Meeting Notes

DRAFT – For Discussion Purposes Only

Meeting Objectives

- Recap the December RPAC meeting and provide status of previous action items.
- Introduce APS President Ted Geisler to the RPAC members.
- Present preliminary results from the EPRI's Climate Change Scenario Analysis.
- Describe updates to APS' load forecast methodology and key assumptions that will be included in the 2023 IRP.
- Summarize the 2023 IRP timeline and identify critical milestones for the process.

Meeting Subject: January RPAC Meeting
Meeting Date: 01/18/2022
Start Time: 09:00am
End Time: 12:00pm
Location: Virtual

Attendees	Organization	Title/Role
Tara Beske	APS	Business Advisor, Resource Management
Kerri Carnes	APS	Director, Customer to Grid Solutions
Michael Eugenis	APS	Manager, Resource Planning
Ted Geisler	APS	President
Todd Komaromy	APS	Director, Resource Planning
Elizabeth Lawrence	APS	Manager, Regulatory Compliance
Elisa Malagon	APS	Advisor, Regulatory Compliance
Eric Massey	APS	Director, Environmental and Sustainability
Pamela Nicola	APS	Manager, ESG Policy
Jason Smith	APS	Program Manager, Regulatory Strategy
Hilary Waterman	APS	Consultant, ESG Reporting
Kayla Wolfe	APS	Manager, Content & Channels
Sadiya Jama	APS	Business Analyst, Resource Management
Ross Mohr	APS	Manager, Energy & Revenue Forecasting
David Peterson	APS	Advisor, Corporate Strategy
Justin Joiner	APS	Vice President, Resource management
Akhil Mandadi	APS	Senior Engineer, Resource Planning
Evan Lipsitz	1898 & Co.	Consultant
Keaton Clark	1898 & Co.	Analyst
Chase Kilty	1898 & Co.	Consultant
Matthew Lind	1898 & Co.	Director of Resource Planning

Joe Hooker	E3	Associate Director
Nick Schlag	E3	Partner
Joshua Spooner	E3	Associate
Steven Rose	EPRI	Principal Research Economist
Erik Smith	EPRI	Climate Resilience Analyst
Francisco Ralston Fonseca	EPRI	Engineer/Scientist
Armando Peralta	ACC	Electrical Engineer
Chaunce DeRoos	ACC	
Steve Jennings	AARP	Associate State Director
Diane Brown	Arizona PIRG	Executive Director
Gary Dirks	ASU	Senior Director
Phil Jones	ATE	Executive Director
Ian Calkins	Copper State Consulting	Vice President of Public Affairs
Johnny Key	Freeport-McMoRan	Director of Energy & Power Solutions
Sam Johnston	Interwest Energy Alliance	Policy Manager
Nitin Luhar	Mitsubishi Power	Regional Director
Nicole Hill	Nature Conservancy	AZ Thrives Program Lead
Amanda Ormond	Western Grid Group	Principal
Dugan Marieb	Pine Gate Renewables	Regulatory Associate
Jeffery Allmon	Pinnacle West	Senior Attorney
Sandy Bahr	Sierra Club	Chapter Director
Alondra Regalado	Stratagen	Policy Analyst
Michael Kenney	SWEEP	Senior Program Manager
Caryn Potter	SWEEP	Arizona Representative
Devi Glick	Synapse Energy Economics	Senior Principal
Autumn Johnson	Tierra Strategy	CEO
Kate Bowman	Vote Solar	Regulatory Director
Alex Routhier	Western Resource Advocates	Senior Clean Energy Policy Analyst
Murphy Bannerman	Western Resource Advocates	AZ Gov. Affairs Manager

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

- Ongoing commitments include.
  - Distribute meeting materials three business days prior to RPAC meetings.
  - Encourage transparency and open dialogue.

- Slide 5 – December Meeting Recap
  - In November, the 2022 DSM Plan was approved by the commission, and the 2023 DSM Plan and 2023 Transportation Electrification plans were filed with the ACC.
  - APS highlighted ongoing developments with Western Markets and its importance for maintaining reliability, integrating clean energy, and increasing customer cost savings.
  - E3 elaborated on the timeline of new resource additions and potential factors that can delay power projects.
  - APS detailed its 2023 IRP framework and proposed scenarios, sensitivities, and assumptions that it will consider during the modeling process.
  - APS shared an overview of gas markets and how fuel prices are forecasted.

