

An aerial photograph of a large dam and reservoir situated in a deep, rugged canyon. The canyon walls are composed of layered, reddish-brown rock formations. The reservoir is a deep blue color, and the dam is a long, curved structure across the middle of the canyon. The sky is a clear, pale blue.

**SRP Integrated System Plan**  
**Modeling Subgroup**  
**Meeting #3: Inputs for the ISP Study Plan**  
**- Part 2**  
**April 4, 2022**

# Welcome

**Angie Bond-Simpson**

Director, Integrated System Planning & Support (SRP)

# Welcome SRP Board and Council Observers



**John Hoopes**  
SRP Vice President



**Victor Flores**  
SRP Board Member



**Anda McAfee**  
SRP Board Member



**Jack White**  
SRP Board Member



**Larry Rovey**  
SRP Board Member



**Suzanne Naylor**  
SRP Council Member



**Rocky Shelton**  
SRP Council Member

# Safety & Sustainability Minute

# Safety & Sustainability Minute

## Distracted Driving Awareness Month

- Stay off your cell phone
- Do not drive drowsy
- Avoid eating while driving
- Do your multi-tasking outside the car

## Green Driving Tips

- Accelerate gradually
- Anticipate stops
- Combine trips
- Stop speeding



Source: [www.enddd.org](http://www.enddd.org)



Source: <https://wiygul.com/>

# Meeting Objectives:

- Review a selection of inputs and assumptions for scenarios and sensitivities for Transmission and Distribution Planning
- Review stakeholder feedback provided on Forecasting, Customer Programs, and Resource Planning

# Agenda

Time		Topics	Presenter
1:00-1:05		Welcome and Opening Remarks	Angie Bond-Simpson (SRP)
1:05-1:10		Agenda Overview and Introduction	Lakshmi Alagappan (E3)
1:10-1:40		Review of Planning Area Inputs and Assumptions with Discussion	SRP Planning Area Leads
1:10	15 mins	<i>Transmission Planning</i>	Justin Lee (SRP)
1:25	15 mins	<i>Distribution Planning</i>	Melissa Martinez (SRP)
1:40-2:25		Recap of What We Heard on ISP Study Inputs and Assumptions – Open Discussion	Lakshmi Alagappan (E3) Angie Bond-Simpson (SRP) Michael Reynolds (SRP)
2:25-2:30		Wrap Up and Next Steps	Angie Bond-Simpson (SRP)

# Transmission Planning Inputs and Assumptions

Justin Lee

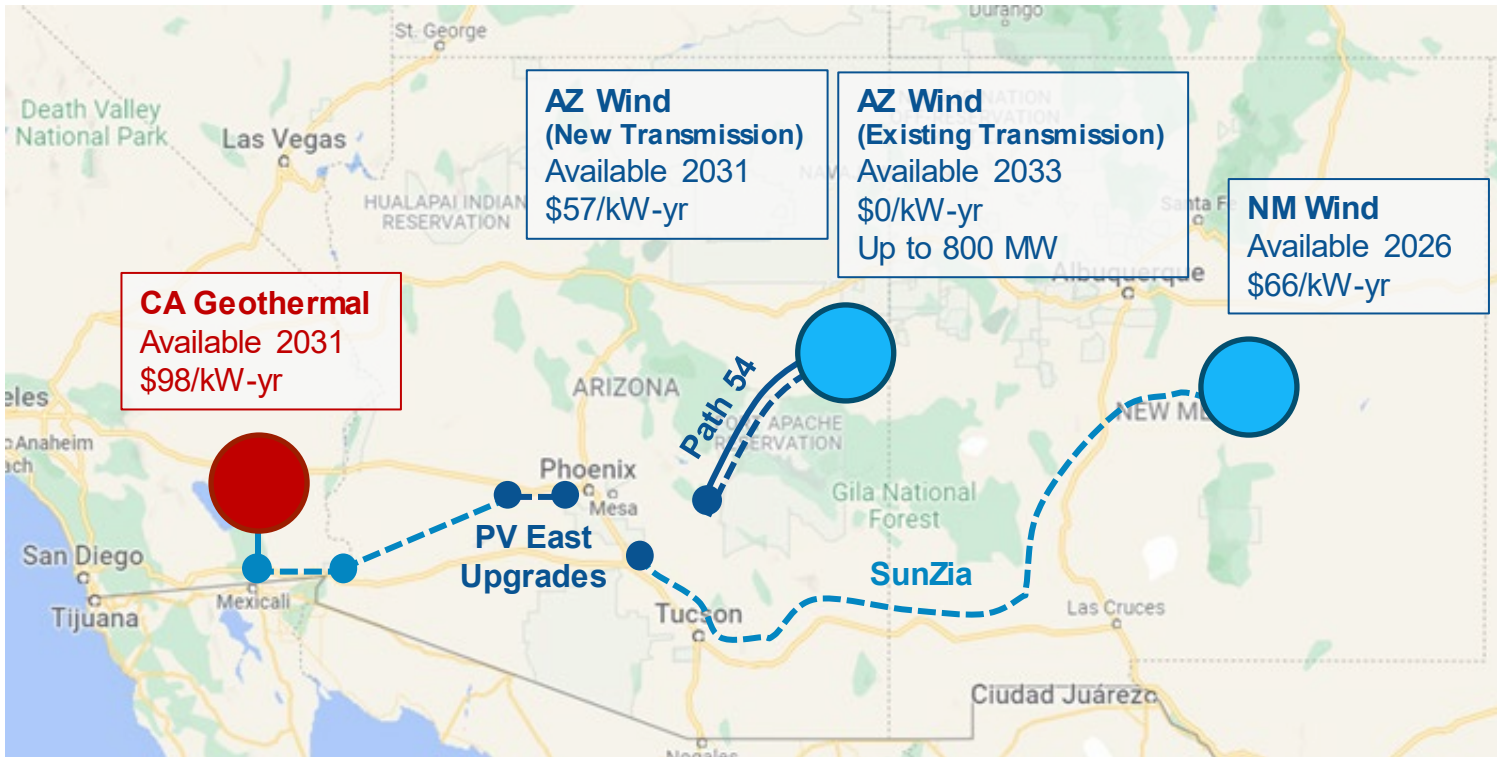
Manager, Transmission Planning (SRP)



