

SRP Integrated System Plan
Modeling Subgroup Meeting:
In-Depth ISP Analysis Review- Part 1

October 25, 2022

Welcome

Angie Bond-Simpson

Director, Integrated System Planning & Support (SRP)

Welcome SRP Board and Council Observers



John Hoopes
SRP Association Vice
President



Chris Dobson
SRP District Vice President



Anda McAfee
SRP Board Member



Jack White
SRP Board Member



Larry Rovey
SRP Board Member



Krista O'Brien
SRP Board Member



Suzanne Naylor
SRP Council Member



Rocky Shelton
SRP Council Member

Safety & Sustainability Minute

Meeting Objectives:

- Recap of ISP scenario load forecasts with opportunities for deeper dive conversations
- Review and discuss Distribution Planning's preliminary results and findings
- Review and discuss preliminary observations from Resource Planning's analysis

Agenda

Time		Topics	Presenter
1:30-1:35	5 mins	Welcome and Opening Remarks	Angie Bond-Simpson (SRP)
1:35-1:40	5 mins	Agenda Overview and Introduction	Nick Schlag (E3)
1:40-1:55	15 mins	Setting Context for Today's Discussion: Recap of ISP Modeling Framework and Scenario & Sensitivity Load Forecasts*	Joe Hooker (E3) Jed Cohen (SRP)
1:55-2:40	45 mins	Distribution Planning Preliminary Results and Findings*	Vanessa Kisicki (SRP) Melissa Martinez (SRP)
2:40-2:50	10 mins	Coffee Break	
2:50-3:50	60 mins	Early Observations from Resource Planning Analysis*	Michael Reynolds (SRP)
3:50-4:00	10 mins	Wrap Up and Next Steps	Angie Bond-Simpson (SRP)

* Advisory Group Discussion

Recap of ISP Modeling Framework and Scenario & Sensitivity Load Forecasts

Joe Hooker

Associate Director (E3)

Jed Cohen

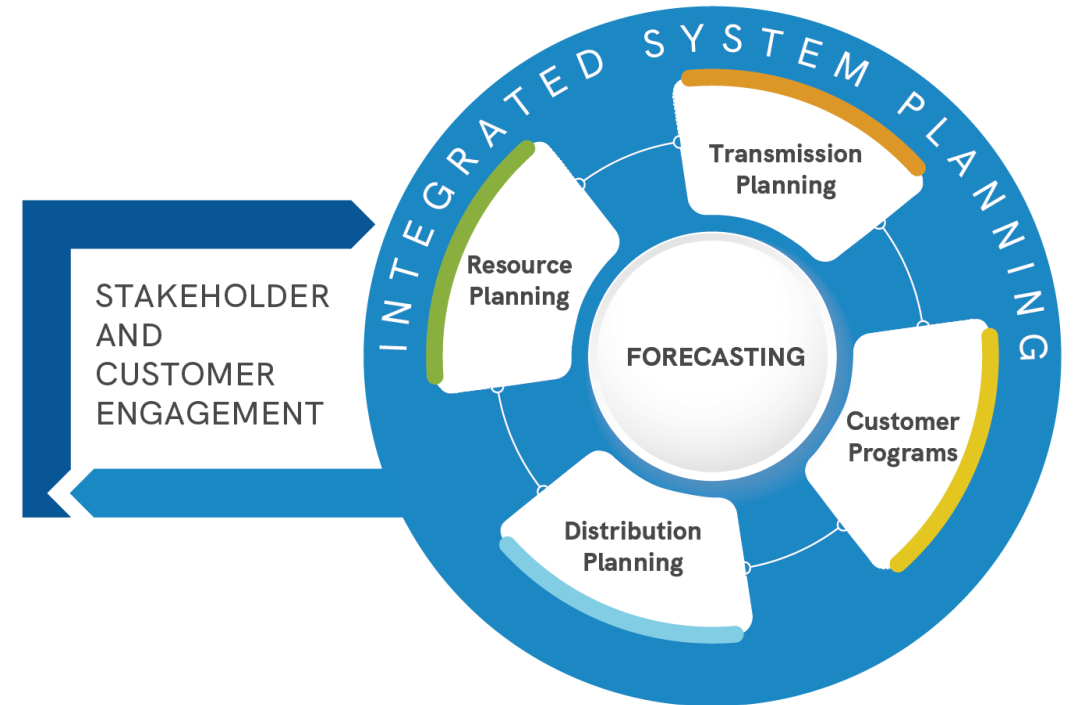
Manager, Load Forecasting (SRP)

SRP's Integrated System Plan Vision

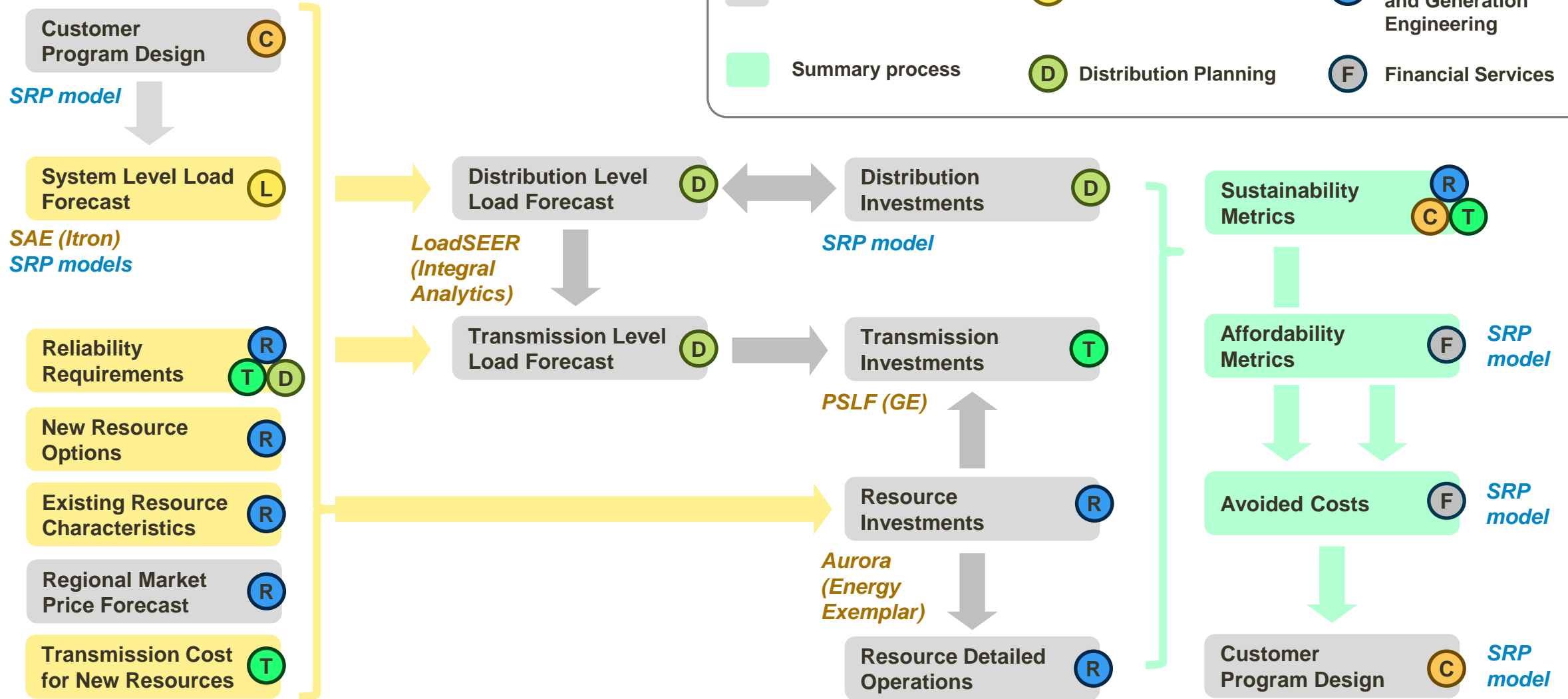
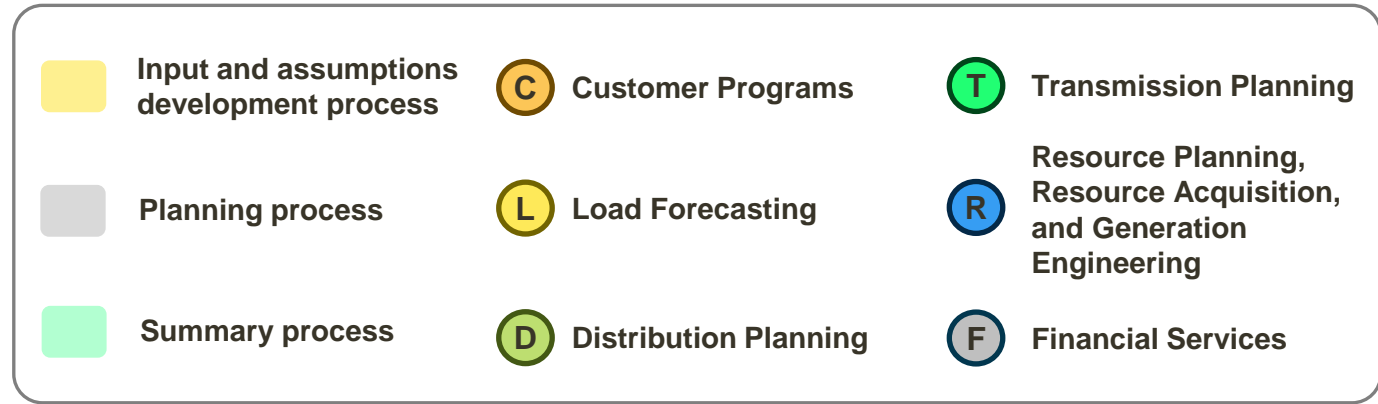
Planning a future system (2025-2035) that will enable us to achieve or exceed our 2035 Corporate Goals with the highest customer value

