Meeting Notes

Meeting Subject:	April 2023 IRP Public Stakeholder Meeting
Meeting Date:	04/07/2023
Start Time:	09:00am
End Time:	11:30am
Location:	Virtual

Matt Lind (1898 & Co./Director, Resource Planning) – Welcome/Meeting Objectives

- Slide 3 – 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.
  - Disclaimer – Meetings and content are preliminary in nature and prepared for stakeholder discussion purposes only.

Jacob Tetlow (APS/Executive Vice President, Operations) – Keynote

- Slide 5 – Keynote Introduction
  - APS welcomes feedback and ideas from stakeholders to serve the company's customers better.
  - APS is focused on the growth of Arizona and the clean energy transition, which presents significant opportunities and challenges.
  - APS plans to shut down its coal plants and is betting big on wind, solar, and batteries to serve customers.
  - By the end of the decade, APS plans to have 3,000 megawatts of battery storage.
  - APS is committed to clean energy and plans to be 100% carbon-free by 2050.
  - APS is working on solutions to improve affordability and reliability for its customers and is open to innovative and creative solutions.
  - APS encourages customers to participate in programs like the Cool Rewards program, which provides over 100 megawatts of demand response and avoids building up to 100-megawatt power plants.

Tara Beske (APS/Business Advisor, Resource Management) – IRP Process Overview

- Slide 7 – An introduction to Integrated Resource Plans
  - The task of an IRP is to find the most economical mix of resources that meet an acceptable standard of reliability, while considering factors such as economics, regulatory requirements, and the impact to the environment.
  - Predicting and capturing how these factors influence future customer energy needs and resource options makes the task incredibly complex.
  - An IRP is a snapshot of a utility's view of what its energy resource mix could look like in the future, based on studies, inputs, and assumptions.
  - Pre-1980’s, only supply-side resources were considered in a utility’s resource plan, but since then, demand-side resources have been included or integrated as interstate energy resource options.
- Slide 8 – Key Components of an IRP

- The diagram shows major inputs to an IRP study and major steps of energy resource mix analysis.
- The load forecast, fuel cost forecast, and energy market price forecast are key inputs to the IRP.
- Demand side resources like energy efficiency programs and rooftop solar are included as energy resource options.
    - Supply side resources like wind, solar, and battery storage are also included.
- Regulatory requirements include inputs like the Arizona Corporation Commission's prescriptive IRP content.
- Sustainability is also an important factor, including the company's Clean Energy Commitment.
- A range of likely future outcomes is identified through the study of industry publications and historical and forecasted data.
- Each combination of economic, regulatory, and environmental conditions that represents a likely future outcome is called a case.
- A software-driven resource mix optimization analysis is performed for each case, and the results are submitted and presented in the IRP study.

- Slide 9 - Regulatory Requirements and Stakeholder Engagement
    - IRP must meet regulatory requirements such as filing every three years and including prescribed content and specific items.
    - APS engages stakeholders through the Resource Planning Advisory Council (RPAC), public stakeholder meetings, and ACC workshops.
- Slide 10 - APS 2023 IRP Planning Principles
    - The three components that Jacob mentioned are reliability, affordability, and sustainability.
    - Reliability has two cornerstones: adequacy and security.
    - Adequacy refers to having sufficient resources to serve customer load at any time, while security includes physical assets and cybersecurity.
    - Affordability aims to provide reliable electric service to customers at the lowest reasonable cost.
    - Sustainability is crucial to APS, and the 2023 IRP resource options represent a clean, balanced supply, including energy efficiency, rooftop solar, battery storage, and utility-scale solar and wind resources.
- Slide 11 - Consultant Engagement
    - APS engaged three consulting firms for its 2023 IRP.
        - 1898 & Co.
        - Energy + Environmental Economics (E3)
        - Astrapé
    - Consulting firms have expertise in various aspects of IRP processes and analysis.
    - Areas where they will be helping APS include inputs and assumptions to the capacity expansion model, reliability planning studies, and maximizing the value of stakeholder engagement.
    - Consulting firms bring a wealth of experience and industry knowledge to the process.

Todd Komaromy (APS/Director, Resource Planning) – IRP Methodology

- Slide 13 – IRP Objectives
    - The IRP will have multiple possible futures represented by different cases.

- Best practices benchmarking with neighbors and orders from the ACC will help define the scope of what will be represented in those cases.
- Reliability, affordability, and sustainability are important factors for APS. APS applies planning reserve margins, generation mix diversity, and analysis of risk to aid in the evaluation of each factor.
- APS will evaluate differences in technology and pricing as part of the IRP to determine an optimal portfolio.

