### Meeting Agenda

<table>
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<th>Session</th>
<th>Presenter</th>
</tr>
</thead>
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<td>01</td>
<td>Welcome/Meeting Objectives</td>
<td>Matt Lind, 1898 &amp; Co.</td>
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<tr>
<td>02</td>
<td>Keynote</td>
<td>Jacob Tetlow, APS</td>
</tr>
<tr>
<td>03</td>
<td>IRP Process Overview</td>
<td>Tara Beske, APS</td>
</tr>
<tr>
<td>04</td>
<td>Methodology</td>
<td>Todd Komaromy, APS</td>
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<tr>
<td>05</td>
<td>Stakeholder Engagement</td>
<td>Matt Lind, 1898 &amp; Co.</td>
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<td>06</td>
<td>Model Development</td>
<td>Akhil Mandadi, APS</td>
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<td>07</td>
<td>Load Forecast</td>
<td>Ross Mohr, APS</td>
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<td>08</td>
<td>IRP Assumptions and Case Development</td>
<td>Michael Eugenis, APS</td>
</tr>
<tr>
<td>09</td>
<td>Closing Remarks</td>
<td>Matt Lind, 1898 &amp; Co.</td>
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Meeting Guidelines

Questions
Clarifying questions are welcome at any time. There will be time allotted following each presentation to answer.

Meeting Materials
Meeting slides will be posted to the APS website along with meeting minutes.

Following Up
We will attempt to answer all questions today. Some questions may require additional information and follow up after the meeting.

Discussion Purposes
Meetings and content are preliminary in nature and prepared for stakeholder discussion purposes only. Litigating attorneys are not expected to participate.
Keynote

Jacob Tetlow, APS
APS understands the importance of stakeholder engagement in planning process.

Economic development is driving load growth in Arizona that APS must reliably serve.

APS remains committed to a reliable, affordable, and clean future.

Jacob Tetlow
Executive Vice President, Operations
An Introduction to Integrated Resource Plans

Integrated Resource Plans are comprehensive studies conducted by electric utilities to identify energy needs and how to meet them through a combination of supply and demand side resources, while considering factors such as economics, regulatory requirements, and impact to the environment.
Key Components of an IRP

- Forecasts (Load, Fuel, Market)
- Demand Side Resources
- Supply Side Resource Costs and Availability
- Reliability Studies
- Sustainability
- Regulatory Requirements

Integrated Resource Plan

Development of Cases → Analysis → IRP Results
Regulatory Requirements and Stakeholder Engagement

An Integrated Resource Plan must also comply with various regulatory requirements, including Arizona Corporation Commission (ACC) mandated timing and content of filings.

- **Frequency:** Typically filed every 3 years
- **ACC Rules:** Resource Planning and Procurement Rules (14-2-701 to 14-2-704)
- **ACC Decisions:** Primarily No. 78499 (March 2, 2022)

The Integrated Resource Plan includes a robust public outreach process to solicit input from customers, community groups, environmental organizations, and other interested parties.

- Resource Planning Advisory Council (RPAC)
- Public Stakeholder Meetings
- ACC Workshops
- aps.com/resources
APS 2023 IRP Planning Principles

**Reliability**
Providing safe and reliable power to our customers is a top priority for APS. Energy resource adequacy and grid security are cornerstones of reliability.

**Affordability**
The goal of the 2023 Integrated Resource Plan is to provide reliable electric service to customers at the lowest reasonable cost. The long-term capacity expansion planning model optimizes the selection of supply and demand side resources to system cost.

**Sustainability**
The 2023 Integrated Resource Plan resource options represent a clean, balanced supply, including energy efficiency programs, distributed generation, battery storage, and utility-scale solar and wind resources.
Consultant Engagement

- Stakeholder Engagement
- All-Source RFP Support
- Resource Planning Support

E3 works extensively with utilities, developers, government agencies, and environmental groups to inform strategy and key decisions.

E3 experts lead rigorous technical analyses, develop innovative methods to study new problems, and provide critical thought leadership to the industry.

E3’s practice areas provide a comprehensive view of the industry including supply, delivery, demand, and investment.

A business, technology and security solutions consultancy part of Burns & McDonnell.

