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APPLICATION OF SOUTHWESTERN ELECTRIC POWER COMPANY FOR CERTIFICATE OF CONVENIENCE AND NECESSITY AUTHORIZATION AND RELATED RELIEF FOR THE ACQUISITION OF WIND GENERATION FACILITIES	§ § § § § § §	BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS

SOUTHWESTERN ELECTRIC POWER COMPANY'S RESPONSE TO CITIES ADVOCATING REASONABLE DEREGULATION'S THIRD SET OF REQUESTS FOR INFORMATION

OCTOBER 14, 2019

TABLE OF CONTENTS

Files provided electronically on the PUC Interchange

- CARD_3_02_Attachment_1.xlsx
- CARD_3_03_2H2018_Low_Attachment_1.xlsx
- CARD_3_9_Attachment_1.xlsx

138

SOAH DOCKET NO. 473-19-6862
PUC DOCKET NO. 49737

SOUTHWESTERN ELECTRIC POWER COMPANY'S RESPONSE TO CITIES ADVOCATING REASONABLE DEREGULATION'S THIRD SET OF REQUESTS FOR INFORMATION

Question No. 3-1:

Provide the estimated congestion costs for each wind energy resource included in the bid evaluation analysis for the wind energy RFP that led to the selection of the proposed wind energy resources.

Response No. 3-1:

The requested information for each facility evaluated was included in the screening workpapers provided in the Company's response to TIEC 1-19 in TIEC 1-19 Confidential Attachment 2.

Prepared By: Paul N. Demmy	Title: Resource Planning Anlyst Sr
Prepared By: Jon R. Maclean	Title: Resource Planning Mgr
Prepared By: William S. Robinson	Title: Resource Planning Anlyst Staff
Prepared By: James F. Martin	Title: Regulatory Case Mgr
Sponsored By: John F. Torpey	Title: Mng Dir Res Plnning&Op Anlysis

SOAH DOCKET NO. 473-19-6862
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Question No. 3-2:

Provide the estimated average annual SPP on-peak and off-peak energy prices for each year of the bid evaluation analysis for the wind energy RFP that led to the selection of the proposed wind energy resources.

Response No. 3-2:

CARD_3_02_Attachment_1.xlsx provides the 2018 H2 Low and Status Quo (i.e., Base No Carbon) used in the bid evaluation analysis.

Prepared By: Connie S. Trecazzi — Title: Economic Forecast Anlyst Staff

Sponsored By: Karl R. Bletzacker — Title: Dir Fundamental Analysis

SOAH DOCKET NO. 473-19-6862
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Question No. 3-3:

Provide the forecasted annual carbon prices for each year of the bid evaluation analysis for the wind energy RFP that led to the selection of the proposed wind energy resources and provide the underlying assumptions and basis for such forecasts.

Response No. 3-3:

Attached please find CARD_3_03_2H2018_Low_Attachment_1.

Prepared By: Karl R. Bletzacker	Title: Dir Fundamental Analysis
Prepared By: Paul N. Demmy	Title: Resource Planning Anlyst Sr
Prepared By: Jon R. Maclean	Title: Resource Planning Mgr
Prepared By: William S. Robinson	Title: Resource Planning Anlyst Staff
Prepared By: James F. Martin	Title: Regulatory Case Mgr
Sponsored By: John F. Torpey	Title: Mng Dir Res Plnning&Op Anlysis

SOAH DOCKET NO. 473-19-6862
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<u>SOUTHWESTERN ELECTRIC POWER COMPANY'S RESPONSE TO CITIES ADVOCATING REASONABLE DEREGULATION'S THIRD SET OF REQUESTS FOR INFORMATION</u>

Question No. 3-4:

Provide the actual basis differentials between NYMEX Henry Hub price and price of gas delivered to the SWEPCO system for each of the last five calendar years.

Response No. 3-4:

The yearly average actual basis differentials between NYMEX Henry Hub and gas delivered to the SWEPCO system gas-fired electric generating plants were:

2014:	+$0.02
2015:	-$0.01
2016:	+$0.05
2017:	-$0.12
2018:	+$0.02

Prepared By: Clinton M. Stutler — Title: Natural Gas & Fuel Oil Mgr
Prepared By: Connie S. Trecazzi — Title: Economic Forecast Anlyst Staff

Sponsored By: Karl R. Bletzacker — Title: Dir Fundamental Analysis

SOAH DOCKET NO. 473-19-6862
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Question No. 3-5:

Identify all testimony filed by any SWEPCO witnesses during the last five calendar years addressing natural gas and/or energy price hedging issues.

Response No. 3-5:

SWEPCO's testimony is publicly available on the Texas, Arkansas, and Louisiana interchange/docketing systems.

Prepared By: Shelli A. Sloan Title: Dir Case Suppt & Special Proj

SOAH DOCKET NO. 473-19-6862
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Question No. 3-6:

Identify any alternatives to the proposed wind energy resources proposed in this case evaluated by SWEPCO to hedge future natural gas and/or energy prices.

Response No. 3-6:

One of the many benefits of the Selected Wind Facilities will be customers' reduced exposure to potentially volatile energy and/or fuel prices, but that is not the purpose of the investment. Accordingly, SWEPCO has not evaluated alternatives to the wind energy resources proposed in this case for hedging natural gas and energy prices.

Prepared By: Jonathan M. Griffin | Title: Regulatory Consultant Staff
Prepared By: Lynn M. Ferry-Nelson | Title: Dir Regulatory Svcs

Sponsored By: Thomas P. Brice | Title: VP Regulatory & Finance

SOAH DOCKET NO. 473-19-6862
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Question No. 3-7:

Provide the base case natural gas, coal and carbon price forecasts used for SWEPCO's most recent IRP.

Response No. 3-7:

Please see TIEC 1-11 (workpapers of Karl R. Bletzacker) for the 2019H1 Fundamentals Forecasts utilized in SWEPCO's most recent Integrated Resource Plan.

Prepared By: Connie S. Trecazzi Title: Economic Forecast Anlyst Staff

Sponsored By: Karl R. Bletzacker Title: Dir Fundamental Analysis

SOAH DOCKET NO. 473-19-6862
PUC DOCKET NO. 49737

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Question No. 3-8:

Provide the forecasted annual energy production (MWh), annual market revenues, and total delivered cost of energy from each of the proposed wind energy facilities for each year the forecasted life of the facilities, with congestion costs and PTCs separately identified.

