BEFORE THE
LOUISIANA PUBLIC SERVICE COMMISSION

DOCKET NO. I-36242

SOUTHWESTERN ELECTRIC POWER COMPANY,
EX PARTE

In re: 2021 Request to Initiate Integrated Resource Planning Process Pursuant to the General Order (Corrected) in Docket No. R-30021 Dated April 20, 2012.

STAFF COMMENTS ON DRAFT IRP

I. Background

On December 28, 2022, SWEPCO (or "Company") submitted a request to the Louisiana Public Service Commission ("LPSC," or "Commission") to initiate the Integrated Resource Planning ("IRP") process (Event 1 of the IRP process).

On February 1, 2022, SWEPCO filed with the Commission its "*2023 SWEPCO Integrated Resource Plan Description of Studies and Study Assumptions"* presentation (referred to as "SWEPCO Assumptions") (Event 2).

On March 29, 2022, the first stakeholder meeting (Event 3) was held virtually, at which SWEPCO presented the IRP data assumption materials and fielded questions from stakeholders. Stakeholders in attendance included Advanced Energy Management Alliance ("AEMA"), Alliance for Affordable Energy ("AAE"), the Sierra Club, the Southern Renewable Energy Association ("SREA"), and Wartsila. On May 16, 2022, Staff issued a Report of Stakeholder Meeting.

On May 27, 2022, Staff submitted its *Staff Comments on SWEPCO's Data Assumptions* ("Staff Comments") pursuant to Event 4. By May 29, 2022, stakeholders filed comments on SWEPCO's data assumptions, also pursuant to Event 4.

On June 29, 2022, SWEPCO announced a stakeholder meeting for July 20, 2022, but this meeting was cancelled.

On March 28, 2023, SWEPCO published it *Draft 2023 Integrated Resource Plan Report* ("Draft IRP") (Event 5).

The second stakeholder meeting was announced on August 24, 2023, to be held virtually on August 29, 2023 (Event 6). Staff issued a report of the meeting on September 22, 2023.

By October 24, 2023, three stakeholders filed written comments (Event 7) on SWEPCO's Draft IRP:

- AEMA: *Comments to Southwest Electric Power Company's ("SWEPCO") Draft Integrated Resource Plan ("IRP");*
- Sierra Club: *Comments on [SWEPCO's] Draft 2023 Integrated Resource Plan;* and
- SREA: *Southern Renewable Energy Association's Comments Regarding Southwestern Electric Power Company's Draft Integrated Resource Plan.*

This report constitutes Staff's written comments (Event 8). The purpose of these comments is to identify issues that remain in SWEPCO's Draft IRP Report, that SWEPCO should address in its Final IRP Report and in so doing, meet the requirements established in the IRP Rules contained in LPSC Corrected General Order, Docket No. R-30021, *In re: Development and Implementation of Rule for Integrated Resource Planning/or Electric Utilities* (April 20, 2012) ("IRP Order").

II. Staff's Comments, summary

Staff appreciates SWEPCO's efforts and recognizes that SWEPCO has already complied with many of the requests made by Staff and stakeholders, and this is reflected in SWEPCO's Draft IRP. Overall, as discussed below in more detail, Staffs believes there are a number of topics and issues which require more transparency; and several which require further analysis to provide SWEPCO, stakeholders, and the Commission with insight to determine the reasonableness of SWEPCO's IRP and intended future investment plans.

III. Staff's Comments, details

The topics covered in Staff's comments are:

1. Load forecast
2. Going-in position (existing resources)
3. Modeling assumptions for future supply options
4. Transmission
5. Resources in SPP

6. Natural gas price outlooks
7. Portfolio development and analysis
8. Other

Staff's comments related to each of these topics are discussed below.

1) Load forecast

In its review of data assumptions, Staff asked that SWEPCO include historical peak load and total energy for SWEPCO and SWEPCO LA for the past 10 years, and the growth rate of load for the past 10 years, in its Draft IRP. This should be broken out by end-use sector (i.e., residential, commercial, industrial).

SWEPCO complied. It provided this in Appendix Table A2, and Figure 4 (energy consumption, history and outlook, by sector); and Appendix Table A 3, and Figure 5 (peak load). SWEPCO also provided, as requested, a comparison of history and actuals, and an evaluation of their previous near-term 2019 IRP forecast. (Appendix) Table A-6 presents a comparison of SWEPCO's energy sales and peak demand forecasts in the 2019 IRP with the actual and weather normal data for 2019, 2020 and 2021. The major source of forecast error was the impacts of the COVID-19 pandemic.

In its review of data assumptions, Staff asked that in the future Scenarios the actual rate of growth assumed in the Base, High and Low growth should be defined in transparent and quantitative terms. The role of customer counts, usage, per customer, the customer segment, and role of incremental energy efficiency in driving peak load and energy consumption should be described, and annual tables of numbers for these drivers should be provided.

SWEPCO complied. In SWEPCO's Draft IRP, the Company reported that residential energy sales are forecasted using two models, the first of which projects the number of residential customers, and the second of which projects kWh usage per customer. The residential energy sales forecast is calculated as the product of the corresponding customer and usage forecasts. SWEPCO reported it uses a Statistically Adjusted End-Use model ("SAE") for forecasting residential and commercial load, and in Appendix Vol 2., Exhibit A, shows the input data, and the forecast outputs. In Appendix Volume 3 SWEPCO provided detailed econometrics (see Appendix Vol 3, page 215,

for Louisiana commercial customers; see page 616 for Xcool, Xheat input data for LA residential sector, and model coefficients on page 658).

