Santee Cooper Resource Planning

Stakeholder Working Group Meeting #4

November 13, 2024

Welcome and Agenda

Stewart Ramsay, Meeting Facilitator
VANRY Associates

Meeting Agenda

12:30 pm	Welcome and Agenda
12:40 pm	Working Group Business
1:20 pm	2024 IRP Update and Short-Term Action Plan
2:00 pm	BREAK
2:10 pm	IRP Process Overview
2:45 pm	2023 IRP and 2024 IRP Update Discussion on Transmission Costs
3:20 pm	Discussion of Transmission Cost and Resource Planning
4:00 pm	BREAK
4:10 pm	2026 Reserve Margin and ELCC Study
4:50 pm	Meeting Closeout

Guest Attendee and Guest Speaker

Chris Wagner
Director Transmission Planning and R&D
Santee Cooper

Joel Dison
Technical Manager
Astrapé Consulting, a part of PowerGEM

Intended Outcomes

Take care of working group matters

- Progress against prior session action items
- Plans for upcoming working group meetings and priority topics

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Take care of IRP business matters

- 2024 IRP update filing, including Commission process and procedural schedule
- IRP process & methodologies, particularly related to IRP transmission costs
- Reserve Margin and Effective Load Carrying Capability (ELCC), including 2023 review and 2026 Scope of Work

Working Group Business

Clay Settle, Manager Resource Planning
Santee Cooper

Review of Action Items

Meeting Identified	Action Item (as recorded and agreed to in prior meetings)	Progress
Meeting 1 and 2	Santee Cooper is committed to adding an additional member to the working group to represent marginalized communities, beginning at the next working group meeting. Details are under discussion.	Done: South Carolina Energy Justice Coalition joined the working group in July 2024.
Meeting 2	Vanry will have follow up conversation with Santee Cooper regarding the applicability of a sub-group for marginalized community members	Underway
Meeting 2	Stewart commits to making sure that we capture and reflect germane stakeholder comments in the meeting summaries and continue to refine and evolve these	Done and Ongoing: Vanry has produced augmented Summaries that outline conversation and member input. This format has been used for meeting 2 & 3 summaries.
Meeting 2	We are committed to incorporating additional comments to the Stakeholder Meeting #1 summary based on specific comments and suggested edits received from stakeholders	Done: No comments or edits were received. The Meeting #1 Summary was filed as originally produced.
Meeting 2	We will consider the suggestions for portfolios and sensitivities raised by stakeholders	Done: Included suggestions from stakeholders for portfolio side case and sensitivity analysis in the 2024 IRP Update.
Meeting 3	Santee Cooper will email working group members when the 2024 IRP Update has been filed with the PSC and when the data room is populated	Done: Emailed members on 9/16/2024 when the 2024 IRP Update was filed and then on the dates when data was added to the data room.

Review of Action Items

Meeting Identified	Action Item (as recorded and agreed to in prior meetings)	Progress
Meeting 2	Given the constraints of the overall IRP schedule and timeline, we plan to keep stakeholders informed of material changes to the load forecast to the best of our ability	See response below.
Meeting 2	Will Brown will work with the Load Forecast team to figure out a frequency for updates and present that proposal at the next meeting	Proposed: The Santee Cooper Load Forecast team will participate and present at SWG meetings five, six, and seven, see Resource Planning Working Schedule.
Meeting 2	We will provide Taylor with any updated versions of data representations that have been shared in the technical discussion, for example TVA view of the simulation results	Done: Sent to working group on July 22, 2024.
Meeting 2	We are committed to discussing the details of how ELCC is developed for renewable and conventional resources in future meetings	Underway: Presentation and discussion with members today, see section Reserve Margin and ELCC Study.
Meeting 2	Stewart will work with Clay and Will to look for opportunities to add additional conversations about ELCC and how to incorporate these into working group meetings and only schedule, if necessary, a technical meeting	See response above.

Review of Action Items

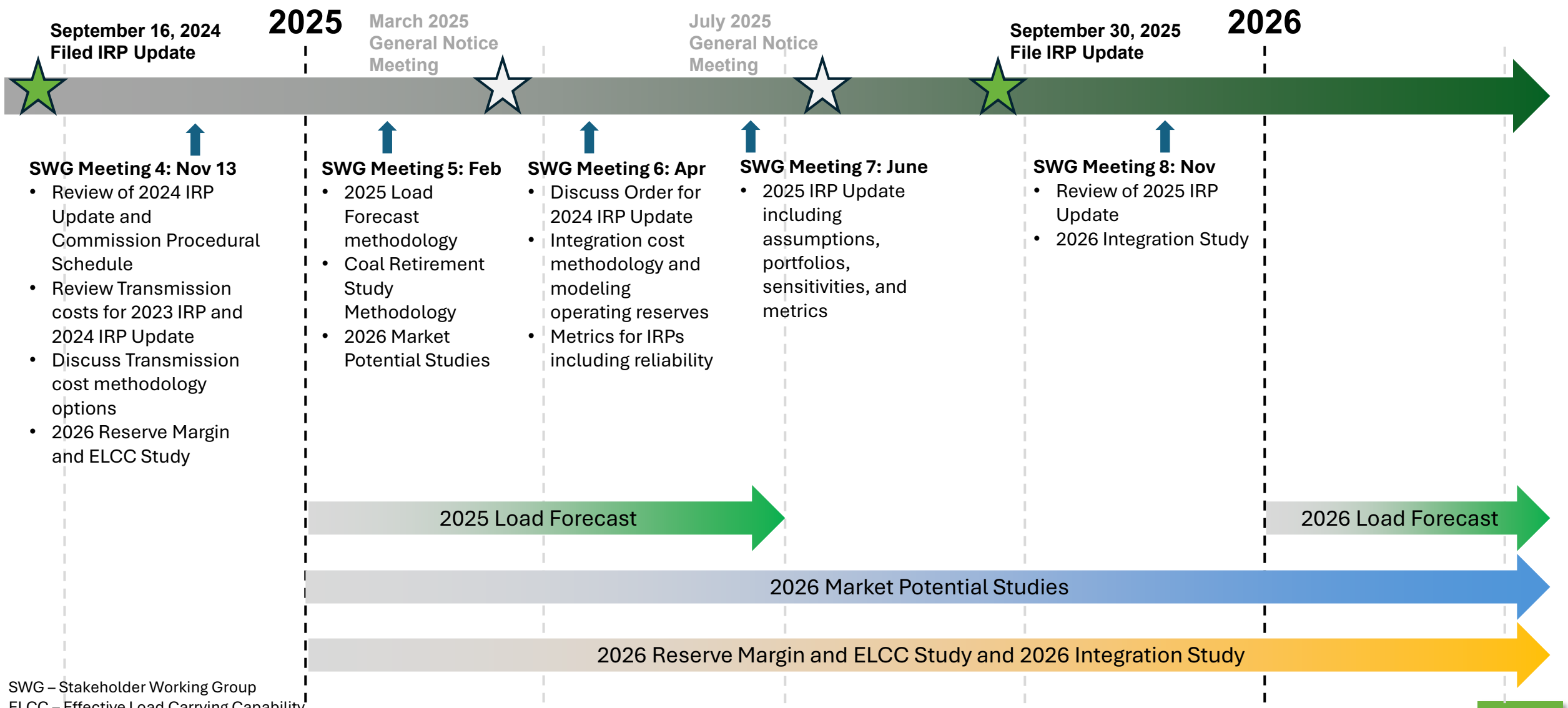
Meeting Identified	Action Item (as recorded and agreed to in prior meetings)	Progress
Meeting 2	Will Brown will follow up with Eddy and discuss internally how to have a meaningful conversation about the 500 kV plan	Done: See next slide.
Meeting 3	Santee Cooper committed to considering Eddy Moore's request related to TIAs	Done: Transmission Impact Analyses (TIAs) contain critical system information that Santee Cooper has an obligation to protect. Santee Cooper has shared all information it can share publicly.

