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March 23, 2020

Public Utility Commission of Texas
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PO Box 13326, Austin, TX 78711-3326
Attn: Filing Clerk

Re: TIEC's Initial Brief to Reflect De-Designation of Certain Information in SOAH Docket No. 473-19-6862, PUC Docket No. 49737; *Application of Southwestern Electric Power Company for Certificate of Convenience and Necessity Authorization and Related Relief for the Acquisition of Wind Generation Facilities*;

Dear Sir/Madam,

Enclosed for filing is a revised copy of the public version of TIEC's Initial Brief. This copy has been revised to reflect SWEPCO's agreement to de-designate certain information as noted in the Notice of Agreement to De-Designate Information filed by TIEC on March 23, 2020.

Sincerely,

/s/ James Z. Zhu
James Z. Zhu
Attorney for Texas Industrial Energy Consumers

cc: All parties of record

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

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**

TEXAS INDUSTRIAL ENERGY CONSUMERS' INITIAL BRIEF

DE-DESIGNATED

March 9, 2020

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SOAH DOCKET NO. 473-19-6862
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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**

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GLOSSARY OF ACRONYMS

AEO	Annual Energy Outlook
AEP	American Electric Power
CCN	Certificate of Convenience and Necessity
DISIS	Definitive Interconnection System Impact Study
DTA	Deferred Tax Asset
EIA	Energy Information Administration
GIA	Generation Interconnection Agreement
GW	Gigawatt
GWh	Gigawatt-hour
ICE	InterContinental Exchange
IRP	Integrated Resource Plan
ITC	Investment Tax Credit
ITP10	Integrated Transmission Planning
LACOE	Levelized Adjusted Cost of Energy
LCOE	Levelized Cost of Energy
LBNL	Lawrence Berkeley National Laboratory
LMP	Locational Marginal Price
LPSC	Louisiana Public Service Commission
MMBtu	Million British Thermal Units
MW	Megawatt
MWh	Megawatt-hour
NCF	Net Capacity Factor
NPV	Net Present Value
NYMEX	New York Mercantile Exchange
O&M	Operations and Maintenance
PFD	Proposal for Decision
PPA	Purchased Power Agreement

PSA	Purchase and Sale Agreement
PSO	Public Service Company of Oklahoma
PTC	Production Tax Credit
PV	Photovoltaic
RFP	Request for Proposals
RPS	Renewable Portfolio Standard
SOM	State of the Market
SPP	Southwest Power Pool
SPS	Southwestern Public Service Company
SWEPCO	Southwestern Electric Power Company
TIEC	Texas Industrial Energy Consumers
WACC	Weighted Average Cost of Capital

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TEXAS INDUSTRIAL ENERGY CONSUMERS' INITIAL BRIEF[1]

I. Introduction

SWEPCO's proposal in this case has drawn a number of comparisons to the Wind Catcher proposal that immediately preceded it. That comparison is unfair to Wind Catcher.

Make no mistake about it, Wind Catcher would have been a disaster for SWEPCO's ratepayers. But the proposal in this case is even worse. For all of its problems, Wind Catcher would have produced 16% more energy for every MW of installed capacity.[2] And it was not burdened with high (and uncertain) costs for congestion and losses, which even SWEPCO acknowledges would add roughly 50% to the cost of energy of the proposed facilities in this case.[3] And SWEPCO's calculated breakeven natural gas price in the Wind Catcher case was well above both the applicable U.S. Energy Information Administration (EIA) low gas forecast and the NYMEX futures market prices.[4] In this case, even with all of its biases in favor of the wind

[1] TIEC attempted to minimize the confidential portions of this brief in keeping with the ALJs' directive in SOAH Order No. 5. However, given the large swath of information SWEPCO has designated as highly sensitive or confidential—including portions of Mr. Bletzacker's rebuttal testimony—TIEC found it necessary to file parts of this brief under seal. Upon filing this brief, TIEC will confer with SWEPCO to determine if any portions of the brief can be de-designated and filed in public format.

[2] *Compare* TIEC Ex. 5 at FoF 105 (stating that Wind Catcher had a P50 net capacity factor of 51.1%) *with* SWEPCO Ex. 8B, Workpapers to the Direct Testimony of John F. Torpey at WP "Updated Torpey Errata Benefits Model Final.xlsx," Tab "Combined P-Values" (showing P50 net capacity factor for the three projects of 44.01%). 51.1%/44.0% = 116% (Torpey Dir. Workpapers).

[3] TIEC Ex. 15.

[4] *Application of Southwestern Electric Power Company for Certificate of Convenience and Necessity Authorization and Related Relief for the Wind Catcher Energy Connection Project in Oklahoma,* Docket No. 47461, Proposal for Decision (PFD) at 26 (May 18, 2018).

projects (Wind Facilities), SWEPCO calculates a breakeven natural gas price that is above both the 2020 EIA Low Case[5] and the most current NYMEX futures prices.[6]

The dismal economics of SWEPCO's proposal are in part due to the fact that natural gas forecasts and futures prices have declined considerably since SWEPCO issued the request for proposals (RFP) more than a year ago. But this case is not about the prudence of SWEPCO's decision when it prepared the RFP in 2018 or finalized the Purchase and Sale Agreements (PSAs) in 2019. Rather, the case is about whether this Commission should find, based on the record in this case, that granting a Certificate of Convenience and Necessity (CCN) "is necessary for the service, accommodation, convenience or safety of the public."[7] Whatever SWEPCO may have believed about the economics of these projects in 2018 or 2019, the evidence in this case demonstrates that not only has SWEPCO failed to meet its burden of proof that these projects are necessary for service to its ratepayers, but that the approval of a CCN for these projects would in all likelihood be harmful for SWEPCO's ratepayers.

If the proposed facilities were actually likely to deliver lower rates to ratepayers, there is no reason that TIEC or the other ratepayer parties would oppose them. Ratepayers have every reason to support projects that would lower their costs, and the same groups that oppose these wind projects have supported other wind projects that have shown a strong likelihood of delivering ratepayers savings.[8] Unlike SWEPCO, however, which stands to charge higher base rates and earn a return on invested capital of over $1.8 billion[9] whether or not the projects provide any benefits to ratepayers, the concern of ratepayer groups is straightforward—will these projects actually reduce rates for Texas ratepayers? The answer to that question for these projects is a resounding no.

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[5] The EIA High Oil and Gas Supply case.

[6] TIEC Ex. 1, Direct Testimony and Exhibits of Jeffry Pollock at 21 (Pollock Dir.).

[7] PURA § 37.056(a).

[8] *Application of Southwestern Public Service Company for Approval of Transactions with ESI Energy, LLC and Invenergy Wind Development North America, LLC, to Amend a Certificate of Convenience and Necessity for Wind Generation Projects and Associated Facilities in Hale County, Texas and Roosevelt County, New Mexico, and for Related Approvals,* Docket No. 46936, Final Order at FoFs 43, 47 (May 25, 2018).

[9] This is a nominal value, taken by adding up the "Return on Rate Base $$ MM" line in SWEPCO Ex. 8B, Torpey Dir. Workpapers at WP "Updated Torpey Errata Benefits Model Final.xlsx," Tab "P50 RR Base"; *see also* Tr. at 466:17-25 (Torpey Cross) (Feb. 25, 2020) (noting that the total return number is in his workpapers).

As set forth below, SWEPCO has made any number of unsupported assumptions that increase its projected "net benefits" of the Wind Facilities by hundreds of millions of dollars. Even given the benefit of all those unsupported assumptions, however, the projects are still money losers based on trended NYMEX futures and the EIA Low Case, both of which the Commission cited in its revised findings rejecting Wind Catcher.[10] This is not a close call. SWEPCO's request for a CCN should be denied.

II. Certificate of Convenience and Necessity Standard of Review (P.O. Issue No. 2)

SWEPCO has the burden of proving that its proposed Wind Facilities are necessary for the service, accommodation, convenience, or safety of the public.[11] Historically, in generation CCN-amendment proceedings, the utility attempts to prove that it needs the additional capacity that the facility would provide, and that its proposal is the best alternative to meet that need.[12] Here, as in the Wind Catcher case, however, SWEPCO is attempting to demonstrate "need" based on forecasted economic savings.[13] SWEPCO does not have a need for any capacity that the Wind Facilities would deliver.[14] If SWEPCO's application is granted, ratepayers would be forced to make a massive bet that the savings generated by the Wind Facilities would exceed their substantial cost. SWEPCO's shareholders, on the other hand, stand to profit from the inclusion of the Wind Facilities in rate base regardless of whether they provide the advertised savings. Under these circumstances, it is particularly critical that the Commission fully consider the risks to ratepayers and hold SWEPCO to its burden of proof.

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[10] TIEC Ex. 5 at FoFs 84, 89.

[11] PURA § 37.056; 16 T.A.C. § 25.101.

[12] *E.g., Application of Southwestern Electric Power Company for Certificate of Convenience and Necessity Authorization for a Coal Fired Power Plant in Arkansas, Docket No. 33891, Final Order at FoFs 24-37 (Aug. 12, 2008); Application of Entergy Texas, Inc. to Amend its Certificate of Convenience of Necessity to Construct Montgomery County Power Station in Montgomery County,* Docket No. 46416, Final Order at FoFs 30-34 (July 20, 2017).

[13] SWEPCO Ex. 2, Direct Testimony of Thomas P. Brice at 25-26 (Brice Dir.).

[14] TIEC Ex. 2, Direct Testimony and Exhibits of Charles S. Griffey at 13 (Griffey Dir.).

III. Analysis of Economics of Selected Wind Facilities (P.O. Issue Nos. 2, 3, 5, 6, 19, 23)

A. Request for Proposals Selection Process

SWEPCO issued a sole-source solicitation for build/transfer/own wind resources.[15] Thus, SWEPCO did not consider other types of resources, such as solar generation or purchasing financial forwards, either of which might have provided economic value.[16] Nor did SWEPCO allow for purchased power agreement (PPA) options, which might have provided a better risk profile than the Wind Facilities, but would not have allowed SWEPCO to place a large asset in rate base.[17] Notably, if SWEPCO had allowed for PPA options, it might have been able to better capture the value of the Production Tax Credits (PTCs).[18] But SWEPCO did not do so.

As discussed below, one flaw in SWEPCO's economic evaluation in this case is that it failed to consider that it would have other options than these Wind Facilities to mitigate against high energy prices in the future (should such prices actually materialize).[19] As can be seen from SWEPCO's RFP process, SWEPCO not only failed to consider this optionality as to the future, it did not adequately consider alternatives to the Wind Facilities even in the present. Ultimately, SWEPCO's flawed RFP process led to the selection of unduly risky resources. The Commission should deny SWEPCO's application.

B. Project Description and Cost

On the heels of the rejection of its proposed Wind Catcher project, SWEPCO requests Commission approval for 1,485 MW of new wind generation, comprised of three separate wind farms located in Central Oklahoma. The Wind Facilities include the Traverse (999 MW), Maverick (287 MW), and Sundance (199 MW) projects.[20] The Wind Facilities are to be developed by Invenergy and turned over to SWEPCO and its sister company Public Service Company of Oklahoma (PSO) under three separate turnkey PSAs for a combined purchase price of $1.86

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[15] *Id.* at 6, 46-50.

[16] *Id.*

[17] *Id.* at 50.

[18] *Id.* at 47-48.

[19] *See infra* Section III.D.1.

[20] SWEPCO Ex. 2, Brice Dir. at 3.

billion.[21] With PSA price adjustments and owner's costs, the initial capital cost of the Wind Facilities will be $1.996 billion.[22] Of the total 1,485 MW, SWEPCO's share will be 810 MW, or roughly 55%.[23] SWEPCO's share of the cost is $1.089 billion, which it has proposed as a cap on the initial capital investment that it may place into rate base.

In addition to the initial capital costs, the Wind Facilities will require interim capital expenditures and ongoing operations and maintenance (O&M) expense,[24] neither of which SWEPCO has included in its capital cost cap.[25] SWEPCO states that the interim capital expenditures are necessary for the Wind Facilities to achieve the 30-year useful life that SWEPCO assumes in its economic analysis.[26] While SWEPCO's economic analysis includes a forecast of ongoing capital and O&M, customers are not protected against the actual amounts being significantly higher than those projected. As SWEPCO witness Mr. DeRuntz testified, the company's interim capex and ongoing O&M forecast does not include risk pricing for unknowns that could be experienced over the life of the project.[27] Further, SWEPCO's ongoing capital and O&M forecast assumes that costs will remain flat in real terms after the first ten years,[28] despite the fact that its turbine manufacturers specifically stated that O&M costs would be higher in later years.[29]

Although SWEPCO is not requesting approval of a dedicated generation tie-line in this proceeding, the cost of a potential gen-tie (which SWEPCO estimates to be $443 million[30]) should be included in assessing the economics of the Wind Facilities. As set forth in greater detail below, the feasibility of a gen-tie was a major consideration in SWEPCO's bid evaluation process, and its

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[21] *Id.* at 6-7.

[22] *Id.* at 7.

[23] *Id.* at 23.

[24] SWEPCO Ex. 16, Rebuttal Testimony of Joseph G. DeRuntz at 3-4 (DeRuntz Reb.).

[25] *Id.* at 4.

[26] TIEC Ex. 1, Pollock Dir. at 15; SWEPCO Ex. 4, Direct Testimony of Joseph G. DeRuntz at 18-19 (DeRuntz Dir.).

[27] SWEPCO Ex. 16, DeRuntz Reb. at 4.

[28] Tr. at 724:22-725:14 (DeRuntz Cross) (Feb. 26, 2020).

[29] SWEPCO Ex. 16, DeRuntz Reb. at Ex. JGD-2R at 6; Tr. at 727:3-22 (DeRuntz Cross) (Feb. 26, 2020); TIEC Ex. 74.

[30] TIEC Ex. 59. This figure is in 2021 dollars, which SWEPCO escalates for inflation such that the assumed capital cost will be $480 million in 2026. Tr. at 394:15-25 (Ali Cross) (Feb. 25, 2020).

economic analyses implicitly assume that a gen-tie would be built. The proposed Wind Facilities should not be approved unless it can be demonstrated that ratepayers would benefit even under a scenario where a gen-tie is built.

C. Economic Modeling

1. Modeling Methodology

SWEPCO used three separate models, each with their own limitations and input assumptions, to project the expected benefits of the Wind Facilities. To model its own operating resources and production costs, SWEPCO used PLEXOS, which models an hourly dispatch of SWEPCO's system.[31] However, the PLEXOS model does not simulate the broader SPP region, and therefore requires as an input the wholesale market prices, or locational marginal prices (LMPs), at which SWEPCO will purchase and sell power from the SPP.[32] Specifically, PLEXOS requires as inputs the hourly market prices for the AEP West load zone (where SWEPCO purchases power) and SWEPCO's and PSO's thermal generation zones (where SWEPCO and PSO sell power). Because SWEPCO's modeling assumes that the Wind Facilities would not change the dispatch of its existing units, the projected benefits of the Wind Facilities come from either allowing SWEPCO to forego making market purchases or freeing up SWEPCO's existing thermal units to make market sales.[33] Indeed, in the low gas/no carbon case, the projected off-system sales margins, net of the 10% that SWEPCO proposes to keep for its shareholders, total $105 million net present value (NPV), or a little less than half of the total benefits of that case.[34] Accordingly, the projected market prices are critical to the projected net benefits.

While AEP's forecast projects long-term market power prices, the AURORA model that is used to develop the forecast is limited in that it only models power prices for thirty regions across the United States, without any additional granularity for locational differences.[35] The relevant region here is an area called the "SPP Central" region in the AURORA model, which

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[31] SWEPCO Ex. 9, Direct Testimony of Johannes P. Pfeifenberger at 39 (Pfeifenberger Dir.).

[32] *Id.*

[33] TIEC Ex. 2, Griffey Dir. at 15. The $117 million figure cited in Mr. Griffey's testimony includes all off-system sales margins. Under SWEPCO's proposal, customers would only receive 90% of that amount, or $105.3 million NPV.