The first Integrated System Plan (ISP) identifies:

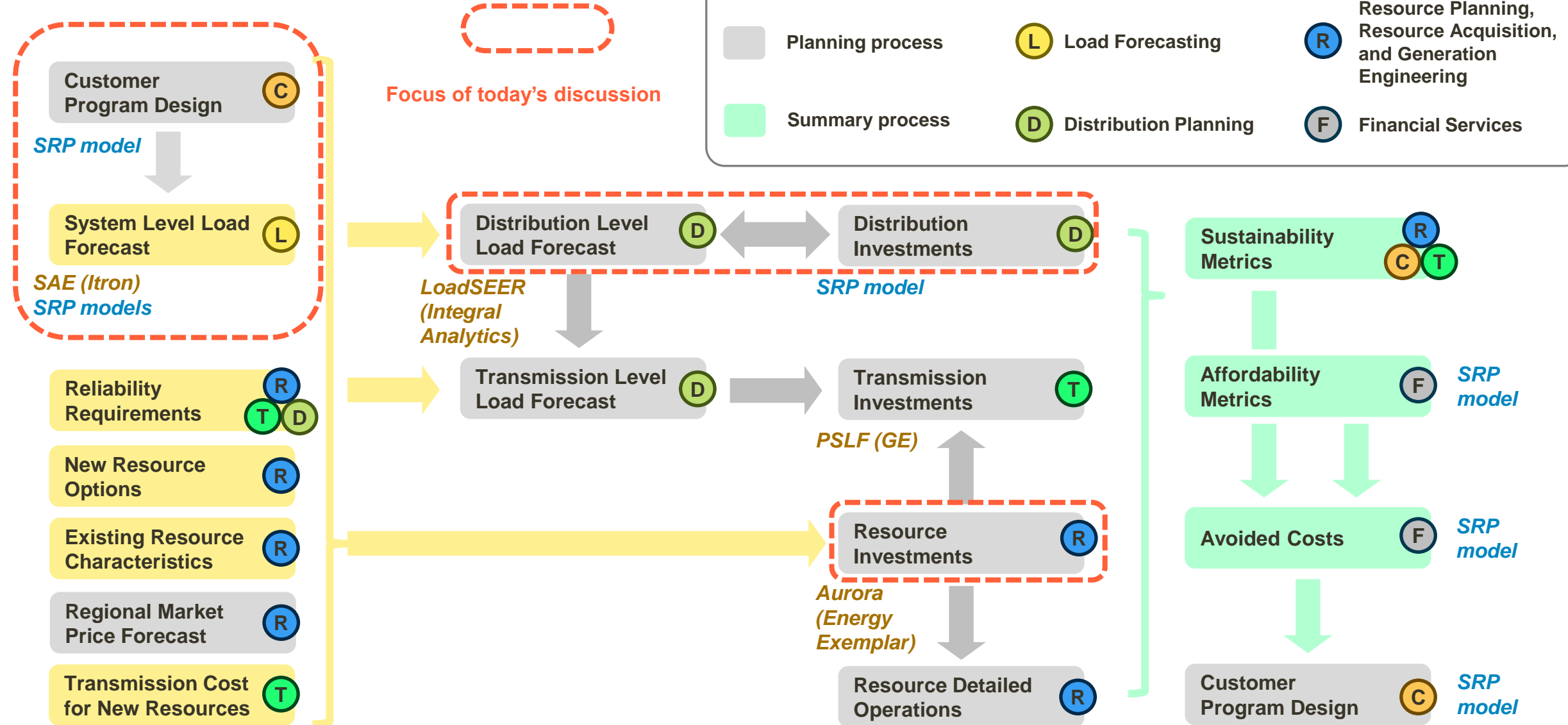
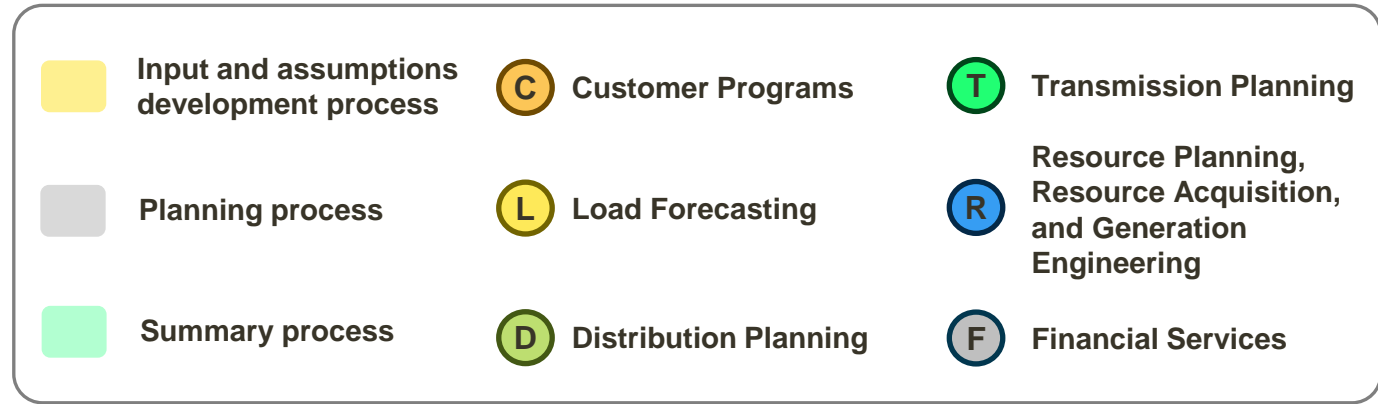
- Viable strategies for achieving SRP's 2035 Corporate Goals
- Costs, risks and tradeoffs of different strategies to building the future power system
- System solutions that are valuable across different future scenarios
- New capabilities and tools needed to plan as the system evolves



