SOUTHWESTERN PUBLIC SERVICE COMPANY 2026 INTEGRATED RESOURCE PLAN

Workshop #3 Facilitated Stakeholder Process
April 30, 2026

Xcel Energy®

OPEN ITEMS FROM PRIOR WORKSHOP

Jarred Cooley | Sr. Director, Strategic Planning
Justin Gable | Director, Resource Planning & Bidding
Dr. John Goodenough | Director, Energy & Demand Forecasting

OPEN QUESTIONS

Resource Options

1. How is SPS considering emerging technologies such as geothermal, nuclear, long-duration storage, and pumped hydro in its modeling? How feasible are they? In what timeframe?
2. What does a fully compliant 2045 zero-carbon portfolio look like? What are cost impacts? Consideration of hydrogen conversion? How to meet the needs of high load factor customers under a zero-carbon future?
3. How does SPS model virtual power plants and demand response options? How to balance potential with performance expectations in the SPP market?
4. 2024 and 2025 RFPs – How will CCN approval impact resource planning? Will these bring more batteries to SPS's system? If not approved, how will SPS split the system between NM and TX?
5. Is interregional transmission modeled as a supply-side resource?

Written responses to these questions are contained in the appendices to this presentation.

OPEN QUESTIONS

Resource Options

6. Regarding the 2024 RFP, did removing thermal generation from the mix mean the selection includes more batteries?
7. Explain the difference between IRP generic resources and RFP specific resources. Will you run a scenario that removes thermal resources?
8. Prior IRP Modeling -What was chosen if no limitation on resources? Expansion plan selects resources, production cost modeling examines performance?
9. 2045-high factor loads, reactive power concerns (O&G) with changing resource mix. How are these handled now vs. future?

Written responses to these questions are contained in the appendices to this presentation.

OPEN QUESTIONS

Resource Options

10. SPP capacity accreditation (ELCC): what is SPP's ELCC for batteries? SPP's winter planning reserve margin is a major driver for SPS. SPP's ELCCs change over time, vary by portfolio mix.
11. Exploration of emerging technologies: is SPP membership constraining resource options? Why no batteries in SPP? Interests in pumped hydro (Carlsbad?), micro hydro (canal based?), long duration storage, fuel cells.
12. Grid Enhancing Technologies (GETs): consideration flow controllers, other transmission optimization tech.

Written responses to these questions are contained in the appendices to this presentation.

OPEN QUESTIONS

Resource Options

Data Requests

1. Generation portfolio by energy (tables): provided in this presentation
2. Load duration curves and demand response impact: discussed in this presentation
3. Link to SPP Interconnection Study Queue - Generator Interconnection - Southwest Power Pool
4. SPP metrics PRM and ELCC: value/cost to SPS customers, exit considerations
5. Microgrids: interest in more discussion, perhaps reframed as “fast connect solutions”

OPEN QUESTIONS

Load Forecasting

1. What are the underlying drivers of the unprecedented load growth? What is SPS's criteria to include new requests in its load forecast?
2. Cost Allocation - Who is paying for the upgrades? How are SPS customers protected? Large load tariff?
3. Oil & Gas Load Growth: How are expanding operations and electrification contributing to forecasted system load growth? Complexity of developers vs. tenants.
4. How much data center growth is SPS forecasting? How firm is it? What are reasonable assumptions for future growth in the outer years of this planning period?
5. Exploratory Loads-how confidently include in a long-term plan? 20 yr plan that needs to consider growth beyond what is contracted.

OPEN QUESTIONS

Load Forecasting

Data Requests

1. Additional detail on load growth elements, including contribution of data centers, other industrial loads, etc. – provided in this presentation
2. SPS Economic Development Team Representatives – discuss data center approach, address speculative shopping
3. Growth Scenario: adding unconstrained forecast as point of reference, show where loads stalled in SPP study process, not getting studied, where lands in forecasting, including as unconstrained – discussed in this presentation.

OPEN QUESTIONS

Planning and Policy Requirements

1. 765 kV Additions: What is the impact on SPS's system constraints? What is the impact on rates?
2. SPP Requirements and Membership: SPP's planning reserve margin (PRM) and effective load carrying capability (ELCC) metrics are severe. How is SPS thinking about the costs to its customers? Has SPS considered withdrawing from the RTO? What would the costs, benefits, and impacts be to exit? What resources are anticipated to be added across SPP?
3. Transmission constraints: How does southeast New Mexico compare to the rest of the system?

OPEN QUESTIONS

Miscellaneous

1. Did Wildcat Power Purchase go through (battery from 2022 RFP)?
2. Hydrogen conversion cost to meet 2045 RPS zero-carbon standard?
3. How are methane reductions accounted for; in the oil and gas reductions or the SPS transportation plan?
4. Texas Policy (SB6) regarding curtailing data center load – how is this considered in the planning reserve margin analysis?

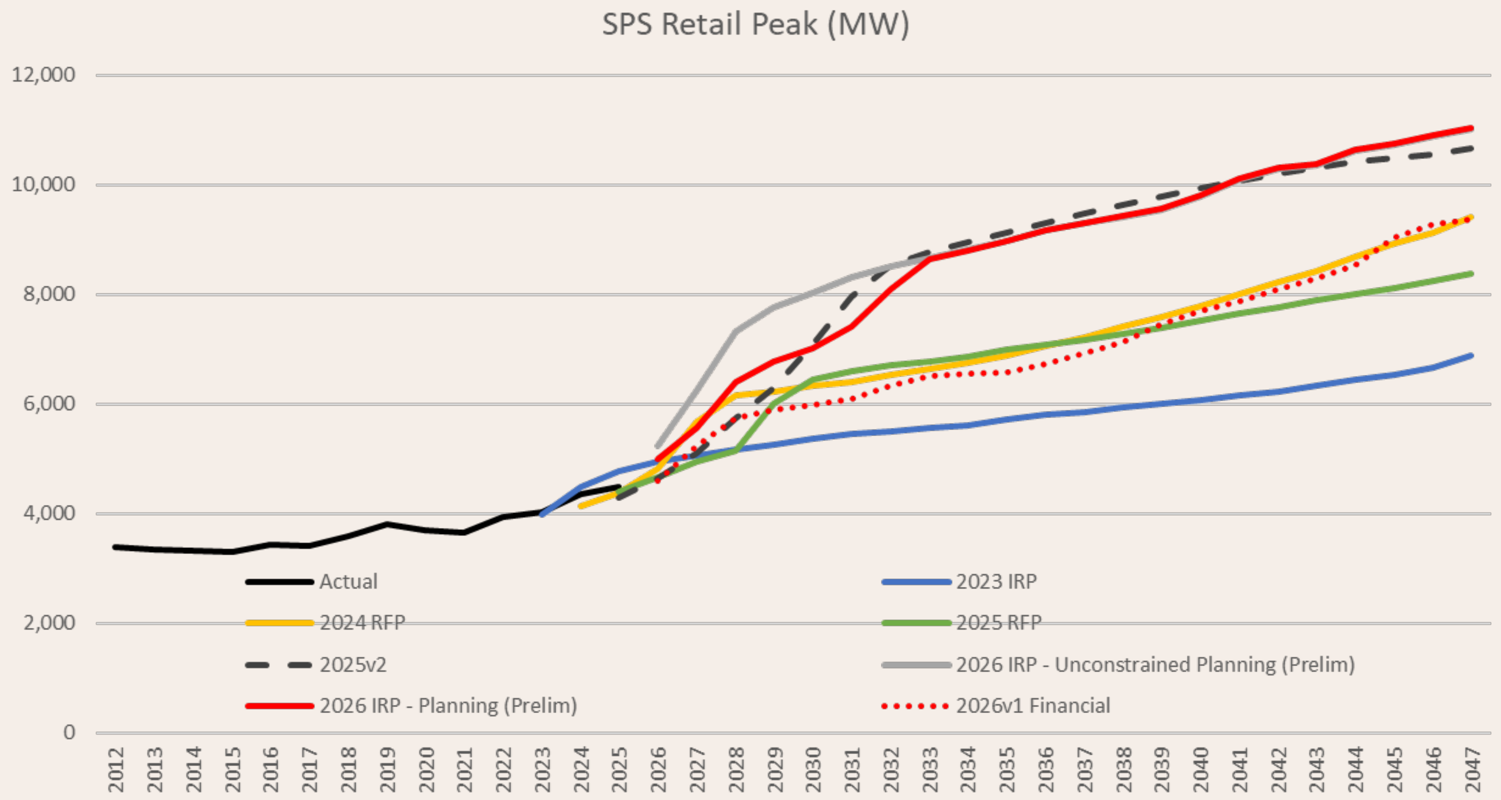
Written responses to these questions are contained in the appendices to this presentation.

LOAD FORECASTING

Dr. John Goodenough | Director, Energy & Demand Forecasting

2026 IRP FORECAST SHOWS ACCELERATING GROWTH

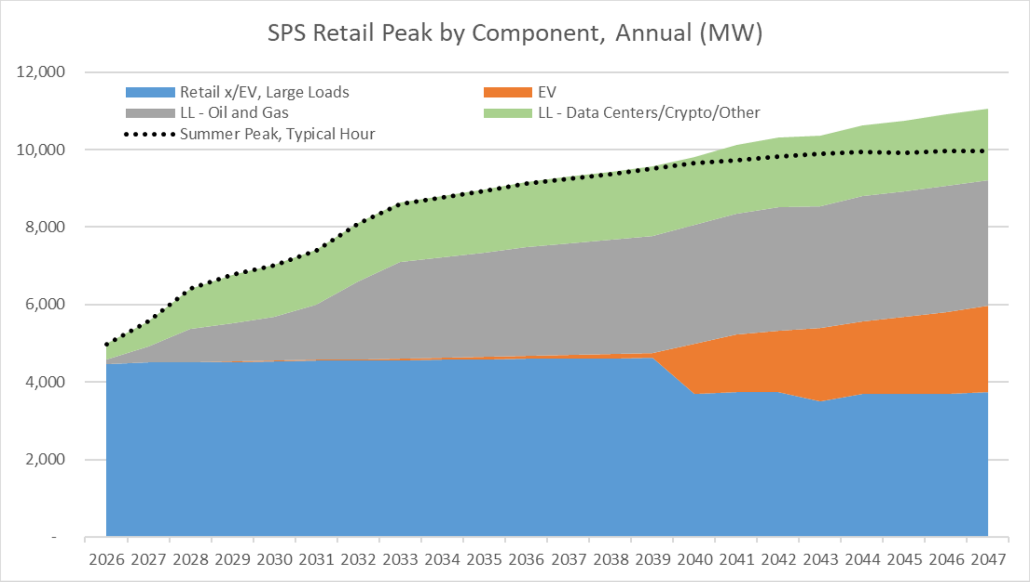
- Preliminary 2026 IRP Planning outlook is similar to the 2025v2 Planning forecast
  - Continue to use updated probabilistic load methodology to better account for future growth and load requests
- Timing of load additions accounts for expected system constraints
- Unconstrained forecast highlights significant near-term demand that would not be served in this scenario
- 2026v1 financial outlook is in-line with prior RFPs