Transmission Stakeholder Engagement

- Santee Cooper recommends to stakeholders who desire to have meaningful conversations on transmission plans and planning methodologies to engage in the South Carolina Regional Transmission Planning (SCRTP) stakeholder process
  - The SCRTP information can be found at the following weblink:

    https://www.scrtp.com/
  - The SCRTP process provides an open and transparent transmission planning forum for transmission providers to engage with stakeholders regarding transmission plans in the region
  - The SCRTP process complies with FERC Order Nos. 890 and 1000

Resource Planning Working Schedule



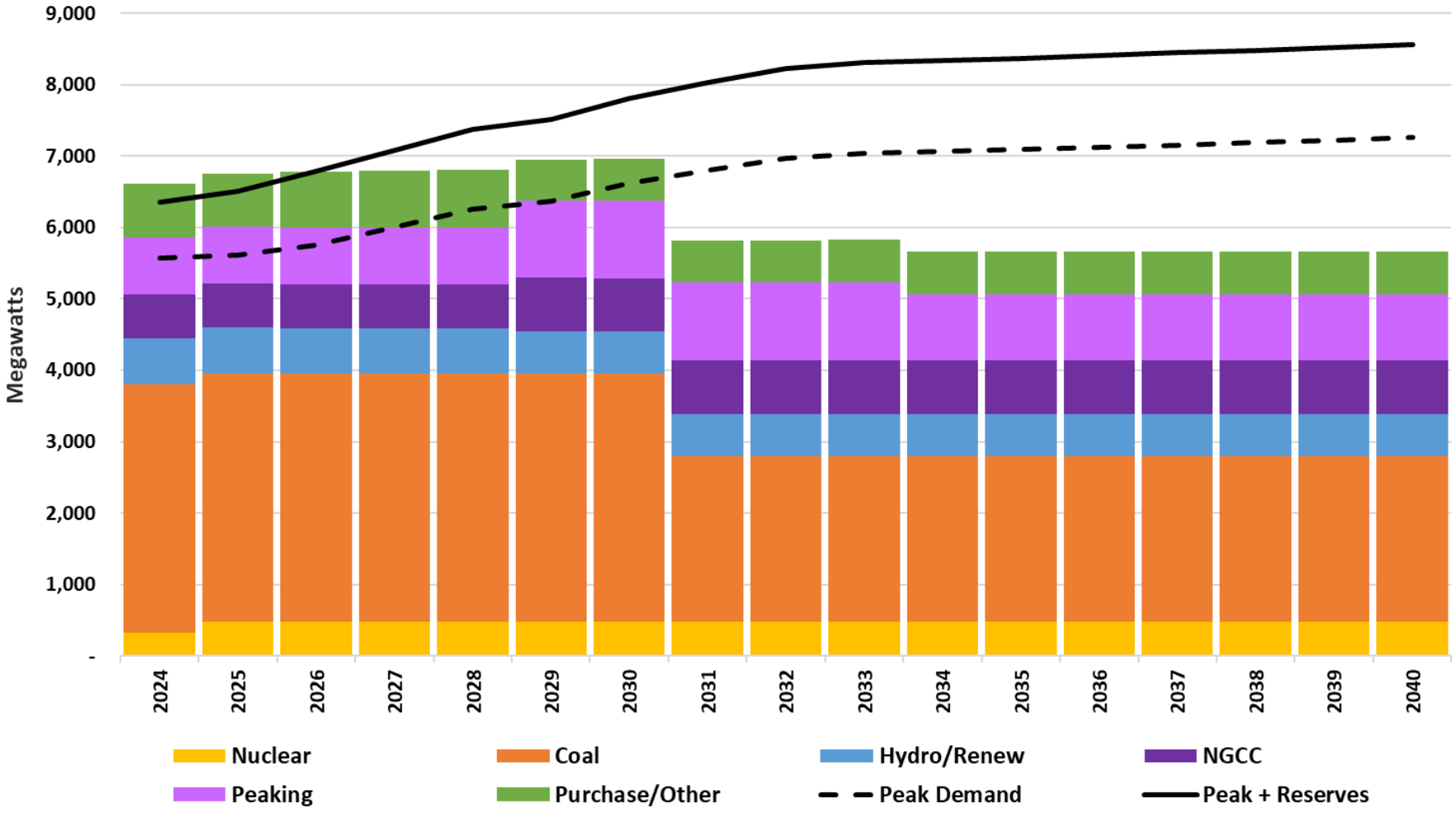
SWG – Stakeholder Working Group
ELCC – Effective Load Carrying Capability

2024 IRP Update and Short-Term Action Plan

Clay Settle, Manager Resource Planning
Santee Cooper

2024 IRP Update Overview

Projected Supply v. Demand Balance (Base Case)



2024 IRP Update Overview

Resource Changes through 2040	Additions (Retirements) (MW)		
	2024 Portfolio Update	2024 Portfolio with PPAs	GHG Rule Portfolio
Retirements			
• Winyah (2031)	(1,150)	(1,150)	(1,150)
• HH and MB CTs (2034)	(165)	(165)	(165)
• Cross (2032)	0	0	(2,330)
Rainey Upgrades (2028)	255	255	255
Central PPAs			
• 2029	672	672	672
New NGCC			
• 2031	1,020	1,020	1,360
• 2032-2040	0	0	2,719
New Peaking			
• 2031	894	447	0
• 2032-2040	0	447	256
PPAs			
• 2031	0	550	0
• 2039	0	(550)	0
New Solar			
• 2026-2031	1,800	1,800	1,800
• 2032-2040	1,650	1,700	2,700
New BESS			
• 2026-2031	250	250	250
• 2032-2040	200	150	50
New Wind			
• 2029-2031	100	100	300
• 2032-2040	500	400	550

Comparison of NPV Power Costs for Reference Case ($B)

Portfolios	NPV Power Costs
2024 Portfolio Update	$29.3
2024 Portfolio with PPAs	$29.2
GHG Rule Portfolio	$35.7

Difference to 2024 Portfolio Update	
2024 Portfolio with PPAs	($0.1)
GHG Rule Portfolio	$6.5