Integrated System Plan



Integrated System Plan

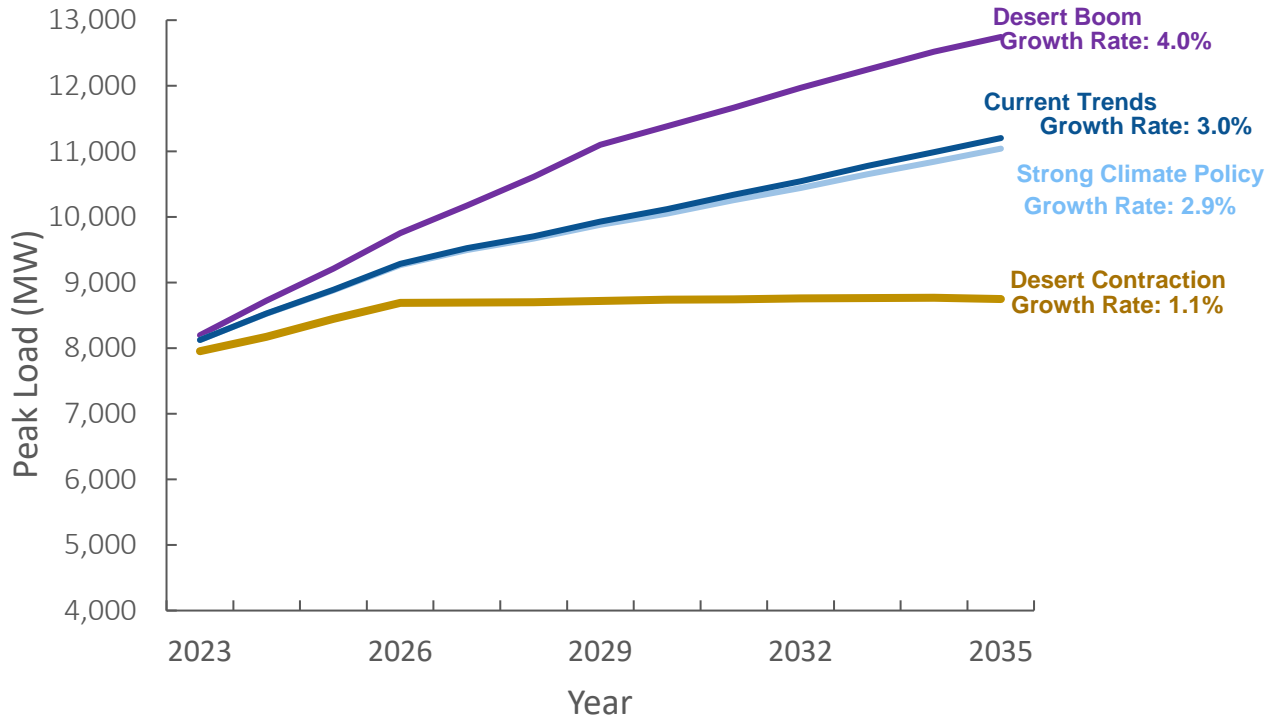


What we heard from the Advisory Group on 9/28

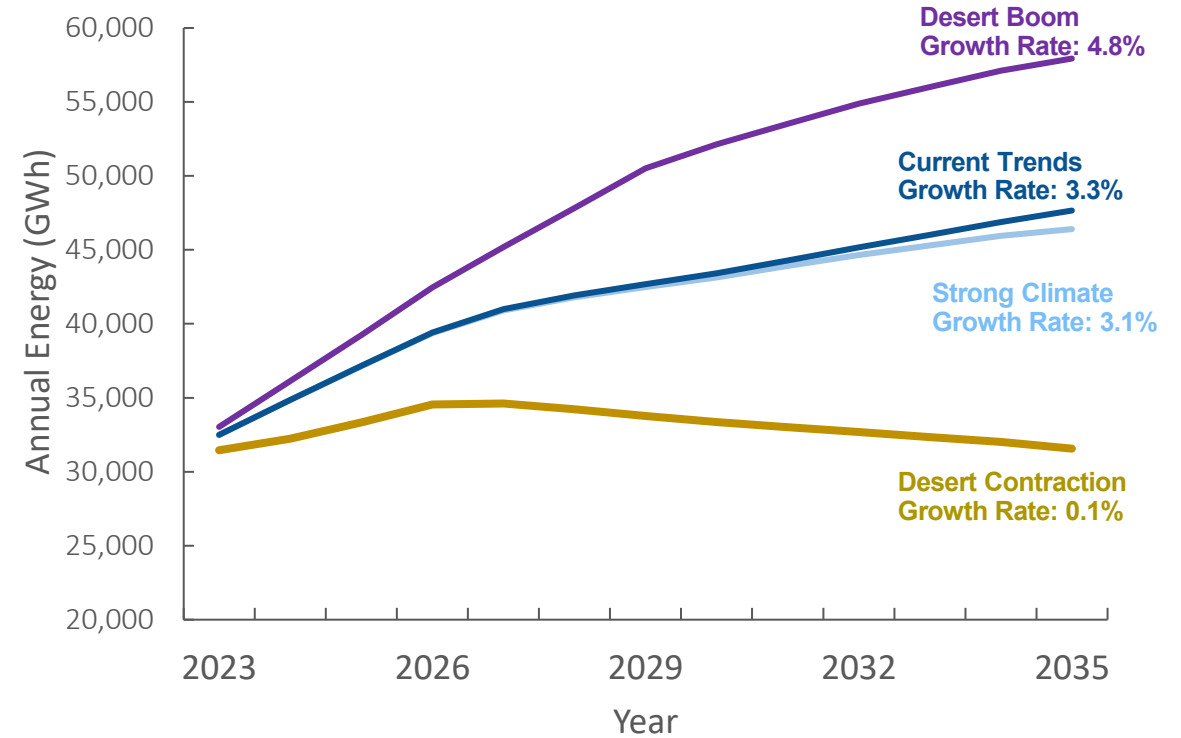
- Interest in how Electric Vehicles (EV) charging and distributed generation are considered in the forecasts
- Interest in the figures for predicted energy
- How heat island effects are captured in load forecasts
- How time-of-use pricing is considered in the load forecasts

ISP Scenario Forecasts

Peak Load Forecasts



Energy Demand Forecasts

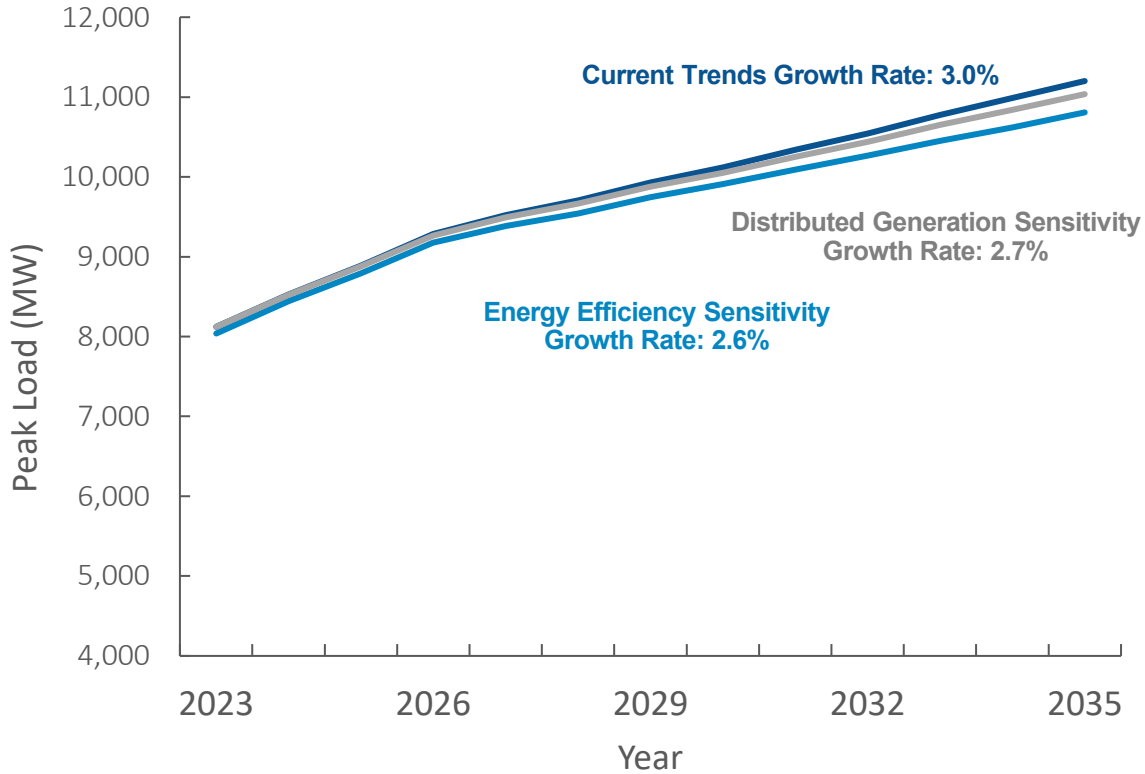


Growth rates calculated as compound annual growth rates (CAGR)