Ted Geisler (APS/President) – 2023 RPAC Welcome

- Slide 7 – Clean Energy Commitment
  - Comment – Ted Geisler: Thank you all for inviting me and allowing me to participate this morning. Before I get into my background, the most important message I have to offer is a sincere thank you to all of you for engaging in this process and participating in the RPAC. I think our company has come a long way in terms of being as inclusive as possible and trying to be as informative as we can be across many different initiatives, with resource planning being one of the most critical. We could not do our job going forward without your engagement and support. It does not mean that we all agree on every decision or policy matter and that is okay. You have my commitment and the company's commitment that APS will be as transparent as possible, and I want to make sure that you hear it straight from me that we are grateful for your time and your engagement in this function. We think this is such a critical space in terms of planning for Arizona's future and ensuring Arizona's energy security. This all starts with robust dialogue. Your input, your perspective, your council, your criticism, and your feeling of safety to voice your own point of view is important to me and this company. I could not be more grateful for the engagement that we have seen from this group. I will be the first to acknowledge that we may not agree on every point and every aspect but that's okay, that is not the point here. It is so important to APS that we benefit from your time and your feedback.
  - APS is committed to achieving the goals of its Clean Energy Commitment.
    - APS is focused on ensuring that it decarbonizes while keeping cost affordable for its customers and while making sure it meets the Arizona's reliability needs.
    - APS cannot afford to place customers at risk from a reliability standpoint and APS is confident that it can reach its end goal in an affordable manner.
  - The planning environment continues to evolve rapidly for APS and other utilities.
    - Several surrounding utilities have similar clean energy goals and commitments, but many have flat or negative customer growth. APS is experiencing record growth which makes planning for the clean energy transition more challenging. APS must be careful and deliberate about its plans and create as much optionality in its plans as possible.

- COVID-19 impacts added to the rapidly changing environment and its impacts are still being felt today, especially with residential usage patterns. Historically, residential use was highly predictable and decreasing due to energy efficiency improvements. COVID-19 heavily impacted those usage patterns and now APS must predict how those patterns might change in the future as people continue to return to work.
- APS is experiencing record commercial and industrial growth that it must plan to accommodate.
- There is an industry wide trend towards electrification.
- The safety net that utilities in the broader southwest have relied on when their load forecasts have been wrong has historically been the wholesale market, but that safety net no longer exists. APS must procure new resources and APS' focus is that the new resources are as clean as possible because it can no longer rely solely on purchases from the market.

- Comment – Ted Geisler: There is more complexity than ever before. APS is not going to give up on its principles and it must remain vigilant in meeting its Clean Energy Commitment. The complexity of the environment emphasizes how important the RPAC venue and RPAC members are to help navigate all these challenges and ensure that the right plans are being made for the State's energy security. APS wants as much flexibility as possible and wants to make good on its Clean Energy Commitment. APS recognizes that coal has an inevitable retirement, and we support that. Candidly, I am proud of the fact that we have chosen a path that gradually transitions off coal. That should not be interpreted that I think coal should live past its rightful retirement. I am committed to its retirement, but had we retired coal in a timeline similar to other states, APS would be at risk right now from a reliability standpoint. Retiring coal in a responsible manner and over a timeline that affords APS the opportunity to build replacement resources has proven to be beneficial to our customers. APS has to recognize that natural gas is an essential resource to help bridge the transition from a heavy coal portfolio to a 100 percent clean portfolio. Lastly, but importantly, I am quick to remind our team, our customers, and our stakeholders that I believe APS is only scratching the surface in terms of our own customers becoming a resource that helps APS fulfill its energy need in the future. I loved seeing how important of a role our energy efficiency programs played in meeting our needs for peak hours in the summer. I expect that we need to remain vigilant in leaning into our customers as a resource as much as possible and much more than we have in the past. I am passionate about this space, and it is a critical part in how we think about the future and hopefully you found it valuable to hear a little about my perspective.
- Question – RPAC Member: On the comment about if you had more expedited coal retirements that somehow you would be at risk. I don't think that is necessarily the case and I was wondering what you were basing that on? You could do good planning with expedited coal retirements as well. I just caught that comment and frankly disagree with it.
- Response – Ted Geisler: I respect your view. Truth is, we will never know what the actual outcome would have been had something been done different. For me, it is about recognizing that we are committed to coal retirement and despite pressures from many different areas to try and keep coal operating longer than we have planned, we are committed to the transition, but we can't ignore the fact in recent times we have been heavily dependent on that resource to buy us time to build out our clean energy portfolio. I look at a few years ago, we never would have predicted the supply chain constraints that we have seen. They are real and it has provided a meaningful impact to our operation. It is amazing to me that not long ago all of us were focused on just in time manufacturing and material delivery and now that is completely reversed. We are trying to inventory as much equipment as possible to build out new solar and battery storage facilities. The fact is they are all on delay due to supply chain shortage. I am confident

that will sure itself up in the coming year or two. In the meantime, based on the current resource portfolio, we are dependent on coal at the present. That should not be confused with our continued commitment to ensure that we responsibility exit from the resource type. Looking back years ago there could have been a different construct that could have worked, but in either case we are aligned on the needed exit.

