

Arizona Public Service

2023 IRP: Public Stakeholder Meeting #3

Questions & Responses

Date	Location	Start	Stop
11/7/2023	Virtual	9:00 a.m.	10:30 a.m.

Matt Lind | 1898 & Co./Director of Resource Planning | Welcome/Meeting Objectives

- No questions.

Todd Komaromy | APS/Director, Resource Planning | Keynote

- No questions.

Todd Komaromy | APS/Director, Resource Planning | 2023 IRP Planning Steps

- No questions.

Mike Eugenis | APS/Manager, Resource Planning & Analysis | IRP Preferred Portfolio & Results

- **Question - Greg Blackie:** What is the assumed lifespan for battery storage? Is the degradation in capacity factored into the advertised additional capacity from these projects? What is the expected effective capacity for battery storage after 10 years of usage? Does the Preferred Plan assume replacement at the end of the useful life of the batteries?
 - **Response - Mike Eugenis:** The assumed lifespan is 20 years. For battery storage projects that are paired with another resource, APS assumes storage replacement after 20 years. Degradation is accounted for in the analysis, and many contracts APS signs have a fixed operation and maintenance charge with remediating that degradation over time. The Preferred Plan does assume replacement at the end of the useful life of batteries to make it comparable to other resources.
- **Question - Anonymous:** Are you indicating that 558 MWs of microgrid resources are already under contract?
 - **Response - Mike Eugenis:** There is a portion that is under contract, but the total amount is not under contract today.
- **Question - Greg Blackie:** APS has an advertised goal of being 65% clean by 2035 and 100% clean and carbon free by 2050. The submitted Plan states that your preferred portfolio works toward that goal, and that it is the least cost. Two years ago, an independent study found that to be 100% renewable by 2050 would cost Arizona ratepayers \$6 billion. How is it that similar goals were projected to cost \$6 billion more than a truly technology-agnostic approach two years ago, but now they are advertised as the least cost? Can you explain the market changes to support that? Should we trust the cost assumptions of the modeling software? Was the independent study authorized by the Commission two years ago incorrect?
 - **Response - Mike Eugenis:** The IRP planning period is for 15 years, 2023 - 2038. APS does not have study work that goes out to that 2050 goal. APS does perform revenue requirements for every year in this plan, and APS has seen that the preferred portfolio is the most economical plan based on that. APS has seen that with the additional tax credits, renewable resources are more cost-effective. APS has seen a considerable amount of solar, wind, and storage because they are economical options in our plan. As technologies develop and investment continues in clean technologies, there will be even more emerging technologies that will become more cost-effective to help reach the 2050 goal. The cost assumptions were a result of partnering with the RPAC along with public sources of data, including the NREL cost curves. APS did

adjust the cost curves to capture the feasibility of resources within Arizona and resources bid pricing from the RFP.