[34] *Id.*

[35] *Id.* at 40; Tr. at 266:15-25 (Bletzacker Cross) (Feb. 24, 2020).

SWEPCO states roughly corresponds to the generation resources of SPP's AEP zone, GRDA zone, OKGE zone, SPS zone, and WFEC zone.[36] Accordingly, SWEPCO had to adjust AURORA's "SPP Central" prices for locational differences to AEP's load and generation zone prices, which SWEPCO did through the PROMOD model.[37] Using 2024 and 2029 PROMOD runs, SWEPCO witness Mr. Sheilendranath calculated the percentage differential between the market prices for the "SPP Central" area shown in PROMOD and the market prices for AEP's load and generation zones.[38] Those percentage differentials were then applied to the "SPP Central" prices from AURORA to obtain the hourly AEP West load zone and SWEPCO/PSO generation zone LMPs that were input into the PLEXOS model for each year.[39]

PLEXOS was then run with and without the Wind Facilities, and the difference in production costs between those runs formed the basis of the production cost savings shown in the top line of Exhibit JFT-3.[40] The difference in future generation additions and retirements formed the basis of SWEPCO's projected capacity savings.[41]

However, neither the PLEXOS nor the AURORA models are set up to model the SPP transmission system, and therefore these models are unable to simulate the congestion and losses between the location of the Wind Facilities in Central Oklahoma and the AEP West load zone.[42] SWEPCO used the PROMOD model to forecast the congestion and loss-related costs between these locations.[43] Specifically, SWEPCO ran PROMOD using the Southwest Power Pool's (SPP) 2019 Integrated Transmission Planning (ITP10) assumptions for 2024 and 2029 to calculate the congestion and loss-related costs for those years.[44] For 2025 to 2028, SWEPCO interpolated the congestion and loss-related costs between 2024 and 2029.[45] For 2021-2023, SWEPCO extrapolated backwards from the 2024 congestion and loss costs using the escalation rate of the

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[36] SWEPCO Ex. 6, Direct Testimony of Akarsh Sheilendranath at Ex. AS-2 at n.1 (Sheilendranath Dir.).

[37] *Id.* at 11-12.

[38] *Id.*

[39] *Id.*

[40] SWEPCO Ex. 8, Direct Testimony of John F. Torpey at 17-19 (Torpey Dir.).

[41] *Id.* at 17-18.

[42] SWEPCO Ex. 6, Sheilendranath Dir. at 8-9.

[43] *Id.*

[44] *Id.* at 9.

[45] *Id* at 10.

AEP forecast, consistent with the principle that congestion costs correlate in tandem with power prices.[46] For the period from 2030 to 2051, SWEPCO held the congestion and loss costs flat in nominal terms at the 2029 level.[47] The congestion and loss costs calculated for each case are what is shown in Exhibit JFT-3 under line 2.

SWEPCO's economic modeling is highly dependent upon the input assumptions. Two of the key assumptions are the forecasted natural gas prices and the forecasted additions of renewable capacity to the SPP market. The lower the forecasted gas price, the lower the projected net benefits. Indeed, at SWEPCO's calculated breakeven levelized gas price of $3.67/MMBtu, the project has no net benefits, even assuming all of SWEPCO's other assumptions are correct.[48] Similarly, the greater the future renewable penetration, the lower the projected benefits. This is due to both the fact that (1) more zero-marginal-cost (or negative, with PTCs) renewable generation lowers market prices[49] and (2) more wind generation raises congestion costs, depending on the location.[50] As discussed throughout the remainder of this brief, SWEPCO's assumptions for these variables and others are not reasonable and serve to inflate the projected benefits of the Wind Facilities.

Due to the complex and convoluted nature of SWEPCO's modeling process, the deficiencies and inconsistencies in each model are compounded, which results in a low level of confidence in the final results.[51] In order to ensure that ratepayers are not harmed by the Wind Facilities, SWEPCO's modeling results should be interpreted in a way that accounts for the large margin of error.

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[46] *Id.* at 4-5, 10; Tr. at 317:11-15 (Sheilendranath Cross) (Feb. 25, 2020).

[47] Tr. at 310:23-25 (Sheilendranath Cross) (Feb. 25, 2020).

[48] Tr. at 445:14-446:4 (Torpey Cross) (Feb. 25, 2020); TIEC Ex. 1, Pollock Dir. at 21.

[49] TIEC Ex. 1, Pollock Dir. at 28-32.

[50] Tr. at 375:7-21 (Ali Cross); SWEPCO Ex. 7, Direct Testimony of Kamran Ali at 10 (Ali Dir.).

[51] ETEC/NTEC Ex. 2, Direct Testimony of John W. Chiles at 18 (Chiles Dir.).

2. Projected Production Cost Savings

a. Natural Gas Prices

Projected natural gas prices are a major driver of the assumed LMPs that SWEPCO used in its net-benefits analysis.[52] The Commission recognized this dynamic in the Wind Catcher case, noting that assumed natural gas prices are an essential part of the analysis because the higher the projected natural gas prices, the greater the projected benefits of the project.[53] As in the Wind Catcher case, SWEPCO used the projected natural gas prices from AEP's forecast, the current version of which Mr. Bletzacker created in April 2019.[54] And, as in the Wind Catcher case, Mr. Bletzacker provided inflated gas projections that skew the net-benefits analysis in favor of the Wind Facilities. The use of more realistic natural gas prices, including the EIA's highest supply case and NYMEX futures price—both of which the Commission relied upon in rejecting the Wind Catcher project—indicate that the Wind Facilities are likely to be uneconomic.

Throughout this section, gas price forecasts are presented as levelized averages when available. Simple averages are also presented for comparisons of forecasts for which levelized averages are not in the record. "Levelized" means that the prices are time-weighted using the same discount rate that SWEPCO used in its economic analysis, which reflects the fact that changes in gas prices in earlier years have a more significant impact on net benefits than changes in gas prices in the later years. Mr. Pollock presented several of AEP's forecasts, EIA's forecasts, and NYMEX prices trended on levelized terms.[55]

AEP's projected natural gas prices are inflated and unreliable.

Mr. Bletzacker's base case and his low/no carbon case (his lowest price case) projections are set forth below:[56]

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[52] TIEC Ex. 5 at FoF 78.

[53] *Id.* at FoF 75.

[54] Tr. at 201:13-16 (Bletzacker Cross) (Feb. 25, 2020).

[55] TIEC Ex. 1, Pollock Dir. at 21.

[56] TIEC Ex. 43; SWEPCO Ex. 5A, Workpapers to the Direct Testimony of Karl R. Bletzacker at WP "2019H1_LTF_NoCO2_Low_Nominal_2019-4-23.xlsx," Tab "Y2019H1 Annual_Prices-Nominal" (Bletzacker Dir. Workpapers).

Year	AEP Base	AEP Low / No CO2	Year	AEP Base	AEP Low / No CO2	Year	AEP Base	AEP Low / No CO2
2019	**$ 3.21**	**$ 2.73**	**2030**	**$ 5.17**	**$ 4.26**	**2041**	**$ 7.32**	**$ 6.05**
2020	$ 3.44	$ 2.92	2031	$ 5.30	$ 4.37	2042	$ 7.61	$ 6.29
2021	**$ 3.54**	**$ 3.01**	**2032**	**$ 5.45**	**$ 4.49**	**2043**	**$ 7.84**	**$ 6.49**
2022	$ 3.71	$ 3.16	2033	$ 5.62	$ 4.63	2044	$ 8.18	$ 6.77
2023	**$ 3.89**	**$ 3.31**	**2034**	**$ 5.82**	**$ 4.80**	**2045**	**$ 8.50**	**$ 7.04**
2024	$ 4.08	$ 3.47	2035	$ 6.02	$ 4.97	2046	$ 8.81	$ 7.30
2025	**$ 4.24**	**$ 3.60**	**2036**	**$ 6.14**	**$ 5.07**	**2047**	**$ 9.05**	**$ 7.51**
2026	$ 4.40	$ 3.74	2037	$ 6.39	$ 5.28	2048	$ 9.32	$ 7.73
2027	**$ 4.55**	**$ 3.86**	**2038**	**$ 6.64**	**$ 5.48**	**2049**	**$ 9.53**	**$ 7.91**
2028	$ 4.84	$ 3.98	2039	$ 6.84	$ 5.65	2050	$ 9.80	$ 8.14
2029	**$ 5.01**	**$ 4.12**	**2040**	**$ 7.02**	**$ 5.80**	**2051**	**$ 10.11**	**$ 8.40**

AEP's forecasted gas prices are overstated even in the near term. Though Mr. Bletzacker created his forecast in the second quarter of 2019, his base case ($3.21/MMBtu) and low/no carbon case ($2.73/MMBtu) were significantly higher than actual Henry Hub prices during that same year, which averaged $2.56/MMBtu.[57] For 2020, Mr. Bletzacker's base and low/no carbon cases are $3.44/MMBtu and $2.92/MMBtu, respectively, but NYMEX futures prices as of January 2020 were only $2.25/MMBtu.[58] As an additional point of reference on 2020 prices, the actual Henry Hub price for the week before the hearing was in the range of $1.90/MMBtu to $2.00/MMBtu.[59] Similarly, for 2021, Mr. Bletzacker's base and low/no carbon cases project prices of $3.54/MMBtu and $3.01/MMBtu, respectively, while NYMEX futures prices are well below that level at $2.43/MMBtu.[60] Thus, the theoretical future natural gas prices that Mr. Bletzacker derives in his forecast depart immediately and significantly from actual market prices.

Mr. Bletzacker's forecast, which features ever-increasing prices that exceed $9/MMBtu by 2047 in the base case, is also unreasonably inflated over the long-term. As discussed below, this is evident from the fact that his forecast predicts significantly higher gas prices than (1) the EIA Annual Energy Outlook (AEO), (2) NYMEX futures prices, and (3) other third-party forecasts. It is also evident from the fact that Mr. Bletzacker's forecast has been overstating gas prices for over a decade, as the Commission found in the Wind Catcher case.[61]

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[57] TIEC Ex. 1, Pollock Dir. at 17.

[58] TIEC Ex. 24 (HSPM).

[59] Tr. at 224:10-13 (Bletzacker Cross) (Feb. 24, 2020).

[60] TIEC Ex. 24 (HSPM).

[61] TIEC Ex. 5 at FoF 80.

AEP's forecast is high compared to EIA forecasts, which themselves have been too high in recent years.

AEP's forecast prices are significantly higher than the 2020 EIA Reference Case and the EIA Low Case, which the Commission cited as the most accurate EIA case in the Wind Catcher proceeding.[62] In its direct case, SWEPCO sought to invoke similarities to the ***2019*** EIA Reference Case in an effort to bolster the credibility of its forecast. Specifically, in his direct testimony, Mr. Bletzacker explained that the EIA "collects, analyzes, and disseminates independent and impartial energy information to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment."[63] And he noted that the 2019 EIA Reference Case projected similar prices to his base case.[64] However, in January 2020, the EIA released its 2020 AEO, and Mr. Bletzacker's comparison no longer holds water.

The 2020 EIA AEO dropped significantly across all cases from the 2019 version.[65] As shown in the following chart, the 2020 EIA Reference Case dropped in every year compared to the 2019 Reference Case, and by $1.27/MMBtu on an average basis:[66]

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[62] *Id.* at FoF 89.

[63] SWEPCO Ex. 5, Direct Testimony of Karl R. Bletzacker at 11 (Bletzacker Dir.).

[64] *Id.* at 12.

[65] TIEC Ex. 3.

[66] *Id.* Mr. Bletzacker's rebuttal exhibits only included forecasted gas prices up until 2050.

Year	EIA 2019 Reference	EIA 2020 Reference	Year	EIA 2019 Reference	EIA 2020 Reference
2021	$ 3.24	$ 2.62	2036	$ 6.20	$ 4.96
2022	$ 3.33	$ 2.68	2037	$ 6.37	$ 5.14
2023	$ 3.56	$ 2.78	2038	$ 6.53	$ 5.30
2024	$ 3.84	$ 2.95	2039	$ 6.71	$ 5.43
2025	$ 4.20	$ 3.27	2040	$ 6.96	$ 5.56
2026	$ 4.39	$ 3.64	2041	$ 7.10	$ 5.68
2027	$ 4.52	$ 3.90	2042	$ 7.33	$ 5.85
2028	$ 4.72	$ 4.11	2043	$ 7.61	$ 6.02
2029	$ 4.84	$ 4.22	2044	$ 7.93	$ 6.18
2030	$ 5.00	$ 4.26	2045	$ 8.25	$ 6.36
2031	$ 5.09	$ 4.29	2046	$ 8.54	$ 6.58
2032	$ 5.38	$ 4.41	2047	$ 8.88	$ 6.82
2033	$ 5.58	$ 4.60	2048	$ 9.35	$ 7.05
2034	$ 5.77	$ 4.77	2049	$ 9.77	$ 7.27
2035	$ 5.95	$ 4.86	2050	$ 10.18	$ 7.54
			Simple Average	$ 6.24	$ 4.97

Further, the new EIA AEO demonstrates that AEP's gas forecasts continue to be outliers. The 2020 EIA Reference Case is now $1.16/MMBtu below AEP's base case on a levelized basis.[67] In fact, the current Reference Case is even $0.25/MMBtu below SWEPCO's low/no carbon case.[68]

The fact that the EIA Reference Case is now lower than even SWEPCO's lowest natural gas case is particularly noteworthy given that EIA itself has consistently projected higher natural gas prices than have actually occurred under the current shale paradigm. As Mr. Griffey testified, EIA's forecasts have been lagging indicators that have overstated natural gas prices in the post-shale revolution era:

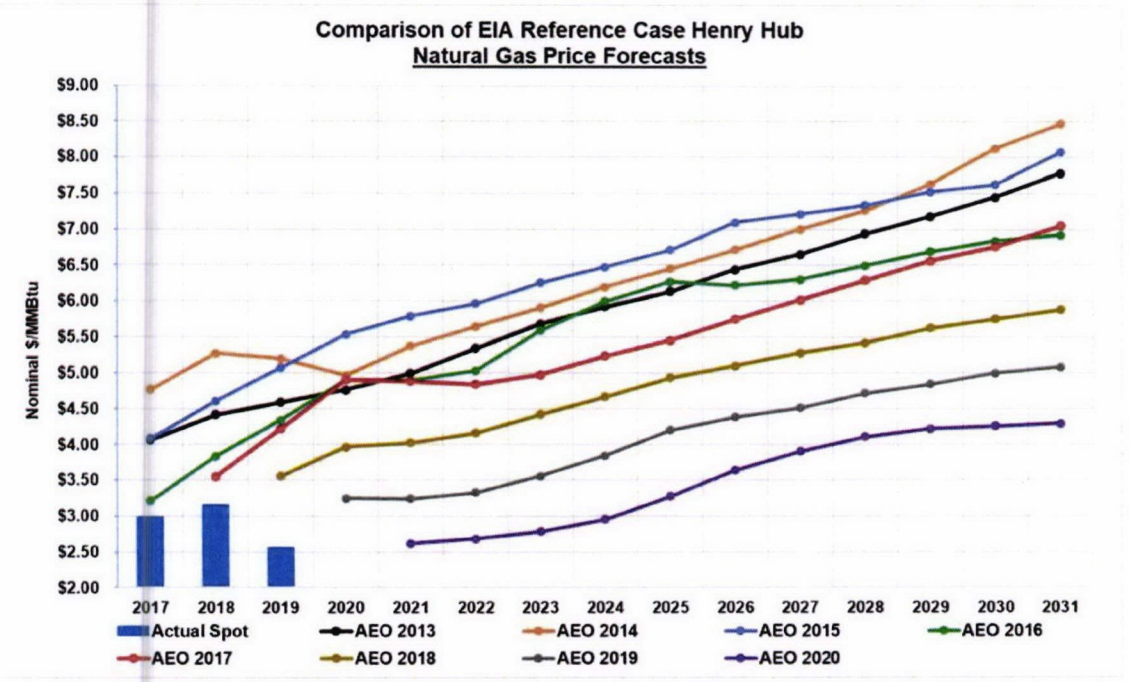
> EIA forecasts of gas prices have always been lagging indicators and have historically overstated future gas prices, particularly since the advent of the shale revolution. This is due in part to the nature of the EIA forecasting process. It is both time consuming and suffers some of the same flaws as SWEPCO's fundamentals forecasts. Indeed, academics and energy modelers have noted that EIA, despite knowing of the potential for shale gas for decades, failed to forecast low prices by not addressing the issues of known unknowns and unknown unknowns in its process.[69]

[67] TIEC Ex. 1, Pollock Dir. at 21.

