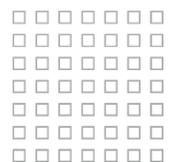


Meeting Objectives

- Provide recap of previous RPAC meetings and provide status of previous action items.
- Summarize RPAC feedback and suggestions for future RPAC meetings.
- Provide an update on the 2022 ASRFP bid submissions with statistics
- Provide RPAC members with an update on the current impacts of recent events in California
- Revisit the Load Forecast in preparation for the upcoming IRP
- Discuss ongoing developments occurring with the ACC.

Meeting Subject: September RPAC Meeting
 Meeting Date: 09/23/2022
 Start Time: 08:00am
 End Time: 11:00pm
 Location: Virtual

Attendees	Organization	Title/Role
Justin Joiner	APS	Vice President of Resource Management
Jessica Hankins	APS	RPAC Liaison, Resource Planning
Todd Komaromy	APS	Director, Resource Planning
David Peterson	APS	Advisor, Corporate Strategy
Elizabeth Lawrence	APS	Manager, State Regulatory Strategy
Mike Eugenis	APS	Manager, Resource Planning
Derek Seaman	APS	Manager, Resource Acquisition
Sadiya Jama	APS	Business Analyst, Resource Management
Akhil Mandadi	APS	Engineer, Transmission Planning
Lakshmi Alagappan	E3	Partner
Nick Schlag	E3	Partner
Matt Lind	1898 & Co.	Director of Resource Planning
Evan Lipsitz	1898 & Co.	Consultant
Chase Kilty	1898 & Co.	Consultant
Keaton Clark	1898 & Co.	Analyst
Alex Routhier	Western Resource Advocates	Senior Clean Energy Policy Analyst
Murphy Bannerman	Western Resource Advocates	AZ Gov. Affairs Manager
Autumn Johnson	AriSEIA	Executive Director
Johnny Key	Freeport-McMoRan	Director
Diane Brown	Arizona PIRG	Executive Director
Nitin Luhar	Mitsubishi Power	Regional Director
Nate Blouin	Stratagen	Western Policy and Markets Consultant





APS RPAC September Meeting

Sandy Bahr	Sierra Club	Chapter Director
Sam Johnston	Interwest Energy Alliance	Policy Manager
Teresa Brown	PG&E	Operating Clerk
Laurie Woodall	AZ RUCO	Director

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

▪ Slide 3 – Meeting Guidelines

- Continuing to share updates on the all-source RFP process evaluation schedule.
- Plan to talk about some of the recent events continuing the themes around some of the challenges in the industry, importance of resource procurement and, reliability aspects associated with the resources being procured, then we'll continue to expand on or discuss IRP. The IRP will continue to be more and more front of mind in our discussions as we move into the rest of this year and next year.
- We do have a couple quick updates as well about things happening with the ACC and APS.

▪ Slide 4 – Following Up

- The new docket number for the 2023 IRP was shared last meeting but it will continue to be shared as information is available.
- Ongoing updates on the all-source RFP process are continuing based on discussions and feedback we hear from these meetings.

▪ Slide 5 – Meeting Recap

- Discussion about the Inflation Reduction Act.
- Discussion of 2022 ASRFP and about broader market impacts
- 2023 IRP and some of the expected timeline.

▪ Slide 6 – 2022 ASRFP Update

- Update on 2022 ASRFP

▪ Slide 7 – Proposed Technology Review

- Comment – Matt Lind: Starting off with the all-source RFP update, last month I talked about the information at a high level but want to continue and prepare a little more detailed information around what we received as part of this 2022 All-source RFP solicitation. So as a reminder, if you see the table on the left-hand side of the slide you can see we asked for a variety of resources, both supply and demand side, Standalone Storage, Thermal standalone, Solar, Wind, Hybrid, as well as Energy Efficiency and Demand Response options. The pie chart on the right-hand side, this is a breakdown of what we received. The percentages are reflection of just count so it's not nameplate capacity weighted or anything of that which we have that information on the next slide.

▪ Slide 8 – Proposal Information

- Almost 31,000 MW received across all the resource types.
- Question – RPAC Member: Reminder, is hybrid solar + storage?
- Response – Todd Komaromy: The hybrid is solar and storage



