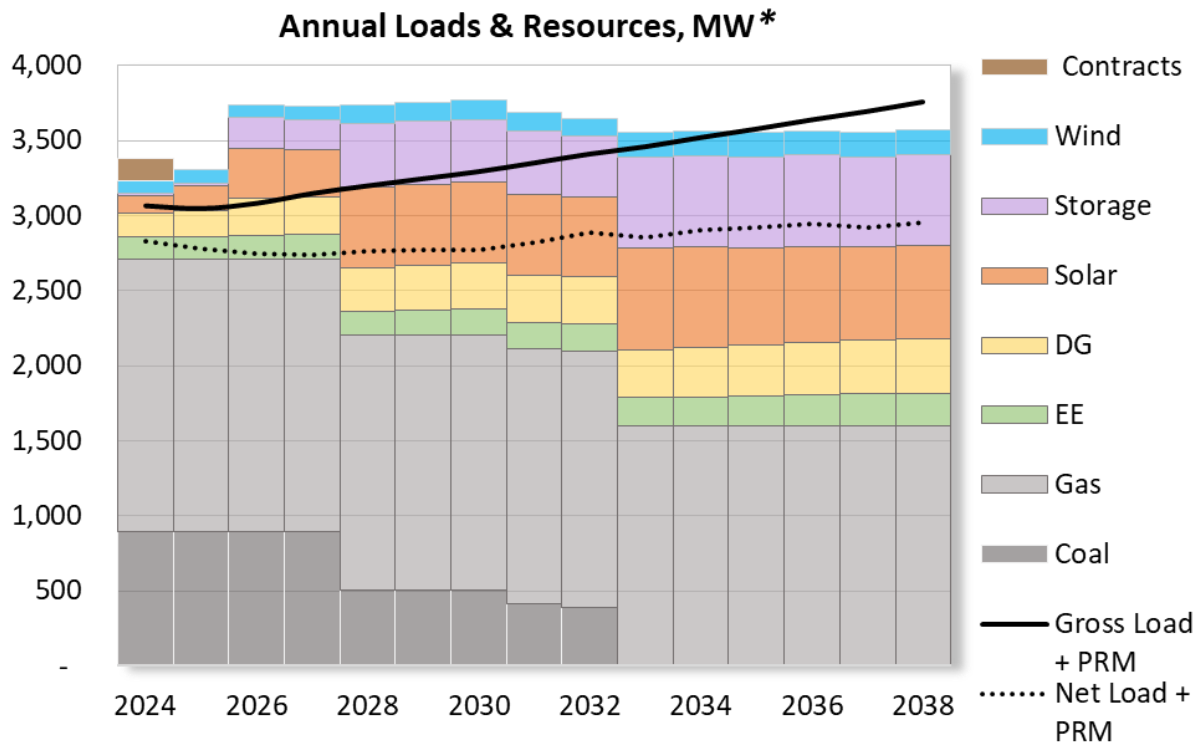
Base Case





Loads and Resources: Long-Term Outlook

Simplified Reference Case



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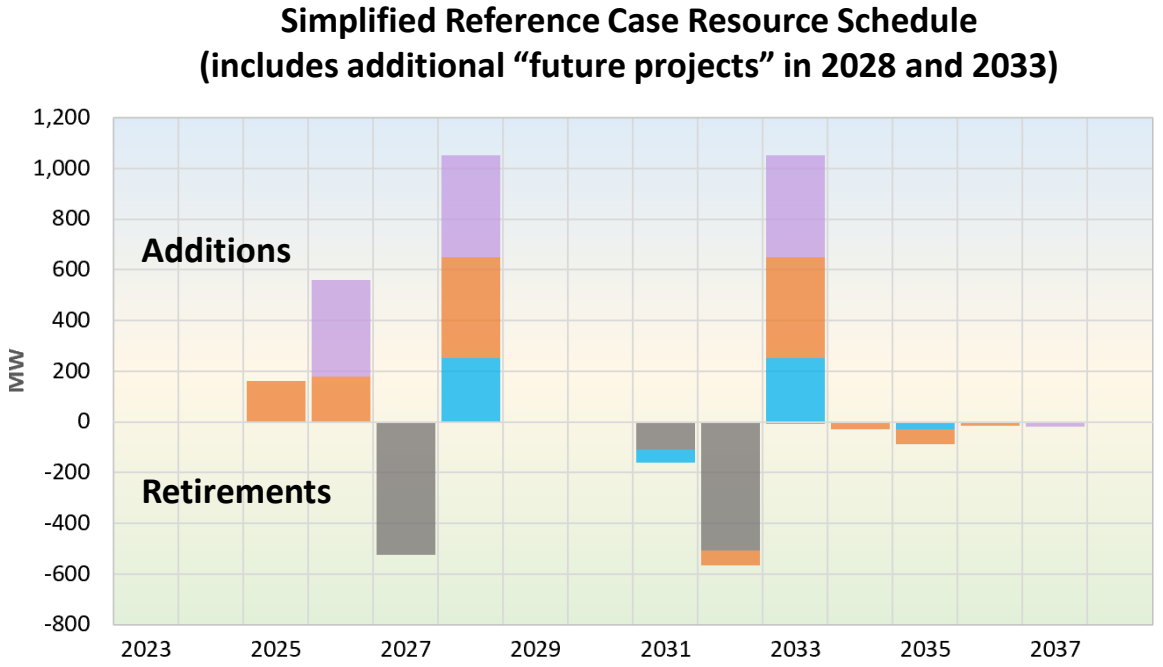
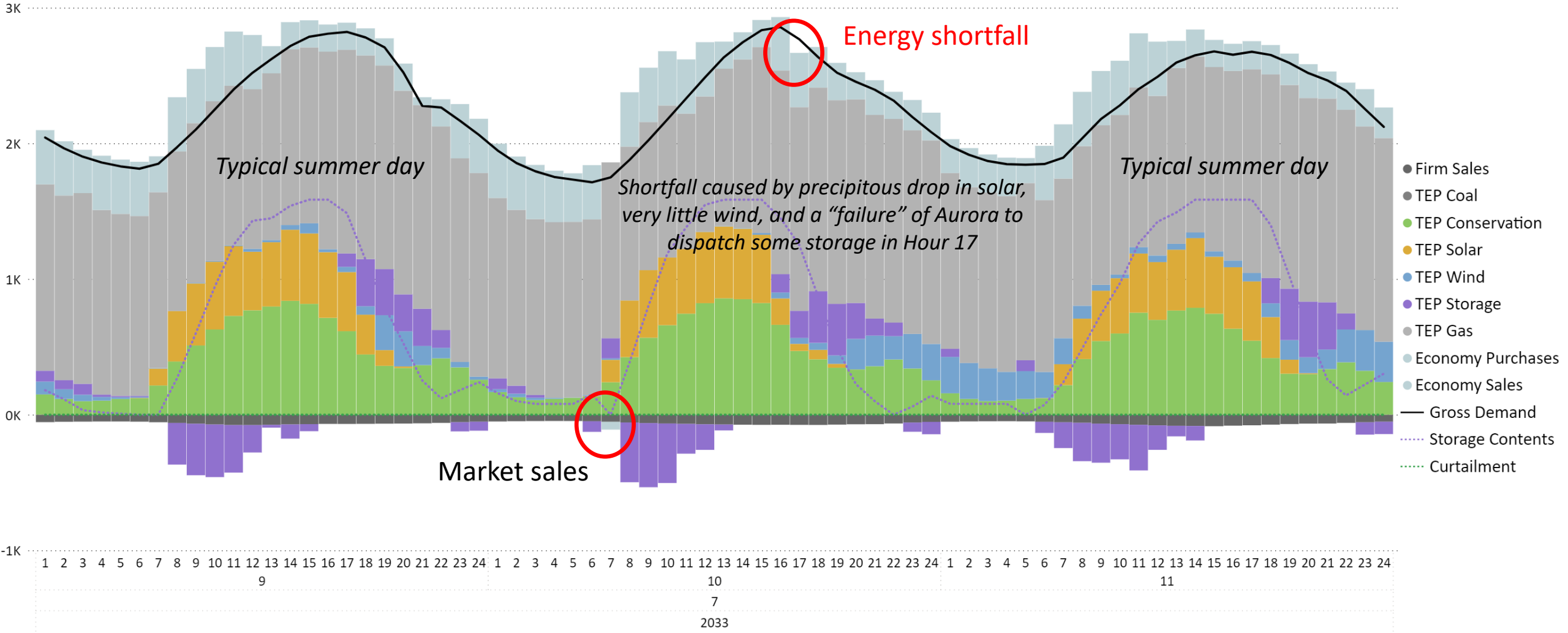
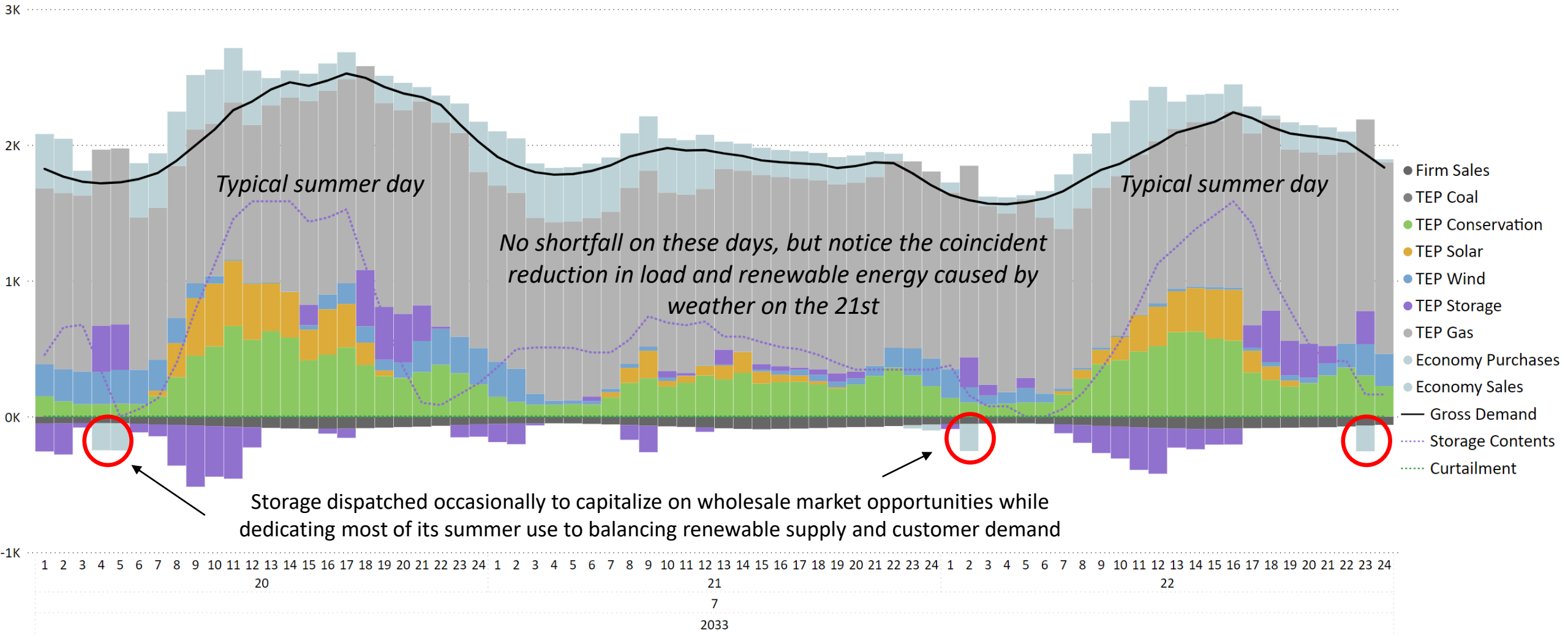


Simplified Reference Case Dispatch Results (July 9-11, 2033)



Simplified Reference Case Dispatch Results (July 20-22, 2033)



Modeling Committee Update

- June 1 – Orientation / kickoff meeting with TEP Modeling Committee members
- June 13 – Joint APS/TEP Modeling Committee meeting
- June 13 – Committee members granted access to EnergyExemplar client portal
- June 26 – APS and TEP provide committee members their respective, first versions of their Aurora input databases
- June 29 – First Aurora training session with EnergyExemplar
- TBD – APS to schedule/coordinate second Aurora training session (on capacity expansion)
- No major comments or questions received so far
- Going forward, TEP plans to:
  - Complete its reference cases for each company and begin modeling sensitivity cases and/or alternative portfolios next week
  - Conduct increasingly-complex portfolio and scenario modeling / risk assessments through the end of September