SWEPCO also reported that "For the Residential class, the long-term elasticity estimate is approximately [negative] 0.1, and for the Commercial class, the modeled price elasticity is [negative] 0.15 and the elasticity estimate for the Industrial class is [negative] 0.18."[1] SWEPCO's long-term price elasticities (its implied behavioral assumptions) are comparable to dozens if not hundreds of studies of residential electric price elasticities which have been performed, using a variety of methodologies, data, time periods, and geographies. A 2018 meta-analysis which encompassed 103 studies of residential electricity demand, spanning 1990 through 2017 found that estimates of long-term residential electricity demand clustered between 0 and negative 1.[2] Staff is satisfied that SWEPCO's behavioral assumptions with respect to energy prices are reasonable.

Energy efficiency ("EE") and demand-side ("DSM") programs

SWEPCO treats energy efficiency programs added from 2023 onward as a resource option, discussed below. Other sources of load reduction in the forecast are based on general trends in appliance efficiency and SWEPCO's most current DSM programs, which either have been previously approved by or are pending currently before the Commission, which are used to "adjust the forecast for the impact of these programs."[3]

SWEPCO explained that EE resources through 2022 are in the load forecast, and incremental EE resources (EE added after 2022) are treated as portfolio additions, as described below:

> *"The cost and performance parameters for the incremental EE programs evaluated are based on input from SWEPCO's internal subject matter experts and the Electric Power Research Institute's ("EPRI") "2014 U.S. Energy Efficiency Potential Through 2035" report with updates from the 2019 Technical Update of this same report...."*[4] *" The amount of available EE potential can be broken into three categories: technical, economic, and*

[1] SWEPCO Draft IRP, P. 29.
[2] Zhu, Xing, Lanlan Li, Kaile Zhou, Xiaoling Zhang, and Shanlin Yang. 2018. "A metaanalysis on the price elasticity and income elasticity of residential electricity demand." Journal of Cleaner Production, 201: 169–177.
[3] SWEPCO Draft IRP. P. 16.
[4] SWEPCO Draft IRP, P. 65.

achievable.... Achievable potential is a subset of economic potential accounting for market acceptance and implementation barriers.... The achievable potential can further be broken into the amount that would be accomplished if implemented through utility-sponsored programs, and the total amount that would fall under codes and standards. The ***former [utility-sponsored programs] is included as part of resource options for capacity expansion while the latter [codes and standards] is accounted for as reductions from the load forecast [emphasis added]****.... SWEPCO ranked individual EE measures according to their lifetime levelized cost. Residential measures were ranked separately from commercial measures to reflect different operating characteristics between residential and commercial EE programs. Once ranked, EE measures were grouped into bundles based on the following criteria, which include that the gross energy savings potential in each bundle is at least 0.5% of the total system load. This is to ensure that each bundle represents a significant energy resource option for AURORA to select when compared against other energy resource options, such as new generating units..."*[5]

In SWEPCO's Exhibit F, which shows the annual portfolio additions in nameplate megawatts ("MW"), cumulative energy efficiency peaks by 2028 in every scenario. In Appendix Vol 2, Table A-12, DSM/EE declines to zero by 2034. This is also shown in Appendix Vol. 3, pages 1,568-1,576.

Staff has several questions related to SWEPCO's methodology and results, which we expect SWEPCO to address in its Final IRP Report. SWEPCO's responses will add clarity and transparency to its Final IRP. These questions are:

Question 1: Does the adjustment for current EE and DSM happen after the forecast which is driven by the parameters of the econometric models? What is the size and annual impact of each adjustment, for each sector? When and by how much is the annual load forecast reduced by codes and standards? What exactly are the codes and standards?

[5] SWEPCO Draft IRP. P. 65.

Question 2: If SWEPCO's models are sectoral (residential, commercial, industrial) rather than specific to end-uses (such as heating, cooling, etc.), how does SWEPCO implement energy efficiency adjustments that reflect codes and standards for specific types of equipment and end-uses?

Question 3: Why does DSM/EE decline to zero by 2034?

Question 4: There seems to be no discussion of SWEPCO's residential and commercial EE programs' historical rate of uptake. Staff would like to see this historical information. What is the implied uptake for the various cost bundles which are modelled in Aurora? How do these compare with historical rates of uptake?

Question 5: Going forward, in a high energy-price scenario (such as SWEPCO's ECR scenario), customers would be motivated to adopt more EE. Why is this not evident in SWEPCO's scenarios? Why does cumulative annual EE peak in 2028 in every scenario?

2) Going-in position

Staff notes that the LPSC Corrected General Order, Docket No. R-30021 ("IRP Rule") states that a company's IRP Report must contain detailed information regarding existing supply-side resources, existing demand-side resources, and the existing transmission system.[6]

SWEPCO's going-in position includes the currently planned retirements of Arsenal Hill Unit 5 in December 2025 and Lieberman gas steam units 3 & 4 in December 2026, the Welsh 1 & 3 units in 2028, and Wilkes 1 gas steam unit in 2030 (see Figure 1). SWEPCO also noted that retirement assumptions "may be further considered as the Company obtains more clarity in the availability

[6] LPSC Corrected General Order, Docket No. R-30021, Section 3 and Section 5.

and timing of new resources and the Southwest Power Pool ("SPP") resource adequacy requirements evolve."[7] It seems that this could mean earlier, or later, retirements.

