SRP Integrated System Plan Advisory Group Meeting #8

ISP Progress Update & Engagement Framework for the Synthesize Phase

September 28th, 2022

Welcome

Bobby Olsen
Senior Director Corporate Planning, Environmental Services, and Innovation, 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:

- Update Advisory Group about ISP Analysis Progress
- Inform the Advisory Group about the engagement framework for the synthesize phase and their role
- Review the remaining ISP engagement process & timeline
- Involve the Advisory Group in updating the Guiding Integrated System Plan (ISP) Principles

Agenda

Time		Topics	Discussion Lead
8:30-9:00	**30 min**	Breakfast & Networking	
9:00-9:15	**15 min**	Welcome, Opening Remarks and Advisory Group Updates	Bobby Olsen (SRP) Joan Isaacson (K&W)
9:15-9:35	**20 min**	Strategies for Ensuring Full Range of Advisory Group Perspectives are Shared and Heard	Joan Isaacson (K&W)
9:35-10:25	**50 min**	Anticipated ISP Structure and Role of Advisory Group	Angie Bond-Simpson (SRP)
10:25-10:35	**10 min**	Coffee Break	
10:35-11:25	**50 min**	Guiding ISP Principles (Small Breakout Activity)	Angie Bond-Simpson (SRP) Joan Isaacson (K&W)
11:25-12:25	**60 min**	Update on ISP Progress (ISP Roadmap) and Analysis • Update: ISP Scenario customer demand forecasts- how customer demand and programs could change over time	Kyle Heckel (SRP) Jed Cohen (SRP) Nathan Morey (SRP)
12:25-12:45	**20 min**	Lunch (start Reliability Roundtables)	
12:45-2:35	**110 min**	<u>Reliability Roundtables</u> The role of resources for future reliability *Coffee Break (10 min)* Summer 2022 Operations Panel Discussion	Nick Schlag (E3) John Coggins (SRP) **Panelists:** Nevida Jack (SRP) Zack Heim (SRP) Jay Guerrero (SRP) Mary Faulk (SRP) Stephanie Conn (SRP) Nathan Morey (SRP)
2:35-2:50	**15 min**	Engagement Calendar	Angie Bond-Simpson (SRP)
2:50- 3:00	**10 min**	Next Steps and Wrap Up	Angie Bond-Simpson (SRP)

*Summer 2022 Operations Panel Discussion agenda item not covered due to time constraints

Rocket Roundtable:

What was your "peak day" since we last met (travel, accomplishment, etc.)?

Strategies for Ensuring Full Range of Advisory Group Perspectives are Shared and Heard

Joan Isaacson
Lead Facilitator, Kearns & West

WHY YOU JOINED

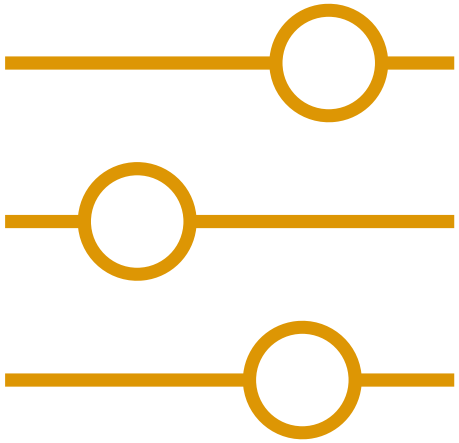
Guides for Productive Meetings

- Actively participate
- Encourage and seek multiple perspectives, including use of multiple engagement methods
- When introducing technical subjects, begin with straightforward definitions and avoid acronyms; create comfortable environment for questions and understanding
- Stay concise so that everyone has time to participate
- Maintain one representative per Advisory Group member organization in meeting discussions
- Enjoy the meeting!

Spring 2022 Advisory Group Check-Ins

Opportunities for mid-process adjustments

- Balance technical and policy-level discussions; for many, deep technical content results in less engagement and fewer contributions
- Use multiple methods to foster greater comfort with sharing varying viewpoints
- Provide more information about where the process is headed and expected outcomes

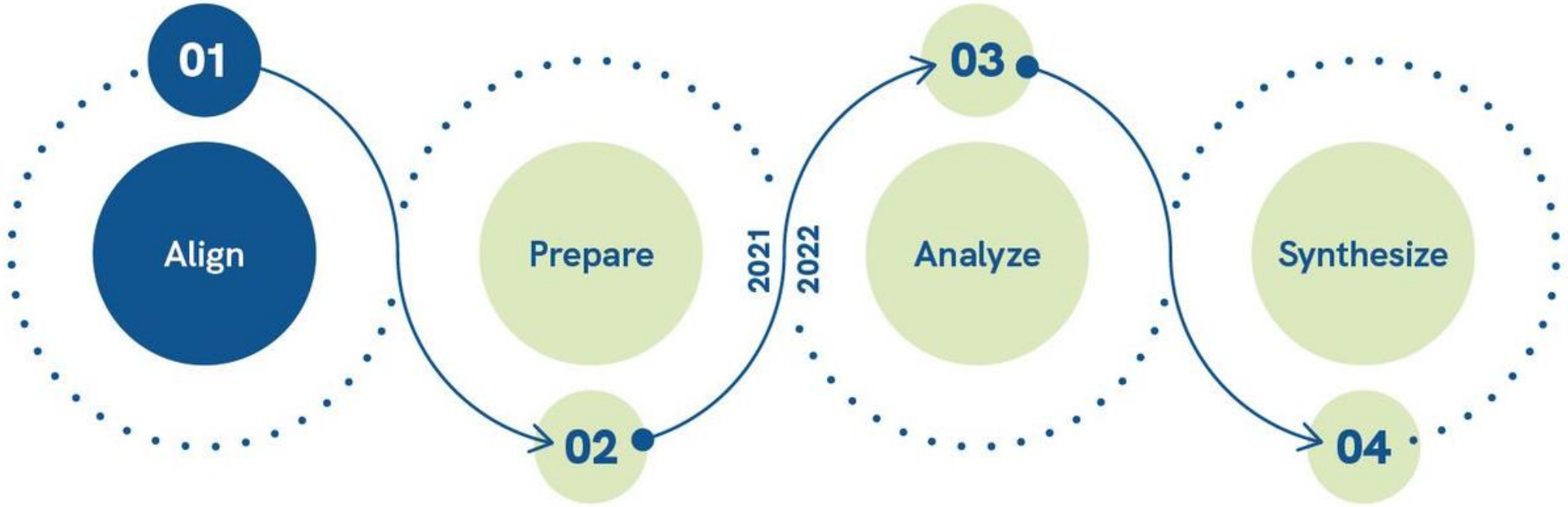


Small Breakout Groups:

Discuss ideas for Strategies for Ensuring Full Range of Advisory Group Perspectives

Anticipated ISP Structure & Role of the Advisory Group

Angie Bond-Simpson
Director, Integrated System Planning & Support, SRP



SRP ISP ROADMAP

Stakeholder Engagement and Public Outreach

Align on Objectives of the first ISP

Collaboratively develop Study Plan:
Scenarios & Sensitivities
Strategic Approaches
Metrics

Gather input data

Perform system analysis

Validate and share results

Recommend new SRP system strategies

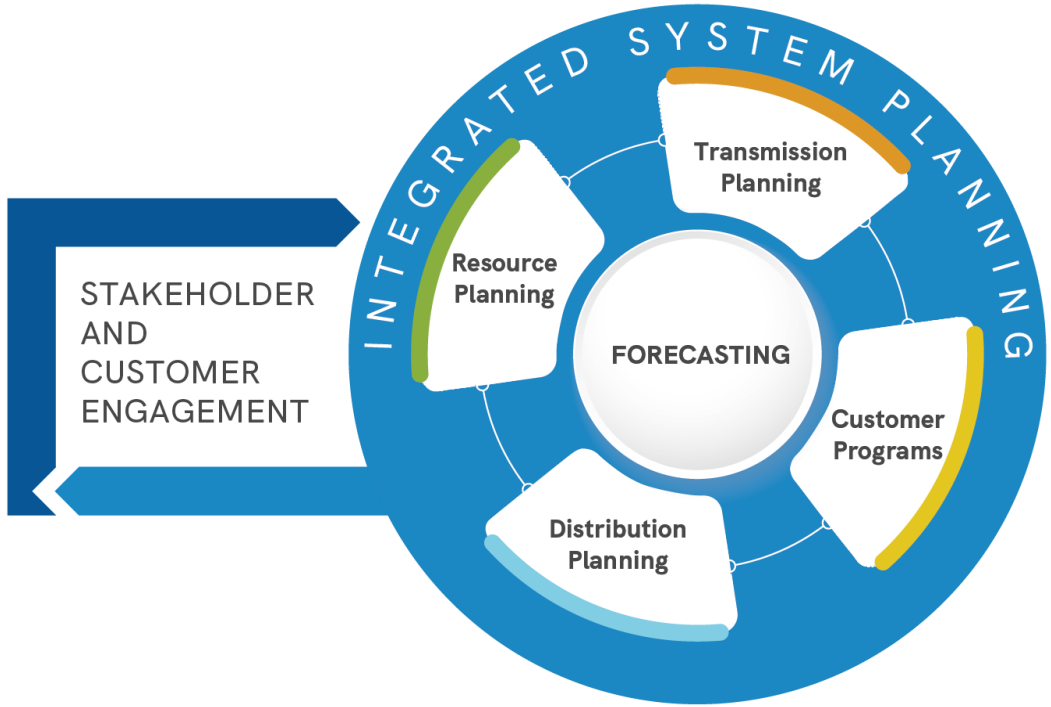
Recommend near term actions

SRP's Integrated System Plan Vision

Planning a future system (2025-2035) that will enable us to achieve or exceed our 2035 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



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ISP PLANNING PROCESS FAST FACTS

NUMBER OF ADVISORY GROUP MEMBERS:

32 community representatives

from **23** organizations

NUMBER OF LARGE STAKEHOLDER GROUP MEMBERS:

224 community representatives from **140** organizations

229

POINTS OF FEEDBACK COLLECTED AND INTEGRATED INTO THE ISP

NUMBER OF MEETINGS:

12 stakeholder meetings

totaling over **40** hours of content

INTERNAL ALIGNMENT MEETINGS:

Over **120** hours

38

INTERNAL SRP DEPARTMENTS CONTRIBUTING

Over **100**

STAKEHOLDER COMMENTS RECORDED

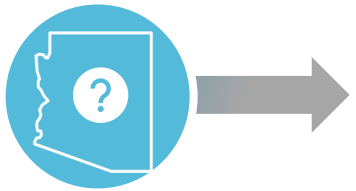
STAKEHOLDER QUESTIONS ANSWERED:

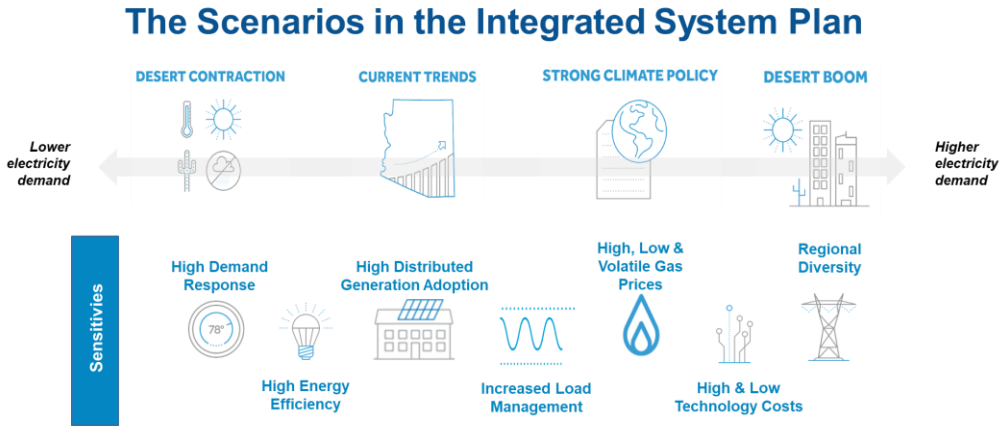
233

Input We Have Gathered Through Stakeholder Engagement

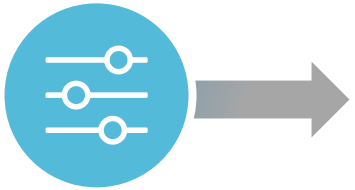
Scenarios/Sensitivities & Strategic Approaches

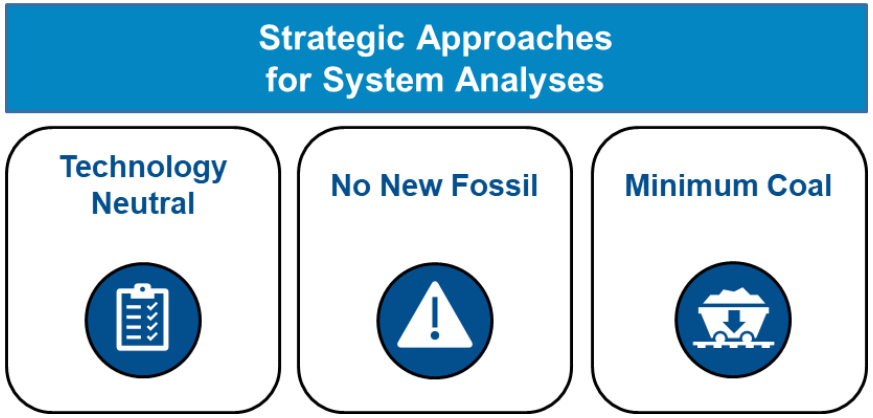
Major uncertainties in Arizona related to electricity





System options SRP should include in its planning analyses

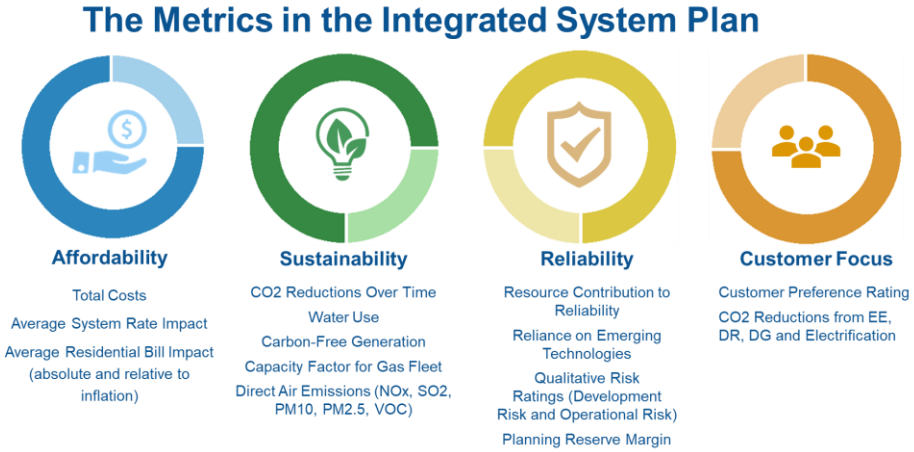




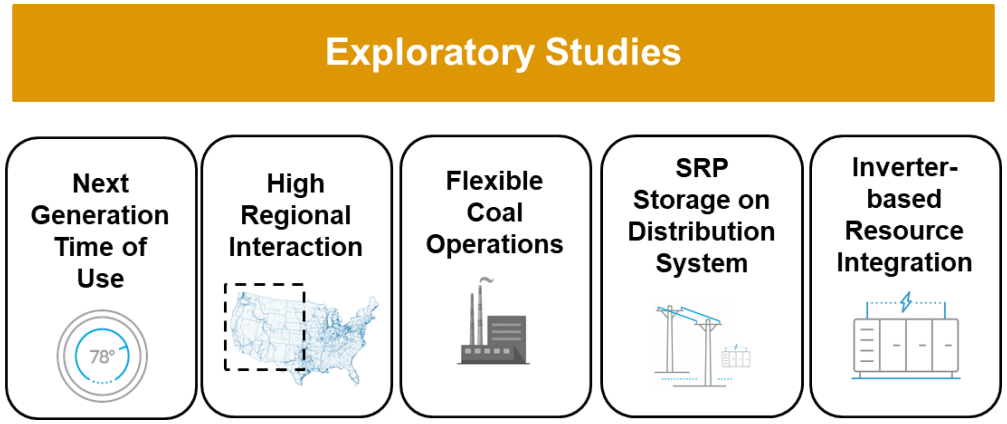
Input We Have Gathered Through Stakeholder Engagement

