



Meeting Notes

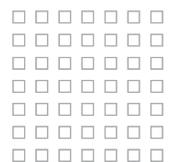
DRAFT – For Discussion Purposes Only

Meeting Objectives

- Recap the January RPAC meeting and provide status of previous action items.
- Provide updated information regarding the 2023 Load Forecast.
- Present 2022 RFP Update with projections of a 2023 RFP.
- Describe APS Microgrid proposal and how the process works.
- Summarize some of the considerations that go into IRP portfolios and solicit RPAC member feedback.

Meeting Subject: February RPAC Meeting
 Meeting Date: 03/1/2023
 Start Time: 01:00pm
 End Time: 3:00pm
 Location: Virtual

Attendees	Organization	Title/Role
Evan Lipsitz	1898 & Co.	Consultant
Keaton Clark	1898 & Co.	Analyst
Chase Kilty	1898 & Co.	Consultant
Matthew Lind	1898 & Co.	Director of Resource Planning
Steve Jennings	AARP	Associate State Director
Phil Jones	Alliance for transportation Electrification (ATE)	Executive Director
Ann Becker	APS	Vice President, Sustainability
Tara Beske	APS	Business Advisor, Resource Management
Michael Eugenis	APS	Manager, Resource Planning
Jill Freret	APS	Director, Resource Acquisition
Justin Joiner	APS	Vice President of Resource management
Todd Komaromy	APS	Director, Resource Planning
Derek Seaman	APS	Manager, Resource Acquisition
Judson Tillinghast	APS	Manager, Customer To Grid Solutions
Ross Mohr	APS	Manager, Energy & Revenue
Yessica Del Rincon	APS	Communications Consultant
Pamela Nicola	APS	Manager ESG Policy
Greg Patterson	Arizona Competitive Power Alliance	Director
Chaunce De Roos	Arizona Corporation Commission	Policy Advisor
Diane Brown	Arizona PIRG	Executive Director





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Gary Dirks	ASU	Senior Director
Joe Hooker	E3	Associate Director
Johnny Key	Freeport-McMoRan	Director of Energy & Power Solutions
Sam Johnston	Interwest Energy Alliance	Policy Manager
John Mitman	OBODO Energy	Founder & CEO
Amanda Ormond	Ormond Group LLC	Principal
Sandy Bahr	Sierra Club	Chapter Director
Kate Bowman	Vote Solar	Regulatory Director
Alex Routhier	Western Resource Advocates	Senior Clean Energy Policy Analyst
Claire Michael	Wildfire	Director of Climate Equity
Cynthia Zwick	Wildfire	Executive Director

Matt Lind (1898 & Co./Director of Resource Planning) – Introduction / Updated Meeting Guidelines / January RPAC Recap

- **Slide 3 – Meeting Guidelines**
 - RPAC member engagement is especially important. Questions and discussion are welcome throughout the presentation.
 - Meeting minutes will be posted on the public APS website along with questions and items to follow up on.
 - Consistent member attendance encouraged.
- **Slide 4 – Following Up**
 - No outstanding action items.
- **Slide 5 – January Meeting Recap**
 - The RPAC was formally introduced to the APS President, Ted Geisler. Ted emphasized APS’ continued dedication to achieving the goals of its Clean Energy Commitment.
 - EPRI provided an update on the preliminary results of its on-going Climate Change Scenario Analysis.
 - APS discussed the 2023 Load Forecast and how datacenters and large manufacturing customers are expected to be a major source of load growth.
 - APS outlined the 2023 IRP timeline and highlighted critical milestones.
- **Slide 6 – Newsworthy**
 - RPAC collaboration highlighted in a recent article.
 - Article titled “Duke, APS planning reforms show ways to work with stakeholders to meet emerging power system needs.”
 - The article is publicly available on Utility Dive and emphasizes the importance of the RPAC group.

Ross Mohr (APS/Manager, Energy & Revenue Forecasting) – 2023 Load Forecast Update

- **Slide 9 – March 2023 Load Forecast Update Summary**
 - January RPAC presented XHLF with two scenarios.



