

Santee Cooper IRP | Public Stakeholder Meeting #3

This Q&A Summary documents the questions and comments that were asked, and the responses that were provided in the Q&A window during the IRP meeting. The questions and written answers are generated by the Zoom platform. The live answers are transcribed from the recording, and are an attempt to capture, as closely as possible, each as it was provided. All live answers have been edited for readability. [Square brackets] are used to identify post-meeting amendments.

#	Question	Asked By	Response Type	Answers, Follow-on Questions, Comments or Input
1	Does PURPA allow small generators to sell electricity into this grid?	Robert McKee	written	Thanks for your question Robert. As we understand Section 210 of PURPA, there is no minimum generator size.
2	Critical Services Microgrids for public safety, hospitals, sanitation, emergency shelters, and other lifesaving public and private services should be included in your planning process. Resiliency, and year round savings from interconnected, islandable Microgrids are valuable assets in a hurricane prone region. Be prepared for the known knowns.	Keith Thomson	written	Thanks, Keith. There is certainly value in the resiliency that microgrids provide for. Santee Cooper would work with customers that are interested in developing microgrids.
3	Can you confirm that it is a possibility that it is a possibility that the municipal customers may renew their contracts after their expiration? If so, what probability would you assign for each customer?	Jonathan Ly	written	Yes; while we can't estimate the probability of renewal, we plan for these contract extensions through sensitivity analysis.
4	what years do each of hte respective municipal/off system contracts expire?	Findlay Salter	written	Thanks for your question Findlay. Details regarding the terms of each of these contracts are provided in Santee Cooper's Official Statement. A link is provided below; please refer to the Wholesale Customer Section beginning on page 38. https://www.santeecooper.com/About/Investors/easset_upload_file77065_59745_e.pdf
5	Can you also confirm that Santee Cooper developed annual forecasts for the intervening years not shown in this chart, and that they are only omitted only for presentation?	Jonathan Ly	live answered by Greg McCormack	Yes, absolutely. (followed by Stewart Ramsay) It's a great question to ask. Thanks Jonathan
		Jonathan Ly		Thank you!

6	Police and fire stations, Senior Living facilities, hospitals and urgent care centers, water and wastewater treatment plants, military bases, and other critical services that we know we would miss when they are constrained by extreme weather, cyber security attacks and other recurring problems. These assets are being aggregated into grid system cost-saving Virtual Power Plants. Keep up the good work in preparing innvations for a stronger, more resilient future.	Keith Thomson	written	Good info. Thanks, Keith.
7	Is it true that Duke Energy contract to supply Central ends in 2030? Close to the end of nuclear operating license of Oconee 31 or Robinson nuclear plant. What if the NRC doesn't renew their operating licenses and coal plants are shut down?	Richard Storm	written	<p>Good morning Richard, Here is a link to Central's IRP which addresses their Duke contract: https://www.cepci.org/sites/cepci/files/Documents/Central%202020%20IRP.pdf</p>
		Richard Storm		<p>The Duke contract is addressed on pg 20</p>
			written	<p>Thank you. My concern for the future of SC and the USA for that matter is, the move toward unreliable, intermittent solar and wind is going to contribute to Blackouts and Brownouts. The connection to reliable nuclear suppliers, Dominion and Duke is grear for now, but if these old reliable nuclear plants shut down (as their sister units in Crystal River and Three Mile Island have, then Santee-Cooper will need to make up the difference. The most reliable and least cost fuel is coal as Santee-Cooper has used for so many years. I sent you my comments and feel shutting down coal presents a great risk to SC. I appreciate the opportunity to submit my concerns.</p> <p>Thanks for sharing your comments, Richard. We agree that reliability is critical and any transition will need to carefully balance all important metrics (reliability cost, environmental impact, etc).</p>

8	Has Santee Cooper talked with Central on a combined effort / mutual goals towards DSM programs? I know this is easier said than done, but it seems like it could be highly beneficial to pursue.	John Brooker	live answered by Patricia Housand	Yes, I can. One of the things we have done is that we have used Central a very much as a resource for helping define our programs, especially with the new initiatives that we have pursued, such as demand response, and things like that. So we'll continue those discussions. We are just now starting the discussions with the combined effort. Because Central was so far ahead of us, with regards to a demand response program, we had energy efficiency that of course yields demand savings, but they weren't controlled demand savings. And so we have been getting our feet wet with what it takes to put into place a demand response system. And now that we've done that, we can sit back and just begin more discussions with Central about ways that we can combine forces and optimize using the information from both sides.
		John Brooker		Thanks, Patricia
9	Is it possible that the choice of test (UCT vs TRC) can affect which EE measures are included or excluded in Santee Cooper's portfolio? Or stated differently, should we expect to see the same resources selected regardless of test?	Jonathan Ly	live answered by Jim Herndon	So yeah, so the tests are different, so you do get different results. I mean, probably the most direct comparison is that the TRC includes the the incremental cost of the measure, whereas the UCT only includes the incentive offered by the utility. So if the incentive offered is less than the incremental cost, usually the UCT has a slightly lower cost as the comparison of the measure costs. So, there would be different measures, included in each day, different measures pass. And as we show, I think, in one of the upcoming slides, kind of the different counts of measures that passed the TRC versus UCT. So there definitely is a difference in using those different test perspectives for the screening.
10	Jim - did you say the 2019 study showed more EE savings than the 2022 study? Why would that be?	Chris Carnevale	live answered by Jim Herndon	I don't think I said that. So I apologize if I did. I didn't intend to. Again, one of the upcoming slides does show that that direct comparison, so we'll get to that in a second. So yeah, apologies if I misstated that, but we'll get into that.
11	What is rough proportion of Admin/Project Mgmt costs in total cost of EE programs?	Arvind Jaggi	written	Thank you for your question Arvind. In the ten year period presented, the admin/project management costs range from approximately 40-60% depending on the scenario.
12	thanks, I must have misheard	Chris Carnevale	written	Your welcome Chris, thank you for engaging today.