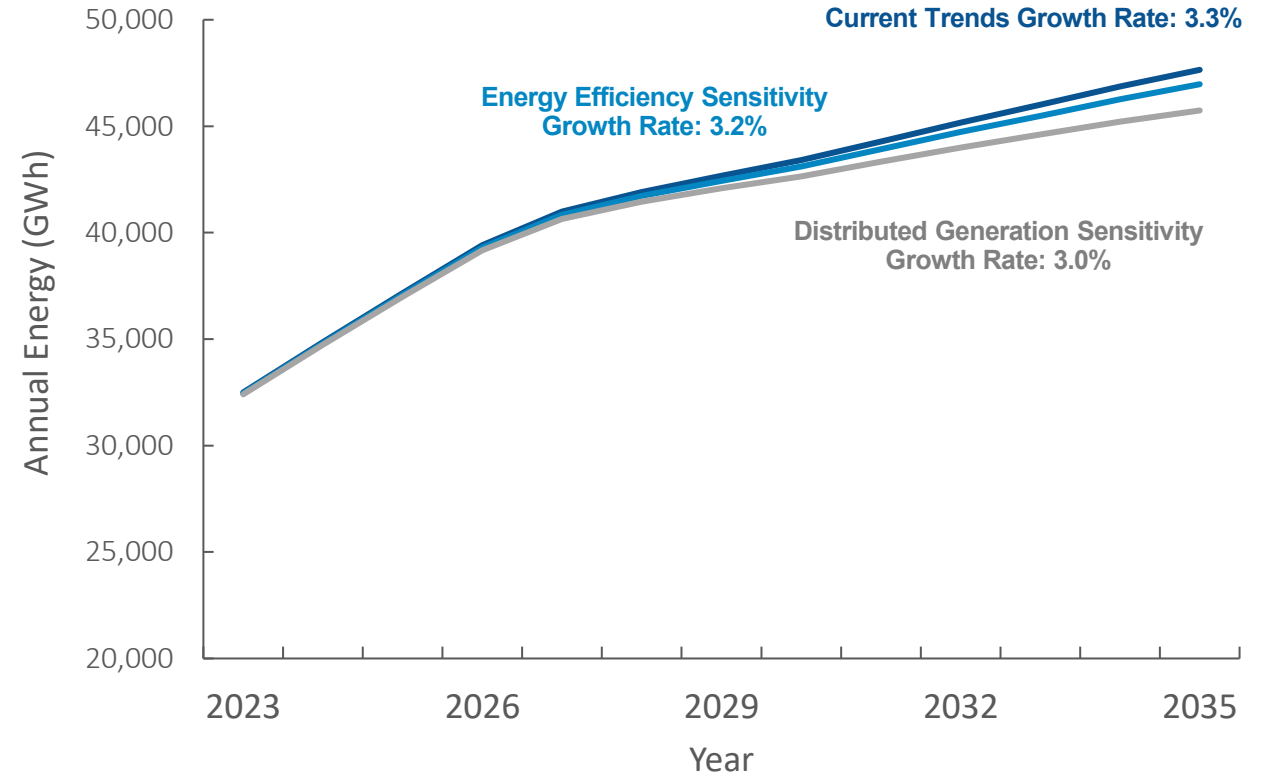
Preliminary Results Only- Subject to Change

ISP Sensitivity Forecasts

Peak Load Forecasts



Energy Demand Forecasts



Growth rates calculated as compound annual growth rates (CAGR)

Preliminary Results Only- Subject to Change

Distribution Planning Preliminary Results and Findings

Vanessa Kisicki

Director, Distribution Strategy (SRP)

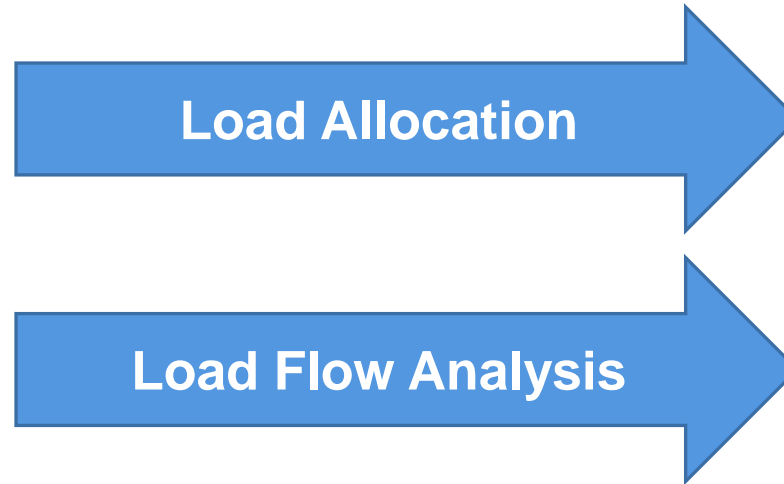
Melissa Martinez

Manager, Distribution Planning (SRP)

Distribution Planning Process

Inputs

- Load Forecast
- Distribution System Model
- New Customer Load Information
- Hourly Load Shapes
- DER Interconnections
- DER/EV Adoption



Outputs

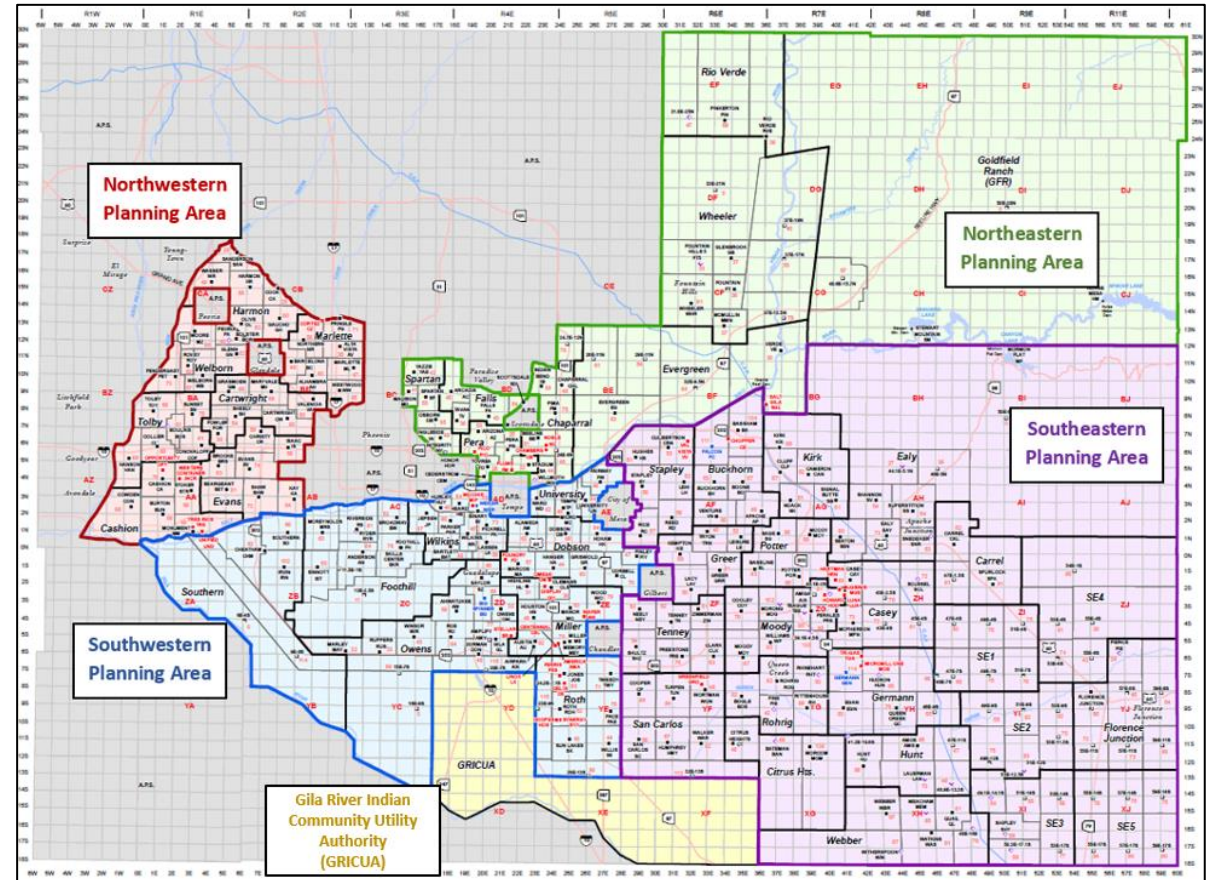
- Forecasted Load by Substation
- Distribution System Infrastructure Upgrade Plan