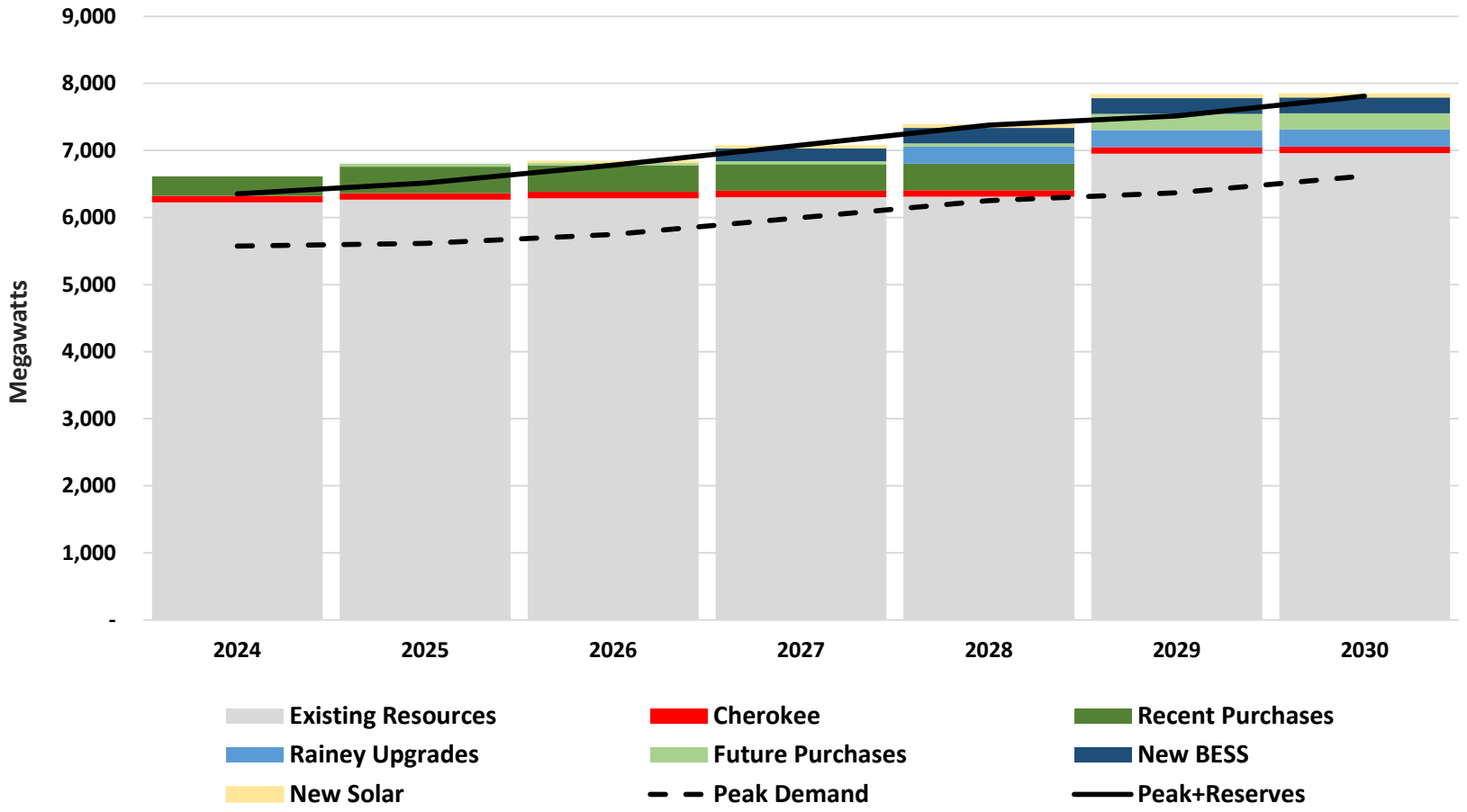
NPV Power Costs Across Sensitivities and Maximum Regret ($B)

Portfolios	Reference Case	Low Fuel Price	High Fuel Price	Med CO2 Price	High CO2 Price
2024 Portfolio Update	$29.3	$27.6	$33.3	$36.6	$49.6
2024 Portfolio w PPAs	$29.2	$27.5	$33.2	$36.5	$49.6
GHG Rule Portfolio	$35.7	$33.4	$42.5	$40.8	$50.5

Max Regret by Portfolio	
2024 Portfolio Update	$0.1
2024 Portfolio with PPAs	$0.0
GHG Rule Portfolio	$9.2