13	Generally speaking, how was demand response integrated into the potential study?	Chris Carnevale	live answered by Patricia Housand	The market potential study was an energy efficiency study. Just energy efficiency. And so with regards to our goals, we had already set out there for our demand response to be at 35 megawatts based on the need from the last generation study. And so we're targeting getting to 35 megawatts by 2027 and then increasing that to 44 megawatts by 2037. So we have taken that on and are looking at an innovative way to get that much under-demand response after not having on-demand response switches, just even when my two way switch is in the field for many, many years. So we've deployed a DERM system to be the brain for our demand response program. And we've looked at that separately, as far as a program separate from the market potential study for energy efficiency.
		Chris Carnevale		thank you.
MORNING BREAK				
14	Will Astrape or Santee Cooper be publishing and sharing the reports for the resource adequacy studies with stakeholders? If so, when can we expect to see them?	Jonathan Ly	written	The reserve margin report is not yet finalized. The results are being shared today; these slides will be posted on the Santee Cooper forum. Once the report is finalized, likely later this year, it will be posted on the forum as well.
		Jonathan Ly		Thank you! Do you have an estimate of when the reports themselves will be completed, or is it still a little far out to put a date on that?
			written	Right now it's a little far out to put a date on it. Thank you for your patience.
15	Is the GDP forecast error analysis for South Carolina? Or the entire U.S?	Ryan Deyoe	live answered by Nick Wintermantel	It is for the entire US. So we're basing that as though it would impact Santee Cooper in the same way. But we're really just trying to get what the error is in economic data, but yeah, it is for the entire US.

16	Have any attempts been made to assess load forecast uncertainty specific to Santee Cooper's historic load forecasts and their performance?	Jonathan Ly	live answered by Nick Wintermantel	So again, all the weather uncertainty in the model, and its impact on load is specific to how Santee Cooper customer load responds to weather. From an economic load forecast error standpoint, we have this more global assumption around load forecast error based on the CBO data. What we've seen is that it can be pretty difficult to understand that economic uncertainty for specific entities. So Astrapé, for most all of its studies goes back and uses the Congressional Budget Office for economic load forecast error. If we think about the economic load forecasts in the results, my guess would be that it accounts for maybe a percent or percent and a half of the overall reserve margin, because we have asymmetrical look of economic load forecast error. It's actually pretty dampened, because you can under-forecast as much as you can over-forecast and so the economic load forecast error, I would say is not not the largest driver in the study.
			written	Good morning Jonathan, Yes, we do evaluate the accuracy of our forecast on a monthly and annual basis, adjusting for weather impacts.
		Jonathan Ly		To clarify, do these evaluations factor into the determination of load forecast error/uncertainty included in Astrape's planning reserve margin study?
		Jonathan Ly		Thank you all for the details!
17	Resiliency microgrids are being added to the grid in areas with known problems for preparedness: https://www.power-grid.com/der-grid-edge/cpuc-approves-sdgc-owned-microgrids-for-resiliency/#gref	Keith Thomson	written	Thanks, Keith. We'll take a look at the linked resource.
18	In addition to the Base case and other sensitivities, can Santee Cooper and Astrape also consider a SERVM sensitivity that removes outlier low temperatures in the 80's?	Ben Pfeffer	written	Astrapé and Santee Cooper have discussed this issue; we feel using a full historical data set (41 years) is important since there is no assurance that the weather seen in the early 1980's won't happen again. Please see slide 49 in the presentation that shows how the last 40 years aligns much more closely with the full data results vs using the last 30 years.
		Findlay Salter		To clarify the question, due the uncertainty and our previous comment from IRP session #2 we are intersted in an additional climate change sensitivity as described above to understand impact

			written	Thanks for clarifying. A Climate Change sensitivity case was run, please see results on slide 60.
19	With respect to the temperature trend, can we assume that SC has evolved the calculation of Normal Temp (CDD/HDD) accordingly to - say, 20 years averages as compared to 30-year averages?	Arvind Jaggi	written	Arvind, I'm not sure I understand the question. Could you please clarify what you are looking for? Did Nick already answer it on his previous slide?
20	Nick - did I hear correctly that the 17.8%/2026 and 18.3%/2029 reserve margins are assuming all neighboring systems have no spare capacity during the weather event?	Chris Carnevale	live answered by Nick Wintermantel	So they certainly have, it depends on the iteration. Recall the model's stochastic, so we're running 2014, running it through 1000s of times. So there's going to be periods where they have substantial capacity available. Even though it's cold in their region, their generators may be performing very well, and Santee Cooper maybe not, so Southern Company may be sending power. So it just depends on the load resource balance during those particular hours. Now, we do have all the external regions set up to a target reliability, which is 0.1, which is kind of industry standard. So we're not forcing them to either be really long capacity or short capacity, We're putting them kind of at their target. So then we can just simply capture diversity of weather. Their loads may be a little bit lower. They may not be getting quite the extreme weather that Santee Cooper is. And generator outage diversity - their generators may be performing better than Santee Cooper's. Or worse. And so we're capturing all that through the stochastic simulations.
		Stewart Ramsay		Okay and so it's a reflection of what's going on in their IRP is and their planning that would would have us see a slight decrease in the amount we could lean on the neighbors.

			live answered by Nick Wintermantel	That's correct. My guess is if we're really going from 26 to 29. You're likely having more and more solar. And so maybe they're LOLE risk, if they had any in the summer, may be shifting more to the winter, which the now on these cold days, if you think about the cold morning at 6 a.m, sun's not shining, there's potential that there's just a fraction less available in the market in 2029 than 2026. If you think about a half a percent reserve margin for Santee Cooper 1% reserve margin is roughly 50 megawatts, a half is 25. So we're talking a pretty small, small movement in an overall market. Think about Santee Cooper and the size being 5500 megawatts of load, connected to Duke, Southern Company's 30 to 40,000 megawatts of load, Duke is similar - 30 to 35,000 megawatts. So it's talking to small movement in what could be available in the market.
		Chris Carnevale		Thank you for answering.
21	Is the 1,500 MW import sensitivity based on a historical maximum import seen between DESC/SC?	Ryan Deyoe	live answered by Nick Wintermantel	I have to recall, and I need some help from some of the Santee Cooper folks on this one. But I believe that was on the judgment of what we thought generally would be available getting into both of those regions at the same time. So kind of a simultaneous import into Santee Cooper, and Dominion, I think as we'll see in the sensitivities is important is that transmission is really not the issue on these cold days. It's not the transmission, so what it tells us is that it's capacity availability on the other side, that we're not really transmission limited, and I think the sensitivity will show that.
		Stewart Ramsay		So, what you're suggesting is the transmission system could handle more just that people don't have it?
			live answered by Nick Wintermantel	That's correct. Generally, when it's cold for Santee Cooper, it's cold in the entire region.
22	What's the basis for the 1,500 MW import constraint assumption?	Mike Lavanga	live answered as a bundle with Question 21 by Nick Wintermantel	
23	https://www.naruc.org/taskforce/webinars/	Keith Thomson		Thank you for the link and engagement.