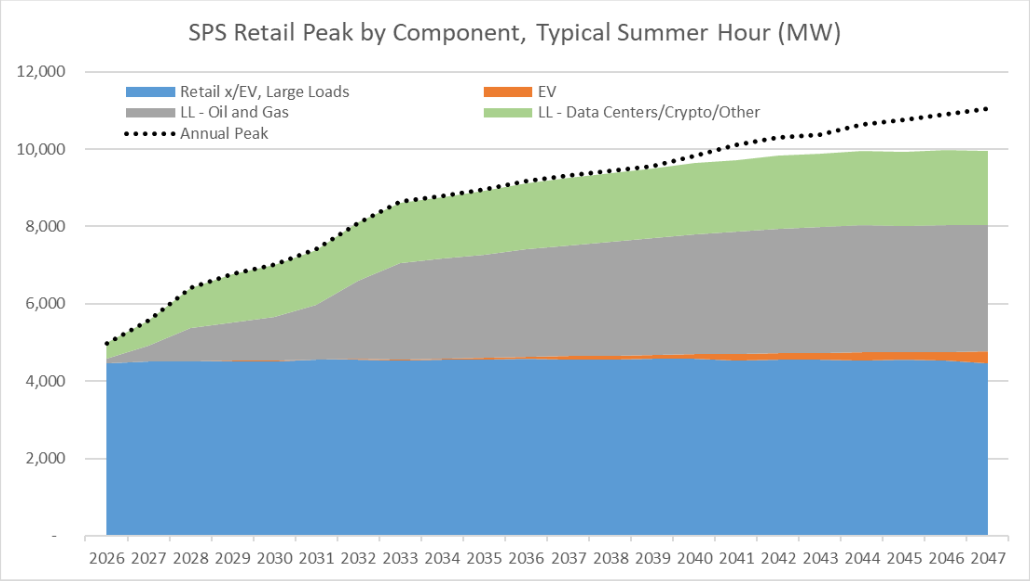


Feedback? Suggested Office Hour Topic

KEY DRIVERS INCLUDE OIL AND GAS LOAD AND DATA CENTERS

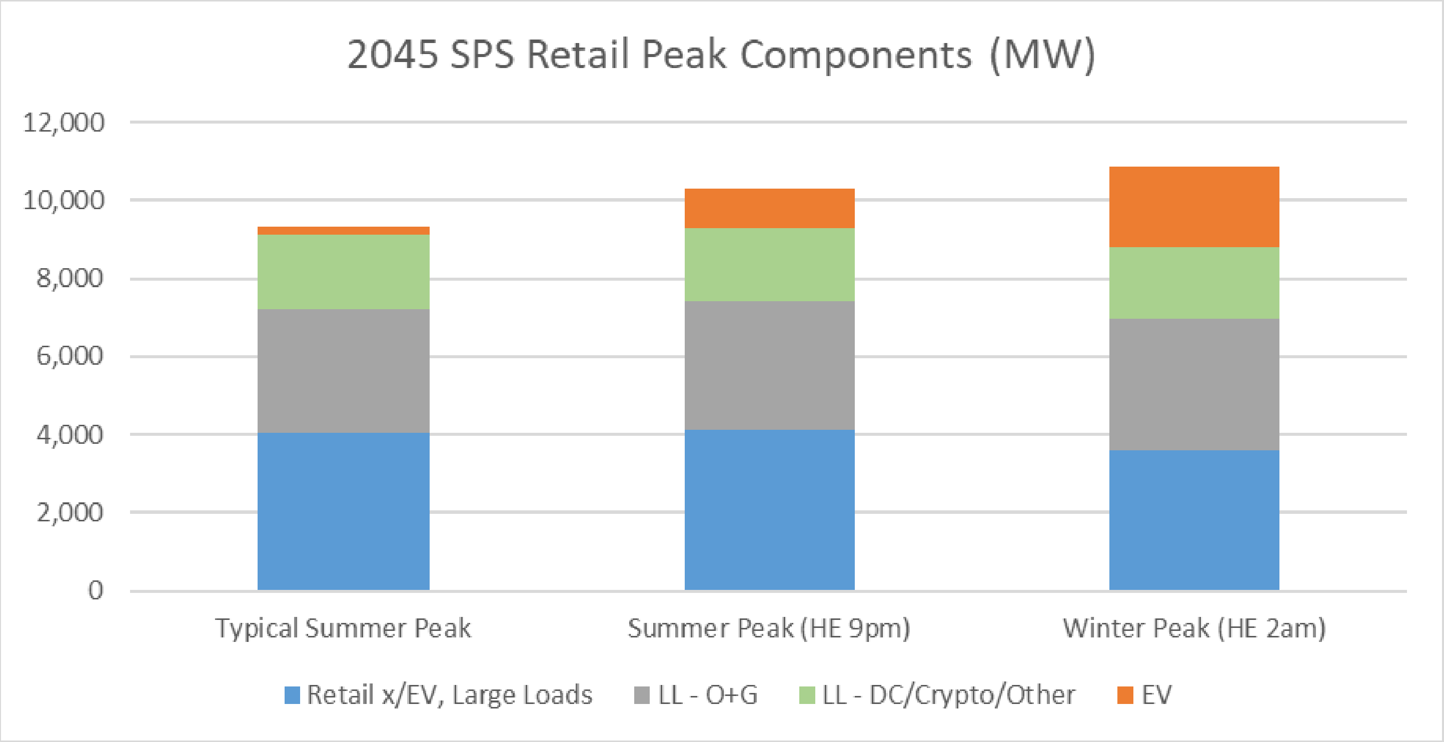
- Large load adjustments account for 96 percent of the total load growth through 2035; 81 percent by 2045
- Data centers account for more than half of the large load additions through 2030, oil and gas the main driver of growth from 2030 through the end of the forecast
- System becomes winter peaking in 2040 due to a higher contribution of EVs to the system peak
  - Increasing EV loads shift the hour of the summer peak in subsequent years
- Smoother trends in peak components when looking at typical summer peak hour





EV LOADS EXPECTED TO SHIFT HOUR AND SEASON OF PEAK

- EV adoption and charging assumptions shift summer peaks later in the day and annual peaks to winter mornings
  - Leads to a shift in EV share of peak demand due to typically lower usage in evening/overnight hours

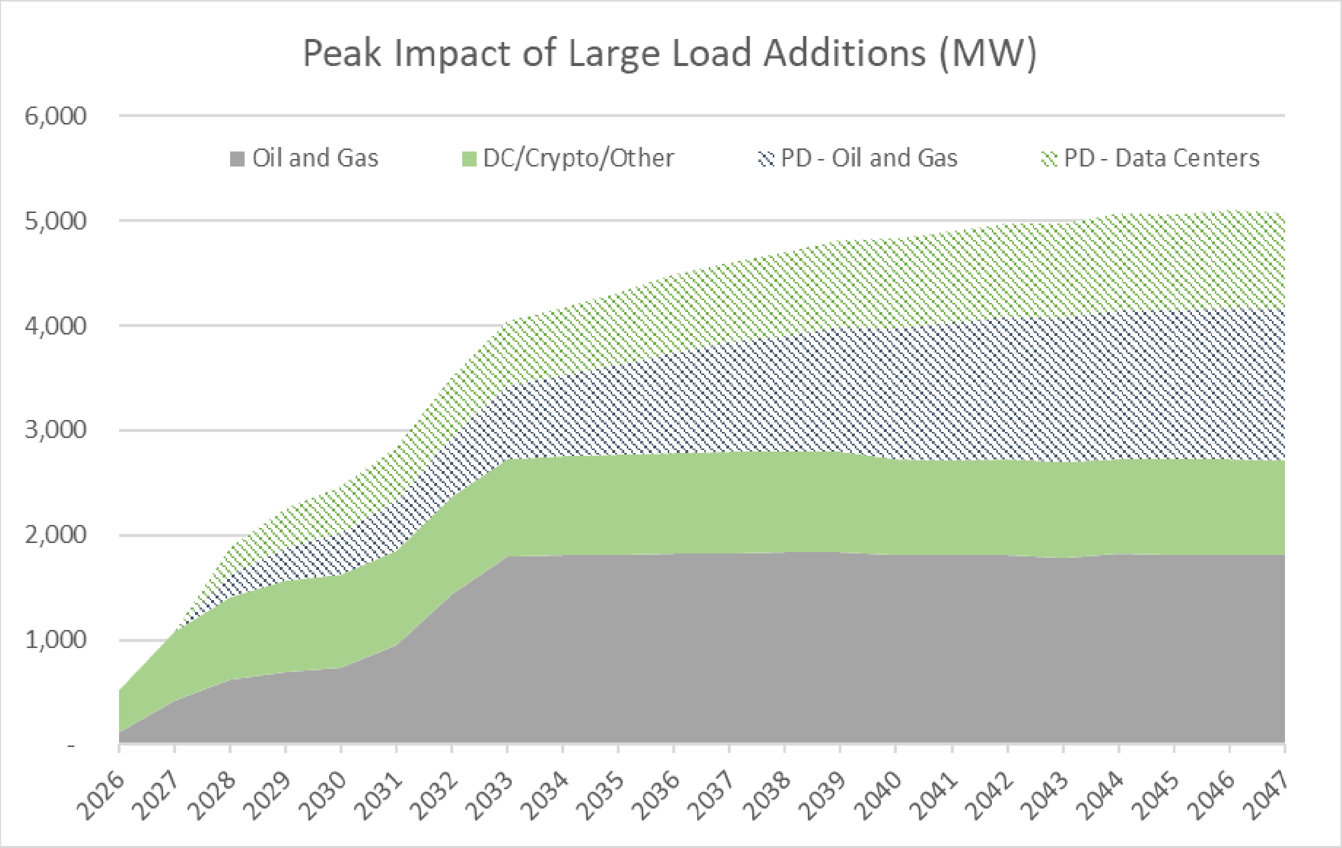


SHARE OF PROBABILISTIC LARGE LOAD INCREASES OVER TIME

- Large load additions attributable to specific projects represents about two-thirds of the growth by 2035; roughly half of the growth by 2045

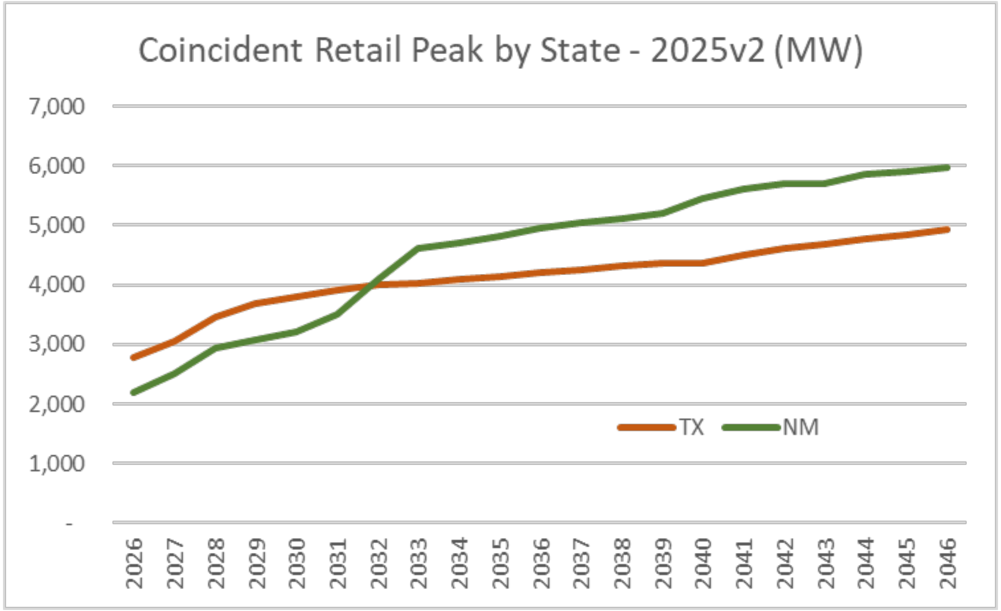
Impact of Large Load Adjustments on Peak Demand (MW)

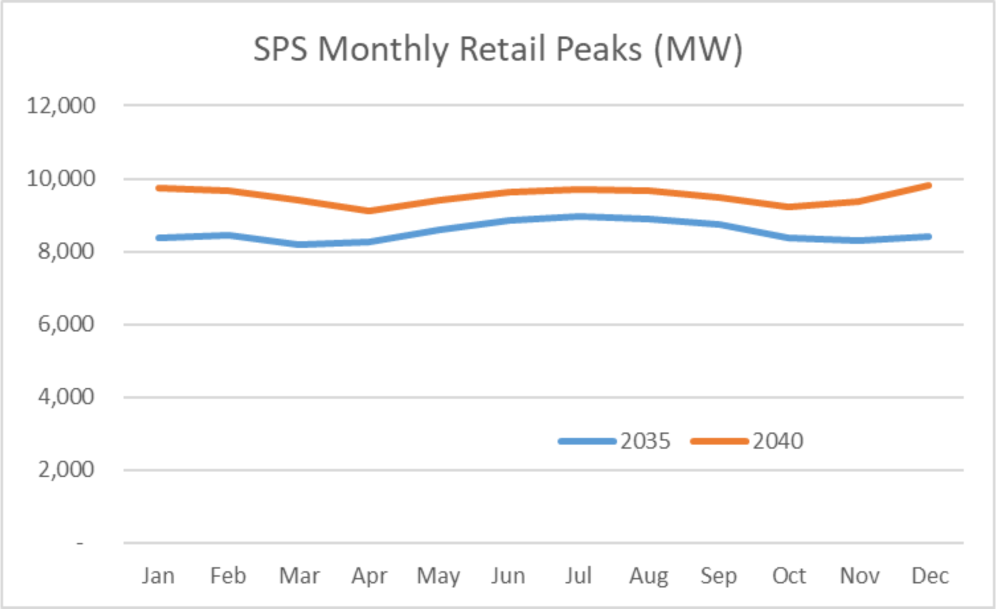
	Oil and Gas	DC/Crypto/ Other	PD - Oil and Gas	PD - Data Centers	Total Peak Impact	% from Prob Modeling
2026	127	396	-	-	522	0%
2030	743	880	400	445	2,468	34%
2035	1,815	947	864	693	4,319	36%
2040	1,816	906	1,256	847	4,825	44%
2045	1,816	906	1,424	918	5,065	46%



INCREASING NM SHARE OF FLATTENING SYSTEM LOAD

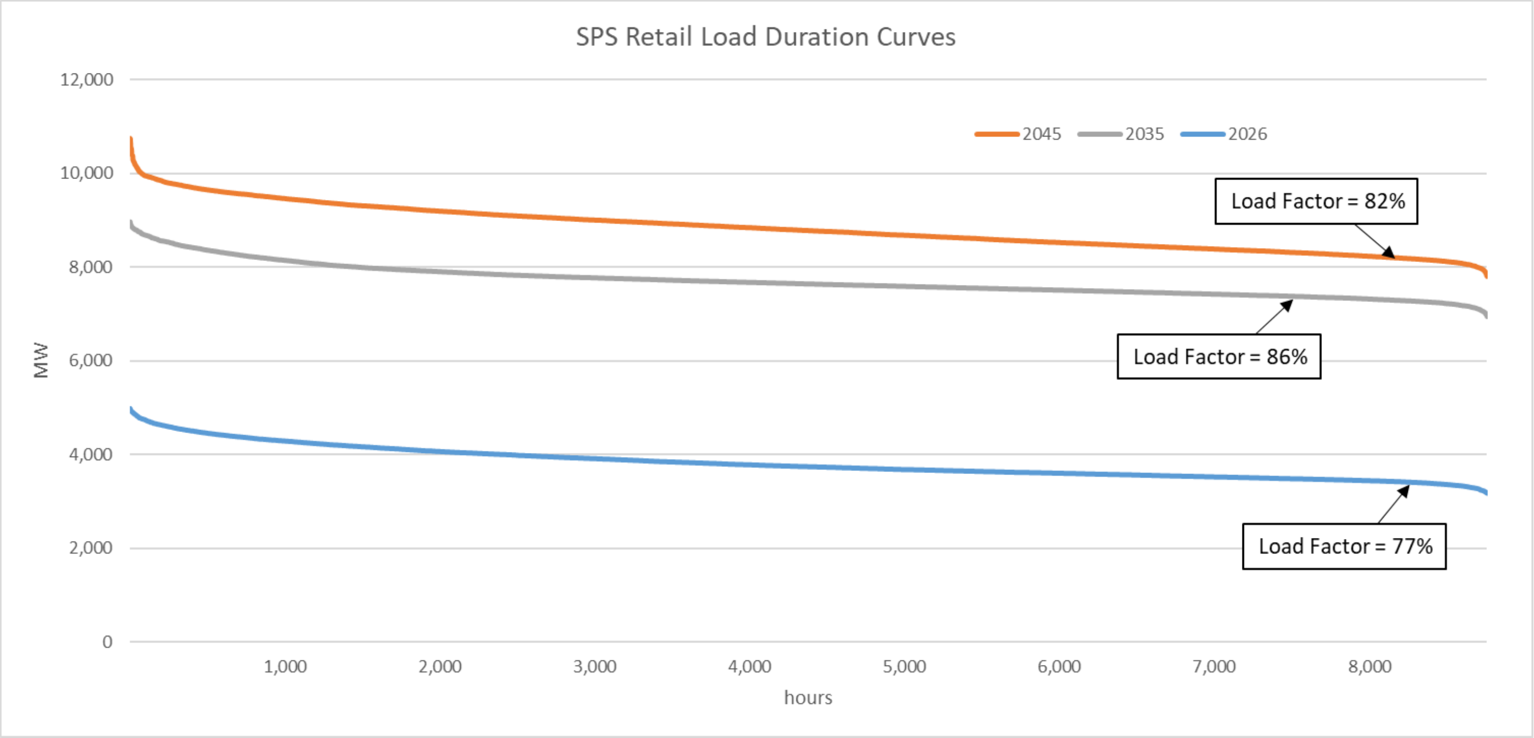
- Oil and gas electrification and expansion in New Mexico is expected to outpace data center growth in Texas
  - NM share of retail peak increases from 44 percent to 54 percent by 2035
- Winter peak demand expected to be about 94 percent of summer peak demand by 2035
  - Currently about 85 percent
- System becomes winter peaking in 2040





LOAD DURATION CURVES

- Large, comparatively flat load additions lead to increasing load factors while system remains summer peaking
- Concentrated EV charging drives the load factor lower when the system is winter peaking, highlighting the potential for managed charging programs to lower overall peak demands



QUESTIONS?