# Transmission Cost Adders for Remote Resources



All costs are in 2021 \$



4/4/2022

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# Transmission Planning Cost Estimates

- Generic Cost Estimates for Materials and Construction

- +/- 30% Accurate
- Re-evaluated every 2-3 years

- Cost Estimates for Land Provided by Land Department

- Large variations in cost
- \$0.40 - \$12 per square foot

## Typical Costs of Major Components

- Transmission Lines

- 500kV - \$2.1M per mile
- 230kV - \$960k per mile

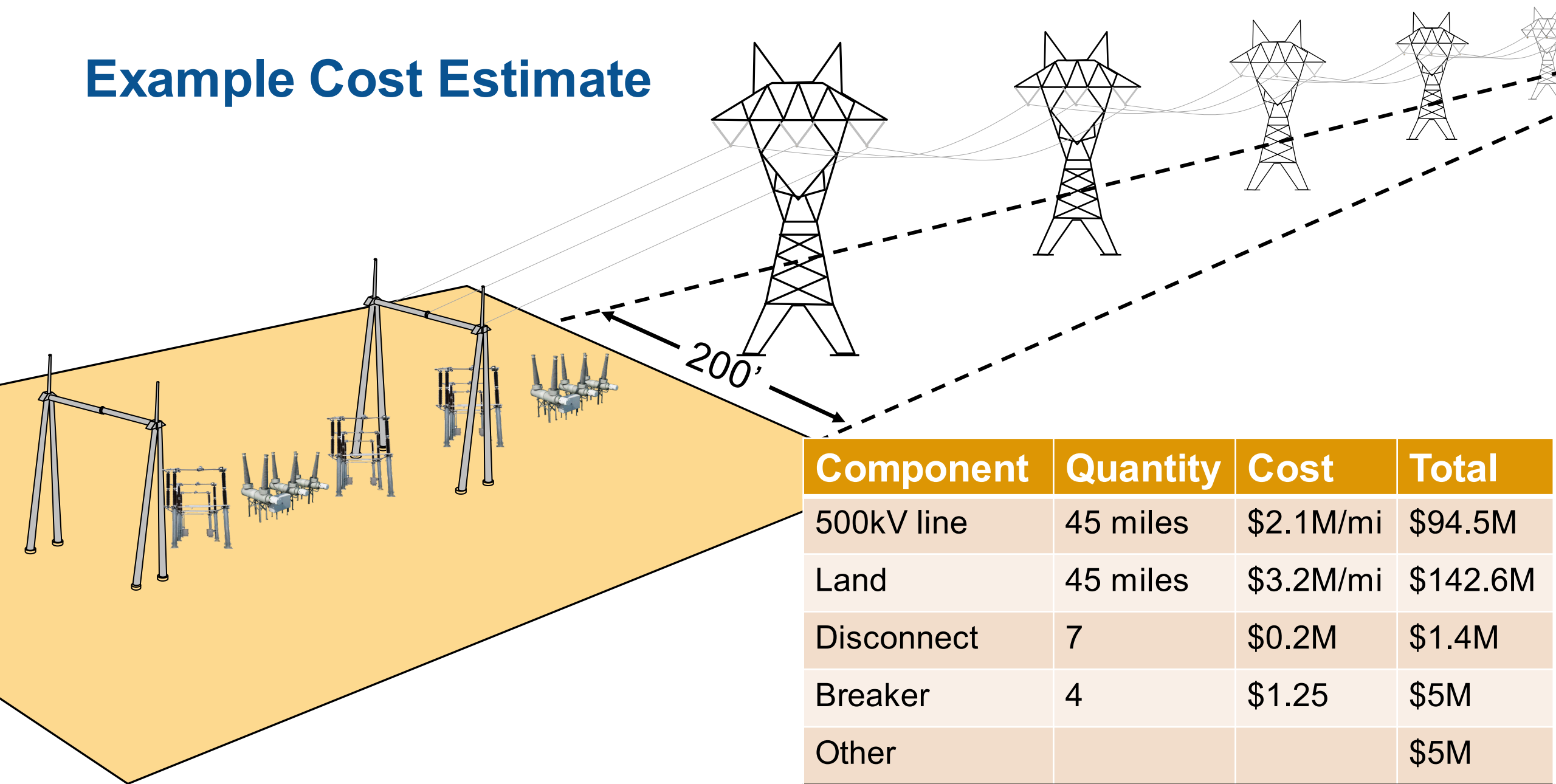
- Transformer Additions

- 500/230kV - \$24M
- 230/69kV - \$5.4M

- Breaker Additions

- 500kV - \$1.25M
- 230kV - \$800k

# Example Cost Estimate



Component	Quantity	Cost	Total
500kV line	45 miles	\$2.1M/mi	\$94.5M
Land	45 miles	\$3.2M/mi	\$142.6M
Disconnect	7	\$0.2M	\$1.4M
Breaker	4	\$1.25	\$5M
Other			\$5M
<b>Total</b>			<b>\$248.5</b>

# Distribution Planning Inputs and Assumptions

Melissa Martinez  
Manager, Distribution Planning (SRP)

# Distribution Planning Criteria & Assumptions

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

# Distribution Planning Cost Estimates

- Generic Cost Estimates for Materials and Construction
  - +/- 30% Accurate
- Cost Estimates for Land Provided by Land Department
  - Large variations in cost
  - \$0.40 - \$12 per square foot

## Typical Costs of Major Components

- Distribution Lines
  - \$540k/mile - Underground
  - Overhead lines not planned to be used
- New Substation Addition (1 bay)
  - 69kV/12.47kV - \$4.5M
- Substation Bay Additions
  - 69kV/12.47kV - \$3.5M

# Recap of What We Heard on ISP Study Inputs and Assumptions – Open Discussion

**Angie Bond-Simpson**

Director, Integrated System Planning & Support (SRP)

**Michael Reynolds**

Manager, Resource Planning (SRP)

# Suggestions from March 21st Meeting:

- Strong Climate Policy carbon reduction trajectory (2025-2035) and 2035 target
- Gas price forecast (relative to current futures)
- Gas price volatility (increased volatility, multiple trajectories)
- Energy efficiency (as a resource, communications)
- Hard resource constraints (sharing w/ stakeholders)