[68] *Id.*

[69] TIEC Ex. 2, Griffey Dir. at 30-31 (footnotes omitted).

Mr. Pollock also testified that EIA's Reference Case forecasts have overstated future natural gas prices.[70] To demonstrate this, Mr. Pollock provided the following analysis in his testimony, which compares the EIA's Reference Cases from 2013 on to actual Henry Hub prices for years 2017 through 2019:[71]



As can be seen, each of EIA's Reference Cases since 2013 projected much higher natural gas prices than actually occurred. Additionally, Mr. Pollock's exhibit demonstrates that the EIA is consistently lowering its Reference Case year after year as it attempts to better reflect the reality of abundantly available cheap natural gas.

Given that EIA's Reference Case has consistently overstated natural gas prices, it is unsurprising that EIA's Low Case has provided the most accurate forecast in recent years. The EIA Low Case projects the largest available supply of natural gas—and the most robust shale development—among the EIA cases.[72] The Commission specifically found that this case has been the most accurate in recent years in the Wind Catcher case, which was tried in 2018.[73] That trend

[70] TIEC Ex. 1, Pollock Dir. at 22.

[71] *Id.* at Ex. JP-2.

[72] *Id.* at 18-19.

[73] TIEC Ex. 5 at FoF 89.

has continued in 2019 and 2020. The following chart shows recent 2018-2020 EIA Low Case projections compared to actual gas prices in 2019 and NYMEX futures prices for 2020 (as well as spot prices at the time of the hearing in this case):

	2019	**2020**
2018 EIA Low Case[74]	$3.25	$3.55
2019 EIA Low Case[75]	$2.90	$2.90
2020 EIA Low Case[76]	N/A	$2.52
Henry Hub Prices	$2.56[77]	$2.25 (NYMEX futures)[78] $1.90-$2.00 (spot Henry Hub prices at time of hearing)[79]

EIA's recent Low Cases overshot prices in 2019, and are on pace to do so for 2020 as well. This means both that the Commission's above-referenced finding in the Wind Catcher case regarding this case being the most accurate has continued to hold true since that time, and that even EIA's lowest price forecast has struggled to reflect the persistence of cheap natural gas under current conditions.

Against this backdrop, it is particularly significant that the EIA's 2020 version of its Low Case is below even SWEPCO's own calculation of the breakeven natural gas price for the Wind Facilities at a P50 net capacity factor (NCF). On a levelized basis, SWEPCO's claimed breakeven gas price is $3.67/MMBtu while the 2020 EIA Low Case is only $3.46.[80] A comparison by year, and on a simple average basis, is presented below.[81]

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[74] TIEC Ex. 30 at 1.

[75] TIEC Ex. 3.

[76] *Id.*

[77] TIEC Ex. 1, Pollock Dir. at 17.

[78] TIEC Ex. 24.

[79] Tr. at 224:10-13 (Bletzacker Cross) (Feb. 24, 2020).

[80] TIEC Ex. 1, Pollock Dir. at 21.

[81] TIEC Ex. 3; TIEC Ex. 1B, Workpapers to the Direct Testimony of Jeffry C. Pollock at WP "Exhibit JP-1,3,4 Henry Hub Benchmarks, Implied Heat Rates, Futures Prices (Errata).xlsx," Tab "Henry Hub Benchmarks" (Pollock Dir. Workpapers).

Year	SWEPCO Breakeven	2020 EIA Low	Year	SWEPCO Breakeven	2020 EIA Low
2021	**$ 2.46**	**$ 2.50**	**2037**	**$ 4.29**	**$ 4.13**
2022	$ 2.57	$ 2.44	2038	$ 4.47	$ 4.24
2023	**$ 2.69**	**$ 2.45**	**2039**	**$ 4.60**	**$ 4.34**
2024	$ 2.83	$ 2.52	2040	$ 4.73	$ 4.43
2025	**$ 2.93**	**$ 2.77**	**2041**	**$ 4.94**	**$ 4.52**
2026	$ 3.04	$ 3.08	2042	$ 5.13	$ 4.62
2027	**$ 3.14**	**$ 3.28**	**2043**	**$ 5.28**	**$ 4.68**
2028	$ 3.24	$ 3.36	2044	$ 5.50	$ 4.74
2029	**$ 3.36**	**$ 3.39**	**2045**	**$ 5.71**	**$ 4.82**
2030	$ 3.47	$ 3.42	2046	$ 5.92	$ 4.93
2031	**$ 3.54**	**$ 3.50**	**2047**	**$ 6.08**	**$ 5.02**
2032	$ 3.66	$ 3.61	2048	$ 6.26	$ 5.12
2033	**$ 3.77**	**$ 3.72**	**2049**	**$ 6.40**	**$ 5.22**
2034	$ 3.90	$ 3.82	2050	$ 6.58	$ 5.34
2035	**$ 4.03**	**$ 3.89**	**2051**	**$ 6.78**	**$ 5.45**
2036	$ 4.12	$ 4.00	**Simple Average**	**$ 4.37**	**$ 3.98**

As shown above, even if one were to accept SWEPCO's breakeven natural gas price (and all of the flawed assumptions embedded within it) at face value,[82] the Wind Facilities are uneconomic under the 2020 version of the EIA case that the Commission recently found to be the most accurate. The 2020 EIA forecasts confirm that SWEPCO's projected gas prices are inflated and that the Wind Facilities pose an unreasonable risk to ratepayers.

AEP's forecast is significantly higher than the futures prices on the NYMEX market.

Current NYMEX natural gas futures prices also demonstrate that SWEPCO's projected gas prices are unreasonably high. Indeed, it is undisputed that AEP's forecasted prices are far higher than NYMEX futures prices, even in the near term. For example, during the first five years in which the Wind Facilities would operate (2021 to 2025), the AEP base case ranges from 45% to 66% higher than NYMEX futures:

[82] For a discussion of a quantification of the other flaws in SWEPCO's modeling and assumptions, see *infra* Section III.D.2.

Year	NYMEX[83]	SWEPCO Base[84]	Percent SWEPCO Base is over NYMEX[85]
2021	$2.43	$3.54	45%
2022	$2.44	$3.71	52%
2023	$2.47	$3.89	57%
2024	$2.51	$4.08	62%
2025	$2.55	$4.24	66%

Over the life of the Wind Facilities, the difference is even starker. In his testimony, Mr. Pollock calculated that the levelized price of NYMEX futures from 2021 to 2051 is $3.10/MMBtu compared to $5.40/MMBtu for SWEPCO's base case, and $4.50/MMBtu for SWEPCO's low/no carbon case.[86] Notably, as with the 2020 EIA Low Case, the levelized futures price is below SWEPCO's claimed break-even price of $3.67/MMBtu.

AEP's forecasted natural gas prices' immediate and ever-increasing departure from the futures prices on the NYMEX exchange is important because NYMEX prices can be transacted on and are based on an actual market.[87] As the Commission found in the Wind Catcher case, "NYMEX futures prices represent actual transactions between buyers and sellers who put real money at risk in their day-to-day operations."[88] In recognition of this fact, other utilities use NYMEX futures in projecting future natural gas prices. For example, Southwestern Public Service Company (SPS) uses a blended forecast method that uses NYMEX futures exclusively for the first three years, 75% for year 4, 50% for year 5, and 25% for years six through the end of the forecast period.[89] Similarly, Mr. Pollock testified that the South Carolina Department of Administration

[83] TIEC Ex. 24.

[84] TIEC Ex. 3.

[85] (SWEPCO price - NYMEX price) / NYMEX price.

[86] TIEC Ex. 1, Pollock Dir. at 21. To derive his futures price, Mr. Pollock used NYMEX future prices based on the 30-day average closing price for 2021-2031 futures contracts traded at Henry Hub through January 7, 2020. He then trended the 2032-2051 prices based on the average escalation rate from 2027 to 2031. *Id.* at 20-21.

[87] TIEC Ex. 1, Pollock Dir. at 20; TIEC Ex. 2, Griffey Dir. at 32, n.47.

[88] TIEC Ex. 5, Order at FoF 84.

[89] TIEC Ex. 80; *see also* SWEPCO Ex. 17, Rebuttal Testimony of Karl R. Bletzacker at 18-19 (Bletzacker Reb.).

recently evaluated future options for the management of utility Santee Cooper using analyses that were based on NYMEX futures gas prices.[90] For the first 10 years, the South Carolina department used actual NYMEX prices, and for the next 10 years it used trended NYMEX prices.[91] These entities recognize the important information that NYMEX prices provide about future natural gas prices. The Commission also recognized this in the Wind Catcher case, when it disagreed with the PFD's proposed finding that the use of NYMEX futures was "problematic"[92] and added in its place the finding that NYMEX futures represented actual transactions between buyers and sellers.[93] The Commission also added to the finding the specific price of trended NYMEX futures.[94]

As it did in the Wind Catcher case, SWEPCO has raised several complaints with using NYMEX futures prices to evaluate the Wind Facilities. None have merit. First, Mr. Bletzacker argues that futures markets contain hedging and similar activities.[95] He contends that such activities obfuscate meaningful price discovery because hedgers are "indifferent to the future spot market price of natural gas."[96] But as Mr. Bletzacker confirmed at the hearing, this is only true *after* a hedger has entered a futures contract.[97] Needless to say, any purchaser of natural gas would prefer to purchase at as low a price as possible, and any seller of natural gas would hope to sell at the highest price possible.[98] That is the essence of a market, and futures prices are thus an important source of price discovery. As the American Enterprise Institute for Public Policy Research described it:

> Price discovery is an information-based contribution of futures markets, whereas hedging implies a transactions role for futures contracts. In both cases the main contribution appears to lie in establishing prices for the future delivery of a commodity and for providing a forum for transacting at such prices. This is an obvious contribution to those dealing in the cash commodity who need prices to plan production and consumption decisions. Moreover, merchants and consumers

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[90] Tr. at 634:21-636:7 (Pollock Redir.) (Feb. 26, 2020).

[91] *Id.*

[92] Docket No. 47461, PFD at 87, FoF 84.

[93] TIEC Ex. 5 at FoF 84.

[94] *Id.*

[95] SWEPCO Ex. 17, Bletzacker Reb. at 6-7.

[96] *Id.*

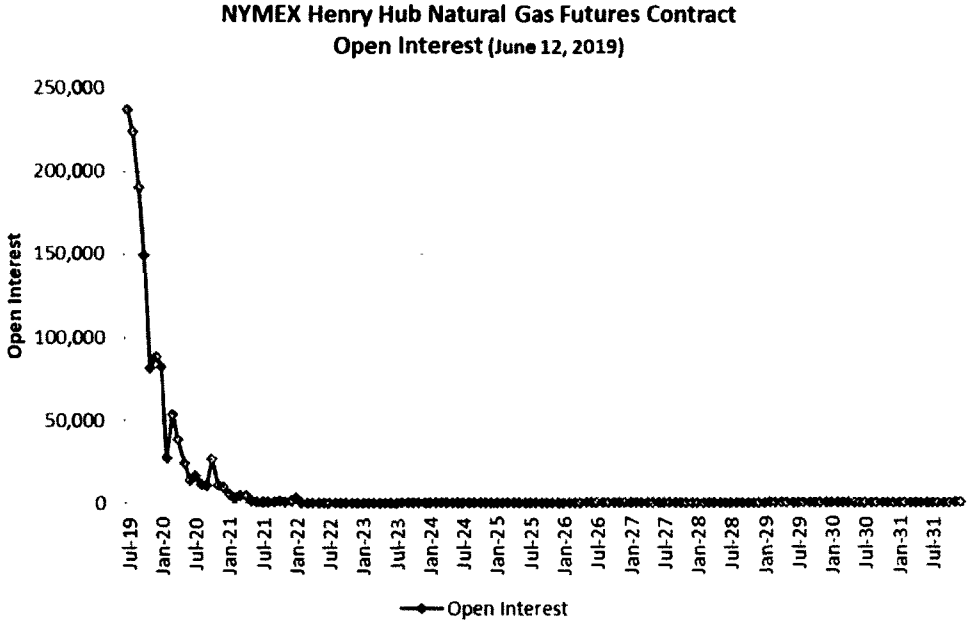
[97] Tr. at 289:9-18 (Bletzacker Cross) (Feb. 24, 2020).

[98] *Id.* at 289:23-290:8.

> who want to avoid the risk of future price fluctuations can eliminate that risk by buying or selling a futures contract today.[99]

Simply put, the presence of hedging activities in the futures market does not change the fact that NYMEX is an actual market in which willing buyers and willing sellers transact.[100]

SWEPCO also attempts to diminish the importance of the NYMEX futures market by arguing that there is very little "open interest"[101] in the market beyond the near term, which Mr. Bletzacker defines as less than two years.[102] SWEPCO's contention misses the mark. As an initial matter, SWEPCO understates the amount of open interest that actually is in the market at any given time. In making this argument, Mr. Bletzacker cites the following chart he created based on NYMEX futures contracts available on June 12, 2019:



Given the large intervals that he uses on the y-axis, Mr. Bletzacker's chart makes it appear that there is a period with no open interest beginning as early as mid-2021. However, his workpaper reveals that open interest for 2021 ranged from a high of 5,418 in January to a low of 860 in

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[99] TIEC Ex. 1, Pollock Dir. at 20.

[100] *E.g., id.*

[101] By "open interest," SWEPCO is referring to the total number of futures contracts that are held by market participants. SWEPCO Ex. 5, Bletzacker Dir. at 7.

[102] *E.g., id.*

September, before rising again to 3,513 in January 2022.[103] The first month in which there was no open interest at all on the trading day that Mr. Bletzacker chose to use for this chart was January 2025.[104] And there are months with open interest as late as mid-2027.[105] While open interest generally declines with time, this does not change the fact that there are actual transactions between buyers and sellers occurring on the NYMEX market well beyond the two-year period Mr. Bletzacker references. Mr. Bletzacker's attempt to ignore all of these sales by using an exaggerated y-axis is a tried-and-true statistical gimmick, and it obscures the fact that there are thousands of trades represented by what he shows as a flat line at zero along the x-axis.

Moreover, SWEPCO ignores the fact that NYMEX prices provide valuable information even in months with little or no open-interest volume. As Mr. Pollock testified, the CME Group (which owns NYMEX), has a committee that uses a proprietary approach to develop settlement prices.[106] The committee uses market data such as actual trades and bid/ask spreads, and also looks to information outside of the NYMEX exchange.[107] NYMEX settlement prices are widely relied on in the industry,[108] and SWEPCO has not provided any reason to believe that NYMEX's published futures prices—even in the out years in which volume is low—are less reliable than Mr. Bletzacker's chronically overstated, theoretically derived, AEP forecast prices.

Indeed, the record shows that SWEPCO itself was recently able to purchase a large amount of gas for physical delivery five years into the future at almost exactly the NYMEX futures price for that term. In 2017, SWEPCO was required by the Louisiana Public Service Commission (LPSC) to buy a five-year forward strip of natural gas.[109] Despite its protests regarding the predictive value of futures beyond the short term, SWEPCO used a benchmark derived from NYMEX futures prices for the five-year purchase period in evaluating the bid it ultimately

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[103] SWEPCO Ex. 5A, Bletzacker Dir. Workpapers at WP "NYMEX NG Open Interest 6-12-2019."

[104] *Id.*

[105] *Id.* June and July 2027 each show open interest of 11 contracts.