24	This is just a comment for Santee Cooper. The reserve margin response shown in the Low Load response case should serve as a key point to the benefits of incentivizing weatherization of homes, especially homes built before 2009. The better residential shells are, the less responsive their load will be during winter freezes.	Ryan Deyoe	written	Thank you for your comment!
25	DERMS Get the Most from the Existing Grid June 24, 2022 With distributed energy resources on the rise, a model-aware distributed energy resource management system enhances their reliability. https://www.tdworld.com/distributed-energy-resources/article/21240529/derms-get-the-most-from-the-existing-grid	Keith Thomson	written	Thanks Keith, we are at the infancy of implementing our DERMS at Santee Cooper and are continuing to determine how to fully utilize that system in the future.
26	The studies seem to support a winter reserve margin closer to 18%, but the recommended reserve margin is 17%. Why was a reserve margin on the low side of the 17%-18% range selected?	Mike Lavanga	written	The study supports a reserve margin in the range of 17%-18%; the climate change sensitivity helped inform the final selection of 17%.
			live answered by Nick Wintermantel	I think with if you take into account all the sensitivities, even the climate change sensitivity, I think that probably edges it. But Eileen, my colleague from Santa Cooper may have a better response. I think, from Astrapé's perspective, we are comfortable anywhere between the 17 and 18%, based on the results. We know modeling is not perfect. We do think that sensitivities covered a wide range of the major impacts, looking at market assistance, looking at climate change, looking at high and low load sensitivities. So from Astrapé's perspective, we're comfortable anywhere between the 17 and 18%.
27	Ok - thank you	Mike Lavanga	written	you are welcome
28	Does the recommended 17-18% winter reserve margin incorporate the planned demand response and achievable energy efficiency savings from the potential study?	Chris Carnevale	written	The load forecast used in the reserve margin study was net of energy efficiency. Astrape modeled demand response as a resource.
		Chris Carnevale		Thanks. Was the assumed level of EE savings from the new study or the 2019 study?

			written	It was from the 2019 study;enhance scenario. The new study was not yet available when the Astrape study was being done.
29	I know we've discussed solar shapes before, but can you remind me, what is the basis for the solar shapes used for the analysis? Is it based on a set of historical locations, or is it using something like the NSRDB and NRELs SAM tool?	Ryan Deyoe	live answered by Nick Wintermantel	Yes, it's using the latter. So we're using the NSRDB and the SAM tool to create the hourly profiles. The internal data sets go back to 1998. So we've got specific sites within Santee Cooper, I can't recall, and maybe up to up to 10 or so sites to get to the roughly 1000 to 2000 megawatts of storage. So you're looking at 100 to 200 megawatt type projects. And yeah, so we're using the NREL dataset. It has irradiance data back to 1998. So we've got very good data from 1998 forward. Then we use the correlation between solar and load for that period 98 to 2020. So that backcasts what solar would be 1980 to 1985. So similar load day in 1980, January one, or use the same solar shape that we saw in the 98 to 2020 period. And that was kind of odd, but the the simple answer to the question is it's all based on the NREL data.
		Stewart Ramsay		So it's based on NREL and Santee Cooper footprint.
			live answered by Nick Wintermantel	Correct.
		Ryan Deyoe		Ok, thank you
30	Question about the batteries. Is grid charging allowed here? Or are the batteries constrained to charge only from solar if hybrid?	Ryan Deyoe	live answered by Nick Wintermantel	For this analysis, all the storage is allowed to be charged from the grid. So it's their separate solar and storage service? I mean, obviously, solar can be used to charge the battery, but, and the modeling the storage can be charged by the grid, in all cases.
31	https://www.greentechmedia.com/amp/article/long-term-value-of-grid-storage-is-all-about-capacity-study-finds	Keith Thomson	written	Thanks, Keith. We'll take a look...certainly the capacity value is a key part of the rationale for storage.
32	https://www.intersolar.us/webinars/long-duration-energy-storage/	Keith Thomson	written	Got it. We'll take a look and will be considering longer duration storage as appropriate, particularly on low carbon portfolio cases.
33	EFOR?	John Brooker	written	Equivalent forced outage rate

34	Have you considered greater penetration of storage or standalone storage on the grid to provide grid services? There are a lot of benefits from solar+storage hybrid systems on providing grid systems or stabilizing solar generation.	Ryan Deyoe	written	We will be speaking to this at more length in the afternoon, but we certainly will be modeling storage assets and capturing certain benefits of hybrid systems, the exact approach yet to be determined.
		Ryan Deyoe		Ok, thank you
35	https://etap.com/sectors/generation	Keith Thomson	written	Got it. Thanks, Keith.
36	How is Santee Cooper considering onshore and offshore wind energy resources for reliability, with and without battery storage?	Chris Carnevale	written	Hi, Chris. We will be addressing this during the afternoon, but certainly wind resources will be among the options, along with batteries to help manage the variability.
		Chris Carnevale		Thanks, Jonathan. SACE has published reports including onshore and offshore wind resources for neighboring utilities (i.e. Progress Carolinas/Duke Energy Progress) that show that wind energy can significantly help meet peak demands in summer and winter: - SACE, 2013 "SEA POWER: South Carolina's Offshore and Nearshore Wind Resource Coincidence with Electrical Demand Load" https://cleanenergy.org/wp-content/uploads/F-SC-Sea-Power-Report-8.7.13.pdf - SACE, 2021 "Achieving 100% Clean Electricity in the Southeast" https://cleanenergy.org/wp-content/uploads/Achieving-100-Clean-Electricity-in-the-Southeast-Report-Appendix.pdf
			written	Thanks, Chris. This seems likely to be directly useful. We'll review and incorporate into our assumptions as appropriate.
		Chris Carnevale		The data underlying the 2013 study is outdated due to evolution in wind turbine technology (and of course Progress Carolinas' historic load profile is not the same as Santee Cooper's future load profile), but there is still valuable information and themes on resource coincidence with load in the 2013 study. The study assumed the offshore wind farms were proximal to Santee Cooper's service territory, so that adds to the relevance.
				Ok. Thanks, Chris.