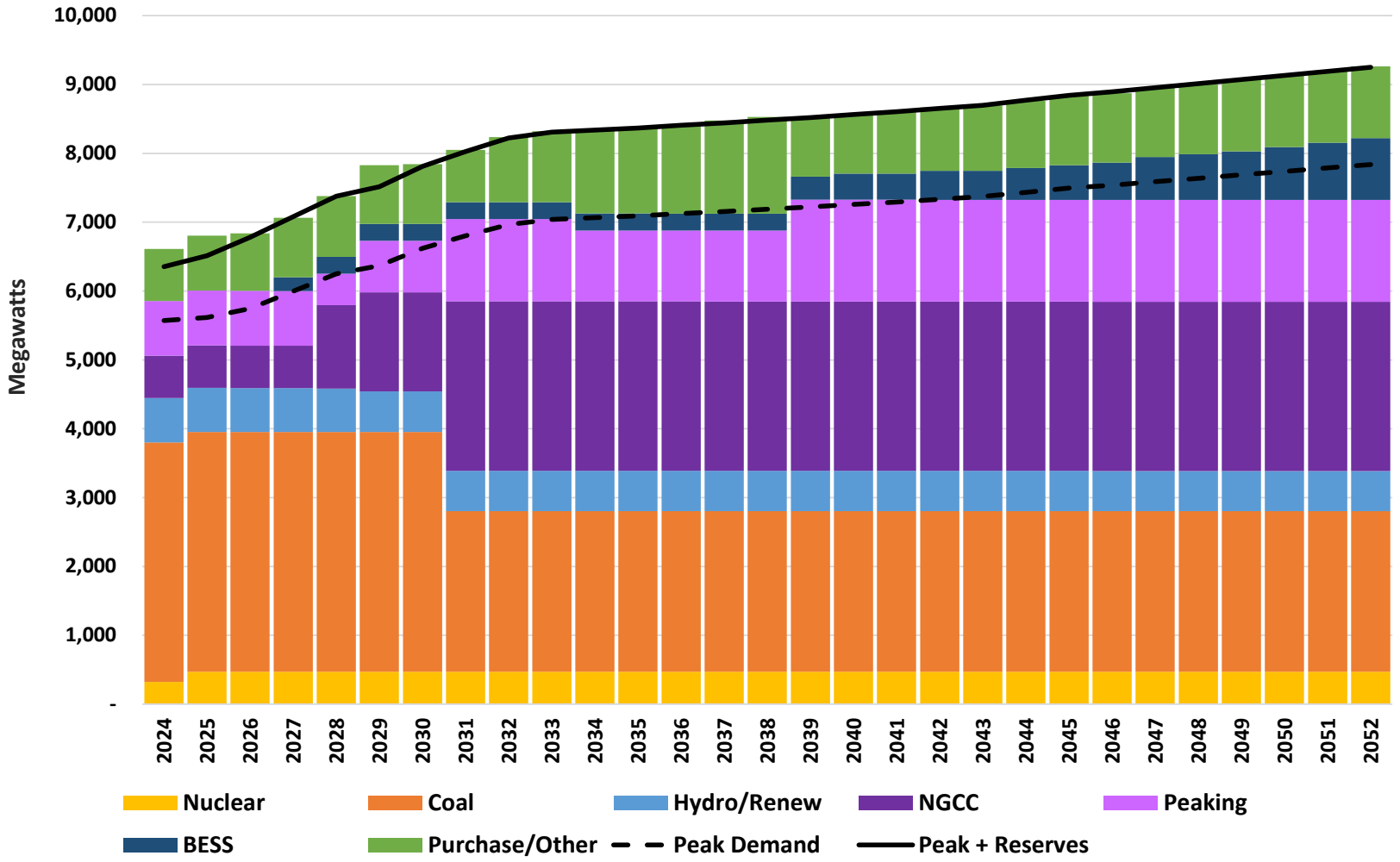
2024 IRP Update Overview

Supply and Demand Balance 2024-2030, Winter Demand and Capacity



2024 IRP Update Overview

Supply and Demand Balance under the 2024 Portfolio with PPAs

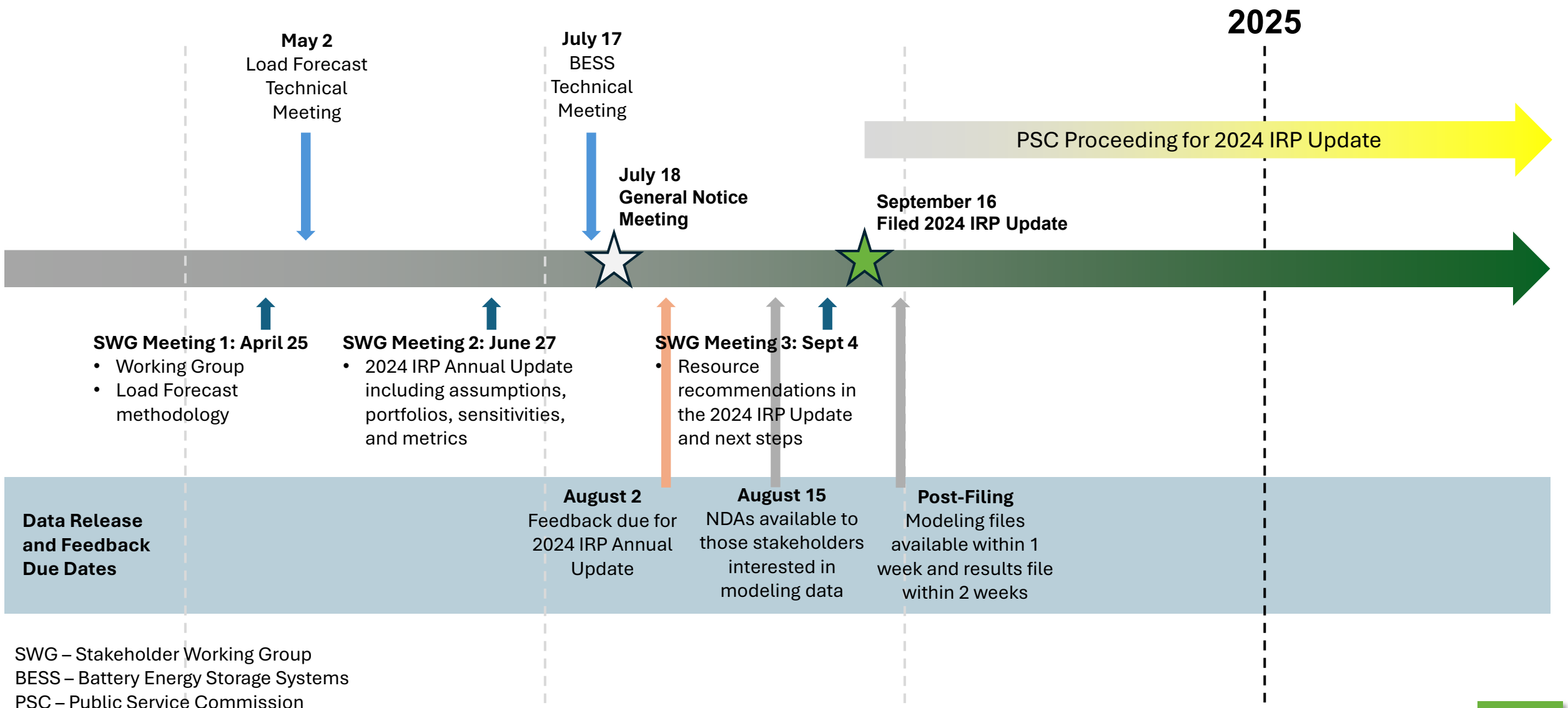


2024 IRP Update Overview

Short-Term Action Plan

- Update the load forecast and monitor changes in potential new large customers
- Implement near-term resources, including Rainey upgrades, short-term purchases, and the addition of battery energy storage systems
- Continue towards executing the key resources in the 2023 Preferred Portfolio, including solar and the 2031 natural gas combined cycle
- Continue to refine options for large-frame combustion turbines to meet load growth
- Monitor regulatory developments
- Continue stakeholder engagement and studies to support future filings
- Investigate the feasibility of onshore wind for future IRPs

2024 IRP Update Schedule



SWG – Stakeholder Working Group
BESS – Battery Energy Storage Systems
PSC – Public Service Commission

2024 IRP Update

Commission Procedural Schedule

Schedule Item	Date	Days Between
Santee Cooper's IRP Update filed with the Commission	September 16, 2024	
ORS to File a Report regarding Santee Cooper's IRP Update	January 14, 2025	120
Intervenors/Other Parties of Record to File Comments Regarding Santee Cooper's IRP Update	February 14, 2025	31
Santee Cooper's Reply Comments in Response to ORS's Report and All Other Parties' Comments to ORS' Report	March 14, 2025	28
Proposed Order Due	March 24, 2025	10
Commission Issues Final Order	TBD	

IRP Process Overview

Clay Settle, Manager Resource Planning, Santee Cooper
Bob Davis, Executive Consultant, nFront

The IRP Process

Development of Assumptions

- Load Forecast
- Planning Reserve Margin
- Operating reserves
- Economic and financial assumptions
- Existing resources
- New resources
- Demand Side Management
- Effective Load Carrying Capability
- Fuel prices
- Transmission costs
- Resource retirements
- Sensitivity assumptions

Portfolio Development

- Identify multiple portfolio strategies for evaluation
- Perform portfolio optimization runs utilizing modeling software
- Portfolio optimization for load sensitivity cases