APS RPAC September Meeting

- Standalone storage we've got ~5,800MW of standalone storage. Those were all 4-hour duration proposals. the hybrid options, which include storage plus solar, we did have a variety of durations that were offered as part of those proposals.
- Short duration was starting at 1-hour to the 4-hour duration and longer duration batteries were also submitted.
- 4 hour was the biggest chunk of the duration of the storage options received in the hybrid configuration.
- **Slide 9 – Effective Load Carrying Capability (ELCC)**
 - Effective load carrying capability assumptions was part of the evaluation and the reflection of numbers. For storage on a standalone basis or on a hybrid basis, if you look at this you can see what the assumed ELCC value was by resource type and by battery duration.
 - Comment – Matt Lind: This ELCC value is weighted in the nameplate capacity. So, I'll just share simplistically, I don't know how familiar or comfortable you all are with the ELCC concept, but you know simplistically if we had a 100 MW Solar, 100 MW storage hybrid resource, the 85% ELCC value would reflect our weighting of 85 megawatts for you know effective load carrying capability value for that resource. So, you get 85% credit of the total nameplate capacity if you will. Same thing with on a standalone basis for storage. If it was 100 megawatts of standalone storage and it was four hours in duration, 70 megawatts would be the accredited capacity value for it.
 - Question – RPAC Member: where do your ELCC % come from?
 - Response – Matt Lind: The ELCC values shown were provided by APS. There's not a standard one-size-fits-all value. For what these are for specific resources, it is regionally specific to where your resource is in the interconnection more broadly, and what are the other resources you're interacting with. What's the load, what is the customer demand profile that your resources are responding to, etc. So, there's a variety of things that go into it and there's not a standard value for this, so this is APS specific.
 - Response – Mike Eugenis: I was just going to add that we utilize a little bit of probabilistic modeling to cope through the exercise of calculating ELCC and then for the purpose of doing the evaluations within the RFP, we made some simplifying assumptions just because there's so many interdependencies on ELCC in your total portfolio. We chose these static values as kind of where these technologies are today for ELCC value, just to rank all the projects, knowing that you know, as you take different technologies within your portfolio, it's going to change over time.
- **Slide 10 – Proposal Draft Pricing Summary**
 - APS has not gone back to Bidders for revised pricing that might be impacted by the Inflation Reduction Act.
 - The pricing range all depends on the technology type, commercial offering, the term. Ultimately there is potential for movement in price based on the IRA.
 - Comment – Matt Lind: So we haven't done anything such as trying to reflect mean or median pricing, throwing out any kind of what we thought might looked suspiciously low or maybe higher relative to the range of pricing of products received so this includes everything outliers and you know we're also we have to be careful in sharing this information that we can't share anything that ultimately would allow you to distinguish individual bid information. We're trying to have some transparency to this information with you all while also not sharing anything that is competitively sensitive and confidential.
 - Question – RPAC Member: I'm just curious for thermal your LCOE it is weighted at \$33 and then it says reflects fuel cost only. Can you just say a little bit more about that?



APS RPAC September Meeting

- Response – Matt Lind: In that thermal row you can see two values, one under the LCOE and one under the capacity weighted ELCC. The capacity weighted LCOE value is the value for that resource where a value is reflected without any operational fuel cost assumptions. It's just strictly the cost to have that resource available and then when you use that resource, that's where the values are somewhat reflecting. The fourth thermal, that is just the fuel cost over the term length based on fuel price assumptions provided by APS for the cost of natural gas delivered. Each of those resources have different efficiencies, different heat rates, so is an average number, but it's the cost of fuel to operate the unit at an assumed 50% capacity factor.
- Question – RPAC Member: Did we talk about this when we did the all-source RFP? What are you using for your fuel cost assumptions? Is that today's price? Is that two years ago pricing? Is that a projection for two years in the future? Where is that number coming from?
- Response – Matt Lind: We did get the number from APS.
- Response – Mike Eugenis: We did have some conversation about this I think in our last RPAC meeting and I wanted to add some clarification to that as well. Our gas price forecast is based off market pricing, so we utilize broker quotes for the near-term time when the market is more liquid and that's a pretty accurate picture of what fuel pricing looks like. As we go into the future, there's a smoothing effect that's applied to that and then pushed out multiple years obvious and then it returns more to like a fundamental or a macroeconomic forecast.
- Question – RPAC Member: Am I right to assume BTA stands for build transfer agreement? And is there is there a reason why the storage industry is more focused on build transfer agreements than it appears the other resources are?
- Response – Matt Lind: Not necessarily, I do think some of this was a function of what was asked for in the RFP. I think the Thermal, Solar, Winds were basically just asking for PPA transaction structure in response, whereas the storage and hybrid were both PPA and BTA responses being an option for folks to offer in. We do see across the board differences in preferences for buyers of those products whether there's a preference for a PPA versus a BTA based on individual project profile, project risk, etc. So, there's a lot of things that go into that, but we see both being options that are being executed on.
- Question – RPAC Member: Since it comes down to really what was asked in the RFP, is it right to assume that APS is more interested in owning battery storage and that's why that option was provided to the battery storage industry versus the wind and solar?
- Response – Matt Lind: I don't know if that is accurate and Todd, Mike, or Justin, you guys might want to clarify anything that I would say. Here I think that. For batteries, I think one of the things that we see is, is the challenge of the operational flexibility that you have under a PPA versus an ownership structure. And so particularly with batteries their flexibility is something where it might be easier to look at those under BTA because of the flexibility that they bring. The operational aspects of it might lend to you need more flexibility to be able to call the battery. To charge or discharge more, or less frequently than what you know a PPA structure might allow.
- Response – RPAC Member: Yeah, I think that now that you said that that makes a lot of sense. The value stacking associated with the battery and the rigidity of PPA's, if you don't know what values you need to use it in in the future, the operational flexibility into that 20-year term gives the company a lot of flexibility.
- Question – RPAC Member: The other question that I had was just in terms of offers, what was the specification for an online date?