Metrics & Exploratory Studies

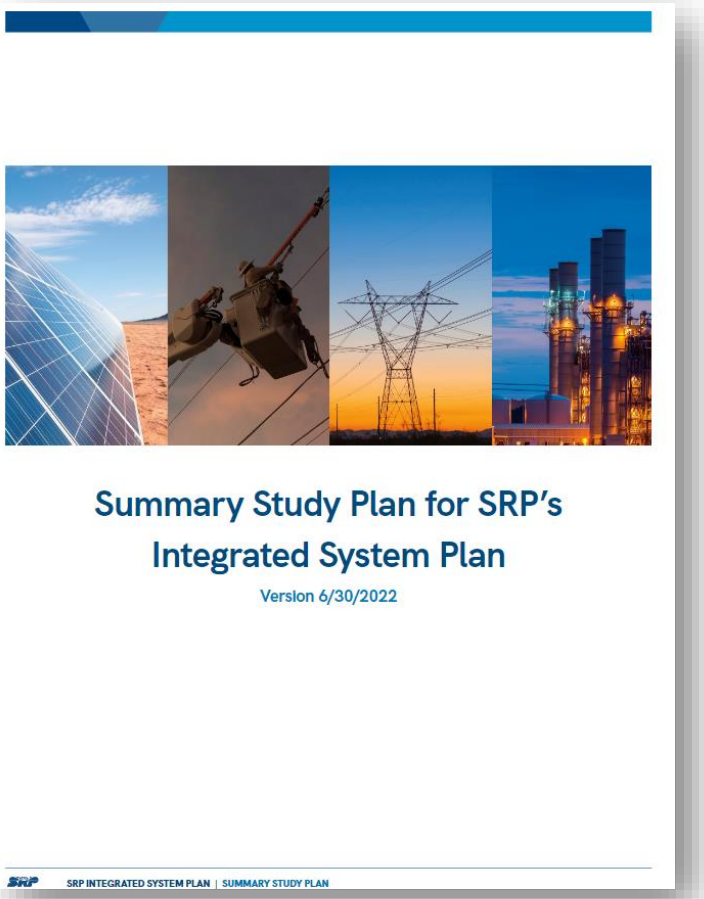
Measures of Success for the Integrated System Plan

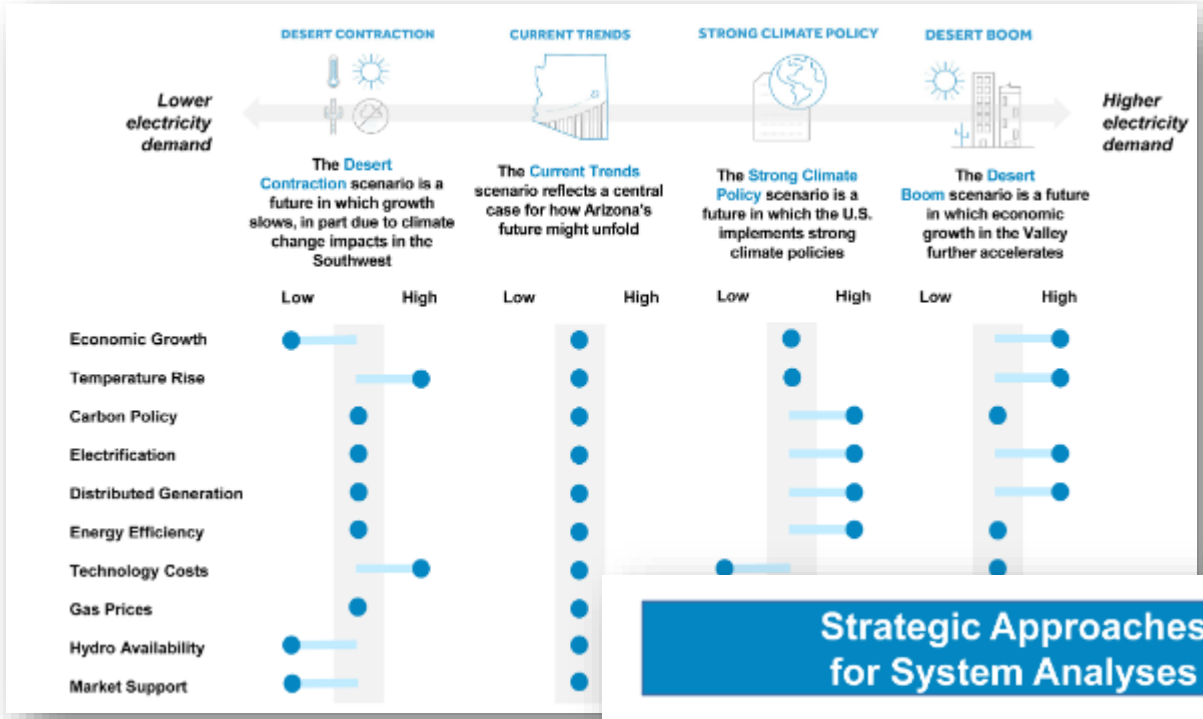


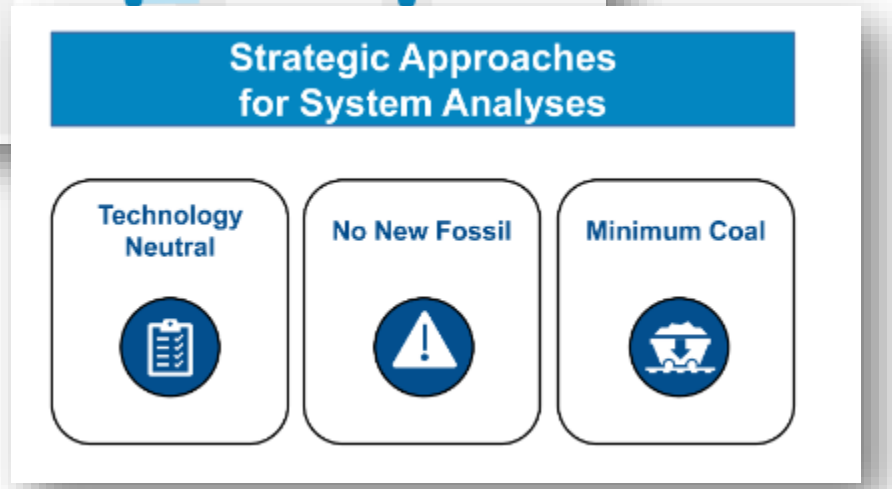
Scope and topics of interest for further research and future Integrated System Plans



ISP Study Plan







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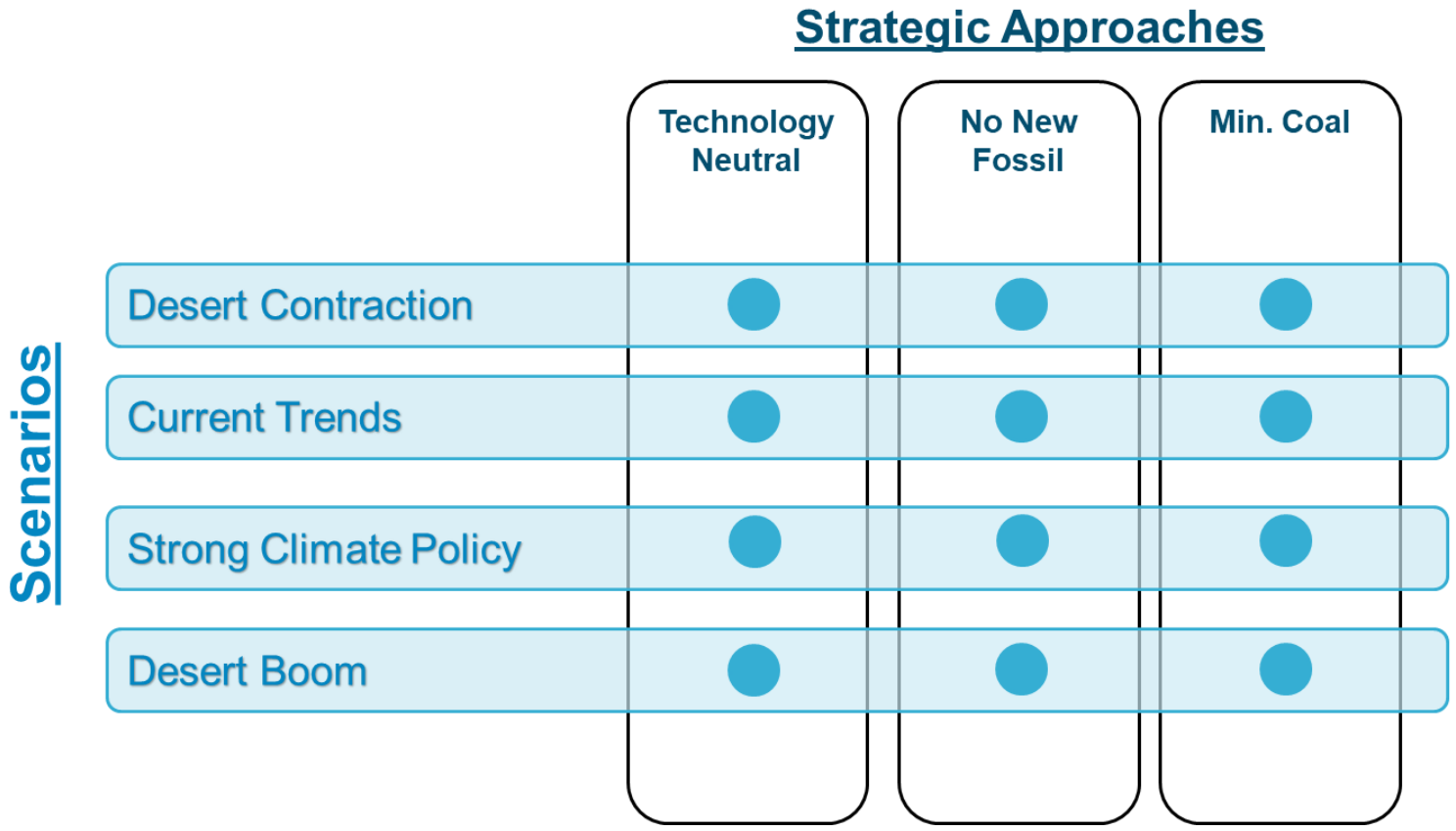
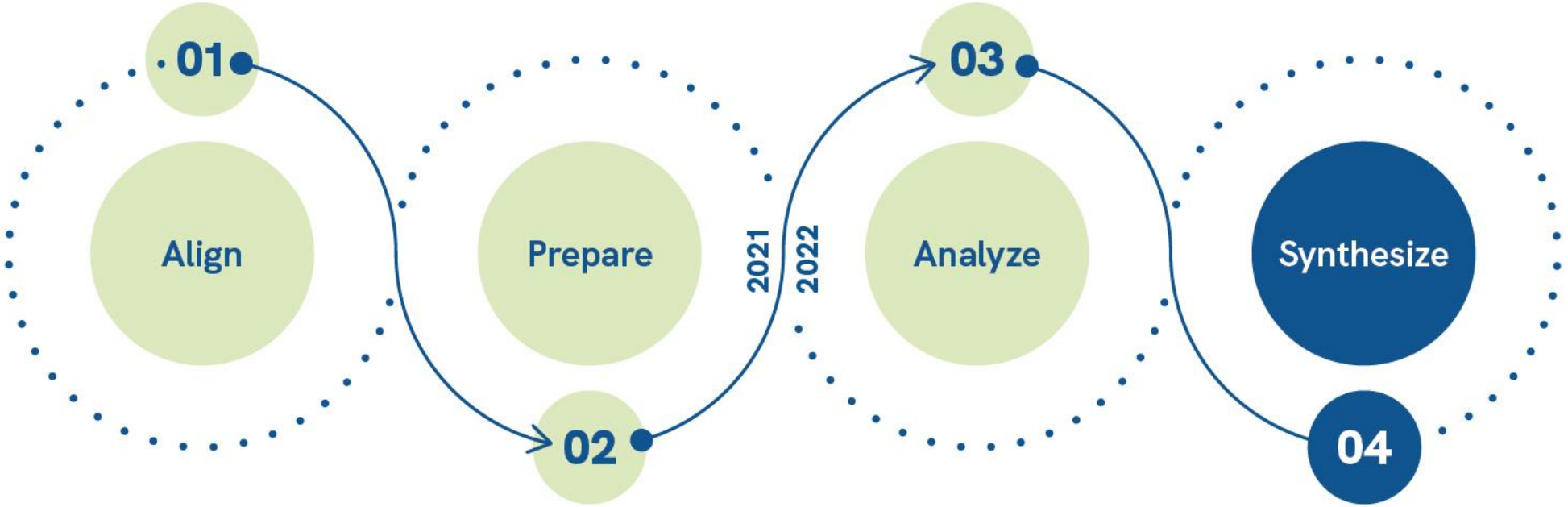
System-Wide Analysis



12 Scenario- Based System Plans

+ 30 Sensitivity-Based System Plans



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Balancing Considerations for ISP Conclusions

Provide focus and priority for future power system investments and innovations

Allow for flexibility to respond to evolving external conditions

Clearly indicate SRP's next steps

Draft Products of the ISP

- Review metrics
- Discuss trends, tradeoffs & findings
- View outcomes through ISP Guiding Principles

1. Develop System Strategies
2. Draft a Balanced System Plan
3. Identify ISP Actions

System Strategies

The System Strategies are the key points of focus SRP management will recommend to the Board for planning and operating the power system through 2035.

How they will be used:

- Provide **guidance and priority** for how to plan and operate the system in the future.
- **Transparency** to customers and other stakeholders of what strategies SRP plans to employ to evolve its system.
- The System Strategies will also be used as **the starting point** for developing other Integrated System Plan deliverables.

DRAFT – Subject to Change

Balanced System Plan

The Balanced System Plan will provide an **illustrative system plan through FY2035** that reflects SRP implementing the System Strategies.

How it will be used:

- The Balanced System Plan will provide customers and other stakeholders with a **tangible vision** for how the system could look through 2035.
- The Balanced System Plan will provide a **system-wide view** for how all parts of the system could evolve in an integrated manner.
- Together with System Strategies, the Balanced System Plan guides development of ISP Actions.

DRAFT – Subject to Change

ISP Actions

The Action Plan is a **set of near-term actions** that SRP will complete following the publication of the Integrated System Plan (ISP).

How it will be used:

- The ISP actions will set a roadmap for SRP to **implement the System Strategies** and make **progress toward the 2035 Goals**.
- Include a **diverse set of actions**, such making specific investments, performing a study, pilot or implementing a new planning methodology.
- Is a **commitment** to pursue these actions and to provide progress updates to stakeholders.

DRAFT – Subject to Change

Questions?

Roundtable:

Do the three ISP products – System Strategies, System Plan, and Actions -- achieve balancing near-term actions with flexibility to adapt to changing conditions? Why or why not?

Role of the Advisory Group through Remainder of the ISP Process

Angie Bond-Simpson
Director, Integrated System Planning & Support, SRP

Recap of the purpose of the Integrated System Plan Advisory Group

Mission Statement:

The charge of the Advisory Group is to contribute wide-ranging expertise and perspectives into the Integrated System Plan, resulting in an end-product that integrates the diverse interests and values of the customers and communities that SRP serves.