[106] Tr. at 633:24-634:20 (Pollock Redir.) (Feb. 26, 2020).

[107] *Id.*; TIEC Ex. 61.

[108] TIEC Ex. 61.

[109] TIEC Ex. 2, Griffey Dir. at 18.

selected.[110] It did not use the AEP Fundamentals Forecast projections.[111] Thankfully, the contract that SWEPCO entered into for delivery to its plant corresponds to a Henry Hub price of $2.83, rather than to Mr. Bletzacker's inflated forecast.[112] Notably, NYMEX Henry Hub futures closed at $2.81/MMBtu for the same five-year period at the time SWEPCO entered this contract.[113]

SWEPCO's own experience in the market thus belies its contentions that NYMEX futures prices beyond two years do not provide any useful price discovery. SWEPCO was able to transact in the market for five years at almost exactly the then-current NYMEX futures price. And unsurprisingly, SWEPCO was able to purchase a large quantity of natural gas—it valued the contract at nearly $50 million[114]—at prices that were substantially lower than the then-current (and even subsequently issued) AEP forecast. To demonstrate these points, Mr. Griffey included the following figure in his testimony comparing SWEPCO's purchase to NYMEX futures and SWEPCO's Fundamental Forecasts:

Figure 2[115]
Comparison of Actual Market Purchase to NYMEX and SWEPCO Forecasts[116]
($/MMBtu)

Equivalent Henry Hub Market Purchase for April 2018-March 2023, executed July 27, 2017	$2.83
NYMEX Henry Hub Futures Price for April 2018- March 2023 on 7/26/17	$2.81
SWEPCO Fundamentals Gas Forecast 2H 2016 for April 2018 – March 2023 Delivery	$5.28 (Base) and $4.45 (Low)
SWEPCO Fundamentals Gas Forecast 2H 2018 for April 2018 – March 2023 Delivery	$4.33 (Base) and $3.65 (Low)

[110] TIEC Ex. 25 (HSPM); Tr. at 218:3-219:14 (Bletzacker Cross) (Feb. 24, 2020). While this discovery response was marked as highly sensitive, Mr. Bletzacker confirmed at the hearing that the information could be disclosed publicly. Tr. at 213:8-14 (Bletzacker Cross) (Feb. 24, 2020).

[111] *Id.*

[112] The delivery price under the contract is $2.63/MMBtu, and SWEPCO projected that natural gas prices were $0.1986 higher at Henry Hub. TIEC Ex. 27 at Bates 24; TIEC Ex. 2, Griffey Dir. at 18-19.

[113] TIEC Ex. 2, Griffey Dir. at 19.

[114] TIEC Ex. 27 at Bates 24.

[115] As noted, some of the information in this table was originally presented as highly sensitive, but at the hearing, Mr. Bletzacker confirmed it could be discussed publicly. Tr. at 213:8-14 (Bletzacker Cross) (Feb. 24, 2020).

[116] TIEC Ex. 2, Griffey Dir. at 19. Mr. Griffey calculated SWEPCO's low case for purposes of this chart as 85% of the Base Case based on Mr. Bletzacker's statement that "the aggregate percentage expression [standard deviation] . . . varies very little between forecasts," and SWEPCO calculates the current standard deviation at 15.7%. *Id.*

As Mr. Griffey summarized: "The values in the table demonstrate that the NYMEX price accurately reflects the actual purchase price, while SWEPCO's AEP forecasts closest in time to the transaction, including SWEPCO's low-case forecasts, are far too high and are unreliable."[117]

In sum, NYMEX futures prices provide a meaningful market-based data point to compare to theoretically derived forecasts and to evaluate future resource decisions. That is why other utilities use NYMEX futures in their natural gas forecasts and resource planning. And that is why the Commission found it relevant to note that NYMEX futures—trended to 2045—were well below SWEPCO's natural gas forecasts in explaining its rejection of the Wind Catcher project.[118] The Commission should follow suit in this case by considering NYMEX futures prices in evaluating the risks of the proposed Wind Facilities. As demonstrated above, SWEPCO's application cannot withstand that scrutiny.

AEP's forecasts have consistently overstated natural gas prices.

SWEPCO's inflated natural gas projections in this case are just the latest example of AEP's forecasts exaggerating future natural gas prices in the post-shale-revolution era. The Commission noted this in the Wind Catcher case, finding that "[e]ach of AEP's past forecasts, dating back to 2007, have been on the high side of actual natural gas prices."[119] The evidence in this case demonstrates that the trend has continued. Mr. Pollock included the following table in his testimony comparing AEP's forecasts over the past decade to the last five years of actual natural gas prices:[120]

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[117] *Id.*

[118] TIEC Ex. 5 at 5, 18, FoF 84.

[119] *Id.* at 17, FoF 80.

[120] TIEC Ex. 1, Pollock Dir. at 17.

Table 4 Projected Vs. Actual Natural Gas Prices At the Henry Hub ($/MMBtu)					
Description	**2015**	**2016**	**2017**	**2018**	**2019**
Past SWEPCO Forecasts					
2010 2H	$5.65	$6.12	$6.30	$6.64	$6.98
2011 1H	$5.52	$5.99	$6.13	$6.32	$6.46
2012 1H	$5.44	$5.97	$6.13	$6.32	$6.46
2013 2H	$5.47	$5.83	$6.01	$6.12	$6.19
2015 1H		$4.34	$5.09	$5.40	$5.50
2016 2H			$3.22	$4.89	$5.13
2018 2H					$3.88
2019 1H (Base Gas)					$3.21
Actual Henry Hub Gas Prices	$2.63	$2.51	$2.98	$3.16	$2.56
Difference From Actual	108% to 115%	73% to 144%	8% to 111%	55% to 110%	25% to 173%
Sources: Response to TIEC 1-9; S&P Global Market Intelligence.					

The AEP forecast has overstated prices in each of the last five years. For example, the 2010 forecast predicted natural gas prices of $6.98/MMBtu for 2019, which turned out to be more than 2.5 times the actual price of $2.56/MMBtu. Notably, as recently as 2018, the AEP forecast predicted prices of $3.88/MMBtu for 2019, which was still more than a $1.30/MMBtu over the actual price a year later.

Despite consistently—and significantly—missing the mark on the high side, Mr. Bletzacker has never made any changes to the methodology he uses for conducting the AEP forecast, which remains completely opaque and subject to his judgment.[121] To the contrary, Mr. Bletzacker appears to believe that the only reason his forecasts have overstated actual gas prices is that his forecasts are weather-normalized while the real world is not.[122] But Mr. Bletzacker has not undertaken any study comparing his natural gas forecasts to actual gas prices on a weather-normalized basis or otherwise.[123] Further, Mr. Bletzacker uses a 30-year weather normalization

[121] TIEC Ex. 31; Tr. at 236:18-237:4 (Bletzacker Cross) (Feb. 24, 2020). For example, Mr. Bletzacker conducts hundreds of runs of AURORA during his forecasting process, making changes to the gas prices at the end of each run based on his perception of a proper range of a price-elasticity ratio. There are no records of his runs, and there are no written parameters that govern when the process is complete. Tr. at 244:3-14 (Bletzacker Cross) (Feb. 24, 2020); TIEC Ex. 33.

[122] *E.g.*, SWEPCO Ex. 17, Bletzacker Reb. at 12-14; Tr. at 260:23-261:4 (Bletzacker Cross) (Feb. 24, 2020).

[123] TIEC Exs. 38, 39, 40; Tr. at 258:9-22 (Bletzacker Cross) (Feb. 24, 2020).

period,[124] which the Commission has rejected because it fails to account for more recent trends.[125] SWEPCO cannot wave away over a decade of inflated natural gas prices based on mere references to unusually warm weather, particularly when the record demonstrates that the current AEP forecast is again an outlier on the high side.

SWEPCO's reliance on an SPS-method forecast and third-party projections is unavailing.

SWEPCO also attempts to prove that its forecast is reasonable, and that its application should be approved, by comparing its natural gas projections (and break-even price) to (1) a forecast Mr. Bletzacker created using SPS's method and (2) various third-party forecasts. But both comparisons prove just the opposite.

First, the SPS-method forecast presented by SWEPCO demonstrates that AEP's projections are inflated and that the Wind Facilities are an unacceptably risky proposition. By way of background, SPS presented public versions of its composite natural gas forecasts in its wind CCN case in Docket No. 46936, which was filed shortly before the Wind Catcher proceeding.[126] Parties to the Wind Catcher case pointed to the lower SPS forecasts, and the Commission ultimately cited SPS's *low* forecast in explaining its denial of SWEPCO's application.[127] In this case, in an attempt to show that SWEPCO's new proposed Wind Facilities are economic, Mr. Bletzacker presented a forecast in his rebuttal testimony using SPS's methodology.[128] Specifically, he used the following methodology as set forth in SPS witness Mr. Adelman's testimony in Docket No. 46936:[129]

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[124] SWEPCO Ex. 5, Bletzacker Dir. at 6.

[125] *Application of Southwestern Electric Power Company for Authority to Change Rates,* Docket No. 46449, Order on Rehearing at FoFs 271-75.

[126] TIEC Ex. 5 at FoF 83; *Id.* at FoF 2; Docket No. 46936, Application (Mar. 10, 2017).

[127] TIEC Ex. 5 at 4-5, 18 & FoF 83.

[128] SWEPCO Ex. 17, Bletzacker Reb. at 18-19.

[129] *Id.*

Table JSA-2 – Natural Gas Forecast Weightings

Years	NYMEX	IHS Energy*	PIRA	Wood MacKenzie
2016-2019	100.0%	0.0%	0.0%	0.0%
2020	74.5%	8.5%	8.5%	8.5%
2021	49.7%	16.8%	16.8%	16.8%
2022 to end of forecast period	25.0%	25.0%	25.0%	25.0%

*formerly known as CERA or Global Insight

The first thing to note about Mr. Bletzacker's SPS-method forecast is that it is significantly lower than both his base and his low/no carbon cases:[130]

Year	SPS Method	AEP Base	AEP Low / No CO2	SWEPCO Breakeven
2021	**$ 2.43**	**$ 3.54**	**$ 3.01**	**$ 2.46**
2022	$ 2.44	$ 3.71	$ 3.16	$ 2.57
2023	**$ 2.55**	**$ 3.89**	**$ 3.31**	**$ 2.69**
2024	$ 2.74	$ 4.08	$ 3.47	$ 2.83
2025	**$ 3.02**	**$ 4.24**	**$ 3.60**	**$ 2.93**
2026	$ 3.19	$ 4.40	$ 3.74	$ 3.04
2027	**$ 3.36**	**$ 4.55**	**$ 3.86**	**$ 3.14**
2028	$ 3.55	$ 4.84	$ 3.98	$ 3.24
2029	**$ 3.73**	**$ 5.01**	**$ 4.12**	**$ 3.36**
2030	$ 3.91	$ 5.17	$ 4.26	$ 3.47
2031	**$ 4.12**	**$ 5.30**	**$ 4.37**	**$ 3.54**
2032	$ 4.28	$ 5.45	$ 4.49	$ 3.66
2033	**$ 4.32**	**$ 5.62**	**$ 4.63**	**$ 3.77**
2034	$ 4.46	$ 5.82	$ 4.80	$ 3.90
2035	**$ 4.63**	**$ 6.02**	**$ 4.97**	**$ 4.03**
2036	$ 4.73	$ 6.14	$ 5.07	$ 4.12
2037	**$ 4.92**	**$ 6.39**	**$ 5.28**	**$ 4.29**
2038	$ 5.11	$ 6.64	$ 5.48	$ 4.47
2039	**$ 5.26**	**$ 6.84**	**$ 5.65**	**$ 4.60**
2040	$ 5.50	$ 7.02	$ 5.80	$ 4.73
2041	**$ 5.63**	**$ 7.32**	**$ 6.05**	**$ 4.94**
2042	$ 5.81	$ 7.61	$ 6.29	$ 5.13
2043	**$ 5.97**	**$ 7.84**	**$ 6.49**	**$ 5.28**
2044	$ 6.16	$ 8.18	$ 6.77	$ 5.50
2045	**$ 6.38**	**$ 8.50**	**$ 7.04**	**$ 5.71**
2046	$ 6.57	$ 8.81	$ 7.30	$ 5.92
2047	**$ 6.72**	**$ 9.05**	**$ 7.51**	**$ 6.08**
2048	$ 6.90	$ 9.32	$ 7.73	$ 6.26
2049	**$ 7.07**	**$ 9.53**	**$ 7.91**	**$ 6.40**
2050	$ 7.21	$ 9.80	$ 8.14	$ 6.58
Simple Average	**$ 4.76**	**$ 6.35**	**$ 5.28**	**$ 4.29**

[130] SWEPCO Ex. 17C, HIGHLY SENSITIVE Workpapers to the Rebuttal Testimony of Karl R. Bletzacker at WP "Bletzacker WP Highly Sensitive.xlsx" (Bletzacker HS Rebuttal Workpapers).

As can be seen, on an average basis, the SPS-method base forecast is over $1.50/MMBtu lower than SWEPCO's base case, and more than $0.50/MMBtu lower than SWEPCO's low/no carbon case. Further, Mr. Bletzacker's SPS-method case is only marginally higher than SWEPCO's claimed break-even price.

Moreover, as noted above, the Commission in Docket No. 47461 relied on SPS's *low* forecast in evaluating the Wind Catcher project, not SPS's base case. And as Mr. Bletzacker testified at the hearing, his SPS-method forecast reflects SPS's base-case method.[131] As set forth in Mr. Adelman's testimony from Docket No. 46936, to replicate SPS's low case methodology, one must reduce the growth rate in the yearly base case prices by 50% beginning in the year of the forecast after the prices cease being based 100% on NYMEX (i.e., year four).[132] Making this adjustment to create an SPS low case yields the following results:[133]

[131] Tr. at 750:16-750:19 (Bletzacker Cross) (Feb. 26, 2020); TIEC Ex. 79.

[132] TIEC Ex. 80; Tr. at 750:9-25 (Bletzacker Cross) (Feb. 26, 2020).

[133] As described above, the SPS low forecast was calculated by halving the escalation rate starting in year 2023, which is the fourth year of the forecast and when NYMEX is no longer the sole component. For instance, the forecasted gas prices increased from $2.44/MMBtu in year 3 (2022) to $2.55/MMBtu in year 4 (2023), or an increase of 4.51%. Half of that increase, or 2.25%, was applied to $2.44/MMBtu, resulting in a 2023 gas price of $2.50/MMBtu. The same calculation was applied for every subsequent year.