Response No. 3-8:

The requested information was prepared for all three facilities during the screening analysis, which was provided in the screening workpapers in TIEC 1-19 Confidential Attachment 2. Note that market energy revenues calculated during the screening phase were computed based on the 2018H2 fundamentals. The customer benefits analysis of the Selected Wind Facilities was computed based on the 2019H1 fundamentals.

Prepared By: Paul N. Demmy	Title: Resource Planning Anlyst Sr
Prepared By: Jon R. Maclean	Title: Resource Planning Mgr
Prepared By: William S. Robinson	Title: Resource Planning Anlyst Staff
Prepared By: James F. Martin	Title: Regulatory Case Mgr
Sponsored By: John F. Torpey	Title: Mng Dir Res Plnning&Op Anlysis

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Question No. 3-9:

Provide SWEPCO's capacity ownership, and the annual average capacity factor and average annual net generation for the P50, P95 and P99 cases for SWEPCO's proposed ownership of the Wind Catcher project and for SWEPCO's share of the wind energy facilities proposed in this case.

Response No. 3-9:

The capacity ownership proposed for SWEPCO in this proceeding is 810 MW, with the alternatives proposed in the Company's application and Mr. Brice's direct testimony in the event the Company does not receive approvals from other state regulatory commissions. The Wind Catcher proposal was for SWEPCO to own 1,400 MW. The capacity factor and annual generation amounts for the wind facilities in this proceeding were provided on the Combined P-Values and Individual P-Values worksheets in the file "Torpey Errata Benefits Model Final" file provided in TIEC 1-19 Supplemental Attachment 1 to the Company's Supplemental Response to TIEC 1-19. All of these amounts are total project. The Company used 54.5% of the values from the 5-year columns on those worksheets as the annual energy to be received by SWEPCO.

See Attachment 1 to this response for the comparable cap factor and total project energy P-Values for Wind Catcher. SWEPCO would have received 70% of the energy in Wind Catcher.

Prepared By: Edward J. Locigno — Title: Regulatory Analysis & Case Mgr
Prepared By: James F. Martin — Title: Regulatory Case Mgr

Sponsored By: Jay F. Godfrey — Title: VP Energy Mktng & Renewables

SOAH DOCKET NO. 473-19-6862
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Question No. 3-10:

Provide the forecasted annual average cost ($/MWh) and average market energy revenue ($/MWh) for each of the proposed wind energy facilities for each year of the Base Case Without CO2 scenario analyzed by SWEPCO.

Response No. 3-10:

The annual cost ($/MWh) of each facility was computed during the screening phase of this project and provided in TIEC-1-19 Confidential Attachment 2. That attachment computed market energy revenues based on the 2018H2 fundamentals. The annual energy market prices ($/MWh) from the 2019 Fundamentals forecast which were used in Company witness Torpey's Base without CO2 customer benefits analysis were provided on the Scenario 3 worksheet in columns O,P, and Q in the "Torpey Figure 1" file provided in TIEC-1-19 Attachment 1 to the Company's response to TIEC 1-19.

Prepared By: Paul N. Demmy | Title: Resource Planning Anlyst Sr
Prepared By: Jon R. Maclean | Title: Resource Planning Mgr
Prepared By: William S. Robinson | Title: Resource Planning Anlyst Staff
Prepared By: James F. Martin | Title: Regulatory Case Mgr

Sponsored By: John F. Torpey | Title: Mng Dir Res Plnning&Op Anlysis

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Question No. 3-11:

Provide the forecasted annual average cost ($/MWh) and average market energy revenue ($/MWh) for SWEPCO's share of the wind facilities proposed in this case for each year of the base case analysis supporting acquisition of the facilities.

Response No. 3-11:

The annual average cost ($/MWh) of SWEPCO's share of the three Selected Wind Facilities collectively can be derived from the cost information provided in page 1 of Company witness Torpey's Exhibit JFT-3 and the P50 energy production provided on the Inputs worksheet of the Torpey Errata Benefits Model Final file provided in TIEC-1-19 Supplemental Attachment 1 to the Company's supplemental response to TIEC 1-19.

The average annual energy market prices ($/MWh) from the 2019 Base with Carbon Fundamentals forecast which were used in Company witness Torpey's base case customer benefits analysis were provided on the Scenario 3 worksheet Column I in the "Torpey Figure 1" file provided in TIEC-1-19 Attachment 1 to the Company's response to TIEC 1-19.

Prepared By: Paul N. Demmy	Title: Resource Planning Anlyst Sr
Prepared By: Jon R. Maclean	Title: Resource Planning Mgr
Prepared By: William S. Robinson	Title: Resource Planning Anlyst Staff
Prepared By: James F. Martin	Title: Regulatory Case Mgr
Sponsored By: John F. Torpey	Title: Mng Dir Res Plnning&Op Anlysis

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Question No. 3-12:

Provide the capital cost including AFUDC for SWEPCO's share of the Wind Catcher project without the tie line.

Response No. 3-12:

SWEPCO's 70% share of the $2.902 billion wind asset portion of Wind Catcher would have been $2.03 billion. This includes AFUDC.

However, the energy from Wind Catcher was not deliverable without either the tie line or substantial upgrades to the existing transmission grid.

Prepared By: Paul N. Demmy	Title: Resource Planning Anlyst Sr
Prepared By: Jon R. Maclean	Title: Resource Planning Mgr
Prepared By: William S. Robinson	Title: Resource Planning Anlyst Staff
Prepared By: James F. Martin	Title: Regulatory Case Mgr
Sponsored By: John F. Torpey	Title: Mng Dir Res Plnning&Op Anlysis

SOAH DOCKET NO. 473-19-6862
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Question No. 3-13:

Provide the base case revenue requirements including any associated congestion costs for SWEPCO's share of the proposed wind energy facilities in this case and for SWEPCO's share of the previously proposed Wind Catcher project (including the tie line) for each year of the base case analyses for these projects.

Response No. 3-13:

The requested information for both projects was provided in the file CARD_1-22_Attachment_1.xlsx provided with the Company's response to CARD 1-22.