# Strong Climate Policy CO2 Target

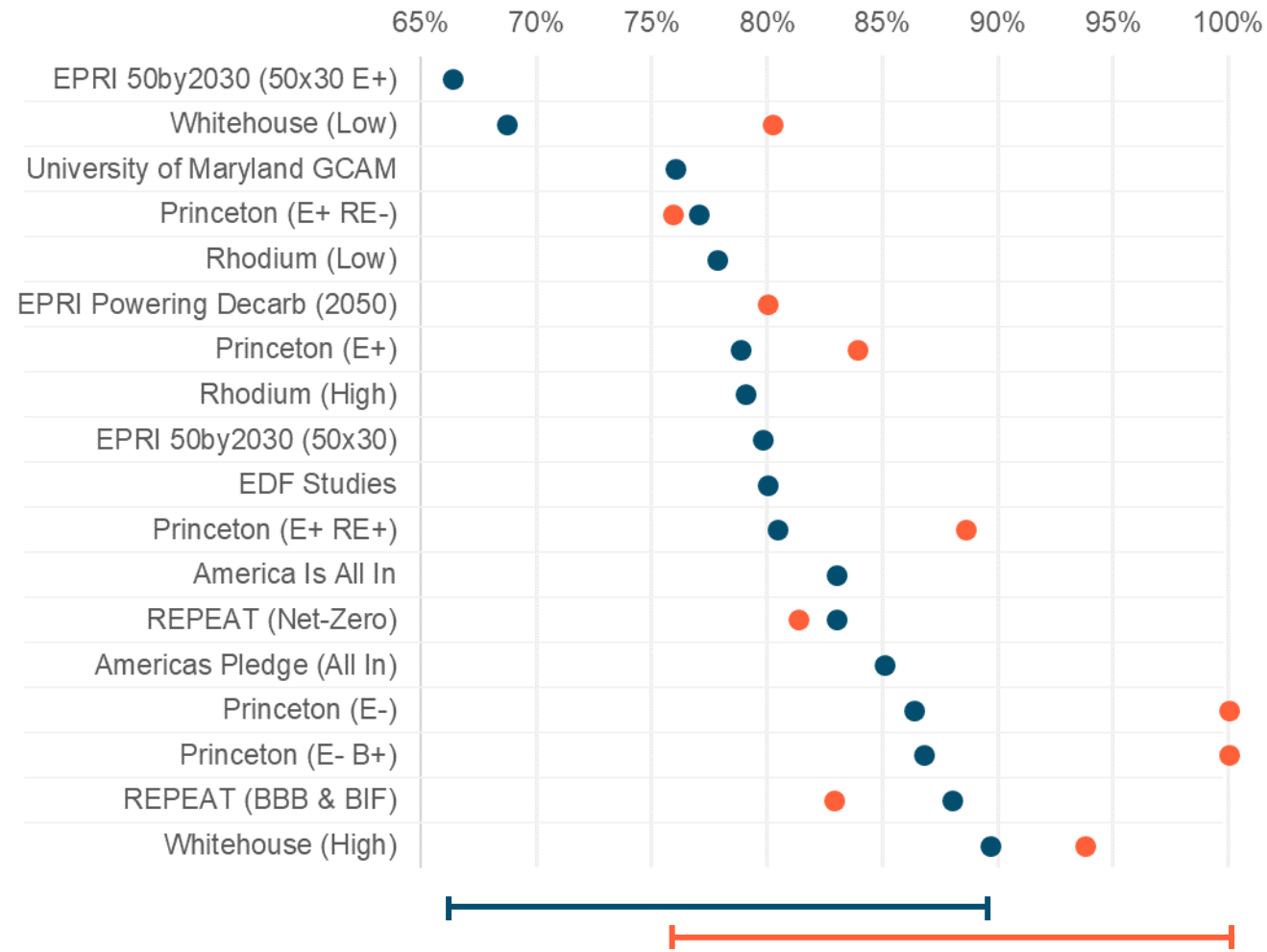
- What we heard:

- Change CO2 reduction target to be 80% by 2030
- Consider benchmark targets throughout the 2025-2035 study period

- Actions taken:

- Performed a literature review of ten national economy-wide decarbonization studies that are consistent with reaching net-zero emissions by 2050
- Updated Strong Climate Policy scenario

Reduction in Power Sector Emissions by **2030** and **2035** Relative to 2005



# Strong Climate Policy CO2 Target

- **Actions taken:**
  - Update mass-based CO2 reduction target in Strong Climate Policy scenario from 80% to 85% by 2035
  - Explore an interim 2030 milestone
  - Include metric of CO2 reductions over time