Recap of the purpose of the Integrated System Plan Advisory Group

Objectives:

- **Create a dialogue** around the Integrated System Plan
- **Include diverse perspectives** as input, guidance, and review for the Integrated System Plan
- **Provide a forum** for deep and technical discussion of the tradeoffs in energy system planning and the various perspectives to build support around the ISP Conclusions
- **Focus communication** for the Large Stakeholder Group

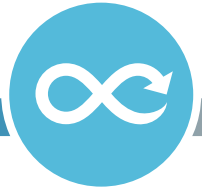
What Input We Aim to Gather Through the Remainder of the Stakeholder Engagement

System Strategies & Engagement Improvements

Input on how SRP could balance tradeoffs between affordability, reliability and sustainability

ISP Guiding Principles & ISP Products: System Strategies & Action plans

Improvement ideas for stakeholder engagement for the future



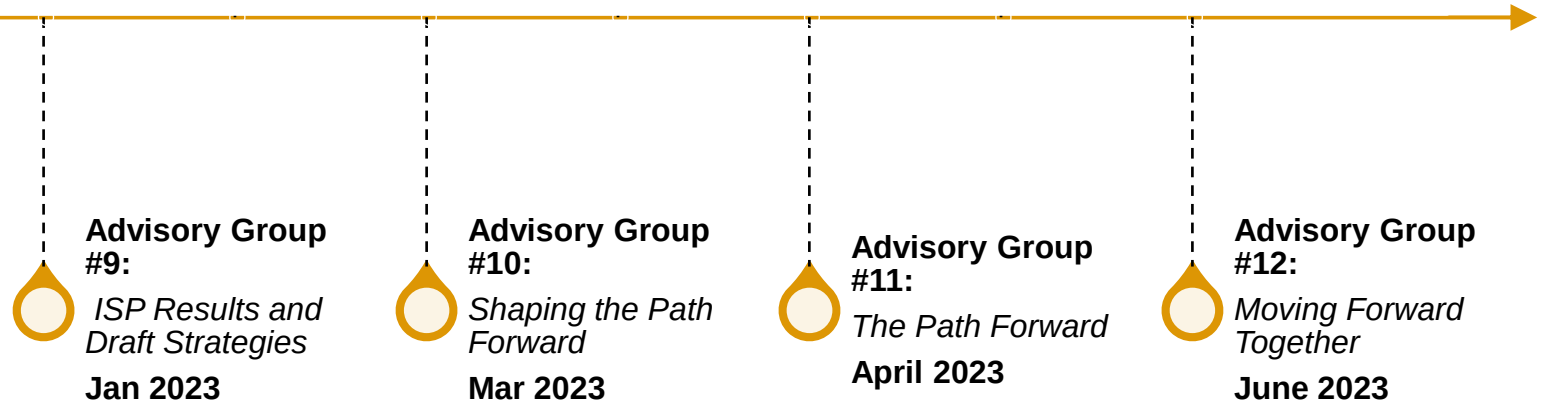
Feedback collected at the end of the process

Integrated System Plan Outputs & Advisory Group Role

Outputs Components	Stage of Completion	Advisory Group Review & Feedback	Share Final Proposal with Stakeholders
Guiding Principles	**In Progress**	**Sept 28th,2022**	Jan 27th,2023
Calculated Metrics	**In Progress**	Sharing Metrics and Key Findings October 2022-Jan 27th ,2023	
System Strategies	**Not Started**	Jan 27th,2023	March 3rd,2023
Balanced System Plan	**Not Started**	March 3rd,2023	April 21st, 2023
ISP Actions	**Not Started**	March 3rd,2023	April 21st, 2023

Advisory Group Meetings

October 2022- January 2023
2 Modeling Subgroups &
3 Technical Working Sessions
Optional to Advisory Group Members



Coffee Break

Guiding ISP Principles

Angie Bond-Simpson
Director, Integrated System Planning & Support, SRP

Joan Isaacson
Lead Facilitator, Kearns & West

From SRP's Perspective

SRP has been committed to providing sustainable, reliable and affordable power to Central Arizona for more than a century. SRP acts in the best interest of the people it serves and strives to help build a better future for Arizona.

ISP's Guiding Principles consider SRP's:

- Duty to serve
- Mission to appropriately balance reliability with sustainability and affordability

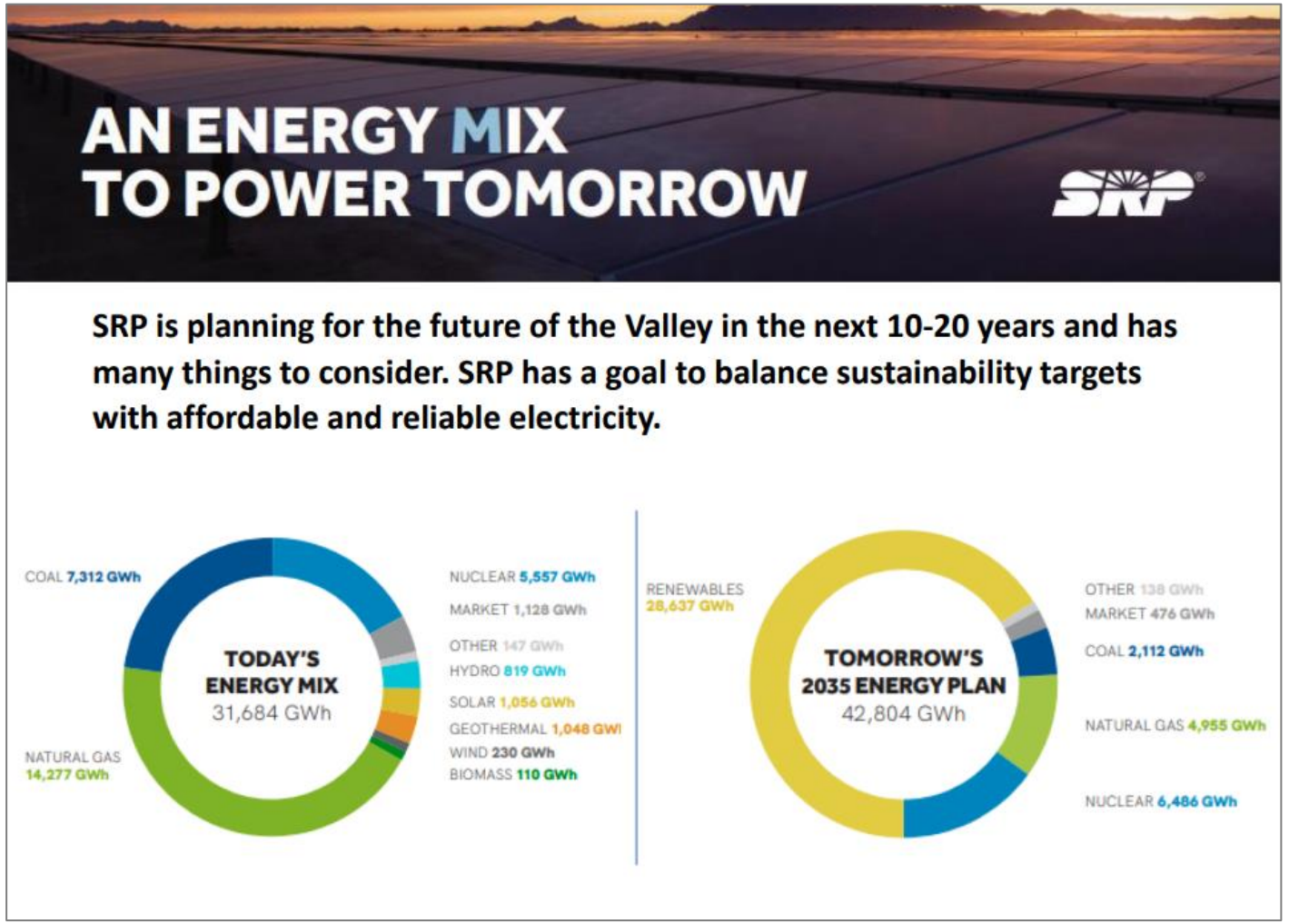
Reflection on the Customer Preference Research

Phase 1 & 2

Illustrative Energy Plan

Customers evaluated an illustrative SRP energy mix, which could take place in the next 10-20 years.

Customers were given background on SRP's priorities to ensure power quality continues to improve.



Reflection on the Customer Preference Research
Phase 1 & 2 Results Summary

In Summary…

66%
Rated Plan Positively

Most customers reacted positively to the illustrative energy plan, and a quarter felt it was excellent. Additionally, a majority expressed positive perceptions of SRP and cited outstanding customer service and reliability as reasons for this.

Affordability & reliability were top priorities for the future

A majority agreed the plan should be prioritized by SRP

Customers wanted to continue to hear about ways to save

bellomy

Purpose of Guiding Integrated System Plan (ISP) Principles

An integrated system is built on three foundational aspects:

1. Developing ideas about what the future might look like, including an analysis of future customer demand
2. Assessing viable system options through metrics
3. Evaluating the metrics and system plans through guiding principles

Purpose of ISP Guiding Principles: Guide the development process of system strategies to ensure SRP appropriately balances all important considerations.

SRP strives to understand the inherent tradeoffs among the principles and establish system strategies that fully considers and balances all of them.

DRAFT Guiding Integrated System Plan (ISP) Principles

Integrated Long-Term View

Develop a holistic view, including resources, transmission, distribution and customer program perspectives for meeting growing customer needs and achieving our 2035 Corporate Goals. The long-term view ensures that SRP is making the right decisions today to support its customers and stakeholders in the future.

Transparency

Engage customers and other stakeholders in a transparent system planning process that is responsive to questions and input.

Measure Success Through the Eyes of Our Customers

Respond to evolving consumer expectations by providing sustainable, safe, reliable, equitable and affordable power. SRP prides itself in serving the needs of customers and goes to great lengths to continually exceed expectations.

Manage Costs

Deliver exceptional Power System value by keeping prices low through diligent, long-term oriented cost management.

Build an Adequate and Reliable Power System

Meet, and in some cases, exceed industry standards to provide a dependable supply of electricity to all SRP customers. Anticipate a grid that is able to prepare for and recover from both anticipated and unanticipated disruptions to ensure energy availability and reliability sufficient to meet customers' needs.

Adapt Toward a More Sustainable Future

Meaningfully reduce carbon emissions to help combat climate change. Reduce other environmental impacts of SRP's operations by using less water and energy, and by creating less waste. SRP can pass those savings on to customers, and everyone can enjoy the benefits of a better environment.

Guiding ISP Principles

Questions for Small Group Discussion

- Do these Guiding ISP Principles balance affordability, reliability and sustainability?
- In what ways do the Guiding ISP Principles address customer preference?
- What are suggestions for modifications to the draft Guiding ISP Principles for optimizing balance?

Guiding ISP Principles

Discussion Groups by Organization Type

- Step 1 – Introductions
- Step 2 – Identify someone to report back
- Step 3 – Discuss:
  - Do these Guiding ISP Principles balance affordability, reliability and sustainability?
  - In what ways do the Guiding ISP Principles address customer preference?
  - What are suggestions for modifications to the draft Guiding ISP Principles for optimizing balance?
- Step 4 – Report out
  - What are suggestions for modifications to the draft Guiding ISP Principles for optimizing balance?

Report Out

What are suggestions for modifications to the draft Guiding ISP Principles for optimizing balance?

Integrated System Plan Analysis

Kyle Heckel
Senior Analyst, Integrated System Planning & Support, SRP

ISP Analysis Update

Completing/Validating	Forecasting, Customer Programs, Distribution planning & design teams
In Progress	Resource and Financial analysis & planning teams running analysis
Not started	Transmission, operational & engineering teams receive upstream results as inputs

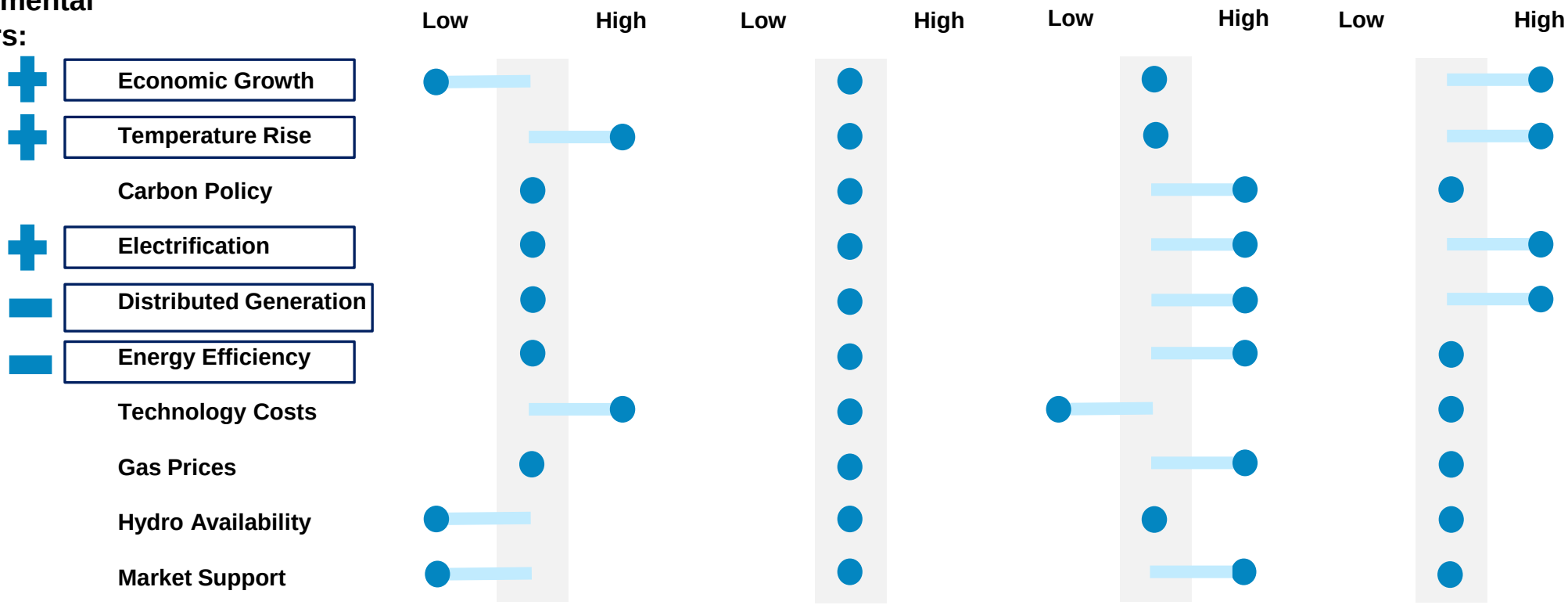
Update:
ISP Scenarios Customer Demand Forecasts