Production Cost and Sensitivity Analysis

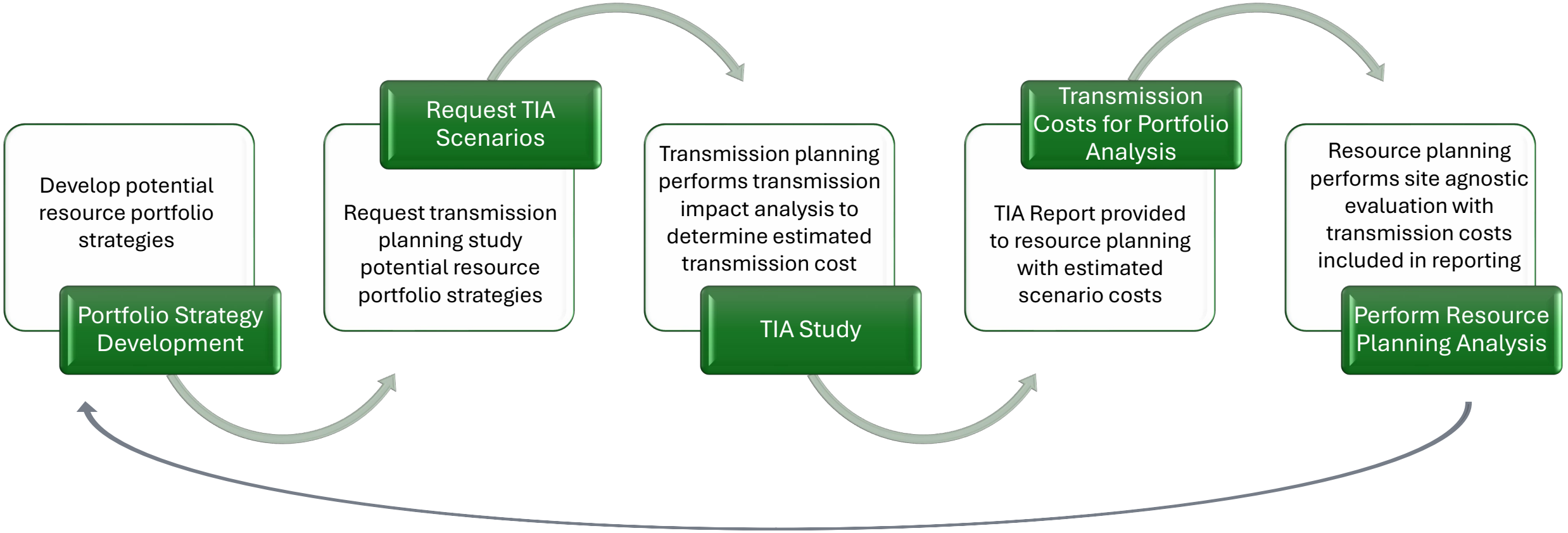
- Production cost runs for base portfolios
- Production cost runs for sensitivity analyses

Metrics and Reporting

- Compute and report results for portfolios, including
  - Load & Resource (L&R) balance
  - Resource additions
  - Portfolio Net Present Value (NPV)
  - CO2 emissions
  - Diversity
  - Renewable energy
  - Fixed costs
  - Sensitivities
  - Fuel cost resiliency
  - Comparative metrics

Transmission Cost Process To-Date

Resource planning to-date has utilized a cyclical process for establishing portfolio scenarios, requesting transmission impact analysis (TIA), and performing resource planning studies



Cross Retirement Analysis 2023 IRP

- In the 2023 IRP, Santee Cooper conducted Cross Generating Station retirement analysis through sensitivity cases
  - Sensitivity cases included No Retirement, Retire 2029, Retire 2034, and Retire 2039
- The analysis is provided in Appendix H of the 2023 IRP
- The analysis showed that under reference case assumptions the estimated system power costs decline the longer Cross Generating Station is left in operation

Figure H-1: Cross Retirement Timing Sensitivity Analyses

Portfolio	Reference Case ($B)
Economically Optimized - Cross Not Retired	$23.5
Future Coal Retirement Portfolio	
Cross Retire 2029	$25.9
Cross Retire 2034	$25.3
Cross Retire 2039	$24.7

2023 IRP and 2024 IRP Update Discussion on Transmission Costs

Clay Settle, Manager Resource Planning, Santee Cooper
Bob Davis, Executive Consultant, nFront

IRP Transmission Cost Assumptions

- Transmission costs assumed in the 2023 IRP and the 2024 IRP Update were derived from transmission impact analysis
- The transmission costs are included in the IRP as post-modeling cost adjustments

Transmission Upgrade Cost	2023 IRP ($B)	2024 IRP Update ($B)
Economically Optimized Portfolio	$0.4	$0.3
No New Fossil Portfolio	$0.4	-
Coal Retirement Portfolio	$1.9	-
Net Zero CO2 by 2050 Portfolio	$1.9	-
EPA 111 GHG Portfolio	-	$1.9
Preferred Portfolio	$0.4	$0.3

Discussion of Transmission Cost and Resource Planning

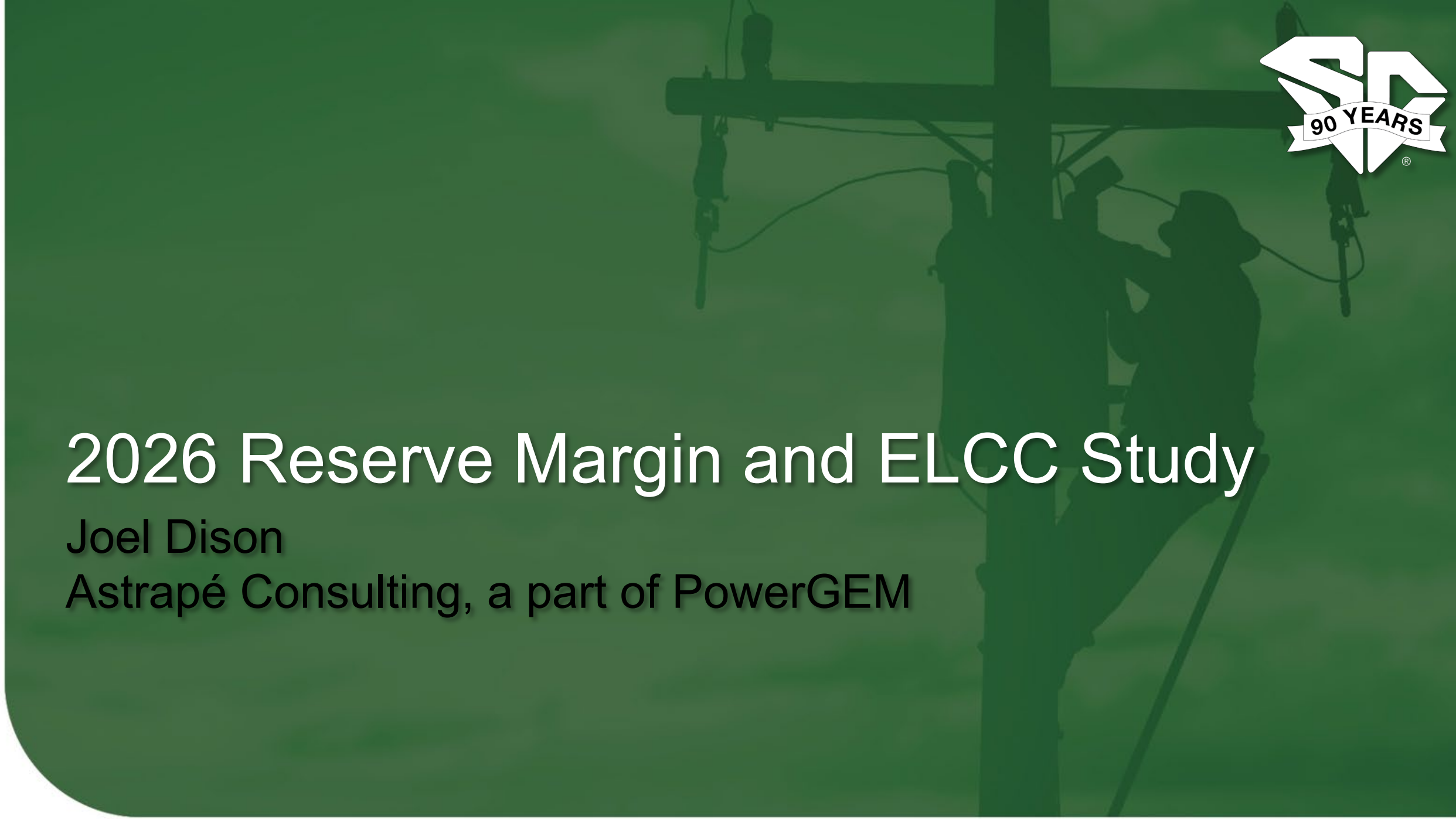
Clay Settle, Manager Resource Planning, Santee Cooper
Bob Davis, Executive Consultant, nFront