Year	SPS Base Method	SPS Base Increase	50% SPS Base Increase	SPS Low Method	SWEPCO Breakeven
2020	**$ 2.25**			**$ 2.25**	
2021	$ 2.43			$ 2.43	$ 2.46
2022	**$ 2.44**			**$ 2.44**	**$ 2.57**
2023	$ 2.55	4.51%	2.25%	$ 2.50	$ 2.69
2024	**$ 2.74**	**7.45%**	**3.73%**	**$ 2.59**	**$ 2.83**
2025	$ 3.02	10.22%	5.11%	$ 2.72	$ 2.93
2026	**$ 3.19**	**5.63%**	**2.81%**	**$ 2.80**	**$ 3.04**
2027	$ 3.36	5.33%	2.66%	$ 2.87	$ 3.14
2028	**$ 3.55**	**5.65%**	**2.83%**	**$ 2.95**	**$ 3.24**
2029	$ 3.73	5.07%	2.54%	$ 3.03	$ 3.36
2030	**$ 3.91**	**4.83%**	**2.41%**	**$ 3.10**	**$ 3.47**
2031	$ 4.12	5.37%	2.69%	$ 3.18	$ 3.54
2032	**$ 4.28**	**3.88%**	**1.94%**	**$ 3.25**	**$ 3.66**
2033	$ 4.32	0.93%	0.47%	$ 3.26	$ 3.77
2034	**$ 4.46**	**3.24%**	**1.62%**	**$ 3.31**	**$ 3.90**
2035	$ 4.63	3.81%	1.91%	$ 3.38	$ 4.03
2036	**$ 4.73**	**2.16%**	**1.08%**	**$ 3.41**	**$ 4.12**
2037	$ 4.92	4.02%	2.01%	$ 3.48	$ 4.29
2038	**$ 5.11**	**3.86%**	**1.93%**	**$ 3.55**	**$ 4.47**
2039	$ 5.26	2.94%	1.47%	$ 3.60	$ 4.60
2040	**$ 5.50**	**4.56%**	**2.28%**	**$ 3.68**	**$ 4.73**
2041	$ 5.63	2.36%	1.18%	$ 3.73	$ 4.94
2042	**$ 5.81**	**3.20%**	**1.60%**	**$ 3.79**	**$ 5.13**
2043	$ 5.97	2.75%	1.38%	$ 3.84	$ 5.28
2044	**$ 6.16**	**3.18%**	**1.59%**	**$ 3.90**	**$ 5.50**
2045	$ 6.38	3.57%	1.79%	$ 3.97	$ 5.71
2046	**$ 6.57**	**2.98%**	**1.49%**	**$ 4.03**	**$ 5.92**
2047	$ 6.72	2.28%	1.14%	$ 4.07	$ 6.08
2048	**$ 6.90**	**2.68%**	**1.34%**	**$ 4.13**	**$ 6.26**
2049	$ 7.07	2.46%	1.23%	$ 4.18	$ 6.40
2050	**$ 7.21**	**1.98%**	**0.99%**	**$ 4.22**	**$ 6.58**
Simple Average	$ 4.67			$ 3.34	$ 4.29

As demonstrated by the table, an SPS low forecast based on SWEPCO's creation of an SPS-method base case would be nearly $1/MMBtu below SWEPCO's purported breakeven price on an average basis.

SWEPCO's attempt to rely on a chart of numerous third-party forecasts in Mr. Bletzacker's rebuttal testimony is similarly unavailing.[134] In an attempt to show a consensus above its purported break-even price, SWEPCO has included numerous outdated forecasts in the chart—including forecasts from before 2019—that render the chart both unreadable and irrelevant.[135] The chart

[134] SWEPCO Ex. 17, Bletzacker Reb. at 21.

[135] *Id.*; *see also* SWEPCO Ex. 17C, Bletzacker HS Rebuttal Workpapers at WP "Bletzacker WP Highly Sensitive.xlsx" (listing forecasts).

also includes all of the EIA's side cases from 2019 and 2020 that project higher prices than even the EIA Reference Case, which, as discussed above, has itself been on the high side of actual gas prices under current market conditions. Notably, several of the most recent gas forecasts, including [redacted] and, of course, the 2020 EIA High Oil and Gas Supply case are below SWEPCO's breakeven price.[136] Accordingly, the chart shows only that there is a great deal of risk that Wind Facilities will be uneconomic.

Summary of Natural Gas Price Assumptions.

The evidence is overwhelming that SWEPCO's natural gas price assumptions are inflated and unreasonable. Mr. Pollock provided the following table of levelized gas prices in his testimony:[137]

Table 5
Levelized Natural Gas Price Forecast At the Henry Hub

Scenario	$/MMBtu*	
SWEPCO Base Gas No CO_2 (CO_2)	$5.30	($5.40)
EIA 2020 Reference Case	$4.24	
SWEPCO Low Gas No CO_2 (CO_2)	$4.50	($4.59)
EIA 2020 High Oil and Gas Supply Case	$3.46	
"Breakeven" Gas Price	$3.67	
NYMEX Futures**	$3.10	

Source: Henry Hub Benchmarks KRB workpaper (Errata), 2020 EIA AEO.
*7.09% Blended Discount Rate.
**30-Day average closing prices of futures contracts (2021-2031) through January 7, 2020; 2032 – 2051 prices escalated at the average 2027-2031 escalation rate.

In keeping with its decision in the Wind Catcher case, the Commission should reject SWEPCO's projected prices as outliers and evaluate the Wind Facilities based on NYMEX futures prices and the EIA Low Case. These measures of future natural gas prices best reflect the reality of persistent cheap natural gas prices and abundant supply. And, as shown in the table, both NYMEX futures prices and the 2020 EIA Low Case are below even the breakeven price that SWEPCO itself calculated. As Mr. Griffey calculated, each $1/MMBtu drop in gas prices from SWEPCO's low

[136] SWEPCO Ex. 17, Bletzacker Reb. at 21.

[137] TIEC Ex. 1, Pollock Dir. at 21. To avoid confusion, Mr. Pollock corrected his testimony on the stand to include levelized prices for both the carbon and no-carbon versions of SWEPCO's base and low cases. Tr. at 594:19-596:21 (Pollock Dir.) (Feb. 26, 2020).

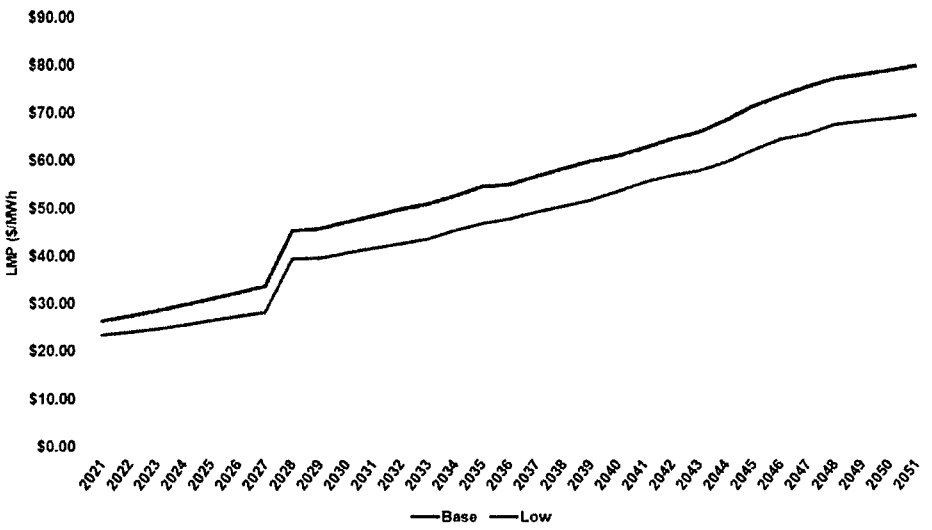
/no carbon case results in a $246 million NPV drop in net benefits.[138] Assuming recent NYMEX futures prices results in a $396 million NPV reduction in net benefits.[139]

b. Other Assumptions Affecting Locational Marginal Prices

Aside from high natural gas prices, other assumptions made by SWEPCO that serve to inflate the projected LMPs are the imposition of a carbon burden in its base case and the undercounting of future renewable penetration in the SPP.

i. Carbon Assumption

SWEPCO included in its base case (and other cases) an assumption that an unprecedented carbon tax will be enacted.[140] The primary impact of the carbon-tax assumption is to increase the projected LMPs in the modeling, which in turn makes the Wind Facilities appear to be more economic. For example, SWEPCO's base case shows $171 million more in NPV net benefits than the version of its base case that does not include the carbon-tax.[141] Mr. Pollock showed the abrupt jump in modeled LMPs from the carbon assumption in his exhibit JP-3:[142]



[138] TIEC Ex. 2, Griffey Dir. at 33.

[139] *Id.*

[140] SWEPCO Ex. 5, Bletzacker Dir. at 13.

[141] SWEPCO Ex. 8, Torpey Dir. at Ex. JFT-3 at 1-2.

[142] TIEC Ex. 1, Pollock Dir. at Ex. JP-3.

SWEPCO also included a carbon-tax assumption in its modeling in the Wind Catcher case, which the Commission rejected in no uncertain terms.[143] There has been no change in circumstances since then that would warrant a different outcome in this case.

The first thing to note about SWEPCO's assumption is that Congress has never enacted a tax on carbon.[144] SWEPCO did not present an expert witness on electoral or Congressional politics to testify on the likelihood that an unprecedented carbon tax would be adopted in the future. It simply decided that it was reasonable to expect that such a tax would be implemented in 2028, which SWEPCO states is "the earliest reasonable projection as to when such legislation could be implemented."[145] Thus, SWEPCO not only has decided that an unprecedented carbon-tax would be enacted, but that it would be imposed at the earliest time that SWEPCO projects is reasonably possible.

SWEPCO's inclusion of a carbon-tax assumption in its modeling is unsupported. As Mr. Pollock testified, the prospects of a carbon-tax have dimmed considerably over the last decade plus.[146] In 2008, there was a strong bipartisan push to adopt carbon burdens.[147] However, those efforts have failed, and bipartisanship around the issue has all but disappeared.[148] Further, while the Clean Power Plan rule was adopted under President Obama, that effort to penalize carbon emissions also fell by the wayside.[149]

Moreover, the evidence indicates that, to the extent that Congress musters the will to act on carbon, it is far more probable that it will do so by incenting carbon-free generating sources rather than penalizing carbon-emitting ones. As Mr. Pollock testified:

> Q. ARE THERE OTHER WAYS TO ENCOURAGE A SHIFT AWAY FROM FOSSIL FUELS BESIDES IMPUTING A COST FOR CO2 ALLOWANCES (A CARBON TAX)?

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[143] TIEC Ex. 5 at 18-19, FoFs 93-97.

[144] TIEC Ex. 2, Griffey Dir. at 39.

[145] *Id.* at 112 (citing SWEPCO's Response to TIEC 9-3).

[146] Tr. at 637:5-638:23 (Pollock Redir.) (Feb. 26, 2020).

[147] *Id.*

[148] *Id*

[149] *Id.* at 620:16-24.

A. Yes. It is not necessary to assume the adoption of an unprecedented carbon tax to address the potential for future government action on carbon. To the extent that Congress takes action on carbon, it is just as likely (if not more likely) that future carbon legislation will take the form of a continuation of policies that make non-emitting generation resources more cost-competitive rather than the form of a penalty on carbon emitting resources. That is what has always happened in the past, as the United States has never passed a carbon tax, but it has adopted incentives for renewable, non-emitting resources. Examples of such policies include PTCs and investment tax credits.[150]

Indeed, while Congress has never enacted a tax on carbon it has not only adopted tax credits for renewable energy sources (like PTCs for wind and the investment tax credit (ITC) for solar), it has renewed those tax credits on numerous occasions.[151] As Mr. Griffey testified, a powerful lobby has arisen around PTCs and ITCs, resulting in the former being extended 10 times since 1999 and the latter being extended twice since 2007.[152]

Incentives for renewable generation have the opposite effect on LMPs as a carbon-tax: the incentives lower market prices, while a carbon-tax increases prices.[153] Consequently, while assuming a carbon-tax in the modeling improves the projected economics of the Wind Facilities, assuming that new renewable subsidies will be adopted or existing ones extended would have the opposite effect.[154] SWEPCO, however, only included the carbon-tax assumption in its analysis.[155]

Ultimately, SWEPCO has simply failed to meet its burden of proving that it is likely that a carbon-tax will be implemented during the relevant timeframe.[156] And it cannot escape the inconsistency of assuming the adoption of an unprecedented tax that would benefit the economics

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[150] TIEC Ex. 1, Pollock Dir. at 27.

[151] TIEC Ex. 2, Griffey Dir. at 39-40.

[152] *Id.*

[153] TIEC Ex. 1, Pollock Dir. at 27.

[154] *Id.* at 27; TIEC Ex. 2, Griffey Dir. at 39.

[155] TIEC Ex. 2, Griffey Dir. at 39.

[156] In a last gasp to justify its carbon-tax assumption, SWEPCO argues that certain TIEC members include a carbon price in their planning. SWEPCO Ex. 17, Bletzacker Reb. at 27. As Mr. Pollock noted, many companies have their own corporate sustainability goals. Tr. at 623:16-624:20 (Pollock Cr.) (Feb. 26, 2020). And while companies engaged in private enterprise may have their own internal goals for their own reasons, this says nothing about the reasonableness of using a carbon-tax assumption in deciding whether a regulated utility should be permitted to construct—and ultimately charge captive ratepayers for—expensive power plants that are not needed for capacity or reliability reasons.

of the Wind Facilities on the one hand, while ignoring the possibility of additional extensions of renewable-energy subsidies that would have the opposite effect on the projects' economics on the other. As it did in the Wind Catcher case, the Commission should reject SWEPCO's carbon-tax assumption.

ii. Future Renewable Penetration Assumption

SWEPCO's modeling undercounts the amount of renewable generating resources—particularly wind generation—that should be forecasted to be developed during the study period. This was an issue with SWEPCO's modeling in the Wind Catcher case as well, in which the Commission revised the PFD's finding to simply state that "SWEPCO's modeling understated the amount of new wind generation in SPP."[157] The same problem exists with SWEPCO's modeling in this case.

As discussed above, the higher the assumed LMPs, the more benefits the Wind Facilities will show. One of the important assumptions in the modeling is thus the amount of renewable resources that will be developed in the SPP during the study period. Renewable resources such as wind and solar have little or no marginal cost and, in the case of wind projects, are able to bid into the market at negative prices.[158] Consequently, the addition of renewable resources in a model will drive down the LMPs that the model projects.[159]

The primary model SWEPCO used to derive its LMPs was AURORA,[160] which assumed 27.8 GW and 28.9 GW of renewable generation capacity, respectively, for years 2024 and 2029.[161] As a point of comparison, SWEPCO witness Mr. Pfeifenberger testified that there was approximately 21.7 GW of wind and solar generation in the SPP footprint at the time he submitted his direct testimony last summer.[162] Thus, SWEPCO assumed in its AURORA model that

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[157] TIEC Ex. 5 at 19, FoF 99, 99A.

[158] Tr. at 338:25-339:3 (Sheilendranath Cross) (Feb. 25, 2020).

[159] TIEC Ex. 1, Pollock Dir. at 22; TIEC Ex. 2, Griffey Dir. at 35. For the purpose of projected congestion costs, the relevant model is PROMOD, as explained in greater detail below.

[160] TIEC Ex. 2, Griffey Dir. at 35, 48-49.

[161] SWEPCO Ex. 20, Rebuttal Testimony of Johannes P. Pfeifenberger at 7 (Pfeifenberger Reb).

[162] SWEPCO Ex. 9, Pfeifenberger Dir. at 8 (showing 250 MW of solar generation); *id.* at 19 (showing 21.4 GW of wind generation).

renewables in SPP would grow by 6.1 GW by 2024 and by 7.2 GW by 2029.[163] Of this new renewable capacity, all of the additions after 2020 were assumed to be solar additions.[164] SWEPCO's renewable estimates are substantially understated, and the assumption of no new wind facilities in the SPP after 2020, not even the ones being proposed in this case, is well beyond the realm of plausibility. SWEPCO's failure to properly model the growth of renewable resources in SPP is one indication that its economic analysis is insufficient to meet its burden of proof in this proceeding.

AEP's forecast assumes no new wind generation will be added in SPP after 2020.

A red flag that SWEPCO undercounted renewable generation is that Mr. Bletzacker's AURORA modeling assumes that ***no new wind whatsoever*** will be added after 2020, even in his base case, which contains a carbon assumption.[165] This assumption not only ignores the ongoing buildout of wind resources in the SPP, it ignores at least two of the plants that SWEPCO has proposed in this case (Traverse and Maverick), which are not slated to begin operation until 2021 and which have a total nameplate capacity of 1,286 MW.[166]

Rather than assuming that new wind will be constructed after 2020 (even in a carbon-tax world), Mr. Bletzacker assumes that existing wind plants will be repowered in place at the end of their useful lives instead of being retired.[167] But given the amount of wind generation that has come online in recent years in the SPP—wind capacity has more than doubled from 8.6 GW in 2014 to 20.6 GW in 2018[168]—and that wind plants generally have an expected life of 20 years or more, there is no reason to assume that Mr. Bletzacker's repowered-in-place assumption serves as an adequate proxy for properly accounting for the influx of new projects. Certainly Mr. Bletzacker has not provided any basis for this assumption. Indeed, his testimony on this point was confusing.