37	What are the assumptions about the siting of the solar resources shown in the solar volatility chart?	Jonathan Ly	live answered by Nick Wintermantel	That's a good question. So the hourly profiles, there's roughly 10 or 12 sides, but the volatility, which gets overlaid on the hourly is actually based on a neighboring utility's data, and they actually have a very broad level of solar. So if anything, from a volatility perspective, I mean, there's potential that we could be overstating the diversity benefits. This utility has significant solar across the Carolinas and it's got significant small projects as well. So I think the diversity benefit here, if anything, could be slightly high, compared to what Santee Cooper will actually see. So it is something we've mentioned and a potential sensitivity that maybe the diversity benefits are a little bit high. Represented by geographical diversity across the Carolinas, because Santee Cooper just didn't have any historical data. They don't have solar on their system, so we had to rely on a neighboring utility who was gracious enough to provide the data.
		Stewart Ramsay		Right. And so just to make sure I understand that correctly, if Santee Cooper would have put all, not that it could, but if it were to put all of the solar resources in the same geographic location, then we might be worried about this analysis. But if it were projects spread all over South Carolina, then this analysis is probably closer to being on the money. Is that a fair assessment?
			live answered by Nick Wintermantel	Yeah, this definitely is representative of a portfolio that's has a lot of geographical diversity
		Jonathan Ly		Very helpful explanation. Thank you!
LUNCH BREAK				
38	How does DEVA departing from VACAR impact the reserve margins that Santee Cooper needs to hold? Does this impact the SERVVM analysis in anyway?	Findlay Salter	written	The VACAR levels assumed in the study incorporated DEVAs departure.
		Findlay Salter		What was the impact to required reserves? Did the team identify what impact these additional reserves had on PRM?
			written	Reserve Component Requirement (MW) in Reserve Margin Study: Regulating Reserves 100 Spinning Reserves 110 Non-Spinning Reserves 110 We modeled slightly above Santee Cooper's responsibility (excluding DEVA); no sensitivities were run.

				I would note that the contingency reserves don't have a meaningful impact on the reserve margin and LOLE analysis because the spinning and non spinning reserves are allowed to be depleted during LOLE events.
39	https://www.canarymedia.com/articles/grid-edge/ohmconnect-raises-55m-to-enlist-more-homes-to-prevent-blackouts	Keith Thomson	written	Thanks, Keith. Looks interesting.
				VOLUNTARY Flexible Demand response systems, (Negawatts), are more equitable than blackouts and brownouts, aka FORCED Demand Response.
40	https://pv-magazine-usa.com/2022/06/28/ge-partners-with-department-of-energy-on-solar-energy-storage-grid-integration-research/	Keith Thomson	written	That's topical...thanks!
41	https://microgridknowledge.com/non-wires-alternatives-are/	Keith Thomson	written	We'll take a look...thanks.
42	When does S&P update their long term resource price cost estimates?	Chris Carnevale	written	Chris - Can you clarify? The S&P projections relate to fuel prices. The EPRI data relates to resource capital and O&M costs.
		Chris Carnevale		natural gas price, specifically.
			written	Got it...answered in the thread below. Thanks, Chris.
43	https://www.energy.gov/eere/buildings/articles/reduced-ac-loads-using-dehumidification	Keith Thomson	written	Thank you!
44	Is the EPRI TAGWeb source publicly available?	Ryan Deyoe	written	No, EPRI TAGWeb isn't publically available, it is obtained via a paid subsription.

45	I don't see anything regarding operational flexibility parameters, such as startup costs, part-load heat rates, ramp rates, minimum up/down times, and ambient temperature derates. Are these characteristics being modeled; if so, what are their assumed values (are they in EPRI TAGWeb)? These characteristics are important to value as more intermittent solar comes online	Bhawramaett Broehm	live answered by Bob Davis	We are certainly modeling every single one that was mentioned as part of our underlying assumptions in our dispatch model. As we talked about previously, and talk a little bit about today, we aren't getting into sub-hourly simulations within our portfolio evaluation. That's not our intent to get down to that level of detail, but we will be simulating, obviously, standard operating requirements and load following. So it is it is necessary to simulate the flexible capability of the resources, and we certainly will be modeling ambient or seasonal characteristics of the resource not only just pure Summer/Winter but looking at Spring and Fall characteristics also. We are going to generalize some of those assumptions. For instance our winter may be typical of some peak conditions during three months of the winter. Same thing for of the summer. And then three months each in the spring in the fall is not uncharacteristic for the way that utilities have typically modeled resource options. So those type of level of detail, and certainly with regard to start costs associated with these assets, minimum up and down times, ramp rates, etc, those will be included for purposes of our dispatch simulation.
		Bhawramaett Broehm		Thank you for the insights, Bob. Will these assumptions be made public, or will they remain confidential?
			live answered by Bob Davis	It is not publicly available, because we are making certain modifications to the underlying assumptions, etc. We can publish the assumptions we intend to utilize within our IRP as we've done here in this presentation. Where we're still working on those assumptions, I believe we will certainly publish them as part of this IRP process. And like several of the other assumptions that we've mentioned along the way, it's going to be later on. We're still working through assumptions. We want to get further into our evaluation process to make sure that we've got the right assumptions, and there's not additional research that needs to be conducted before we we finalize our assumptions. Sometimes you don't know until you actually start simulating and you say, "wait a second, it doesn't look right." So we want to make sure that we get far enough along in the analysis that we feel comfortable before we start publishing a full set of data and assumptions for consideration. And certainly, I will say that regardless, as we get into the IRP hearings, that information will be disclosed and available to intervenors in that process that are willing to sign NDAs etc to acquire our underlying database from Encompass.
46	I'm wondering are they on an annual update cycle like AEO or more frequent and when is their next	Chris Carnevale		That is a follow up question about S&P.