- Slide 14 – Managing Risk and Uncertainty
  - Discussion of key factors in the decision-making process for IRP.
  - Key case inputs commonly seen in IRPs across the nation will be modulated for comparison purposes.
  - A call to action for feedback from the audience on inputs or outputs they would like to see in the IRP.
  - Feedback will be collected and reviewed, with efforts made to accommodate or address them in the IRP.
- Slide 15 – Considerations Informing the 2023 IRP
  - New orders from the ACC help to define the scope of the IRP.
  - Technology agnostic cases to be evaluated without regard to emission reduction goals or renewable energy standards.
  - Analysis of coal retirements and cases addressing energy efficiency.
  - No limit on energy efficiency or demand side resources for most cases.
  - One case will require a minimum annual energy savings of 1.5% and analysis of demand side resource capacity equal to at least 35% of 2022 peak demand based on a commission requirement.
  - Ten portfolios were designed to achieve the emission reduction goals in the 2020 IRP. All cases besides the technology agnostic case will have to meet the APS Clean Energy Commitment.
- Slide 16 – Considerations Informing the 2023 IRP
  - The IRA will include the analysis of natural gas price assumptions, extreme weather and corelated risk analysis, and hydrogen analysis.
  - Comparison of value distribution between grid and transmission connected resources.
  - Assessment of resource adequacy.

Matt Lind (1898 & Co./Director, Resource Planning) – Stakeholder Engagement

- Slide 18 – Key Considerations for Stakeholder Communications
  - APS has engaged with a diverse mix of organizations collectively referred to as the Resource Planning Advisory Council (RPAC) on a near monthly basis for the past two years, facilitated by a third-party consultant, with transparent meetings, prepared materials, and agendas tailored to the discussion topics and activities of each meeting.
- Slide 19 – Resource Planning Advisory Council (RPAC) Meeting Topics
  - The RPAC meetings have covered a wide range of topics, including load forecast development and emerging industry challenges.
  - The development of an all-source RFP for resource procurement was informed by RPAC feedback.
  - Updates and discussions were provided regarding APS's 2023 IRP, as well as news on regulatory activities, climate change analysis, and potential market evolution in the West.
  - All materials can be found on the APS website at aps.com/resources.
- Slide 20 – Impact of Resource Planning Advisory Council (RPAC) Feedback
  - The RPAC has played an important role in informing and shaping the IRP currently under analysis.

- The RPAC provided feedback on the load forecast and collaborated with APS to develop a load forecast based on their inputs.
- The 2022 all-source RFP was also informed by RPAC feedback, including discussions on evaluation criteria for different resources.
- Regular meetings with the RPAC allow APS to keep members informed and collect feedback to incorporate into their work on the IRP.

Akhil Mandadi (APS/Senior Engineer) – Model Development

- Slide 22 – Questions to answer – Breaking down the complex problem
  - The modeling team's main goal is to help APS make informed decisions about how to allocate resources in the long term to ensure that customers have access to reliable, affordable, and sustainable energy.
  - The team uses multiple models that work together to solve optimization problems related to cost, risk, reliability, and environmental impact.
  - Modeling helps APS answer questions about their energy needs, available options, and tradeoffs involved.
- Slide 23 – APS Model Development Process
  - The modeling process for energy planning involves collecting and analyzing various inputs such as load energy, renewable energy potential, cost assumptions, operating costs, and fuel costs projections.
  - The modeling process involves three interdependent models: the resource adequacy model, capacity expansion model, and production cost model, which help determine the optimal mix of resources to meet the projected demand while considering renewable portfolio standards and operating characteristics.
- Slide 24 – Resource Adequacy Model
  - The resource adequacy model analyzes uncertainty and variability.
  - The model uses data on parameters such as load, demand, renewable output, and resource availability, as well as hourly output for the entire year to identify the reserve margin needed to prevent loss of load.
  - The industry standard of 1 day in 10-year loss of load expectation (LOLE) is used as a measure of reliability, and the model helps establish the planning reserve margin and effective load carrying capability (ELCC) needed to meet this reliability need.
- Slide 25 – Capacity Expansion and Production Costing Models
  - The resource adequacy tool SERVM is mentioned, its output is the effective load carrying capability and reserve margin targets, which are used as inputs for the capacity expansion model.
  - The capacity expansion model uses a variety of inputs, such as fuel prices, planning reserve margins, and regulatory and environmental constraints, to determine the optimal mix of resources that need to be built to meet demand while honoring all constraints and expectations.
  - The production costing model (PCM) is then used to optimize the operating costs of the chosen resource portfolio. The results of these two models provide the analytical framework for developing the Integrated Resource Plan (IRP).
- Slide 26 – Capacity Expansion and Production Costing Models
  - The capacity expansion model helps determine the optimal resource mix and answers questions such as what is needed, when it is needed, how much is needed, and what type of resource is needed.