INTEGRATED RESOURCE PLANNING TOPICS

Justin Gable | Director, Resource Planning & Bidding

MODELING

WHY WE USE ENCOMPASS IN INTEGRATED RESOURCE PLANNING

Consistent Resource Evaluation

EnCompass evaluates wind, solar, storage, gas, market purchases under a unified optimization framework ensuring consistent comparisons.

Cost-Effective Portfolio Planning

The model identifies least-cost portfolios considering present value costs across fuel, operations, market transactions, capital charges.

Operational Feasibility Modeling

EnCompass pairs production cost modeling with capacity expansion to ensure portfolio decisions translate into feasible hourly operations.

Scenario and Sensitivity Analysis

The model supports testing policy constraints, fuel price variations, and market forecasts to assess portfolio robustness under uncertainties.

WHAT ENCOMPASS IS (AND IS NOT) FOR SPS PLANNING

Core Functionality

EnCompass models long-term generation planning selecting cost-effective resource portfolios under constraints and assumptions.

Operational Scope

It evaluates economic value and reliability of resources including storage and ancillary services for SPS.

Model Limitations

EnCompass is not a nodal powerflow simulator and uses simplified transmission to enable broad scenario analysis.

Use Case and Cautions

Results support decision-making but depend on input quality and require complementary studies for reliability.

OPTIMIZATION ENGINE: CO-OPTIMIZING BUILD, COMMITMENT, DISPATCH

Integrated Optimization Approach

EnCompass simultaneously optimizes capacity expansion, unit commitment, economic dispatch to avoid handoff bias.

Mixed-Integer Programming Solution

The problem includes integer variables solved via branch-and-bound to find feasible near-optimal solutions.

Constraints and Model Complexity

Constraints include load balance, transmission limits, environmental rules, ramp rates, capacity factors.

Solver and Practical Implications

EnCompass uses advanced solver heuristics and parallelism, with solution tolerances impacting results interpretation.

CAPACITY EXPANSION TO 8760 DISPATCH

Capacity Expansion

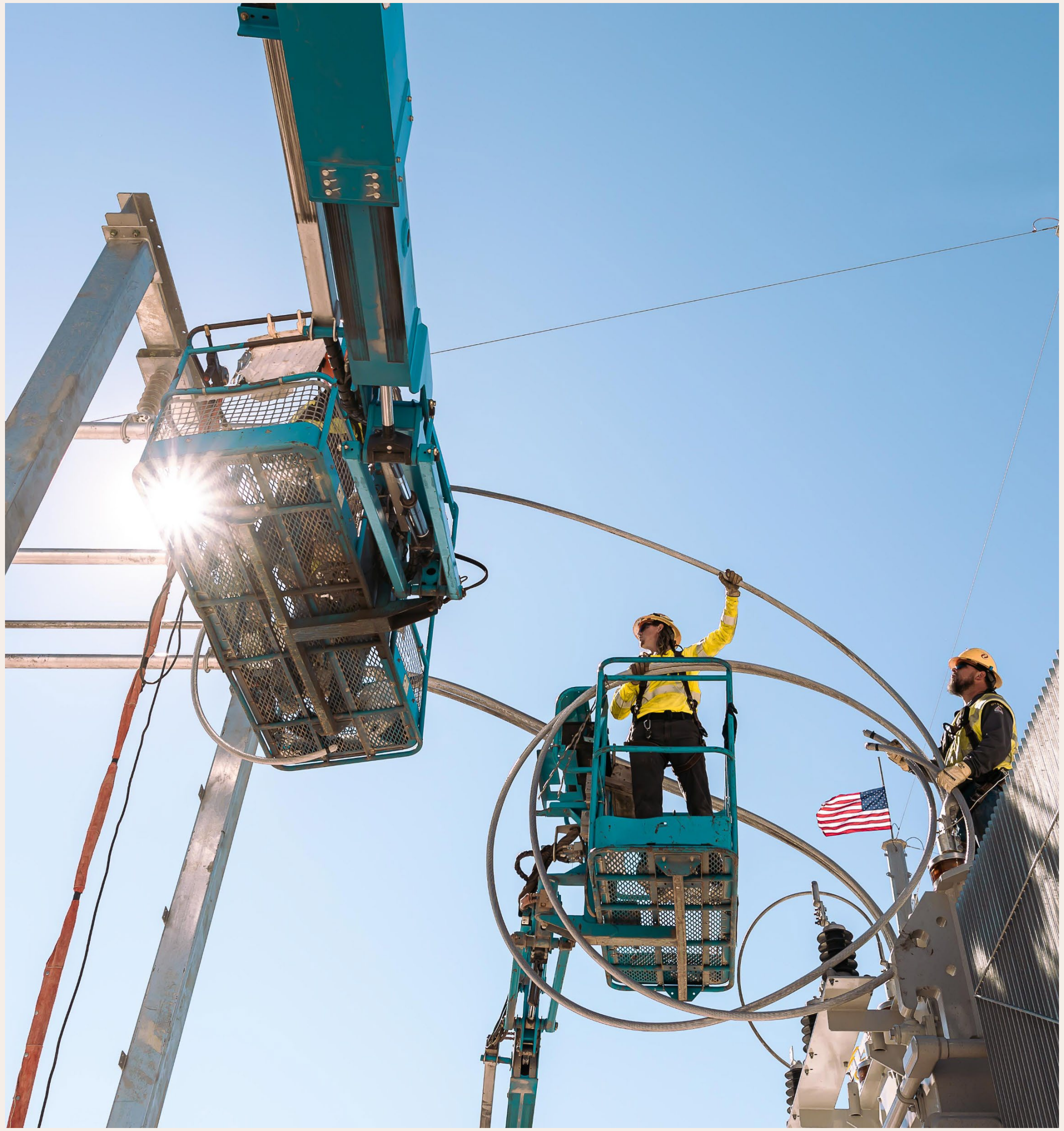
EnCompass simultaneously optimizes capacity expansion, unit commitment, and economic dispatch to avoid handoff bias.

- Primary Purpose: Find least-cost long-horizon portfolio under constraints
- Key Uses: Establish baseline build timing, resource mix

Production Cost

Problem includes integer variables solved via branch-and-bound to find feasible near-optimal solutions.

- Primary Purpose: Find least-cost long-horizon portfolio under constraints
- Key Uses: Generate costs, emissions, adequacy, market outcomes



PRACTICAL CONSTRAINTS: RUNTIME, PROBLEM SIZE, INTERPRETATION

Problem Size and Runtime

Problem size drives runtime, with thousands of variables drastically increasing computation times from hours to weeks.

Solver Behavior and Solutions

Mixed-integer optimization and parallelism influence solver paths, yielding slightly different but feasible solutions within tolerance.

Model Simplification and Interpretation

Simplified transmission models and perfect foresight require supplementing results with real-world studies and risk reviews.

Process Discipline and Efficiency

Well-scoped inputs and systematic scenario structuring prevent rework and data drift, improving modeling efficiency.

SPS CURRENT LOADS AND RESOURCES (L&R) POSITION

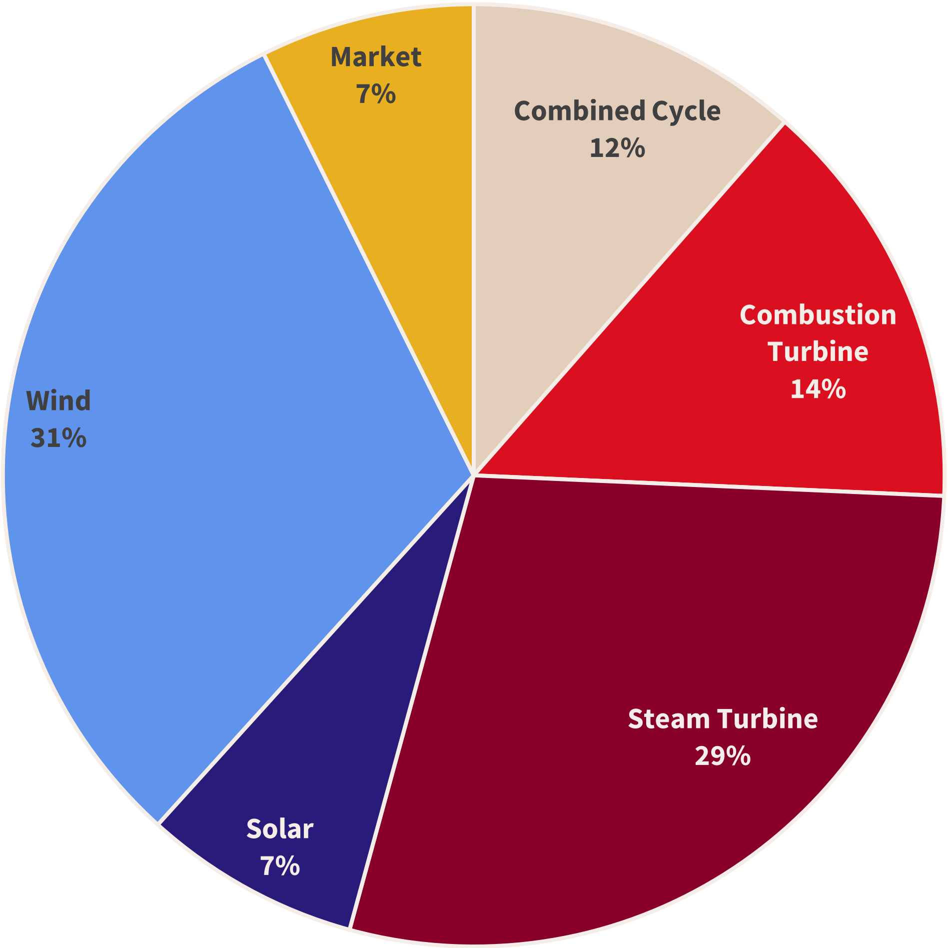
WINTER	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32
SPS Owned	3,828	3,696	3,685	2,959	2,916	2,889
2024 RFP	0	483	1,635	2,793	2,748	2,697
PPAs	1,123	1,124	1,126	1,090	1,031	1,022
Demand	(4,551)	(5,365)	(5,881)	(6,137)	(6,359)	(6,998)
PRM	(695)	(820)	(949)	(990)	(1,026)	(1,129)
Total	**(295)**	**(882)**	**(384)**	**(285)**	**(690)**	**(1,519)**

SUMMER	2026	2027	2028	2029	2030	2031	2032
SPS Owned	4,061	4,077	4,072	3,159	3,159	3,137	3,116
2024 RFP	0	0	472	2,863	2,843	2,828	2,812
PPAs	1,177	1,151	1,148	1,141	1,059	1,038	1,002
Demand	(4,809)	(5,280)	(6,112)	(6,477)	(6,723)	(7,122)	(7,807)
PRM	(340)	(373)	(432)	(492)	(511)	(541)	(593)
Total	**90**	**(425)**	**(852)**	**194**	**(173)**	**(660)**	**(1,470)**

Reflects preliminary version of forecast - 2026v1 planning

APPROXIMATE ENERGY MIX 2030

Information is based upon on the 2024 RFP Results



From the 2024 RFP and is expected to be updated in the IRP process as well as impacted from the 2025 RFP.

GENERIC RESOURCES PRICING (RENEWABLES)

Modeling Input

Policy driven cost shift

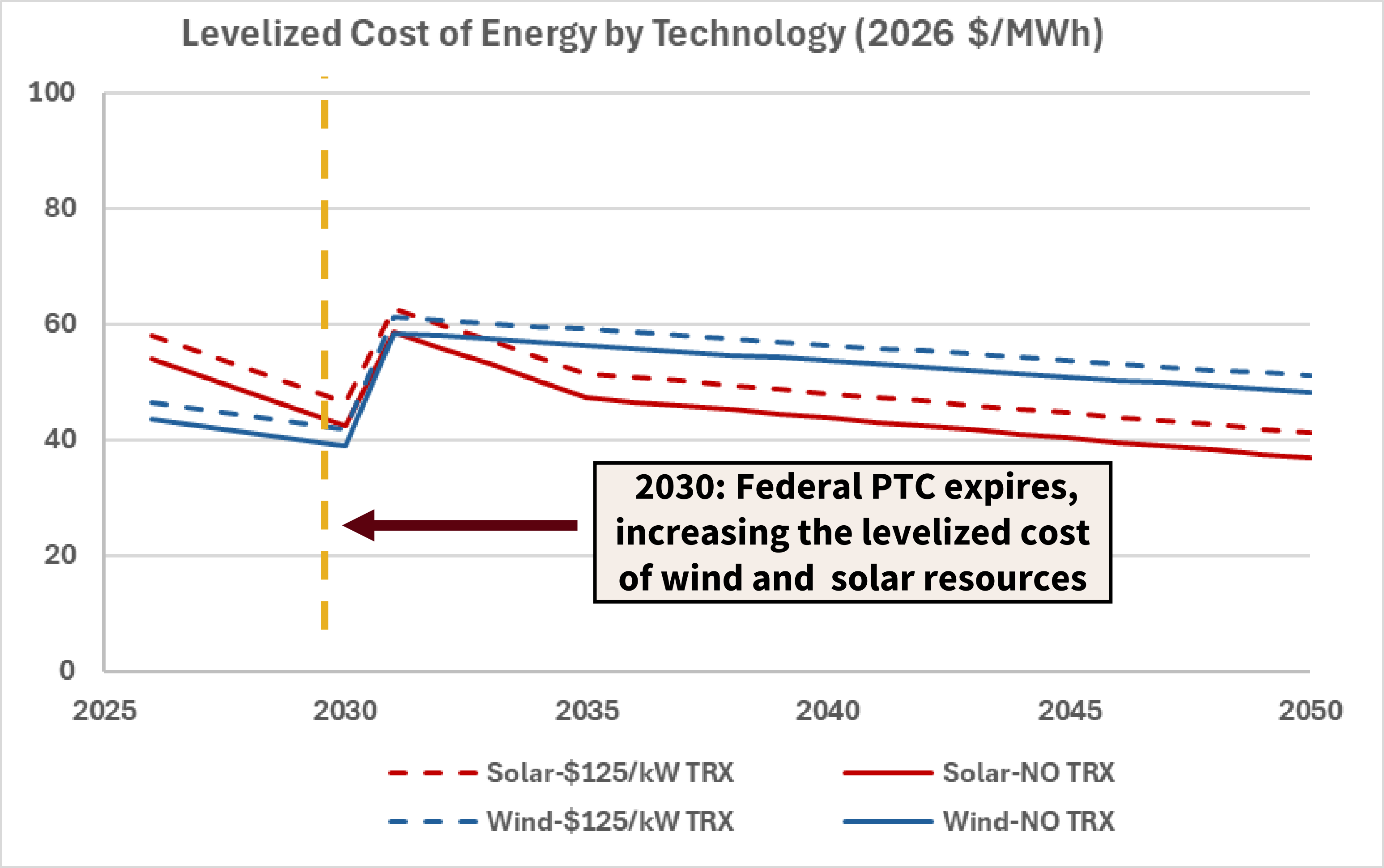
Step change around 2030 reflects modeled transition from tax-credit supported projects to unsubsidized renewable development under current federal policy assumptions.