- Question – RPAC Member: When you were talking about gas as a bridge fuel, I just wanted you to say a little more about that. In the November, Justin Joiner said that it was not a 20-year bridge and I'm just wondering if you could shed more light on your views on the role of gas as we transition to clean energy?
- Response – Ted Geisler: Absolutely, I'm talking more broadly and less specifically. If I look at the peak days for example, and what contributed to serving our customers on the peak days and ensured grid reliability, our gas portfolio continues to play a more critical role in being a shock absorber of the system. For example, in the early morning hours, before we get the benefits of some of our clean energy resources ramping up, it is the gas fleet that compensates that gap. Then during the peak after the sun sets, before we are able to benefit from the battery storage portfolio that is currently under construction, it is the gas fleet that is currently bridging the gap. As APS continues to retire the coal fleet, the gas fleet buys APS time between losing base load resources and building up clean energy resources. At some point the current technology of storage reaches an expiration of its ability to serve our customers in peak hours. Then you need to rely on more advanced storage technologies or long duration storage. We need existing resources to bridge the gap between what is currently available and what the supply side is still developing. It is more of a philosophical view than it is anything more specific.
- Question – RPAC Member: I appreciate the overview, it's always helpful to hear from the president and understand what his thinking is. I really appreciate that you were talking about focusing on the customer side. The company does not make as much money that way, compared to putting steel in the ground, but it is the low hanging fruit and given all the challenges ahead, to me, doubling down or tripling down is really important. I wanted to ask about regional markets. I do a lot of work on regional markets. On February 1st, the CAISO board is going to vote on whether the extended day ahead of market (EDAM) should go forward. PacifiCorp has already said that it is going to go forward and join EDAM. APS used to be a leader in this space with other utilities really pushing to get that next piece of the market to build on EIM. APS has fallen off and is not where leading in the space today. I am curious if you can inform us on what your thinking is around EDAM? We really have not heard much other than that you are evaluating options. I appreciate that you have been on the trading floor, I think that anybody that has been in the room gets the whole idea of being able to trade with people and how that can really hold up the system.
- Response – Ted Geisler: Yes, the trading floor and our engagement with the wholesale market is near and dear to my heart. The team is probably sick of hearing me engage and comment on that, but it is one of my favorites and I believe one of the more important parts of our operation. I fear that I am probably going to disappoint you in the answer because I'm not likely going to have any more specifics than what you have heard from the team. Here is my view of it. I fully embrace the progress that the west has made on engaging wholesale markets. The efficiencies that have been gained by the EIM have are terrific and valuable to all of us. The next natural evolution is the day ahead market. The governance issues in California are real and cannot be ignored. If there is a solution to be had that can accommodate the governance issues, there is tremendous opportunity for the day-ahead market to continue to grow. I support the direction that many of the jurisdictions have taken in the west, which is you cannot just rely on California to take care of the governance issues itself. What if that never happens? We need to entertain other solutions and continue to be

patient and let California work through some of its governance changes. If those come to fruition, there is a terrific opportunity. If they do not, what I do not want us to be doing is sitting here not engaging in a day-ahead market just because we were waiting on the California policy to mature. That is where other options would be valuable if that is the only way that you can take advantage of the wholesale market. Once you put in a day-ahead market there is a next iteration that can provide further benefits. I am very pro markets. I think it is the best way for the west to serve customers in the most affordable manner while also taking advantage of the diverse set of resources and peak time periods. We need to stay fully committed to seeing this through.

- Comment – RPAC Member: As we go through this resource planning process, one of the things we have to keep in mind is that every day that we do not have an extended day market or more market services, APS is charging its customers more than what is necessary. Back to the leadership issue, early joiners who say "I'm in here, I'm in there" can help push the market. I think using that bully pulpit is important and APS is a valuable utility in the market because of all your transmission and all your generation. I am going to be asking during the RPAC series to try and quantify what we are missing out on by not being more aggressive in joining some of these markets.
- Response – Ted Geisler: I do not want to ignore the fact that my expectation and Justin's expectations of his team is that notwithstanding a formalized day-ahead energy market is no excuse for us not to be actively engaged on a day-to-day basis with the day-ahead market that exists today. Albeit it is a less mature version than a formal full-fledged day-ahead market, but I know the trading team is regularly active in the day ahead market that is in place today. It is just not as automated as what the hourly market is thanks to EIM. That is the real opportunity for us to be able to mature to that next level.
- Comment – RPAC Member: Ted, thank you for taking the time to share your perspectives.

Eric Massey (APS/Director, ESG Policy and Reporting) – Climate Change Scenario Analysis

- Slide 10 – Update and Draft climate change results from APS' climate scenarios project with EPRI
  - Climate change analysis is common in the industry to help understand risks associated with climate change.
  - A high-level overview from the first phase of results will be discussed.
  - The next phase of the analysis will address the low carbon transition risk analysis and the low carbon transition strategy and the contextualization of APS' greenhouse gas goals. The information for the next phase will be summarized at a future RPAC meeting in the summer.