APS RPAC September Meeting

- Response – Matt Lind: Online dates were generally 2025 and 2026 and projects being available or online in December of 2024. I want to say there was some flexibility in the timing, but the focus was on 2025 and 2026, but we had flexibility for resources that were starting up as early as 2024 and stretched into 2027 as well.
- Response – Todd Komaromy: We really want to make sure that we saw commercial viability on these projects when we needed them.
- Question – RPAC Member: I was just wanting to follow up on another RPAC Members question. I assume those battery resources degrade over time. So, when you're looking at a PPA structure are the bidders bidding in a self-augmenting bid where they're guaranteeing a capacity over the term? or are they doing an overbuild bid? or are there a variety of options there and then how does that impact a preference between BTA and a PPA for the company?
- Response – Matt Lind: I believe for PPA, the specification was for augmentation to be included and then the assumptions and costs associated with that to be included in the price of the PPA pricing. And then the BTA would be with APS ownership, but I think augmentation would still be factored into the cost of that. Both of those are equivalently looking at augmentation over time versus initial overbuild but also still looking at guaranteed capacity, energy, and duration values.
- Question – RPAC Member: Would APS be factoring in its augmentation costs over time in the modeling for a BTA scenario?
- Question – RPAC Member: Why not use the fuel cost of solar for the LCOE calculation or wind for that matter
- Response – Mike Eugenis: Because solar (by itself) provides a limited amount of capacity value to the grid, we price its cost based on the energy it provides. Similar situation for wind energy.
- Question – RPAC Member: It seems you are comparing assets based on LCOE but calculating LCOE differently for each resource type. LCOE have some big drawbacks as a metric, but particularly when you're inconsistent with how it is calculated. LCOE should be total lifetime energy generation divided by total lifetime system costs. That's not what you're showing us.
- Question – RPAC Member: I had a similar point to an RPAC Members previous point. Will you please address this?
- Comment - RPAC Member: In very general terms, LCOE is the lifetime expected energy generation of your asset divided by the total lifetime costs, and that's not what you're showing us, especially for the thermal, because you're not showing us any of the hardware costs, you're not showing us O&M, there's a lot of cost in addition to fuel that you're going to get from a thermal generator. LCOE is problematic comparing different types of assets to each other, but now you're being inconsistent with the way that you're calculating it. What you're telling us is the LCOE of the fuel for thermal. You're not telling us the LCOE of thermal power plant, you're just talking about fuel. LCOE with different resources is already not an apples-to-apples comparison, but not including hardware costs, O&M, or financing costs into your LCOE is skewing that number and probably making it artificially low.
- Response – Matt Lind: There is an inherent challenge in trying to compare a four-hour storage resource to a hybrid solar plus storage with variety of durations and types, thermal resources, solar and wind. We are comparing apples to oranges to Peaches to kumquats or something, pick a favorite fruit, and so that is a challenge and people will naturally look at these numbers and want to compare them on a consistent basis. We've pointed out in here if you are looking at the thermal row, we've put the asterisks next to the LCOE value to reflect that this is fuel costs only. The hybrid resource that \$42 is reflective of the solar resource only, it's not reflecting the cost of the storage and how you might charge or discharge that and the hardware associated with that included in that hybrid cost as well. So, the solar and



wind we've got an expected production profile for those. Those numbers are based on a finite capacity factor curve. These are all very hard to compare to one another consistently. I think that's just an inherent challenge and we do have in the capacity weighted LCOC column, the thermal cost is reflective of the cost of that plant. the O&M, the fixed cost, the cost of having that plan available but not running it.