Technology and Transmission impacts

Wind costs increase more noticeably than solar due to higher capital intensity, but $125/kW transmission adder(TRX) increases solar LCOE more significantly relative to base cost, narrowing gap between two technologies.

Cost benchmark and calibration

Renewable cost trajectories follow 2024 NREL ATB technology trends, with starting values anchored to TRIO renewable PPA market benchmarks to reflect current market condition.



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(!) All Values shown in constant 2026 dollars (Inflation removed)
TRX: Transmission Adder

GENERIC RESOURCES PRICING (BESS)

Modeling Input

Policy assumption

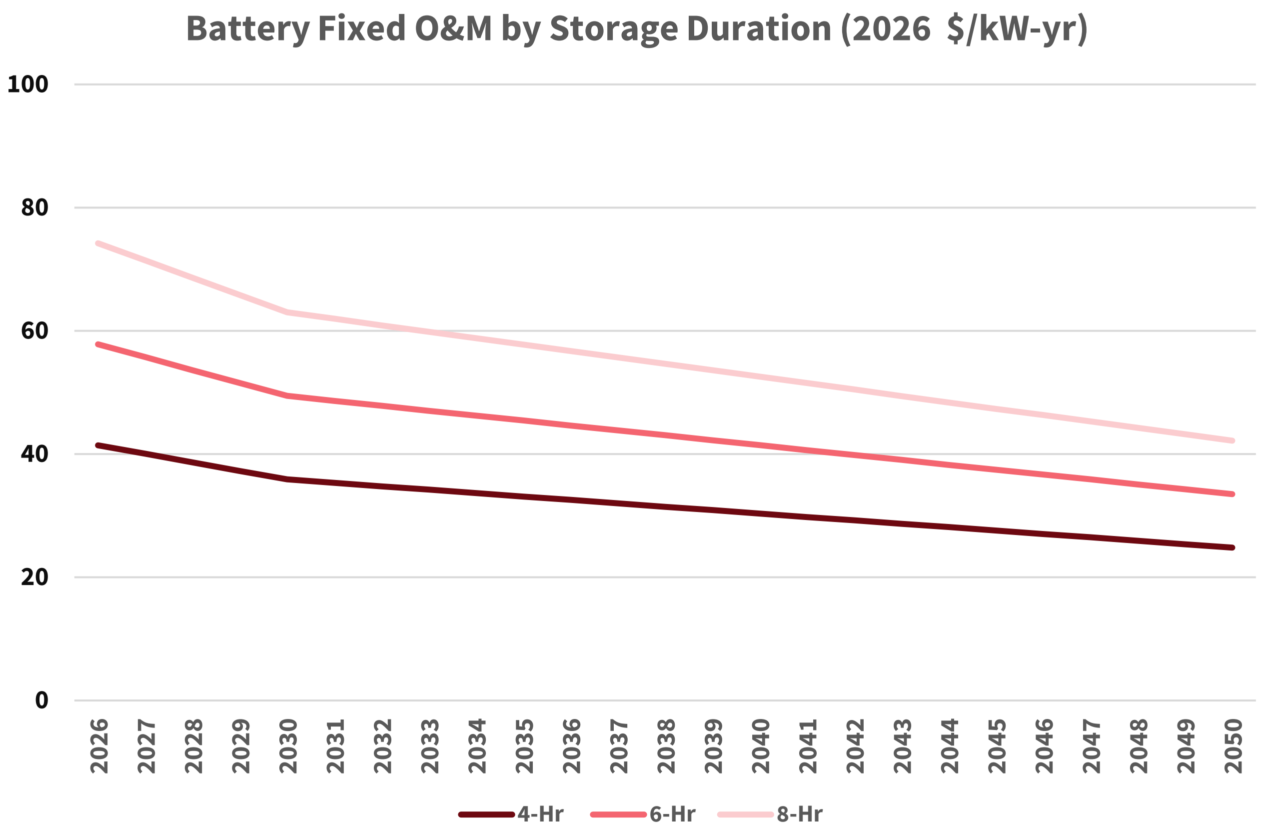
No Investment Tax Credit assumed for battery storage due to potential Foreign Entity of Concern restrictions may limit eligibility under current federal guideline.

Technology cost basis

Battery FOM assumptions based on 2024 ATB NREL.

Duration difference

Separate cost trajectories applied for 4-hour, 6-hour, 8-hour battery configurations to reflect difference in system size, augmentation needs, maintenance requirements.

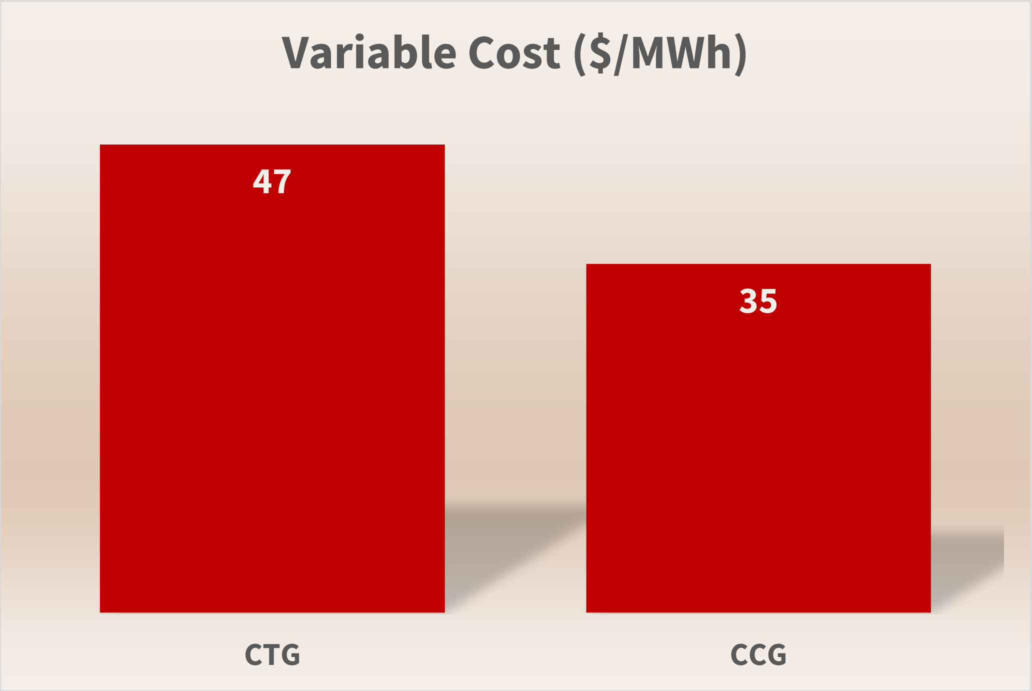


GENERIC RESOURCES PRICING (THERMAL RESOURCES)

Modeling Input

- CCG units have lower heat rates, resulting in lower fuel assumption, lower operating costs compared to CTG
- Estimated operating costs calculated using heat rate, VOM, an assumed natural gas price to illustrate dispatch economics
- CTG and CCG technologies serve different roles in system, with cost structures influenced by efficiency, utilization, operating profile.

Tech	Summer Peak capacity (MW)	Capex ($000/yr) (2028)	Average Summer Heat Rate (Btu/kWh)	FOM($/kW-yr)	VOM($/MWh)
CTG	179.7	2,673	10,250	9.63	6.19
2x1 CCG	384.2	3,586	7,679	15.16	4.26



SPS ENCOMPASS TOPOLOGY REPRESENTATION

Modeling Input

Load Bubble Representation

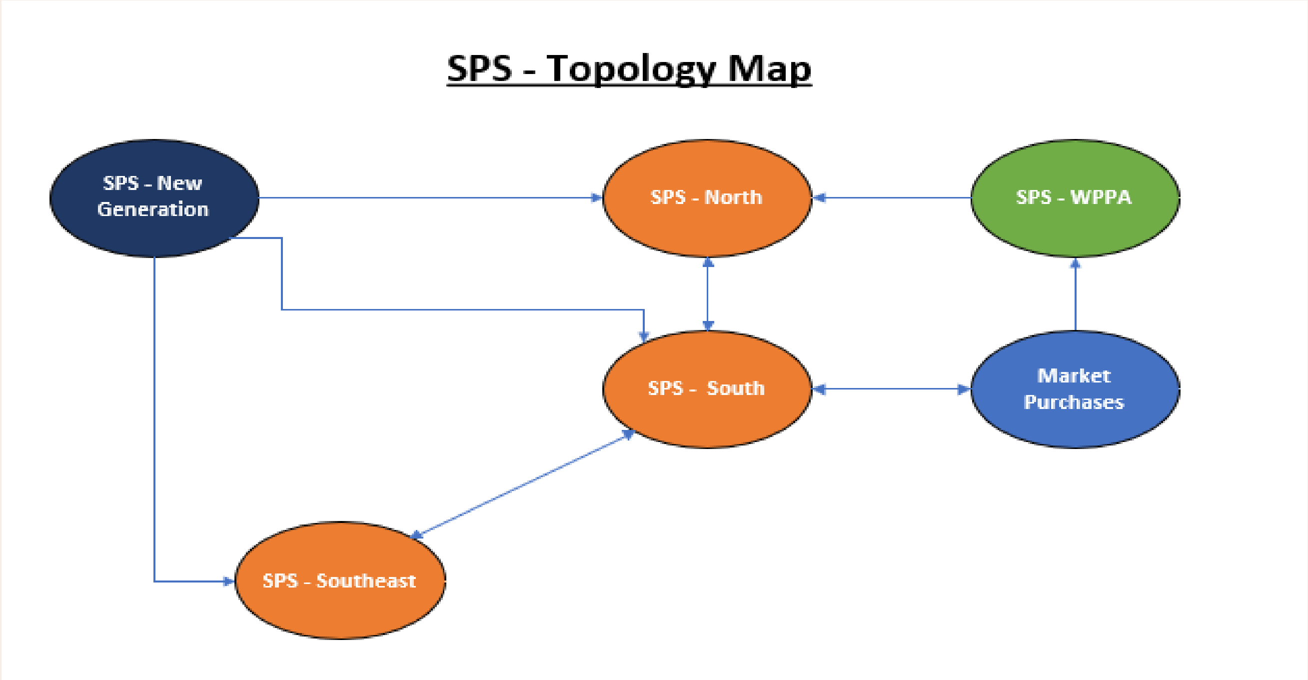
SPS system is modeled using three primary load bubbles: SPS-North, SPS-South, and SPS-Southeast, representing the major load zones within the system.

Transmission Interface Structure

Interface between nodes represent key transmission pathways used in the Encompass model.

Time-Varying Transfer Limits

Transmission limits change over the early years of modeling horizon to reflect assumed system upgrades, with the most significant increases occurring on the SPP Southeast to SPP South interface and selected market access paths.



Transmission Interface Limit Changes

Interface	2028	2029	2030	2031	2032
SPP Market → SPS North	Base	↑	_	_	↓
SPP Market → SPS South	Base	_	_	_	↑
SPS South ↔ SPS Noth	Base	_	_	↑	_
SPS Southeast → SPS South	Base	↑	↑↑	↑↑	_

MODELING TREE

CONCEPTUAL MODELING TREE

All resource types available in all models expect where otherwise noted.

Feedback? Suggested Office Hour Topic

Load Forecasting

Unconstrained Planning
- Known demand unconstrained by transmission and near-term generation restrictions

Constrained Planning
- Demand expected to be served given known impedances to serving customers

Low Forecast
- Conservative demand currently being outpaced given recent actuals

SPP Market Interaction

Islanded
- No interaction with the Southwest Power Pool through planning horizon and no winter PRM/ELCC

Non-islanded
- Assumes normal market interactions with Southwest Power Pool through planning horizon

Energy Transition Act

Incremental Renewables
- Least-cost for system and incremental renewables to meet Renewable Portfolio Standard

Deconstructed System
- Least-cost for system, lock load ratio share of carbon-emitting for TX, re-model only allowing non-carbon emitting resources

Sensitivities

Emerging Tech to serve New Mexico
- Nuclear (+advanced)
- Geothermal
- LDES
- Hydrogen Conversion
- Others?

Data Centers
- 1 GW in Texas (All resources types available)
- 1 GW in New Mexico (Non-carbon emitting resource types only)

Fuel Pricing
- High
- Low

ADDITIONAL SENSITIVITIES?

All resource types available in all models except where otherwise noted.