Steven Rose (EPRI/Principal Research Economist) – Climate Change Scenario Analysis

- Slide 11 – Background
  - The climate is changing, and it will continue to change. EPRI has been looking at how this could affect APS.
  - There is significant interest in decarbonization to limit climate change.
  - APS initiated the project with EPRI to investigate climate and energy system transitions to inform their climate risk management thinking. The three main tasks of the analysis are:
    - Initial physical climate risks assessment analytical foundation
    - Arizona low-carbon transition risk analysis
    - Low-Carbon transition strategy & GHG goals contextualization
- Slide 12 – RPAC's Initial feedback

- RPAC provided positive responses to APS that the climate scenario project is meaningful and will play a significant role in planning.
- Specific RPAC feedback was incorporated:
    - Developing capacity building and educational resources
    - Analyzing changes for climate variables and metrics of interest
    - Evaluating climate change regionally and for multiple individual locations
    - Transition uncertainty and risk analysis suggestions

Erik Smith (EPRI/Climate Resilience Analyst) – Climate Change Scenario Analysis

- Slide 13 – Assessing physical climate change for the region and select locations
    - Locations were detailed for the climate change assessment. Additional locations have been added so now there is six specific locations being studied.
    - Dozens of variables and metrics for the region and the six specific locations were developed.
- Slide 14 – Physical climate change – illustrating of high-level insights
    - Warming projected across all temperature metrics.
        - More extreme heat days
        - Longer and hotter summers leading to more heat during planned maintenance season.
    - Extreme cold projected to decrease in frequency and intensity.
    - Water stress projected to increase across Arizona.
    - Wind speeds have decreased across the Phoenix metro area, but there has been little change elsewhere.
    - Projected changes in wind speed are uncertain.
    - Confidence in change is allocated to the variables to help show what categories are likely or unlikely to change.
- Slide 15 – Sample quantitative results: physical climate change
    - Extreme heat could become four times more frequent by 2070 and occur earlier and later in the year.
    - Drought projected to increase in frequency significantly through 2070.

Steven Rose (EPRI/Principal Research Economist) – Climate Change Scenario Analysis

- Slide 16 – Potential types of impacts and responses
    - System elements assessed.
        - Generation
            - Thermal (common impacts)
            - Coal, natural gas (specific impacts)
            - Solar
            - Wind
        - Battery Storage
        - Transmission & distribution
            - Lines/conductors
            - Poles & towers

        - Transformers and substations
    - Demand
    - Human health
- Process
    - For each system element we identify:
        - Relevant climate variables
        - Potential types of impacts (positive or negative)
        - Potential types of adaptation responses
    - Includes identification of potential types of climate change impacts and potential management responses for consideration in a future detailed assessment.

- Slide 17 – Illustrative example: Thermal generation
    - Qualitatively assess how extreme heat impacts thermal generation.
        - There are potential impacts to efficiency of cooling systems.
        - Reduced generation capacity and increased heat rate.
        - Changes requirements for plant flexibility and operations due to shifting load profile.
        - Determine potential responses and specific potential adaptations to accommodate impacts.
    - Qualitatively assess how extreme precipitation impacts thermal generation.
        - Inland flooding – physical damage to power plant infrastructure
        - Determine potential responses and specific potential adaptations to accommodate impacts.
- Slide 18 – Mapping climate variables to system elements
    - A high-level characterization of the relationship between climate variables and system elements.
    - Tables function as a guide to inform conversations.
- Slide 19 – Draft high-level insights: potential types of impacts and responses
    - Climate change can impact many system elements of APS's business.
    - Some climate variables can impact multiple elements simultaneously.
    - Some system elements could be affected by multiple climate variables simultaneously.
    - Potential adaptation responses are specific to each combination of climate variable & system element.
    - Analysis of system element types of impacts and adaptation Informs system level assessment.
        - Integrated system-level analyses needed to identify additional potential vulnerabilities and adaptation strategies.
- Slide 20 – Next steps
    - Finalize initial physical climate risk assessment analytical foundation.
        - Provides an analytical foundation for informed dialogue and additional physical risks analyses aligned with TCFD.
    - Launch Arizona low carbon transition risk analyses.
        - Develop customized, plausible scenarios to evaluate energy system transition uncertainties and risks for APS.
        - Identify key risks, signposts, and tradeoffs for APS as it progresses towards its Clean Energy Commitment.
        - Provide scientific basis and grounded insights regarding transitional risk.

- Launch low carbon transition strategy & GHG goals contextualization.
    - Evaluate APS' GHG targets and transition scenarios related to international climate goals.
    - Educate on the relationship between global pathways and companies, including limitations of global pathways as guides for company targets.