	update due on natural gas price long term forecast?		written	The S&P projections are updated at least quarterly. We'll look into the exact timing of the recent release shown in the current slides (don't have that handy), but we would likely update projections for purposes of the modeling work to the extent of significant revisions.
		Chris Carnevale		Thank you, Jonathan.
			written	<p>The S&P projections appear to be from March. I believe we do have updated projections from earlier this month, but we have not spent sufficient time with them to reflect herein or comment on the significance of any differences.</p> <p>Correction...While an updated set of projections may be available, we have not yet seen/obtained it. I was looking at a more recent dataset, but it was actually forwards, not an updated S&P forecast.</p>
47	Does santee cooper continue to model new resource options located only at Winyah site or are there any alternative portfolios with resources located at alternative sites nearer to existing natural gas capacity?	Findlay Salter	written	For the 2023 IRP we plan to study new resource options as non site specific.
		Findlay Salter		Could you further clarify that approach given the previously reported significant difference regarding transmisson network upgrade costs depending on the site where the new resource is located?
			written	For the IRP analysis a "generic" set of electric and NG transmission costs will be assumed. Once a resource option is identified through the IRP process electric and NG (if a gas resource is identified from the IRP work) transmissions costs will be analysed using the best information available at the time to determine siting.
		Findlay Salter		Thanks Eileen, so the iterative analsyis described above will be completed as part of the IRP process, prior to publishing of the 2023 IRP and identification of preffered portfolio?
			written	The IRP process will not be iterative. The IRP will assume reasonable electric and NG transmission assumptions; based on what is known at the time. Should Santee Cooper move forward to a site certification filing for a specific site, using most recent information, would be identified at that time.

48	What assumptions are given to ITC? Would assumptions be updated if Congress updates ITC in budget reconciliation this summer?	Chris Carnevale	written	We are assuming current law on ITC with a 4 year safe harbor for solar, fairly consistent with the assumptions in the 2021 ATB. The treatment for offshore wind may change a bit depending on what our review of the 2022 ATB suggests. Certainly any change in law would make us consider revisiting these assumptions.
		Chris Carnevale		Thank you. I think September 30 is the hard deadline for budget reconciliation for this year, so there should be better understanding of ITC policy going forward by then.
			written	Agreed. Thanks, Chris.
49	Could Santee Cooper build and own the solar rather than going the PPA route?	Mike Lavanga	live answered by Bob Davis	So as those who are familiar, Santee Cooper is a publicly owned utility, which means that we cannot access the investment tax credit. We have no income taxes that we're paying in order to apply either the investment tax credit or the production tax credit against. So at the end of the day, it's almost always beneficial for a municipal utility, a public utility, to utilize a PPA for solar resources and wind resources, so that we can acquire that ITC or PTC through the pricing mechanism. We will obviously in the future continue to look at self-build resources versus PPA options. If there ever comes a time when it's apparent that we could work with a developer to build an asset that would be owned and operated by Santee Cooper, and it would actually be cheaper than securing power from renewable asset through a PPA, we would be inclined obviously to do that because it's the more cost effective route assuming that other risks weren't imposed, that would change our decision. But at the moment, we're generally assuming that the PPA route will be the cheapest alternative for Santee Cooper and therefore the most desirable and probably the most appropriate to use within the IRP valuation.
		Stewart Ramsay		So the implications are the tax credits are significant enough that allowing somebody to claim those and pass that total netted down cost on to Santee Cooper would be cheaper than you. Santee doing it?

			live answered by Bob Davis	That's right. You can see the early years, and then there's a pretty steep decline from, I believe it's 27 through 30. Those are predominantly indicative of the effects of the ITC. And how you're assuming Safe Harbor tax related implications with regard to the quantity of ITCs that can be claimed by a developer than in NREL has assumed. That's that's one of the things we may modify that assumption just slightly to smooth out that curve a bit. What you see from 2030 and beyond though, is a relatively constant line there. That's because the ITC at a given point in time, late 20s, converts over to a flat 10% under current IRS tax rules. So you know, you could argue that maybe when you get out into those later years if the ITC was only 10%. Could Santee Cooper use tax exempt debt in order to overcome that 10% ITC benefit? Possibly. And that's certainly a point in time when Santee Cooper would go to the market, issue a request for proposals under, under its procurement policy, while at the same time look at it what a self-build option might be, to make sure that it's making the right choice between a PPA and self-built.
		Stewart Ramsay		Sure, so your analysis is based on you know, these are the things that we know are achievable, and down the road there's nothing that would stop Santee Cooper from making a different decision about PPA versus ownership if the ownership approach was more attractive to its members.
			live answered by Bob Davis	That's correct. Absolutely
		John Brooker		They wouldn't benefit from the federal tax credit
50	What percentage of the ITC and PTC are the solar and wind resources assumed to qualify for? Are the tax credits assumed to be extended, or do they follow the current phase-out schedule?	Jonathan Ly	written	They assume the current phase-out schedule, fairly consistent with the curves shown in the NREL Annual Tech Baseline materials (2021 edition). We are currently evaluating the 2022 ATB, which has only come out within the last couple of weeks. We will continue monitoring developments on tax credits.
		Jonathan Ly		Got it. Thank you!
51	Thanks - that discussion was helpful.	Mike Lavanga	written	You're welcome Mike. Thank you for the engagement
52	https://cleantechnica.com/2022/06/27/virtual-power-plants-do-more-than-aggregate-they-empower/	Keith Thomson	written	Thank you Keith

