SRP ISP Summer Stakeholder Series: Meeting #1 Q&A

Renewables

Question: Can you give us a status update on the request for proposals (RFPs) on Navajo Nation and whether there is more to come?

Answer: As part of our current RFP process, SRP requested at least 200 MW of new solar to be developed on the Navajo Nation. We have made an award for a project located on the Navajo Nation and are currently negotiating a power purchase agreement with the awarded entity. SRP already has power purchase agreements associated with two solar projects located on the Navajo Nation (Kayenta Solar I and II) and has previously entered into a memorandum of understanding with the Navajo Tribal Utility Authority to work together in order to encourage development of more future solar resources on the Navajo Nation.

Question: With what is going on with the Electricity Reliability Council of Texas (ERCOT) does adding wind make you nervous?

Answer: The electric system in Texas operates under a deregulated environment, in which energy providers are required to bid into a market and are only paid if they are called upon and produce energy. In that environment, generators are not incentivized to make the needed investments to maintain reliability. Texas has faced continuing issues with its inability to incentivize the construction of new generation as a result of its structure. In contrast, SRP takes numerous aspects of system and customer needs into account when constructing new facilities.

Reliability and resiliency are key considerations for SRP as we add new resources to meet our growing customer load. SRP currently receives power from two wind projects in Navajo County, Arizona. We continue to consider wind a viable future option to help diversify our renewable generation portfolio. Because wind power is a variable resource (meaning it fluctuates), it's important for SRP's generation plants to have enough operational flexibility to respond to these changes in supply. Integrating natural gas and batteries as a complement to a diverse set of renewables, including wind, ensures a robust reliable system to meet extreme weather events while reducing carbon.

Question: Do we have renewable selection criteria that prioritize states that need to transition from coal? If we can't invest in Arizona wind, Wyoming wind is an investment that supports their economies transition away from coal. That's a great story to tell and while not as important to Arizona customers as Arizona invests, there is a clear value add.

Answer: SRP will consider wind projects in both Arizona and Wyoming, as well as other regions that may have viable, economic wind projects that are able to deliver to SRP's customers in central Arizona. SRP evaluates renewable projects based on a balanced set of criteria, including economics, counterparty strength, project location, development risk, and deliverability to our load center.

Question: Is there an opportunity to leverage some of the planned solar deployment (either before or after 2025, perhaps with storage included) in the form of community solar initiatives in partnership with other low-income communities in the Valley? These could potentially bring important community benefits while also addressing the goals of SRP and the sustainability and ESG goals of larger customers.

Answer: On May 3, 2021, the SRP Board approved the extension of a pricing rider to support a new customer program intended to leverage the planned solar deployed here in Arizona for residential and small business customers. The program is currently in development, and more details will be available later this year.

Question: What are the barriers or challenges for meeting the growing large business demand for renewable energy in the next 5 plus years? Which of these will be difficult for SRP to address without broader support within AZ or within the larger region?

Answer: As demonstrated by doubling our solar commitment to 2025 MW by 2025, SRP is taking steps to increase renewables, both to support customer requests for renewable energy supply, and to meet our sustainability goals. Currently, solar energy is among the more economic renewable resources for our customers, but many customers consume significant energy outside of daylight hours. Adding more solar than our system can support is a key challenge for reliability and affordability. Energy storage can help store and shift solar energy to evening hours, but at an additional cost. SRP still needs to develop more operational experience on how to optimally integrate storage resources into our system to maximize benefits for all SRP customers. We are on our way- beginning with 20 MW of storage pilots and applying lessons learned to scale up to an additional 373 MW by 2023. In addition, transmission, land and electricity system considerations will influence the pace and cost at which renewable resources can be hosted.

Renewable hosting challenges are not unique to SRP. Throughout the region, growing penetrations of renewables paired with retirements of coal, nuclear, and gas power plants have created growing momentum for regional integration solutions, such as a western regional market. A broader regional construct such as this could be helpful, but it would depend on the cost impacts and the preservation of a reliable system for our customers over the long-term horizon. Key considerations including but not limited to governance, transparency, cost-allocation, and reliability would need to be considered.