**Strong Climate Policy  
85% by 2035 (*updated*)**

*(Mass - absolute ton reduction vs. 2005 levels)*

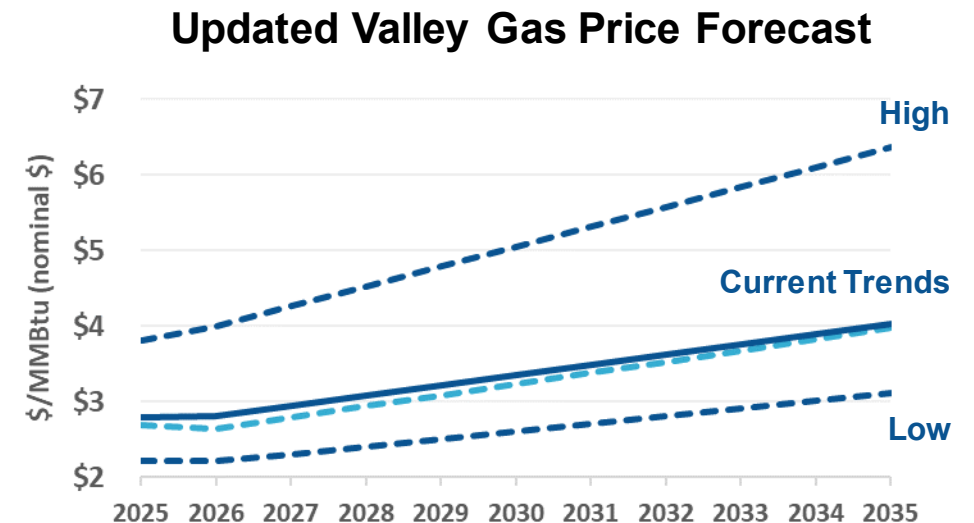
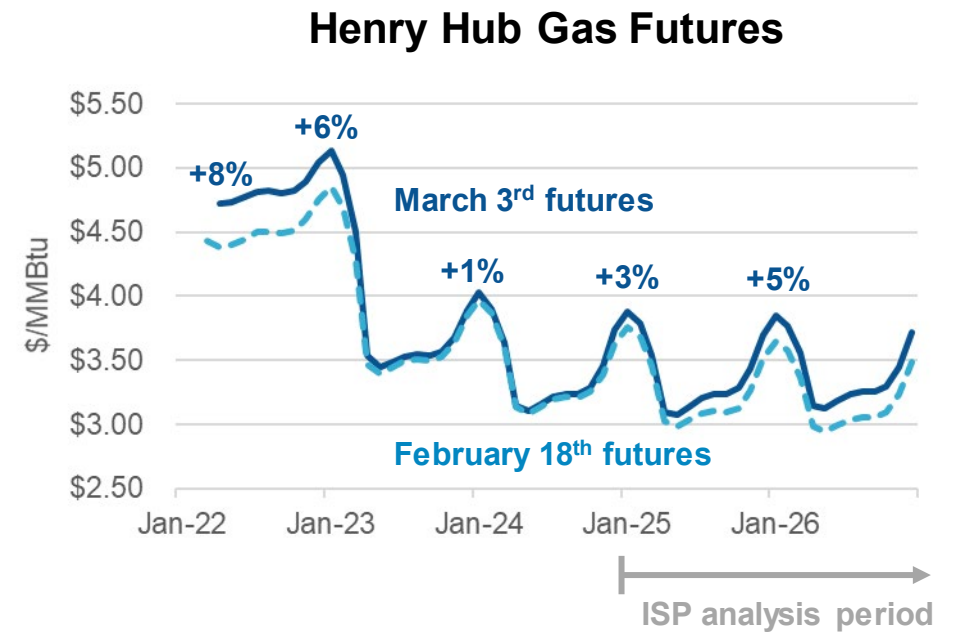
**Other Scenarios**

**65% by 2035**

*(Intensity - ton per MWh reduction vs. 2005 levels)*

# Gas Price Forecast

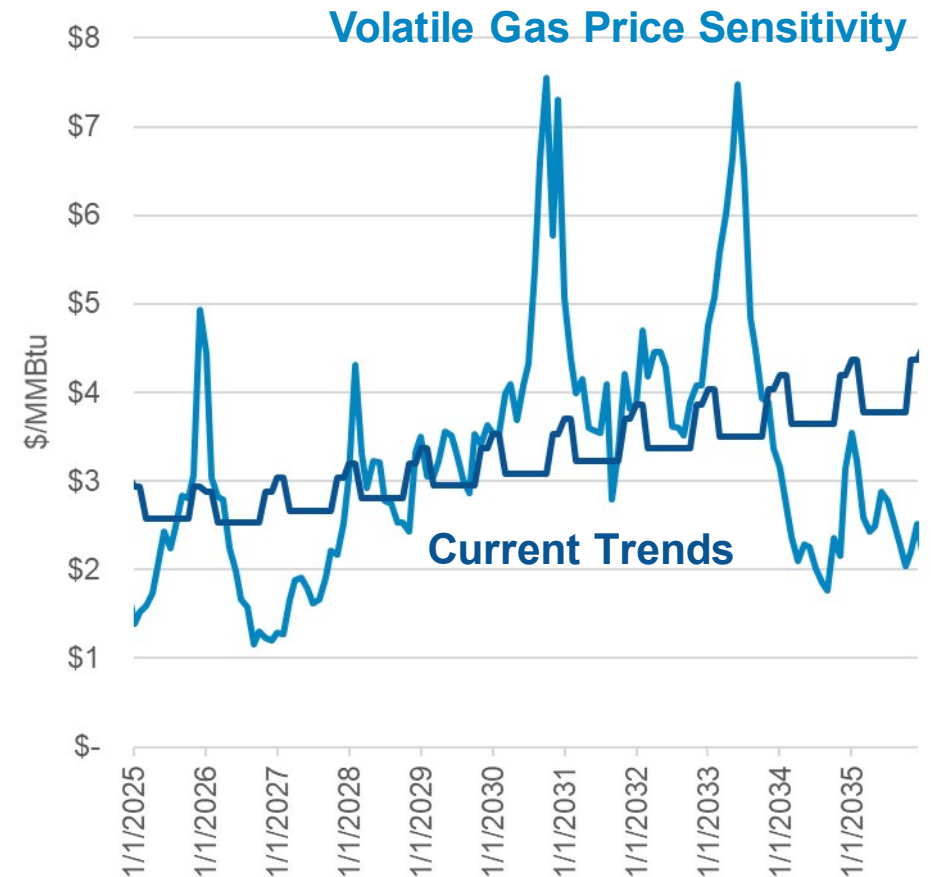
- What we heard:
  - The gas price forecast does not appear to reflect current gas prices
- Actions taken:
  - Evaluated difference between gas futures on 3/3/2022 (date the 2022 Energy Information Administration (EIA) Annual Energy Outlook (AEO) became available) and 2/18/2022
  - Updated gas price forecast to use futures data as of 3/3/2022