- Slide 21 – RPAC Feedback Request
    - Question – RPAC Member: As part of this climate assessment will APS look at supply-side resources? It seems to me that supply-side resources are not subject to climate risks, which if maximized, will provide more stability in the resource portfolio.
    - Response – Steven Rose: This first task will be characterizing the relationship between changes in climate variables and various kinds of assets including the supply side resources to be able to talk about what those potential impacts might be and think about potential strategies for managing those impacts. This initial foundation we are building is identifying these relationships and informing where more detail and analysis can be done. This is meant to be a guide for conversation and to help to find those relationships and to inform future work.

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

- Slide 30 – Load Forecast Approach
    - Break out customers by class (Residential, Commercial, Large commercial).
    - Identify key drivers within each class.
    - Forecast key drivers within each class.
    - Aggregate forecasts to build final load forecast.
- Slide 31 – New Manufacturing and Datacenter Loads Add to Resource Needs
    - New manufacturing facilities and datacenters create large resource needs and have limited historical data.
    - Large loads require careful review and planning to keep the system reliable.
        - Customer interaction is relied upon to estimate load additions.
    - New large customer operations may also bring related supply chain customers.
- Slide 32 - RPAC 2021 Base Case Summary
    - Key Forecast Drivers:
        - New large customers are the major source of forecast growth.
        - C&I: anticipated supply chain for large customers and increased floor space usage.
        - Residential: increased "other" uses, semi-permanent remote work.
    - Question – RPAC Member: I am interested in what level of conversation is taking place between APS and any of these datacenters about how they may best avoid peak load impacts. I realize that they need to operate their business but I am wondering, to what extent, rates and overall energy usage is discussed?
    - Response – Ross Mohr: These conversations are ongoing, and datacenters are a new source of load so there are discussions about rates and discussions addressing peak demand impact. These customers are still so new that discussions are ongoing, and we are all learning.
    - Response – RPAC Member: I recognize that each of them are unique, but I am wondering if there are any commonalities that you are hearing from folks and if those commonalities may shift how APS is thinking about working with these larger customers.

- Comment – Kerri Carnes: The datacenter load that we are looking at is a little different in the sense that there is not a lot of flexibility. There is a desire from the datacenter customers for increased resilience and reliability that would potentially require some additional backup generation. We are looking at innovative solutions including rate solutions for other large customers that are looking at siting in our service territory that do have a bit more flexibility. What Ross is showing here is that there is significant interest from base load datacenter customers that are wanting to site our service territory. This is something important that we are collectively working on to identify solutions.
- Question – RPAC Member: The other thing that we have heard quite a bit about from large customers is the increased desire to have a significant part of the portfolio come from renewable energy and I'm wondering how much that factors into this as well?
- Response – Kerri Carnes: That is also happening in my space. I think you have hit it spot on. We have some larger C&I customers who have established their own clean energy goals. My team is working hard to develop solutions and products to meet that need. The Green Power Partners program that was approved by the commission is a really great example of that. It is something that we worked on in partnership with some of our largest customers to develop and we are seeing strong interest in that program. My team is very much engaging in those conversations with existing customers in partnership with our economic development team for new customers who are looking at coming to our service territory. The Green Power Partners program has been successful in trying to meet some of that need for some of our largest customers.

- Slide 33 – 2021-2022: Actuals vs RPAC 2021 Forecast
  - 2021 sales almost 1000 GWh more than RPAC forecast (strong residential sales).
  - 2022 sales almost 900 GWh higher than forecast, despite datacenters ramping slower than forecast (strong residential and small C&I growth).
  - 2022 weather-normalized peak 200 MW higher than RPAC forecast.
  - RPAC 2021 forecast under forecasted the recovery from COVID.
    - 2022 RPAC forecast starts higher than prior forecast but has slower load growth in residential and small C&I in later years.
  - Question – RPAC Member: Is it possible to see this weather-normalized data at the customer segment level?
  - Response – Ross Mohr: I don't have a slide right now that has the actuals, but the forecast is broken down on a customer level. That is something that we can follow up on.
- Slide 34 - Probabilistic Large C&I Customer Forecast
  - New forecasting process to include load impacts (sales and peak) of potential large customers (datacenters and large manufacturing – "XHLF")
    - All customers included are at the 100% locate stage of the economic development pipeline.
  - Probabilistic approach to model the uncertainty of load size and timing.
    - Probabilities reflect the status of project study, funding, and construction and reflect possible delays due to recession or supply chain issues.
  - Question – RPAC Member: As far as APS' planning process and also your actual transactions and deals with a lot of these big companies, is the opportunity to expand infinite? Or is there a certain amount in which APS cannot provide more power? Do we just build more plants as economic development continues, and we welcome all these large businesses to the valley, and then we worry about the water situation later or is there a line at which we cannot go

beyond? I am wondering if 20 new data centers show up tomorrow and say they want to build their shops in APS service territory, do you say yes to all of them? How does that work?