Distribution Planning Criteria & Assumptions

System Targets	Forecasts	Assumptions
<ul style="list-style-type: none">• Substation transformer load \leq 85% of emergency rating• Overall distribution system load \leq 70% of capacity	<ul style="list-style-type: none">• Plan is made to 1 in 10 forecast• Net load reflection based on summer peak• Net load does not yet separate the load and distributed generation	<ul style="list-style-type: none">• Known new customer load growth information• Unexpected loads and events• Localized load growth projections are based on historic data

Distribution Planning Areas

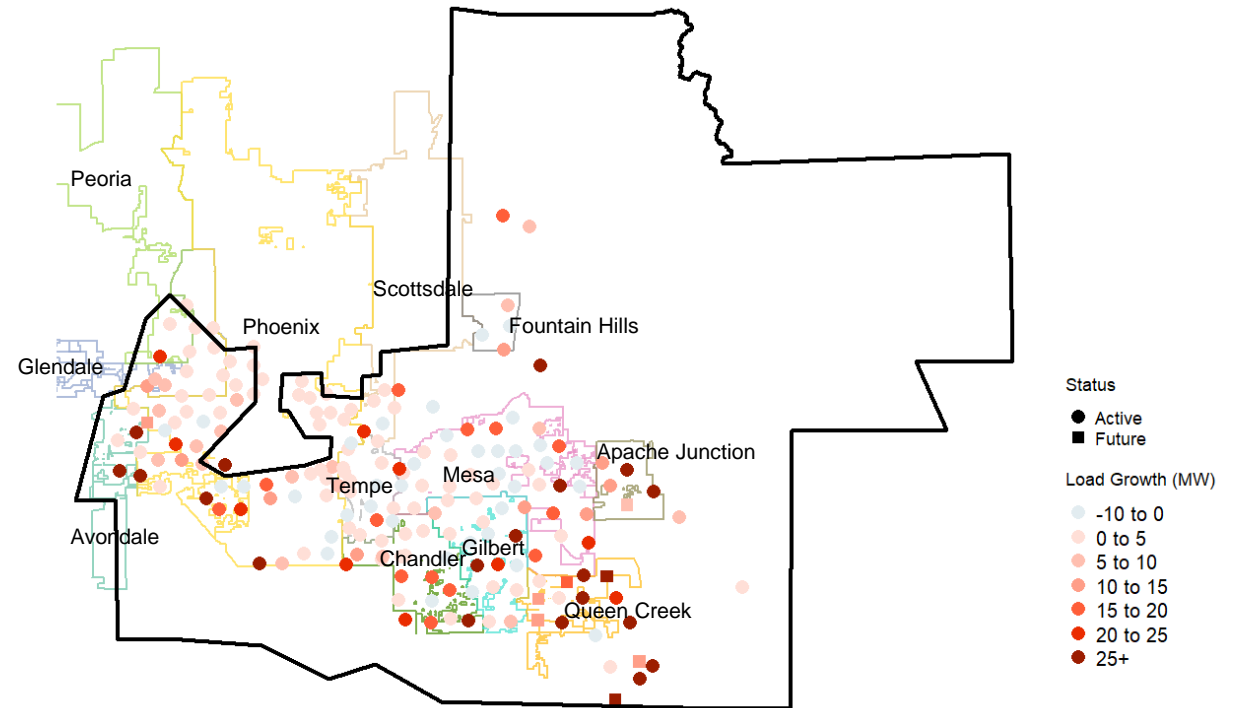
- SRP's distribution system is divided between four planning areas.
- Each planning area has unique characteristics and demographics.
- Interconnected looped system topology between each area



Load Growth Pattern

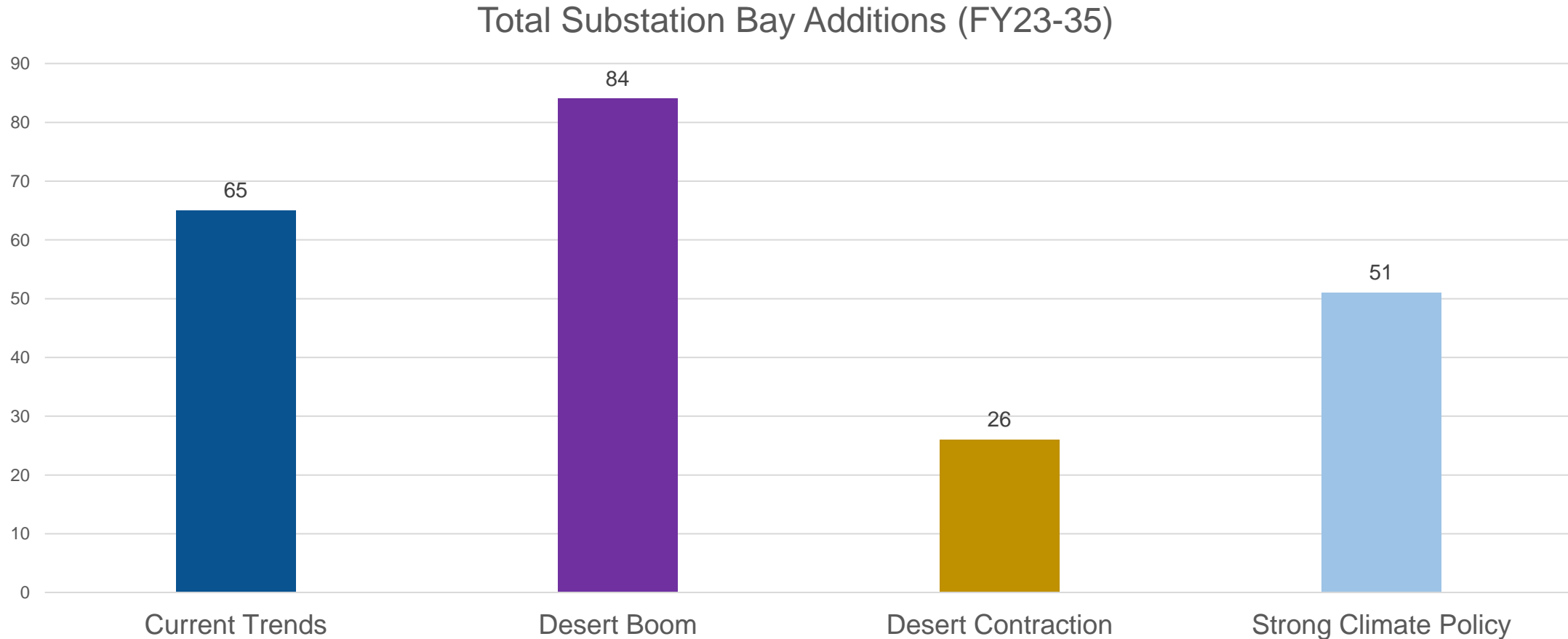
- Large load growth occurs in areas with more land availability.
- Variability in customer types and rezoning (residential, commercial, industrial)
- Scenarios follow similar patterns
- Load growth concentration in southeast regardless of ISP scenario

Load Growth Through 2035 by Distribution Substation Current Trends Scenario



Preliminary Results Only- Subject to Change

Total Substation Bay Additions (Preliminary)