Storage

Question: SRP's leadership in solar is to be applauded. I'm happy to see the 2500MW commitment. As SRP knows, energy storage is critical to extend solar and other renewables to be 24/7/365 resources. Li-ion batteries can extend solar for 4-6 hours but technologies beyond Li-ion batteries are needed. Can we expect to see SRP leadership in R&D related to long-term storage? Perhaps leveraging SRP's influence within the Electric Power Research Institute (EPRI) to bring energy storage R&D to Arizona universities?

Answer: SRP has been active in investigating energy storage solutions through our research and development program. Since 2014, SRP has supported more than 40 projects focusing on the advancement and integration of storage on our system. Many of these efforts have been in cooperation with our university research partners. One current example is a project with Arizona State University (ASU) to evaluate various fluid chemistries for possible application in flow batteries. We are also long-

term supporters of EPRI's bulk energy storage research program. This program is evaluating many different long-duration bulk energy storage technologies, including mechanical, gravitational, and thermal energy storage types. SRP seeks to have our university and EPRI research complement each other so we are optimizing our investments to address the specific needs of SRP.

Question: The results of the previous IRP recognized natural gas as a way to meet peak demand and allow for higher renewable integration. Given the carbon footprint and long-life of new natural gas, why is SRP investing in natural gas rather than solely battery capacity? Is there a particular use case that natural gas can meet that storage currently cannot?

Answer: SRP foresees the need for investments in both natural gas and energy storage to meet peak demand, integrate more renewables, and maintain reliability. Natural gas resources are uniquely capable of meeting increasing peak durations, ramping up and down quickly or over time, and satisfying reserve requirements. Firm and flexible gas resources are able to provide these important reliability functions in the same day, over multiple days, or over longer durations when required for extreme conditions. Energy storage is limited based on its discharging capabilities (typically no more than four hours per day before needing to be recharged). Energy storage technologies will continue to mature, and SRP is interested in the many potential applications, including longer-duration storage, which is not yet economic or widely deployed at grid-scale. We are committed to meeting our long-term carbon reduction goals using an all of the above approach: renewable technologies such as our 2025 MW of solar by 2025 commitment, integrating the largest batteries in Arizona, partnering with customers to reduce energy usage, and adding flexible natural gas to maintain reliably. The combination of renewables, natural gas, and future storage will enable decarbonization at an affordable cost, without sacrificing best in class reliability for SRP's customers.

Question: How is SRP thinking about siting stand-alone battery storage? Near load-centers or near generation facilities? Along congested lines or less congested lines?

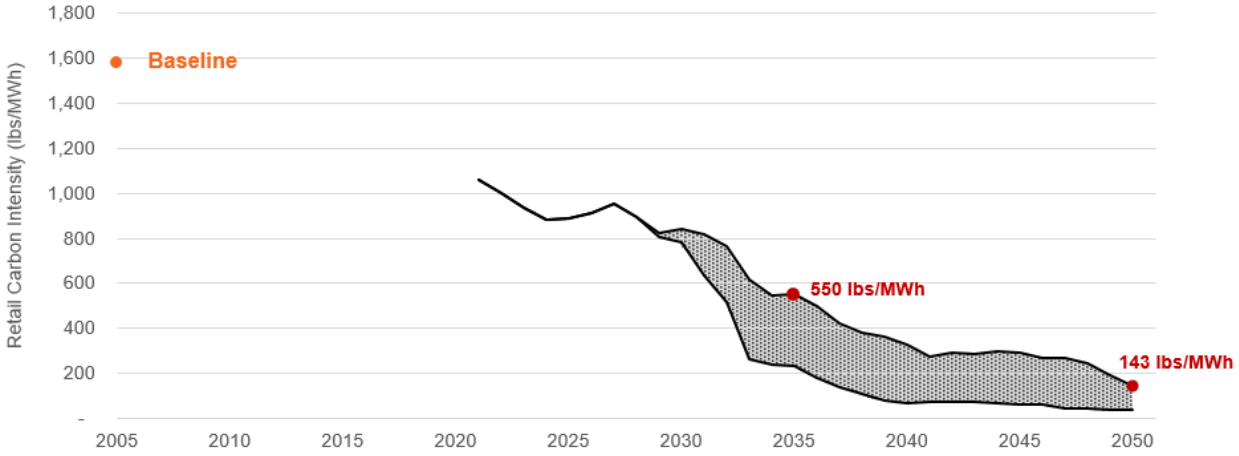
Answer: SRP believes that grid-charged batteries can provide locational benefits at various spots on its system and works with its internal generation, transmission, and distribution teams to evaluate and prioritize needs and specific use applications for grid-charged batteries. Today, SRP is still in the learning, researching, and testing phase for grid-charged applications, having installed two grid-charged projects to date, one at a substation and another at a generating station. SRP's Grid Enablement roadmap also includes several pilots in the coming years to explore how energy storage can be leveraged on the distribution system to address system constraints and defer infrastructure investment.