- Response – Mike Eugenis: If I can just add a couple of things to that, I think you bring up a good point and some good questions here too. Whenever we're doing and representing these kinds of costs, we're only showing one side of the equation, right? These are the costs that are associated with these resources, but it's not a picture of the benefits of these resources bring to the grid and so the timing and the nature of the intermittency. I don't think what we're trying to do with this slide is to say, "just because a thermal facility has the lowest overall LCOE means that that's the facilities that we prefer to satisfy all our energy needs." That's not what we're trying to say, we're just trying to delineate some of the different costs associated with these resources. As we move forward in the process, we're going to be looking at things of when am I getting this energy, what is that energy worth to me during those periods and how do I have further optimized my total portfolio of resources to minimize costs during our yearly production cost modeling. Resource acquisitions and resource planning, I would say it's hard to have a conversation, in simplistic terms. These are the guidepost for how you pick resources because there's too many things that play at once, especially with resources that you don't get to dispatch anymore, and so we're looking at things from both a coincidence capacity perspective to say, "okay, I need to make sure that I've got enough resources available in my system for the hottest day of the year here in Arizona and to be able to provide for all of our customer needs then and there", and then we're looking at things from a holistic, "what's the total energy that I have to serve throughout the entire year" and "what blend of resources gives me the most flexibility?" it's tough to operate within that range. When you get things like these thermal bids. It's incredibly difficult to calculate an LCOE without knowing how much those plants are going to dispatch in the future as well. At this point in time in the in the analysis that we've done we don't have that portfolio level view that says, "okay, this plant is going to run this amount of time" so we're just trying to delineate here. We think that the majority of the value of a thermal plant comes from that capacity, and we recognize that there is a run cost to these plants instead of it being absolutely zero with a solar or wind facility, which is more just capital costs.
- Comment – Nick Schlag: I might just add one more thing for clarity in all this, which others have alluded to, I think the purpose of showing this summary is largely informational, but in the process of evaluating these bids in terms of the short list and everything these numbers are not being used to compare one type of technology directly or head-to-head, or against another. There's no point at which where anyone is saying, "thermal is \$33, solar is \$35 the thermal is preferable."
- Comment – Matt Lind: We had conversations with the IM yesterday and we're working through what the short list is but as we talked about the evaluation and scoring, these resources are all scored relative to one another within those technology buckets. This cross comparison is something that we all naturally do, but when we're evaluating this preference for moving forward and looking at the system benefits and getting into negotiations and trying to sign contracts. there are more evaluation aspects that are more head-to-head within each of these technology bucket types.
- Question – RPAC Member: I'm just wondering, if the point of this slide is not to compare the resources against each other or to indicate how APS is going to be comparing them, what was the original intent of this slide? Is this just sort of an FYI?



APS RPAC September Meeting

- Response – Matt Lind: Yes, informational. There are other sources of information out there that is being reported regarding industry and other regions. These other resource RFP activities are informational and trying to show some transparency. We talked about costs going up and if you compare these costs to other numbers in the in the public, you might see that there are some price increases. There's a lot of nuances as you try to compare these things or look at these things and make heads or tails on things and aren't made just one based on comparison. Would you rather not see a table with this sort of information? We struggled with wanting to share information, and give data points and say, "here's how we're looking at it." We must be careful about how we're presenting the information because we can't present things that are distinguishable to individual bids.
- Comment – RPAC Member: I think having as much information like this is helpful, but it does seem like it needs to be kind of reflected in total and so maybe your kind of getting there, but when you just see one chart like this, it is a little misleading even though you've got some of the caveats on here. My eyes went directly to the numbers, so perhaps it is looking at it from more of a holistic point of view, like what a previous RPAC Member was driving at. You can look at the capital expenditures, you can look at fuel, you can look at all of it comparatively in one and then perhaps having some more of the breakdowns after that.
- Response – Matt Lind: I think that the challenge is the standalone solar. This is the average cost of resources that were received. Now what is the value of that energy as it supports the relative customer demand for APS that overall, how does it play within the rest of the resources, to the system, to the portfolio, both from a supply side and how that value is reflected relative to customer demand? Hour by hour is very complicated to be able to show that here and certainly an LCOE doesn't do that, or LCOC. It's not as easy as just reflecting that out of a production cost model either. We tend to talk about those in portfolio NPV's and variety of other metrics, but we haven't had enough time to evaluate at that level to be able to report this information to that kind of degree. We've got over 100 different proposal types we can't compare all of those at a very granular level ultimately, so we've got to send this list down to look at a smaller cut of these in a more detailed level.
- Comment - Justin Joiner: In my mind I thought that the way I'm looking at this is that the LCOC addresses some of those additional costs that an RPAC Member was referring to in the total operation of the various technology types. I know that we discussed this briefly earlier in the week, but is that a fair concept? The fixed cost that the Member is referencing, isn't that encapsulated in the LCOC? Maybe overly simplistically stating it, an aggregate of LCOE and LCOC gives a full value and cost appraisal.
- Response – Matt Lind: The LCOC value for thermal is reflective of those fixed cost for those resources on average. It comes down to how much, how much are you going to run it? What are the fuel costs? That fuel cost is an assumed cost based on an assumed operation that hasn't been verified from a system portfolio. How do these integrate into the overall broader APS system of other resources and support customer demand in any given hour?
- Comment – Justin Joiner: With a trade or a resource type I look at that as our tolling cost and \$33 might be the strike price if we want to run the facilities or utilize them on an hourly basis or an energy basis and maybe that's getting too much into the technical jargon, but I'm glad we're having this conversation.
- Response – Nick Schlag: As it relates to technical jargon, an analogy might be helpful in the sense that the reason that the costs are being presented this way is it is in a sense the sort of cost structure that APS faces in contracting for any one of these types of resources or purchasing any one of these types of resources. One way of thinking about the thermal cost breakdown here is it's a bit like what you would face if you're renting a car. If you go to rent a car, you're



going to pay some amount per day up front for that car rental, but then in addition, you're going to have to put gas in the tank. So, the upfront cost is kind of like the cost of the car rental. Then the cost of the energy that's in the LCOE column is a little bit like the costs that you incur in addition to putting gas in the tank. This analogy is a little tough to extend to the solar and wind, but one way of thinking about that is with the solar and wind under a PPA structure, you don't have that same upfront rental cost because we're paying per unit of energy with each of those, so even though those are fixed costs resources and we're paying per unit of energy one way of thinking about that is it might be a little bit like taking public transportation where you're paying per trip, not an upfront cost for the whole thing. So, all of these are a little bit different in how they're expressed. Now, which of these makes sense to pick as your mode of transportation doesn't just depend on those costs? It depends on how much you need to get places, how much you need to get from point A to point B, how frequently, how far you're going. That side of the equation is kind of what was alluded to. That's the value side that's not captured at all in a table like this.