Feedback? Suggested Office Hour Topic

Replacement

Quay Co 24 MW CT
- Distillate Fuel Oil in Tucumcari w/long duration storage

Harrington/Nichols
- Nuclear

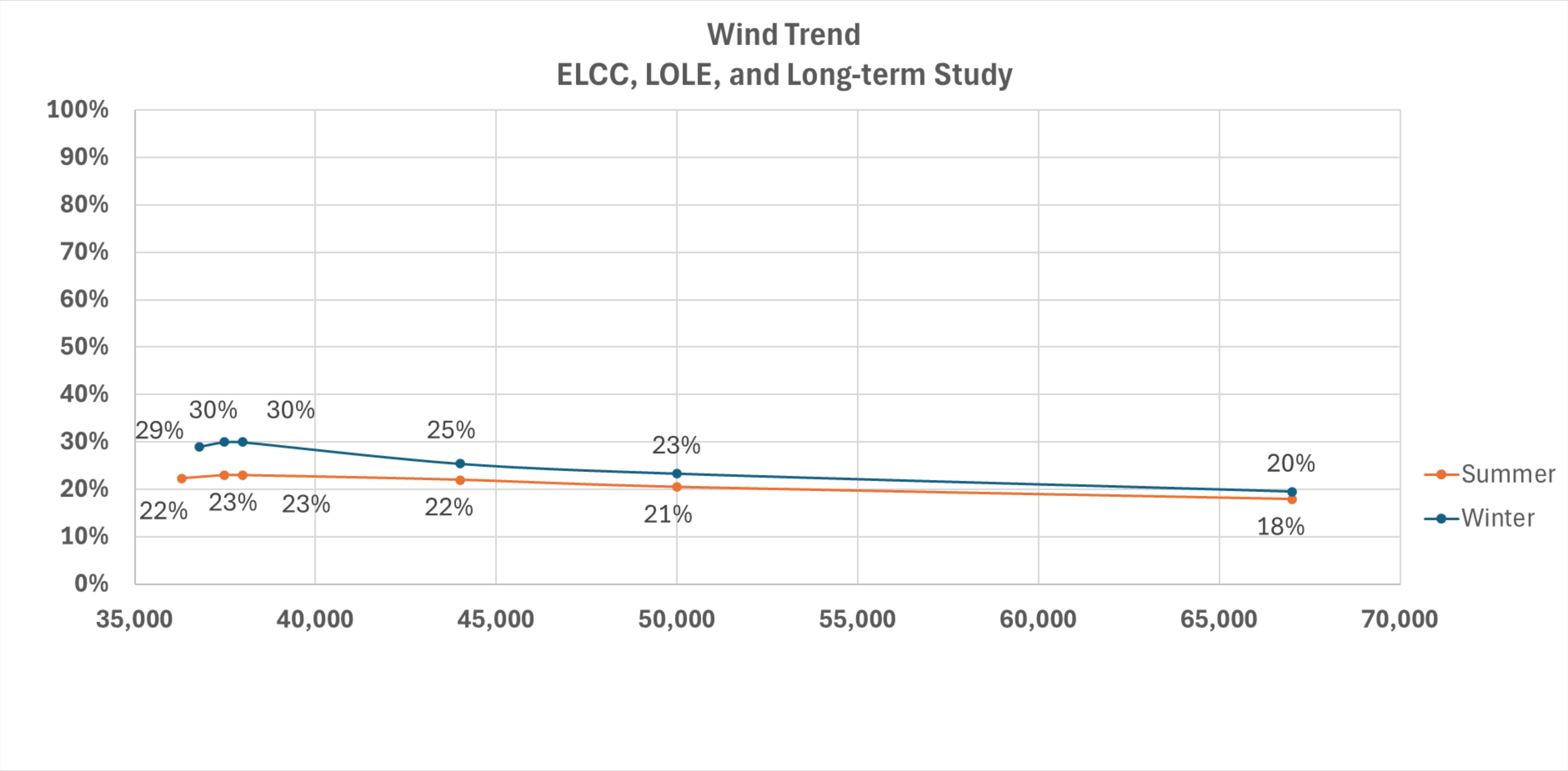
Cunningham 3 or 4
- Combustion Turbines w/Fuel Cells

Data Centers

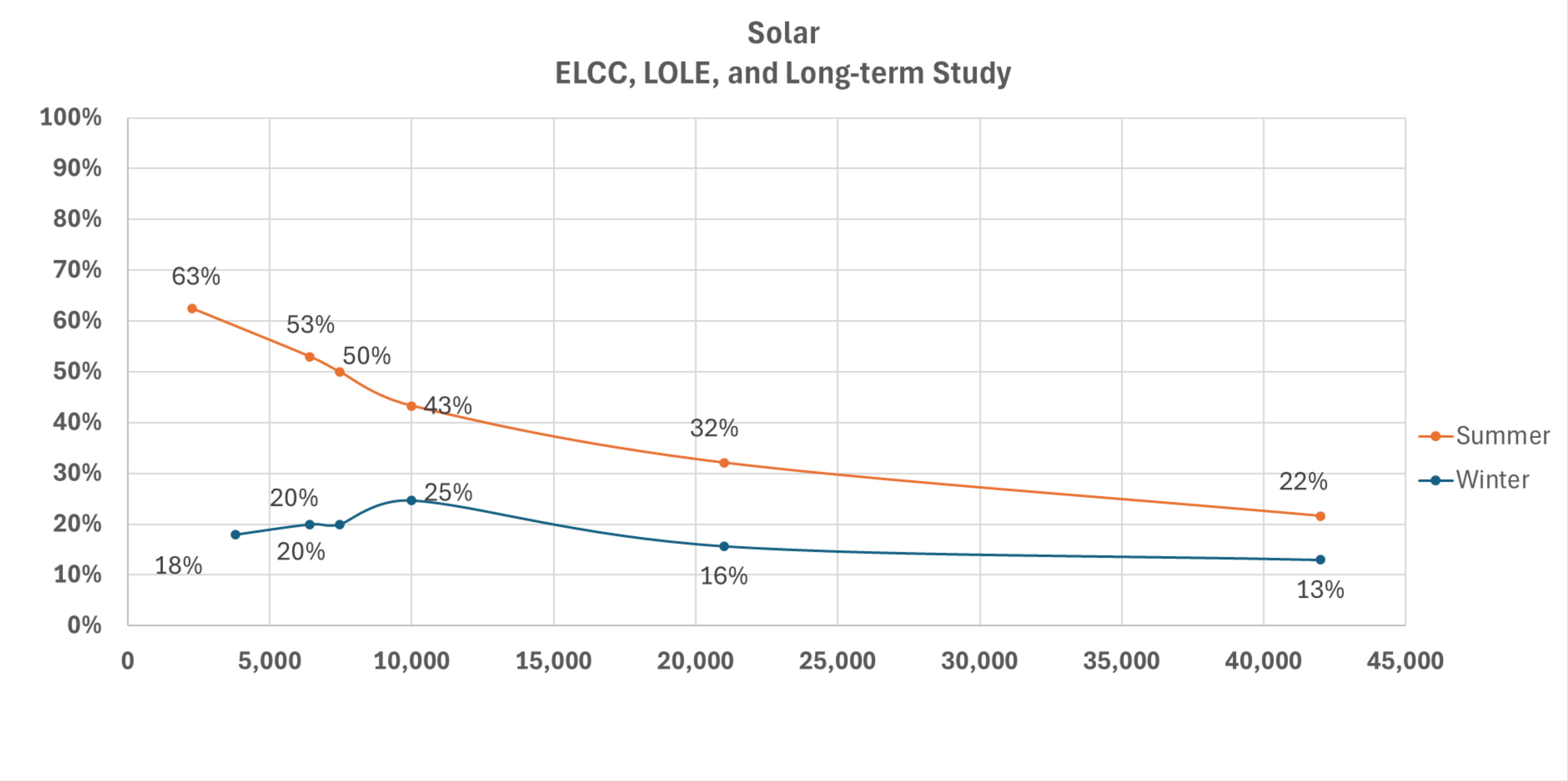
Emerging Tech
- Fuel Cells w/ and w/o CCS

INPUTS

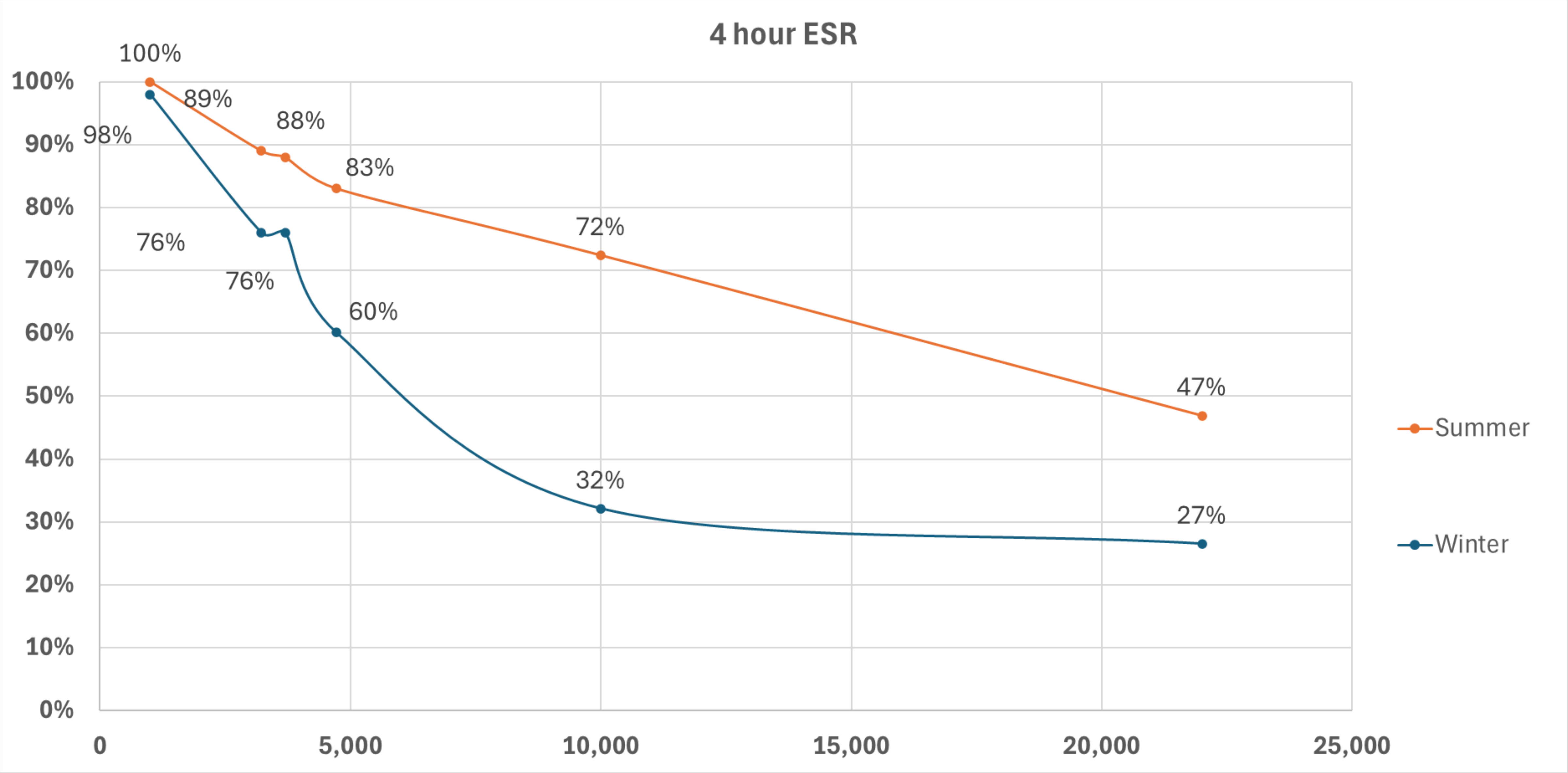
WIND ELCC TRENDS



SOLAR TRENDS

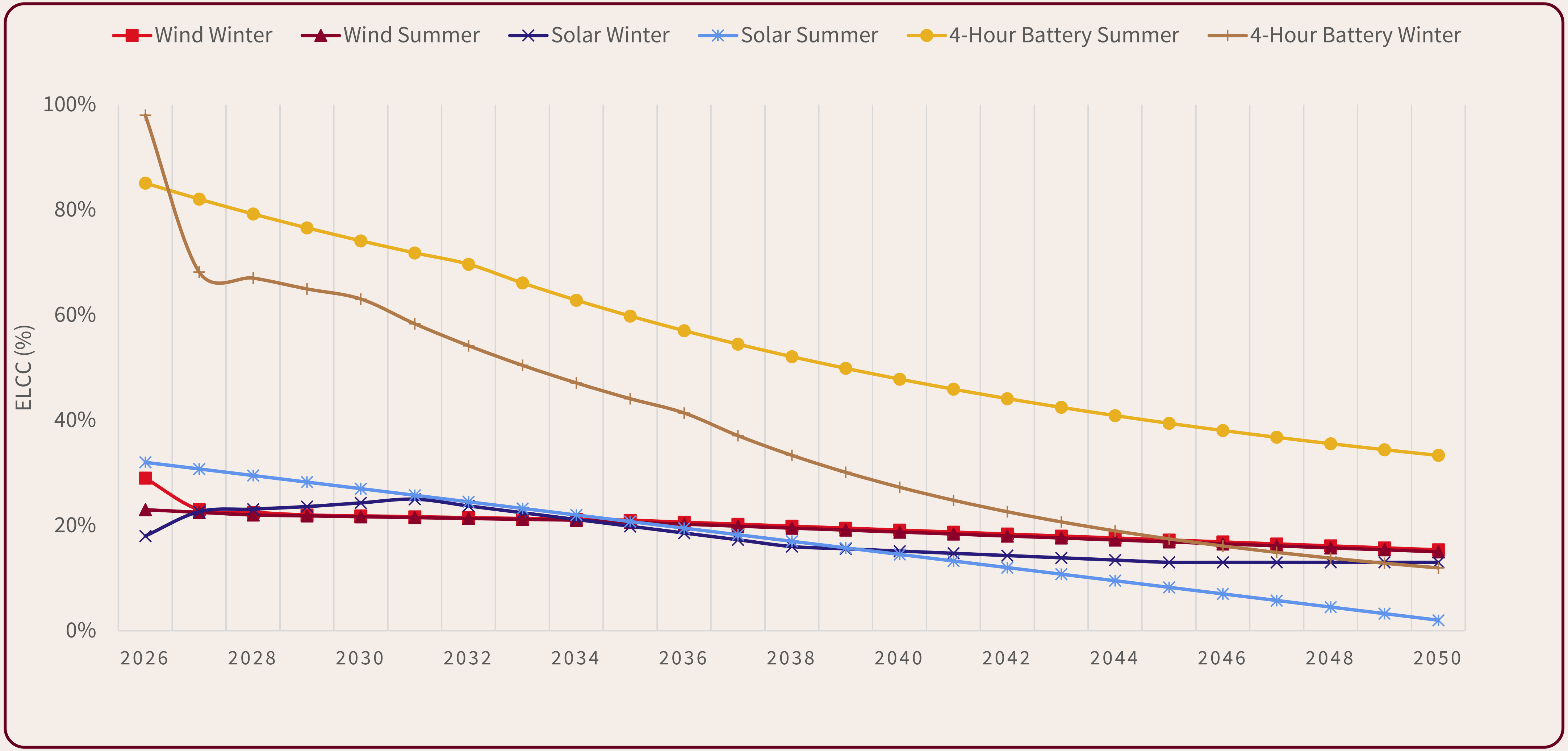


ESR* TRENDS



*ESR=Energy Storage Resource, also known as BESS, Battery Energy Storage System

DECLINING ELCC PROJECTIONS (2026-2050)



PERFORMANCE BASED ACCREDITATION (PBA)

Performance-Based Accreditation (PBA) assigns accredited capacity to thermal generation resources based on historical operational performance.