Coal

Question: Have you developed a graph that shows the net anticipated impacts of all of these various actions on coal emissions between now and 2032?

Answer: The net impact of coal reductions is complicated to isolate. Replacing coal generation while continuing to meet load growth results in portfolio choices combining gas, added nuclear, storage and renewable energy as we presented in the first Stakeholder meeting. We have developed the graph below that illustrates the range of carbon intensity pathways depending on the mix of resources in our long-term portfolio. A variety of factors will shape the exact mix including load growth, gas prices,

battery technology maturation and resource adequacy needs. SRP will, at a minimum, meet the 65% carbon intensity reduction goal by 2035 and the graph illustrates the reduction could be as high as 85% (relative to our 2005 baseline). Similarly, by 2050, SRP will meet its 90% carbon intensity reduction goal and the reduction could be as high as 98%. The ISP process will help us gather feedback from stakeholders on the tradeoffs to best balance affordability, reliability and sustainability when creating a system plan to meet our 2035 carbon goal.



Question: Are the upward trends in western temperatures causing SRP to reconsider the current resource retirement plans?

Answer: SRP does not anticipate changes to the announced coal retirement plans.

Question: Is the 65-85% carbon reduction from 2005 levels by 2035, rate or mass based?

Answer: SRP has committed to reduce the rate of CO_2 emitted per megawatt-hour (MWh) by 65% from 2005 levels by 2035 and by 90% by fiscal year 2050. This rate-based commitment scales with system growth, including economic growth and vehicle electrification.

Question: How does the projected 65-85% reduction in emissions rate by 2035 translate to a mass-based reduction? What drivers most impact where in that range you'll be?

Answer: With the forecast for annual electricity sales used in SRP's most recent completed annual plan, a 65% reduction in our carbon intensity is associated with a carbon mass reduction of slightly more than 35% from 2005 levels, while the 2050 projection correlates to a 82% mass reduction from the same baseline year. Drivers for the range of reductions include load growth, gas prices, and technology needs.

Economic growth in Arizona, including SRP's service territory, is among the fastest in the U.S. This provides a unique challenge for SRP to meet continued abundant customer growth while significantly and intentionally reducing carbon. SRP is on the path to our carbon commitments with early carbon reductions by doubling the commitment to solar energy by 2025, integrating nearly 400 MW of solar

shifting storage by 2023, and with the additional ownership share of 114 MW of carbon free generation at Palo Verde nuclear plant in 2024.

Question: Given the slow ramp time and high cost of ramping up and down for coal, does running coal resources for fewer hours of the year result in these plants being un-economic? How does SRP consider the cost per MWh when deciding how many hours a year to operate coal resources?