Jed Cohen
Manager, Load Forecasting and Research

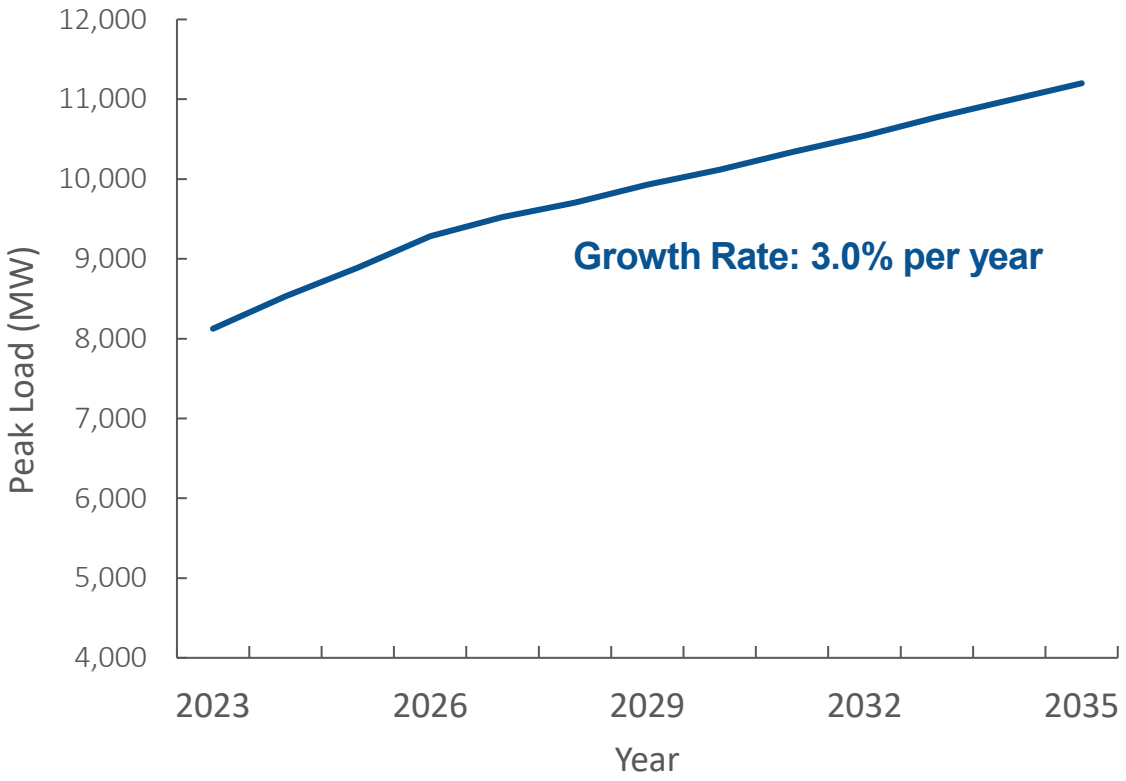
Nathan Morey
Manager, Customer Programs

The Scenarios in the Integrated System Plan

Fundamental Factors:



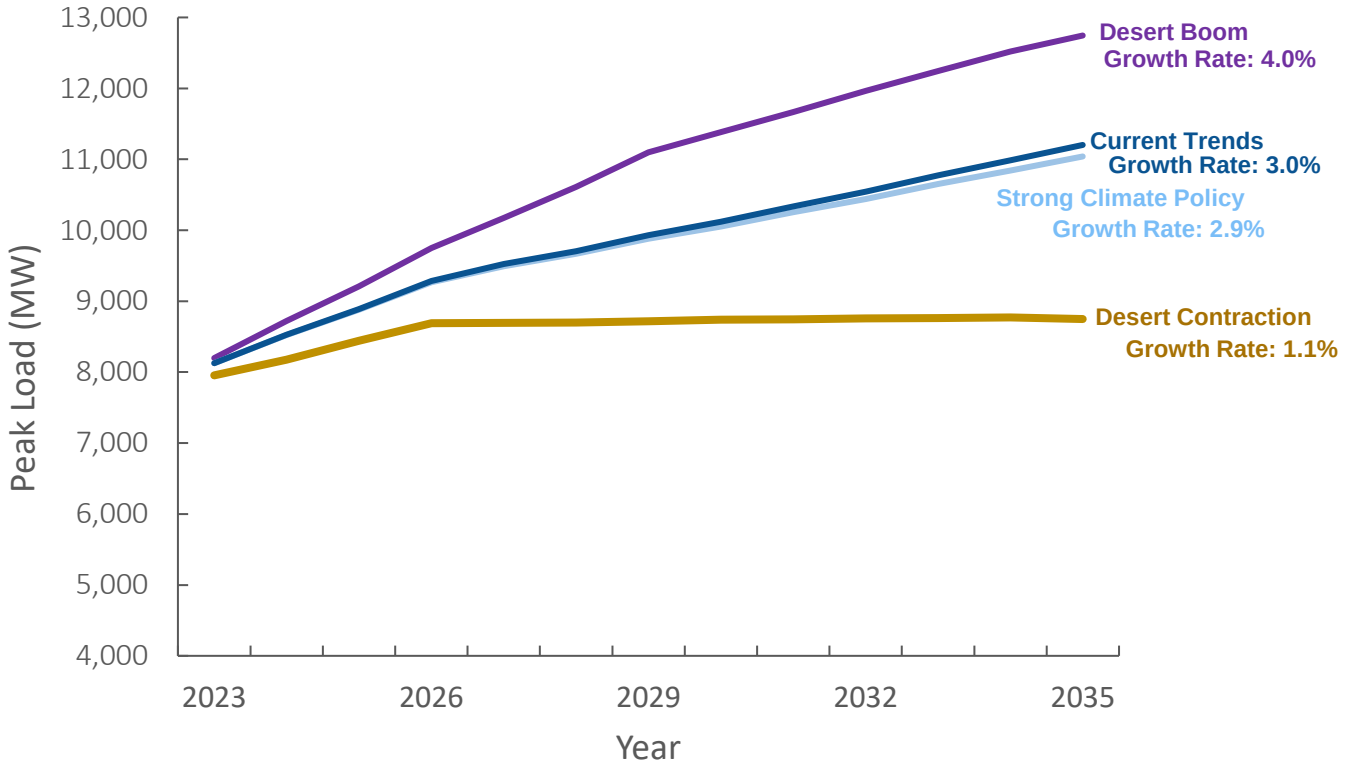
Current Trends Peak Load



Growth rates calculated as compound annual growth rates

- The Peak Load Forecast tells us how much demand for power the future power system must accommodate
- People and companies moving to Arizona are the main drivers of projected load growth
- Other factors: Energy efficiency, distributed 'rooftop' solar, and electrification

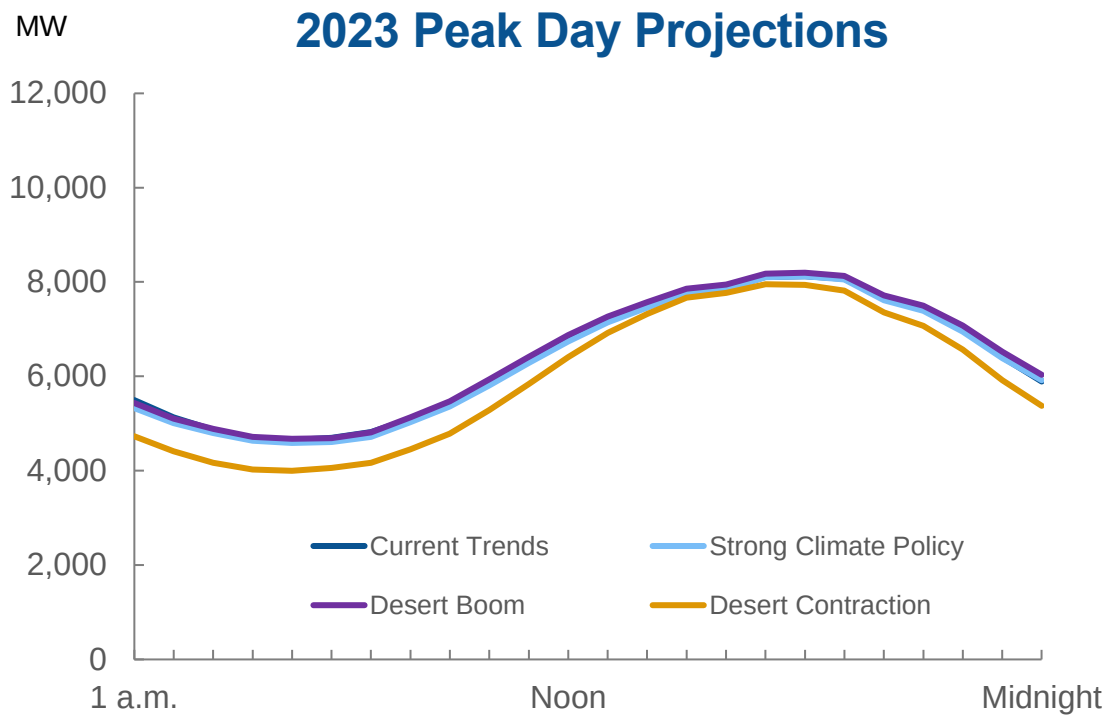
ISP Scenarios Peak Load Forecasts

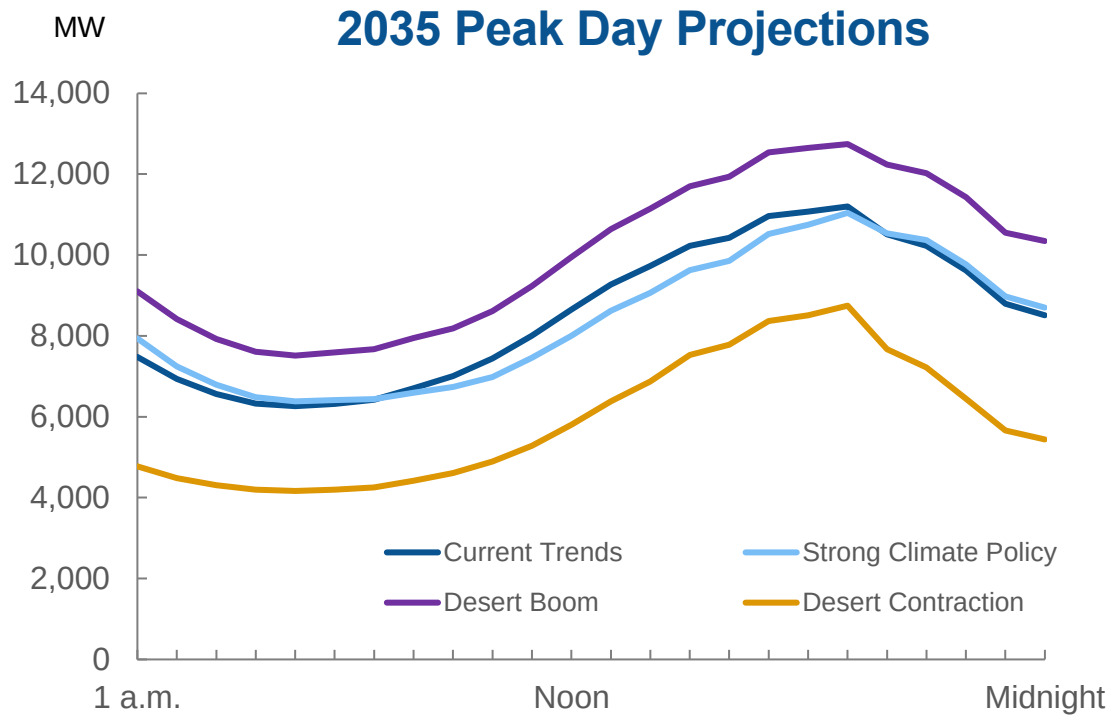


Growth rates calculated as compound annual growth rates

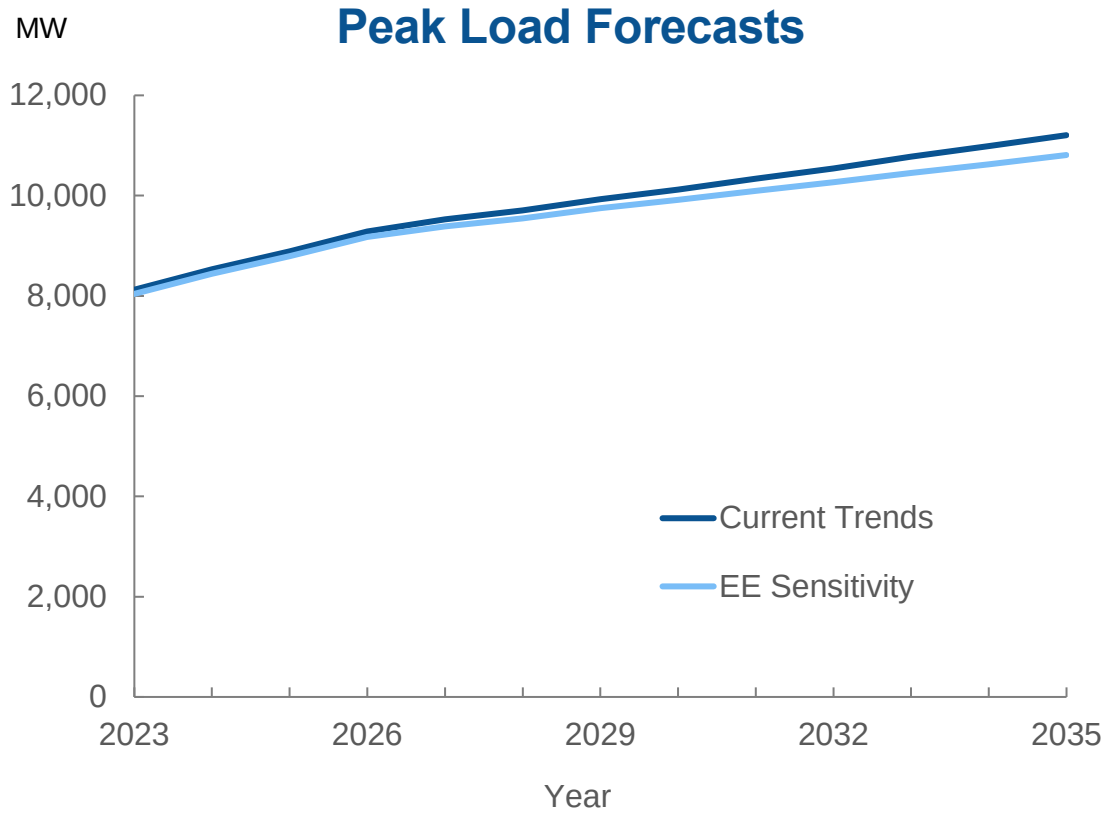
- **Desert Boom** : strong growth in economic loads as Arizona grows to be a regional energy, technology, and manufacturing hub
- **Current Trends & Strong Climate Policy:** sustained economic growth in the greater Phoenix area, continued migration, and expansion in commercial and industrial business activity
- **Desert Contraction**: limited new migration and reversal of commercial growth trends due to scarcity of water and increasing summer-time temperatures

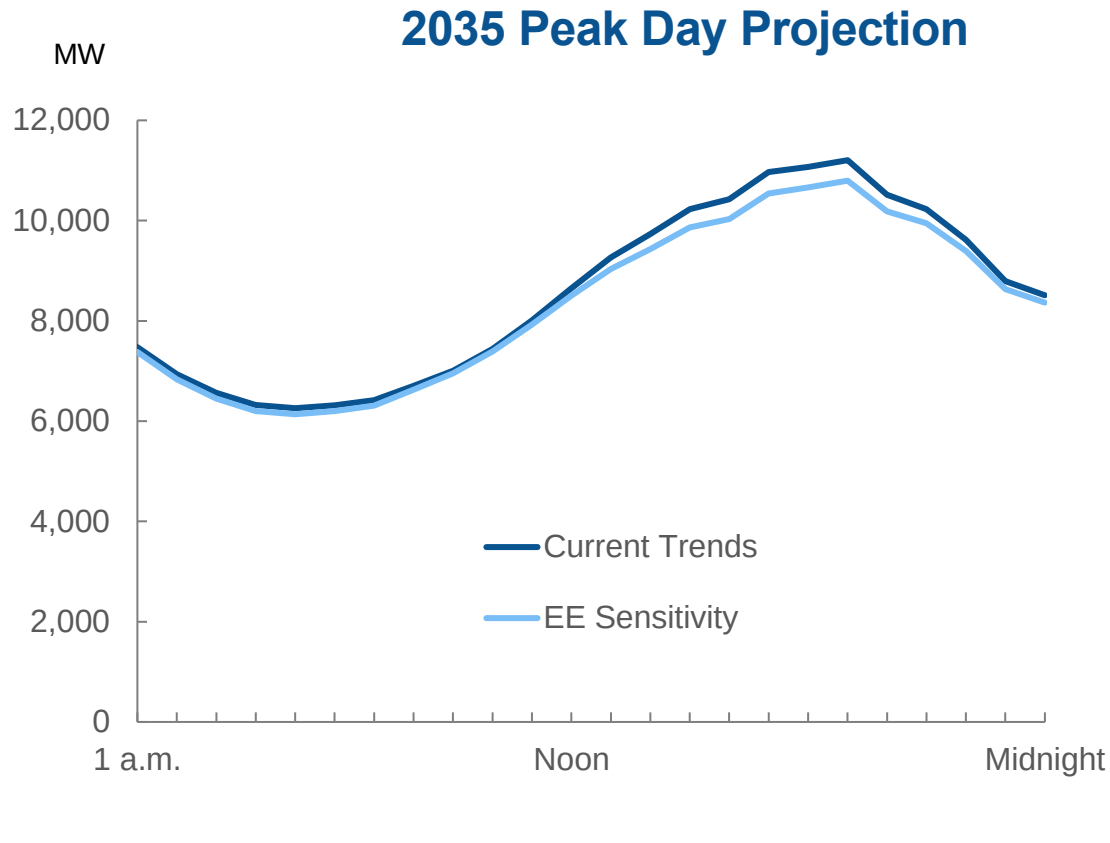
Hourly Demand Load Shapes for Summer Peaks