Transmission and Resource Planning

- Current industry practices are to model generating resource and transmission systems plans using separate models specifically designed to evaluate the unique characteristics, operating limits, and planning criteria of each system
- Transmission and resource planning studies are conducted to satisfy separate regulatory requirements
- Integration of transmission and resource planning is achieved by incorporating the results of a transmission or resource study into a subsequent, respective, resource or transmission study – Santee Cooper currently uses this process
- Santee Cooper is investigating whether options may be available to estimate transmission costs used for its resource planning process

Group Discussion

- Do stakeholders have additional insights on how integrated modeling is performed?
- Any thoughts on modeling approaches that Santee Cooper may want to consider?
- Any insights on future industry trends?
- What haven't we asked?



2026 Reserve Margin and ELCC Study

Joel Dison
Astrapé Consulting, a part of PowerGEM

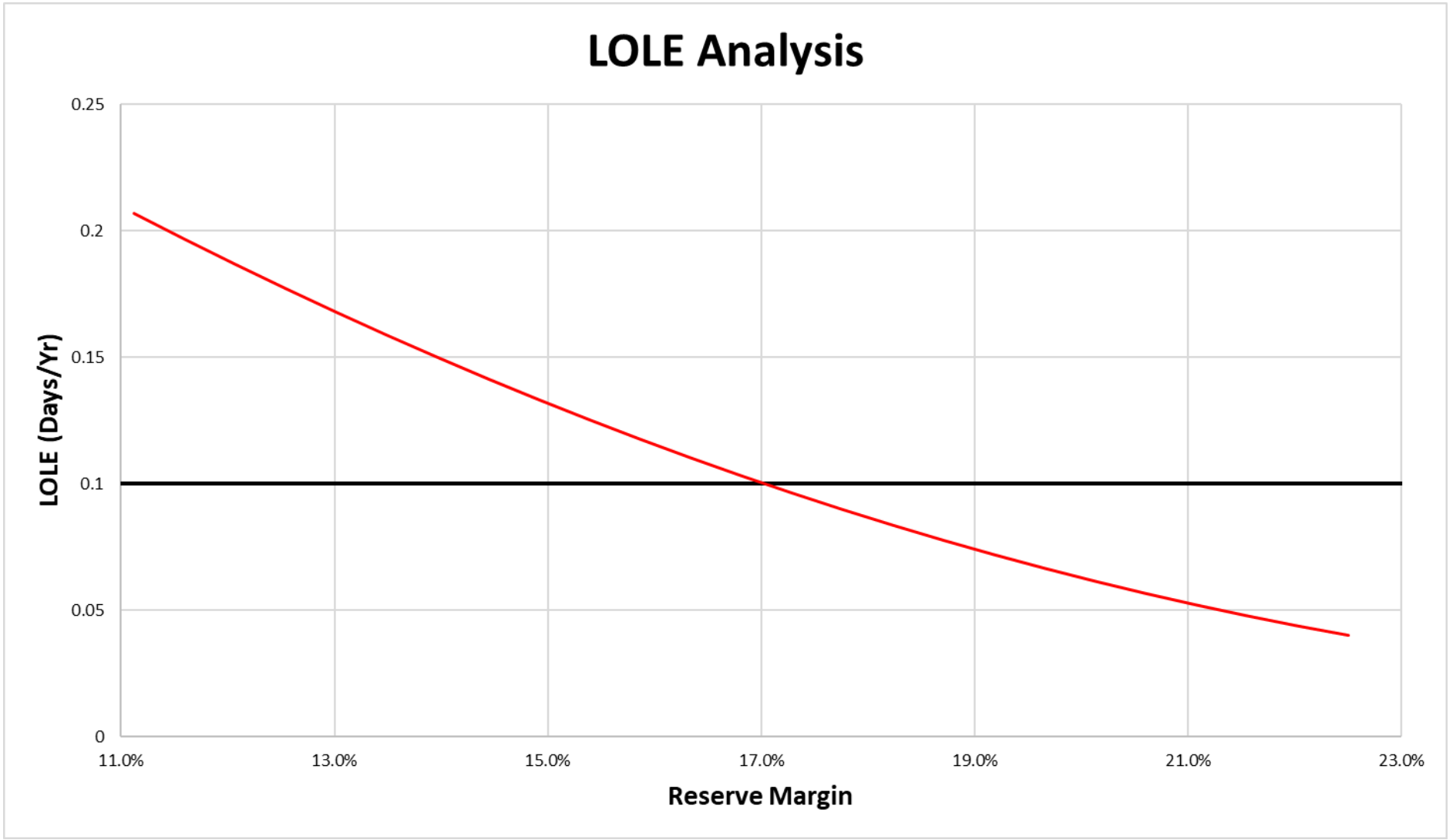
Astrapé Consulting, a part of PowerGEM

- Astrapé Consulting – owner of Strategic Energy Risk Valuation Model and provides expertise in resource adequacy and resource planning
  - Astrapé was purchased by PowerGEM in 2024
- SERVM
  - Multi-area reliability and economic simulation tool for the bulk electric system
  - Originally developed/patented in 1980s by Southern Company
  - Owned/licensed by Astrapé Consulting with 20+ years of ongoing development
  - Capable of hourly and sub-hourly chronological resource commitment and dispatch
- Used by ISOs/RTOs/Utilities across the U.S.
  - Neighboring entities such as Duke Energy, Dominion Energy South Carolina, Southern Company, and TVA all use SERVM for resource adequacy analysis

PRM Study

- Objective
  - Determine the amount of reliable capacity needed to maintain adequate reliability
- Reliability Standard
  - 0.1 Days/year Loss of Load Expectation (LOLE)
- SERVM
  - SERVM determines the amount of reliable capacity needed, which in turn gets converted (via accounting) into a PRM