- **Question - Anonymous:** What range is the duration of batteries being considered for deployment? Are there any considerations made for longer duration storage as firming assets given the projected availability of new longer duration storage technologies?
 - **Response - Mike Eugenis:** In the action plan window, all the battery storage that was studied was 4-hour storage. APS anticipates that in the future, there will be longer-duration storage options available.
- **Question - Michelle King:** Can you please provide an overview of the key assumptions informing the base case scenario, to make meaningful the projected savings in the least cost portfolio?
 - **Response - Mike Eugenis:** The reference case is very similar from an input assumption perspective to the preferred portfolio. It utilizes the same load forecast, resource costs, and commodity pricing. APS believes it's a fair comparison between these portfolios. The key difference is the ability to leverage the wind firming by gas construct at Four Corners, and that is what is driving a lot of the savings. It re-optimizes the plan and leads to additional benefits for the customers.
- **Question - Zeke Zemer:** Would APS be open to sharing natural gas transport rights to help large customers pursue onsite generation/microgrid solutions?
 - **Response - Mike Eugenis:** APS did not explore that explicitly as part of the IRP, so APS cannot speculate on that in the context of our presentation today.
- **Question - Anonymous:** Your cost differences look small when your y-axis is in billions of dollars. What is the percentage difference between the preferred portfolio and the FC Exit 2028 scenario?
 - **Response - Mike Eugenis:** All revenue requirements are in the \$37B range, and they are all less than 1% different from the reference case. However, \$356M is a lot of money, and it is APS's responsibility to capture as much benefit for APS customers as possible.
- **Question - Anonymous:** Does APS take into consideration community solar in their IRP? Do they plan to do this through the RFPs for third parties to build and manage, as per the policy statement voted on by the ACC on March 7, 2023? Could that be part of the microgrid/DR portion of the action-preferred plan?
 - **Response - Mike Eugenis:** APS does include a substantial amount of distributed energy resources into the future. There is a forecast that informs the level of customer adoption that there is going to be. It is an important source of energy in the APS system. While it is not in the bar chart itself, it is an important part of APS's resource mix going forward. Regarding community solar, in the context of the IRP, APS is most concerned with the resource itself and the amount of the resource present.
- **Question - Spencer Stanton:** Might APS value stand-alone storage cited near load pockets differently than co-located storage? Do they have different ELCC scores?
 - **Response - Mike Eugenis:** Yes. Astrape Consulting Group helped with the development of the ELCC for these different areas. There are differences in the ELCCs between a co-located and standalone storage facility. In general, you will see a benefit to co-locating solar and storage, especially in the summer. The battery can be charged with additional solar, and then the battery can be discharged when the load increases in the evening.
- **Question - Nikki Colletti:** Throughout the planning process, did APS include representatives of retired and mature Arizonans? Many of our members are on fixed incomes, so the cost of utilities is a major concern in their budgets. Two years ago, the Commission said that renewable energy would cost an additional \$6 billion. The plan proposed by APS seems to make the same commitments as the proposed mandates from the Commission. It is also apparent that electricity costs more in states that have more "renewable" energy. We prioritize affordability far above climate goals. Does APS prioritize ensuring the lowest cost energy, or its voluntary climate commitments?
 - **Response - Mike Eugenis:** AARP is a part of the RPAC external stakeholder group. Affordability and a least-cost plan are critical to our operations going forward. APS has balanced reliability with affordability in the preferred plan by achieving the most customer benefit.
- **Question - Greg Blackie:** The table on page 37 of the submitted Plan seems to show that every type of natural gas generation is cheaper than every potential "renewable" option. If this is the

case, why did the “technology agnostic”/ “least cost” portfolio select renewable sources over additional natural gas generation, and why was it more expensive than other plans?