Energy Efficiency and Future Loads



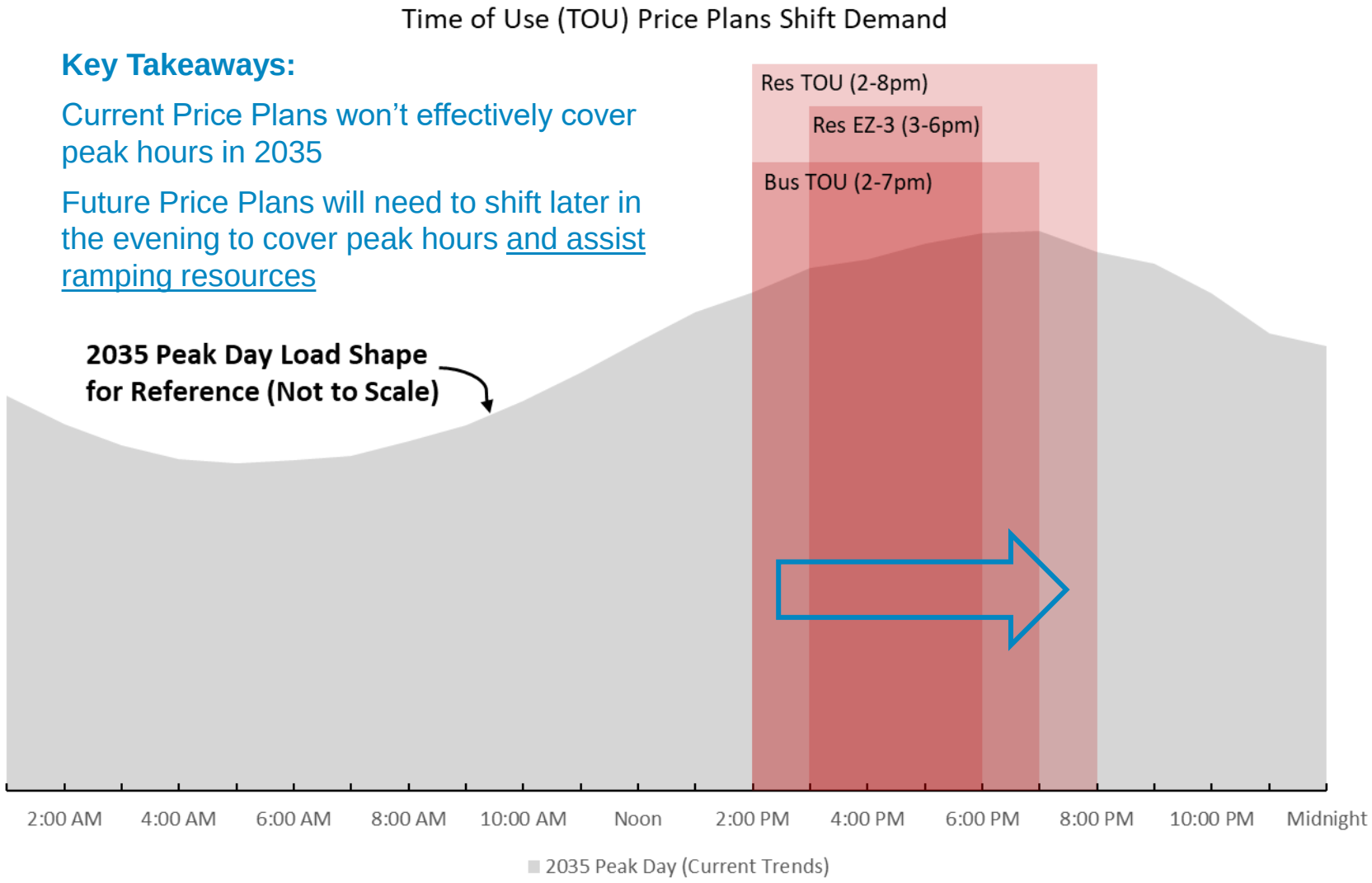


Shaping Customer Demand with Price Plans

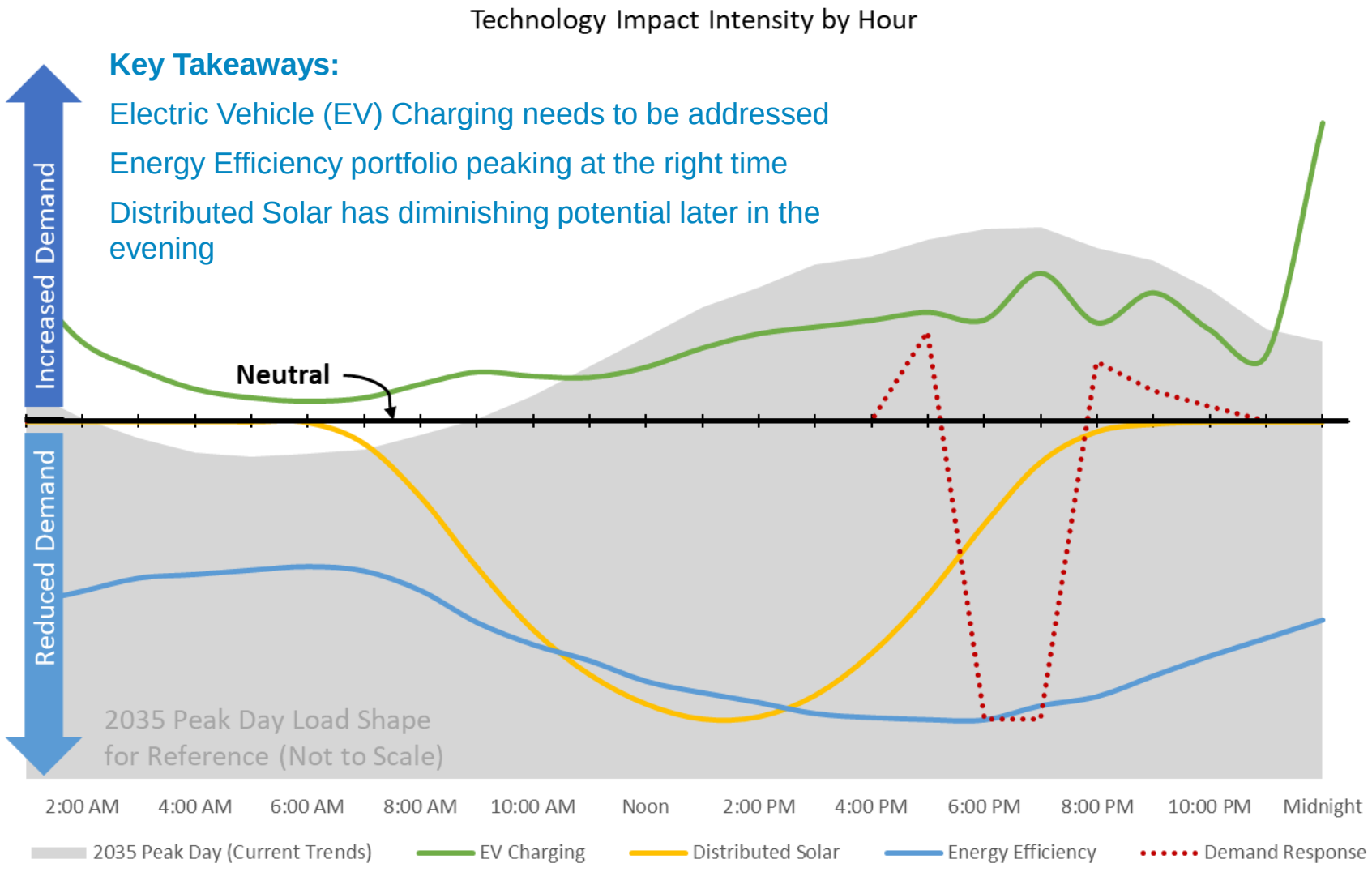
Key Takeaways:

Current Price Plans won't effectively cover peak hours in 2035

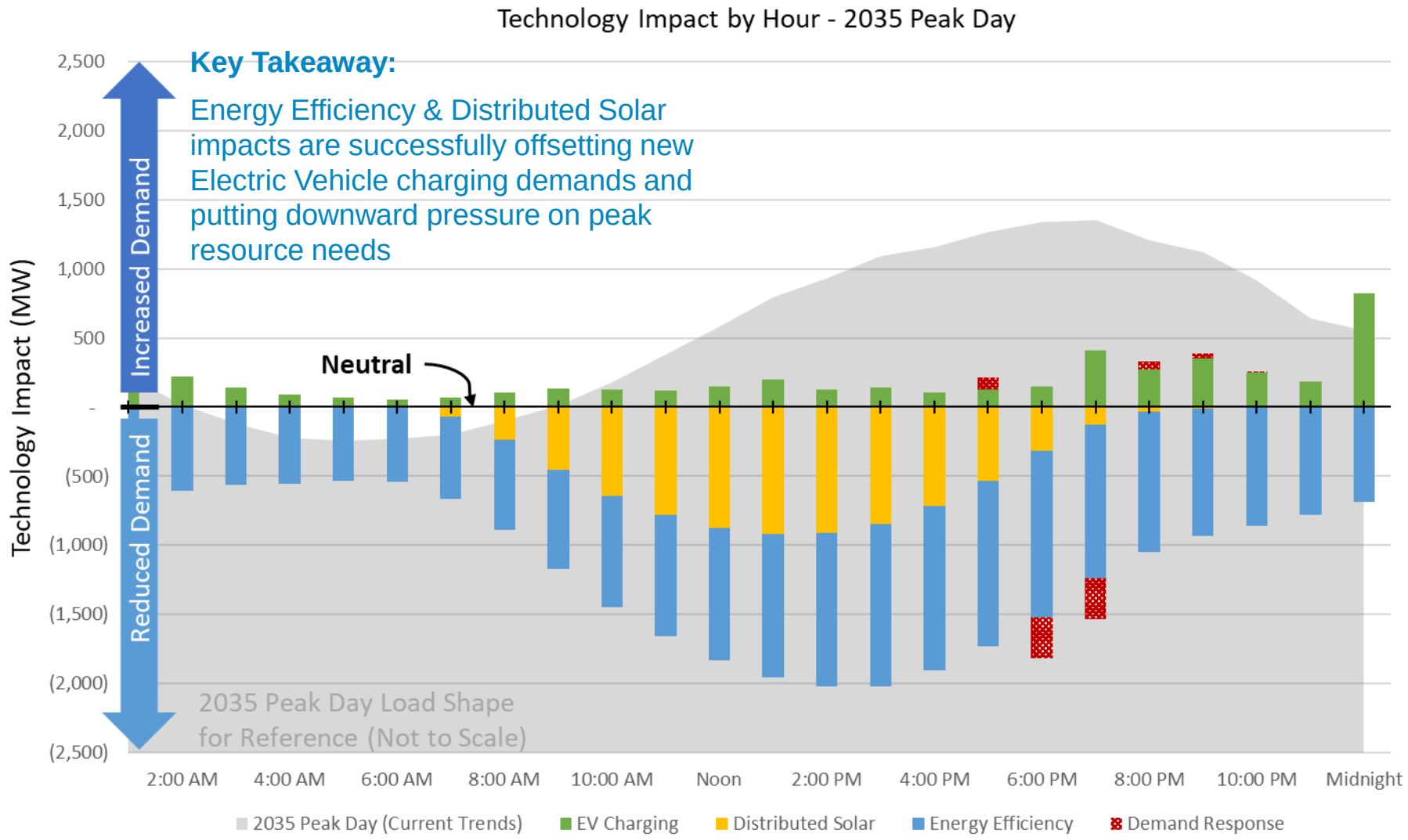
Future Price Plans will need to shift later in the evening to cover peak hours and assist ramping resources