- Response – Todd Komaromy: A big part of what we are doing in the RPAC as part of the IRP process is the long-range plan. I know you just threw out the number 20 data centers, but there is an upper limit on what can be done at any given point. We have control over the timing on what we would have to tell the customers as far as staging when they would come in. We have multiple tools in the toolbox. The IRP process helps us assign those tools and put our plans together to address whatever that forecast ultimately becomes and have a resource mix that is diverse, adequate, and reliable.
- Response – RPAC Member: It just strikes me that, with our load forecast, we have been under forecasting and then we have communities in the Valley that do not have water and we have farmers in Pinal County that are pumping 100% groundwater. To me, it seems like there has to be some limit on what we can possibly do. I am just mostly thinking about this because I got an interview request yesterday about JA Solar coming here which obviously, from our standpoint, is a great thing to have solar manufacturing in the valley, but I wonder if at some point something has to give, and I was curious where that line might be.
- Question – RPAC Member: I have been curious about how APS is starting to think about reclassification when it comes to non-attainment of the Clean Air Act with ground ozone and how that impacts C&I customers. This is a greater concern for C&I customers that have heavy duty manufacturing or high-tech manufacturing in the state and concerns of restrictions that may happen if we do not fix the non-attainment issues that we are suffering from currently in the state. Especially as the reclassification deadline is pending in the near future. How are you all thinking about tackling this? We have not had a lot of discussions about this yet in the RPAC, but I think it bears some conversation about how that impacts C&I customers and how that should be considered as a part of our planning discussions.
- Response – Todd Komaromy: We can certainly add it to a future agenda and put it down for topics to discuss.

- Slide 35 - Load Forecast Update Summary
  - 2022 RPAC forecast shows slower “core” load growth (residential and non-XHLF C&I customers) due to changes in usage trends post-COVID, increased DSM, and model improvements.
    - Minimal change to customer forecast
  - Datacenter and large manufacturing customers (“XHLF”) are expected to be the major source of load growth, presented here with two scenarios.
    - 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
  - Slight increase to EV forecast: Guidehouse 2019 “Strong Market Transformation” scenario adopted into load forecast.
  - Forecast updates in progress (all with Guidehouse)
    - EV forecast to reflect increased adoption vs current forecast.
    - DE forecast to reflect increased residential rooftop solar (and battery) adoption.
    - EE forecast and DR potential Study.
- Slide 36 – Sales Forecast Update

- Large projected load increases due to prospective datacenters and large manufacturing.
- An increase of 20,000 GWh contributes to approximately half of the projected forecast in year 2038.

- Slide 37 – Peak Forecast Update
  - Peak forecast increases to 9,956 MW (low or 13,206 MW (high) vs 9,919 MW (RPAC 2021)
  - APS is now planning for a 117-degree max temp to the forecast. This adds 139 MW to the peak forecast.
- Slide 38 – Load Forecast Growth Summary
  - 2022 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.
  - Question – RPAC Member: Can you speak to impacts to the company on shifting demand to be potentially 50% XHLF in just 16 years? When you think about shifting completely who you are serving from 4% to potentially 50%, I am thinking about personnel or assets you have. I'm sure there are major implications for changing the type of service you have over a relatively short period of time.
  - Response – Todd Komaromy: It definitely has impacts on the company. The nice thing about the utility business is there is a lot of different communication that happens, and we are not the first to have dealt with these changes in our growth. We are leveraging those learnings. There are differences in how we need to staff up our economic development teams and those teams that help do the analysis on new customers coming in. Because of these types of forecasts, we are able to plan accordingly. Is there anything specifically that you are hoping to hear about?
  - Response – RPAC Member: No, I am just asking a wide-open question. I just want to know what are the impacts that you are seeing and how you are modifying it. I also wonder, are you pushing any of these datacenters to closing coal plant locations that already have infrastructure?
  - Response – Todd Komaromy: The datacenters work closely with our economic development team for site selection. It is a complex problem. We are not actively trying to push datacenters to those coal sites but as part of the coal transition, we are actively trying to find the best possible usages for those lands.
  - Question – RPAC Member: What are the impacts on the company besides the economic development staff?
  - Response – Todd Komaromy: Over time we have to be flexible and have an open mind to changes. This is one of those changes Ted was alluding to. There will be different use cases for the load that is coming in. The data centers have a steady use around the clock, so it impacts from that perspective. At the end of the day, these are peak MW, and our duty is to serve them reliably. We need to make sure we have enough resources available to meet those needs around the clock.
  - Response – RPAC Member: Another RPAC Member brought up a point about water, everything has been okay with water but now there is more of a recognition that maybe we are not quite okay on water, so I think keeping that in mind is important.
  - Question – RPAC Member: I'm curious if there is some kind of internal metric when it comes to water that you are utilizing to help understand the load forecast? Is that something that we could possibly explore within this group? Some kind of water productivity metric that helps us understand how we can decouple economic growth from additional water consumption and what are some additional tactics that APS can utilize as a part of the IRP to improve our productivity and efficiency of water?