- **Response - Mike Eugenis:** The table mentioned lists costs on a \$/kW basis, which is like an installed cost of a particular resource. Given market volatility and risk, you do not want all of one type of resource. The installed cost of a resource is only one characteristic of a resource that APS considers. For example, wind is steadily available at certain times of the year, whereas demand response and microgrid resources are dispatchable resources. Some resources have fuel costs, while some do not. As APS has performed the IRP, APS has considered all those factors to optimize that complete cost to customers. The IRP is holistic in its financial analysis.
- **Question - Greg Blackie:** Why is the cost of new coal generation not included in the table on page 37 in the submitted Plan?
 - **Response - Mike Eugenis:** APS has not had any coal bids in recent years. There is not a lot of development in the West for this technology, and therefore, there is no cost information for new coal facilities. APS did model not carbon capture with existing facilities.
- **Question - Greg Blackie:** When calculating emission reductions, are the upstream emissions for the production of solar panels, wind turbines, and batteries factored in?
 - **Response - Mike Eugenis:** The CO2 calculations that we do are based on the output of our thermal facilities, so they are limited to the emissions from the output of electricity generation.
- **Question - Anonymous:** Is reliability given the same value across the different plans?
 - **Response - Mike Eugenis:** APS has the same reliability metrics across these plans. There is a mathematical definition of what a reliable system is in the future, and APS uses industry best practices to determine what level of reliability APS should plan towards. There are qualitative factors that APS considers in these plans. For example, the Commission required APS to investigate Four Corners' early exit in 2027, and APS's ability to acquire those resources is not feasible. APS values reliability to their customers, and a responsible transition to the future without Four Corners.
- **Question - Misheel:** There is a CO Bar solar complex around 1.2 GW PPA announced publicly, which is not included in your current portfolio- is this included in your action plan? Another 1GW will be procured from the current RFP. So, will these suffice the current action plan until 2027?
 - **Response - Mike Eugenis:** APS has a portion of the CO Bar facility, and it is a part of our resource plan going forward.
- **Question - Nikki Colletti:** Grid reliability is also very important. Looking at states like California, where summer after summer, residents have been asked to reduce energy usage, and yet there are still rolling blackouts, causing much concern for our members. Many of our members cannot accept a rolling blackout in the middle of an Arizona summer. The pursuit of Net Zero has caused capacity problems in places like California, and Texas during the winter storm. Why shouldn't we be concerned that APS' plan will not do the same here?
 - **Response - Mike Eugenis:** Reliability is paramount to the work that APS does. APS fully realizes the critical nature of the service that they provide to our customers. During modeling, changes that are happening in the West were captured, such as new resources and interaction with APS's neighbors. APS is confident in the preferred plan as being able to meet reliability requirements.
- **Question - Anonymous:** Due to the APS tariff reform, it seems that many projects will be withdrawn from the current queue, which will make it difficult to achieve their target COD. What would be the preferred COD in your next RFP? Have you included this impact on the IRP in terms of the timing?
 - **Response - Mike Eugenis:** APS does not specifically model this amount of detail with interconnection reform. The modeling of Four Corners' early exit does reflect the feasibility of being able to maintain reliability without it. APS wants to ensure it has enough time to bring these resources online.
- **Question - Greg Blackie:** The submitted plan expects over a million EVs within APS' grid. Assuming this proves true, does this increase in demand for electricity require immense investments in

transmission and capacity? Does APS plan to socialize these costs across all ratepayers, relying on non-EV owners to subsidize the increased costs created by those who can afford EVs?

- **Response - Mike Eugenis:** APS does include EVs as part of the load forecast, and APS did leverage work that was done by an external consultant in the development of that EV forecast. The RPAC stakeholder feedback was considered in the forecast. The IRP is not a rate-making document, but the Preferred Plan is the least-cost portfolio.
- **Question - Terry Winters:** Your plan has 2.9 GW of battery storage. What is the capital cost of this storage? Is there any such large battery storage facility in operation anywhere? I estimate that it would cost about \$ 1 billion.
 - **Response - Mike Eugenis:** APS does have about 2.9 GW of battery storage in the action plan, which is a combination of smaller facilities. There is no single facility. The model considers the capital costs, operation and maintenance costs, and all other costs.
- **Question - Terry Winters:** Your future plan relies on an additional 6.9 GW capacity, with 90% of it being renewables /batteries. Why are we going so all-in on renewables?
 - **Response - Mike Eugenis:** Renewables are the most economical as they provide energy and capacity to the system. They are a portion of our portfolio for maintaining reliability. There is a higher level of confidence that APS will be able to get those resources online in a shorter period.
- **Question - Anonymous:** What locations are in your preference in the 15 years of plan in terms of the new resources?
 - **Response - Mike Eugenis:** The IRP does not contemplate specific locations for resources within Arizona. APS relies on the ASRFP to understand where the most economical bids are, along with all relevant costs.
- **Question - Anonymous:** As a large C&I customer that has been notified that only 1/3 of requested capacity can be provided by APS until 2030, does that impact the likelihood of the IRP anticipating the high load growth scenario as the most likely outcome?
 - **Response - Mike Eugenis:** APS studied the high load growth scenario to determine the amount of resources and if there would be any changes to the amount of resources necessary for APS's investment in supporting additional growth. APS's corporate load forecasting team develops the load forecast and represents the best information that APS has on the load into the future.
- **Question - Anonymous:** Unsure if this was answered, but curious about how stand-alone storage is viewed differently than co-located, if at all. Particularly from an ELCC standpoint.
 - **Response - Mike Eugenis:** APS studied standalone and paired storage. Pairing storage and solar together can provide benefits to the grid to deal with load differences throughout the day.

Matt Lind & Todd Komaromy | Next Steps/Closing Remarks

- No questions.