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- Low XHLF is comprised of existing datacenter customers and two announced Fabs of TSMC
- High XHLF includes a probability-weighted forecast for all prospective datacenters and large manufacturing customers that are in various stages of study/funding/construction.
- Datacenters and large manufacturing customers' (XHLF) share of energy sales increases from 4% of sales to 16%-49% of sales from 2023 to 2038.
- March RPAC: Datacenter and large manufacturing customers ("XHLF") are expected to be the major source of load growth, with energy sales increasing from 4% of sales to 28% of sales from 2023 to 2038.
 - Modeled with probability-weighting as was the High XHLF scenario from January.
 - XHLF forecast now closer to low XHLF scenario due to lower probabilities and lower projected loads on some datacenter customers.
 - No other changes to the forecast (including EV, DE, and EE/DR forecast updates in progress with Guidehouse)
- Slide 10 – Sales Forecast Update
 - XHLF customers' share of energy sales increases from 4% to 28% by 2038.
 - XHLF is now projected at more than twice the amount of sales growth vs the 2021 RPAC forecast for XHLF customers. The 2021 RPAC forecast had XHLF share of sales increasing to 15%.
 - There is a slight net decrease among residential and C&I compared to 2021 RPAC forecast.
- Slide 11 – Peak Forecast Update
 - 2023 Peak forecast from the 2021 RPAC was 7,646 MW and in 2023 the peak forecast is 8,042 MW.
 - Peak forecast increases to 10,506 MW vs 9,919 MW (RPAC 2021)
 - Almost all peak growth compared to 2021 RPAC forecast is due to datacenters and large manufacturing.
 - Planning for max temps of 117 degrees adds 139 MW to the peak forecast.
- Slide 12 – Load Forecast Growth Summary
 - 2023 RPAC forecast shows slower "core" load growth due to changes in usage trends post-Covid and model improvements.
 - XHLF customers expected to be the major source of load growth; new probability-weighted forecast.
 - There is a higher average annual growth rate for the first five years, and it flattens out beyond five years.
 - Question – RPAC Member: What is the projected percentage load growth for residential and C&I?
 - Response – Ross Mohr: I can provide the growth rates for residential and C&I after the meeting.
 - Question – RPAC Member: Did I hear you say that load growth was going negative? Or was that in reference to one projection versus another?
 - Response – Ross Mohr: That value was not negative, just a decrease compared to the prior.

Derek Seaman (APS/Manager, Resource Acquisition) - 2022 RFP Update

- Slide 15 – 2022 RFP Update
 - Significant need for flexible and diverse resources to come online in 2025-2026
 - Negotiations ongoing; expect to conclude late Q2 2023
 - Nearly 600MW executed (2025 COD)
 - Approximately 1600MW in active negotiations (2025 COD)



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- Pursuing 500-1000MW additional resources (2026 COD)
- Anticipate issuing next RFP late Q2/early Q3 2023
 - All Source approach.
 - Resources to come online beginning in 2027 and beyond.
 - Take lessons learned and build on successes of 2022 effort.
 - Continued RPAC engagement.
- Question – RPAC Member: How much gas do you expect to purchase?
- Response – Derek Seaman: Out of the 2022 ASRFP we're looking at all opportunities. We did see some bids from gas tolls in the region. We're still working through conclusion of the entire portfolio of what we're going to take. We had the opportunity, at an affordable price, to extend two of the gas tolls. We took that opportunity as low hanging fruit, while we're also negotiating other contracts, we're taking everything. We have solar under contract, storage under contract, wind under contract, and then the gas tolls that I alluded to.
- Question – RPAC Member: How much are those tolling agreements in MW size?
- Response – RPAC Member: One is 525 MW, and the other is 463 MW. I would have to go back and look at those, I don't have the numbers in front of me, but those are extensions of existing agreements.
- Question – RPAC Member: Are you running into transmission issues on an ATC available transmission capacity? Are developers counting on new builds or the transmission owners to upgrade lines? Can you talk a little bit about the transmission issues?
- Response – Derek Seaman: So, the ATC (available transfer capability), we have cut over to Mod 30. We're in this flow gate space now as of this year and with Mod 30 there is better utilization of the transmission lines. It is looking at additional space for renewable energy. I think that's where you are going to see most of the benefit, it may not be in additional capacity on those lines, but better utilization of the existing lines. There is a different process of how we must evaluate each of these sites. I don't know if I'm seeing it from the developers' eyes, but they are putting in their projects where they think they fit best. We provided the transmission map as part of our RFP and reflecting on the transmission map where we were saying deliverability, what does that look like? We did a red, yellow, green, system to try and provide that transparently. Pretty much all roads in were yellow, which essentially means that transmission space is becoming a scarce commodity. We are doing the evaluations right now and we are having to look at it in this flow gate world where a project that we intend to take, we must make sure that we are able to do so through a study process. Every time a new resource gets added, the overall portfolio is updated along the way. It is an iterative process. Forgive me for this. I am probably not the best person to be speaking to the nuances of flow gate, but essentially, we are looking at how we can take additional projects through better utilization of the existing transmission network.
- Question – RPAC Member: How long were the gas tolls extended?
- Response – Derek Seaman: I think one was extended five years and then the other was seven. Seven was the maximum of what we were permitting or allowing within this RFP. Both units are combined cycles, and I don't have capacity factor numbers off hand, but we could certainly pull that information and share it later.