Figure 1. SWEPCO's going-in supply resources

Plant/unit	Unit number	Primary fuel	COD	Rating (MW) (summer)	Retirement date	Current age	Age at retirement
Arsenal Hill	5	Gas steam	1960	108	1/1/2026	63	66
Flint Creek	1	Coal	1978	258	1/1/2039	45	61
Harry D. Mattison	1	Gas (CT)	2007	70	1/1/2053	16	46
Harry D. Mattison	2	Gas (CT)	2007	71	1/1/2053	16	46
Harry D. Mattison	3	Gas (CT)	2007	71	1/1/2053	16	46
Harry D. Mattison	4	Gas (CT)	2007	71	1/1/2053	16	46
Pirkey	only 1	Coal	1985	580	3/31/2023	38	38
J Lamar Stall	only 1	Gas (CC)	2010	511	1/1/2051	13	41
John W. Turk, Jr	1	Coal	2012	477	1/1/2068	11	56
Knox Lee	5	Gas steam	1974	335	1/1/2040	49	66
Lieberman	3	Gas steam	1957	109	1/1/2027	66	70
Lieberman	4	Gas steam	1959	108	1/1/2027	64	68
Welsh	1	Coal	1977	525	3/1/2028	46	51
Welsh	3	Coal	1982	528	3/1/2028	41	46
Wilkes	1	Gas steam	1964	162	1/1/2030	59	66
Wilkes	2	Gas steam	1964	352	1/1/2036	59	72
Wilkes	3	Gas steam	1964	350	1/1/2037	59	73
Sundance	only 1	Wind	2021	109	2051	2	30
Maverick	only 1	Wind	2021	156	2051	2	30
Traverse	only 1	Wind	2022	544	2051	1	29
Majestic	only 1	Wind	PPA	80	2029	n/a	n/a
High Majestic	only 1	Wind	PPA	80	2032	n/a	n/a
Flat Ridge	only 1	Wind	PPA	109	2032	n/a	n/a
Canadian Hills	only 1	Wind	PPA	201	2032	n/a	n/a

Source: SWEPCO Draft IRP. Table 2, P. 30.

The levelized cost of energy for existing units

In *Staff Comments on SWEPCO's Data Assumptions,* Staff asked for an analysis of the historical and going forward costs for each of the existing supply side resources included in the going in position, which should include transparent details of operating and maintenance costs, additional capital costs including the cost of new equipment needed to comply with Federal and state-level emissions requirements such as the requirements discussed by SWEPCO in its 2019 IRP Final Report in Section 3.3, especially for meeting potential future requirements under EPA 's Coal Combustion Residuals ("CCR") Rule and Effluent limitations Guidelines ("ELG").[8] Staff noted that SWEPCO should then convert the going-forward costs (including a transparent assumption for each resource's capacity factor) to a levelized cost of energy ("LCOE") for each resource; and

[7] SWEPCO Draft IRP. P. 10.
[8] LPSC Docket No. I-36242. *Staff Comments on SWEPCO's Data Assumptions*. May 27, 2022.

then SWEPCO should compare each resource's LCOE to SWEPCO's forecast of energy prices in each of its Scenarios. The Draft IRP should then discuss SWEPCO's decisions whether to de-activate or retire each of its existing resources in the context of the going-forward LCOE and energy prices as well as reliability and resource adequacy in each of SWEPCO's future Scenarios.

SWEPCO complied with the request for the LCOE data, providing such information in Confidential Appendix Volume 2, Exhibit J, which Staff reviews in detail below.

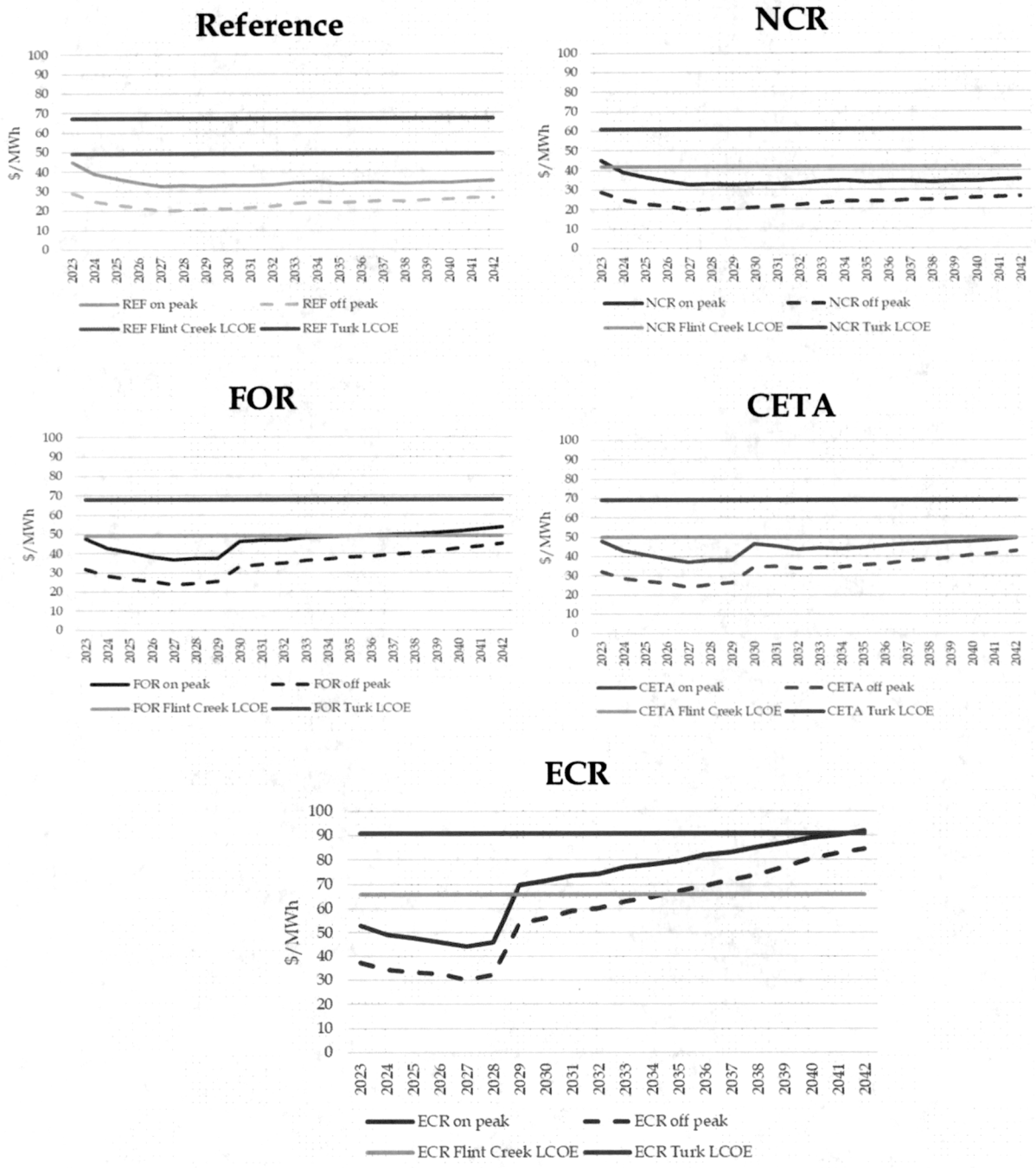
The cost of existing coal indicates earlier retirement may be economic, and SWEPCO should address this in its Final IRP