Prepared By: Paul N. Demmy — Title: Resource Planning Anlyst Sr
Prepared By: Jon R. Maclean — Title: Resource Planning Mgr
Prepared By: William S. Robinson — Title: Resource Planning Anlyst Staff
Prepared By: James F. Martin — Title: Regulatory Case Mgr

Sponsored By: John F. Torpey — Title: Mng Dir Res Plnning&Op Anlysis

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Question No. 3-14:

Provide the Wind Catcher tie line revenue requirement for each year of the base case analysis.

Response No. 3-14:

The requested information was provided in the file CARD_1-22_Attachment_1.xlsx provided with the Company's response to CARD 1-22.

Prepared By: Paul N. Demmy	Title: Resource Planning Anlyst Sr
Prepared By: Jon R. Maclean	Title: Resource Planning Mgr
Prepared By: William S. Robinson	Title: Resource Planning Anlyst Staff
Prepared By: James F. Martin	Title: Regulatory Case Mgr
Sponsored By: John F. Torpey	Title: Mng Dir Res Plnning&Op Anlysis

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Question No. 3-15:

Identify the beneficial factors that would offset the drop in market revenues by the proposed new wind facilities when compared to the market revenues forecasted for the Wind Catcher project.

Response No. 3-15:

Any comparison of a single component of the two projects or the projects as a whole is of limited usefulness without consideration of the risks and Company guarantees associated with each. Both projects as a whole are/were very good projects for customers, despite differences in revenues and costs between the projects.

One factor offsetting the drop in revenues viewed in isolation is that there is less risk in delivering the level of production cost savings in this proceeding than there was in the proposed Wind Catcher project. As described in the response and Attachment 1 to CARD 1-22, market energy forecast prices are $25/MWh (34%) lower on average in this proceeding. Assuming all other things equal, there is less risk in achieving forecasted production cost savings based on lower forecast market prices.

Other factors that may be considered as favorable with respect to the current proposal as compared to Wind Catcher include, but are not limited to:

1. Although the Company's guarantees did substantially mitigate tie-line construction cost and risk in Wind Catcher, this proceeding does not include that tie-line construction cost and risk.
2. The current project includes flexibility. The current proposal includes three facilities which can be scaled down if one or more SWEPCO states or PSO do not approve their respective proposed share of the project, as described in the direct testimony of Company witness Brice, page 23. The contracts facilitating the proposed Wind Catcher project required approvals from all four states.

Prepared By: Paul N. Demmy	Title: Resource Planning Anlyst Sr
Prepared By: Jon R. Maclean	Title: Resource Planning Mgr
Prepared By: William S. Robinson	Title: Resource Planning Anlyst Staff
Prepared By: James F. Martin	Title: Regulatory Case Mgr
Sponsored By: John F. Torpey	Title: Mng Dir Res Plnning&Op Anlysis

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Question No. 3-16:

Provide the forecasted base case PTC values for SWEPCO's share of the Wind Catcher project and for the Company's share of the proposed new wind facilities and identify the beneficial factors that would offset the reduction in PTC value when compared to the Wind Catcher project.

Response No. 3-16:

Any comparison of a single component of the two projects, and even a comparison of the projects as a whole, is of limited usefulness without consideration of the risks and Company guarantees associated with each. Both projects as a whole are/were very good projects for customers, despite differences in revenues and costs between the projects.

The PTC values for both projects were provided in the attachment to the Company's response to CARD 1-22. As shown in that attachment, a factor offsetting the reduction in PTC value is reduced carrying charges on a deferred tax asset (DTA) which would result if PTCs are unable to be used to offset taxable income in the year they are earned. The DTA balance is forecasted to be smaller because of the lower volume of PTC's associated with the currently proposed new facilities.

In addition, see the Company's response to CARD 3-15 for further discussion of comparison to the proposed Wind Catcher project.

Prepared By: Paul N. Demmy	Title: Resource Planning Anlyst Sr
Prepared By: Jon R. Maclean	Title: Resource Planning Mgr
Prepared By: William S. Robinson	Title: Resource Planning Anlyst Staff
Prepared By: James F. Martin	Title: Regulatory Case Mgr
Sponsored By: John F. Torpey	Title: Mng Dir Res Plnning&Op Anlysis

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Question No. 3-17:

Explain the basis for the forecasted firm capacity rating used for assessing the estimated capacity value of the proposed wind energy facilities and provide workpapers supporting this forecasted value.

Response No. 3-17:

The Company assumed this capacity would be accredited by SPP at 15.3% of nameplate. In March, 2019, the SPP Supply Adequacy Working Group (SAWG) approved using the Effective Load Carrying Capability (ELCC) methodology as the guiding principle for intermittent resource accreditation, as explained in a whitepaper prepared by SPP in August 2019 provided here as CARD 3-17 Attachment 1. At the current level of wind capacity in SPP, the ELCC method would accredit 19.9% of nameplate capacity for wind resources. The 15.3% value represents the accreditation that would be ascribed today to Tier 2 wind (wind projects without a firm transmission contract on the full ownership amount) as shown in the example on page 9 of Attachment 1. This is a conservative planning assumption assuming the ELCC methodology is formally adopted by SPP, and that the Selected Wind Facilities do not receive a firm transmission contract.

Based on this methodology the firm capacity credit rating assumed for SWEPCO was 810 MW times 15.3% or 123 MW.

Prepared By: Paul N. Demmy	Title: Resource Planning Anlyst Sr
Prepared By: Jon R. Maclean	Title: Resource Planning Mgr
Prepared By: William S. Robinson	Title: Resource Planning Anlyst Staff
Prepared By: James F. Martin	Title: Regulatory Case Mgr
Sponsored By: John F. Torpey	Title: Mng Dir Res Plnning&Op Anlysis

Allocation of Wind and Solar ELCC Accreditation

August 2019

Southwest Power Pool

Revision History

August 18, 2019	Chris Haley	Wind and Solar Accreditation	Combining wind and solar accreditation policy

Table of Contents

1. Introduction

This white paper proposes a methodology for prioritizing and allocating the available effective load carrying capability (ELCC) from wind and solar generating facilities that qualify as capacity in the SPP Balancing Authority (BA). Because of wind and solar's intermittency, the capacity value or effective load carrying capability (ELCC) of wind and solar powered resources are lower than their nameplates indicate and will decrease as the penetration increases across the BA. As the penetration of increases, SPP and its members need to be aware of and understand the changing impact these resources have on the economics of resource adequacy and on the reliability of the system.