- Response – Todd Komaromy: We had a healthy section in the previous IRP to address that. You can anticipate that will also be the case for the 2023 IRP. Certainly, having a discussion in this forum would make a lot of sense and we will add it to a future session.
- Question – RPAC Member: I seem to recall in TEP's 2020 IRP, when they provided us the portfolio dashboards, I think they might have included water metrics. Reflecting on the conversation that happened yesterday with the utilities and legislatures, I thought Justin did an excellent job. It is interesting to me that it is the environmental, natural resources, and energy committee, and they did not ask any questions on how water fits into this resource planning mix. I don't recall the 2020 APS IRP having a qualitative water section but if that was the case, I think that's great and I think we should be thinking about water usage for different supply side resources as well and how that is going to look over the next 15 years.

Michael Eugenis (APS/Manager, Resource Planning) - 2023 IRP Update

- Slide 41 – 2023 IRP Timeline
  - In the December RPAC meeting we spent time walking through the IRP objectives, the framework, and evaluation metrics. We also discussed different input assumptions.
  - APS is currently working diligently to define IRP portfolios and scenarios.
  - IRP will include a section on APS' response to ACC rules.
  - IRP schedule is still aiming for an August 1st filing.
  - Communication Plan will be a tiered approach.
    - RPAC to discuss and collaborate.
    - Broader stakeholder meetings are to inform others.
    - Aurora license holder training forthcoming.
  - February RPAC meeting will include a section to discuss updates on reference assumptions and cover additional information on scenario development.
  - Question – RPAC Member: What is file market report referring to on the timeline?
  - Response – Michael Eugenis: The market report is going to be a part of our response to the rules section. It will have a piece in the front section of the IRP as well. The first couple of chapters in the APS IRP speak to a swath of different areas in a more generalized format. If you looked at our 2020 IRP, there are sections on transmission, load, generation, fuel diversity, and future customer programs in that first section. We anticipate that markets are probably going to have a section within there too in the 2023 IRP.
  - Question – RPAC Member: I want to request to try to quantify this because I've always read your market sections and I appreciate that you have been putting them in the IRP, but I think we really need to start drilling in on the fact that not having market participation cost customers. What could APS save in customer costs if it were participating either in EDAM or in the Markets+ offered by SPP? I think it is time to put pen to paper and start quantifying. There is the state led market study that quantifies the benefits. It is a statewide quantification, but it was built out utility by utility, so I would really love to see some dollars and cents and not just a discussion of markets.
  - Response – Michael Eugenis: We are going to be working with Brian Cole who presented as part of our December RPAC, and he had a lengthy discussion about our involvement in market developments so far. We are going to be leveraging him heavily when it comes to our markets piece. He has been deeply involved in our participation in either

EDAM or other options throughout the West. I think we will be able to get really good feedback from him as to what that section will look like.

- Response – RPAC Member: I would be curious to see what APS would pick out of the statewide market study. I know you were also working with a number of utilities to try to do some analysis yourselves and I don't know that any of that has come to light or been publicly released, and I would be really interested in some of that. There is a lot going on and the more we can put out on paper the better it's going to be.
- Response – Michael Eugenis: I really like what Brian has put out. His three main points to market adoption that he talked about in December include cost to customers, integration of clean renewable energy into the future, and reliability. The is also a piece of markets involved with the optimization of transmission assets. There are benefits to the markets and it is something we are looking at in the future.
- Question – RPAC Member: I am glad to hear that you are planning to do a preferred portfolio, that was one of my criticisms last time and I hope that you do stick to that. My first question is about the Aurora licensure. A number of us are on the TEP RPAC as well. TEP had their RPAC meeting last week and there was some confusion about whether or not we can have one license and do both, or if we have to have a license through APS and a license through TEP to be able to do the modeling for each one. Do you know what the process is for that?
- Response – Michael Eugenis: I don't know that I can speak to it authoritatively. I know that APS has acquired licenses for the folks that have volunteered, so I can guarantee you that you will get a license from us. There are some stipulations that come with it, and we're going to have an NDA in place for that. There is a timeline associated with that license where it expires after a certain time frame, however, whether or not it applies to only APS data? I'm not aware of anything in the contract that says that. However, I think that that TEP is also pursuing licenses.
- Question – RPAC Member: It doesn't make sense to me that you would have to pay for these licenses so it just doesn't make sense to me that both TEP and APS would have to get licenses. I don't know if there is some way for you to confer with each other or check with Aurora on what the process is, but we don't need two licenses unless there is some sort of limitation on the data access. Another question is on the modeling. For the 2020 IRP, we got to see E3 modeling in advance, but we did not get to see the APS modeling until it was filed. Last time, TEP had all these dashboards where we could compare all the different portfolios to each other and then we had a meeting where we discussed each one of them. Is APS planning to show us the modeling in advance? Is that what this portfolio selection bar is here or how are you going to handle that?
- Comment – Michael Eugenis: Are you asking about how we anticipate developing each of these scenarios? Or are you more focused on the results, from a dollar per MW-hour perspective or emissions from each of those scenarios?
- Comment – RPAC Member: This question is about the latter.
- Response – Michael Eugenis: We anticipate sharing information as we can from the different runs that we perform. Admittedly, it is my first time going through this effort, and as we get there, I'll have to work with my team and work with our other internal stakeholders on what we're able to share. We are interested in being as transparent as we reasonably can be.
- Question – RPAC Member: Sorry, I don't think I'm following what that means then, I don't know why you would not be able to share the modeling results. Is that not the point of the RPAC?
- Response – Michael Eugenis: Yes, I did not want to make a blanket statement there. Anything that we file publicly will have an opportunity to be reviewed within the RPAC.