Answer: While daily fleet utilization decisions are made based on the marginal $/MWh cost of generation to meet daily load needs, seasonal operation decisions are made in the context of a total annual system cost. Seasonally reducing coal plant usage maintains the reliability benefits of the units and enables the addition of more solar on our path to lower carbon emissions. Announced retirement dates are supported by this system-wide economic analysis and the total cost of replacement resources.

Gas

Question: Glad to see some hydrogen enrichment - where is the hydrogen sourced?

Answer: SRP is taking steps to allow for hydrogen use and supports research on hydrogen production. At this point, SRP has not defined a source for future hydrogen utilization, but SRP participates in regional and industry research to help develop our understanding of hydrogen production and delivery pathways. Carbon neutral hydrogen can be produced by either using carbon free electricity to split water into oxygen and hydrogen via electrolysis, or from natural gas in processes that split off the hydrogen from the methane and capture the resulting carbon for sequestration. Producing hydrogen from electrolysis is currently more expensive, but many companies are working on ways to make this approach more cost effective. Delivery of hydrogen is another challenge. Existing steel natural gas pipelines can only be blended with hydrogen at low concentrations due to compatibility complications with hydrogen. For large quantities, new dedicated hydrogen pipelines or on-site production will be required. **Question:** Is SRP actively pursuing hydrogen blending in natural gas plants or just waiting to see if it becomes economical in the future?

Answer: SRP does not yet have a clear path or plans for delivery of hydrogen to blend at our natural gas facilities. However, we are active participants and funders of the Low Carbon Research Initiative (LCRI), a collaboration between the Electric Power Research Institute and the Gas Technology Institute. This effort includes funding from utilities across the country totaling over $100M. A primary focus of the LCRI is understanding the production, transportation, storage and utilization of hydrogen for power generation, including demonstration tests and pilots at power plants. Participation in this type of national level collaboration enables greater impact and faster development than we could do alone. We have an internal team that is supporting our LCRI involvement, evaluating our current gas plant hydrogen capabilities and informing our long-term planning. We expect to learn from the LCRI efforts near term and have that help drive the necessary industry improvements to enable potential use in the future. Ultimately, use of hydrogen will only happen if it can be made economic relative to other low carbon options. One potential scenario is that hydrogen costs will limit its use to peaking and back-up reliability needs, with other lower cost options providing most of the energy on annual basis.

Question: We are seeing concerns about adequacy in Texas and California again. The Texas winter shock has many lessons showing system wide issues that created a very brittle system when the system was stretched. How is SRP planning for robustness to shocks to the system?

Answer: Inadequate planning conditions in California and Texas that caused constituents to lose power have captured the industry's attention, and SRP is reviewing lessons learned. SRP practices planning and preparedness in several ways to demonstrate the robustness of system operations in extreme conditions. To begin, SRP's current and planned resource portfolio is purposefully diverse in both technology type and geography as an integral component to preserving reliability. Resource adequacy is a primary focus of our planning groups. This means having ample programs, generation, and transmission to serve SRP customers at all times of the year and developing contingencies for extreme conditions. To do this we analyze SRP's system and its performance against statistical variations in key drivers such as load and unforeseen transmission and generation outages. When appropriate, SRP has increased reserve margins (additional resources to serve possible unplanned outages or extreme weather events) to proactively prepare. In addition to our own internal evaluations and studies, we are also participating in several collaborative studies and regional discussions to quantify and support resource adequacy.

SRP also routinely prepares by evaluating the performance of our generation, transmission, and distribution system under extreme weather events, developing proactive maintenance programs and critical spare parts inventory, and partnering with neighboring utilities through reserve sharing groups to access a larger footprint of resources.

While we continue to evolve in our understanding of changing reliability challenges, SRP's planning focus is dedicated to securing sufficient resources to reliably serve customer needs.