2. Background

Since 2004, when SPP originally adopted the criteria for the recommended methodology to evaluate the capability of wind and solar facilities, the wind penetration in the SPP region has increased substantially. The current criteria has been updated once during the past 15 years and this led to most wind facilities receiving more accreditation based on the amount of wind installed on the system at that time. The current criteria accredits wind and solar without any direct consideration of the existing total penetration in the region. As the penetration of wind and solar increases, there may be reliability impacts based on over stating the capacity accreditation of these resources.

The Supply Adequacy Working Group (SAWG) charter's scope of activities directs the SAWG to review the processes and requirements needed to maintain reliable supply adequacy in the SPP BA. One of those requirements is the accreditation methodology for resources and in late 2018, the SAWG directed SPP staff to review and research industry use of the Effective Load Carrying Capability (ELCC) methodology for intermittent resources. The goal was to determine if there was a reliability concern with the current criteria and how it measured up against the accreditation established based on the ELCC methodology. SPP staff completed a system-wide wind[1] and solar[2] analysis in 2019 and found that there was a measureable difference in the results between the two methodologies. The results of the ELCC Wind Study were significant enough for the SAWG in March 2019 to approve, via a straw poll, to use ELCC as the guiding principle for the accreditation of solar, wind and storage resources in the SPP Balancing Authority. This

[1] 2019 ELCC Wind Study Report
[2] Insert 2019 ELCC Solar Study Report here

move to ELCC will replace the current accreditation methodology found in section 7.1.6.1 (7) of the SPP Planning Criteria once new criteria language is approved.

3. ELCC Overview

ELCC is defined as the amount of incremental load a resource, in this case wind and solar, can dependably and reliably serve, while considering the probabilistic nature of generation shortfalls and random forced outages as driving factors to load not being served. ELCC is an industry wide accepted methodology used for determining the capacity value of resources and been in use for nearly half a century.[3]

The measurement of ELCC for both wind and solar resources is consistent, and is described in the following example using one wind scenario. To measure the ELCC of a particular resource, the reliability effects are isolated for the resource in question, from the other resources. This is accomplished by calculating the LOLE of two different cases: one with and one without the resource, as shown in Figure 1. Inherently, the case with the resource should be more reliable and consequently have fewer days per year of expected loss of load (smaller LOLE).

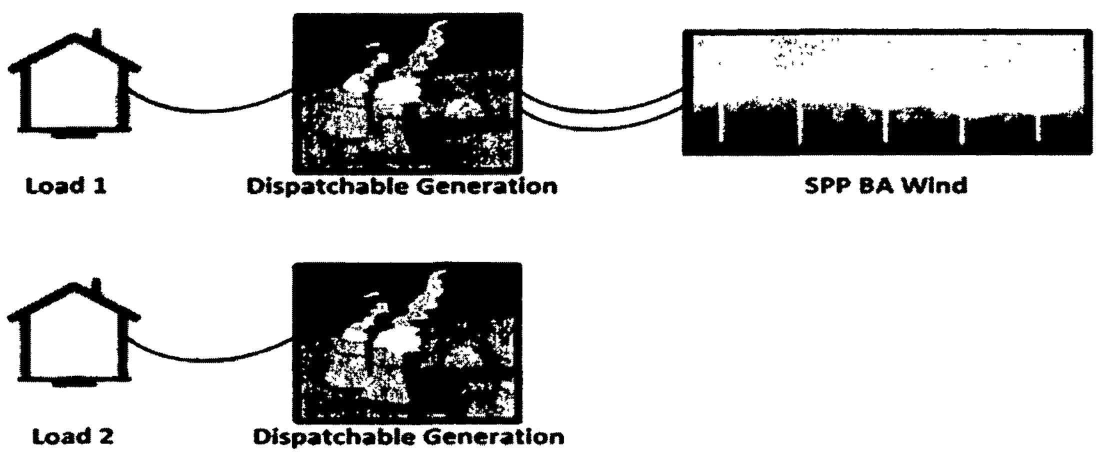

Figure 1: With and without the wind and solar resources

[3] ELCC has been used for determining capacity value of resources since the 1960's when Garver demonstrated the use of Loss of Load Probability (LOLP) in the calculation of ELCC (Section 2 of the 2019 ELCC Wind Study Report)

With each base system case being at the same reliability level, as shown in Figure 2, the only difference between the two cases is that the load was adjusted to meet a required LOLE metric of one day in 10 years. This difference in adjusted load is the amount of ELCC expressed in load or megawatts, which is done by subtracting Load 2 (58,757 MW) from Load 1(61,874 MW), and in this case equals 3,117 MW. This number (3,117) is divided by SPP wind capacity of 19,339 MW and expressed in percentage form. The wind resources in the ELCC example Fig. 2 have an ELCC of 16.1 percent of the resource's nameplate capacity.