Todd Komaromy (Director, Resource Planning) – Thermal Performance Upgrade (TPU)

- Slide 18 – Upgrade to West Phoenix Power Plant
 - Improved efficiency – approximately 55 MW additional reliable, dispatchable generation capability
 - In service by summer of 2024



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- No noise increases, nor externally visible modifications
- Similar upgrades have occurred at APS's Redhawk facility and others around the state.
- Exploring options at existing generation sites for additional capacity.
- Question – RPAC Member: What is the total capacity after the 55 megawatts of additional capacity expected to be?
- Response – Todd Komaromy: The combined cycle unit is expected to be 523 MW of summer capacity.
- Question – RPAC Member: I know there's a diversity of units out at West Phoenix, is there a particular unit that this upgrade is targeted at?
- Response – Todd Komaromy: I don't have the particulars, it's multiple units that are being upgraded. I can set up a separate time with our experts to talk. It is combined cycle unit number 5.

Judson Tillinghast (Manager, Customer to Grid Solutions) – Microgrid Primer

- Slide 22 – Typical Customer Solution Emergency Generation
 - Tier 2 diesel generation
 - Distributed throughout your facility.
 - High capital expenditure.
 - Only allowed to run during an outage.
 - Maintenance
 - Time consuming air permits, expensive fuel, complicated testing, repairs, etc.
 - Generation is not your core business.
 - Lack training, expertise, materials, and vendor relationships.
- Slide 23 – What is an APS Microgrid?
 - APS partners with customers.
 - Engines always prioritize emergency power.
 - Operates in parallel with the grid, not just during an outage.
 - Cleaner parallel operation creates value.
 - APS installs cleaner generation instead of the customer installing Tier 2 diesel engines.
 - Creates value for the grid in addition to the customer facility.
 - Reduces risk and cost to customers.
 - APS owns and maintains generation, even air permits, for the customer.
 - Backup solution costs are lower than less capable standby-only systems.
 - Question – RPAC Member: I like the idea that you are taking control of these generators and it will give you flexibility and additional resources. I'm wondering about the air quality permits that these units lived under when they were owned by different private entities, does that type of air permit determine how often you can run it? Does that change if it becomes part of your fleet or what happens with the amount of time that you can run these things related to air quality permits?
 - Response – Judson Tillinghast: So just to make sure I'm clear in your question, if they are doing the Tier 2 diesel, they own the air permits themselves. We don't have any access to that resource, it can only be run based on EPA state regulations in the event of an outage and for testing. They get maybe 90 to 100 hours a year for testing. In our scenario, where APS owns and operates it, we own the air permits. Generally, we are seeing a couple 100 hours per



year max, so it's not something that we would run frequently. It's really for the issues where the grid is really strained that that resource would come online and export that capacity to the grid. In the case of an actual outage, there is no limitation on how much it can run in either scenario, the Tier 2 or the APS micro grid.