Sample PRM Analysis



Updates Planned for 2026 IRP

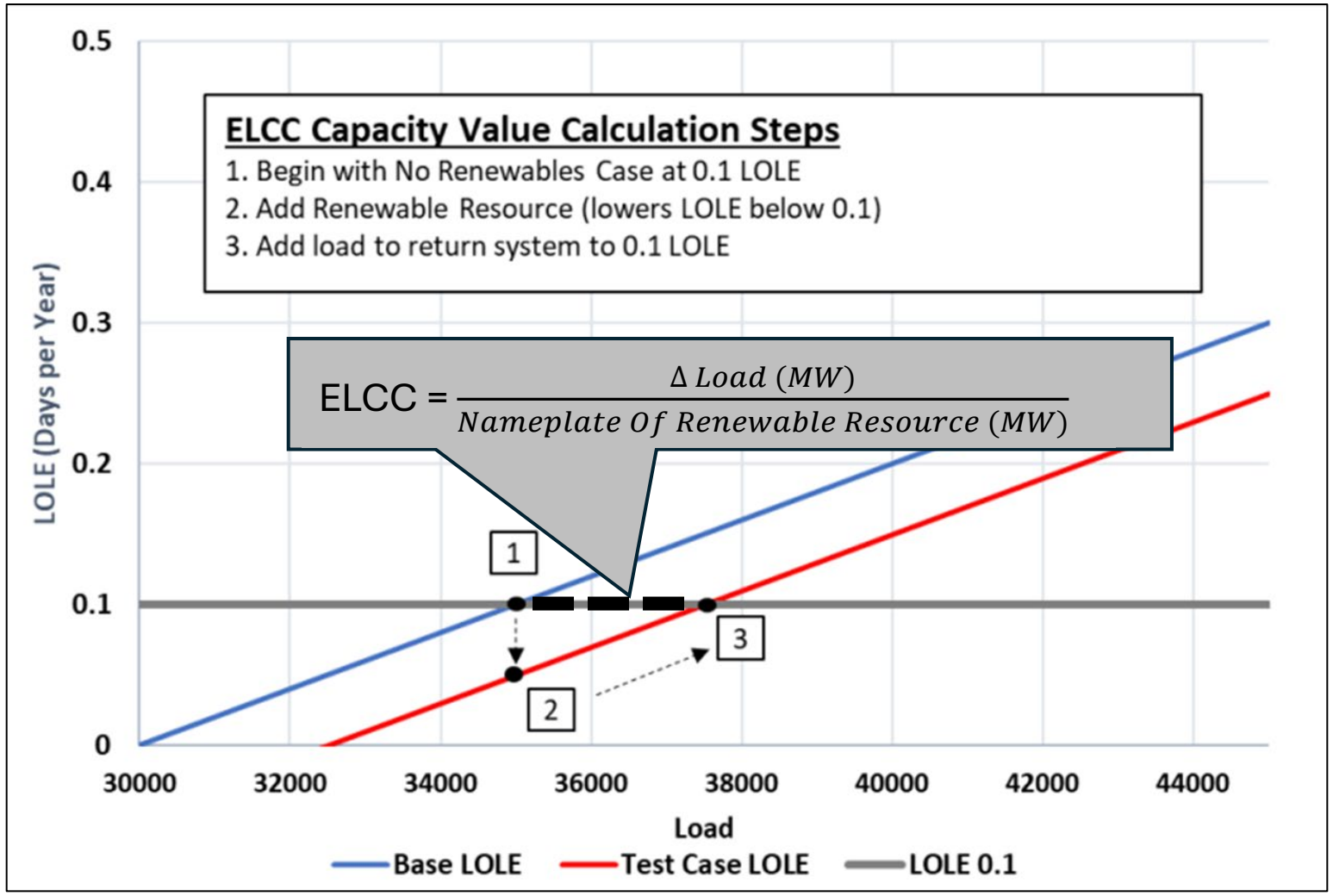
- Revise Load Response based on most recent weather including Winter Storm Elliott
- Revise unit outage data to include GADS data thru winter 2024
- Add weather years 2021-2023
- Move Study Year to 2030
- Update resource portfolio to latest preferred plan
- Separate major load components into separate load shape
  - EE
  - EV
  - Datacenter

ELCC Overview

- Effective Load Carrying Capability (ELCC)
  - ELCC compares the reliability contribution of variable energy resources and energy limited resources to perfect capacity/load

- Calculation Method
  - Winter ELCC
    - Santee Cooper resource adequacy risk is in the winter
    - Capacity value is determined for a given test resource by iteratively adding load until LOLE reliability metric returns the system to its prior state without the test resource

ELCC Methodology



Marginal vs. Average ELCC

Average ELCC

Performed as part of the Monte Carlo simulation

Resource Class is added to the system at 0.1 LOLE

Load is added until the system returns to 0.1 LOLE

ELCC = Resource MW / Load Added

Summary:
Measures the reliability value of entire resource class to meeting total demand

Marginal ELCC

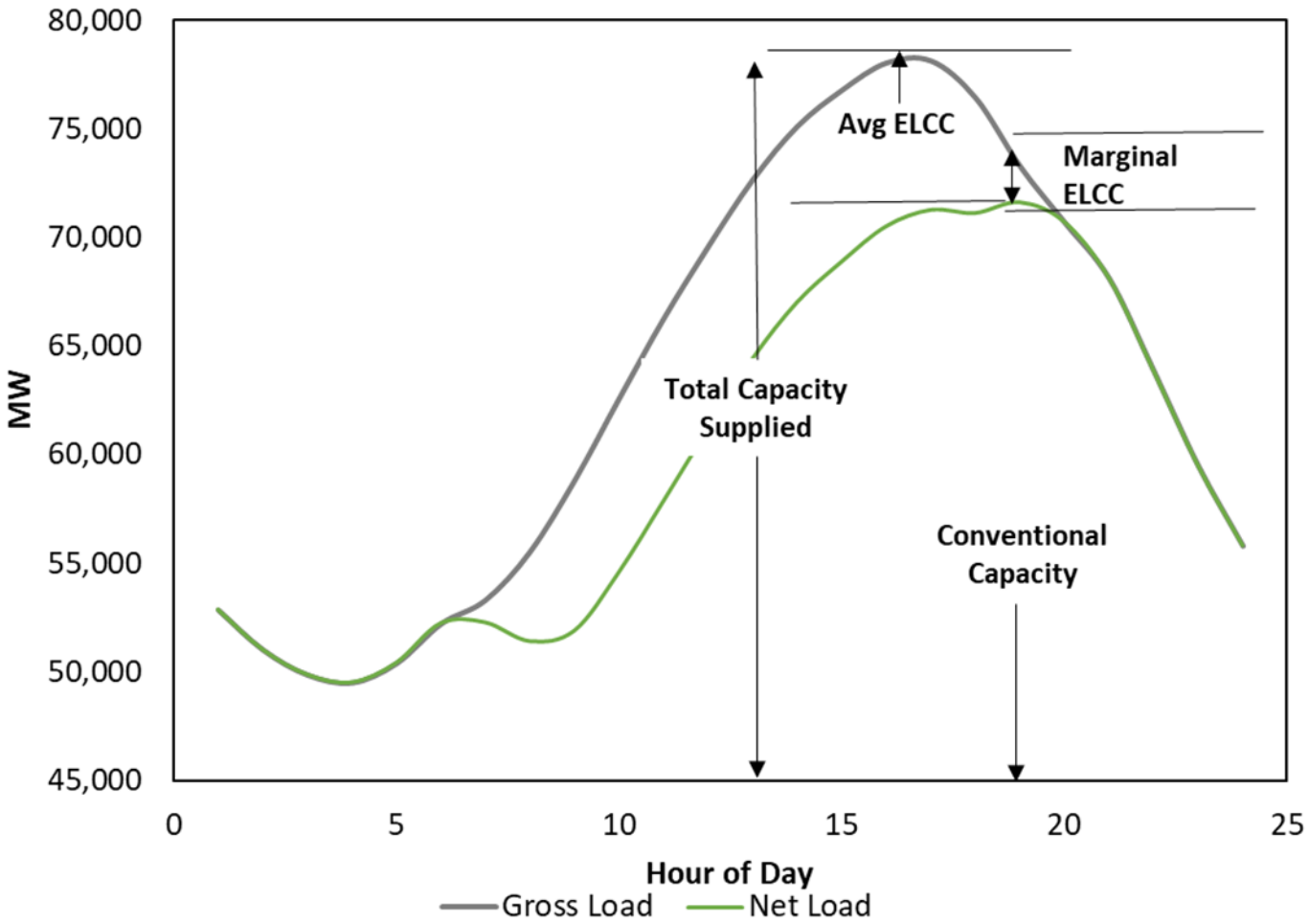
Performed as part of the Monte Carlo simulation