Nuclear

Question: In April, senior VPs at EPRI participated in a panel discussion on decarbonization, electrification, resiliency, and equity in the clean energy transition. A significant part of the time was devoted to advanced/high temperature nuclear as a needed technology option and that EPRI and its member utilities are concerned about workforce development and supply chain/infrastructure to support nuclear. The three public universities in Arizona offer little in terms of nuclear education--the University of Arizona decommissioned its research reactor about two decades ago, for example. Does SRP have any plans to support local workforce development in nuclear to support Palo Verde or to invest in R&D in advanced nuclear technologies?

Answer: Over the past few years, SRP has funded and participated in EPRI's Advanced Nuclear Technology program, which consists of R&D activities that evaluate and address the challenges of deploying nuclear power plants of all generational designs. SRP joined this program when we were actively developing and preserving the option for new nuclear generation. With those efforts now on hold, we are still participating in the program to monitor technology developments. SRP does not currently have any plans in place to assist in local workforce development for nuclear as a support for the Palo Verde Nuclear Generating Station.

Question: How long is Palo Verde expected to be in service?

Answer: In 2011 the Nuclear Regulatory Commission renewed the Palo Verde operating licenses for all three units by 20 years. The renewed licenses for the units will now expire on June 1, 2045, for Unit 1; April 24, 2046, for Unit 2; and November 25, 2047, for Unit 3. The operating licenses could be renewed again in the future, but the decision to pursue such a renewal has not yet been made.

Markets

Question: If SRP were to join the California Independent System Operator (CAISO) day ahead market, when is the soonest that could happen?

Answer: The CAISO does not currently have a projected timeline for when the expanded day-ahead market might begin operating for participants within the Energy Imbalance Market. Deployment of such a market is expected to take at least 2 years once there is a successful pathway at the conclusion of the CAISO's stakeholder process. SRP would not be able to fully evaluate whether to join an expanded day ahead market until such a market design has been finalized, and would not immediately anticipate participating on day 1 of such a market, unless the development aligns with SRP's requirements for both a reliable deployment and upgrade of critical operating infrastructure as well as ensuring that the market construct would not risk or degrade current reliability objectives of our system.

Customer Programs

Question: Many parts of the country have been dealing with significant outages due to natural disasters. Have you inquired into how those events have changed customer perceptions of resilience and how that influences adoption of Distributed Energy Resources (DER)?

Answer: Because natural disasters and significant outages are uncommon in Arizona, SRP has not to date done extensive research on this issue. SRP does follow industry research across the country, which illustrates a growing expectation among customers regarding DERs and resilience services. Those expectations are primarily related to residential battery storage coupled with solar and electric vehicles. While the research captured the growing expectations around these emerging DERs, it did not capture a shift in customer sentiment around resilience or the DERs that might influence adoption.

New Technologies

Question: We have massive concrete resources all over the valley already. Is there a way to use some of that concrete for thermal storage?

Answer: SRP is currently co-funding a pilot project that focuses on whether this emerging thermal technology can be integrated with existing fossil generation resources to provide low-cost energy storage and reduce the degree of operational flexibility that may be needed at such facilities in the future. The project is part of a U.S. Department of Energy grant and if the concept proves successful it is anticipated it can be applied at all types of power plants, including nuclear, solar and wind. We are aware that other research is in progress to investigate additional applications for concrete thermal energy storage (e.g., commercial and residential buildings), but cannot predict if or when such technology may be available for incorporation into existing concrete structures.

Question: Ford is promoting using their electric F150 as residential back up. Is this being considered as part of the National Renewable Energy Laboratory (NREL) residential battery study?

Answer: SRP's Residential Battery Research Program scope currently only addresses research on residential batteries as part of our Residential Battery Incentive Program. It does not include electric vehicle batteries. However, as other vehicle manufacturers follow Ford's lead with similar vehicle-to-grid capabilities, SRP and utilities across the country will likely conduct research on a variety of vehicle-to-grid use cases.

Transmission

Question: Have you looked into the question of what would be required, in terms of distributed generation and storage resources, to offset some of the new transmission development discussed (and therefore avoid those costs and impositions on siting communities)?