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[163] SWEPCO may have assumed even less solar and wind growth than this to the extent that Mr. Pfeifenberger's reference to "Renewables in the Model" in his rebuttal testimony accounts for hydroelectric power. SWEPCO Ex. 20, Pfeifenberger Reb. at 7. As of the end of 2018, SPP reported 3.4 GW of existing hydroelectric power. TIEC Ex. 1B, Pollock Workpapers at 48.

[164] TIEC Ex. 2, Griffey Dir. at 35; TIEC Exs. 44-45.

[165] TIEC Ex. 2, Griffey Dir. at 35; TIEC Exs. 44-45.

[166] SWEPCO Ex. 2, Brice Dir. at 6.

[167] Tr. at 270:23-271:4 (Bletzacker Cross) (Feb. 24, 2020).

[168] TIEC Ex. 51.

During cross-examination on his direct testimony, he testified that the repowered-in-place assumption was the model's decision, not his:

> Q. Essentially your assumption is that wind is repowered and retained in place. Is that a fair way to say it?
>
> A. Yes. And I'd rather not call it my assumption. That's the model's econometric output.[169]

However, Mr. Bletzacker also responded in discovery that the repowering of wind facilities was ***not*** an output of the model.[170] When questioned about this apparent inconsistency during cross-examination on his rebuttal testimony, Mr. Bletzacker indicated that he input into the model the cost to repower specific wind facilities at specific locations knowing that this would likely cause the model to select the facilities for repowering.[171] It thus appears that Mr. Bletzacker essentially had to guide his model to make the repower-in-place assumption and that, absent this guidance, the model would not only have assumed no new wind generation in the SPP footprint after 2020, but also that the amount of wind would decline. SWEPCO's LMP modeling is simply not reliable.

<u>The SPP Generation Interconnection Queue demonstrates that SWEPCO's renewable resource assumptions are too low.</u>

SWEPCO's failure to account for the expected growth in renewable resources is also evident from the current requests in the SPP generation interconnection queue, which total approximately 114 GW. Mr. Pollock included a table showing the active requests in the queue in his testimony:[172]

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[169] Tr. at 270:23-271:4 (Bletzacker Cross) (Feb. 24, 2020).

[170] TIEC Ex. 75. Specifically, Mr. Bletzacker, the sponsor of SWEPCO's response to TIEC 11-5, stated that:

The Aurora model allows for planned retirements (e.g., retirements upon reaching a certain age) and planned additions (e.g., units currently under construction). All other capacity changes are an output of the model (***except the anticipated re-powering of wind facilities***). *Id.* (emphasis added).

[171] Tr. at 736:1-737:8 (Bletzacker Cross) (Feb. 26, 2020).

[172] TIEC Ex. 1, Pollock Dir. at 30.

Table 7 SPP Generation Interconnection Queue Active Requests For Renewable Generation* As of December 23, 2019	
Scenario	**Nameplate Capacity (MW)**
Total Requests	114,141
GIA Fully Executed On Schedule	9,956
Facility Study Stage	11,073
DISIS Stage	70,754
Source: SPP, GI Active Request * Wind, Solar, Battery Storage.	

As noted, SWEPCO's AURORA model run assumed that only approximately 7.2 GW of renewable resources will be added to the SPP footprint in the next decade (and none thereafter). However, as demonstrated in the above table, there are nearly 10 GW of renewable resources in the SPP queue that already have an executed generation interconnection agreement (GIA) and are on schedule. As Mr. Pollock testified, this means that these projects are on schedule to enter commercial operation during the period 2019 to 2021.[173] Moreover, there are an additional 11 GW of renewable capacity in the Facility Study Stage, which is one step before executing a GIA, and there are over 70 GW of renewable projects currently in the Definitive Interconnection System Impact Study (DISIS) stage.[174] If the 10 GW of renewable resources with executed GIAs are constructed, along with only half of the capacity in the Facility Study Stage, that would indicate more than 15 GW will be constructed.[175] This would be more than double the renewable-resource growth assumed in SWEPCO's AURORA model by 2029.

In rebuttal testimony, SWEPCO witness Mr. Pfeifenberger disagreed with Mr. Pollock's analysis of the SPP queue, noting that there have been small changes in the amount of capacity in the GIA stage since Mr. Pollock submitted his testimony, and arguing that it is uncertain whether renewable projects in the SPP queue will actually be completed.[176] But this argument misses the

[173] *Id.*

[174] *Id.*

[175] *Id.*

[176] SWEPCO Ex. 20, Pfeifenberger Reb. at 5.

point. While it cannot be said with absolute certainty which of the projects in the queue will be constructed and on what timeline, Mr. Pollock's 15-GW analysis is conservative for at least two reasons. First, his analysis looked only to projects with executed GIAs or in the Facility Study Stage (counting only 50% of the capacity for the latter). This analysis assumes that literally none of the 70 GW of capacity in the DISIS stage will be constructed. Second, Mr. Pollock's analysis is based only on projects currently in the queue. Needless to say, new renewable resources can and will be proposed over the 20-plus years that the Wind Facilities would be in service.

Indeed, SWEPCO's contentions that the total amount of capacity in the SPP queue should be ignored simply prove too much. In discovery, SWEPCO itself has cited to the queue as evidence that there will likely be continued wind deployment in the SPP.[177] And outside the context of this contested proceeding, AEP has indicated that it believes that SPP's Future 2 case—which assumes a higher level of renewable resources than the Future 1 case that SWEPCO used in its PROMOD modeling[178]—more accurately represents the expected level of future renewable penetration in the SPP.[179] Specifically, AEP representatives in the SPP planning process have stated that: "SPP's own wind projections show that Future 2 aligns with the expected reality—this region will likely have over 30 GW of wind power in the not distant future."[180]

A similar dispute regarding the use of the SPP queue to evaluate potential future wind development arose during the Wind Catcher proceeding. In that case, Mr. Pollock testified that, based on the projects in the various stages of the queue, SWEPCO had undercounted wind in its modeling by over 16 GW compared to 2016 levels.[181] Mr. Pfeifenberger, who also testified for SWEPCO in that case, agreed that the modeling understated wind, but argued that it was only by approximately 6,000 MW.[182] His quantification was based on the projects with pending or

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[177] TIEC Ex. 51 ("Furthermore, the Company reported approximately 80 GW of wind energy resources in the SPP interconnection queue at the time of the study and the Company believes that there is a high potential for additional wind resources deployment in the SPP footprint going forward.").

[178] Tr. at 376:1-14 (Ali Cross) (Feb. 25, 2020); TIEC Ex. 52. SPP's 2019 Future 2 case projects 27 GW of wind in 2024 and 30 GW in 2029, and SPP's 2020 Future 2 case projects 30 GW of wind in 2025 and 33 GW of wind in 2030. TIEC Exs. 52, 53.

[179] Tr. at 378:16-380:2 (Ali Cross) (Feb. 25, 2020); TIEC Ex. 55.

[180] TIEC Ex. 55.

[181] Docket No. 47461, PFD at 34.

[182] *Id.* at 35.

completed GIAs.[183] The PFD accepted Mr. Pfeifenberger's testimony on this point, recommending a finding that SWEPCO's modeling understated wind by approximately 6,000 MW.[184] The Commission, however, did not accept that finding. Instead, it modified it to read simply that "SWEPCO's modeling understated the amount of new wind generation in the SPP."[185] And, in setting out the reasons it was rejecting SWEPCO's application, the Commission specifically noted all of the renewable capacity in the three stages of the SPP queue discussed above, including the DISIS stage.[186] It is thus clear that the Commission found the amount of pending requests in the queue from renewable projects to be relevant to whether—and to what degree—SWEPCO had understated renewables in its modeling.

The EIA's renewable projections confirm the flaws in SWEPCO's modeling.

The EIA not only makes projections of future natural gas prices, it also makes projections regarding a wide variety of energy-related matters, including the future electricity generation mix.[187] And one of the "key takeaways" from the 2020 AEO is that "the electricity generation mix continues to experience a rapid rate of change, ***with renewables the fastest-growing source of electricity generation through 2050. . . .***"[188] Indeed, the EIA projects that, due to declining costs for new wind and solar projects, renewables will grow their share of the generation mix under a wide range of assumptions about the future, including under the EIA Low Case.[189] The EIA's bullish outlook on renewable resources, and in particular solar and wind generation, includes the following projections:

- Because of declining capital costs and higher renewable portfolio standards (RPS) targets in some states, ***AEO2020 projects that the relatively sharp growth in renewables seen during the past 10 years will continue through the projection period.*** Total renewable generation exceeds natural gas-fired

[183] *Id.* at 34, 35.

[184] *Id.* at 88, FoF 99.

[185] TIEC Ex. 5 at 19, FoF 99.

[186] *Id.* at 5-6, 19, FoF 99A.

[187] TIEC Ex. 46 at 3.

[188] *Id.* (emphasis added).

[189] *Id.* at 67.

generation after 2045 in the AEO2020 Reference case. Renewable generation grows faster than overall electricity demand.[190]

- In the AEO2020 Reference case, ***the United States adds 117 gigawatts (GW) of new wind and solar capacity between 2020 and 2023***, which is the result of tax credits, increasing RPS targets, and declining capital costs.[191]

- The AEO2020 projects that ***generation from renewable sources will rise from 18% of total generation in 2018 to 38% by 2050 in the Reference case***. Solar photovoltaic (PV) contributes the most to the growth in renewable generation, increasing from 13% of total renewable generation in 2018 to 46% by 2050. Although ***onshore wind generation more than doubles during the projection period***, its share of renewable generation declines slightly from 37% to 29% between 2018 and 2050.[192]

The EIA's specific renewable capacity projections for SPP are in accord, as shown in TIEC Exhibits 76 and 77, which were admitted at the hearing[193] and contain excerpts of the 2020 AEO's Reference Case Table 56, "Electricity Generation Capacity by Electricity Market Module Region." EIA divides SPP into three regions. TIEC Exhibit 76 shows the projected "Renewable Sources" by GW for SPP Central and North by year, while TIEC Exhibit 77 provides the same information for SPP South. The following table compares the EIA's projections for renewable capacity in SPP to the assumptions made in SWEPCO's modeling for selected years:

[190] TIEC Ex. 46 at 68 (emphasis added).

[191] *Id.* at 72 (emphasis added).

[192] *Id.* at 80 (emphases added).

[193] Tr. at 740:12-745:10 (Bletzacker Cross) (Feb. 26, 2020).

Source	2024 (GW)	2029 (GW)	2049 (GW)
2020 EIA AEO[194] (Reference Case)	38.1	50.3	64.1
SWEPCO AURORA Modeling[195]	27.8	28.9	28.2
SWEPCO PROMOD Modeling[196]	28.2	30.6	N/A

The EIA projections confirm that SWEPCO has understated renewable capacity in its modeling, and by a significant margin.[197]

SWEPCO's failure to properly account for renewable generation is evident in its ever increasing-LMP projections and implied heat rates.

Given SWEPCO's understatement of the growth of renewable capacity in the SPP in its modeling, it is unsurprising that SWEPCO posits ever-increasing LMPs throughout the life of the Wind Facilities, including in the no-carbon cases. This is shown in Mr. Pollock's Exhibit JP-3:[198]

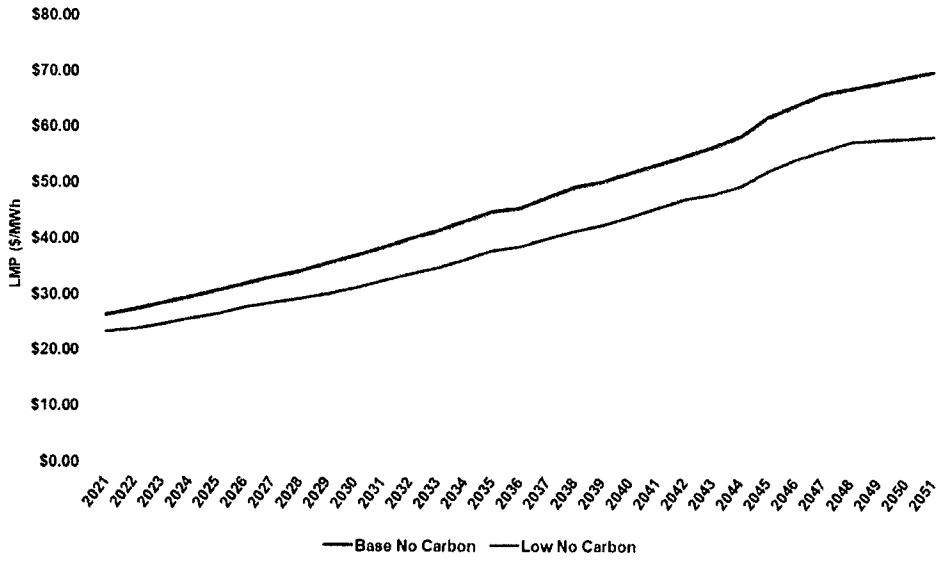
[194] TIEC Exs. 76, 77. For each listed year, the EIA AEO figure is the total of the renewable generation shown on these two exhibits for the three SPP regions. For example in 2024, the EIA projects 13.1 GW and 9.7 GW, respectively, for SPP Central and North (TIEC Ex. 76), and 15.3 GW for SPP South (TIEC Ex. 77). 13.1+9.7+15.3=38.1.

[195] SWEPCO Ex. 20, Pfeifenberger Reb. at 7 (showing 2024 and 2029 assumptions); TIEC Ex. 44 (showing 2049 assumptions).

[196] SWEPCO Ex. 20, Pfeifenberger Reb. at 7. Because PROMOD was only run for 2024 and 2029, there are no wind assumptions for any other years.

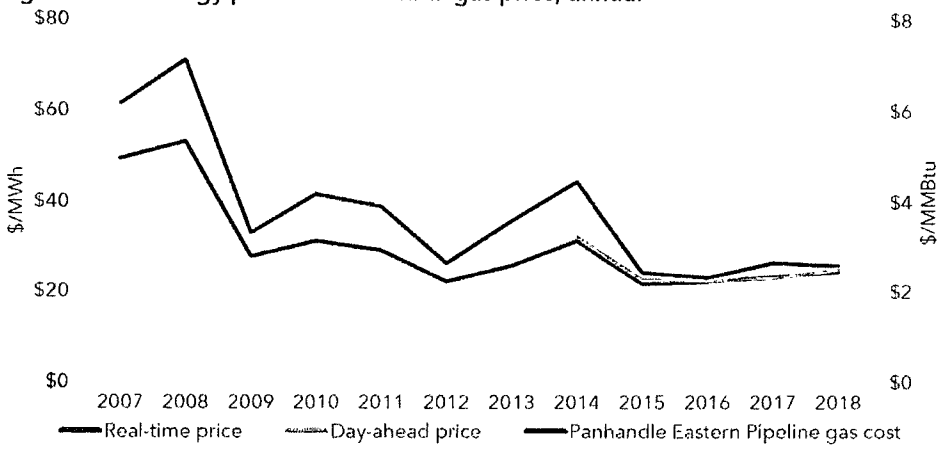
[197] The EIA renewable projections include additional renewable resources other than solar and wind, such as hydroelectric power, SWEPCO Ex. 40 at n.2, though the EIA's projections are driven by solar and wind growth as discussed above. As a point of reference, the 2018 SPP SOM report indicated that there was 3.4 GW of hydro power and a miniscule amount (74 MW) of "other" sources as of the end of that year. TIEC Ex. 1B, Pollock Dir. Workpapers at 48.

[198] TIEC Ex. 1, Pollock Dir. at Ex. JP-3 at 2.