Single Resource is added to the system at 0.1 LOLE

Load is added until the system returns to 0.1 LOLE

ELCC = Resource MW / Load Added

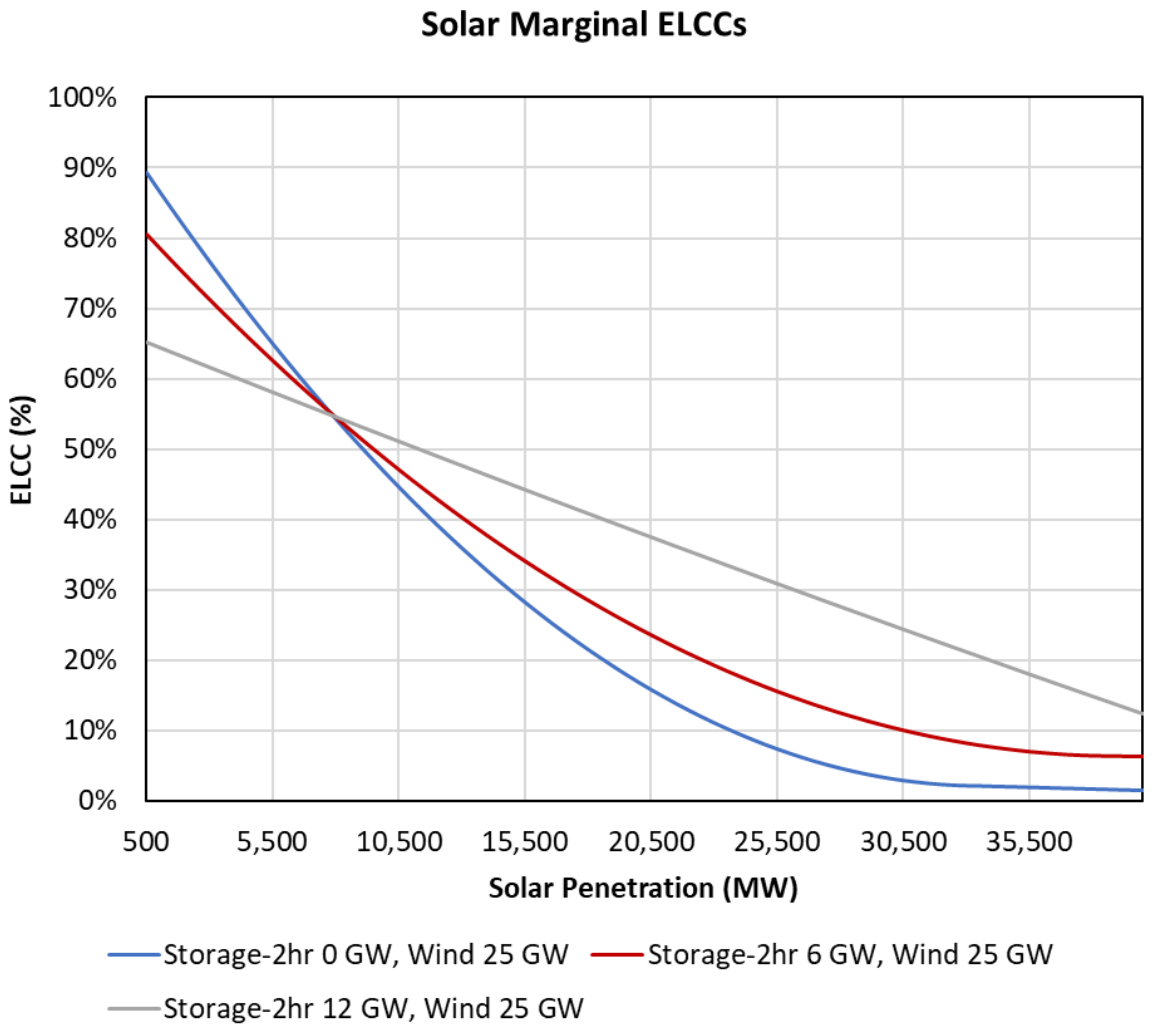
Summary:
Measures the reliability value of a single resource to meeting net demand (after all other resources)



Synergy

Synergy Between Resources

- In this illustrative example, the solar marginal ELCC increases as 2hr storage is added in tranches.
- Indicates that solar gets increasing value as more storage is added to the system.
- Needs to be accounted for in the IRP process.
- Our ELCC surface methodology allows for this to be analyzed.



*Illustrative

ELCC Matrix Plans

- Evaluate Combinations of Solar, Wind, and Battery up to*:
  - Solar: 6,000 MW
  - Offshore Wind: 3,000 MW
  - Battery: 3,000 MW
    - 4-hour
    - 8-hour
- Methodology will incorporate effects of synergistic benefits

*Subject to change

Illustrative Example of Results

- Illustrative results for **Solar Average Winter ELCC** values and are subject to change

Solar Avg ELCC Values		Installed 4hr					
		0 MW	250 MW	500 MW	1,000 MW	1,500 MW	2,000 MW
Installed Solar	0 MW						
	500 MW	3.5%	4.1%	4.8%	6.2%	7.7%	9.2%
	1,000 MW	2.9%	3.3%	3.8%	4.9%	5.9%	6.8%
	2,000 MW	2.0%	2.3%	2.6%	3.1%	3.6%	4.1%
	3,000 MW	1.6%	1.8%	1.9%	2.3%	2.6%	3.0%
	4,000 MW	1.3%	1.4%	1.5%	1.8%	2.0%	2.2%

- Similar tables will exist for 4-hr battery, 8-hr battery, and wind

Meeting Closeout

Stewart Ramsay, Meeting Facilitator
VANRY Associates

Closing

- Review and agreement around action items
- Next steps
  - Vanry will send the meeting summary to members to provide comments
- Next working group meeting
  - Targeting February of 2025
  - If a member would like to present on a topic, let us know

Intended Outcomes Achieved?

Take care of working group matters?

- Progress against prior session action items
- Plans for upcoming working group meetings and priority topics

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Take care of IRP business matters?

- 2024 IRP update filing, including Commission process and procedural schedule
- IRP process & methodologies, particularly related to IRP transmission costs
- Reserve Margin and Effective Load Carrying Capability (ELCC), including 2023 review and 2026 Scope of Work

Thank you!

We would like to hear from you about your experience at this session.

Please complete our survey
that will appear in your browser as you leave the meeting

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