Answer: SRP has analyzed several value streams that come from DER and storage including the potential to postpone or eliminate the need for transmission infrastructure. Those studies are very location specific, and we evaluate each situation on a case-by-case basis.

Question: Do decisions about where to add new transmission lines/upgrade existing transmission lines take into consideration where renewable resources can/ are being sited? How does SRP think about the cost burden of these upgrades between the utility (passed onto customers) and interconnecting generators?

Answer: SRP performs system impact studies for each new generation resource that look specifically at the transmission system and ability to handle the new generator. SRP has publicly posted Large Generator Interconnection Procedures as part of its Open Access Transmission Tariff. These procedures describe the cost allocation for transmission upgrades associated with new interconnecting generators.

Distribution

Question: Would widespread adoption of new electric water heaters, stoves/ovens, and/or winter furnaces significantly impact the distribution needs, in addition to electric vehicles (EVs)? Or are EVs the key technology?

Answer: Widespread adoption of any new technology that changes the amount of energy demand at the retail customer level carries the potential for impacting the distribution system. One historic example that resulted in significant impact to the distribution system was the widespread adoption of air conditioning, especially here in the desert southwest. Today, electrification of the transportation sector is occurring at a rapid pace. As a result, the potential impact of EVs as adoption rates increase is a primary focus in understanding distribution's evolving needs. The other factor that makes EVs particularly unique is that they can theoretically plug in and charge at any time and at any location. The mobile nature of this demand presents a new challenge to distribution planners, as demand has traditionally been presented in fixed locations.

Load Forecast

Question: Do the organizations you work with to develop the SRP load forecast also provide you with the components that make up the forecast (e.g., EV and DER)?

Answer: SRP uses data from multiple third-party organizations to support the development of its load forecast. For example, SRP incorporates data on economic forecast drivers received from UofA, ASU, Moody's Analytics and Woods & Poole Economics. We also incorporate data on end use efficiencies (e.g., heating, cooling, and lighting), which we receive from Itron and the U.S. Energy Information Administration. For electric vehicles, our forecast leverages research from EPRI on charging load shapes. For customer owned batteries, SRP uses processes developed in partnership with NREL, during the SRP Battery Research Project, to create load shapes from customers in the study. For other distributed resources we do not use a third-party but instead use load shape data we have gathered and analyzed from our existing customers.

Question: Are 100MW+ data centers an important growth area and a big part of the customer strategy for SRP on the energy side?

Answer: As the consumer and business demand for cloud-based computing services grows with new technologies and the expanded use of existing technologies, so too does the need for hyper-scale data centers. The Phoenix Metro area in recent years has become an attractive location for these data centers for a number of reasons. From SRP's perspective, as a not-for-profit public power utility, we do not have our own growth objectives. Rather, our role is to provide the best possible support to our cities in achieving their own economic development objectives including the types of industries they are looking to attract. That support consists primarily of providing electrical infrastructure, reliable power at low costs, and working closely with cities from start to finish on business attraction projects. We also need to ensure that we are able to meet our carbon reduction targets and to support the data center customers in meeting their own renewable energy commitments. Several high-tech businesses with large data center operations have publicly announced commitments to offsetting all of their electricity consumption with 100% renewable energy. We project that data centers will continue to locate and expand in our area, and we will need to add the resources to meet that demand, while keeping power reliable and costs low for all of our customers and ensuring that we meet our long-term sustainability goals.

Question: Will SRP also help data center customers reduce the massive amounts of water used for cooling data centers?

As a water supplier and a community and environmental steward, SRP has a vested interest in water conservation, and we recognize that data centers are large water consumers. SRP has been partnering with the University of Arizona over the last two years to conduct a comprehensive analysis of water and energy use in data centers. This research will guide the team to develop a multi-criteria decision support tool for data center cooling system optimization. The tool will allow data centers to analyze water-energy tradeoffs with different building configurations and cooling system designs, helping them develop holistic strategies for improving their water and energy management. Once fully developed and available next year, SRP plans to share the tool with existing and prospective data center customers.