# Gas Price Volatility

- What we heard:
  - The proposal may not capture the range of gas price volatility that has been seen in the past. SRP should consider the volatility that was seen in previous decades.
  - The proposal is only one potential outcome of future gas prices. SRP should test multiple gas volatility price sensitivities.
- Actions taken:
  - Updated the Volatile Gas Price Sensitivity to utilize observed volatility from 2000-2010 for the 2025-2035 analysis period
- Ideas for future ISPs
  - Stochastic modeling to capture gas price risk

## Valley Gas Price Forecast

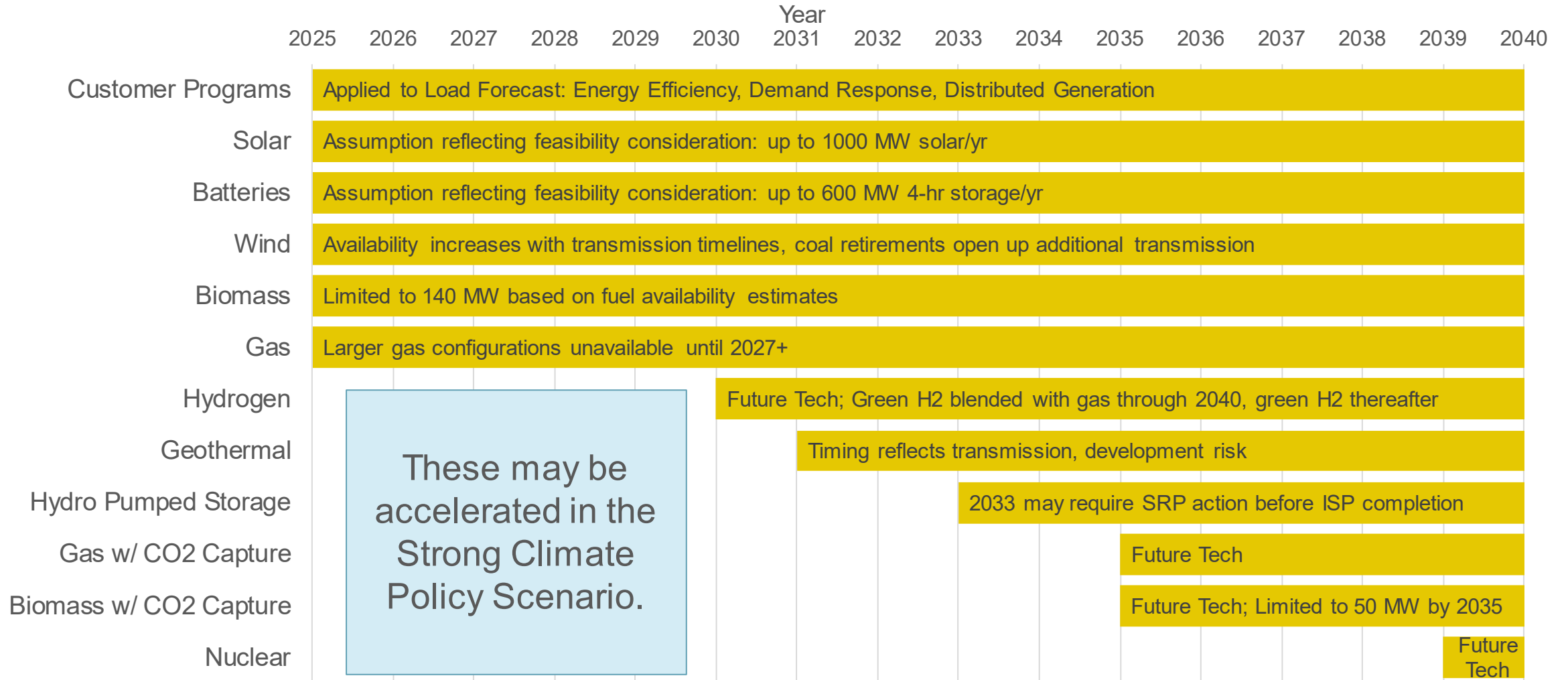


*In real-world operations, SRP employs a gas hedging strategy and as a result is not fully exposed to the spot gas price.*

# Energy Efficiency

- What we heard:
  - When communicating resource options to meet system needs include demand side management solutions
  - Can energy efficiency be included as a resource option in Resource Planning's capacity expansion model?
- Actions taken:
  - Include demand side management as resource option in communications going forward (see next slide)
- Ideas for future ISPs
  - Explore energy efficiency as a resource option in capacity expansion modeling to see how it may be selected if optimized strictly on resource economics

# Technology Availability: Current Trends Scenario



# Provide more detail on modeling constraints

- What we heard:
  - Request to provide all constraints used in resource planning models
- Actions taken:
  - Discussion of constraints and other modeling inputs

# Resource Analysis Inputs

## Regional Loads and Resource Data

Source: Energy Exemplar database (sourced from various publicly available data)

## Electric Price Forecast

Source: SRP analysis, market quotes

## Hourly Load Forecast

Source: SRP Forecasting, contracted external sales

## SRP Resource & PPA Characteristics (heat rates, flexibility metrics, outage rates, cost elements, emissions, etc.)

Source: SRP Generation Engineering, SRP contracts

## Effective Load Carrying Capability (ELCC)

Source: SRP analysis

## Fuel Costs

Source: SRP Fuels (existing contracts), Consulting Groups, Publicly Available Sources (EIA Annual Energy Outlook, etc.), market quotes, SRP analysis

## Potential Resource Technologies & Costs

Source: SRP Procurement Activities, SRP Transmission Planning, EPRI, Publicly Available Sources (NREL Annual Technology Baseline, etc.)

## Other Modeling Constraints

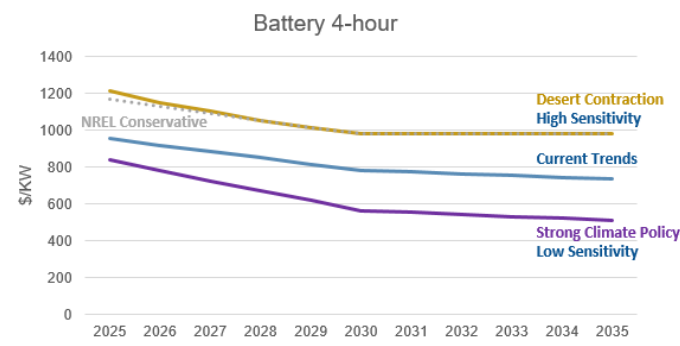
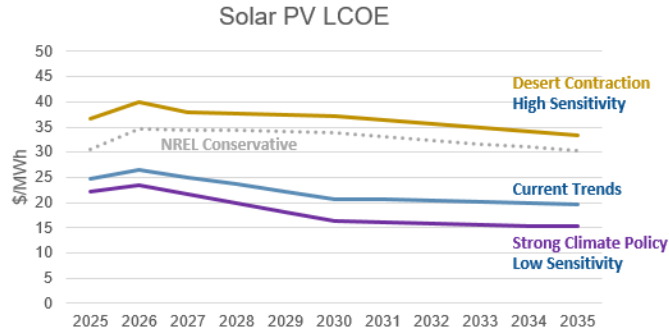
Source: SRP Board Policy, SRP Fuels (existing contracts), transmission limits for new resources ("renewable energy zones")

Input sources will be further evaluated and defined for this ISP process.