53	https://pv-magazine-usa.com/2022/05/03/top-ten-hybrid-solar-and-storage-plant-observations/	Keith Thomson	written	Thank you!
54	Thank you for the clarification	Bhawramaett Broehm	written	Your welcome and thank you for the participation
55	Is the cost of integration for solar based on Astrape going to apply to onshore and offshore wind as well?	Ryan Deyoe	live answered by Bob Davis	It will not be directly the Astrapé numbers because Astrapé did not evaluate the cost of integration for wind technologies. But what we intend to do is, through industry researchers, take a look at some of those costs of integration that we're seeing for wind technologies, taking into consideration the wind characteristics that exist here in South Carolina, both onshore and offshore, and utilize the Astrapé studies to help inform the development of some integration costs for those technologies that would be specific to our local service territory. I can't give you the absolute numbers right now. I can't give you the the absolute approach. I guess I'm asking you to take a leap of faith with us here that this is an evaluation that can be accommodated and developing reasonable assumptions and numbers that we can utilize within the IRP.
		Ryan Deyoe		Thank you for the explanation.
56	Have transportation concerns been considered for Hydrogen i.e. embrittlement ?	John Brooker	written	Hi, John. We are still developing assumptions on hydrogen, including several issues around production. Your input and information would be useful. Do you have some specific information/a resource you can point us to?
		John Brooker		Thanks, Jonathan. My understading on this topic is limited, but I know there are issues when transporting hydrogen via existing pipelines, especially in concentrations exceeding 15%, hydrogen gas can embrittle the steel and welds making them more prone to breaking. Also, since Hydrogen is such a small molecule it is much more prone to leakage. These safety concerns neccesitate upgrades or replacement to existing pipelines and are likely to increase cost to pursue the technology. More info here: https://www.energy.gov/eere/fuelcells/hydrogen-pipelines I hope that's helpful!
			written	Certainly is...thanks, John.

57	Has Santee Cooper performed any studies to evaluate feasibility of Georgetown/grandstrand service territory as an onshore location for the Carolina Long Bay wind area?	Findlay Salter	written	Great question Findlay. There were some preliminary studies completed years ago to determine the feasibility of interconnecting off-shore wind in the N. Myrtle Beach area to the 115 kV transmission system. The studies indicated that there was some potential but not to the scale of what is being discussed currently. Now that the auction has taken place, we will begin to better understand what the developers are intending to do and how to best plan for interconnection to the transmission system.
58	In Session #2, I believe that hydrogen was deemed purely "investigational". Has that now changed given that hydrogen is more developed than originally expected? And do these conclusions also extend to SMR/SNR resources?	Jonathan Ly	live answered by Bob Davis	I mean, we're still in an investigation phase. To the extent that we believe that we can develop credible assumptions that can be utilized within the IRP, then we intend to incorporate these technologies within the IRP study. That's probably the best way to answer that without too many words.
		Jonathan Ly		Makes sense. Thank you again!
59	How did Santee Cooper land on using Class 8 for the land-based wind assumption?	Chris Carnevale	written	Hi, Chris. The Class 8 data shown in the chart is simply an example...the wind maps suggest a range of wind resources. We've not settled on the specific class(es) to assume. Like solar, we may utilize an average of the dominant wind speeds, recognizing there may be limitations as sites approach the coast, where the wind is generally more favorable.
		Chris Carnevale		Thank you, Jonathan. 140 meter hub height or representative technology more like the ATB advanced scenario could be appropriate for Santee Cooper's service territory. For reference, see Georgia Power's proposed tall wind project as part of their current IRP proposal, which is a demonstration project of towers of 140-165 m. with on-site tower fabrication.
			written	Ok...will do. Thanks, Chris.

60	I would like to add that the downside of limiting sensitivities assessed locks in fewer futures that are assessed and diminishes Santee Coopers ability to plan for risk in their long-term planning efforts. This is why shifting to more probabilistic analysis assessing many combinations of key drivers such as load, DSM levels, fuel prices (both gas and coal) and other factors provides a more robust analysis. TVA does a fairly robust monte carlo analysis where they assess over 100 different combinations of variables and assess portfolios against how robust the NPVRR costs are against these types of combinations. This could be very valuable and help ensure risks are better captured.	Ryan Deyoe	written	Understood. At this time, we intend to model a wide range of assumed values for the key drivers in a scenario context. We believe this will provide sufficient information regarding risks of proceeding down a particular path. Thanks for your input, Ryan.
61	Will Santee Cooper's coal retirement evaluations include both hard-coded and model-optimized coal retirement dates?	Ben Pfeffer	live answered by Bob Davis	So for coal retirements, our intent is not to model optimized retirement dates for the assets, but to model sufficient number of coal retirement strategies. Keep in mind, we're only thinking about the Cross unit, so we only have one plant to consider here. We'll be able to model enough separate retirement dates and optimize the remaining resources around those coal retirement dates, that will be able to determine the effective date or the most optimum date and timing of those coal retirements. So for instance, if we retired the coal resources in 2028, so we could avoid ELG costs, then maybe we model the earliest, practical or technologically achievable retirement date, say in the early to mid 30s. And then we set a retirement date, perhaps sometime between the earliest practicable and the never-retired type configuration. We'd have essentially a curve that would allow us to establish when it really looks to be most cost effective to retire the Cross generating asset. While we aren't running an optimization within Encompass, we believe running a group of constrained or defined retirement strategies will give us exactly the same answer.
		Ben Pfeffer		Thanks! Yes, that helps
62	How does Santee Cooper expect to model noncommercial technologies like green hydrogen and carbon capture in the net-zero scenario?	Chris Carnevale	written	While the exact approach around assumptions is not set at this point, we expect to model these technologies in an optimization context, based on the assumed cost impacts. Does that get to the question?

		Chris Carnevale		Thank you, Jonathan.
63	Why wouldn't you let Encompass optimize retirement dates at least in the Economically optimized case.	Phil Hayet	live answered by Bob Davis	Well, if for instance, in the in the scenario that I described where we've got four separate timings, we run each one of those portfolios, we're allowing the model to optimize around that effectively. You can imagine a curve, which would tell you when the the optimum date would be, you'll find a minimum on that curve, if one exists, that would tell you it's most optimum to retire that unit by a date certain. So in our view, it's simpler to evaluate, as these discrete scenarios, and it's just a complication that's not required to simulate a retirement option within Encompass. Evaluating retirement options are more complex for mixed integer linear programs, such as Encompass. It adds complexity time, runtime to actually run it. So we would prefer and we think that modeling the multiple retirement dates is going to give us exactly the same answer that we would receive if we were to run a full optimization on the retirement.
			live answered by Bob Davis	And just just so everybody's aware of it's not like we're avoiding any cost, we're certainly going to capture the costs that can be avoided from the core retirements with regard to avoided fixed O&M and CAPEX. For each one of those defined retirement dates. That'll include avoided DIG costs to the extent that we can get the unit retired before 2009.
RH		Phil Hayet	open mic / raised hand	I think I appreciate the answer that you just gave, I do know, and understand the complexity in optimization that you're going to be going through. I don't know if you've tested it, and you've discovered, you know, challenges with Encompass and doing it. I certainly understand the thought process, but, my question, really is right now is, have you had experience with Encompass that that led you to make that decision?