The confidential information in Appendix Volume 2 shows that the LCOE of the Flint Creek and Turk coal-fired units is higher than SWEPCO's projections of on-peak and off-peak power prices (Confidential Appendix Vol. 3, Table 3 and Table 4) in almost every year and every scenario (see Figure 2). However, SWEPCO's going-in position (Exhibit C, Pp. 144-146) assumes Flint Creek operates until 2038, and Turk remains operational through the forecast period (to 2042). The persistence of energy market revenues far below total going-forward costs indicate the units should be flagged for potential retirement.

SWEPCO should include analysis of retirement of Flint Creek and Turk in its IRP scenarios. These are not deactivation decisions, nor is this an analysis of optimal retirement dates. The purpose of an IRP is to provide insight into the long-term costs of various resource decisions and arrive at a

least-cost resource mix going forward. Existing resources that are projected by SWEPCO to be uneconomic should not be included automatically in the going-in portfolio.

Figure 2. CONFIDENTIAL LCOE of Flint Hills and Turk coal-fired units, and SWEPCO's projected energy prices



Source: SWEPCO Draft IRP. Confidential Appendix Vol. 3, Table 3 and Table 4

SWEPCO should report economic retirements of existing resources that result from Aurora runs in SWEPCO's future scenarios (not just the going-in retirements that are assumed by SWEPCO as inputs to the Aurora process). This output is within the capability of Aurora. Hard-wiring uneconomic units into all SWEPCO's scenarios will not likely result in a least-cost portfolio.

Sierra Club also believes that SWEPCO should test earlier retirement of solid-fuel units.[9]

3) Modeling assumptions

The cost and performance of future supply options

Staff asked that all assumptions (in addition to overnight capex, variable operating and maintenance ("VOM"), fixed operating and maintenance ("FOM"), and heat rate) used by SWEPCO to characterize supply side resources for the purposes of modeling the resources, including capacity factors if these are used as inputs into any of the model, be provided transparently in the Draft IRP.[10] SWEPCO complied with this, providing Exhibit B in its Draft IRP. Staff examined SWEPCO's capital cost assumptions and compared them with capital costs estimates from other widely used industry sources, the Energy Information Administration ("EIA") and Lazard (which provides a high-end and low-end estimate of capital costs (see Figure 3). Staff inflated current EIA and Lazard cost assumptions to make them comparable to SWEPCO's first available years based on an assumed inflation rate of 2.5% (Staff did not make any adjustments for improvements in technology that could potentially reduce costs for equipment or for labor shortages or other factors which could increase costs between the year of the estimate and SWEPCO's first available year). In Figure 3, green shaded entries indicate that SWEPCO's assumption falls within or is close to EIA and/or Lazard estimates; blue indicates SWEPCO's estimate is substantially lower; yellow indicates SWEPCO is at the high end or slightly exceeds the other estimates; red indicates SWEPCO's assumption substantially exceeds both EIA and Lazard estimates. Staff concludes that SWEPCO's solar PV capital cost assumptions may be too high, and SWEPCO should provide additional information to support these assumptions. Staff concludes that SWEPCO's ICE assumption may be too low, and SWEPCO should provide

[9] Sierra Club. LPSC Docket No. I-36242. *Comments on [SWEPCO's] Draft 2023 Integrated Resource Plan.* P. 1.
[10] LPSC Docket No. I-36242. *Staff Comments on Data and Assumptions.* P.4.

additional information to support this assumption. SWEPCO's assumptions for the other technologies in Figure 3 appear to be reasonable.

Figure 3. Overnight capital cost assumptions for a subset of new resources (costs exclude impact of federal subsidies)

	SWEPCO summer capacity (MW)	SWEPCO first available year	SWEPCO overnight capital cost, first year available (without transmission adder) ($/kW)	EIA SPPS region capital cost inflated to first available year	Lazard 2023 capital cost inflated to first available year (low end)	Lazard 2023 capital cost inflated to first available year (high end)
CCGT multi-shaft	1,100	2031	$1,380	$1,327	$780	$1,560
CCGT single-shaft	418	2031	$1,580	$1,512	$780	$1,560
CT Frame	240	2031	$980	$979	$840	$1,380
ICE	105	2031	$1,580	$2,668	n/a	n/a
Wind (onshore) Tier 1	100	2026	$1,910	$1,723	$1,478	$2,419
Wind (onshore) Tier 2	100	2026	$2,110	$1,723	$1,478	$2,419
Utility solar PV Tier 1	50	2026	$1,810	$1,533	$753	$1,505
Utility solar PV Tier 2	50	2026	$2,010	$1,533	$753	$1,505

Sources: SWEPCO Draft IRP, Exhibit B; EIA *Cost and Performance Characteristics of New Generating Technologies, Annual Energy Outlook 2023*, March 2023, /https://www.eia.gov/outlooks/aeo/assumptions/pdf/elec_cost_perf.pdf;
Lazard, *Lazard's Levelized Cost of Energy Analysis—Version 16.0.* April 2023, Pp. 37-39.
Note: Lazard's costs are overnight costs only, for all but CCGT. Assumed construction time for a CCGT exceeds 12 months, so Lazard includes capitalized financing costs in CCGT estimates. The other technologies are assumed by Lazard to be constructed in 12 months or less, so financing costs are not included.
Note: Assumed inflation rate is 2.5%.