The accreditation process takes into account multi-year outage data, including forced outage rates, during seasonal peak demand times, offering more accurate assessment of resource availability.

Below is an example calculation:

Tolk Unit 1 Calculation

535 x 9.2% = 486 MW

In this example, SPP cuts the capacity we can plan on by 49 MW

Actual EFORd by SPS units

Conventional Resource Accreditation - SPS

Summer 2026

Data updated at 9/30/2025 12:06:12 PM

Category	EDST Name	Init Operation Date	Avg EFORd	2018 Summer	2019 Summer	2020 Summer	2021 Summer	2022 Summer	2023 Summer	2024 Summer
Conventional Steam Coal	Tolk_1	1/1/1982	9.2%	9.8%	9.8%	9.8%	9.8%	19.9%	2.7%	2.5%
	Tolk_2	1/1/1985	16.8%	9.8%	9.8%	9.8%	9.8%	1.5%	28.0%	48.9%
CT w/ Onsite Fuel Storage	Jones (TX)_3	6/1/2011	5.8%	9.9%	9.9%	9.9%	9.9%	0.0%	0.9%	0.1%
	Jones (TX)_4	5/1/2013	5.7%	9.9%	9.9%	9.9%	9.9%	0.0%	0.3%	0.2%
	Quay County_1	10/1/2013	23.5%	9.9%	9.9%	9.9%	9.9%	100.0%	24.8%	0.0%
CT w/o Onsite Fuel Storage	Cunningham_3	5/1/1998	6.2%	6.7%	6.7%	6.7%	6.7%	4.8%	0.5%	11.0%
	Cunningham_4	5/1/1998	7.6%	6.7%	6.7%	6.7%	6.7%	4.9%	2.1%	19.0%
	Maddox_2	1/1/1976	6.6%	6.7%	6.7%	6.7%	6.7%	11.4%	8.0%	0.0%
NG Steam Turbine	Cunningham_2	1/1/1965	11.5%	11.6%	11.6%	11.6%	11.6%	0.9%	25.0%	8.0%
	Harrington_1	1/1/1976	17.7%	11.6%	11.6%	11.6%	11.6%	5.4%	7.8%	64.0%
	Harrington_2	1/1/1978	12.7%	11.6%	11.6%	11.6%	11.6%	23.9%	7.2%	11.1%
	Harrington_3	1/1/1980	7.7%	11.6%	11.6%	11.6%	11.6%	1.1%	5.8%	0.4%
	Jones (TX)_1	1/1/1971	8.7%	11.6%	11.6%	11.6%	11.6%	2.1%	3.6%	8.5%
	Jones (TX)_2	1/1/1974	11.5%	11.6%	11.6%	11.6%	11.6%	0.8%	23.2%	9.7%
	Maddox_1	1/1/1967	9.9%	11.6%	11.6%	11.6%	11.6%	6.5%	10.7%	5.5%
	Nichols_1	1/1/1960	8.4%	11.6%	11.6%	11.6%	11.6%	8.7%	0.0%	3.5%
	Nichols_2	1/1/1962	7.7%	11.6%	11.6%	11.6%	11.6%	3.3%	0.0%	3.8%
	Nichols_3	1/1/1968	8.0%	11.6%	11.6%	11.6%	11.6%	0.0%	0.1%	9.7%
	Plant X_1	1/1/1952	35.6%	11.6%	11.6%	11.6%	11.6%	2.4%	100.0%	100.0%
	Plant X_2	1/1/1953	40.9%	11.6%	11.6%	11.6%	11.6%	39.6%	100.0%	100.0%
	Plant X_4	1/1/1964	8.9%	11.6%	11.6%	11.6%	11.6%	0.1%	6.2%	9.6%

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For more information on the Performance Based Accreditation (PBA) policy, please refer to Attachment AA of the SPP OATT. An example calculation is available in Business Practice 8400.

Data Type
- Actual
- Class Avg

Class Average EFORd by resource type

4HR BATTERIES IN SPS

Example of 1,000 MW of 4hr BESS

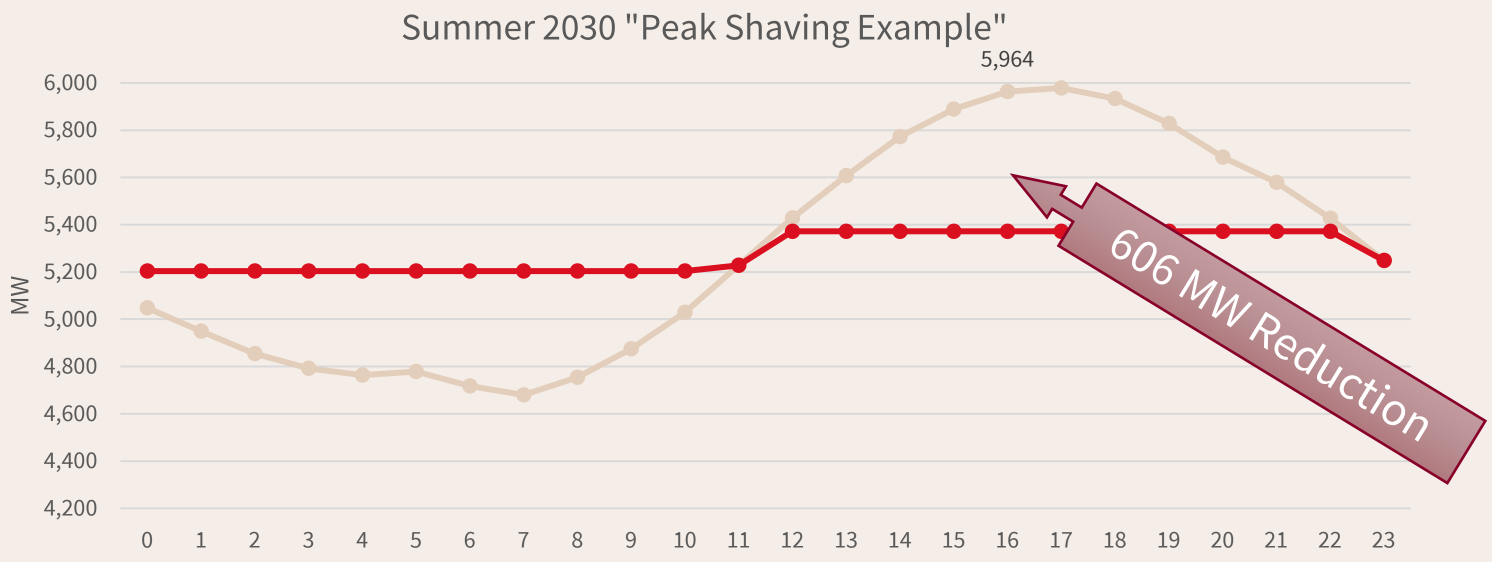
Example is a spreadsheet exercise of perfect foresight dispatch of 1,000 MW of 4hr BESS's to reduce the peak as much as possible.

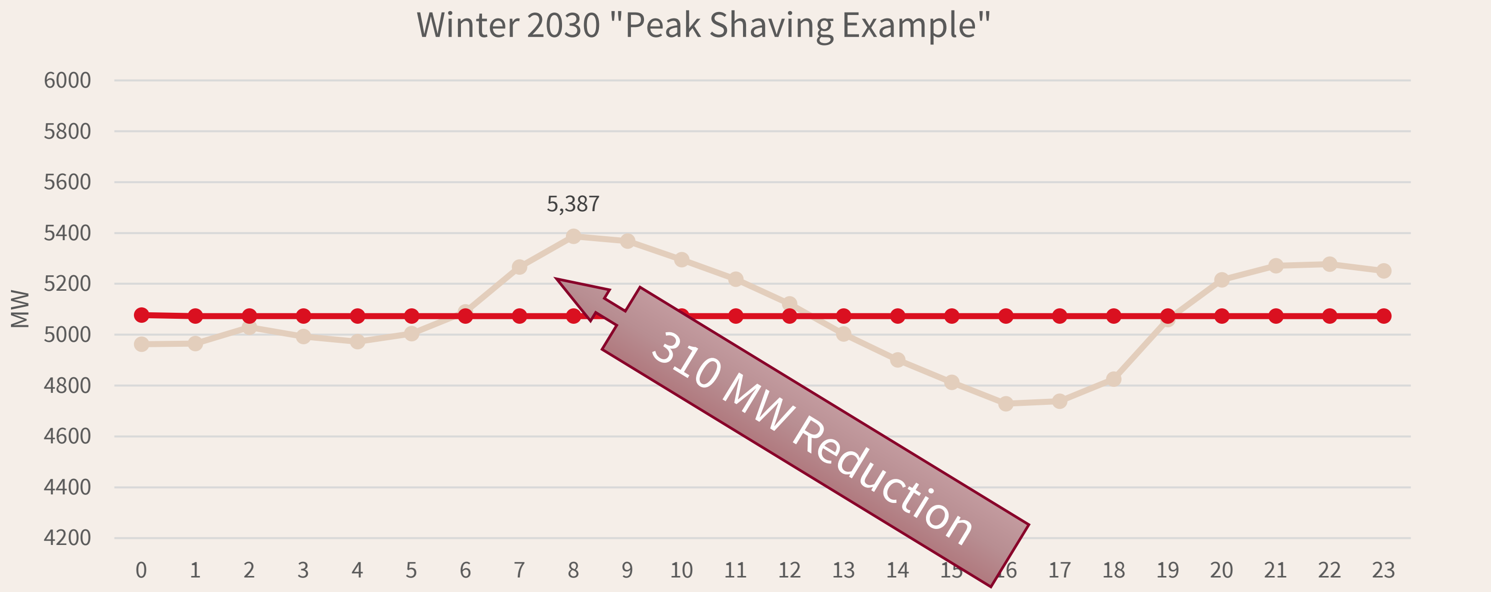
Assumes a 24 hr period to discharge and charge.

Example is for Winter 2030 Peak and Summer 2030 Peak in latest Financial Forecast.

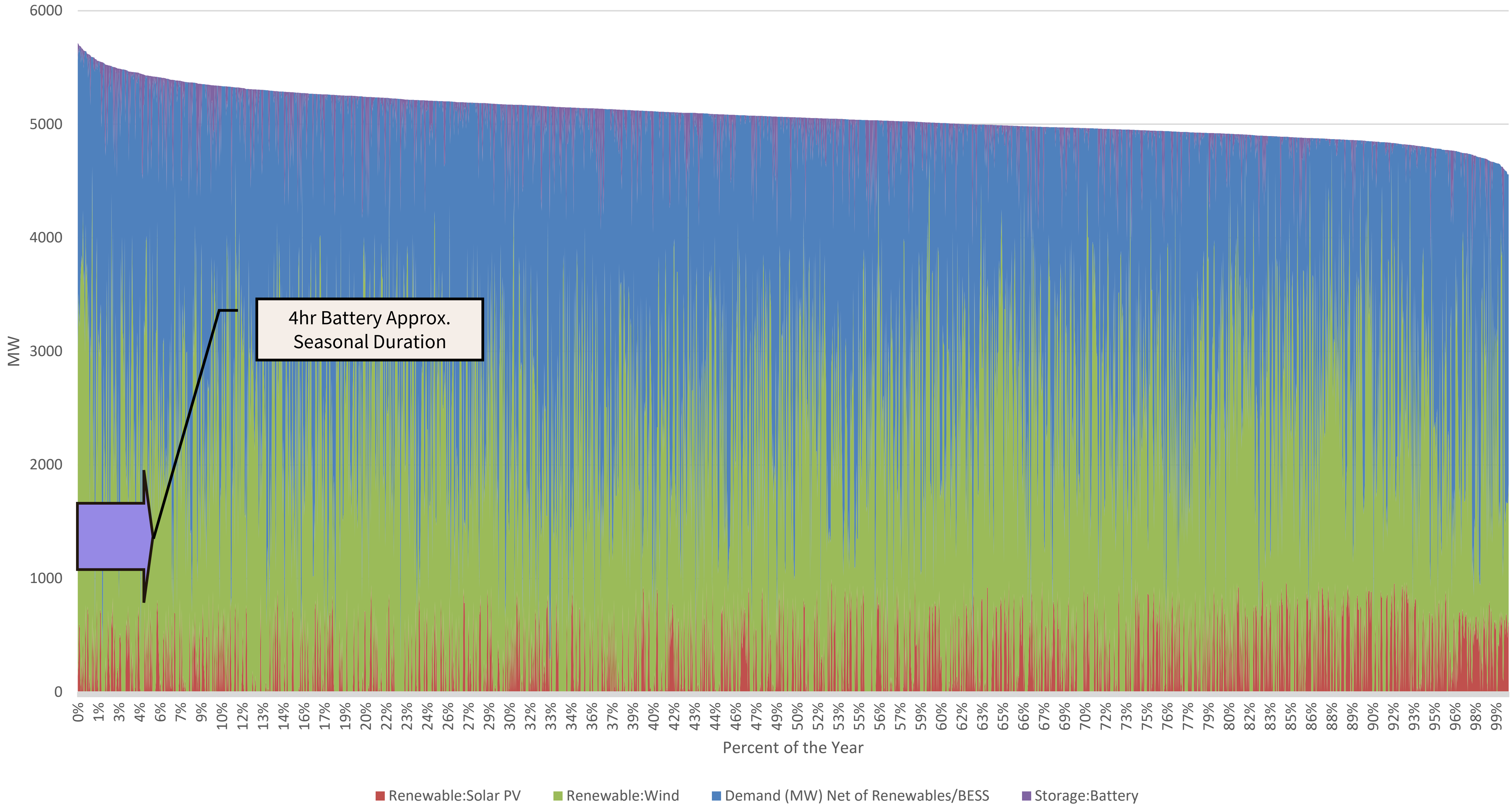
1,000 MW represents an approximate penetration of 20%. An effective capacity value of 60% and 30%, respective of season.