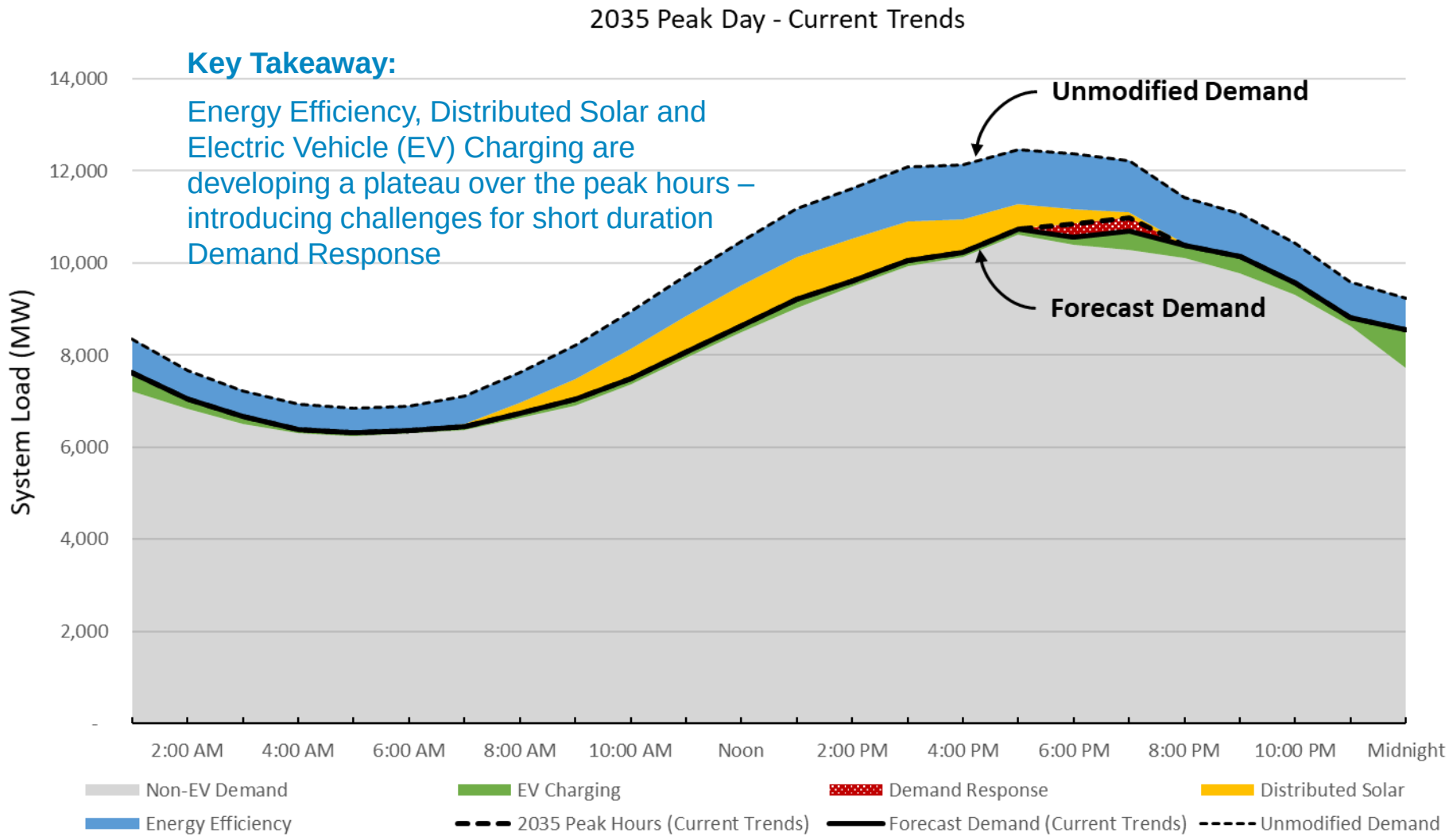
Shaping Customer Demand with Technology



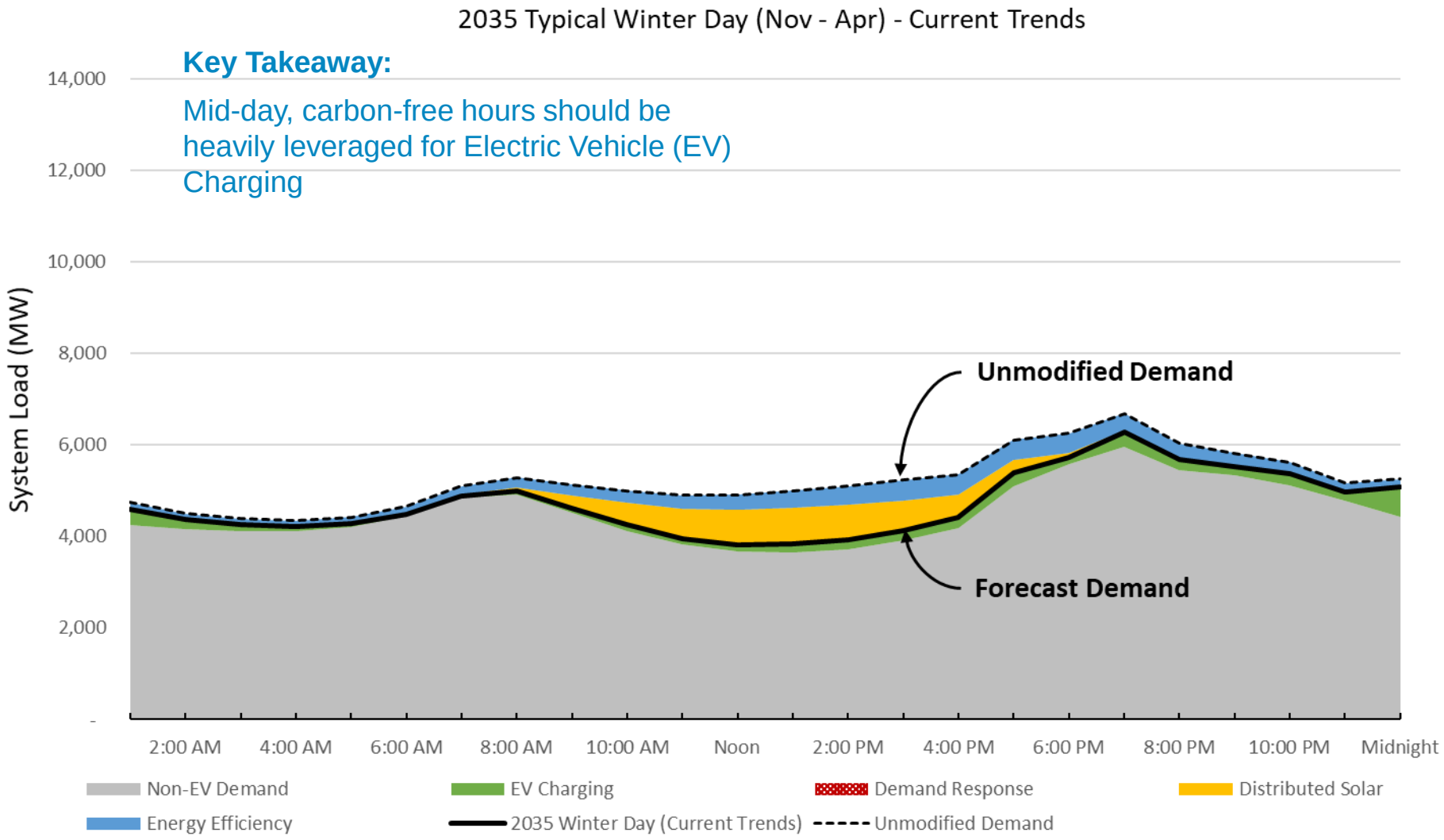
2035 Peak Day – Hourly Program Impacts



2035 Peak Day w/ Program Impacts



2035 Winter Day w/ Program Impacts



Lunch Break

12:25-12:45PM

Industry Perspectives on Reliability, Near- and Long-Term

Presentation to ISP Advisory Group

September 28, 2022

Energy+Environmental Economics

Nick Schlag, Partner

E3 has worked extensively to support modernization of reliability planning throughout the country

- **Founded in 1989, E3 is a leading energy consultancy with offices in San Francisco, Boston, New York, and Calgary**
- **E3 works extensively with utilities, developers, government agencies, and environmental groups to inform strategy and key decisions**
- **E3 is a recognized industry leader in studying the resource adequacy needs in the transition to a decarbonized grid**
  - Technical support for multiple Western utilities in application of an ELCC-based accounting framework
  - Strategic support to PJM & NYISO in integration of ELCC into capacity market constructs
  - Participation in ESIG Redefining Resource Adequacy task force and IEEE Resource Adequacy working group
  - Multiple technical studies of the implications of economy-wide long-term decarbonization goals upon resource adequacy

Recent E3 Publications on Resource Adequacy

- Resource Adequacy in the Pacific Northwest
  (sponsored by a coalition of Northwest utilities)
- Long-Run Resource Adequacy under Deep Decarbonization Pathways for California
  (sponsored by Calpine)
- Capacity and Reliability Planning in the Era of Decarbonization
  (E3 whitepaper)
- Resource Adequacy in the Desert Southwest
  (sponsored by a coalition of Southwest utilities)

Industry perspectives on maintaining reliability

+ **In the near term, the industry faces several challenges for maintaining reliability**
  - Near-term need for new resources is significant
  - Evolving resource mix changes the nature of reliability challenges
  - Market uncertainties point to a turbulent landscape
+ **In the long term, a balanced portfolio of resources will be needed to complete a reliable transition to a low-carbon electricity system**
  - **Firm capacity** is needed to maintain reliability, even under deep decarbonization scenarios where renewables and storage meet the majority of day-to-day energy needs

What is a "firm" resource?

A generator that can operate at **full capacity** for **extended periods of time** (24+ hours) except when unavailable due to maintenance or forced outages

Examples: nuclear, coal, natural gas, *hydrogen, long duration storage*

Maintaining Reliability in the Near Term

Energy+Environmental Economics

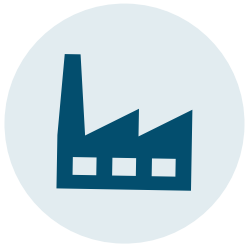
Key trends are reshaping the power system in the Southwest

Load growth

Expected 2% load growth resulting from net migration, electrification, and new large customers

Climate change impacts on extreme weather

Increased frequency and intensity of extreme heat events results in more frequent extreme peak demand

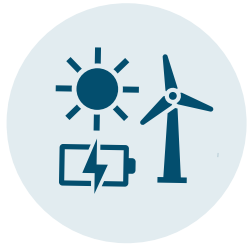


Planned coal & gas retirements

Announced retirements total 1.4 GW by 2025 and 5 GW by 2033

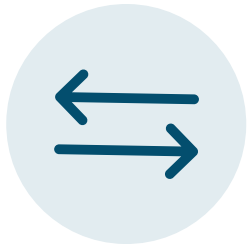
Increasing risk of sustained drought

Hydroelectric generation facilities susceptible to significant impacts under drought



Rapidly increasing reliance on renewables and storage

Resource additions driven by state policy, voluntary commitments, and economics



Tightening Western markets

Changes & trends across the broader Western Interconnection reshaping market dynamics

Development of new resources in the Southwest must occur at an unprecedented rate

+ **The rate of new resource additions required in the next ten years is nearly unprecedented in the history of the Southwest**
+ **With project development timelines measured in years and near-term supply chain risks looming, advance planning and prompt action by utilities are needed to avoid falling behind in the transition**

+ **Utilities, regulators, developers and stakeholders will share responsibility for working cooperatively to ensure new resources are in place as needed**
  - Plans for new resource additions should account for reasonable risks of project delays and cancellations
  - Failure to develop new resources in a timely manner will either result in (1) a degradation of reliability or (2) the need to retain existing plants with scheduled retirements

New Installed Capacity Additions by Year (Southwest Region)
(Nameplate MW)

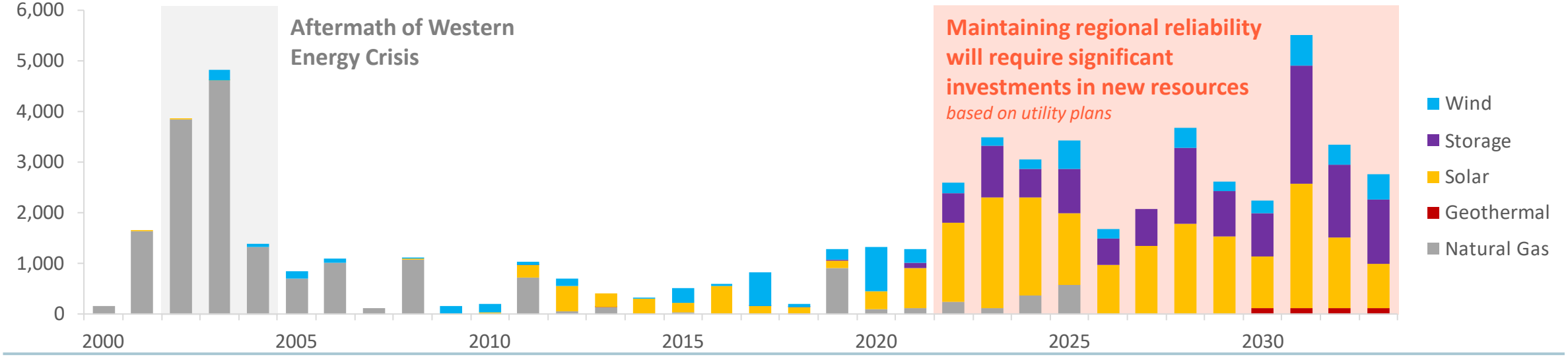


Figure adapted from E3's Resource Adequacy in the Desert Southwest

Solar & storage poised to meet a large share of the region's needs, but remaining firm resources will be needed for reliability

+ **A portfolio of variable renewables, storage, and other energy-limited resources can provide a significant contribution to regional resource adequacy needs**
  - Capabilities of solar and storage are particularly well-suited to matching high summer peak demands

+ **As penetrations of solar & storage increase, risks to reliability extend deeper into the evening, indicating a need for resources that can deliver for extended periods overnight**

+ **Because of their ability to produce energy on demand for sustained periods, existing firm resources – including nuclear and natural gas – will continue to play a key role in meeting regional needs**

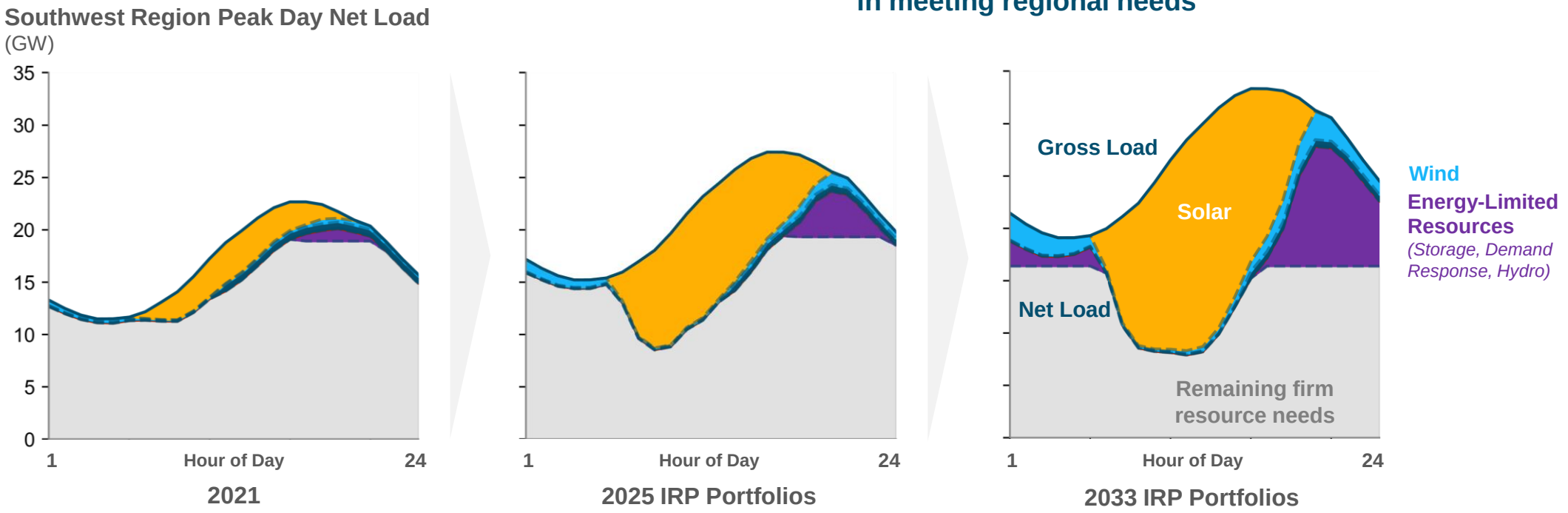
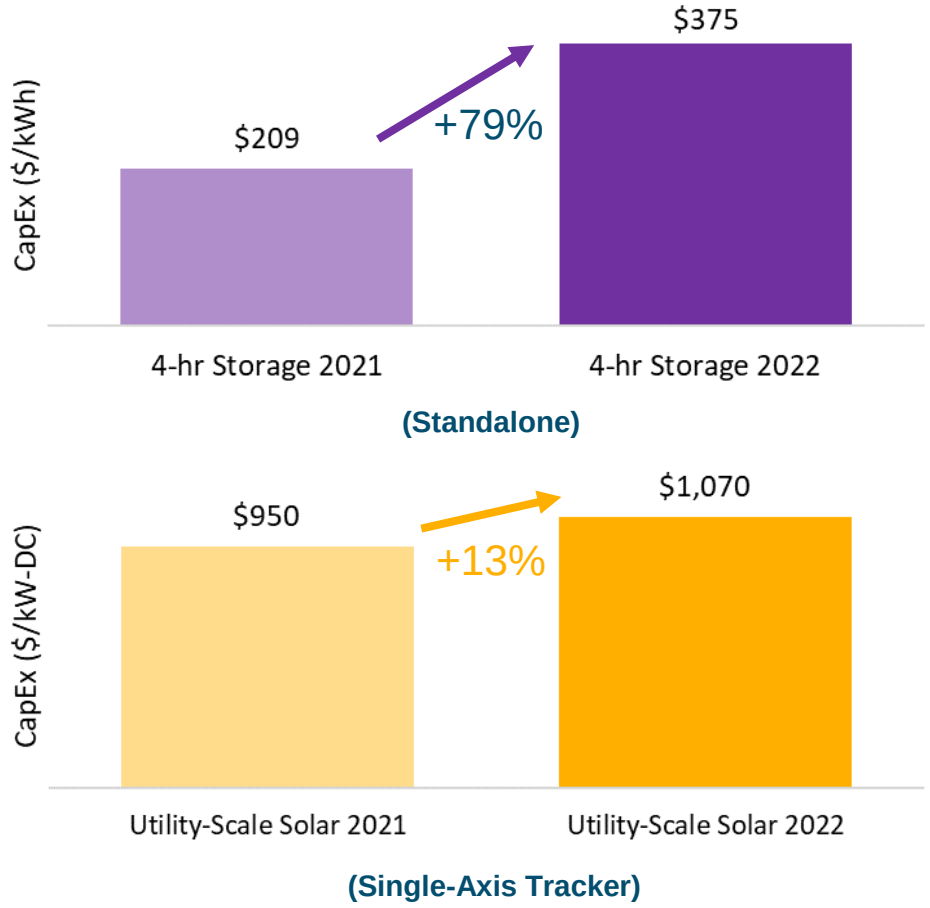