SWEPCO included assumptions for the capital cost of transmission network and interconnection upgrades. It assumed a cost of $20/kW for thermal resources, $90/kW for wind, and $115/kW for solar resources.[11] It did not provide any detail of how these assumptions were developed. SWEPCO should provide this detail in the Final IRP.

Tax subsidies and federal programs

The passage of the Inflation Reduction Act ("IRA") in 2022 impacts project economics starting January 1, 2025. Beginning on that date, the IRA replaces the traditional Production Tax Credit ("PTC") with the Clean Energy Production Tax Credit at a base amount of 2.75 cents/kWh ($27.50/MWh). The IRA replaces the traditional Investment Tax Credit ("ITC") with the Clean Electricity Investment Tax Credit at a base amount of 30% (with adders if the facility meets additional criteria). Wind and solar projects are eligible for one or the other (but not both). Energy storage is eligible for the ITC, but not the PTC. Both apply to projects placed in service starting in

[11] SWEPCO Draft IRP P. 45.

2025 or later. The IRA's PTC applies to production for ten years after equipment is placed into service. The IRA's ITC applies to projects begun by 2032.

SWEPCO applied ITC and PTC benefits for all its scenarios.[12] SWEPCO applied ITC benefits to storage technologies; it applied the PTC (rather than the ITC) to wind and solar resources. For the ITC, after 2032, SWEPCO assumes the tax credit declines to 22.5%, 15% and 0% of its value in 2033, 2034, and 2035, respectively. This decline in the tax credit is not firmly established in the IRA for those particular years. Instead, the IRA specifies that the credits are in effect either until the later of 2032, or until electricity sector CO_2 emissions are at or below 25% of 2022 levels; Reaching this threshold triggers a three-year phaseout with defined annual step-downs in tax credit value.[13]

SWEPCO implemented the PTC in AURORA as a negative variable cost adder. After 2032, SWEPCO assumes the PTC tax credits will be reduced to 75%, 50% and 0% of their value in 2033, 2034, and 2035, respectively.[14] Like the PTC, the ITC incorporates a three-year phaseout, which could begin in 2023 or later. Staff is satisfied, however, that SWEPCO's assumption that the phaseout of the PTC and ITC beginning in 2032 is reasonable.

Limits on SWEPCO resource additions

Although SWEPCO included annual caps on new solar and wind resources, it indicated that the results of its Aurora modeling did not reach annual limits for solar and wind resources. [15]

4) Transmission

SWEPCO noted that "Currently the capability of the transmission system to accommodate large incremental firm imports to the AEP-SPP area is limited. **Generally,** (emphasis added) the transfers are limited by the facilities of neighboring systems rather than by transmission lines or equipment owned by AEP."[16] In its Final IRP SWEPCO should identify what and where the

[12] SWEPCO Draft IRP P. 73.
[13] Legal Information Institute. 26 U.S. Code § 45Y - Clean electricity production credit. https://www.law.cornell.edu/uscode/text/26/45Y
[14] SWEPCO Draft IRP P. 52.
[15] SWEPCO Draft IRP P. 167.
[16] SWEPCO Draft IRP P. 42.

transmission limitations that are the result of AEP facilities, rather than those of neighboring systems.

SWEPCO noted that "estimate of costs for transmission upgrades and congestion costs in the SPP South Zone were included in the modeling."[17] In the Final IRP, SWEPCO should explain how the "estimated costs of transmission upgrades and congestion" are modelled. SWEPCO should state clearly whether the three specific new projects it listed (Chisholm to Woodward/Border, Sooner to Wekiwa, and South Shreveport to Wallace Lake) address the limited capability of the neighboring systems.

As noted by Sierra Club, funding is available from the US Department of Energy through the Energy Infrastructure Reinvestment ("EIR") loan program to fund upgrades to transmission systems.[18] The availability of low-cost loans could make such projects cost-effective. Staff believes that the IRP Rule intends that transmission be considered in the analysis of preferred portfolios. The IRP Rule provides that "*At times, there may be large transmission projects that could provide access to economic generation resources, and it may be desirable to treat those projects as separate resource options in the optimization process.*"[19] In its Final IRP, SWEPCO should identify (at a general level) opportunities for transmission projects that could reduce congestion, improve reliability, and better utilize SWEPCO's generation and transmission assets.

5) Other resources in SPP

In Staff's comments on SWEPCO's assumptions, Staff recommended that SWEPCO consider a scenario in which, at least, the capacity currently in the SPP queue is eventually developed, and it is assumed that the strong ongoing interest in solar and wind development does not come to an abrupt halt in 2023.[20] However, in the Draft IRP, SWEPCO noted that it limited its modeling of additional renewables by assuming that only 20% of the renewables in the current SPP queue would be developed. It provided no support for this assumption. Staff expects SWEPCO to provide

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[17] SWEPCO Draft IRP. P. 158.
[18] US DOE. Energy Infrastructure Reinvestment Loan Programs Office. https://www.energy.gov/lpo/energy-infrastructure-reinvestment
[19] IRP Rule, Section 3, Footnote 6.
[20] LPSC Docket No. I-36242. *Staff Comments on Data and Assumptions.* P. 5.

the rationale for this assumption in its Final IRP.