DOES NOT REPRESENT ACTUAL ELCC, BUT DEMONSTRATES RELATIVE VALUE TO REDUCE PEAK



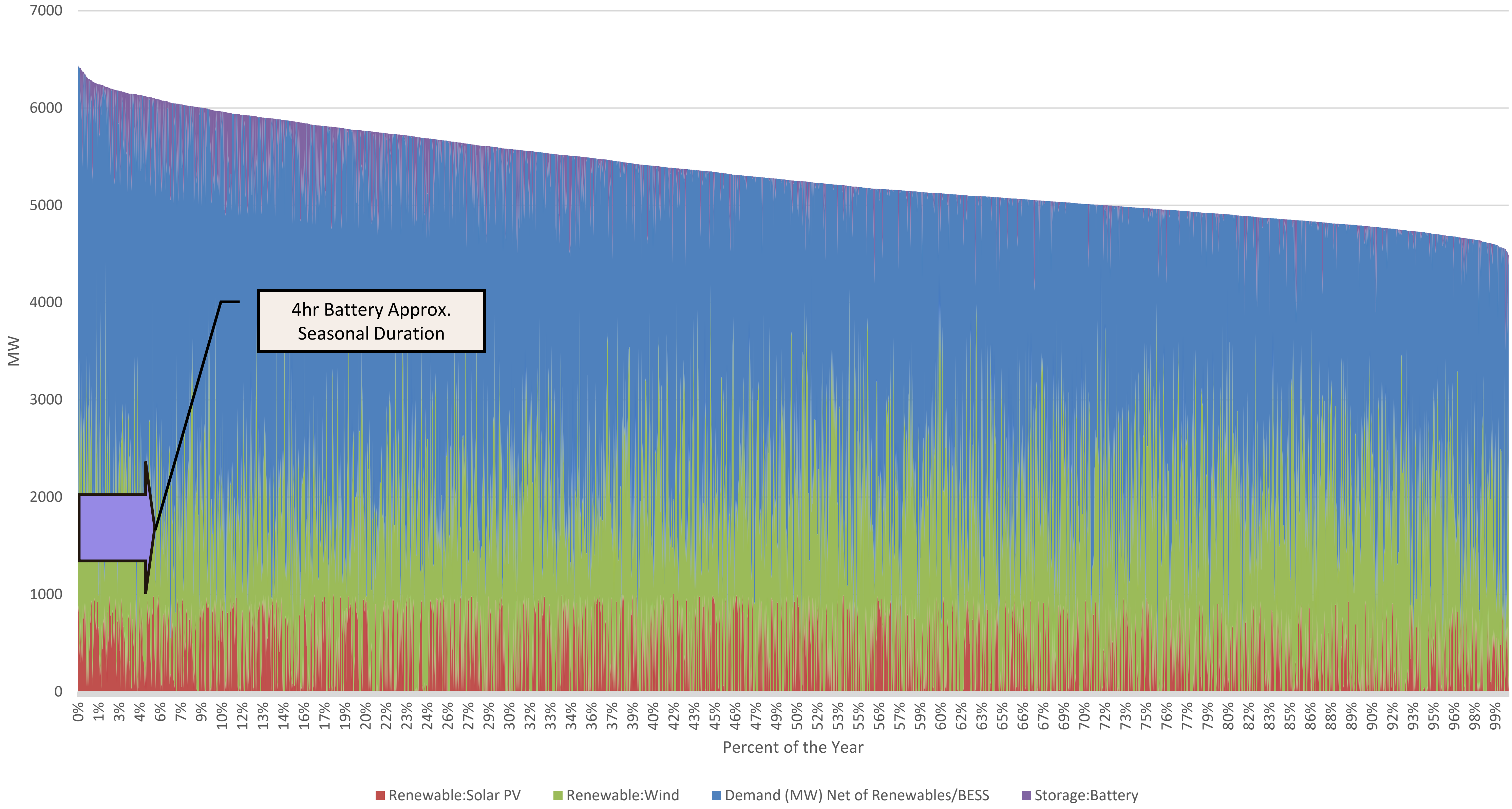


WINTER 2030 LOAD DURATION CURVE



*Expired Forecast Vintage

SUMMER 2030 LOAD DURATION CURVE



*Expired Forecast Vintage

QUESTIONS?

ADVANCED GENERATION & STORAGE TECHNOLOGIES

Dr. Taylor Moot| Senior Innovation Technology Consultant

SCENARIO PLANNING TECHNOLOGIES: ADV. GENERATION & STORAGE

Technology	Benefits	Carbon Free	Dispatchable	Ready for SPS*	RFI Responses
Nuclear (AP1000)	• Clean • High capacity factor	✓	✓	Today	N/A
Fuel Cells	• Fast to deploy • High capacity factor	?	✓	Today	N/A
Long Duration Energy Storage	• Clean • High accreditation factor	✓	✓	Today	10
Next Generation Geothermal	• RECs • High capacity factor	✓	✓	Mid 2030s	3
Advanced Nuclear (SMRs)	• Clean • High capacity factor	✓	✓	Late 2030s	0
Green Hydrogen	• Clean • High accreditation factor	✓	✓	Mid 2040s	0
Carbon Capture	• High capacity factor	?	✓	Mid 2040s	1

*Dates are high level estimates based on the technology adoption readiness and developer interest/focus locations from what we know today. This is not intended to represent when the first demonstration comes online across the US or globally. Further, technologies have different development timelines and this is not intended to reflect timeline for *real* projects

TECH MUST REACH HIGH ADOPTION READINESS TO BE READY FOR SPS

Adoption Readiness Evaluates...	*Low*	*Medium*	*High*
Technology Maturity At what scale has the technology been deployed?	*Pilot*	*First of a Kind > 1MW*	*>500 MW deployed*
Cost Maturity When will the technology be cost competitive?	*Path to <$100/MWh unclear*	*<$100/MWh expected by 2050*	*<$60/MWh expected by 2050*
Policy & Regulatory Maturity What level of changes are required for broad deployment?	*Significant hurdles exist*	*Some hurdle exist*	*Not hindered*
Sector Maturity: Infrastructure How much new infrastructure is needed for deployment?	*Buildout needed*	*Benefits from buildout*	*Not hindered*
Sector Maturity: Supply & Value Chain What level of changes are required for broad deployment?	*New ones needed*	*Modifications of existing*	*Not hindered*
Sector Maturity: Workforce What level of changes are required for broad deployment?	*New workforce needed*	*Upskilling or scaling needed*	*Not hindered*
Sector Maturity: Community Perception How will communities impact deployment?	*Significant resistance*	*Neutral*	*Desired*

Adoption Readiness Levels (ARL) Framework | Department of Energy

TECHNOLOGIES TODAY: ASSESSMENT OF ADOPTION READINESS & MATURITY

Criteria

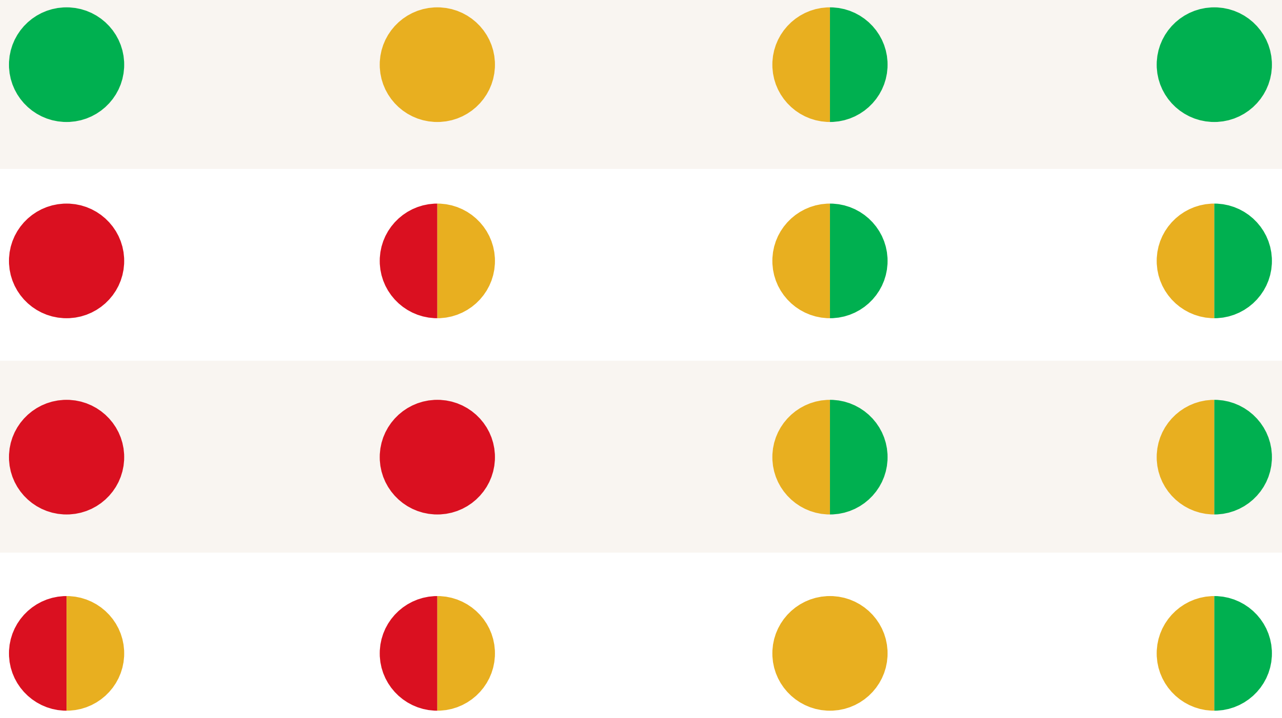
Crawl	Walk	Run
Ready in the 2040s	*Ready in the 2030s*	*Ready today*

Tech Maturity:
How derisked are these? Have they been deployed at utility scale?

Cost Maturity:
How quickly will costs become competitive ?

Policy Maturity:
Does the tech have the needed policy, regulation, and permitting to deploy?

Sector Maturity:
Are there mature supply chains, existing workforce, needed infrastructure and public support?



Technologies: Clean Fuels, Carbon Capture | Advanced Nuclear | Next Gen. Geothermal | LDES

This analysis was informed by data aggregated from public sources such as NREL, DOE, EFI, IRENA, IEA, DNV, BNEF, INL, PNNL, Guidehouse, Lazard, etc. as well as direct feedback from startups, EPRI, and via responses to Xcel Energy's emerging technology RFI

OPPORTUNITIES TO DEPLOY “MATURE” ADV. GENERATION & STORAGE

Gas Generator Replacements

Modeling Scenario: Evaluate upcoming gas generator retirements and identify potential advanced generation and storage technology solutions that are mature and could be ready to deploy

For example:

Unit	State	MW	Retirement	Adv. Gen & Storage Replacement Options
Quay	NM	23	2034	LDES, Fuel Cells?
Cunningham 3, 4	NM	207	2040	Fuel Cells?

HOW MIGHT WE DEPLOY EMERGENT ADV. GENERATION & STORAGE?

Feedback? Suggested Office Hour Topic

Let's start the conversation

Current Barriers	Questions to Ponder	Potential Opportunities
Costs are higher today, but dropping	How might we procure higher cost resources while minimizing impacts to our customers?	Focus on smaller scale projects?
Long term performance likely, but not confirmed	How might we right size projects to minimize potential reliability impacts?	Focus on smaller scale projects, don't count towards capacity?
Long development timelines necessary for some technologies	How might we procure long lead time technologies?	Run long lead time RFP(s)?
Long interconnection queues	How might we think creatively about interconnection opportunities?	Consider leveraging the distribution grid, retiring generators?

Potential Opportunities are inspired by other utility pathways

QUESTIONS?

SOUTHWEST POWER POOL

Jarred Cooley | Sr. Director, Strategic Planning

SOUTHWEST POWER POOL BENEFITS OF MEMBERSHIP

SUMMARY

- Integrated Market - most economical generation, utilizing transmission system limitations
  - Co-optimizes energy and reserve products
- Reserve-sharing
  - Leverage generation diversity across larger geographical region = reduce reserve capacity
- Reliability coordination (RC) function
  - Bulk electric system monitoring
  - Congestion management
  - Situational awareness
  - Coordination between entities

*Note that listed benefits generally align with benefits discussed in Case No. 13-00031-UT testimony.

SOUTHWEST POWER POOL BENEFITS OF MEMBERSHIP

SUMMARY

- Minimum planning reserve margin (PRM)
- System-wide transmission planning studies
- Professional Services
  - Engineering
  - Training
- Tariff and Scheduling - absent SPP, collective LBAs would need to staff FTEs (engineering, reservation handling).
- Facilitates integration of wind / renewable resources

*Note that listed benefits generally align with benefits discussed in Case No. 13-00031-UT testimony.

SOUTHWEST POWER POOL 2025 MEMBER VALUE STATEMENT

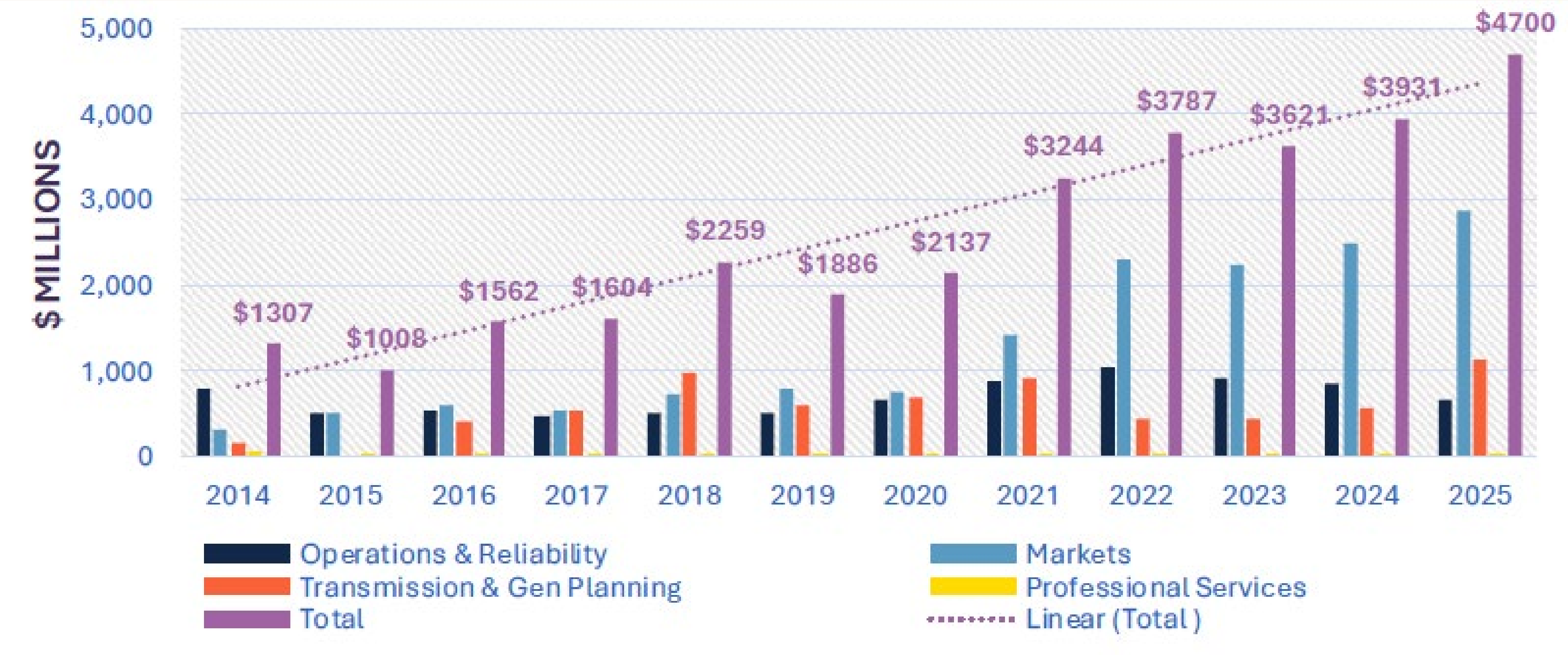
Operations & Reliability	Markets	Transmission	Professional Services
• Reliability • Reserve Margin	• Markets • Regulation	• Robust Transmission • Wind Integration • Planning Margin	• Compliance • Settlements • Engineering • Tariff & Scheduling • Training

The analysis of 2025 data found annual net benefits to members of more than $4.667 billion, provided at a benefit-to-cost ratio of 24-to-1.