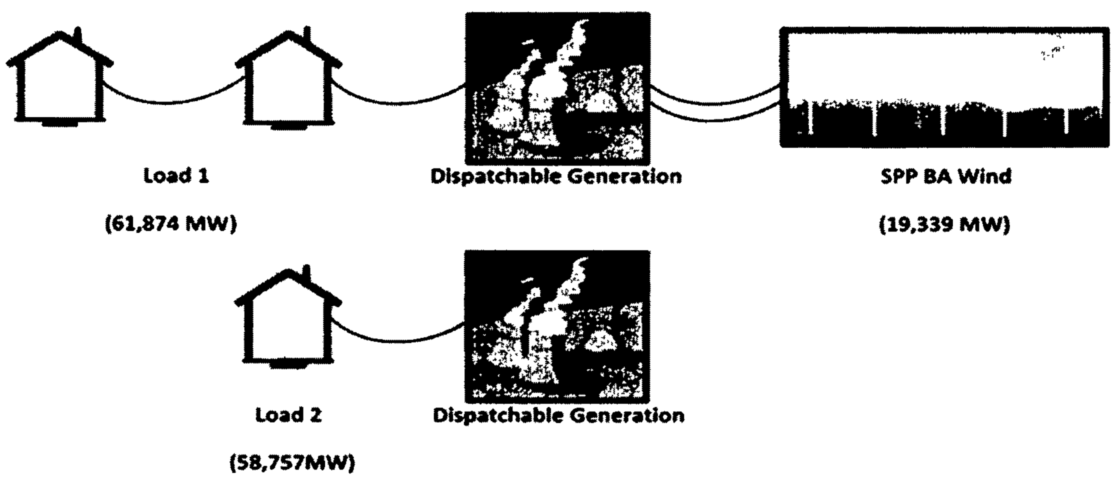

Figure 2: Differnce in load amounts

4. <u>Results from the ELCC Wind Study</u>

SPP Staff completed the ELCC Wind Study in early 2019 using SERVM software. The results of the ELCC Wind Study demonstrated that while the total capacity available from wind resources increases with penetration, the accredited percentage of capacity related to nameplate of each individual resource will decrease. This is illustrated in the Figure 3 below, which is taken from the ELCC Wind Study. The yellow line indicates the total capacity available from wind increases to 5,633 MW for an installed capacity of approximately 38,678 MWs. However, the ELCC of these resources decreases from 19.9% with 19,339 MW of wind to 14.6% with an installed capacity of 38,678 MW[4], for reference, the current SPP

[4] Reference Appendix C

accreditation methodology in Planning Criteria 7.1.6.1 is shown on the green line. The capacity value difference between the ELCC methodology and the current Planning Criteria is a potentially over-valuing approximately 5,000MW of accredited capacity for an installed wind fleet of 38,678 MW nameplate capacity

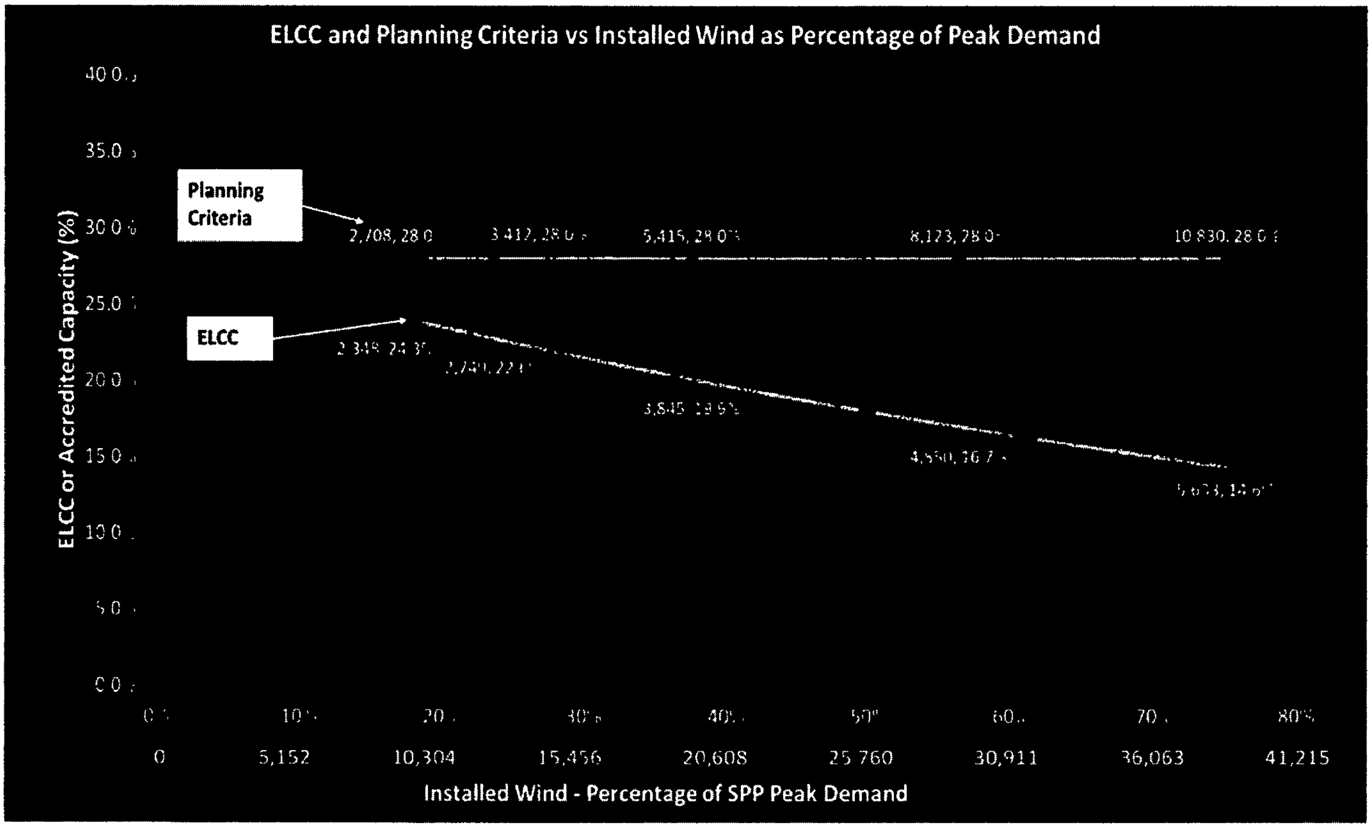

Figure 3: Methodology comparison between SPP Criteria and ELCC

5. <u>Results from the ELCC Solar Study</u>

SPP Staff completed the ELCC Solar Study in 2019 using SERVM software. The results of the ELCC Solar Study demonstrated that while the total capacity available from solar resources increases with penetration, the accredited percentage of capacity related to nameplate of each individual resource will decrease. This is illustrated in the Figure 4 below, which is taken from the ELCC Solar Study.

The yellow line indicates the total capacity available from solar increases to 6,200 MW for installed capacity of 40,000 MW. However, the ELCC accreditation percentage of the resources decreases from 62.4% with

4,282 MW of solar to 15.5% for 40,000 MW. For reference, the current SPP accreditation methodology in Planning Criteria 7.1.6.1 is shown on the green line with an accredited percentage of 60.7% for penetration levels above 1,000 MW, which stays consistent for any future level of penetration. Historical output from the installed existing solar facilities (215 MW) was used to determine the accredited capacity for both methods, ELCC and Planning Criteria. The additional amounts of solar penetration (1,000 MW and greater) utilized solar shapes from existing sites and additional potential sites based on the assumptions in Section **Error! Reference source not found.** of this report. The difference in assumptions (more diversity of solar sites including sites in the northern latitudes of SPP) causes the initial decrease in accredited percentage from 215 MW to 1,000 MW shown in Figure 4.