- Response - Justin Joiner: I think it's a good analogy for us to have with broader audiences and not use the strike analogies that I was using a minute ago. I have a reservation with a 24/7 strike ability option and for others you're looking at as available, this is what it would cost to operate, or this is what the cost of energy would be. I don't know how we kind of can break that down and present it better going forward or conceptualize that, but I know the industry as a whole struggle with that.
- Question - RPAC Member: So, shifting gears a little bit, I think maybe I already know the answer to this, but are you mentioned that this isn't reflecting inflation reduction act price adjustments? Right. Are you going to at least get a rough estimate of those price impacts before you start compiling the short list? You said last meeting that those would be a point in negotiations with the bidders. Are you at least going to get a rough idea of how that's going to impact this pricing before you compile your list?
- Response - Matt Lind: We're not getting refreshed pricing from all the proposals before we strike the list down to a shorter list. Standalone storage for example, or battery storage technology, might be one of the technologies and pricing having more impacts felt to it from a cost reduction standpoint relative to the other technologies where you've already got existing tax credits or incentives in place that are maybe the IRA is extending or bumping those up a little bit. Some other things where it's not going to be felt as much there. It is a technology specific impact that the IRA would have and storage being one that's maybe more impactfully addressed by that, but we're carrying forward a broader shortlist than what we otherwise would have because of some of those uncertainties so that we are able to cast a wider net of resources to look at. The intent is that we're going to capture that, but we also move forward the 2025 commission date. APS needs to be able to get resources negotiated and contracted in a timely manner, so we're trying to move forward during uncertainty with the numbers. There's relatively similar movement within the technology classes.
- Comment – Todd Komaromy: We have expectations that both are going to rise together, but there will be an opportunity for entities to give updates, if they're applicable, before any kind of final decisions are made.
- Comment – Mike Eugenis: I think that you can see a little bit on this just has to do with what we expect from pricing on technologies as they go through a maturation process and something in the past we've seen solar pricing consistently decrease year over year and as that technology manufacturing has become more and more prevalent and the supply chain on it has become more robust, and I think that we no longer in this RFP compared to the previous ones and you see that there's more of a tie to the supply chain as a in totality with inflation data going up as well as the raw materials



APS RPAC September Meeting

becoming more expensive. Now we're starting to see that it's getting a little bit more expensive, so I think it's useful for us to understand too that the solar technology and panels aren't always going to become cheaper, and we may be entering a period where there's going to be consistent price inflation there as well.

▪ Slide 11 – Current/Ongoing Activity

- We have completed the qualitative, quantitative scoring.
 - A shorter list has been identified based on the RFP document scoring matrix and then screened down those proposals relative to one another in the same technology bucket
- Questions have come up such as how does the shorter list of resources provide benefits broadly across the APS system relative to the other supply resources available? How do they all interact to serve customer loads in the most cost-effective manner?
- That evaluation will continue getting into further due diligence, further evaluation, negotiations, and getting the pricing impacts due to the IRA impacts.

▪ Slide 12 – Remaining Steps

- The quantitative qualitative scoring has been completed and we are going to be moving forward with a shorter list to take forward. That's going to commence in the rest of the time that we have in September through the rest of the year.
- Expectations that contracts would still be negotiated and signed by Q1 of 2023.
- Question – RPAC Member: How many are left on the list? Can you share the breakdown in that list?
- Response – Matt Lind: We were just finalizing it yesterday; we can follow up with the numbers. I think in general we've got somewhere around 40 to 50 that we're looking at in more detail.

▪ Slide 13 – Discussion & Questions

Nick Schlag (E3/Partner) – Recent Events - California

▪ Slide 14 – Recent Events – California

▪ Slide 15 – What's Been Going on in California?

- A lot has changed since the 2020 August blackouts.
 - It has been approximately 2 years since that occurred in California.
- CPUC Mid-Term reliability procurement order.
- There are clean energy policy changes occurring.
- Diablo Canyon has new developments regarding the life of the plant.

▪ Slide 16 – Progress Towards CPUC's Mid-Term Reliability Procurement Targets

- The MTR states that by summer of 2021 11.5 GW of net capacity is needed from new resources.
 - Approximately 9.5 GW must be online by Summer 2025.
 - Approximately 2 GW online by Summer 2026.

▪ Slide 17 – Significant New Resources Needed to Meeting Reliability and Greenhouse Gas Reduction Goals

- Preferred System Plan – reflects the filings from the IRP.
 - Includes capacity requirements (predominately fulfilled by battery storage).
 - Has new renewable resources.
- Requires approximately 5 GW per year through 2030.