- Question – RPAC Member: Are you taking over ownership of existing Tier 2 diesel generation or is this APS' own generation.
- Comment – Judson Tillinghast: I work very closely with our economic development team to look for those opportunities and we offer this and share this concept with them. Instead of buying a Tier 2 diesel, we have an option on the table, not only is it cleaner, but it is also going to save you money and provide reliability and grid benefits to the entire grid, which helps serve the greater population. It is a difficult process to align our timeline, budgeting process, and the customers all at the same time. Our team is very focused on looking for those opportunities because we believe it is a win for all the parties involved.
- Question – RPAC Member: When we think about the challenges that are coming, I think demand response needs to be used a whole lot more. That's a big toggle switch of these extra generators of some of the large corporations. If APS could have control of them for certain extreme conditions, it would give you another set of resources that you don't have to pay for it. Are you considering that at all?
- Response – Judson Tillinghast: We work very closely to resource planning to see what the value proposition for the resource is, because it really depends on what the customer needs for their resiliency, the length of the term of that resource, how many megawatts it is, how many hours are available via the air permit, and that really depends on what the technologies are that are available, and how they help us with the value proposition for that resource. That's what we can share with that customer, and we would only move forward in a scenario where it is below market capacity purchase compared to the market. That is why it helps put downward pressure on rates for all customers.
- Question – RPAC Customer: Does APS know every backup generator that's owned by all its customers?
- Response – Judson Tillinghast: It's hard to say, I have been working with our key account managers team and I think we have a good idea because there is an interconnection process that I believe they go through with any customer that has a generator on site. I don't know if there's limitations based on the size. I would think it's safe to say that close to all data centers will have them like large manufacturing. There are lots of little ones that are around 50 kW to 100 kW that are more for IT backup resiliency. It would be too costly to engage in that. We really target opportunities that are at least two to three to four megawatts before the economics really start to make sense.
- Response – RPAC Member: You may see that more people want to buy backup generators, so thinking about that, how do you make sure that they are accessible to the utility in extreme conditions might be a great thing to think about.
- Response – Judson Tillinghast: I tell our customers even if you don't use our program, at minimum buy Tier 4 final diesel Gen sets because that gives us opportunities in the future for new programs that we could use. If it is Tier 2, it is off the table altogether.
- Question – RPAC Member: How does APS procure and contract for these owned and operated microgrid facilities? Does APS' microgrid initiative translate also into a willingness to tap into customer-owned microgrid resources for broader grid benefits (outside of existing rate/net metering programs)?
- Response – Judson Tillinghast: Currently we work hand in hand with a company called Power Secure, they are a microgrid developer that we have a long-term agreement with. We share three patents with that company on



autonomous frequency response which is an ancillary service that provides grid stability to all customers. For the process we procure these unique customer opportunities that were unexpected. There's RFP procurement exemptions, but in a situation where it's an unexpected customer opportunity that we can prove provides benefits to all customers, we go through that procurement methodology.

- Response – Judson Tillinghast: From a contracting standpoint, we have a specific agreement with the participating customer, and we require them to pay their share of the resource upfront so there is no liability concern that they won't pay their required amount over the term of the contract. They make one payment to us upfront. There is no outstanding risk to the rest of our customer base.
- Question – RPAC Member: Can you comment on the competitive implications of APS' ability to offer this microgrid solution vs. the third-party market?
- Response – Judson Tillinghast: We do have other companies that offer micro grid solutions in our service territory. It's typically the Tier 2 and not the Tier 4. We must work in a collaborative fashion to do a partnership program that can provide that exportability to the grid. In theory if a customer has a technology that can do that, they can bid into our all-source RFP. We're also looking at different ownership structures now. In the past, they have all been APS owned, but my group specifically tries to vet every opportunity that is out there and something that makes our system safer, more affordable, and more reliable.
- Question – RPAC Member: Relative to the Tier 4 requirement, are you referring to the gas turbine rating, or rather the backup generator rating?
- Response – Judson Tillinghast: Yes, from an air permit perspective. If it's Tier 2, the way the rules are written, there is no ability for us to run that in a non-grid outage scenario. The micro grid is really a brain. It is really technology agnostic. There are folks that have done some renewable natural gas opportunities in California. We have been keeping a close eye on hydrogen reciprocal engines because if you generate hydrogen with clean energy, it burns clean. That could be considered a clean backup resource. There is a company that makes hydrogenated vegetable oil which is permitted to be run in the Tier 4 final generators which have a significant carbon reduction. It's not carbon-zero but it is a step in the right direction. There are a lot of companies that are focusing on this because they know data centers are really driving the backup generation industry. Datacenter customers have some of the most stringent sustainability goals and shortest timelines to achieve those, so we look for every opportunity we can to partner with those customers and help them reach those goals, because we also believe that gives us an opportunity from an economic development standpoint to get more jobs into our service territory and help decarbonize our grid in a timelier fashion.
- Response – RPAC Member: You mentioned that customers who have their own microgrid, whether it be through a third party or otherwise, they must submit to the all-source RFP to be considered as an additional grid resource and, by extension, be able to tap into the value exchange mechanism there. Is there any thought to the reality that solutions at that scale that the All-source RFP is not the right forum for the type of program? Is there any thought on how to better facilitate customer engagement and that process?
- Response – Judson Tillinghast: I think we're open to various pathways to do that. The exemption I mentioned was just the ones that we've done in the past. I can show you the list of microgrids we have either in service or about to be in service today. It is a relatively new program, and we have some other ones that we are close to that are not public quite yet. When it gets to large scale data centers, it might make sense to run a separate RFP. Maybe Jill Freret might be able to speak more accurately to that process.