1898 & Co. is a nationwide network of consulting professionals supporting:
- Business optimization
- Digital transformation
- Cyber security/risk management

Owner and Exclusive Licensor of SERVM
- Nation’s leading resource adequacy model
- Full hourly economic commitment and dispatch for thousands of weather, unit performance, fuel, regulatory, economic growth scenarios can be performed in hours

Resource Adequacy Studies
- Renewable Integration, Expansion Planning, Energy and Capacity Resource Valuations
IRP Methodology
Todd Komaromy, APS
IRP Objectives

**RELIABILITY**
- Reserve Margin
- Generation Mix

**AFFORDABILITY**
- Total Cost of Electric Services

**SUSTAINABILITY**
- Clean / Renewable
- Emissions
- Water Consumption

**RISK**
- Price Exposure
- Technology
- Timing
Managing Risk And Uncertainty

- Identify Key Drivers of Uncertainty
- Identify Qualitative Risk Factors
- Identify Quantitative Risk Factors

KEY CASE INPUTS

- Load Growth
- Fuel Price
- CO\textsubscript{2} Price
- New Resource Capital Costs
- Demand Side Resources
## Considerations Informing the 2023 IRP

<table>
<thead>
<tr>
<th>Requirements*</th>
<th>Technology Agnostic</th>
<th>Coal</th>
<th>Eliminate coal units must-run designations.</th>
<th>Energy Efficiency</th>
<th>DSM</th>
<th>Emissions Reductions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Technology Agnostic</td>
<td>Least-cost method without regard for emissions reduction goal or renewable energy standards.</td>
<td>No restrictions on the economic cycling and economic retirement.</td>
<td></td>
<td>No limit on the amount of energy efficiency.</td>
<td>Demand side resource capacity equal to at least 35 percent of 2020 peak demand.</td>
<td>Minimum of 10 resource portfolios that are designed to achieve the emissions reductions goals specified in the 2020 IRP</td>
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<tr>
<td>2 Coal</td>
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<tr>
<td>4 Energy Efficiency</td>
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<td>6 DSM</td>
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<tr>
<td>7 Emissions Reductions</td>
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</table>

*Based on ACC Decisions, including No. 78499 (March 2, 2022)
Considerations Informing the 2023 IRP

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<tr>
<th>Requirements</th>
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<tr>
<td><strong>Power system resiliency</strong></td>
<td>• Extreme weather, correlated risks to both the power and gas systems</td>
</tr>
<tr>
<td><strong>Natural gas price assumptions</strong></td>
<td>• Impact on short- and long-term resource procurement decisions.</td>
</tr>
<tr>
<td></td>
<td>• Implications of declining natural gas usage to achieve emissions reductions.</td>
</tr>
<tr>
<td><strong>Regional markets</strong></td>
<td>• Effects of participation on near- and long-term resource procurement actions.</td>
</tr>
<tr>
<td><strong>Retirement analyses</strong></td>
<td>• Estimated retirement dates.</td>
</tr>
<tr>
<td></td>
<td>• Economic impact to ratepayers</td>
</tr>
<tr>
<td><strong>Grid-connected resources</strong></td>
<td>• Value of distribution grid-connected resources as compared to transmission-connected.</td>
</tr>
<tr>
<td><strong>Emissions reduction commitment</strong></td>
<td>• Costs and benefits of emissions reduction commitments.</td>
</tr>
<tr>
<td><strong>Resource adequacy</strong></td>
<td>• Increasing variability on the bulk electric system.</td>
</tr>
<tr>
<td><strong>Hydrogen</strong></td>
<td>• Sources, costs and any associated capital expenditures.</td>
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</table>
Stakeholder Engagement

Matt Lind, 1898 & Co.
Key Considerations for Stakeholder Communications

Monthly RPAC meetings allow APS an opportunity to provide planning progress updates. This also allows stakeholders to provide input and feedback that can inform the development of the IRP plan.

Meeting minutes and presentation slide decks are publicly available on the APS website at aps.com/resources.

APS provides opportunities for stakeholder feedback, such as workshops, public comment periods, and online surveys.
Resource Planning Advisory Council (RPAC) Meeting Topics

- RPAC Load Forecast
- Southwest Resource Adequacy Study
- All-Source Request for Proposal (ASRFP) Workshops
- Regulatory Updates
- Industry Trend Overviews
- Climate Change Scenario Analysis
- Western Markets Developments
- IRP overview and feedback

Meeting material available to the public on the APS website:
aps.com/resources
Impact of Resource Planning Advisory Council (RPAC) Feedback

RPAC Load Forecast will be utilized and evaluated in IRP case.

Feedback on scoring criteria and evaluation metrics incorporated into 2022 All-Source Request for Proposal (ASRFP).

Monthly meeting cadence allows APS to hear what stakeholders prioritize and actively incorporate feedback into its planning processes.
Model Development
Akhil Mandadi, APS
Questions to answer – Breaking down the complex problem

What is our need? And, When?