Figure adapted from E3's Resource Adequacy in the Desert Southwest

Tight supply chains are increasing solar and battery storage costs

Utility-scale Solar and Storage Capex (2021 vs. 2022)



+ **Tight supply chains and other inflationary pressures have increased solar and battery storage costs**
+ **Tight supply chains have also resulted in delays in new projects**
  - In Q4 2021, one-third of solar and storage projects were postponed due to supply chain challenges
+ **The Inflation Reduction Act (IRA) passed in August. It provides additional incentives for storage, solar, and many other resources**
  - It remains to be seen how supply chain pressures and the IRA together will impact storage and solar pricing over the next 5-10 years

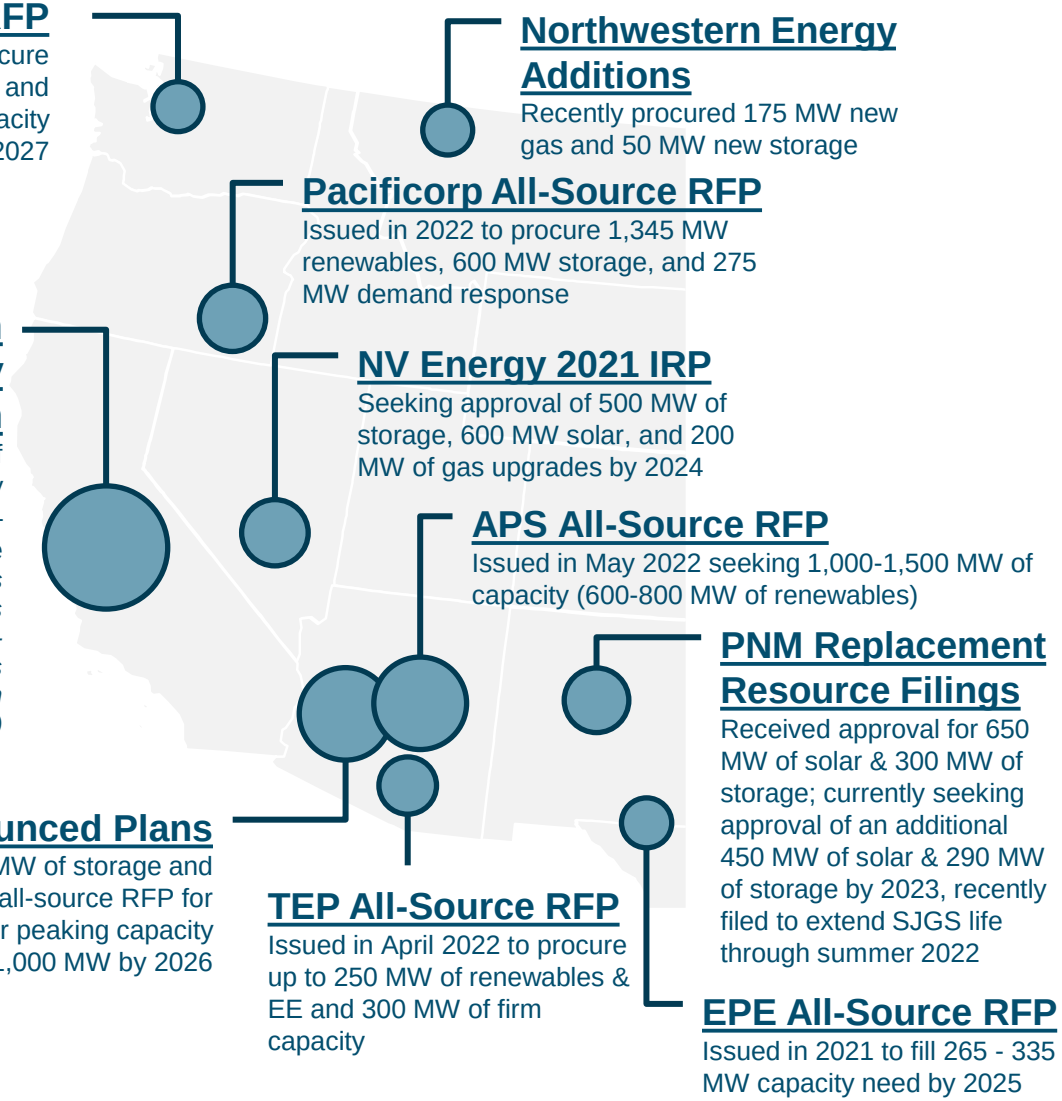
Sources: Utility Dive, https://www.utilitydive.com/news/solar-storage-delays-price-supply-chain/620537/;
Wood Mackenzie, U.S. Solar Market Insight, Executive Summary. Q3 2022. Executive Summary. https://www.woodmac.com/industry/power-and-renewables/us-solar-market-insight;

Recent industry actions to maintain reliability in the near term

+ **Utilities throughout the region are racing to procure new resources to come online mid-decade**

+ **Despite efforts to bring new capacity online, uncertainties have led to delays in plant closures**
  - CA is considering delaying retirement of the Diablo Canyon nuclear plant
  - 8 coal plants, totaling 6 GW of capacity, have had planned retirements delayed between 1-3 years across the US

+ **In California, urgent statewide text messages prompted customer demand reductions (2 GW) amidst extreme weather and high loads**



Long-Term Role of Firm Capacity in Maintaining Reliability

Energy+Environmental Economics

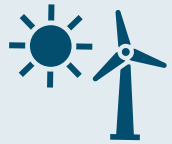
Common findings across studies of electric sector decarbonization

E3's work studying electric sector decarbonization and resource adequacy support three general findings:

1. **Achieving a low-carbon grid is technically feasible and can be affordable, but eliminating carbon from the electricity sector entirely with today's technologies appears challenging and cost-prohibitive**
2. **A technology-neutral approach to decarbonization that focuses on carbon reductions will enable utilities to meet clean energy goals most affordably**
3. **Some form of firm capacity is needed for reliability even under a deeply decarbonized grid**

These findings are supported by a growing body of literature, including recent studies by the National Renewable Energy Laboratory (NREL), Princeton University, the Electric Power Research Institute (EPRI), and the Massachusetts Institute of Technology (MIT)

Blueprint for a Low Carbon Grid



Scalable Low-Cost Clean Energy Resources

Today: wind, solar

Future: nuclear SMR, CCS

Balancing Resources

Today: batteries, pumped storage, hydro, DR

Future: advanced flexible loads, other storage technologies

Firm Resources

Today: nuclear, natural gas, geothermal

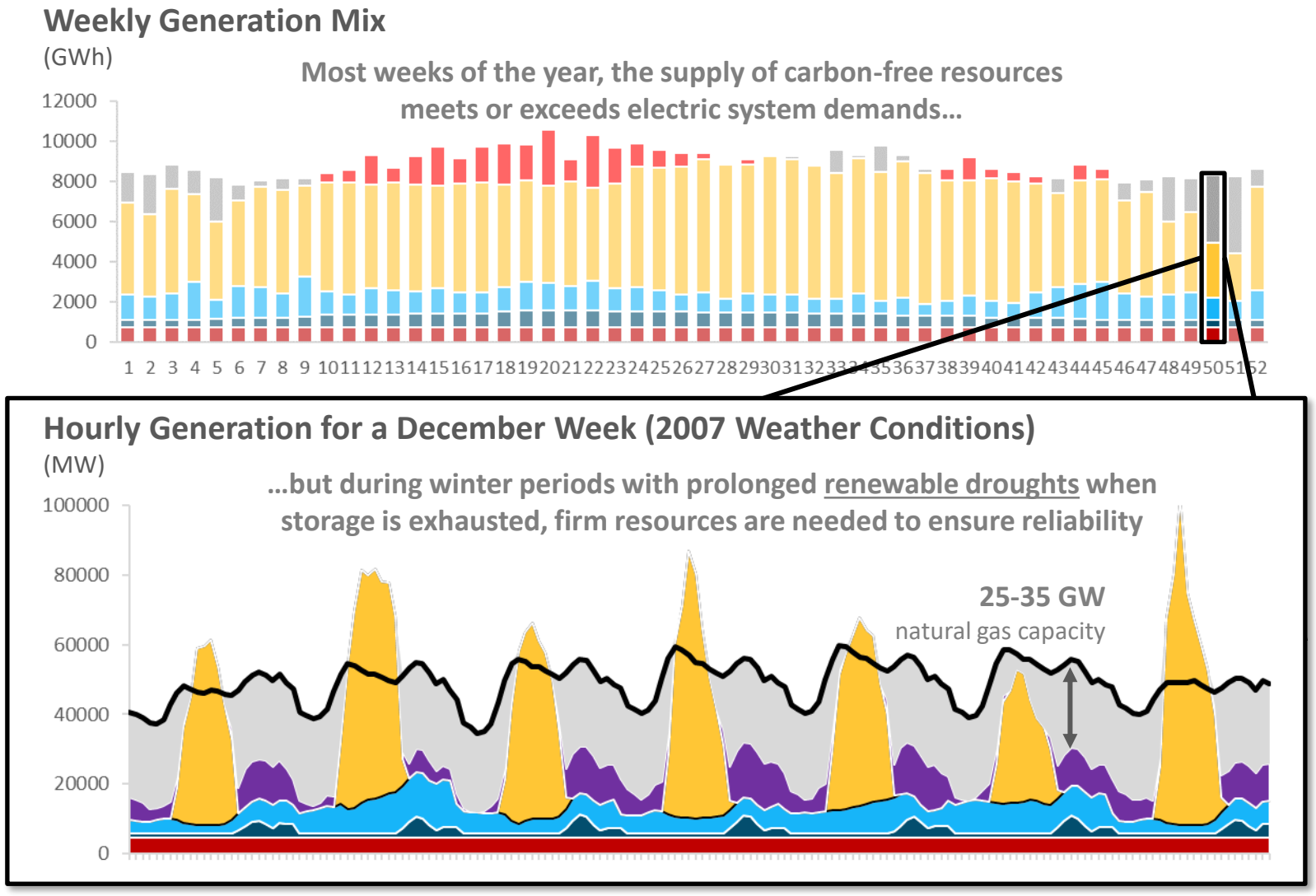
Future: hydrogen, long-duration storage, nuclear SMR, CCS

The essential role of firm generation in a low carbon grid

California in 2050 at a glance:

+ **93 GW** peak demand
+ **90%** carbon-free generation
  - 150 GW solar PV
  - 21 GW wind
  - 8 GW hydro
  - 5 GW geothermal
  - 75 GW energy storage
+ **35 GW** reliability need for firm capacity (40% of peak)
+ **90% GHG reduction** relative to 2005 levels

Statistics and visuals adapted from High Electrification scenario in Long-Run Resource Adequacy under Deep Decarbonization Pathways for California



Summarizing the evolution of reliability planning challenges and the role of firm capacity

Main drivers of reliability challenges will shift as penetrations of storage and renewables increase

Summer Peak

At low penetrations, the periods of highest demand present the greatest challenge to reliability

Summer Net Peak

At moderate penetrations, solar shifts "net peak" to evening, which becomes the primary challenge

Renewable Droughts

At high penetrations, periods of sustained low renewable production – most often in the winter - present the greatest challenge to reliability

At all stages of the transition, firm resources will play a crucial role in maintaining reliability

Firm resources meet loads throughout the year, including during peak periods

Firm resources cycle to integrate renewables, reaching highest output during summer net peak

Firm resources serve as backup generation, operating infrequently when primary energy resources are unavailable

Thank You

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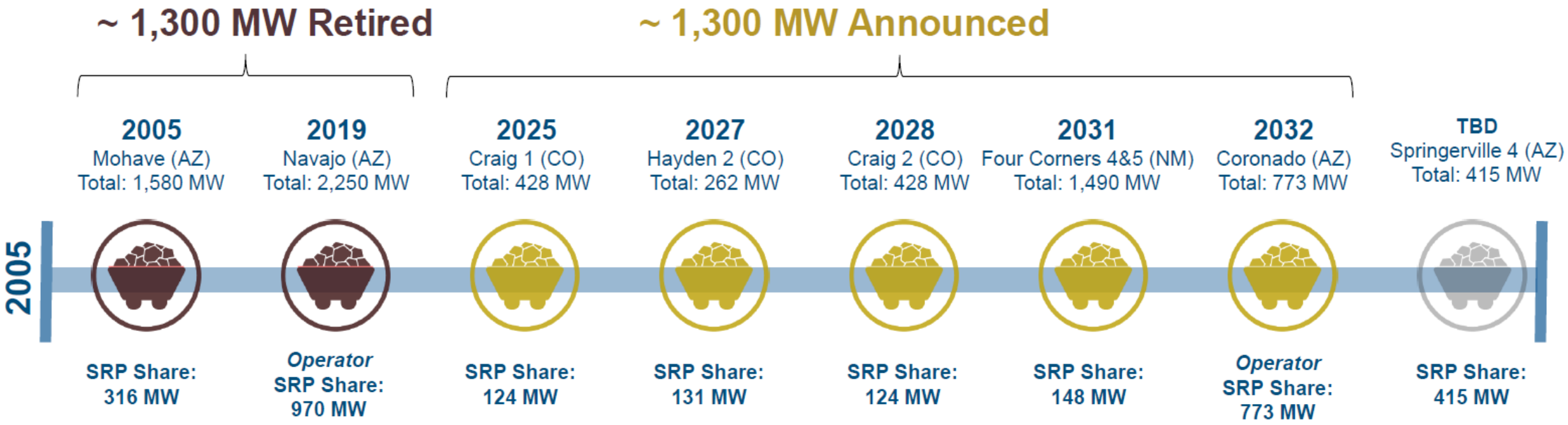
Lakshmi Alagappan, lakshmi@ethree.com