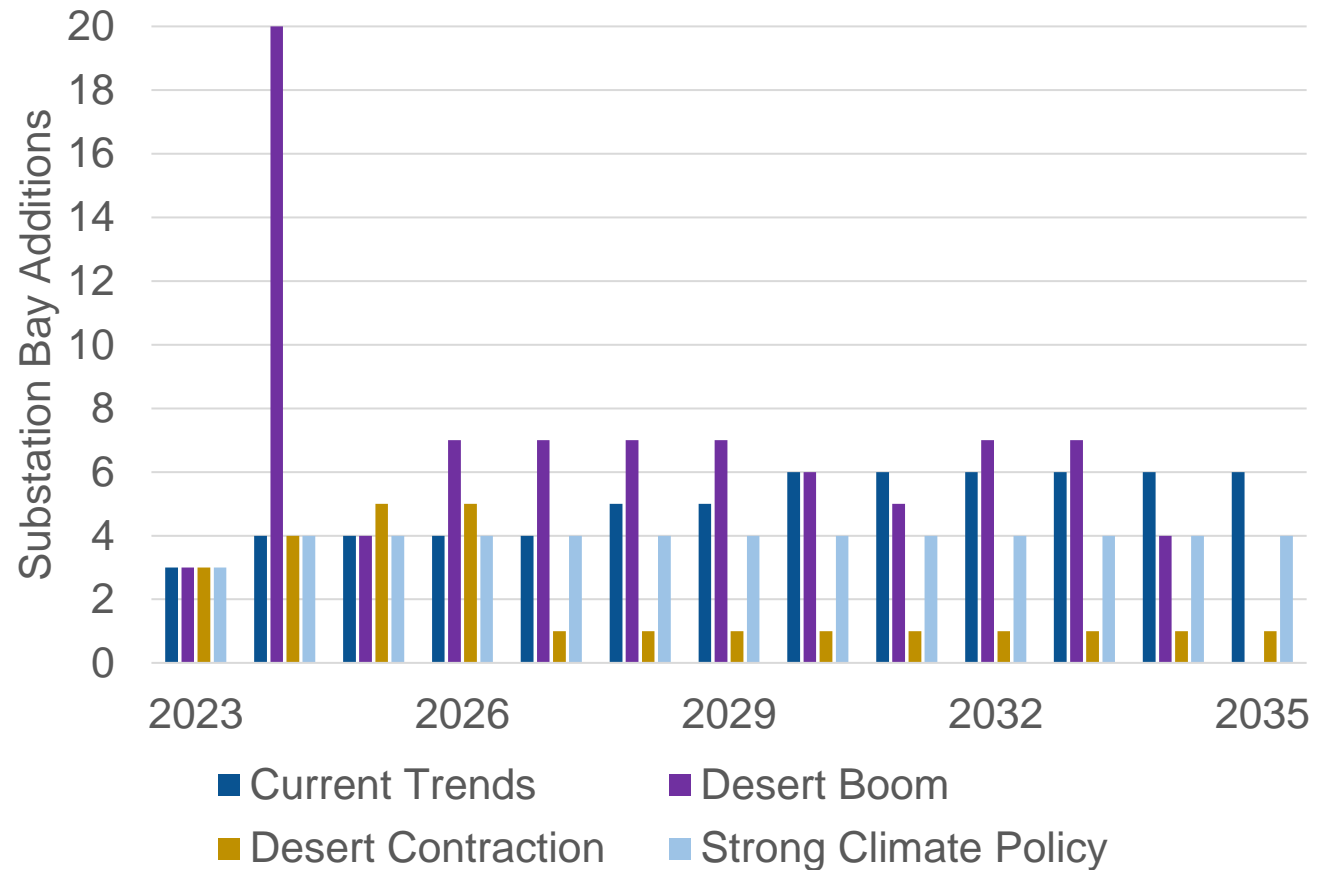


Preliminary cost range for substation bay additions: \$111M to \$318M

Preliminary Results Only- Subject to Change

Substation Bay Additions by Scenario per Year (Preliminary)

- Results align with scenario forecasts
- 2024 Desert Boom infrastructure required to support growth spike in southeast valley
- Most scenarios follow historical and consistent growth rates aligned with ISP scenario forecasts.



Preliminary Results Only- Subject to Change

Additional Findings (Preliminary)

- Capacity constraints occur in heavily developed areas
- Increased variability with customer type changes
- Consistent large growth patterns in the southeast valley
- Uncertainty with electric vehicle location and charging patterns during the day
- Non-wire alternatives may provide temporary solutions in future years

Next Steps

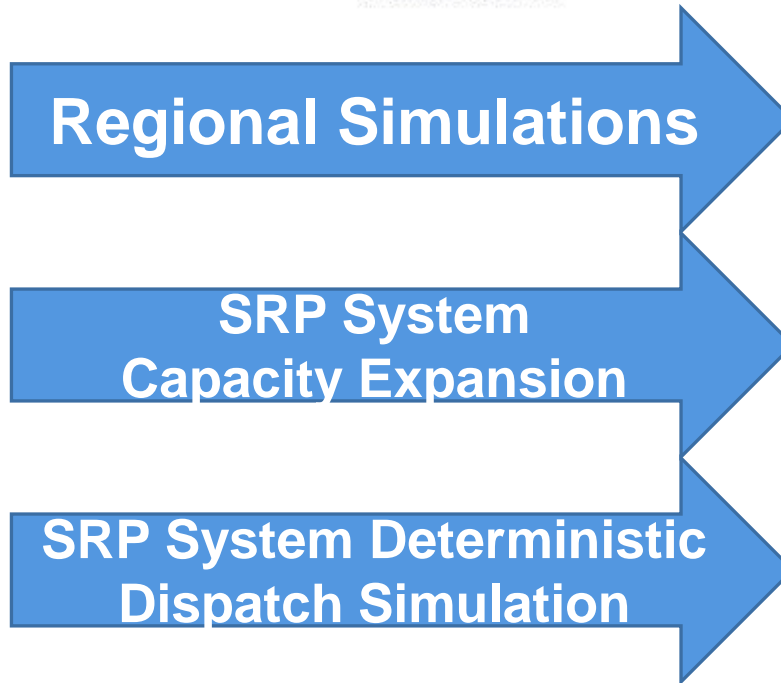
- Collaborate with Transmission Planning on results
- Synthesize results and formulate strategies and action plans
- Complete SRP Storage on Distribution System Exploratory Study

Early Observations from Resource Planning Analysis

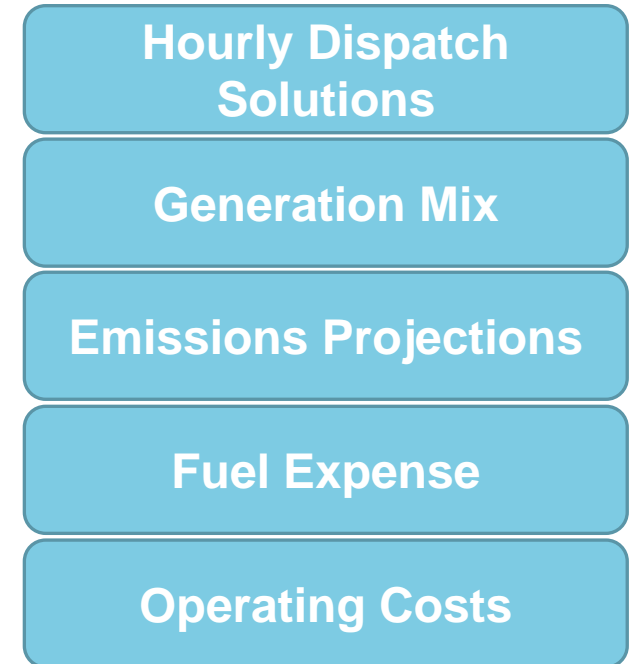
Michael Reynolds
Manager, Resource Planning (SRP)

Integrated System Plan: Resource Planning Process

Inputs



Outputs

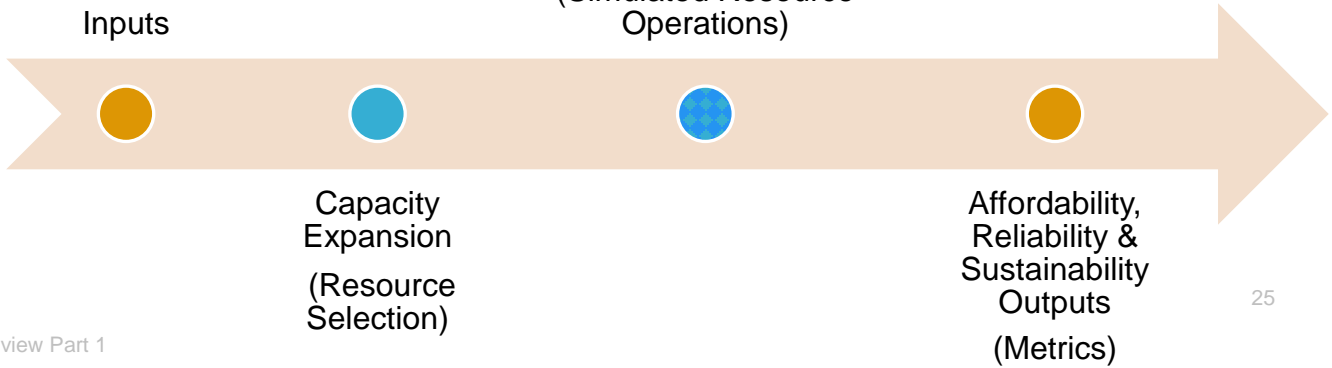


Study Plan Matrix

		<u>Strategic Approaches</u>		
		Technology Neutral	No New Gas	Min. Coal + No New Gas
Sensitivities	Current Trends	●	●	●
	High, Low, & Volatile Gas Prices	●●●	●●●	●●●
	High & Low Technology Costs	●●	●●	●●
	High Demand Response	●	●	●
	High Energy Efficiency	●	●	●
	High DG Adoption	●	●	●
	Increased Load Management	●	●	●
	RTO Assessment	●	●	●
Scenarios	Desert Contraction	●	●	●
	Desert Boom	●	●	●
	Strong Climate Policy	●	●	●