- Question – RPAC Member: I would encourage you to take a look at what TEP did last time because they did a dashboard for us where we could compare all of the portfolios and discuss. I don't know what the output is going to look like for APS but something user-friendly like that where we can compare apples to apples would be really helpful. My next question, we didn't get to see a draft of the IRP before it was filed last time, and it was a surprise once it got filed. Are you planning on showing us any sections or a draft in advance of filing, or will we just see the final result when everyone else does?
- Response – Michael Eugenis: Yes, we plan to include the RPAC in this process extensively.
- Response – Todd Komaromy: Yes, it is our intention to be able to share sections of the IRP prior to the final filing so that we are inclusive of all the sections that we want to be representing in the final product. I think it would be a better final product for all of us.
- Question – RPAC Member: Todd, you and I have had separate conversations about some of the qualitative sections that will be in the IRP, specifically having to do with the different technologies. Is that something we are going to talk more about? Or when might we start considering, for instance, how hydrogen ready will impact this IRP? I think Justin said yesterday, SMR best case scenario is 10 years, but this IRP is for 15 years. Is talking about the qualitative components factored into this timeline?
- Response – Todd Komaromy: It is a part of our timeline and we will definitely be addressing it as we go along. I think Justin is absolutely accurate and having detailed sections or quantitative information as part of this IRP is not timely for some of those technologies. We can absolutely get into that as we move along the timeline you are seeing.
- RPAC Member – Question: I think we talked about its importance. If there is a technology that is not timely, it is important to be reflecting on that here. You got a question from the legislature yesterday about building all new nuclear and not worrying about any other technologies. I think policymakers legitimately don't know that it is not a realistic possibility. They are asking you to model technologies that don't actually exist. I think that's important to be included, even if it can't be modeled.
- Response – Todd Komaromy: I appreciate that and it is our intention to help educate in that section as we have done in the past on other items.
- Question – RPAC Member: I heard Michael say you are going to do 10 portfolios. I sadly do not recall a conversation from December about the different portfolios, but I went back and looked at the slides and sure enough they are there. I only saw eight reflected. Where are the other two coming from and is there going to be any opportunity for stakeholders to suggest portfolios or are those already set in stone?
- Response – Michael Eugenis: Yes, still very much under development. What we had put together and shared in that December meeting was our first draft and that is what I want to spend more time on during our February session together. We purposefully didn't lay out all 10 portfolios because we didn't want to suggest that we knew everything that we wanted to look at already. We are interested in feedback on those.

Matt Lind (1898 & Co./Director of Resource Planning) - Next Steps

- Slide 44 - APS is Celebrating the third anniversary of its Clean Energy Commitment
  - The 3rd Anniversary of the Clean Energy Commitment.
  - 100% clean, carbon free electricity by 2050.
  - 65% clean energy by 2030 with 45% renewable energy.

- Eliminate coal by the end of 2031.
- Comment – Todd Komaromy: I did want to let everyone know that we appreciate these discussions and the meaningful dialogue and also bringing up the things that you want to hear about. That is extremely helpful to us. We all feel strongly about the Clean Energy Commitment, and we would be remiss if we did not bring it up on its third anniversary. Thank you all for attending. I really appreciate having this ability to go back and forth. It helps us make sure that we're providing the type of product that we need to as part of this IRP filing. Thank you all.

New Action Items:

- APS will address Aurora licenses for RPAC members in first quarter of 2023. Communication will be managed directly through email.
- Discuss IRP portfolio and scenario development in the February RPAC Meeting.
- Address APS water usage metrics and planning methodologies with RPAC members.