SWEPCO allowed Aurora to retire non-SWEPCO units based on economics. Staff does not take issue with this approach but notes that it is in contrast with SWEPCO's assumption that its own uneconomic plants would continue to run. Staff reiterates that SWEPCO should allow its own plants to be retired based on economics in its Aurora runs and develop alternatives to those plants as part of its Final IRP.

In its Final IRP, SWEPCO should provide the annual capacity profile (total MW by fuel, with renewables adjusted for accreditation as appropriate) in SPP in each of different scenarios.

Resource adequacy assumptions

The minimum SPP Planning Reserve Margin ("PRM") beginning on June 1, 2023, requires a reserve capacity of 15% above a utility's coincident summer peak load.[21] Currently, SPP has planning reserves of over 20% (see Figure 4). Despite the 15% summer requirement, SWEPCO assumed an SPP PRM of 22% above peak load by summer 2025. In its Final IRP, SWEPCO needs to provide the justification for assuming a PRM of 22%, which is far higher than the current summer requirement of 15%.

SWEPCO assumed a 26% PRM for winter, in its FOR-Winter scenario. This was informed by an SPP Supply Adequacy Working Group ("SAWG") study.[22] The SAWG study noted that "For today's generation portfolio, maintaining a 1 day in 10-year metric requires winter PRM ranging from 29% to 42%."[23] This result assumed that all scheduled maintenance would occur in the winter. If maintenance were scheduled for shoulder months, then the required winter PRM would be lower. Staff is satisfied that SWEPCO's winter PRM is reasonable.

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[21] SWEPCO Draft IRP. P. 39.

[22] SPP. Preliminary Winter LOLE Study and Generation Sensitivity Results. April 2022. https://www.spp.org/Documents/66966/sawg%20agenda%20and%20background%20materials%2020220422%20(2).zip

[23] Ibid. P. 27.

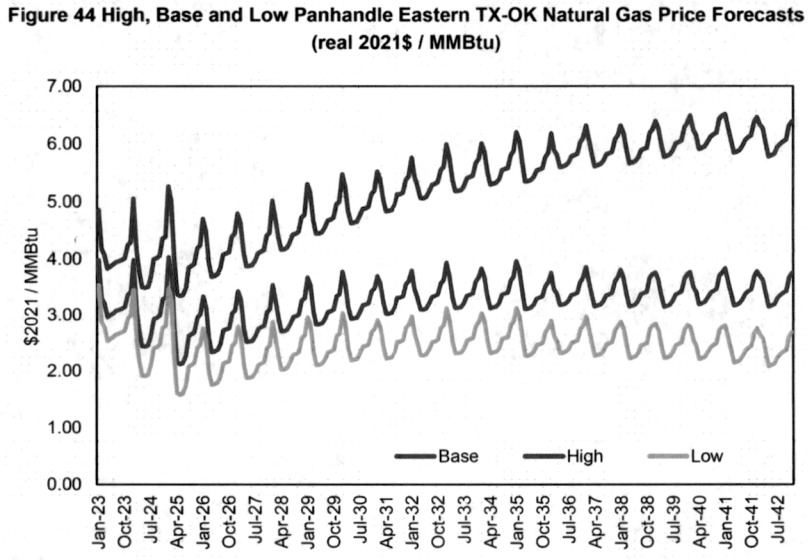
Figure 4. SPP BA Area PRM projection as of June 2022

Source: 2022 SPP Resource Adequacy Report.

6) Natural gas price forecast

SWEPCO complied with Staff's request to include the role of demand for gas in its gas price forecasts, and to examine the potential for a wider range of outcomes for natural gas prices in its scenarios. SWEPCO provided a range in real terms that is wide enough to have an impact on portfolios (see Figure 5).

Figure 5. SWEPCO's natural gas price assumptions



Source: SWEPCO Draft IRP. Figure 44.

7) Portfolio development and analysis

Environmental regulations

SWEPCO provided extensive detail of potentially more stringent environmental requirements, some of which could impact its units. However, SWEPCO was not transparent with respect to the cost of compliance options and did not include these costs in its LCOEs, operating costs, or portfolio analysis. Environmental regulations need to be reflected in costs and in future scenarios. Staff reviews these in detail:

National Ambient Air Quality Standards ("NAAQS"): SWEPCO noted that "Revisions tend to increase the stringency of the standards, which in turn may require the Company to make investments in pollution control equipment at existing generating units, or, since most units are already well controlled, to make changes in how units are dispatched and operated. In January 2023, the EPA announced its proposed decision to strengthen the primary (health-based) annual PM2.5 standard. The Biden administration has previously indicated that it is likely to revisit the NAAQS for ozone, which were left unchanged by the prior administration following its review."[24] SWEPCO should include a scenario which reflects such changes in dispatch and operation.

Regional Haze Rule ("RHR"): SWEPCO noted that "…no additional emission controls are expected for [SWEPCO's Louisiana] facilities as a result of the RHR at this time."[25] However, it is not clear whether additional emissions controls would be needed for Arkansas-based facilities, or whether additional controls would be needed to comply with Louisiana's proposed rules. SWEPCO should clarify this in the Final IRP.

Cross-state Air Pollution Rule ("CSPAR") (NO_x and SO_2): SWEPCO note that "In January 2021, the EPA finalized a revised CSAPR rule, which substantially reduces the ozone season NO_x budgets in 2021-2024…. Management… is evaluating its compliance options for later years, when the budgets are further

[24] SWEPCO Draft IRP. P. 33.
[25] SWEPCO Draft IRP. P. 35.

reduced [emphasis added]. In addition… a [Federal Implementation Plan] FIP... that further revises the ozone season NOx budgets under the existing CSAPR program in… Louisiana, was finalized on March 15, 2023, and will take effect for the 2023 ozone season. Management is evaluating the impact of changes in that rulemaking."[26] SWEPCO should specify in its Final IRP which units are affected by the revisions and include the compliance options and the cost of these options in the LCOE and operating costs for each future scenario.