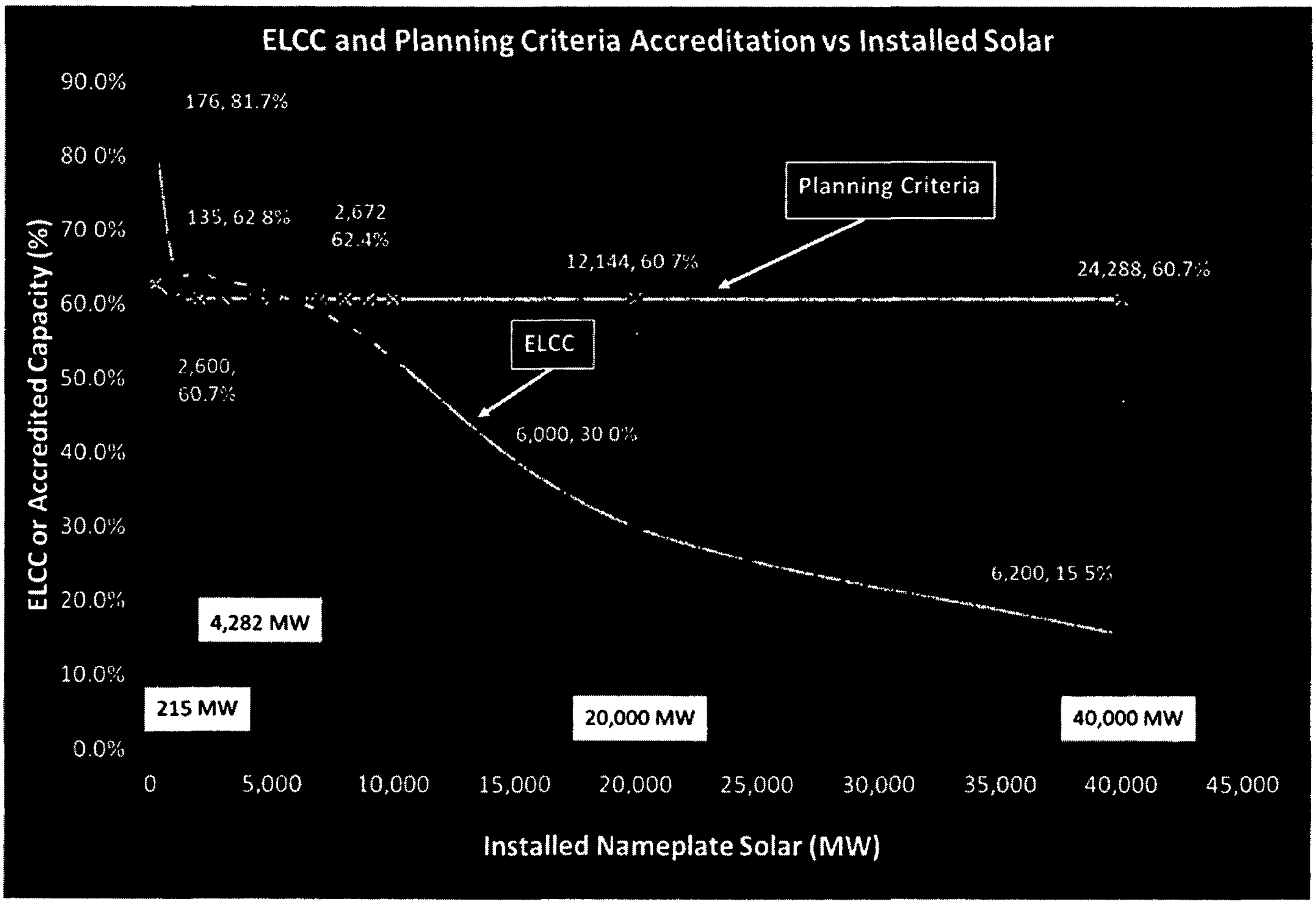

Figure 4: Methodology comparison between SPP Criteria and ELCC

In summary, the SPP ELCC solar analysis:

- Determined the ELCC accredited capacity of installed solar.

- Determined, based on actual and supplemental solar data used in the study, that as solar penetration increases there is a reliability concern that the current SPP Planning Criteria will over-value the accredited capacity of solar.
- Concluded that if wind and solar are analyzed together for the calculation and allocation of ELCC, there is a high possibility that solar resources could receive a portion of the combined ELCC accreditation that otherwise may have been allocated for wind. This is based on the current methodology allocating ELCC on the top 3% of load hours.

Based on this determination, SPP staff recommends that wind and solar be independently studied for the purposes of ELCC accreditation.

6. ELCC Allocation Guidelines

a. Study Priority

SPP staff will perform an annual ELCC[5] study on both the summer and winter seasons to determine the MW amount of accreditation that wind resources receive. As evidenced in Figure 3 and Figure 4, when wind and solar penetration is lower on the system, the ELCC accreditation tends to be of higher value on a percent of nameplate (MW). For this reason, wind and solar resources will be broken into two tiers based on the resource's ability to serve load. In Tier 1, all resources that are a Designated Resource on a Transmission Customer's Network Integration Transmission Service Agreement (NITSA) will have priority in the study queue and will have the ELCC capacity value determined first. Tier 1 resources will be studied at the firm service amount that has been assigned to the Designated Resource in the NITSA. For example, using wind data from Figure 3 above, if the Tier 1 consists of 12,185MW of wind resources, the Tier 1 resources will be assigned an ELCC value of 2,749MW. If Tier 1 resources do not have firm transmission service on the full contract or ownership amount, the remaining nameplate rating capability of the resource will be studied in Tier 2, as shown in Figure 5. Tier 2 will consist of all additional wind and the leftover MWs from Tier 1. Again, using wind data from Figure 3, if Tier 2 consisted of an additional 7,154MW, the ELCC value assigned to Tier 2 would be the difference of the calculated ELCC value of

[5] The ELCC study will piggyback off the latest LOLE study that was performed. The 2019 ELCC Wind and Solar Studies were based off the 2017 LOLE study assumptions.