			live answered by Bob Davis	No, we haven't encountered an issue that suggests that, "hey, we never want to do that", it's just a function of, you can get rather complex, and if you think about it as budgets continue to evolve with regard to avoided cost associated with the asset, every time that you, you may modify or fine tune that budget, you'd be forced to go back and rerun that evaluation. If we can model discreetly timed avoided retirement dates for the units, the rest of the data surrounding that is based upon the assumptions that we have in the model, and we can update for avoided costs specific to individual retirement dates, within an ex post reporting evaluation. And we don't really have to do it, and go back and rerun the model. So it's a simplifying approach that we believe will get to the same answer. If we were attempting to evaluate the retirement of multiple plants, multiple units and the timing of those individual plants was important. and there there was a relationship or an interaction between those multiple plants we'd be more concerned with simulating an optimized retirement strategy within the model. But we believe that given the fact that we're only looking at a single generating station, that this probably will at the end of the day is just going to be a much simpler and less time consuming approach.
		Phil Hayet	open mic / raised hand	Okay, I appreciate your answer.
RH		Bhawramaett Broehm	open mic / raised hand	I'm with Wartsila. First of all, thank you, for the presentation, Bob and for coordinating Stewart. So I know, Bob, you mentioned, I think I just want to make sure I heard it right. But for kind of the more flexible resources like battery storage, Recep engines and aero derivative turbines, despite not actually doing the sub-hourly modeling in Encompass. Did you mention that you were going to do some some sort of flexibility value metric or how exactly that was going to be calculated?
			live answered by Bob Davis	Well, I can answer the first part. Yes, we're going to attempt to do that recognize that benefit? How I'm not sure yet. Right now, we are not anticipating huge costs for cost of integration. So we wouldn't anticipate monstrous value for avoiding that cost of integration. That's effectively what we want to do is we want to make sure then when the model is considering an optimized portfolio that it factors in the value that might be available from these flexible type resources, so that their value can be fully reflected in the end the optimized portfolio.

64	West Virginia v. EPA case before the Supreme Court now may make CO2 regulations moot. Have you considered that adding coal generation may be feasible in this case?	Robert McKee	written	Robert thank you for your comment. Santee Cooper believes it's a key strategic objective to move toward a more diverse energy mix.
AFTERNOON BREAK				
65	When do you expect the video for this session to be available? And is there a deadline for stakeholder response to this session for it to be considered in modeling?	John Brooker	live answered by Stewart Ramsay	Video session to be in a couple of weeks, based on previous turnaround time, maybe a little bit sooner. Three to four weeks, looking at holidays, to turnaround the video as well as the meeting summary if as we do all of that as package, to have that cleaned up. Deadline for feedback?
			live answered by Bob Davis	We'd like to see your feedback soon, within the next couple of weeks, if possible. We're striving to and we're running on all engines here to try to get final assumptions updated so that we can begin some simulation and testing. I will say that, hopefully it came across during this presentation, that many of the assumptions we feel are pretty final at this point in time, not to say that we won't listen to compelling discussions or feedback from the stakeholders. But we'd like some focused commentary if someone is trying to convince us to do something different than what we've already recommended through this presentation. And if those comments or recommendations could be provided in the next two, three weeks that would certainly be appreciated.
RH		Findlay Salter	open mic / raised hand	Yes, thanks for the presentation. had a conversation with Eileen in the chat, just not quite sure. Understand the process. Maybe it would help if, if y'all could explain it verbally. It was new to me today that I guess the IR the proposed resource was not going to be location based, have previously seemed to Cooper's talking about significant differences in transmission costs, whether a resource may be located at when you're in Fairfield County in Dorchester County or in Jasper County between 350 to \$750 million difference in transmission costs. How are y'all accounting for the transmission cost in for these proposed resources without a specific location in mind

	live answered by Rahul Dembla	Hey Findlay, this is Rahul. Would you mind muting your comms? Let me try to address that question, and tell me if I'm not clear and I'll try again. So I think the IRP will need some pretty strong good underlying assumptions about those costs because, as you mentioned, those costs are big. So we cannot ignore those. So we'll have to make a fairly good assumption. So for even going in the pre-Act 90, whenever we did resource planning or finding IRP, it had a lot of portfolio of resources. Now for specifically for when Winyah's retirement and what you are referencing, I think the resources that would be needed in that 2029 timeframe, these costs are significant. So we need a good assumption to include in the IRP. However, I think, as you know, until you to do sign contracts and move forward, you keep doing diligence and further studies. So I think the IRP will have a resource portfolio, but it could not be committed to a site. And even in the past, as you mentioned, there are transmission spans, there are natural gas infrastructure commitments, and a lot of sites have been fairly close to each other. So I think if one significant assumption changes based on further diligence, there needs to be flexibility to adapt that path going forward. So I think the IRP will put forward a preferred portfolio of resources, and it will have a pretty solid underlying site assumption that would make sense, but it will not make a commitment to a site unless we get to a point where we need to make that kind of a commitment. So, the short answer is those costs will not be ignored in the IRP.
Findlay Salter	open mic / raised hand	I was just trying to understand is what you said that the transmission cost for a proposed resource would not be included when performing the analysis in the IRP?
	live answered by Rahul Dembla	No, there are two different concepts - a proposed resource ia a coordination agreement concept and the IRP is the preferred resource portfolio. What I was saying was that the IRP, the preferred resource portfolio in the IRP will include relevant transmission costs based on the best site, we would know at the time. It will not ignore those costs.
Findlay Salter	open mic / raised hand	Okay. And so, additionally, just one follow-on question, you mentioned the proposed shared resource and the interaction with Central. And I think your presentation and I can look back. The capacity that you're looking at for your new resource options, is still the full capacity for both Santee Cooper and Central's share? Or y'all just looking for Santee Cooper share of that capacity?