What are we building or utilizing? And, When?

What is it going to cost us?

Will it be reliable?

What will be the environmental impact?

Balancing Act – Optimization Problem (Multiple trade-offs)

“All Models are wrong, some are useful” - George Box
APS Model Development Process

1. Input Data Collection
   - Assumptions
   - Demand Representation

2. Resource Adequacy Modeling
   (Model: SERVM)

3. Capacity Expansion Modeling
   (Model: AURORA LTCE)

4. Production Costing
   (Model: AURORA)

5. Output Data Collection and Processing
   - Characteristics
   - Revenue Requirements
Resource Adequacy Model

APS loads and resources represented in SERVM

SERVM performs resource adequacy across all hours of the year under a broad range of weather conditions, producing statistical measures of the risk of loss of load (considers both supply and demand side uncertainty)

Identify the amount of Planning Reserve Margin needed to achieve the desired level of reliability

Factors that impact the amount of perfect capacity needed include load & weather variability, operating reserve needs

Calculate capacity contributions of different resources

ELCC measures a resource’s contribution to the system’s needs relative to perfect capacity, accounting for its limitations and constraints

Loss of Load Expectation
(days per year)

Planning Reserve Margin Identified

APS’s LOLE Standard

0.1 days per year

Reserve Margin (MW)

Marginal Effective Load Carrying Capability (%)

Firm
Energy-Limited
Solar
Wind

Perfect Capacity
### Inputs
- Fuel Prices
- Financial Assumptions
- Ancillary Service Requirements
- Existing Resource Operating Characteristics
- Constraints
- Resource Adequacy Tool (SERVM)

### Aurora

#### Capacity Expansion (LTCE)
- Resource Expansion Plan — Supply and Demand Side
- How the portfolio behaves under a fixed set of market conditions and Energy Adequacy

#### Production Costing
- Foundation to Various Analyses and Communication
- Analytical Backbone to IRP Analysis

### Portfolios
- Portfolio 1
- Portfolio 2
- Portfolio 3
Capacity Expansion and Production Costing Models

**Capacity Expansion**
- Optimal resource mix to serve future needs
- Simulation of new builds (answers where, when, how much and what type of assets to pick)
- Higher Resolution and Scope

**Production Costing**
- Minimizes Operational Costs and thereby provides expected operational plan for the resources picked
- Detailed Simulation of specified resource mix (answers how the picked resources would be used and thereby their impact to the environment, etc.)
- Finer Resolution and Scope

Cost, $  

Assets  

Capital Cost, C(x)  

Production Cost, P(x)  

Total Cost, C(x) + P(x)  

Min Cost
Break
Load Forecast
Ross Mohr, APS
2023 IRP Load Forecast Summary

- Datacenter and large manufacturing customers (Extra High Load Factor – “XHLF”) are expected to be the major source of load growth during 2023-2038
  - XHLF share of total energy sales (MWh) increasing from 3% to 34%
  - XHLF share of summer peak demand (MW) increasing from 2% to 21%
- Slower projected “core” load growth compared to 2020 IRP due to declining usage, increased solar generation, energy efficiency, and DSM savings, and forecasting model improvements
  - “Core” load includes residential and non-XHLF commercial and industrial (C&I) customers
- Electric vehicle (EV) charging also expected to drive sales and peak growth:
  - EV share of total energy sales (MWh) increasing from 0% to 6%
  - EV share of summer peak demand (MW) increasing from 0% to 4%

Average Annual Growth Rates For the 15-Year Planning Period

<table>
<thead>
<tr>
<th></th>
<th>Customers</th>
<th>Retail Sales (MWh)</th>
<th>Peak Demand (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2020 IRP (2020-2035)</strong></td>
<td>1.6%</td>
<td>2.7%</td>
<td>2.0%</td>
</tr>
<tr>
<td><strong>2023 IRP (2023-2038)</strong></td>
<td><strong>1.5%</strong></td>
<td><strong>4.0%</strong></td>
<td><strong>2.4%</strong></td>
</tr>
</tbody>
</table>
2020 IRP Sales Forecast

2020 IRP Sales Forecast (GWh)

- Residential
- C&I x/ XHLF
- EV
- Other
- XHLF

Key Forecast Drivers

New data center customers are the major source of forecast growth.

C&I: increased floor space and large customer growth, including anticipated supply chains for other large customers.

Residential: increased home size, increased “other” uses.
Datacenters and large manufacturing customers are expected to be the major source of load growth.