▪ Slide 24 – APS Microgrid Projects

- There are APS microgrid projects that are currently in service. The Marine Corp Air Station Yuma, the Aligned Data Center, Phoenix City Wastewater, Preacher Canyon, and Young.
- These projects range in size from 2 MW to 22 MW and are all Tier 4 classification.
- Question – RPAC Member: You mentioned that this is a new program, but the Yuma Air Force Base and the Aligned Data Center. I can't recall exactly when those occurred, but I would say they occurred close to 10 years ago.
- Response – Judson Tillinghast: I meant new in the sense that there are not many of them. I forgot what year Marine Corp came online, but yes, at least six years ago. Aligned has been connected for three or four years, maybe five. There was a gap between those and the city of Phoenix which comes online in a few months.
- Response – RPAC Member: Has APS put the idea of this down for a while and is turning it back on or has this been something that for the last several years, APS has maintained a lot of interest in but just had a sort of dearth of interest in it?
- Response – Judson Tillinghast: I wouldn't call it a dearth of interest. A lot of it is the right time right place. There are situations where we had a customer that recently updated their tier 2's, two or three years ago, so they are not going to reinvest money again into what they would call a relatively new asset. We keep track of those opportunities and sometimes we could not make the economics work, and there are other situations where there is a lot of load growth opportunities. I think there is a lot of interest right now for potential opportunities, so we have been trying to find more opportunities for these solutions to move forward.
- Question – RPAC Member: You mentioned the relationship with Power Secure. You answered one of my questions about hydrogen. There is a lot of technology and new ideas coming into the market now. They are coming to meetings, Enchanted Rock, Generac just to name a few, there's a lot of dynamism in this space now. So, are you open to talking to these other vendors as well and coming up with different ownership or JV structures or are you tied to the Power Secure relationship?
- Response – Judson Tillinghast: We are open. I have a relationship with Enchanted Rock as well and I know you have a lot of background with transportation electrification and I think solutions like this need to be tied in to bus fleets, for example, because without resiliency if there is an extended outage, you also lose transportation for many people. I think that is an important piece to bring into that puzzle. We are open to different ownership structures and developers, but we have had some success with Power Secure as well, and they are one of the leaders in the industry.
- Comment RPAC Member: I wasn't going to toot my horn on EV's, but now that you mentioned that the EVSC loads can be an interesting flexible load management technique. WRI is working with Xcel. Working with electrification of school buses is a resiliency play. During the California power outage, VPPs, Tesla and other companies were a focus. If we can aggregate the larger batteries either through an intermediary or to you directly that is another flexible load management resource.
- Response – Judson Tillinghast: Those are definitely things that we have on our mind and are looking to build strategies around.
- Question – RPAC Member: When you're talking about school buses and transit agency buses for that matter, you're talking about electric first, correct?
- Response – Judson Tillinghast: Yes, we were talking about electric buses and load shifting opportunities that can help to provide system value and reliability.