			live answered by Rahul Dembla	No, so the load forecast which will be the basis for the resource planning for the IRP is the combined system forecast. So, it would plan for the combined systems, and even Central could serve that opted out portion through a pool resource which serves the entire system. So the IRP does not consider the rate aspect of it, just what the best resource plan is for the combined system. So, short answer Findlay it will plan for the entire system without worrying about the cost allocation side of it.
		Findlay Salter	open mic / raised hand	Okay, thank you. Sure.
RH		Ryan Deyoe	open mic / raised hand	Thanks Stewart. Also, thanks for all and Bob and everyone else for for being here today. And taking us through these lengthy slides, we really appreciate all the information you guys provide. I just have two questions. One is following onto the previous question, can we also assume that any natural gas infrastructure upgrade costs will be incorporated in that best proposed site or the best available sight at the time, depending on you know, whether a combined cycle or CT or whatever the replacement resources, if it is a natural gas resource, will those be incorporated into the portfolio costs?
			live answered by Rahul Dembla	Yes. In short, the answer is yes. So we will choose the best site people would know, based on the confluence of natural gas transmission, we will make the best decision at the time and incorporate those costs into the plant, and then keep working on it. And the diligence likely will continue to be in some kind of deals in the future. So the answer is yes.

		Ryan Deyoe	open mic / raised hand	<p>Great. Thank you. Appreciate that. My other question, you guys went over your portfolio evaluation approach. And Bob made the comment like potentially trying to minimize the sensitivities and just wanting to have maybe a little bit of broader discussion. One of the downsides of minimizing sensitivities is you kind of lock yourself into a couple, maybe a couple of variations, three, four or five, of kind of deterministic futures, right? You kind of miss the tails, the tail risk cases, right? And that's where a lot of costs can be ascribed. And you might have a weakness in one portfolio over over another. And, you know, I'm not trying to propose you guys swap everything out right now. I'm just really curious what what's the biggest limitation that you guys see in your resources that like whether it's, you know, person hours or computational resources, whatever it may be to prevent you guys from doing more of like a probabilistic or Monte Carlo simulation. And I asked because, you know, I mentioned TVA, but there's other utilities, both public, or, an ISO is maybe vertically integrated, etc, that do more probabilistic analysis. And I'm just curious what you guys feel is a limitation there? Or has you hesitate against doing? Because I understand analysis paralysis, right, the bloat, you don't want to get caught in that I get that? Definitely.</p>
			live answered by Bob Davis	<p>Yeah, I'd have to suggest that even if we do head down the probabilistic approach, I think we're still on what I would describe as deterministic stochastic scenarios, where you're actually defining a set or a selection of, say, 30, random draws across a group of random walks on individual variable inputs, which I've done in the past. My suggestion would be, in order to meet the obligations that we're dealing with here, we're already stretched thin enough, just on computational time alone, as you can imagine, in order to evaluate optimized portfolios. You've got several hours worth of run time for optimize plan. And then you've got, several hours worth of QA / QC for each one of those where we've got to devote actual manpower, of looking at this and comparing contrasting other cases to make sure that what we think we're putting into the model as far as assumptions where we're getting off the back end. So my biggest concern is just the total time required to get all this done. We've got a prescriptive set of underlying sensitivities that we need to model on fuel prices load, CO2 and DSM. If you combine all those and set number of cases, and try to optimize multiple portfolios, which we're also obligated to do under the legislation, we were at a position where we could be looking at hundreds if you tried to go up to the probabilistic approach, it could even be, you know, in the into the 1000s, or at least hundreds of optimized cases, and we're into periods of time, that would take more than a year to complete the evaluation.</p>

			live answered by Bob Davis (cont.)	So we've got to find a way to accommodate that within a reasonable timeframe, the evaluation, we're trying to get done. I hear what you're saying about not measuring the tails, and I think it's a point well taken. So I think what we're struggling with is there a balance between the sensitivities we're evaluating and the number of optimized cases that we were evaluating. So we'd love to do more optimized portfolios, because we think that provides some useful information for both decision-makers as well as stakeholders in the PSE. But we are kind of hamstrung with regard to the precedent that's already set. So what I was trying to bring up is, is looking at what Dominion has suggested through their recent stakeholder meetings, looking at approximately a dozen or so different sensitivities, scenario combinations, which should allow them some expansion of their optimization evaluations. I'm not sure how they're planning on performing their evaluation in that regard. But at least that was our first thought and looking at what they were proposing. But I also understand you're interested in not accidentally eliminating a tail by not running all the sensitivities required. So it's a tough balance, and then unfortunately, there is no perfect answer. And until we've got, you know, Crays on our desktops, I think it's always gonna be a problem.
		Ryan Deyoe	open mic / raised hand	I appreciate your response, they evolve, and I definitely understand it, because I can empathize with with that and the time constraints. And, you know, we're just all trying to look forward to having a as robust of an analysis as possible and where are we can find that common ground. So appreciate your response. You know, maybe just kind of a pining here, but maybe it's a little bit on some of the burdensome constraints where you have to assess you know, XYZ or maybe you know, that kind of devotes time away from doing other types of new analysis because you always have to hit those those markers. I'm not saying whether that's good or bad. I just understand there's some some changes that could benefit that are also you might lose things.
			live answered by Bob Davis	I know and I heard you and the comments that were coming in on the portfolio I just gave me the probabilistic analysis and right, you know, I had, I'd love to go there. But in order to do a probabilistic evaluation in this type of model, it would require an optimization under each one of those. And that's where he can quickly get out of hand from the standpoint of time constraints.
		Ryan Deyoe	open mic / raised hand	Yeah, maybe we can think something up in the future.

			live answered by Bob Davis	Yeah, I agree. We'd be open to that dialog.
		Ryan Deyoe	open mic / raised hand	That's good to hear. Thank you guys.
66	Harsh climate consequences of adding more fossil CO2 to the atmosphere and the uncompetitive nature of coal combustion vs. energy efficiency, distributed renewables and energy storage, and voluntary, flexible demand response systems, and emerging market opportunities. Thank you for the leadership in creating a more resilient energy future for South Carolina.	Keith Thomson	written	Thanks for the input, Keith. The IRP process and assumptions, particularly this stakeholder process, are intended to assess and balance these factors. Stay tuned...
67	Excellent session!	Keith Thomson	written	Thank you