▪ Slide 18 – Tight Supply Chains Increase Solar and Storage Costs



APS RPAC September Meeting

- Significant cost increase in battery storage. Nearly double since a low point in 2020.
 - This can be partially due to earth metals.
 - Lithium price has increased 504% since Q2 - 2022.
- One-third of solar and storage projects were postponed due to supply chain challenges.
- **Slide 19 – Sept 6, 2022: Extreme Weather, High Loads, and Customer Response**
 - Close call due to heat wave in September 2022. This drove the electrical demand in California to all-time high levels.
 - Temperatures approximately 116 Fahrenheit.
 - All time system peak 51,426 MW.
 - This is 5 GW more than the August 2020 Peak.
 - This brings up a point: Is the risk of extreme weather being fully considered when anticipating the states peak load forecast?
 - Right after this peak the state sent out an emergency text alert asking customers to reduce electrical use.
- **Slide 20 - Sept 6, 2022: Resource Performance During Net Peak**
 - Net Peak is the greatest challenge for maintaining reliability
 - The most constrained period on the grid is right when the sun goes down when load is high and the output from renewables is down.
 - Approximately 26 GW of power generation was from Natural gas.
 - During this net peak period approximately 2 GW was due to Battery storage. This is a new addition when comparing to 2020.
- **Slide 21 – Sept 6, 2022: Imports from the NW and SW Were Critical**
 - California relied heavily on the resources in the western interconnection.
 - SRP & APS balancing authorities together accounted for approximately 3 GW of capacity during the constrained period.
 - Retirements of coal and gas resources is ongoing as well as a shift to renewable resources. This has the potential to reduce import availability in the future.
- **Slide 22 - Sept 6, 2022: A Hiccup in Storage Dispatch**
 - Batteries dispatched in California is different than other areas because of the centralized market. This would differ with a utility, such as APS.
 - During peak load the batteries dispatch in two periods. The “pre-dispatch” of the batteries in the real-time market likely contributed to making system conditions tighter during the peak period.
 - This shows that there is still a lot to learn and implement regarding battery storage.
- **Slide 23 – California Policies Continue to Raise the Bar Going Forward**
 - New Clean Energy Targets in the SB 1020
 - This states 90% clean electricity by 2035 and 95% by 2040
 - Governor Newsom encouraged CEC to adopt more aggressive targets for offshore wind.
 - New sales mandate for zero-emission vehicles.
 - 100% of new car sales by 2035.
- **Slide 24 – Diablo Canyon: What Happened and What’s Next**



APS RPAC September Meeting

- Diablo Canyon is California's last standing nuclear power plant.
 - Extend operations through 2029/2030.
 - Safety risk assessments from CA environmental review are required.
- License renewal must be filed with Nuclear Regulatory Commission soon.
- California requires that 2024/2025 IRP's do not include this plant in the resource mix.
 - It's in a way viewed as a contingency or a backup generator.
- **Slide 25 – What Does This Mean For APS?**
 - Extreme weather and climate impacts in load forecast is crucial in planning.
 - Are the demand forecasts systemically low?
 - Net Peak is now the main challenge for reliability.
 - Battery storage needs to continue to be studied and improved.
 - California remains on the cusp of load-resource balance and reliability risk.
 - The next couple of years will more than likely be turbulent. There will be a short supply of spare capacity on the market for this region.
 - Comment– Justin Joiner: I can speak firsthand that we did have a lot of sales into California in early September. I think it's important to note with your theme of we shouldn't focus on historic temps and past data, we need to look at trend and new norms. Arizona was largely the rarity that was at or below normal highs for that period, pretty much all the west was above and because of that Arizona as you showed was able to put 3 GW on the California system. If we were at more normalized or even higher than expected attempts like they were, what does that do? That obviously would have been a huge detriment to California but I do want to say that we had good diversity this summer to an extent where California, we imported at times that it made sense and we were able to return the favor for September and I want to denote just how important a regional model is and that we are fully dedicated to exploring that regional market with the various options that are out there. We have a team that is focused on that exclusively. This underscores the importance of it in the entire region was strained during this event, but Arizona and BPA were able to help and that's all part of that pool of resources. I was just reading some articles about Dominion NIPSCO, P&M, we know about Diablo Canyon, but I find it unacceptable if we allow ourselves to get into a position where we have to retract on commitments, delay, or go off the plan and that's why I just view the RPAC these discussions, these very transparent discussions is important so that we, we keep our plans, we are committed and we have good plans in place to ensure that we don't have to go the Dominion route and say “we need to extend now”. hope that other RPAC members find this data and this discussion, and you just presented is helpful. We're not hitting an alarm bell, we're just sharing facts and wanting to be as straightforward as possible so that we can continue these plans to make sure that we hit all our targets timely and if possible, ahead of schedule, but definitely not delayed or retracting. For what it's worth, I want to reiterate our commitment to a regional construct, regional diversity, and I also want to make it clear that this is just to share data that we are aware of the development, so we are taking the appropriate actions so that we don't wait until the last minute and say “wow, this just came out of nowhere and hit us upside the face and we need to take a drastic action”. I hope that RPAC members. take solace in that and know that we we're looking at everything.
 - Question – RPAC Member: At the end of the ACCE meeting on Wednesday there was a conversation that was relate to this conversation and there was a comment from ACC staff or maybe it was an insinuation kind of at the end that had