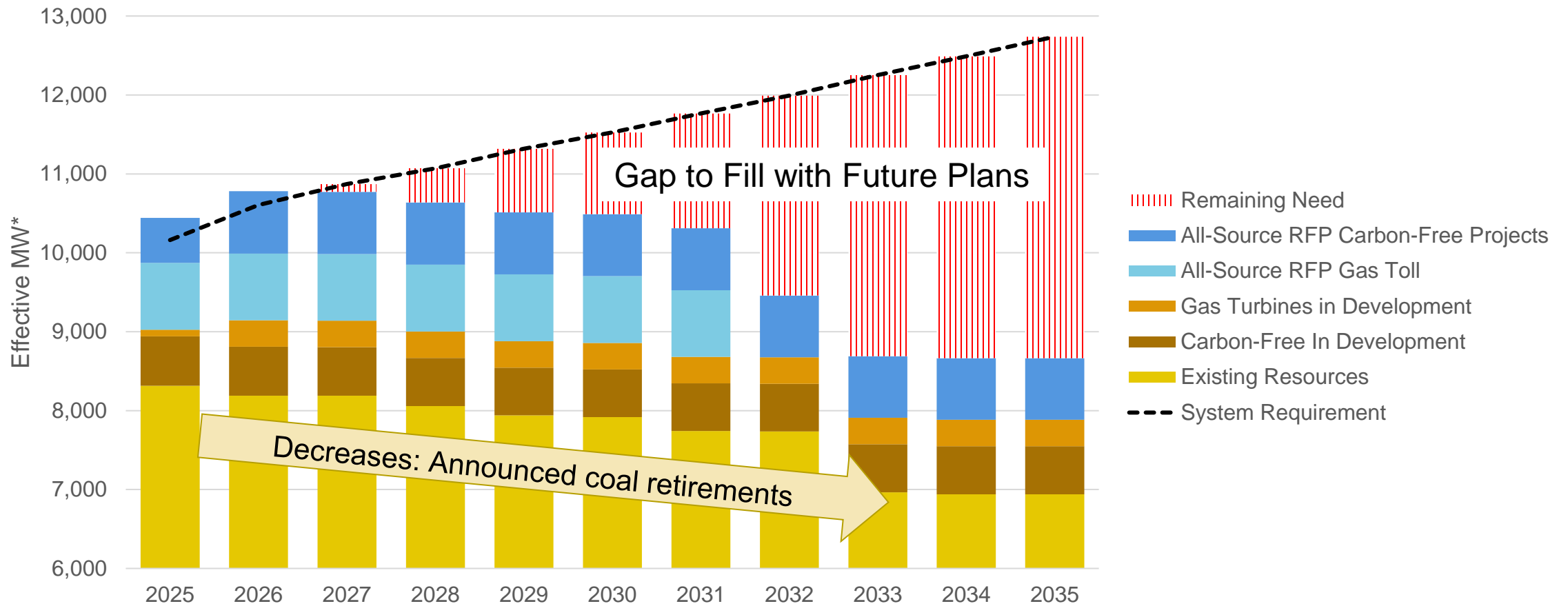


Production Cost Modeling
(Simulated Resource Operations)



Existing and Known Future Resources

Resource Foundation: Current Trends Scenario



*Effective MW represents how each resource serves SRP's reliability needs, which is usually less than nameplate MW.

Preliminary Results Only- Subject to Change

Scenario Planning & Resource Selection Observations

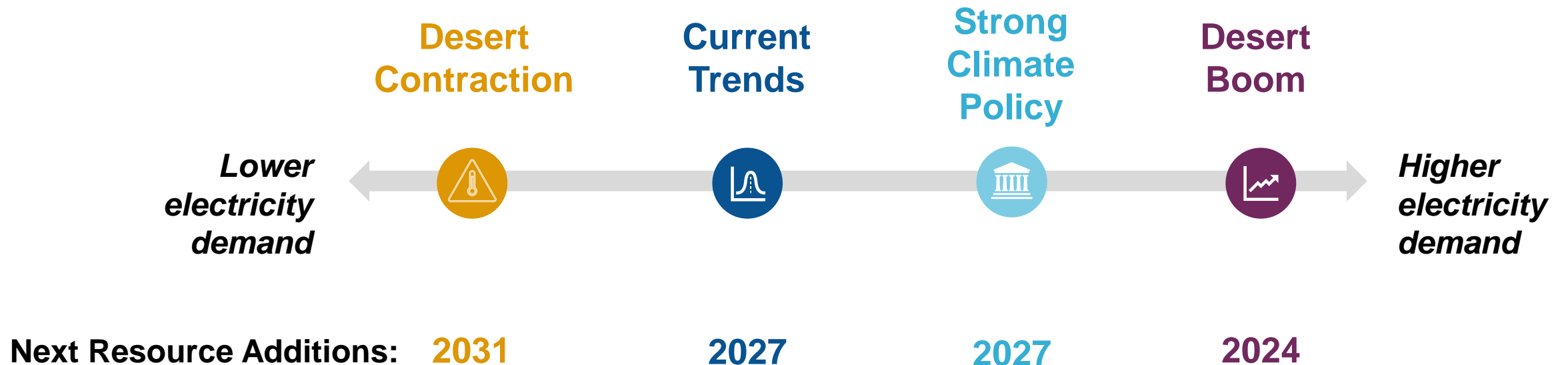
Cost-optimal resource technology selection is unique in each case;
there is no always-perfect portfolio.

Every available technology proved useful in a potential future scenario.

Now the exploration begins.