Notably, this projection stands in contrast to average LMPs that have historically occurred in the SPP, which have fluctuated from year to year, but generally declined over the last decade:[199]

Figure 4–1 Energy price versus natural gas price, annual



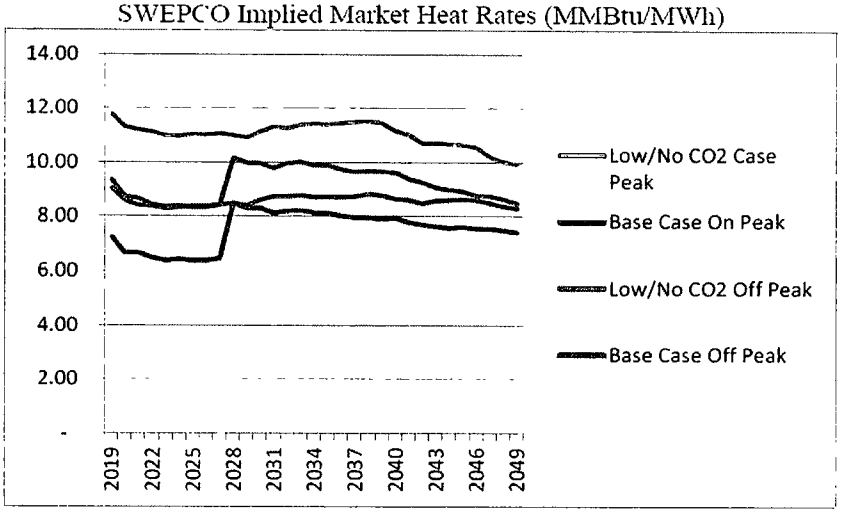
Another indication that SWEPCO has understated renewable resources in its modeling is that its implied market heat rates remain flat. An implied market heat rate is the projected power price (LMP) divided by the projected gas price.[200] Implied market heat rates should decrease with technological improvements and with greater penetration of zero-marginal-cost renewable

[199] SWEPCO Ex. 20A, Workpapers to the Rebuttal Testimony of Johannes P. Pfeifenberger at WP "2018 annual state of the market report.pdf" at 106 (Pfeifenberger Reb. Workpapers).

[200] TIEC Ex. 1, Pollock Dir. at 28-29.

resources.[201] SWEPCO's modeling of the SPP market, however, shows implied heat rates remaining essentially flat over the next 30 years, even in the no-carbon cases. This can be seen in the following figure Mr. Griffey included in his testimony:[202]

Figure 8
SWEPCO Implied Market Heat Rates (MMBtu/MWh)



As Mr. Griffey testified:

> Assuming flat implied heat rates means that the on-peak price is increasing with SWEPCO's gas price forecast, and it also means that SWEPCO is not forecasting significant technology-driven declines in power prices nor considering the impact of accelerated renewables penetration. The net effect is to make the Wind Projects appear more economic.[203]

In his rebuttal testimony, Mr. Pfeifenberger attempted to justify the flat implied heat rates in SWEPCO's modeling by noting that the market heat rates he has "inferred" from SPP's State of the Market (SOM) Reports have increased in recent years despite growing wind capacity.[204] However, Mr. Pfeifenberger's over-simplified analysis does not change the fact that increasing renewable penetration will tend to lower implied heat rates. While there are many factors that can impact a market implied heat rate, the very 2018 SPP SOM Report that Mr. Pfeifenberger included

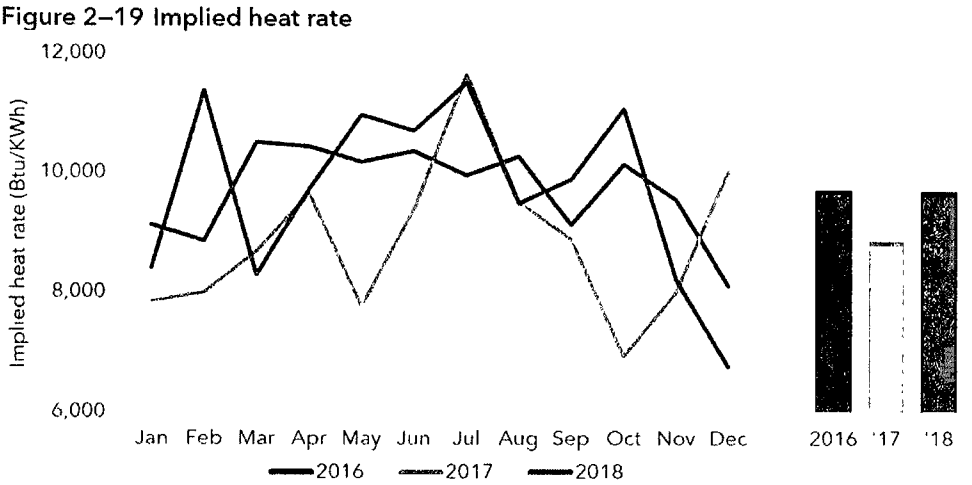
[201] TIEC Ex. 2, Griffey Dir. at 35.

[202] *Id.* at 34.

[203] *Id.* at 35.

[204] SWEPCO Ex. 20, Pfeifenberger Reb. at 16.

in his workpapers discusses that wind generation drives down implied heat rates. Specifically, the report included the following chart and discussion:[205]



> The chart shows a decline in implied heat rates in 2017 compared to 2016 and 2018. Of note, wind generation and load affected electricity prices in 2017. For instance, high levels of wind generation affected electricity prices in May and October, lowering average heat rates, while high temperatures in July increased load and electricity prices. Implied heat rates in December 2018 were low as a result of coal resources setting electricity prices more frequently (see Section 2.4.2) as higher natural gas prices caused more gas resources to be uneconomic.

There is simply no doubt that increasing amounts of renewables in SPP will tend to put downward pressure on LMPs.

Impact of Undercounting Renewable Additions

SWEPCO's failure to properly account for renewable generation renders its models unreliable and means that it cannot meet its burden of proof in this proceeding. While SWEPCO witness Mr. Pfeifenberger has attempted to quantify the impact of assuming more wind by comparing two PROMOD model runs and by looking at an academic study, these calculations only account for 3,400 MW of additional wind.[206] As set forth above, this amount substantially understates what is likely to be developed. Moreover, these back-of-the-envelope analyses simply

[205] SWEPCO Ex. 20A, Pfeifenberger Reb. Workpapers at WP "2018 annual state of the market report.pdf" at 37-38.

[206] SWEPCO Ex. 20, Pfeifenberger Reb. at 9-12.

consider changes in average LMPs,[207] and do not reflect the true impact that additional wind generation will have on the projected benefits. First, additional wind penetration will have the greatest impact in driving down LMPs during the windiest hours, which will also tend to be those hours when the Wind Facilities are running.[208] Second, wind generation only sets the price in the hours in which wind is on the margin, and those prices are generally negative due to PTCs.[209] And, as renewable penetration increases, the number of hours in which wind sets the price increases in a non-linear fashion.[210]

In order to fully capture the impact of SWEPCO's failure to include sufficient renewables in its analysis, the models would have to be rerun using reasonable renewable capacity assumptions. However, Mr. Griffey did make an adjustment to at least account for SWEPCO's average implied heat rate remaining flat. Specifically, he compared the implied heat rates shown in the AEP forecast with the market heat rates implied by the InterContinental Exchange's (ICE) SPP South forward prices. The ICE SPP South forward prices, when divided by NYMEX futures (adjusted for basis differentials to the Panhandle Eastern Pipeline hub in Oklahoma), show that market implied heat rates decline by 2 MMBtu/MWh between the present and 2028.[211] Assuming the SPP South forward prices, which effectively accounts for both the market's expectations for gas prices (NYMEX) and the market's expectation for implied heat rates, reduces net benefits by $409 million NPV.[212] Because this quantification is based on average market prices, it does not fully account for the fact that the additional hours when wind is on the margin at negative LMPs are likely to be the same hours as when the Wind Facilities have their greatest output.[213] And

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[207] *Id.*

[208] SWEPCO Ex. 20A, Pfeifenberger Reb. Workpaper at WP "LBNL Study_wind_and_solar_impacts_on_wholesale_prices_approved.pdf" at 36-37 (noting that the "region with the highest concentration of negative wholesale prices and the lowest average prices in 2017 [wa]s in the SPP footprint covering states in and around Oklahoma" and that "periods with high system-wide wind generation have been correlated with lower LMPs, particularly if the load was also simultaneously low").

[209] Tr. at 335:10-336:1 (Sheilendranath Cross) (Feb. 25, 2020).

[210] SWEPCO Ex. 20A, Pfeifenberger Reb. Workpaper at WP "LBNL Study_wind_and_solar_impacts_on_wholesale_prices_approved.pdf" at 37-38 (noting that in 2011, when wind penetration in the SPP was low, negative prices were nonexistent even on windy days, whereas in 2017, when wind penetration in the SPP was higher, negative prices occurred often on windy days when the load was low and even sometimes when the load was high).

[211] TIEC Ex. 2, Griffey Dir. at 36-37.

[212] *Id.* at 37, 45.

[213] Tr. at 575:11-577:1 (Daniel Cross) (Feb. 26, 2020).

given that LMPs are equal to gas prices multiplied by the implied heat rate, higher levels of wind penetration will have a greater impact on net benefits under higher gas scenarios.[214]

c. Capacity Factor

A key assumption that affects both the projected production cost savings and the expected value of the PTCs is the expected NCF. The NCF is a ratio that represents the amount of energy that will actually be generated by the Wind Facilities divided by the total amount of energy that could be generated given the nameplate capacity.[215] SWEPCO's consultant, Simon Wind, provided SWEPCO with a probability distribution of expected NCFs.[216] In its base case scenario, SWEPCO assumed an NCF of 44.01%, which was the P50 level provided by Simon Wind.[217] A P50 level of 44.01% means that, based on the probabilistic modeling of the windiness of the area, there is a 50% chance that the NCF will be higher than 44.01% and a 50% chance that the NCF will be lower than 44.01%.[218] SWEPCO also ran scenario cases assuming the P95 level, which was 38.13%.[219]

However, the P50 level of 44.01% does not actually represent the median expected outcome because it excludes the consideration of factors such as force majeure and curtailment.[220] As stated in the wind reports prepared by Simon Wind, the projected NCFs "assum[e] turbines operate according to the stated power curve, including the 2.0% discount per the "Losses" tab, turbines are operated and maintained according to the manufacturer specifications with no major mechanical defects, and all curtailment is reimbursed."[221] Curtailment, which can happen due to reasons such as transmission constraints, means that the wind farms will not be generating energy

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[214] This is because the marginal cost of wind stays constant at -$25/MWh to -$30/MWh irrespective of gas prices. Wind will reduce net benefits by a greater amount under a high-gas scenario because the LMPs are higher and the hours in which wind is on the margin will have a more significant percentage impact on the LMPs.

[215] Tr. at 35:11-36:16 (Smoak Cross) (Feb. 24, 2020).

[216] Tr. at 190:5-10 (Godfrey Cross) (Feb. 24, 2020).

[217] SWEPCO Ex. 8B, Workpapers to the Direct Testimony of John F. Torpey at WP "Updated Torpey Errata Benefits Model Final.xlsx," Tab "Combined P-Values" (Torpey Dir. Workpapers); Tr. at 56:11-16 (Smoak Cross) (Feb. 24, 2020).

[218] Tr. at 191:9-16 (Godfrey Cross) (Feb. 24, 2020).

[219] SWEPCO Ex. 8B, Torpey Dir. Workpapers at WP "Updated Torpey Errata Benefits Model Final.xlsx," Tab "Combined P-Values."

[220] Tr. at 188:23-189:9 (Godfrey Cross) (Feb. 24, 2020).

[221] SWEPCO Ex. 3, Direct Testimony of Jay F. Godfrey at Ex. JFG-6 at 58 (Godfrey Dir.); Tr. at 189:17-25 (Godfrey Cross) (Feb. 24, 2020).

even though the wind is blowing.[222] Additionally, while certain expected loss factors are accounted for (such as extreme temperatures, blade degradation, and icing), the NCFs do not account for force majeure events, such as possible environmental curtailments and major mechanical defects.[223] Since the various P-levels used by SWEPCO assume that there are no force majeure events and curtailment over the projected life of the Wind Facilities, they overstate the actual, real-world probability distribution of NCFs.

Force majeure events and curtailment are real possibilities that could have a significant impact on the project economics. As just one example, it was disclosed in the environmental schedules for the Traverse PSA that whooping cranes use the Traverse project area and its surrounding areas.[224] Additionally, SWEPCO's Canadian Hills wind farms, which are also located in Central Oklahoma,[225] [redacted] The possibility of these events occurring is not captured in the P-levels assumed by SWEPCO. As a result, the purported P50 level of 44.01% overstates what would be expected under a true median probability scenario.[227] Neither SWEPCO's economic analysis nor its proposed energy production guarantee account for the risks of force majeure and economic curtailment.

Additionally, the probability distribution of the expected NCF of the Wind Facilities is not symmetrical.[228] Rather, it is skewed such that the negative impact of a worse-than-expected outcome is more significant than the positive impact of an equally likely better-than-expected outcome.[229] For example, the actual NCF is equally likely to be lower than the P75 level as it is to be higher than the P25 level. However, while the P75 level is 41.68%, or 2.33 percentage points

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[222] Tr. at 398:16-19 (Ali Clarifying Exam.) (Feb. 25, 2020). Or, they will be generating less than their full capacity. Tr. at 507:16-508:6 (Pfeifenberger Cross) (Feb. 25, 2020).

[223] SWEPCO Ex. 3, Godfrey Dir. at Ex. JFG-6 at 54.

[224] SWEPCO Ex. 3B, Highly Sensitive and Voluminous Exhibit JFG-3 at Ex. JFG-3 Traverse at 625 (Godfrey HS Dir.).

[225] Tr. at 193:20-194:9 (Godfrey Cross) (Feb. 24, 2020).

[226] TIEC Ex. 18 (HSPM). [redacted] *Id.*

[227] Tr. at 56:23-57:3 (Smoak Cross) (Feb. 24, 2020).

[228] Tr. at 192:10-14 (Godfrey Cross) (Feb. 24, 2020).

[229] Tr. at 193:3-19 (Godfrey Cross) (Feb. 24, 2020).

lower than the P50 level, the P25 level is 45.94%, or only 1.93 percentage points higher than the P50 level.[230] Accordingly, ratepayers do not benefit as much from a better-than-expected outcome as they would be harmed under an equally likely worse-than-expected outcome.

SWEPCO's P50 low/no carbon case shows projected benefits of $236 million NPV,[231] while SWEPCO's P95 low/no carbon case shows projected benefits of $43 million NPV.[232] That represents a decrease of $193 million NPV for a 5.88 percentage point decrease in the NCF, or a $32.8 million NPV decrease for every percentage point decrease.[233]

d. Useful Life of Wind Facilities

In its economic analysis, SWEPCO assumed that the Wind Facilities would have a useful life of 30 years. In contrast, just two years ago SWEPCO based the economic analysis of its Wind Catcher project on a useful life of 25 years.[234] Notably, both the currently proposed Wind Facilities and Wind Catcher use the same turbine manufacturer (GE Renewables North America LLC) and platform (GE 2 MW).[235] The majority of the wind turbines would also be the same tower height (88.6 meters) and rotor diameter (127 meters) as the turbines used in Wind Catcher.[236] Nevertheless, SWEPCO assumed that the Wind Facilities it proposes in this proceeding will last five years longer. That assumption adds significantly to SWEPCO's projected benefits.

SWEPCO's support for extending the useful life of the Wind Facilities is a Lawrence Berkeley National Laboratory (LBNL) study that shows that wind project participants are, on average, assuming useful lives of 29.6 years.[237] However, that study is based merely on a survey of wind developers, sponsors, and owners—who would have every reason to be optimistic about the potential service lives of their facilities; it does not reflect actual achieved service lives.[238]

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[230] SWEPCO Ex. 8B, Torpey Dir. Workpapers at Updated Torpey Errata Benefits Model Final.xslx at Tab "Combined P-Values"; Tr. at 190:14-192:11 (Godfrey Cross) (Feb. 24, 2020).

[231] SWEPCO Ex. 8, Torpey Dir. at Ex. JFT-3 at 5.

[232] SWEPCO Ex. 14, Rebuttal Testimony of Thomas P. Brice at 6 (Brice Reb.).