Source: spp report - powering progress together.pdf

SOUTHWEST POWER POOL 2025 MEMBER VALUE STATEMENT

Yearly Member Value 2014-2025



Source: spp report - powering progress together.pdf

SOUTHWEST POWER POOL 2025 MEMBER VALUE STATEMENT

SPP Powering Progress

Worksheet: Individual 2025 SPP Member Value Statement (MVS) Estimation

Benefits Related to Load Share *(Applies to Load Serving Members)*	**Reserve Sharing Benefit** *(Unique by Control Zone)*	**Benefits Related to Services** *(Applies More Broadly)*	**Unique Benefit(s)** *(Unique by Member)*	**Unique Cost(s)** *(Unique by Member)*
• Market Load Ratio Benefit • Wind Integration • Value of Transmission • Capacity Margin • FERC Fees (negative)	• RSG Benefit	• Reliability Services • Tariff & Scheduling • Professional Services	• Market Virtual Activity • Market Revenue *(Energy/Transm.)* • Transmission Rights • Hedging • Policy facilitation	• Schedule 1A • Your organization's transmission costs for SPP-directed projects • Annual member fee ($6,000)
***Estimate** your organization's % of SPP's total load for 2025 and **multiply** the above MVS by your % load ratio share (LRS)*	***Identify your control zone's share of RSG** to determine your savings from reserve sharing*	***Low estimate**[2]**: divide** value of applicable services by 115 (Final # of SPP members in 2025)* ***High estimate**: **multiply** by LRS %*	***Add** your unique benefits*	***Subtract** your unique costs*
SPP's total load-related MVS: $4,461,700,000 [3]	**SPP's total RSG for 2025: $590,600,000**	**SPP's services benefit: $116.90 million** • $74.0M Reliability • $26.6M Tariff • $16.3M Prof. Services	**Each Member Provides: $_______________**	**Each Member Provides: $_______________**

How to Estimate Your Individualized MVS: Use the information above, the table on the next page and your own data to estimate values for the highlighted fields below.

Load Share Benefit (LSB)	**Reserve Sharing Benefit (RSB)**	**Services Benefits (SB)**	**Member's Unique Benefit(s)** *(user fills in)*	**Member's Unique Costs** *(subtract from value total)*	**Member's net MVS benefit**
Multiply your load ratio share (LRS) of SPP's load (table on next page) by SPP's load-related MVS: **X.X% * $4.46B = $______**	Reference table on next page for your share of RSG benefits **X.X% * $591M = $______**	Value is somewhere *between*: 1/115 of total: **$1,016,500** LRS% of total: $_______	IM virtual trading: $_______ IM revenue: $_______ TX rights: $_______ Hedging: $_______ Policy: $_______	1A: -$_______ Tx costs: -$_______ Member fee: **-$6,000**	LRB + RSB + SB + Unique Benefits – Unique Costs = _____________

[2] Some members (e.g. those with no end-use customers) may not benefit from reliability or tariff services. This would result in a larger share for other members.
[3] This figure is larger than the regional total MVS because it excludes ATRR cost. To individualize, each member subtracts their unique ATRR in the right column.

Source: spp report - powering progress together.pdf

SOUTHWEST POWER POOL 2025 MEMBER VALUE STATEMENT

Worksheet: Individual 2025 SPP Member Value Statement Estimation

Load Share Benefit (LRS)	Reserve Sharing Benefit (RSB)	Services Benefit (SB)	Member's Unique Benefit(s) *		Member's Unique Costs *		Member's Net MVS Benefit
9.69% * $4,460,000,000 = $432,174,000	12.12% * $591,000,000 = $71,629,200	9.69% * $116,900,000 = $11,327,610	IM Net Rev/Cost	($34,529,902)	Member Fee	$6,000	$573,737,703
LRS * SPP Load-Related MVS	Control Zone Share * SPP Reserve Sharing Benefits	LRS * SPP Service Benefits	Trans Rights	$220,690,795	Schedule 1A	$14,874,537	
			Anc Svc Chgs/Rev	$1,122,310	Transm Charges	$110,567,948	
					FERC Assessment Fee	$3,227,824	
				$187,283,203		$128,676,309	

Note: These calculations are very high-level, based on MVS numbers from SPP and may not be indicative of benefits calculated on an in-depth analysis.

* Member's Unique Benefits and Costs based on data from Docket 13-00031-UT 2024 Annual Report; 2025 data not yet finalized.

QUESTIONS?

APPENDICES

OPEN ITEMS FROM PRIOR WORKSHOP

OPEN QUESTIONS

Resource Options

1. **How SPS considering emerging technologies such as geothermal, nuclear, long-duration storage, pumped hydro in modeling? How feasible are they? In what timeframe?**
   - SPS intends to model several emerging technologies as sensitivities in its IRP modeling. Please see Slides 16 and 17 of the presentation for Workshop #2 for more information on possible types, feasibility and likely adoption readiness.
2. **What does a fully compliant 2045 zero-carbon portfolio look like? What are cost impacts? Consideration of hydrogen conversion? How to meet needs of high load factor customers under a zero-carbon future?**
   - SPS appreciates these questions and anticipates modeling such scenarios which should identify potential costs and needs of high load factor customers given the zero-carbon future requirement.
3. **How does SPS model virtual power plants and demand response options? How to balance potential with performance expectations in SPP market?**
   - VPPs and DRs modeling approaches are being identified but have traditionally been modeled as a load modifier in the load forecast and not as specific resources with defined attributes within the model. Southwest Power Pool is adopting new Resource Adequacy Requirements as early as 2027 or 2028 and will likely have a significant impact on how DR and VPPs are accredited for capacity in the future. Please refer to SPP RR703 for additional information.

OPEN QUESTIONS

Resource Options

4. **2024, 2025 RFPs – How will CCN approval impact resource planning? Will these bring more batteries to SPS's system? If not approved, how will SPS split system between NM, TX?**
   - Resources SPS is seeking approval in 2024 RFP and resources considered for open solicitation (2025 RFP) will have significant impacts to SPS's resource planning. Denial of resources selected in either 2024 or 2025 RFP (which is still being evaluated) will indicate a nearer term customer need that will not be possible to solution given timing of IRP process.
   - 2024 RFP resulted in selection of over 1 GW of new batteries on SPS system.
   - SPS is reviewing modeling approaches to a "split system" and anticipates a dedicated modeling exercise for this scenario within this IRP. In this scenario, SPS will likely model using multi-phased approach where systemwide needs will be modeled using least-cost approach. Once solved, SPS will take New Mexico load ratio share of carbon-emitting resources and remove them from model, leaving volume of carbon-emitting resources necessary to service Texas load ratio share within model. This portfolio of resources will then be "locked" and model will be allowed to reoptimize using only non-carbon emitting resources to fill need left by removed carbon-emitting resources.
5. **Is interregional transmission modeled as supply-side resource?**
   - In SPS IRP modeling, interregional transmission is represented as physically limited import/export capability with market prices and supports economics and operations but is not treated as a selectable supply-side resource for planning adequacy because Southwest Power Pool rules do not assign capacity value to transmission alone.

OPEN QUESTIONS

Resource Options

6. **Regarding the 2024 RFP, did removing thermal generation from mix mean selection includes more batteries?**
   - Not necessarily. During the 2024 RFP, SPS modeled several approaches to removing thermal generation. When removing thermals and allowing model to reoptimize on generic resources, model selected a range of wind, solar, batteries. In removing thermals, an associated volume of energy is removed. To supplant this lost energy, model can select from range of options that can include additional resources such as wind, solar, additional dispatch of other thermals, additional market reliance, possibly batteries if energy is available to "move" across the system. Thermal Resources and Batteries are not one-for-one replacement for each other.
7. **Explain difference between IRP generic resources, RFP specific resources. Will you run scenario that removes thermal resources?**
   - Generic resources represent generic pricing of technology types and do not represent actual projects. Since are theoretical, the limit to volume of a specific technology each year can be opportunity for sensitivity. Because represent a technology and not necessarily an actual project, model can select a "perfect" amount appropriate for given need. Specific resources resulting from RFP have actual pricing, timing, sizing that ultimately represent what is available to SPS to build or contract today. In this IRP, SPS does plan to model scenarios that do not include thermal generation for New Mexico customers in addition to least-cost base model.

OPEN QUESTIONS

Resource Options

8. **Prior IRP Modeling -What was chosen if no limitation on resources? Expansion plan selects resources; production cost modeling examines performance?**
   - Please see 2023 IRP for information related to prior IRP modeling. There are some important distinctions between now and last IRP, including updates to resource pricing, tax advantage assumptions, customer demand.
   - EnCompass uses two-phase modeling framework consisting of capacity expansion followed by production cost analysis. In capacity expansion phase, model determines least-cost portfolio of resources over planning horizon using simplified operational representations. This allows model to efficiently optimize long-term investment decisions while meeting reliability, policy constraints. Once resource selection and timing decisions are established, EnCompass performs a production cost analysis using full chronological dispatch to evaluate system operations.

9. **2045-high factor loads, reactive power concerns (O&G) with changing resource mix. How are these handled now vs. future?**
   - High load factors for certain customer demand is expected to be modeled in SPS's sensitivities related to data centers (both TX, NM sited).
   - While IRP primarily evaluates system adequacy, costs, reliability from a real-power (MW and MWh) perspective, SPS separately and comprehensively addresses reactive power and voltage requirements through transmission and distribution planning processes. Large motor-driven industrial loads, including oil and gas facilities, are well understood to have localized reactive power and voltage support needs, which are evaluated and mitigated through site-specific solutions such as power factor standards, distribution equipment, and targeted transmission-level reactive resources. Portfolio-level resource decisions evaluated in this IRP do not diminish SPS's ability to meet those requirements, as voltage and reactive performance are addressed through established planning criteria and operational practices outside the IRP framework.

OPEN QUESTIONS

Resource Options

10. **SPP capacity accreditation (ELCC):** What is SPP's ELCC for batteries? SPP's winter planning reserve margin is major driver for SPS. SPP's ELCCs change over time, vary by portfolio mix.
    - Please see section "Inputs" in this Workshop #3 presentation.
11. **Exploration of emerging technologies:** Is SPP membership constraining resource options? Why no batteries in SPP? Interests in pumped hydro (Carlsbad?), micro hydro (canal based?), long duration storage, fuel cells.
    - No. SPS's membership in the Southwest Power Pool does not constrain resource options. Battery Technology penetration is expected to increase penetration into the system over time. However, every Load Responsible Entity or Market Participant makes their own decisions on future resource development. All participants must follow the Open Access Transmission Tariff, but participating in those rules does not preclude a member from exploring emerging technologies. SPS is interested in a range of emerging technologies and as such has issued and has maintained an Open Request for Information ("RFI") for Emerging Tech since the 2023 IRP. Please see the presentation for Workshop #2 for general information on what responses that RFI has received.
12. **Grid Enhancing Technologies (GETs):** Consideration flow controllers, other transmission optimization tech.
    - Traditionally GETs are considered transmission operational enhancements and not a substitute for new generation resources. Xcel Energy is actively evaluating, piloting, and explaining GETs as targeted transmission-operation tools, but it is not relying on GETs as a substitute for major transmission expansion or as a modeled resource in IRPs. GETs are treated as complements to traditional transmission planning, deployed where they are cost-effective, reliable, and operationally manageable.

OPEN QUESTIONS

Miscellaneous

1. **Did Wildcat Power Purchase go through (battery from 2022 RFP)?**
   - The previously approved BESS at the site never went forward because SPS did not obtain approval for the project from both the Commission and the Public Utility Commission of Texas. The developer subsequently bid a BESS project, i.e., the Wildcat Ranch BESS LTPPA presented in this case, in response to the 2024 RFP. The Wildcat Ranch BESS is larger (120 MW) than the previous project that did not go forward. It is a similar project—albeit a larger one—that was bid and ultimately selected as part of the Final Preferred Portfolio.
2. **Hydrogen conversion cost to meet 2045 RPS zero-carbon standard?**
   - SPS did provide estimates in the 2023 IRP and is looking to update those numbers. Hydrogen fuel estimates have been developed, please see "Emerging Technologies" section in this Workshop #3 presentation for more information. SPS also seeks input from stakeholders concerning hydrogen conversions.
3. **How are methane reductions accounted for; in the oil and gas reductions or the SPS transportation plan?**
   - The methane reductions are accounted for as oil-and-gas-sector reductions, not as part of the SPS transportation plan. During the 2024 RFP, SPS commissioned a 3rd party analysis to identify potential reductions of customer methane emissions by constructing the Gaines Co. Project. Methane reductions referenced in SPS's 2024 CCN arise from avoided emissions at oil and gas customer facilities due to electrification and are accounted for as oil-and-gas-sector methane reductions. They are evaluated only for purposes of determining whether incremental generation meets New Mexico's zero-carbon resource definition and are not part of SPS's transportation emissions plan or SPS's own emissions inventory.
4. **Texas Policy (SB6) regarding curtailing data center load – how is this considered in the planning reserve margin analysis?**
   - Texas SB6 is specific to ERCOT, therefore it is inappropriate for SPS to consider this legislation in its planning.

ADVANCED GENERATION & STORAGE TECHNOLOGIES APPENDIX

TECH TODAY: ASSESSMENT OF ADOPTION READINESS & MATURITY

Note, this holistic overview does not consider how challenging the remaining barriers are