APS RPAC September Meeting

to do with selling into California, even in extreme weather events like this, was limited by resource type. I think the insinuation was that if you have gas, you can't sell that into California. I feel like that was conflating several issues and so I just wasn't sure if anyone had listened to that and if you could just confirm or not if that was correct.

- Response – Justin Joiner: There was no limitation on the types of resources that we sold into California, and we saw the highest prices and the largest demand in the evening where I can tell you that it would have involved gas, coal, nuclear. So, they took the electrons regardless of what fuel type.
- Response – Nick Schlag: I wasn't listening into the ACC meeting, so I don't have the specifics of the conversation but I will say California has a cap and trade program in the state and what that means as far as out of state generation is that if out-of-state generators want to sell into the California market you do face a GHG hurdle at the border where you have to pay for the cost of an allowance to get into the California market. So, I'm not if that's what was being alluded to, but that is kind of a dynamic that that is present given the state of California GHG policies.
- Question – RPAC Member: One of the things that goes through my head is you talk about California sort of being on the edge and the concern that that sort of brings to Arizona but I just want to make sure we're not overly focused on California because our neighbors to the East as well have talked about how they are precipitously close to the edge and your neighbors in this state have screamed related to the Coolidge plant that the decisions made around that are putting them precipitously close to the edge and whether or not the merits of that I know are debated by many of the people on this call, but my concern is, is all of that in concert and whether or not being hyper focused on California is even constructive for us and if we need to be paying very close attention to what's happening in neighbors immediately around APS and to the East.
- Comment - Justin Joiner: I wouldn't say that I can tell you that APS is not hyper focused on any area, we have to be planning holistically and seeing what all our neighbors are doing this ask that we had of Nick with E3 was because of the recent news. There's been a lot of publicity around the challenge, and we wanted to make sure that we brought awareness to it. I think we could easily make similar narratives around what's happening all around us.
- Comment – RPAC Member I just want to follow up with Justin, because Justin joined APS since RPAC has kicked off and as you were speaking, you know the thoughts in my head we're going back to the original RPAC meeting on April 15th of 2021. RPAC members were asked to provide their priorities for the RPAC, and I have my notes here regarding those priorities and one of which was real time scheduling for, for AGX to make sure that the efficient management of the system with this 200 MW of load. That has been a very constructive and productive conversation in another forum. One thing that I would love to understand from an APS perspective is level of transparency that you're giving to resource procurement into your efforts on West Wide RTO and ISO, I think that the WMEG is something that is happening, but there's very little transparency out of that organization and between APS and RPAC members on that topic. That was my second priority, and then my third priority is something that hasn't even been discussed within RPAC in the preceding year and a half which would be regional transmission planning and what is APS doing regarding regional transmission planning. I really do appreciate your comments, but I don't know that you've ever heard our priorities because that was a conversation that was had a year before you were around and so I just want to reiterate that and ask if there is opportunity in the future to provide a little bit more transparency on those latter two topics.
- Comment – Justin Joiner: On the WMEG, because we're part of a larger group and there we have to respect the dynamic of the larger group in regards to the WMEG, I'm limited there, but it is definitely not just part of our intention, but we're going to be very transparent and share with our Commission staff and obviously the RPAC what we're seeing



APS RPAC September Meeting

with our analysis as we're looking at benefit to costs of the various options. Once all the work has been done within the greater domain, we can then start to make that more granular and how that applies to APS and how we're specifically viewing the world. I would say timing for that would probably be second quarter of next year when we would be better positioned to start sharing that and what we're seeing and how we're viewing the world. We want to keep people engaged on that. I joined in June of 2021, so I just missed the meeting that formed the RPAC, we wanted to focus on the resource acquisition piece because of how dire the situation was at the time. The transmission planning continues to have more and more conversations internally. The markets and what we're looking at could all lead to the transmission planning topic that you raised. I personally have some concerns with just how slow that process can be. If you're looking at a regional dynamic, my experience has been you could identify a need and it takes a decade to get something built if it's cross state and there's mutual parties of benefit, looking at the cost allocation is always tough. We're wanting to look at something that maybe respects the regional process that we're going through, but also is timely enough to meet the needs that we have in the near and midterm. Todd's team has been talking quite a bit about the transmission part of the IRP and how we need to be thinking about that from expanding upon the resource mix. I don't have any black and white answers right now for you except that we are very much aware of the transmission planning need at a distribution and transmission level as we look at more and more intermittent.