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- Comment RPAC Member: I thought that was the direction that APS was going. I get a little nervous when hydrogen enters the conversation, I realize there are roles for hydrogen, but I don't think this is one of them.
- Comment - Jill Freret: As we approach an all-source RFP or any sort of resource solicitation, we think carefully about the general premise that all resources should compete. That is our starting point. Then we have to answer the question, is that vehicle necessarily, given a particular resource, the best way to allow the resource to compete, to maximize benefits to our customers, and to reach our goals around safety, reliability, affordability? It is something that we carefully think about as we approach our 2023 RFP. What are the components of that and how do we frame it up under the umbrella of the all-source. It is something that I think will come up in further conversations as we move toward the issuance of the 2023 RFP.
- Question – RPAC Member: I'm curious you know relative to the APS owned microgrids in general, is this renewed interest coming out of the Inflation Reduction Act (IRA) and some of the normalization changes that give you the ability to monetize the tax incentives?
- Response – Judson Tillinghast: Unfortunately, I think the majority of that is only dedicated to the microgrid controller, which is proportionately a very small piece of the entire project. It helps, but I don't think it is the driver behind the large amount of interest we have seen recently. I think it is more related to load growth in our service territory.
- **Slide 25 – How does the Process Work?**
 - A single financial contribution and a location for the site is all the customer is responsible for and APS will take care of the rest.
- **Slide 26 – APS Microgrid Summary**
 - Clean:
 - Emissions reductions compared to Tier 2 diesel generation.
 - Affordable:
 - Cost share provides lower cost for participating customer and lower cost capacity for all APS customers.
 - Reliable:
 - Capacity and ancillary service benefits for all APS customers, not just the participating customer.
 - Customer Centric:
 - The customer can focus on their core business while APS provides resiliency as a service.

Matt Lind (1898 & Co./Director of Resource Planning) – IRP Portfolios & RPAC Feedback

- **Slide 30 – APS' 2030 IRP Planning principles include reliability, affordability, and sustainability**
 - Reliability
 - Reserve margin
 - Diverse generation mix
 - Affordability
 - NPV-revenue requirement
 - Sustainability



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- Clean target
 - Renewable target
 - Emissions
 - Water consumption
- Risk
 - Price exposure
 - Technology risk
 - Diversity of supply
 - Permitting and licensing
- Slide 31 – APS evaluates portfolios across different future scenarios with varying assumptions
 - Portfolio - The entire set of resources over the planning period designed to meet customer demand for electricity. All portfolios represent paths that enable APS to deliver on its Clean Energy Commitment.
 - Scenario - The grouping together of a set of assumptions of key uncertain variables that could potentially all occur in tandem. Illustrates the potential impact to portfolios if multiple key variables are stressed in a plausible manner.
- Slide 32 – Each portfolio will have tradeoffs
 - Each portfolio's component tradeoffs will drive varying performance under varying scenarios.
- Slide 33 – Risk factors that could influence portfolio cost
 - Quantitative Risk Factors
 - Fuel Price
 - Load
 - CO2 Price
 - Capital Cost
 - Intermittent Renewable Resource Profiles
 - Plant Forced Outages
 - Qualitative Risk Factors
 - Power Supply
 - Market Volatility
 - Siting and Permitting
 - State and Federal Policy
- Slide 34 – RPAC Feedback
 - Of the identified risk factors, which one is most important to you?
 - Are there other variables that you would like to see quantitatively or qualitatively measured/varied?
 - Are there portfolios characteristics that could emphasize performance tradeoffs?
 - Comment – RPAC Member: We are in a transition to a clean energy system. If we have loss of load events it is likely those will get pinned on clean energy, and I think as we move into the future, we must be very mindful of that. I think when you look at the event in Texas, when its gas system froze, renewables were blamed. I think that policymakers need to discuss how much it would cost to make the system as reliable as it has been historically into the future. I think there is trouble coming when thinking about variable weather. I think we need to have some honest conversations and



ask honest questions such as “is one in ten” working anymore? And what should we be trying to plan for? I am a clean energy person, but I think if we can't keep the system stable, then everybody is going to say you cannot do that and that you must go and build more coal plants.