- The production costing model helps determine the number of emissions, generation output, capacity factors, variable costs, and operating costs of the system. It is an iterative process that impacts the capacity expansion model. The goal is to find a minimum cost value that meets all requirements. The modeling team provides data to the rest of the IRP team to perform the analysis.

Ross Mohr (APS/ Manager, Energy & Revenue Forecasting) – Load Forecast

- Slide 29 – 2023 IRP Load Forecast Summary
  - The key growth drivers for the 2023 IRP forecast are data centers and large manufacturing customers, which will eventually comprise a larger share of APS's energy and peak sales.
  - Among core load growth, residential, commercial, and industrial customers are expected to have lower growth compared to the 2020 IRP due to declining usage, increased solar generation, energy efficiencies, and DSM savings.
  - Model improvements have resulted in slower growth over time and are more closely aligned with historical usage trends.
  - Electric vehicles are expected to contribute to overall load growth and comprise a greater share of sales, with energy due to electric vehicle charging expected to increase up to 6% of total sales by 2038.
  - The average annual growth rates for retail sales and peak demands have increased compared to the 2020 IRP due to the extra high load factor customers.
- Slide 30 – 2020 IRP Sales Forecast Update
  - The 2020 IRP sales forecast shows growth in residential sales due to increased home size and other uses such as electronics.
  - Commercial and industrial customers also saw growth due to increased floor space, while data center customers were a major source of growth in the 2020 IRP.
- Slide 31 – Datacenters and large manufacturing customers are expected to be the major source of load growth
  - Large customers such as Taiwan Semiconductor Manufacturing Corporation (TSMC) and Nestlé are expected to be a major source of load growth.
  - Recent headlines show a lot of interest among large customers, including TSMC's manufacturing facility and Nestlé's plans to build in the West Valley.
- Slide 32 – 2023 IRP Sales Forecast
  - The 2023 IRP sales forecast shows slower growth for residential and smaller commercial customers due to increased solar adoption, DSM savings, energy efficiencies, and model improvements.
  - The main driver of sales growth is the extra high load factor customers such as data centers and large manufacturing, which are projected to triple their sales growth compared to the 2020 forecast. The share of sales going to these customers is expected to increase from 12% in 2035 to 34% in 2038.
- Slide 33 - 2023 IRP Peak Demand Forecast
  - The graph shows the summer peak demand forecast, with the 2020 IRP as the black line and the blue bars representing residential and small commercial customers.
  - The peak demand growth is mostly due to data centers and large manufacturing customers, with a forecast of 1,100 megawatts greater than the 2020 IRP in 2035.

- The green portion of the bars shows planning for maximum temperatures of 117 degrees for summer peaks, which is an increase from the 115 degrees used in the 2020 IRP due to the 10-year average including the very hot summer of 2020.

Michael Eugenis (APS/ Manager, Resource Planning) – IRP Assumptions and Case Development

- Slide 35 – IRP Cases are being developed around a reference case set of assumptions
  - The IRP process studies the impact of different assumptions such as fuel pricing, renewable development, and carbon tax on the most economic resource portfolio.
  - APS' Clean Energy Commitment is foundational to our cases, and is included as a part of our assumptions except where mandated otherwise by the ACC. There are also scenarios that vary the exit year of the Four Corners Power Plant in accordance with ACC requirements.
- Slide 36 – APS has developed cases to evaluate uncertain assumptions.
  - The chart outlines specific cases that will be looked at in the IRP. With arrows indicating if the inputs are higher, lower, or the same compared to the reference case inputs for the additional cases.
  - These inputs include factors such as gas prices, technology costs, coal dispatch, energy storage, and natural gas as an additional resource.
- Slide 37 – Additional cases required by the commission will be included in the IRP evaluation.
  - This chart describes additional cases that will be run as part of the IRP.
  - The cases include requirements by the Arizona Corporation Commission for demand-side technologies, energy efficiency, low and no growth cases, and the elimination of must run dispatch on coal units.
- Slide 38 – Four Corners coal operation exit sensitivities will be analyzed in the 2023 IRP.
  - The focus is on potential exit dates from the Four Corners coal facility in Farmington, New Mexico.
  - The earliest exit of Four Corners that is modeled is in 2027 due to the tight capacity market in the West and supply chain constraints.
  - The exit of Four Corners in 2028-2030 is also studied and an additional case will be evaluated to study the impact of a natural gas replacement compared to other portfolios.

Matt Lind (1898 & Co./Director, Resource Planning) – Closing Remarks

- Slide 40– IRP Timeline
  - The next public stakeholder meeting related to the IRP is tentatively planned for 2-3 months from now on June 27th.
  - A market report related to the Western markets will be available in early June.
  - The IRP filing is slated for August 1st, 2023.
  - The written responses associated with the meeting can be found on the APS website at www.aps.com/resources.
  - The stakeholders' participation is crucial to the effort.