Coal combustion residuals ("CCRs"): SWEPCO note that "Because SWEPCO currently uses surface impoundments and landfills to manage CCR materials at generating facilities, significant costs will be incurred to upgrade or close and replace these existing facilities and conduct any required remedial actions."[27] The CCR rule applies to the Pirkey (to retire 2028) and Welsh (retired 2023) units. Flint Creek has already complied; the CCR Rule does not apply to Turk, because Turk does not use water to transport or store coal combustion byproducts. Staff has no recommendations.

Effluent limitations guidelines ("ELG"): The ELG rule sets limits for flue gas de-sulfurization ("FGD") wastewater, fly ash and bottom ash transport water, flue gas mercury control wastewater, and combustion residual leachate. The Pirkey and Welsh Plants will comply with the 2020 ELG Rule by retiring by 2023 and 2028. The Flint Creek and Turk plans are not compliant with the leachate limits. SWEPCO noted it "is still evaluating how the proposed combustion residual leachate limits will impact these plants."[28] As Flint Creek and Turk already have higher LCOEs than projected energy prices in nearly all SWEPCO's scenarios, it is hard to imagine that the units' economics would justify additional investment to meet leachate limits. SWEPCO should transparently provide its assumptions as to the ELG investments in each of the plants and the impact on plant economics and viability in each of the future scenarios.

[26] SWEPCO Draft IRP. P. 36.
[27] SWEPCO Draft IRP. P. 37.
[28] SWEPCO Draft IRP. P. 38.

Sierra Club highlighted similar issues, noting that *"SWEPCO should explain its understanding of the environmental controls and costs that would be required at Flint Creek and Turk to comply with final and proposed regulations and include such costs in its modeling for this IRP."*[29]

Comparisons across portfolios and futures

In general, the purpose of scenarios is to allow a company to plan better and react quickly to more than one version of the future. The potential decision (in this case, the decision as to which resources should be chosen for investment) should be tested against a variety of possible futures, to ensure the decision is robust against a variety of future outcomes, all of which are out of the control of the company.

SWEPCO compared all its optimal portfolios across all the scenarios, in terms of the net present value of the resource requirement ("NPVRR") (see Figure 6). LEI computed the expected value of each portfolio assuming each future is equally likely (the last column in Figure 6). The portfolio with the lowest expected cost is the Reference portfolio; the one with the highest cost (by far) is FOR-Winter.

Figure 6. SWEPCO's 30-year NPVRR of portfolios across scenarios ($ million)

	Scenario					
Portfolio	Ref	CETA	ECR	FOR	NCR	Expected value
Reference	$ 19,217	$ 19,211	$ 17,860	$ 19,198	$ 18,645	$ 18,826
Clean Energy Tech Advance	$ 20,991	$ 20,680	$ 18,145	$ 20,984	$ 20,934	$ 20,347
Enhanced Carbon Regulation	$ 19,880	$ 19,536	$ 18,145	$ 19,886	$ 19,429	$ 19,375
Focus on Resiliency-summer	$ 19,260	$ 19,254	$ 17,922	$ 19,247	$ 18,720	$ 18,881
Focus on Resiliency-winter	$ 25,799	$ 25,688	$ 24,160	$ 25,816	$ 25,838	$ 25,460
No Carbon Regulation	$ 19,439	$ 19,809	$ 20,670	$ 19,428	$ 17,939	$ 19,457

Source: SWEPCO Draft IRP. Table 19.

In its Final IRP Report SWEPCO should continue to report the results of its portfolios across all its scenarios, to provide insight into the risks as well as costs of the portfolios. It must provide a clear rationale for choosing its preferred portfolio.

Use of scorecard analysis

[29] Sierra Club. LPSC Docket No. I-36242. *Comments on [SWEPCO's] Draft 2023 Integrated Resource Plan.* P. 2.

SWEPCO went further in its analysis of the portfolios than simply assessing and comparing cost. It developed many other quantitative criteria and used these to create a scorecard for comparison of the portfolios, as shown in Figure 72 in its Draft IRP. It was not clear whether each portfolio in Figure 72 was the optimal portfolio for the corresponding scenario, and SWEPCO should clarify this.

Staff overlaid a heatmap onto SWEPCO's Figure 72 scorecard, in which red is most expensive, most risky, or otherwise "bad;" green is less expensive, less risky, or otherwise "good." Staff found this to be a useful comparison (see Figure 7). For example, the ECR portfolio had the lowest 5-year impact on rates (3.79% increase per year) but the least operational flexibility, least resource diversity, and the fewest resources located outside of SWEPCO. The FOR-winter portfolio was the most expensive, providing an extremely high summer reserve margin, had the same lack of resource diversity as the ECR portfolio, and nearly the same impact on CO_2 emissions as the ECR portfolio.

Figure 7. SWEPCO's scorecard, with Staff's heatmap overlay

	Customer affordability			Rate Stability		Maintaining Reliability				Sustainability
Portfolio	5-year CAGR	30-yr NPVRR' levelized	High-Low, levelized	Cost Risk: RR increase in Reference Case, 2042 (95th-50th)	Mkt Exposure (net sales as % of portfolio load, summer)	Pln Res (%, Scenario Avg, summer)	Op flex (dispatchable cap, 2042, MW)	Resource (Diversity, reference case (pie charts, percent wind, 2042 (eyeballed))	Locational Diversity (MW outside SWEPCO, 2023-2032)	CO2 emissions (% reduction from 2005 - Ref Case, 2042
Reference	4.32	$ 71.10	4.51	85.1	15	21	4,133	0.48	1,988	0.83
Clean Energy Tech Advance	4.97	$ 77.50	6.11	102.4	25	32	5,047	0.55	2,778	0.82
Enhanced Carbon Regulation	3.79	$ 73.40	5.79	67.8	13	20	3,089	0.75	1,868	0.89
Focus on Resiliency-summer	4.18	$ 71.20	4.54	83.4	15	22	4,365	0.55	1,988	0.83
Focus on Resiliency-winter	12.49	$ 95.30	6.84	68.6	30	33	4,203	0.75	2,453	0.87
No Carbon Regulation	4.29	$ 71.80	15.4	42.1	6	18	4,234	0.33	1,968	0.83

Note: Red is most expensive, most risky, or otherwise "bad;" green is cheaper, less risky, or otherwise "good."
Source of numerical information: SWEPCO Draft IRP. Figure 72.