- Comment - Todd Komaromy: I wasn't aware of those, so that's very helpful. I haven't had chance to chime in and just thank everybody for the discussion. I know we're not done with the meeting, but the discussion today has been tremendous. the market discussion is a huge part of our clean energy transition and the transmission aspects both of those great topics for future RPAC meetings, and I think you'll see that also through the upcoming IRP.

- Slide 26 – Discussion & Questions

- Slide 27 – Break

Mike Eugenis (APS/Manager, Resource Planning) – Load Forecast Revisited

- Slide 28 – Load Forecast Revisited

- Slide 29 – Load Forecast in the IRP Revisited

- Filing 2023 IRP next August
- Load forecast and needs assessment will cover a 15-year period.
 - Allows for development strategy for resource procurement into the future.
 - Load growth means that APS needs to take on future resource needs to meet the total load requirements.

- Slide 30 – APS Load Forecasting Tool

- The load forecasting tool is intended to narrow the key areas of the forecast that interest the RPAC.
 - The tool has levers that looks at distributed generation such as roof top solar, electric vehicle charging, and extreme weather.
- APS develops internal load forecasts.
 - The tool can look at total energy usage.
- APS wants to open it up and give RPAC members the opportunity to do the same with their own assumptions.

- Slide 31 – BAU Drivers

- In the last year there has been developments within the state of Arizona, new customers have come, and new facilities have been developed. The Business As Usual (BAU) have been updated with the information obtained in the last year.



APS RPAC September Meeting

- The same update will be applied to the RPAC load forecast.
 - This includes firm load coming in the future.
- APS wants the RPAC using an updated load forecast, the same that would be used for the 2023 IRP.
- **Slide 32 – RPAC Load Forecast Selection Results**
 - Results of our discussions last year.
 - The levers that were discussed including:
 - Business as usual, residential, commercial, industrial, and then the different categories that we layered on top of it:
 - Demand side management, distributed energy, electric vehicles, etc.
 - Extreme weather has a 2-degree Fahrenheit increase.
 - Question – RPAC Member: I think it might be worth considering how the passage of the IRA might impact EV and DG numbers as far as rooftop solar installations and or EV adoption. It might be worth some consideration on how it might make those numbers more aggressive. The second point, I hope that a lot of the debate and discussion will still be utilized going forward, even though we're revisiting it now.
 - Response – Mike Eugenis: To be completely transparent, that's absolutely our goal is to give the RPAC, the broader updates that we have for our base forecast that was information that nobody had a year ago. I think all the discussion that we had six months, a year ago, spanning over quite a bit of time, I think is still very valid. I don't want to walk away from what we've already worked on and decided and that's why I'm bringing this up now just to see if there's anything that is worth additional discussion. I appreciate your comment about the IRA and additional impacts there, but it is very much our intent here to utilize the work of the past year so that we can move forward and talk about other assumptions within the IRP and utilize this as the forecast for this portfolio.
- **Slide 33 – RPAC Load Forecast Going Forward**
 - APS will update the APS load forecast.
 - APS will update the base portion of RPAC load forecast with up to date residential and C&I projections.
 - APS will work with RPAC on IRP assumptions.
- **Slide 34 - Discussion & Questions**

Elizabeth Lawrence (APS/Manager, State Regulatory Strategy) – ACC Updates

- **Slide 35 – ACC Updates**
- **Slide 36 – Community Solar**
 - Commission staff has been holding Stakeholder Workshops discussing Community Solar.
 - Meetings held at least once a month
 - A two-day workshop on August 30-31, 2022, topics were covered such as:
 - Bill credit
 - Program implementation
 - Program modeling
 - Draft program proposed by the developers
 - APS proposal timeline. APS answered questions from commissioner officers surrounding consumer protections.
 - Next Steps



APS RPAC September Meeting

- APS will file a community solar proposal
- ACC staff will review proposal and write on it before voting on it
- **Slide 37 – Rate Case**
 - APS will be filing application at the end of October 2022
 - Test year will be July 1, 2021, through June 30, 2022
 - The case will include:
 - Minimal residential rate design changes
 - Topics ordered in the last rate case
 - Testimony on other topical items
- **Slide 38 – Next Steps & Open Discussion**
 - Question – RPAC Member: I'll just flag that one of the reasons I think it's important to talk about Community solar in the RPAC conversation is that during the August 30th and 31st meeting impact on resource planning and procurement needs based on implementation of a community solar program in APS service territory was a big topic of conversation. Something that was brought up quite a bit by APS was how this being a must take resource would or wouldn't impact costs of them being able to buy low console or resources from California. One of my comments in the meetings was that we should really be talking about this more in the IRP. I don't know when that conversation would be appropriate, but assuming a certain size of community solar going forward, at least after hopefully a November vote, I think would be prudent. I say that in not a rate case definition, but just in a way definition of the word prudent.
 - Response – Todd Komaromy: We're definitely watching this, that's why we asked for this presentation to be made and depending on how those things develop I think we can readdress that as we get further into the IRP process.
 - Targeting the next RPAC Meeting October 26th from 9:00am to noon Arizona time.