3,845MW (value at 19,339MW of nameplate capability) less the value assigned to Tier 1 (2,749MW). The resulting value to Tier 2 is 1,096MW as shown in the Equation Example 1 below.

$$Nameplate\ Capacity = 19{,}339\ MW \text{ and } ELCC\ Accreditation = 3{,}845\ MW$$

$$Tier\ 1\ Capacity = 12{,}185\ MW\ and\ ELCC\ Accreditation = 2{,}749\ MW$$

$$Tier\ 2\ Capacity = (19{,}339 - 12{,}185) = 7{,}154\ MW$$
$$Tier\ 2\ ELCC\ Accreditation = (3{,}845 - 2{,}749) = 1{,}096\ MW$$

Equation Example 1: Tier 1 and Tier 2 Calculation

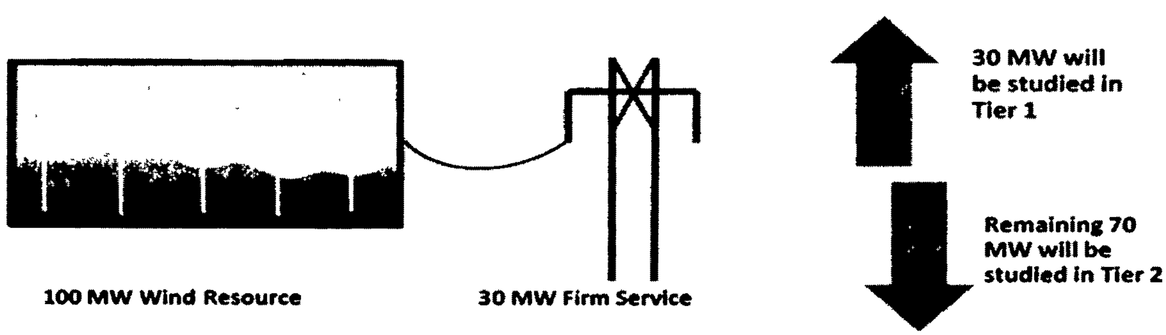

Figure 5: Tier 1 vs Tier 2 Study Priority

b. ELCC Allocation Load Shape

Once each tier level has had its total ELCC assigned, the ELCC megawatt value will be allocated to each individual wind or solar resource. The allocation to Tier 1 resources will be based on the LRE load shapes, which will accredit these resources based on historical performance[6]for serving the load for which they are contracted. For accurate allocation of Tier 1 resources, LREs will be required to annually submit their previous years hourly load data to SPP. If the LRE does not provide the data by June 1, their resource will be allocated with Tier 2 resources.

The assignment to Tier 2 resources will be based on the SPP BA load shape, which will give these resources an accreditation percentage based on historical performance at the time of the SPP peak.

c. ELCC Allocation Load Hours

The available accredited capacity from the ELCC study will be allocated by selecting the hourly net power output values occurring during the top 3% of load hours for the LRE (Tier 1 resources) or SPP BA load (Tier 2 resources) for the peak season that is being analyzed. The yearly values selected will be averaged together to determine the amount of historical production during the top 3% load hours. The data must include the most recent 3 years.

- For wind or solar facilities in commercial operation 3 years or less:
    a) New wind or solar facilities that do not have 3 years of data will be supplemented by output data from the nearest wind facility with a comparable capacity factor or technology vintage to complete the appropriate data set. If no nearby facility has a comparable capacity factor, the output data from the existing facility will be scaled up to mimic the power curve of a more modern facility.
- For wind or solar facilities that have been in commercial operation greater than 3 years:
    - a) The data must include all available data up to the most recent 10 years of commercial operation.

    b) Only metered hourly net power output (MWH) data may be used.

[6] SPP will look at the feasibility of adding curtailments back into the hourly historical performance data. Bring the data back to the SAWG for the 2020 ELCC scoping effort.

7. ELCC Schedule for Implementation

In order to allow LREs a level of certainty based on existing wind accreditation expectations in the next 3 year planning horizon, the ELCC methodology schedule for implementation is proposed starting with the 2023 summer season. Until ELCC becomes effective, wind resources will continue to calculate accreditation based on current SPP Planning Criteria in 7.1.6.1 (7). Starting with the 2023 summer season, all wind resources will be accredited using the ELCC methodology.

SPP staff will perform a summer and winter ELCC study in years 2020 and 2021, and allocate the results to each Load Responsible Entity (LRE) as proposed in this whitepaper for information only. Results for the 2023 Summer Resource Adequacy process will be posted by October 1, 2022. The study will include all resources that have either reached commercial operation by June 1, 2022 or have been submitted in the February 15, 2022 Resource Adequacy Workbook (RAW) as intended to be available for the 2023 summer peak.

8. New Facilities

It is recognized that wind and solar facilities may come into service after June 1 of any individual calendar year or may not be submitted by the appropriate LRE in time to be included in the annual ELCC study. Such occurrences should be rare given the construction lead times for generating facilities. For new wind or solar facilities that reach commercial operation after June 1 of the applicable study year, the facilities must be submitted in the Workbook by Feb 15 to be studied in the upcoming ELCC study. If not, the facility would receive a flat 10% accreditation for wind and a flat 50% accreditation for solar for the upcoming summer peak season.

For example, if a new facility has a commercial operation date of November 1, 2022 and was reported in the Workbook submission by May 15, 2022 that facility will be studied in the 2022 ELCC study, which will be used for the 2023 summer season. In this example, the entity must demonstrate the facility is a Designated Resource before June 1, 2022 in order to be considered a Tier 1 resource for the 2022 study. If a new generator has a commercial operation date of November 1, 2022, but was not analyzed in the 2022 ELCC study then for the 2023 summer season that facility would receive a flat accreditation.

9. Annual ELCC Accreditation Review

Leading up to and upon implementation, the SAWG shall continue to monitor the ELCC accreditation for wind and solar. Modifications to the methodology may be deemed appropriate and could include changes to the tier definitions, allocation method to each facility and consideration of need for a sub-regional derivation of an ELCC value (wind and solar) in place of a region-wide single value.