- Response – Matthew Lind: I really appreciate you sharing your opinion there. I do think it feels like if we have more electric vehicles on the road or if we electrify other sectors of the economy is the one in 10 days standard reliable enough as we have more dependence on the electric grid. I think it's a great discussion and I don't know that the answer is there, I think it's a risk factor and you are right it is very important to be thoughtful about it in these future supply plans.
- Question – RPAC Member: How you all are thinking about correlation of methane gas outages. In other IRP's we are seeing loss of load risk for gas plants being modeled individually. For example, every facility has the same outage risk, but I think there is a lot of studies and data that show that those outages are correlated. So, I'm just wondering if you have any thoughts on that?
- Response – Matthew Lind: I think it's an important question and thought I would point out the plant forced outages as a quantitative risk factor. I think there's an opportunity to look at that and use that as an evaluation factor and a metric that can look at, does every plant have the same outage factor or do they have multiple units that may have the same outage at the same time. I do think that's something that's under consideration and I do think that's it's a great comment. This is something that we can consider including the thoughts for the evaluation.
- Comment – RPAC Member: I was just thinking about this relative to your comments about trade-offs. I wanted to highlight that while recognizing there are trade-offs, sometimes they are not quite as stark as they are presented and that there are factors that can really help you do both or mitigate them at a minimum.
- Response – Matthew Lind: I think as you look at unique portfolios with unique resources that make them up some of those aspects maybe help hedge or insulate risk factors and others do a better or worse job at others. Ultimately different resources can help hedge different risks at different levels of effectiveness. There are absolutely some things that I think are better at not being an “either or”, but a “both”. There are usually things that balance affordability with reliability. We can plan for a lower loss of load expectation into the future, which might mean we need to add more resources because our load forecast projections say we need to add more resources to serve at a lower loss of load probability. Adding more resources gives you better reliability, but does that come with lower cost? It might, but the cost may not go up as much relative to other risk factors in certain scenarios. There are competing variables and there are always trade-offs.
- Response – RPAC Member: I think you can get affordability, reliability, and sustainability if you really double down on energy efficiency and demand response. I was trying to say there are some things that you should have in every portfolio because they give you all those things.
- Response – Matthew Lind: The clean energy commitment is a baseline across nearly all the portfolios that APS will be looking at, I think a technology agnostic would not include that, but there's a baseline of that in in all of these.
- Question – RPAC Member: Why isn't risk attributed to resources like nuclear or other baseload fossil resources? The need for flexibility in the system is often attributed to renewables but inflexible baseload resources are as much a contributing factor for the need for flexibility as intermittent resources.
- Response – Matthew Lind: I would not want my comments or the slides to imply that intermittent resources are the only resources that provide supply risk. If we look at the quantitative risk factors, intermittent renewable resource



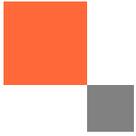
portfolios are a reference to renewable resources, but plant forced outages are a reference to base load fossil resources or natural gas resources. Those all have forced outage rates included in them so that is a nonrenewable or fossil resource where there is a risk that is being varied as well and will be explored and looked at and things like capital cost and technology risk. For nuclear, if we look at capital cost the example in the southeast portion of the country with the Vogtle plant in Georgia, we know that there have been cost overruns there and a variety of challenges and maybe those things will be overcome with the next iteration of Vogtle type plants. There's discussion of small modular reactors, but we don't know what the cost is. Those are not commercially available or commercially tested, those are things where there is a technological risk, and that's something that is something that is going to be looked at and considered as part of this. Renewables are not strictly our focus of risk aspects in the analysis. There are equal opportunities of resources to introduce risk that need to be evaluated.

- Question – RPAC Member: How will technology (distributed solar/storage, managed EV charging, microgrids, etc.) improve grid flexibility, and does the IRP process have enough granularity to capture those benefits and incorporate them into portfolio selection?
- Response – Matthew Lind: I think about it as having more tools in the toolbox and doing that allows you to solve a variety of problems. Ultimately having a diversity of options is a good thing and I think diversity of options lends itself to all having different characteristics. I think the flexibility of how they are being applied is something that is adherent to the aspects of each type of resource and can add flexibility to what can be offered to the grid when different problems are being encountered. I think mentioning all those offers opportunity for flexibility in terms of what problem they might address and how they could address it based on their characteristics. Does the IRP process have enough granularity to capture these benefits and incorporate them into portfolio selection? Whether it's discrete options that are included, whether it's variance in the level of these resources that would be included, I think there's a variety of ways that you can try to address that and still be able to measure the effects of how that that performs in the IRP.
- Question – RPAC Member: Acknowledging that we are in a time of a lot of transition and when you think about electrification and the potential for managed EV charging their opportunities to account for those in load forecasts, but I'm wondering as we learn more about how customers adopt these technologies or encouraging growth of these technologies can help to improve good flexibility. Is there a better way to quantify that or to account for it in planning to make sure the IRP is selecting the best mix of resources?
- Response - Matthew Lind: What I'm seeing and experiencing in the industry is that there are a lot of technological changes on the horizon that are working to incorporate them into the IRP, I don't know if it is being perfectly right now, I don't know if we are at a state where we can say we have got it perfectly covered, but I think there is an interest in including those technologies in the process and giving everything a fair shake to say how do these all help contribute to the different objectives that every utility and their customers are really asking for and looking for?
- Comment – Todd Komaromy: The point of the session is to gather feedback and we want to make sure that we're covering all the bases of what's important to the RPAC. We know we are not going to agree on everything, but we don't want to put forth kind of our thoughts without getting this feedback and having this discussion, so I don't think we are looking to answer all of these, and I don't think that's what you all are offering by putting it in the chat and putting it out there. You just want to see the extent that we can address it through the RFP process that we try to. We are going to do our best to give them the right treatment in the RFP process.