SWEPCO did not draw conclusions or identify a preferred portfolio.

8) Other

Rate impacts

The Final IRP should include SWEPCO's projections of rate impacts.

Action Plan

SWEPCO did not identify any preferred portfolio in its Draft IRP, and there was no Action Plan identified. The Final IRP should include an Action Plan which creates a link between the Company's preferred portfolio and the specific implementation actions that need to be performed during the first five years of the planning period. It should include a timetable indicating important activities, discuss permitting issues or other regulatory actions that are required for the resource action to take place, or account for environmental impacts or plans to meet environmental regulatory requirements at existing resources subject to such requirements. SWEPCO' Final IRP Report must contain a Five-Year Action Plan that complies with the requirements outlined in Section 7 of the IRP Rules.

Net zero goals

SWEPCO has stated it intends to achieve net-zero carbon dioxide emissions by 2050.[30] Staff is pleased to note that, in its draft IRP, SWEPCO reported and the carbon footprint of each of its portfolios in 2042 (see Figure 8, which reproduces Table 26 in SWEPCO's Draft IRP) as well as its current its current carbon footprint of 16.5 million tons ("mt") in 2022.[31] It was not clear whether each portfolio in SWEPCO's Table 26 was the optimal portfolio for the corresponding scenario or in the Reference Case, and SWEPCO should clarify this. Each portfolio represents a significant reduction in SWEPCO's carbon footprint in terms of total carbon emissions. It is not clear what the reduction is in terms of $/MWh, and SWEPCO should provide the demand outlook (consumption in MWh) for each year of each scenario, in order that such a calculation can be made.

[30] SWEPCO. *Clean Energy Plan*. https://www.swepco.com/clean-energy/renewable/plan
[31] SWEPCO Draft IRP. P. 111.

Figure 8. SWEPCO CO_2 emission reductions by portfolio

Portfolio	Level of Emissions in 2005 ($mtCO_2$)	Level of Emissions in 2032 ($mtCO_2$)	% reduction in 2032 relative to 2005	Level of Emissions in 2042 ($mtCO_2$)	% reduction in 2042 relative to 2005
Reference	21.9	3.5	84%	3.7	83%
CETA	21.9	3.6	83%	3.9	82%
ECR	21.9	3.5	84%	2.5	89%
FOR-Summer	21.9	3.5	84%	3.8	83%
FOR-Winter	21.9	3.5	84%	2.7	87%
NCR	21.9	3.5	84%	3.7	83%

Source: SWEPCO Draft IRP. Table 26. P. 112.

IV. Conclusion

Staff's comments noted in detail in this report can be organized into two themes: Transparency and insight (see Figure 9). SWEPCO should enhance the transparency of the IRP by providing additional information and will gain additional insight into its alternatives and their potential outcomes with some additional quantitative analysis.

Figure 9. Summary of Staff's comments

Transparency	Insight
Address Staff's 5 questions with respect to EE and DMS assumptions	Use Aurora outlooks and fixed cost information to perform analysis of economic retirement of the Flint Creek and Turk plants
Provide additional information on how assumptions for capital cost of ICE and solar PV were developed	Provide transparent cost of compliance options for emissions reductions, include these costs in LCOEs, operating costs, and portfolio analysis. Environmental regulations need to be reflected in costs and in future scenarios.
Provide information on how assumptions for capital cost of transmission network and interconnection upgrades were developed	Perform a modeling analysis with and without a major transmission line
Provide rationale for assuming that only 20% of the renewables in the current SPP queue are developed	Report the results of all portfolios across all scenarios, to provide insight into the risks as well as costs of the portfolios. Provide a clear rationale for choosing the preferred portfolio
Identify what and where the transmission limitations that are the result of AEP facilities, rather than those of neighboring systems.	Include an Action Plan which creates a link between the Company's preferred portfolio and the specific implementation actions that need to be performed during the first five years of the planning period
State clearly whether the three specific new transmission projects it listed (Chisholm to Woodward/Border, Sooner to Wekiwa, and South Shreveport to Wallace Lake) address the limited capability of the neighboring systems.	
Explain how the estimated costs of transmission upgrades and congestion are modelled.	
Identify at a general level opportunities for transmission projects that could reduce congestion, improve reliability, and better utilize SWEPCO's generation and transmission assets	
Provide numerical data tables for the annual capacity profile (total MW by fuel, with renewables adjusted for accreditation as appropriate) in SPP in each of different scenarios	
Provide the justification for assuming a PRM of 22%, which is far higher than the current summer requirement of 15%.	
Provide the demand outlook (consumption in MWh) for each year of each scenario	
Clarify whether each portfolio in Table 26 was the optimal portfolio for the corresponding scenario	
Clarify whether each portfolio in Figure 72 was the optimal portfolio for the corresponding scenario	

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CERTIFICATE OF SERVICE

I hereby certify that a copy of the above and foregoing has been served upon all parties of record by email, fax or United States Mail, properly addressed and postage prepaid, on this 29th day of November, 2023.

Justin Bello

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as of 11/29/2023

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