Biden to visit TSMC plant under construction in north Phoenix

$600 million gas plant planned to support Phoenix semiconductor manufacturing facility

KORE Power poised to break ground on Valley battery manufacturing plant by end of 2022

Behind the deal: Why Nestle picked Arizona for its manufacturing plant
Sales Forecast Update

2023 IRP Sales Forecast (GWh)

- XHLF customers’ share of energy sales increases from 3% to 34% by 2038

Large projected load increase due to datacenters and large manufacturing customers

**XHLF**
- Now projected at more than triple the amount of sales growth vs the 2020 IRP forecast
- 2020 IRP forecast had XHLF share of sales increasing to 12% in 2035

Net decrease among residential and C&I compared to 2020 IRP
2023 peak demand: 2020 IRP is 7,706 MW; 2023 IRP is 8,005 MW

In 2035, peak demand forecast is now 1,100 MW higher than 2020 IRP

XHLF: Almost all peak demand growth compared to 2020 IRP forecast is due to datacenters and large manufacturing

Planning for max temps of 117 degrees adds 139 MW to the peak forecast

Decrease in peak demand among residential and C&I compared to 2020 IRP
IRP Assumptions and Case Development

Mike Eugenis, APS
IRP Cases are being developed around a reference case set of assumptions.

<table>
<thead>
<tr>
<th>External environment</th>
<th>Capital costs</th>
<th>Financial</th>
<th>EE and DSM deployment</th>
<th>Four Corners replacement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Load growth</strong></td>
<td>Reflect 2022 ASRFP baseline pricing &amp; utilize NREL ATB for future price curves</td>
<td>2.5% Inflation 6.74% Weighted Average Cost of Capital (WACC)</td>
<td>In accordance with most recent DSM Implementation Plan</td>
<td>Retire in 2031 Additional cases include retire in 2027, 2028, 2029, 2030, and 2031 with natural gas replacement</td>
</tr>
<tr>
<td>Peak load growth of ~3.5% p.a. from 2023-2032 (23Q1 w/ probability-weighting)</td>
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<tr>
<td><strong>Natural gas prices</strong></td>
<td>E3 revised 2023 prices (reflects updated clean and renewable technologies throughout WECC)</td>
<td>Internal carbon price</td>
<td>Clean Energy Commitment</td>
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</tr>
<tr>
<td>2023: ~$3.98-8.22 / MMBtu Future: $4.38-5.32 / MMBtu</td>
<td>$20.72/ton CO2e (internal assumption)</td>
<td>45% Renewable / 65% Clean by 2030</td>
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</table>
APS has developed cases to evaluate uncertain assumptions.

<table>
<thead>
<tr>
<th>Case Name</th>
<th>Load Forecast</th>
<th>Gas Prices</th>
<th>Carbon Tax</th>
<th>Technology Cost</th>
<th>Technology Cost Included</th>
<th>Coal Dispatch</th>
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<th>Storage Constraint</th>
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<tr>
<td>Reference</td>
<td>Base</td>
<td>Base</td>
<td>Base</td>
<td>Base</td>
<td>Yes</td>
<td>Base</td>
<td>2031</td>
<td>&lt;= 25% of Peak Load + Peak Reserves though 2027</td>
<td>Yes</td>
<td>N/A</td>
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<tr>
<td>Low Gas Price</td>
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<td>High Gas Price</td>
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<td>Low Technology Cost</td>
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<td>High Carbon Tax</td>
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<td>No New Natural Gas</td>
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**Key**

- Same as Reference Case
- Lower Than Reference Case
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36
Additional cases required by the commission will be included in the IRP evaluation.

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<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>High Demand Side Tech</td>
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<td>-</td>
<td>&gt;=1.5%/year for 10 years</td>
<td>&gt;=35% of 2020 load by 2030</td>
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<td>Technology Neutral</td>
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<td>Economic Coal Dispatch</td>
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<td>No Must Run</td>
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Four Corners coal operation retirement date sensitivities will be analyzed in the 2023 IRP.

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<td>Four Corners Retire 2027</td>
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<td>2027</td>
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<td>Four Corners Retire 2028</td>
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<td>2028</td>
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<td>Four Corners Retire 2029</td>
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<td>Four Corners Retire 2030</td>
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<td>Base</td>
<td>2030</td>
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<td>Four Corners Retire 2031 Replace w/ Nat. Gas</td>
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<td>2031 with Natural Gas Replacement</td>
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IRP Timeline

Key Milestones

Market Report: Early June
Public Meeting #2: Tentatively June 27
IRP Filing: August 1