# Examples of Model Inputs Shared on 3/21

## Technology Cost



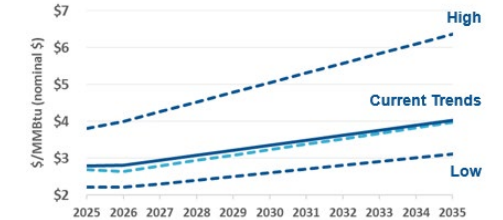
## Market Support

**Current Trends & Desert Boom**  
 525 MW Market Availability  
 16% Planning Reserve Margin

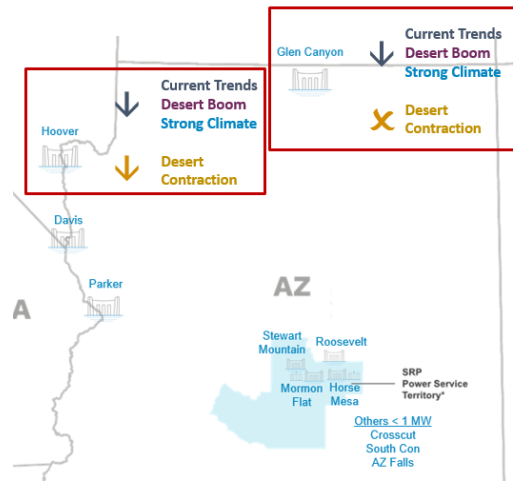
**Strong Climate Policy**  
 525 MW Market Availability  
 13% Planning Reserve Margin

**Desert Contraction**  
 0 MW Market Availability  
 16% Planning Reserve Margin

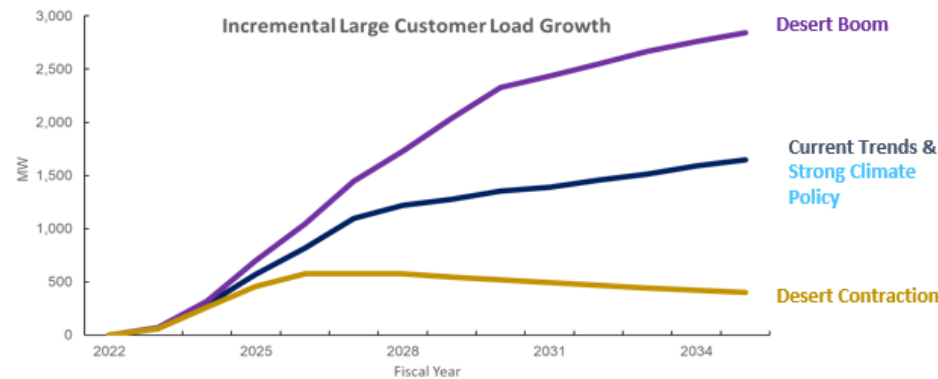
## Gas Prices



## Hydro Availability



## Economic Growth



## Committed Additions

Solar Additions 2,025 MW by 2025	Battery Storage +450 MW by 2023	Wind +161 MW by 2024	Near-Term Capacity Projects +198 MW by 2022
Palo Verde Nuclear +114 MW by 2024	Coolidge Expansion +820 MW by 2025	Demand Response 150 MW by 2022	Natural Gas Upgrades +190 MW (at peak) by 2024

# Recap of Responses

## Feedback Incorporated

- Updated carbon reduction target in Strong Climate Policy scenario
- Updated gas price forecast to incorporate recent futures
- Updated gas price volatility to reflect historic volatility observed
- Will communicate energy efficiency as a resource option
- Discussed constraints

## Considerations for future ISPs

- Stochastic modeling to capture multiple volatile gas price trajectories
- Energy Efficiency as a resource in capacity expansion modeling

# Wrap Up and Next Steps

Angie Bond-Simpson

Director, Integrated System Planning & Support (SRP)

# Next Steps

## Advisory Group Meetings

- **April 15, 2022 [Hybrid] 9:00AM-1:00PM** – ISP Study Launch

### Location Details:

PERA- Training & Conference Center  
1 E Continental Dr, Tempe, AZ 85281  
Conference Room: Sandhill West

- **May 10, 2022 9:00AM-TBD** – Advisory Group Meeting #7



**Stakeholder Communication Email:**

**[IntSysPlan@srpnet.com](mailto:IntSysPlan@srpnet.com)**

**Integrated System Plan: Informational Portal**

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

## Large Stakeholder Group Meetings

*Open to all existing  
Large Stakeholder and Advisory Group Members*

- **April 29, 2022** – ISP Study Plan
- **April 29, 2022** – ISP Technical Working Session #1: ISP Study Plan Details

**thank you!**