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- Comment – RPAC Member: I have three things. One is I appreciate the point regarding risk and in your response on that I think we all understand that it is not just the parameters of risk as you described. I'm not sure that it is universally known or described often times at the Commission, I do think it's important to highlight some of the risks from the existing resources and where they're from. The second thing is I also agree with the need to make sure that as we're talking about reliability, affordable, and sustainability that there is overlap. I am increasingly concerned with efforts at the legislature that is trying to put reliability and affordability over sustainability and undermine the jurisdiction of the Commission, but also the positive direction I would say that APS is heading in with some of the Clean Energy Commitments and one I think isn't necessarily the form for it, but passing along to your legislative folks as well, the importance of making sure that anything that we're talking about in these meetings is not impeded by something that another entity in Arizona is trying to impose on APS. The third item, we often talk about rates, energy efficiency, and transportation electrification, many items that have direct ratepayer benefits. I think incorporating more of the customer experience would be a great opportunity. Talking to APS staff, it seems like it's a front and center piece, but I would just encourage you as you are pulling all of this together to incorporate a bit more than into the conversations, we have with the RPAC. I believe it helps weave all the various stakeholder processes and conversations happening within APS together.
- Question – RPAC Member: In the list I think I see intermittent profiles of renewables and then also market risk. One thing we are thinking about is future regional cooperation in the West. I think there is a tendency to think of the risk that market imports might not materialize. I think we are also thinking about the risk on the other side of that. There will be more market imports available than we anticipate and then what kind of opportunity risk does that create for you all as far as the potential for stranded assets? I think building on that a little bit, we know that the capacity factors of renewables increase with greater geographical diversity and then at least some states in the region are potentially moving toward a future with an RTO in the region. So given that's all changing in horizon, I think that's one thing that we would want to flag is how you are thinking about a future with more cooperation would look like and how that would impact imports and then how that would also change the way you might model renewables.
- Question - I say this every single IRP process, I think you need to run a scenario that maximizes demand response and energy efficiency. Given your low growth profile, how hard it's going to be to find places to put this stuff, transmission constraint, water constraints, all those, I think even if you don't make as much money this way, doing a very high demand response and energy efficiency scenario is something I'm going to keep asking for. I think it is going to be the lowest cost and lowest risk for consumers. Next, I think that gas price spikes have major impacts on customer costs, where utilities tend to model gas prices as being very slow increases. Executing some sensitivity runs that look at one event a year where gas goes to "X" number for five days. The reset of your adjuster is in part because of these spikes, I think that when we ignore that, gas spikes in price. APS can join a day ahead market either in SPP or in CAISO. You guys are part of the Western Market Exploratory Group. I was told by Brian Cole that there was going to be analysis and numbers that are going to be completed at the end of Q2. I asked that you try to put some numbers in the IRP about what happens if you go into a day ahead market and beyond. I'm going to keep asking for that because in the IRP's you have said, we're exploring the regional markets, but we now have numbers. We have the market state report that was led by Utah that shows what the savings could be for not having to carry as many reserves and operating. I think it's time to start putting numbers to what happens if we start playing more in the region. Thirty-nine balancing authorities



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in the West is not going to work from a reliability standpoint. The sooner we get costs clear to everybody involved about the benefits for individual customers, for the utility, the better off we will be.

- APS will be sending out a survey to the RPAC Members that allows everyone to provide feedback to the question listed on the presentation.
- **Slide 36 – Next Steps**
 - The next RPAC Meeting will be on Friday March 24th.
 - The meeting will be held from 9:00am to 12:00pm
 - This will be a short gap between meetings so the next meeting might be a shorter meeting.