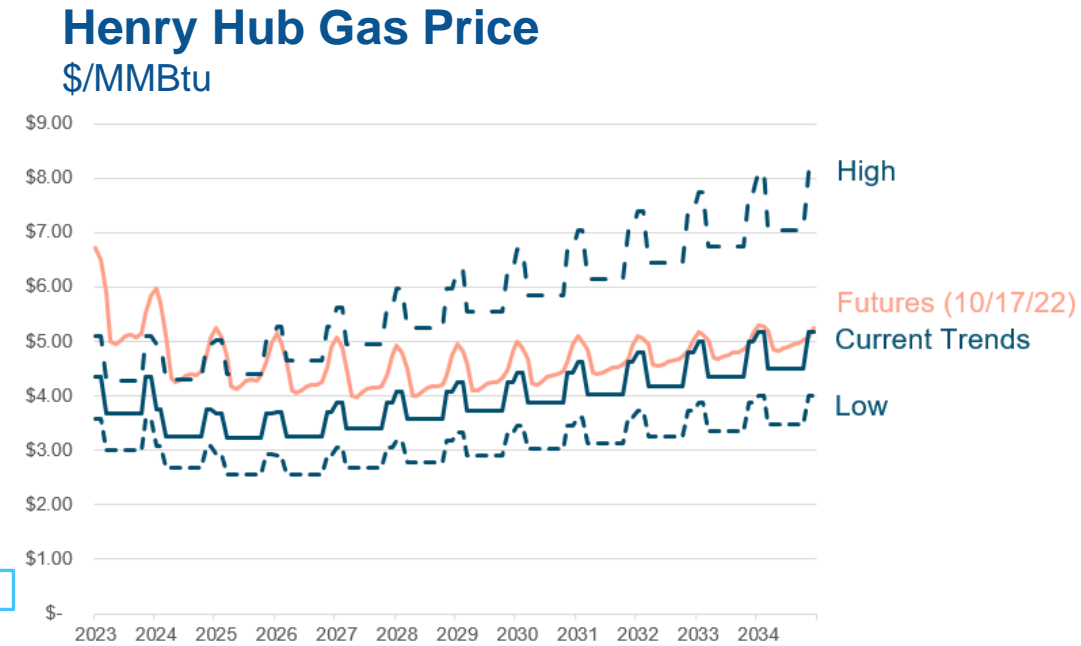
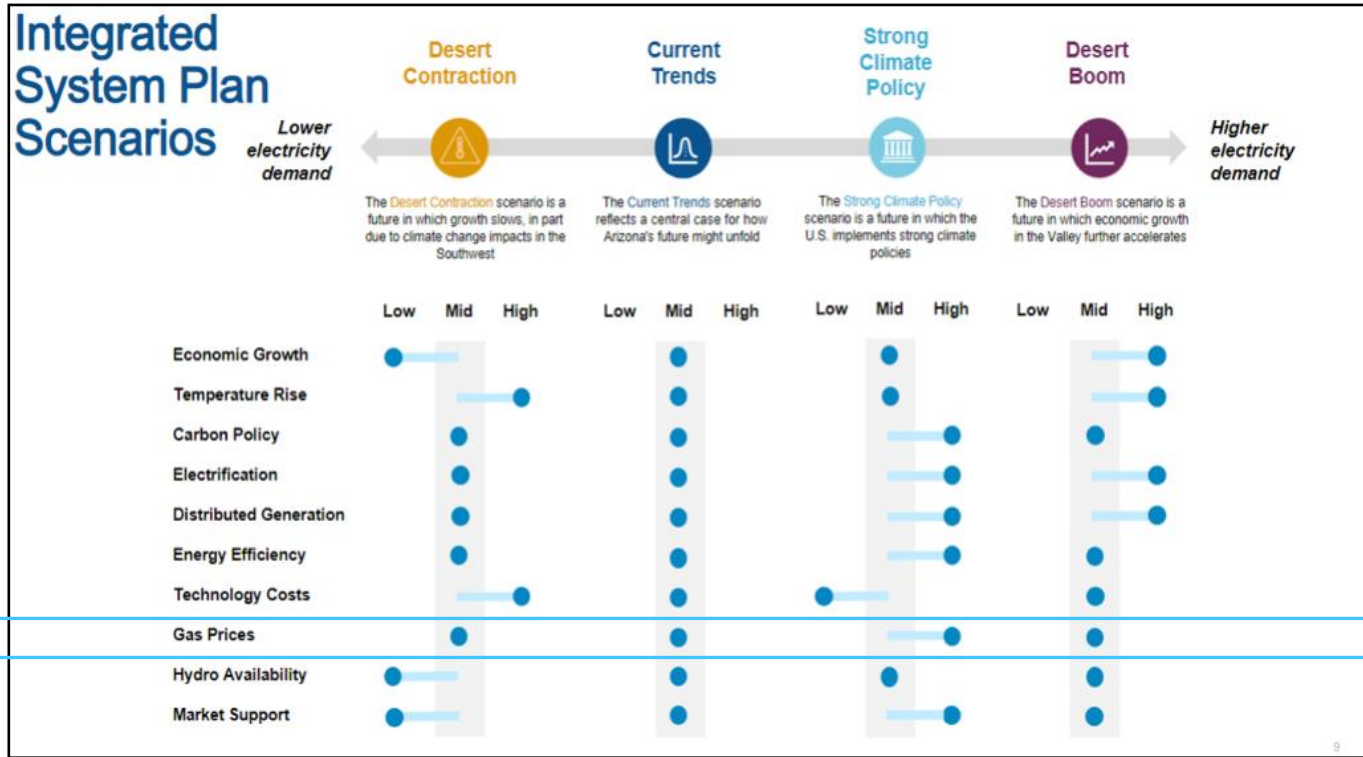
Preliminary Observation: Capacity Need Drives Resource Additions

SRP's existing and known resource portfolio may include resources sufficient through 2026. Efforts today will allow SRP to add necessary resources in the future.



Preliminary Results Only- Subject to Change

Preliminary Observation: High Gas Prices Needed Additional Consideration

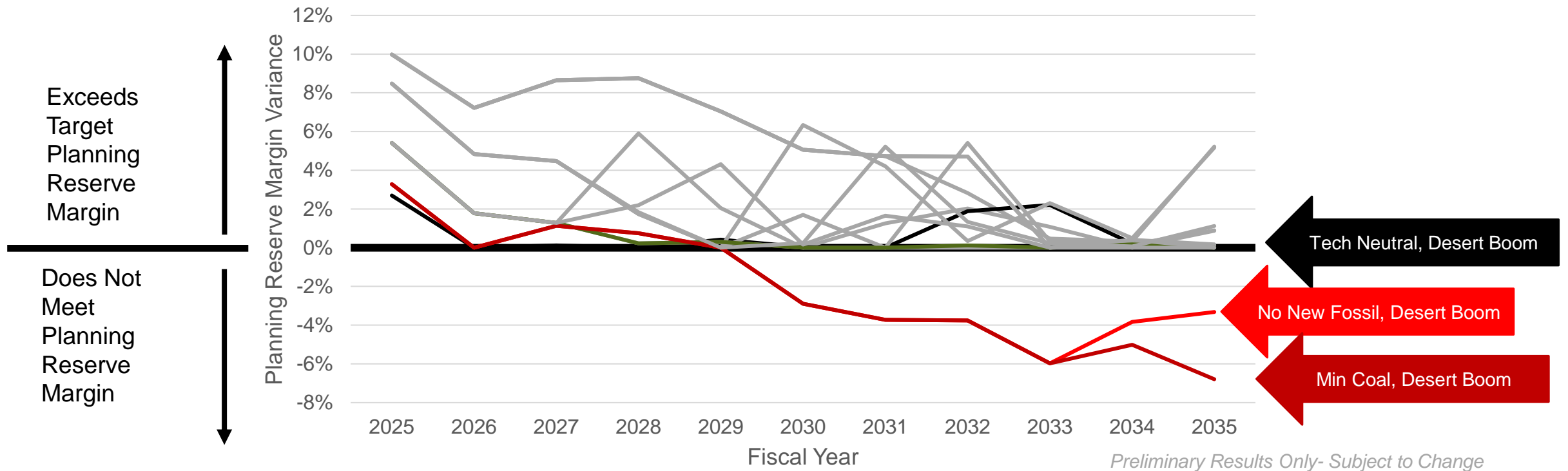


Preliminary Results Only- Subject to Change

Modeling Impact: SRP added a 13th capacity expansion analysis (Current Trends, Tech Neutral, High Gas Prices)

Preliminary Observation: Insufficient Capacity Options in Stress Cases

With limited firm capacity options, available carbon-free technologies may be insufficient to serve SRP's reliability needs before 2035. This is compounded by accelerated coal retirements.



Modeling Impact: SRP relaxed constraints on new resources, including extending ELCC (Effective Load Carrying Capability) to another 1,000 MW of storage and incorporating green hydrogen combustion turbines sufficient to fill Planning Reserve Margin (PRM) gaps to preserve reliability.

Preliminary Observations by 2035

- Variable renewable energy resources with storage play an important role in helping SRP meet increasing demand and reduce carbon intensity under all strategic approaches.
- New gas additions appear economic under all scenarios; the model builds new gas when allowed.
- Under the Strong Climate Policy scenario (3 modeled cases), new nuclear and 100% green hydrogen are assumed available by 2035, and the model selects both when new gas is unavailable (2 cases).
- Pumped storage hydro is selected in every case without available gas (8 cases).
- (Initially gas-blended) Hydrogen is selected in 2/5 Tech Neutral cases.

Next Steps

- Transmission Planning is evaluating transmission system impacts from resource selections
- Extend 12 (+1) capacity expansion analyses to 42+ model inputs, adjusting sensitivities for various load growth assumptions (net of various energy efficiency (EE), distributed generation (DG), load management assumptions)
- Detailed hourly production cost modeling → metrics, metrics, metrics
- SRP to draw conclusions derived from analysis of reliability, affordability and sustainability metrics
- Simulated system cost and carbon impacts to inform Pricing and Customer Programs for designing customer-sided solutions

Wrap Up and Next Steps

Angie Bond-Simpson

Director, Integrated System Planning & Support (SRP)

Next Steps

Advisory Group Meetings

- **November 18, 2022** (Optional) Modeling Subgroup Meeting 1:00 PM - 4:00 PM (AZ Time- MST) – In-Depth ISP Analysis Review Part 2
- **January 27, 2023**, 9:00 AM -3:00 PM (AZ Time- MST) – Insights from Analysis

Large Stakeholder Group Meetings

Open to all Large Stakeholder and Advisory Group Members

- **December 9, 2022**, 12:00 PM -2:30 PM (AZ Time- MST) – Analysis Review
- **February 21, 2023**, 1:00 PM -3:00 PM (AZ Time- MST) – ISP Analysis Results



Stakeholder Communication Email:

IntSysPlan@srpnet.com

Integrated System Plan: Informational Portal

<https://srpnet.com/about/integrated-system-plan.aspx>

thank you!