Appendix Appendix A:

2019 ELCC Wind Study

Appendix B:

Link to 2019 ELCC Solar Study once approved and posted on SPP website

Appendix C:

For the ELCC Wind Study, the scaling approach that SPP staff chose was to scale up or down the current wind installations installed in the SPP footprint. This method was used instead of trying to predict where future wind installations would be located, which could inaccurately bias the results for any future installed capacity. For example, if the selection of future wind was predominantly located in higher wind capacity areas, it could alter the results compared to the wind resource locations actually in commercial operation.

This could appear as a conservative modeling assumption that future wind plants would have output patterns identical to those of existing wind plants. In reality, future wind plants could inherently have output patterns that are different from those of existing wind plants, which may increase or decrease the ELCC of those resources above the level modeled by SPP. This is because new wind plants built even a short distance away from existing wind plants will have somewhat different output patterns due to the inherent geographic diversity of wind resources. In addition, technological advances such as taller turbine towers and longer blades are increasing the output of new and repowered wind plants. Historically, this tends to significantly increase the capacity value of these plants because the increase in output primarily occurs during periods when older wind plants had lower output. These factors could potentially help offset the decline in wind's ELCC percentage at higher wind penetrations. The impacts of new wind farms will be captured in the annual ELCC wind analysis and the results will reflect the impacts of the new technology based on the historical performance, which could increase or decrease ELCC accreditation.

Appendix D:

Solar and Wind Studied Together

The effects of wind and solar studied together versus separately were analyzed as well using the results from the ELCC Wind Study Report[7]. The results in Table 1 represent the ELCC values for 19,339 MW of nameplate wind and 4,282 MW of nameplate solar studied together versus studied separately shows a

[7] 2019 ELCC Wind Study Report: https://www.spp.org/Documents/60434/2019%20ELCC%20Wind%20Study%20Report.pdf

difference of 130 MW of accreditation between the two averages accounting for less than 0.5% of nameplate capacity. If wind and solar are analyzed separately, the effects of each resource type can be analyzed and an associated ELCC can be established for each fuel type, which does not over-value once resource over the other based on the allocation of capacity.

Table 1: ELCC results of wind and solar studied together vs separately.

[illegible]							
Year	Wind & Solar Studied Together (MW)	Wind & Solar %	Solar Only (MW)	Wind Only (MW)	Wind Only + Solar Only (MW)	Total %
2012	4,464	18.9%	2,313	2,043	4,356	18.4%
2013	4,495	19.0%	2,365	2,022	4,387	18.6%
2014	6,100	25.8%	2,731	3,126	5,857	24.8%
2015	7,099	30.1%	2,937	3,952	6,888	29.2%
2016	9,114	38.6%	2,733	6,198	8,931	37.8%
2017	8,823	37.4%	2,960	5,932	8,892	37.6%
Average	**6,682**	**28.3%**	**2,673**	**3,879**	**6,552**	**27.7%**

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SOUTHWESTERN ELECTRIC POWER COMPANY'S RESPONSE TO CITIES ADVOCATING REASONABLE DEREGULATION'S THIRD SET OF REQUESTS FOR INFORMATION

Question No. 3-18:

Provide total energy supplied by resource type for each year of SWEPCO's current IRP including energy supplied from the proposed new wind facilities separately identified.

Response No. 3-18:

See the file TIEC_1-16_Supplemental_Attachment_9-_Fig_ES2_4_6_8_Fig37_42_43_44_Tbl12.xlsx provided in response to TIEC 1-16.

Prepared By: Paul N. Demmy	Title: Resource Planning Anlyst Sr
Prepared By: Jon R. Maclean	Title: Resource Planning Mgr
Prepared By: William S. Robinson	Title: Resource Planning Anlyst Staff
Prepared By: James F. Martin	Title: Regulatory Case Mgr
Sponsored By: John F. Torpey	Title: Mng Dir Res Plnning&Op Anlysis

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SOUTHWESTERN ELECTRIC POWER COMPANY'S RESPONSE TO CITIES ADVOCATING REASONABLE DEREGULATION'S THIRD SET OF REQUESTS FOR INFORMATION

Question No. 3-19:

Provide the total modeled production costs, and total forecasted benefits (or costs) for each scenario presented on a nominal and NPV basis for the first ten years and for the full 31-year study period of the cost/benefit analysis for SWEPCO's share of the proposed new wind resources.

Response No. 3-19:

All of the requested annual information was summarized on the "SWEPCO Exhibits" worksheet in the file "Torpey Errata Benefits Model Final" file included in TIEC_1_19_Supplemental_Attachment_1 to the Company's supplemental response to TIEC 1-19. Amounts can be traced back to various input locations throughout the model using the cell references in each worksheet.

Prepared By: Paul N. Demmy — Title: Resource Planning Anlyst Sr
Prepared By: Jon R. Maclean — Title: Resource Planning Mgr
Prepared By: William S. Robinson — Title: Resource Planning Anlyst Staff
Prepared By: James F. Martin — Title: Regulatory Case Mgr

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SOUTHWESTERN ELECTRIC POWER COMPANY'S RESPONSE TO CITIES ADVOCATING REASONABLE DEREGULATION'S THIRD SET OF REQUESTS FOR INFORMATION

Question No. 3-20:

Provide the total forecasted off system sales margins for each scenario presented on a nominal and NPV basis for the first ten years and for the full 31-year study period of the cost/benefit analysis for SWEPCO's share of the proposed new wind resources.

Response No. 3-20:

The requested OSS margin information was provided between rows 423 and 728 of the Inputs worksheet of the file "Torpey Errata Benefits Model Final" provided in TIEC_1_19_Supplemental_Attachment_1 to the Company's supplemental response to TIEC 1-19. Those inputs are pulled into the worksheet "SWEPCO Exhibits" which is the source for Errata Exhibit JFT-3. That worksheet is the source for Errata Exhibit JFT-4, which appears on the Tables worksheet. The Gen Tie cases in Exhibit JFT-4 are calculated on the "Gen Tie Tables" worksheet in the model.

Prepared By: Paul N. Demmy — Title: Resource Planning Anlyst Sr
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Prepared By: James F. Martin — Title: Regulatory Case Mgr

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