Energy+Environmental Economics

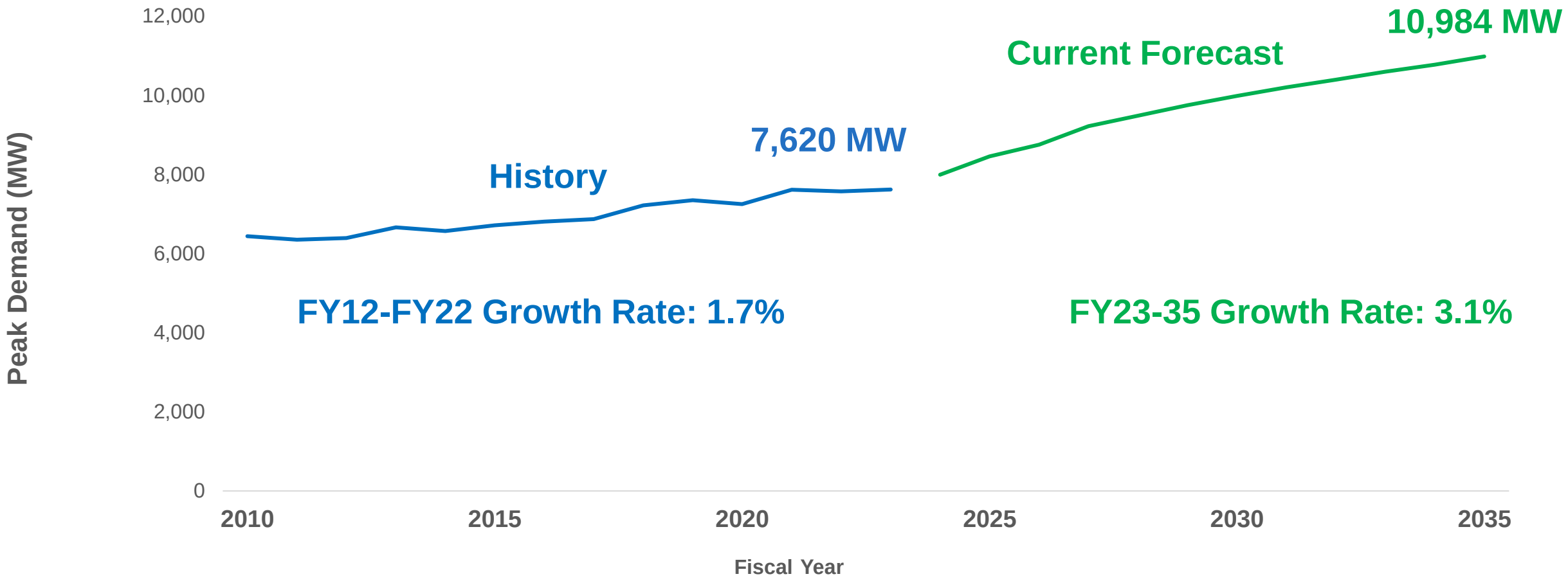
Maintaining Reliability as SRP Decarbonizes its Portfolio

John Coggins
Associate General Manager & Chief Power System Executive

Reduce Coal: Retirements



SRP's Current Load Forecast



* Growth rates calculated as compound annual growth

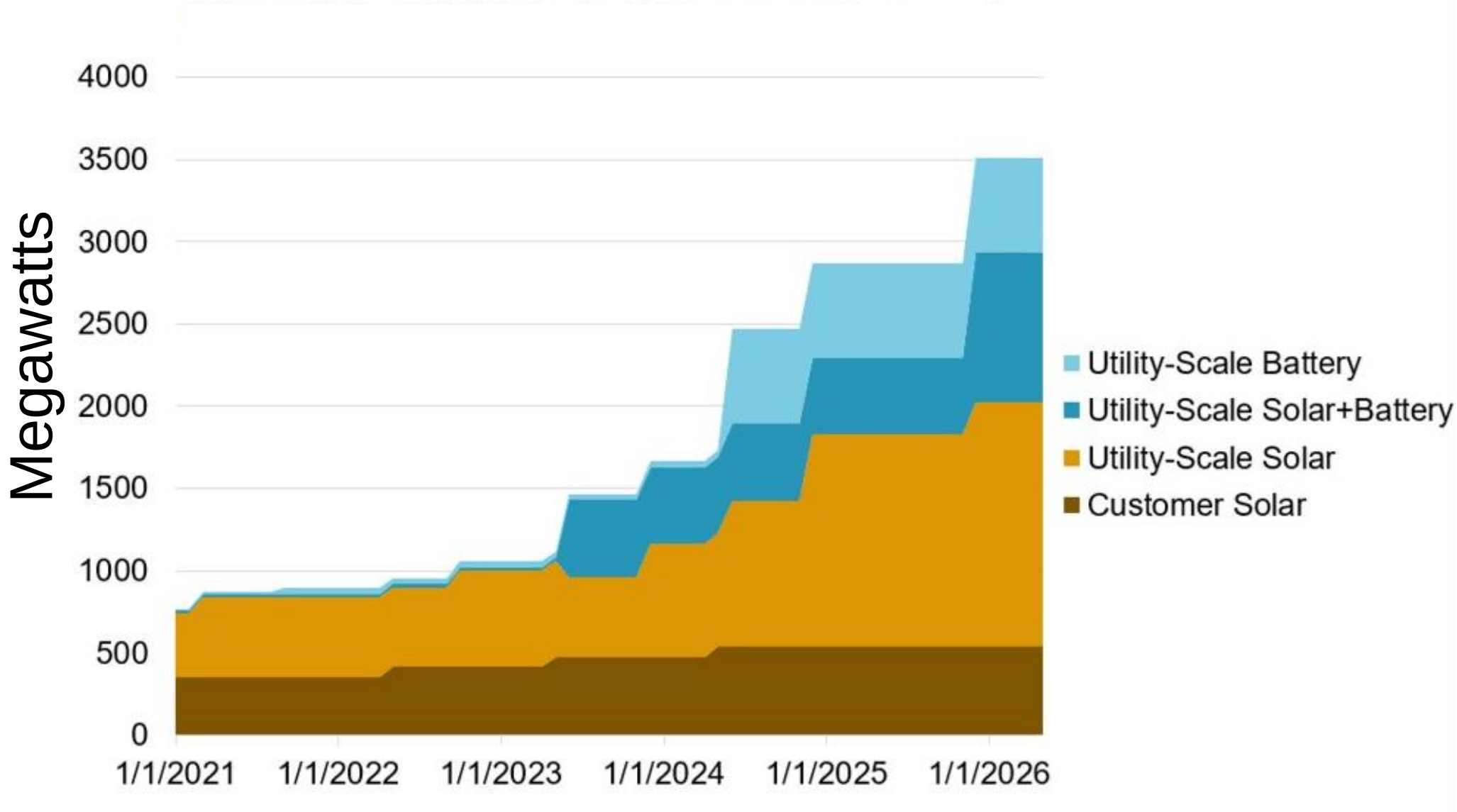
Renewable and Energy Storage Additions

2020

- East Line 100MW
- Saint 100MW
- Central Line 100MW
- West Line 100MW
- Sonoran 260MW & Storey 88MW Solar + Storage
- Valley Farms 200MW
- Randolph 200MW
- Saint Battery 100MW
- Babbitt Ranch 161MW
- Cameron 200MW
- Co Bar 400MW
- Additional Projects 277MW++

2025

Potential Solar and Battery Additions Through 2025



Key Challenge – Reliability

As the portfolio continues to transform, how do we maintain industry leading reliability for our customers while also lowering carbon emissions, meeting growth and managing costs?

Importance of Reliability

Even short-term power outages over a wide portion of the SRP service territory can impact:

- Public safety and security
- Financial returns for small and large businesses
- Economic development in the Phoenix metro area
- Integrity of the western U.S. grid

Sample SRP Reliability Metrics

Reliability Component	Metric	Target
System maintenance	Preventative Maintenance (PM) completion rate	>= 90%
Localized customer outages	System Average Interruption Duration Index (SAIDI)	<= 73.1 minutes (top quartile of large U.S. utilities)
SRP system wide outages / possible Western grid impacts	Rotating blackouts (EEA3)	Zero incidents

Open Questions:

What kind of impact does an outage have on your organization or community sector?

Reliability Requirements

Four components of reliability must be met:

- Meet peak customer demand as growth occurs
- Firm up and balance the intermittent renewable resources being added to the system
- Respond to unplanned outages and longer-term reliability events
- Ancillary services to support grid operations

Firm Flexible Resource Options

Options Today

Flexible Natural Gas

- Mature technology
- Capable of 24/7 operation – can meet short or long-duration needs
- Moderate to high cost
- Can be converted to hydrogen over time

Lithium-Ion Batteries

- Early phases of deployment
- Short duration storage (2 to 4 hours)
- Moderate to high cost for short duration, very high cost for long duration
- Lack of industry data and operating experience creates uncertainties

Potential conversion

Long-Term Options

Flexible Hydrogen

- Early phases of development today
- Capable of 24/7 operation – can meet short or long-duration needs
- Cost and timing?

Pumped Storage Hydro

- Mature technology, but long timeframes for new development
- Long duration storage (12+ hours)
- High cost but long duration

Current Uncertainties With Lithium-Ion Battery Technology

Reliability

- Continuing to see fires and thermal runaway events
- Battery life and performance degradation over time (State of Health)

Availability

- Charging scenarios (State of Charge)
- Duration limits to serve multiple needs
- Longer term reliability events

Broader bulk power system operations

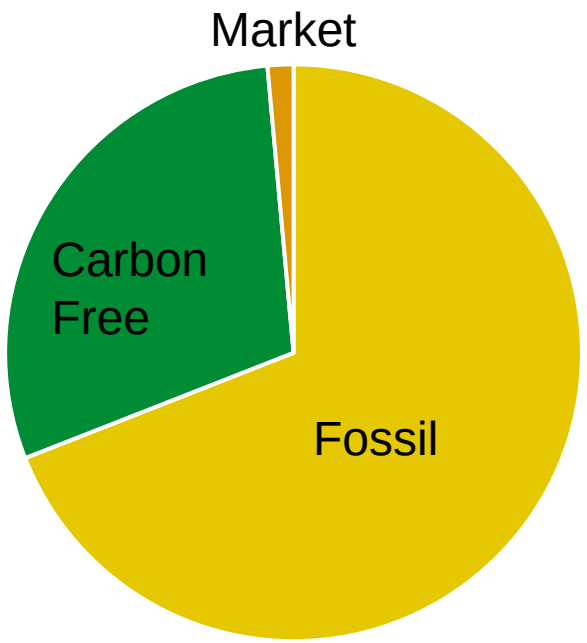
- Control system interoperability
- System inertia

Complementing Battery Innovation with Firm Flexible Gas Generation

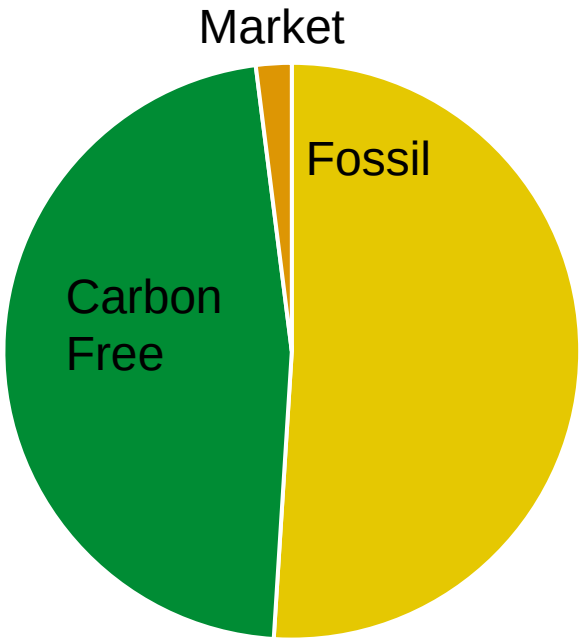
- Allows SRP to adopt battery storage at a more measured pace, providing additional time to acquire data and operating experience
- Serves as a backup capacity resource, with renewables providing most of the of the energy that is needed
- Allows SRP to reliably integrate more variable renewable resources to meet or exceed carbon reduction goals
- Can be converted to hydrogen over time as fuel becomes available and more cost effective

Carbon Free Energy Mix With Firm Flexible Gas Generation

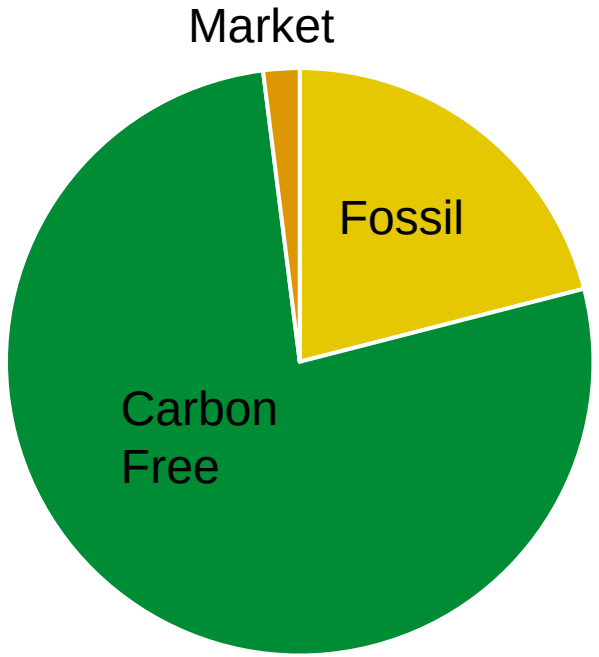
Now



2025



2035



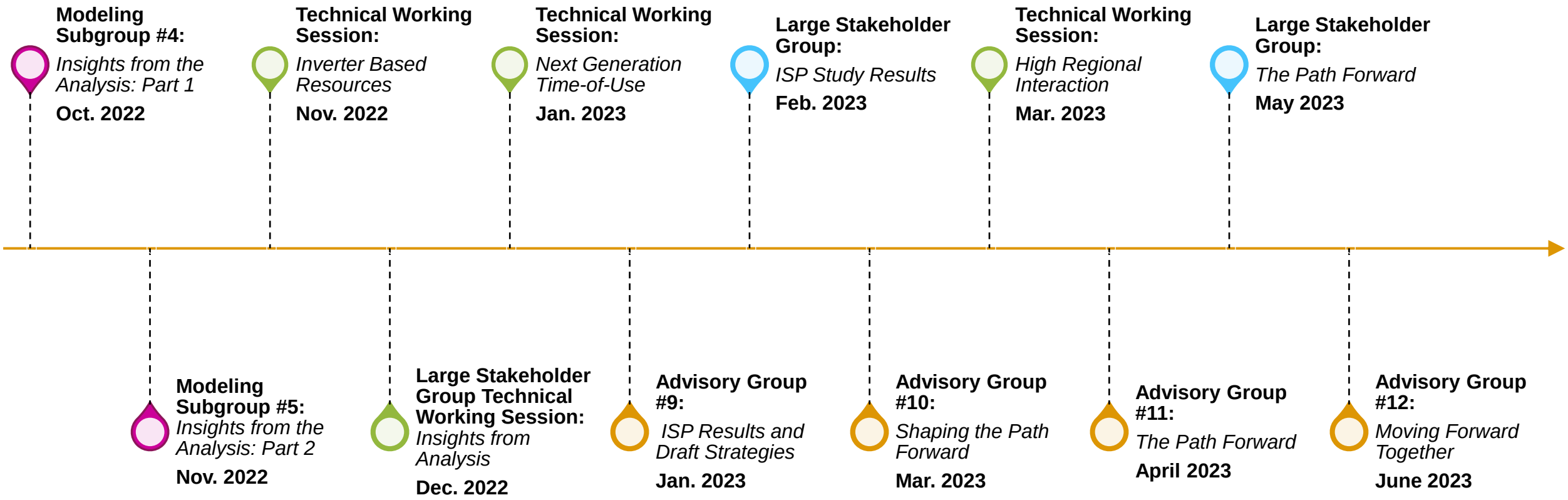
Key Takeaway: >75% of electricity needs will be met by carbon-free resources by 2035

* Based on February 2022 Resource Plan. Emission reductions may change based on load growth and resource mix.

Engagement Calendar

Angie Bond-Simpson
Director, Integrated System Planning & Support, SRP

Stakeholder Meetings



Wrap Up and Next Steps

Angie Bond-Simpson
Director, Integrated System Planning & Support

Next Steps

Advisory Group

- Inform the SRP Project Team of interest and recommendations in Technical Working Sessions

SRP Team

- Host New ISP Advisory Group Member Orientation(s)
- Send invitations for **optional** ISP Advisory Modeling Subgroup Meetings
- Communicate ISP Exploratory Study Technical Working Sessions program details & dates

Stakeholder Communication Email:

IntSysPlan@srpnet.com

Integrated System Plan: Informational Portal

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

thank you!