[233] 44.01% - 38.13% = 5.88%. 193 million/5.88 = $32.8 million.

[234] TIEC Ex. 1, Pollock Dir. at 13.

[235] *Id.* at 14.

[236] *Id.*

[237] SWEPCO Ex. 16, DeRuntz Reb. at 2.

[238] Tr. at 726:1-11 (DeRuntz Cross) (Feb. 26, 2020).

Indeed, Mr. DeRuntz testified that he is not aware of any wind farms achieving a 30-year useful life.[239]

If the Wind Facilities are to achieve a 30-year useful life, SWEPCO will have to make interim capital additions and expend a higher amount on O&M costs.[240] While SWEPCO has included a forecast of ongoing capex and O&M in its economic analysis, those amounts are mere projections and are not subject to SWEPCO's proposed capital cost cap.[241] Additionally, SWEPCO's forecasted ongoing capex and O&M expense are flat in real terms after year 10 of the project,[242] despite the fact that the wind turbine manufacturers stated that higher O&M costs in the later years are to be expected.[243] As Mr. Pollock testified, the economic analysis should assume a useful life that is based on the period over which the initial capital investment is expected to remain in service.[244] That initial capital investment is the amount that is certain and subject to SWEPCO's proposed cost cap.

Assuming a 30-year rather than a more appropriate 25-year useful life appends an additional five years of projected production cost savings for the years 2046 to 2051, a period when SWEPCO is projecting high gas and power prices and thus high levels of expected benefits.[245] Even in SWEPCO's low/no carbon case, the projected benefits during those last five years represents $473 million in nominal benefits[246] or $77 million NPV,[247] which represents a third of the total $236 million NPV in benefits projected under that case.[248] Overall, the impact of assuming a 25-year rather than a 30-year useful life in the low/no carbon case is $63 million NPV.[249] This quantification takes into account both the shorter depreciation schedule (which

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[239] *Id.* at 726:12-18.

[240] TIEC Ex. 1, Pollock Dir. at 13; TIEC Ex. 74.

[241] TIEC Ex. 1, Pollock Dir. at 13.

[242] Tr. at 725:10-14 (DeRuntz Cross) (Feb. 26, 2020); SWEPCO Ex. 4, DeRuntz Dir. at 17-18.

[243] Tr. at 727:14-22 (DeRuntz Cross) (Feb. 26, 2020); SWEPCO Ex. 16, DeRuntz Reb. at Ex. JGD-2R at 6; TIEC Ex. 74.

[244] TIEC Ex. 1, Pollock Dir. at 15.

[245] *Id.* at 14-16.

[246] SWEPCO Ex. 8, Torpey Dir. at Ex. JFT-3 at 5 (adding the nominal benefits shown for years 2047-2051).

[247] TIEC Ex. 2, Griffey Dir. at 45 & n.69.

[248] SWEPCO Ex. 8, Torpey Dir. at Ex. JFT-3 at 5.

[249] TIEC Ex. 2, Griffey Dir. at 45.

decreases net benefits) and removing interim capital additions and ongoing O&M after year 25 (which increases net benefits).[250]

e. Congestion and Losses (including Gen-Tie)

SWEPCO used the PROMOD model to forecast congestion costs; that is, the cost associated with delivering the energy that would be produced by the Wind Facilities to the AEP West Load Zone.[251] Specifically, SWEPCO modeled congestion as the difference in the PROMOD projected congestion and loss components of LMPs at the Wind Facilities' nodes and the same components of LMPs at the AEP West load zone.[252] Congestion costs were then treated as an offset to project benefits.[253] Accordingly, all else equal, the lower the congestion costs SWEPCO projects, the higher the net benefits the Wind Facilities will show. As set forth below, SWEPCO understated congestion costs in its modeling for at least three reasons.

SWEPCO's analysis understates congestion costs.

First, PROMOD understates congestion.[254] This is because PROMOD makes simplifying assumptions regarding market conditions such that its simulations are essentially modeling the day-ahead market with perfect foresight.[255] PROMOD is not capable of capturing real-time uncertainties, such as transmission outages and fluctuations in wind generation output, which can exacerbate conditions such as negative pricing and lead to curtailments.[256] For instance, the most recent SPP Quarterly SOM report noted that "typically, the frequency of negative price intervals in the real-time market is about two to three times that of the day-ahead market."[257]

SWEPCO acknowledges these limitations with PROMOD. Mr. Pfeifenberger testified:

> The PROMOD simulations, like those of similar other nodal market simulations, make certain simplified assumptions about market conditions that ***tend to yield conservatively low market price fluctuations and congestion levels***. For example,

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[250] *Id.* at 45 n.69; *see also* TIEC Ex. 1, Pollock Dir. at 15.

[251] SWEPCO Ex. 6, Sheilendranath Dir. at 3, 9; Tr. at 506:7-19 (Pfeifenberger Cross) (Feb. 25, 2020).

[252] SWEPCO Ex. 6, Sheilendranath Dir. at 9.

[253] SWEPCO Ex. 8, Torpey Dir. at Ex. JFT-3.

[254] TIEC Ex. 2, Griffey Dir. at 42.

[255] SWEPCO Ex. 9, Pfeifenberger Dir. at 6.

[256] *Id.*; TIEC Ex. 2, Griffey Dir. at 100-101 (citing SWEPCO's Response to TIEC 2-34).

[257] TIEC Ex. 49 at 32-33.

> PROMOD simulations generally use long-term projections of fuel prices (which do not have as much daily and monthly volatility as actual fuel prices), weather-normalized loads (which do not include occasional heat waves or unusual cold weather), and a fully intact transmission system (i.e., no temporary transmission outages). Thus, the simulations do not capture the actual daily or monthly fluctuations in these variables, nor the added stresses associated with the encountered more challenging system conditions. The simulations are based on perfect foresight of daily real-time conditions—which approximates day-ahead power markets but understates real-time market uncertainties, including variances in wind generation output and therefore the likely generation curtailment driven by the uncertainty of real-time market conditions and temporary transmission outages.[258]

SWEPCO witness Mr. Ali also confirmed that PROMOD understates congestion costs.[259] Nevertheless, SWEPCO did not make any adjustments in its net benefits analysis to account for PROMOD understating congestion costs.[260]

Notably, SWEPCO took a decidedly different approach in the Wind Catcher case. One of the economic analyses that SWEPCO ran in that case was a comparison of its proposed Wind Catcher project to what SWEPCO called a "Generic Wind case." The Generic Wind case reflected the acquisition of 1,900 MW of wind generation (which was also the capacity of the Wind Catcher project) from multiple projects across the SPP.[261] The proposed Wind Catcher project had a dedicated gen-tie line, whereas the generation projects in the Generic Wind case were modeled as being delivered over the existing and planned SPP transmission system.[262] Thus, SWEPCO's primary purpose for the Generic Wind case was to demonstrate the claimed benefits of avoiding congestion and curtailment costs through the gen-tie associated with the Wind Catcher project as compared to a Generic Wind alternative.[263]

In conducting this comparison, SWEPCO modeled congestion for the Generic Wind projects using PROMOD, as it did in this case.[264] And, as in this case, SWEPCO noted that

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[258] SWEPCO Ex. 9, Pfeifenberger Dir. at 5-6 (emphasis added).

[259] SWEPCO Ex. 7, Ali Dir. at 5 (footnotes omitted).

[260] TIEC Ex. 2, Griffey Dir. at 43.

[261] TIEC Ex. 65 at 5.

[262] *Id.* at 4-5.

[263] *E.g.*, *id.* at 20-21.

[264] *Id* at 21-22.

PROMOD yields conservative congestion and curtailment levels.[265] ***Unlike*** in this case, however, in the Wind Catcher proceeding, SWEPCO decided to make an adjustment for PROMOD's tendency to understate curtailments. In fact, Mr. Pfeifenberger testified that "[b]ecause PROMOD does not simulate the uncertainties associated with real-time market conditions, a realistic level of real-time wind curtailments ***has to be added to the PROMOD simulation results.***"[266] To accomplish this adjustment, Mr. Pfeifenberger assumed a 5% curtailment of Generic Wind production.[267] In this case, however, SWEPCO has made no adjustment whatsoever to account for PROMOD understating congestion and curtailments. Accordingly, its economic analysis overstates the benefits of the Wind Facilities.

The second way that SWEPCO has undercounted congestion is by understating in its modeling the amount of renewable resources, and particularly wind generation, that will be developed in SPP in the future. TIEC detailed SWEPCO's understatement of the anticipated SPP wind buildout in Section III.C.2.b.ii above. As discussed in that section, greater wind penetration than assumed by SWEPCO will drive down power prices generally. But it will also tend to increase congestion costs associated with delivering energy from the Wind Facilities to the AEP West Load zone.[268] By underestimating the wind development that is likely to occur in the future in the SPP in its modeling, SWEPCO has understated this risk.

The third way in which SWEPCO has understated congestion costs is by artificially holding congestion costs constant in nominal terms from 2029 forward in its modeling.[269] While SWEPCO's economic analysis assumes that electricity prices will double from 2029 to 2051 (growing by 3% per year), it nevertheless assumes that congestion costs will remain flat during this period.[270] These contradictory assumptions are at odds with the principle that congestion costs correlate directly with power prices, a relationship that happens simply "by definition of [the]

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[265] *Id.* at 23-24.

[266] *Id.* at 24 (emphasis added).

[267] *Id.* at 22, JPP-2 at 4.

[268] *E.g.*, SWEPCO Ex. 20, Pfeifenberger Reb. at 13 ("For example, if more wind generation were to develop in SPP beyond 2030, the percentage price differentials from SPP Central zone to the AEP load zone would likely increase."); SWEPCO Ex. 9, Pfeifenberger Dir. at 12 (noting prevailing west-to-east power flows in SPP, which cause congestion); Tr. at 375:7-21 (Ali Cross) (Feb. 25, 2020); SWEPCO Ex. 7, Ali Dir. at 10.

[269] TIEC Ex. 2, Griffey Dir. at 41.

[270] *Id.* at 41.

calculation of congestion costs."[271] Thus, SWEPCO's assumption of flat congestion costs means that it is in fact assuming that system congestion levels in the SPP are improving dramatically after 2029. Indeed, because SWEPCO is holding congestion flat in nominal terms, it is even assuming that congestion costs will not increase with inflation.[272] As Mr. Griffey testified, because "the cost of congestion is correlated with the cost of electricity, SWEPCO's assumption does not make sense."[273]

SWEPCO's rationales for understating congestion costs—including that it will build a gen-tie if necessary—are insufficient.

SWEPCO offers several strained justifications for its highly speculative assumption that congestion costs would stay flat in nominal terms despite ever-increasing power prices. First, SWEPCO argues that it is appropriate to cap the level of congestion at the level that is projected by PROMOD for 2029 because it believes that SPP will advance transmission upgrades to relieve any higher levels of congestion.[274] Indeed, SWEPCO contends that even escalating the congestion costs by inflation is inappropriate because there will be technological improvements that will make it more cost-effective for the SPP to address congestion through transmission solutions.[275] However, as Mr. Griffey testified, it is inconsistent to assert that new technology will mitigate any future increases in the cost of transmission solutions to congestion, but that somehow cost-effective new technologies would not limit the continuous power-price increases that SWEPCO projects.[276] SWEPCO's cherry-picked assumption that technology will lower only congestion costs serves to unjustifiably inflate the expected economics of the Wind Facilities.

Second, SWEPCO argues that capping congestion at 2029 levels is appropriate because it can simply build a gen-tie to alleviate congestion if it gets higher than that level. For example, SWEPCO witness Mr. Pfeifenberger stated in rebuttal testimony:

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[271] Tr. at 317:11-15 (Sheilendranath Cross) (Feb. 25, 2020).

[272] *Id.* at 310:23-25.

[273] TIEC Ex. 2, Griffey Dir. at 41.

[274] *Id.* at 41 (citing SWEPCO Response to TIEC 2-9); SWEPCO Ex. 20, Pfeifenberger Reb. at 17-18.

[275] TIEC Ex. 2, Griffey Dir. at 41 (citing SWEPCO Response to TIEC 2-9); Tr. at 341:7-14 (Sheilendranath Cross) (Feb. 25, 2020).

[276] TIEC Ex. 2, Griffey Dir. at 41-42.

> Even growing congestion costs with inflation, let alone at the rate of projected increases in power prices as suggested by Mr. Griffey, would inflate congestion to the point that it would be economical for the Company to mitigate these cost increases. For instance, under the Base Case with No Carbon, growing congestion costs with inflation from 2030 to 2051 would result in a 2027-2051 NPV of congestion costs that exceeds the equivalent NPV of the revenue requirements of constructing a gen-tie between the Selected Wind Facilities and the Tulsa region of the AEP load zone.[277]

However, if the assumption to hold congestion costs flat in nominal terms is implicitly based on the availability of a gen-tie solution, then the cost of that gen-tie solution needs to be factored into the economic analysis.

SWEPCO, however, presented its base case scenarios without a gen-tie, then separately presented gen-tie scenarios that purport to act as an upper "bookend" to the forecasted congestion costs.[278] In the gen-tie cases, SWEPCO assumed that there would be a higher level of congestion in the SPP.[279] Then, SWEPCO assumed that a gen-tie would be built such that it would be in-service by the end of 2026.[280] That year was chosen because it is the earliest that SWEPCO can feasibly build a gen-tie after allowing for one year of commercial operation for all three facilities to monitor congestion costs.[281]

Although SWEPCO's stated position is that it is not currently planning on building a gen-tie, the economic analysis should be evaluated assuming that the gen-tie will be built. It is inconsistent for SWEPCO to use the gen-tie as an implicit justification for its unreasonable assumption that future congestion costs in the SPP will stay flat in nominal terms without also including the cost of that gen-tie. Moreover, assuming no gen-tie is at odds with how SWEPCO has evaluated the Wind Facilities. During the RFP process, SWEPCO ranked the proposed bids using a metric called the Levelized Adjusted Cost of Energy (LACOE).[282] The LACOE was calculated by taking the Levelized Cost of Energy (LCOE) and adding the levelized cost of congestion and line losses and the levelized cost of a potential gen-tie, giving equal weighting to

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[277] SWEPCO Ex. 20, Pfeifenberger Reb. at 17.

[278] Tr. at 359:3-23 (Sheildendranath Redir.) (Feb. 25, 2020); Tr. at 387:14-21 (Ali Cross) (Feb. 25, 2020).

[279] Tr. at 453:1-13 (Torpey Cross) (Feb. 25, 2020).

[280] SWEPCO Ex. 7, Ali Dir. at 13.

[281] Tr. at 387:14-21 (Ali Cross) (Feb. 25, 2020); TIEC Ex. 58.

[282] SWEPCO Ex. 8, Torpey Dir. at 14; Tr. at 455:16-457:2 (Torpey Cross) (Feb. 25, 2020).

both.[283] The feasibility of constructing a gen-tie to deliver a project's energy to load was a critical part of the RFP bid evaluation process. Accordingly, the Wind Facilities should not be approved unless it can be shown that ratepayers would still benefit even with the construction of a gen-tie.

Moreover, SWEPCO understates the true net cost of building a gen-tie. To reflect the impact of the gen-tie in those cases, SWEPCO made two adjustments. First, it included a $233 million NPV revenue requirement of the gen-tie starting in 2027.[284] Second, SWEPCO removed all congestion costs, also starting in 2027.[285] Both assumptions are problematic. The $233 million NPV revenue requirement amount is understated because the gen-tie is assumed to be depreciated over 60 years, but the economic analysis only captures the first 25 years of costs. This flaw in SWEPCO's analysis is addressed in greater detail below in Section III.C.6.

Second, SWEPCO's assumption that a gen-tie will reduce congestion costs to zero is inconsistent with its modeling in the Wind Catcher proceeding. In Wind Catcher, SWEPCO proposed a gen-tie that would directly deliver energy from the Oklahoma panhandle to AEP's load in Tulsa.[286] Similarly, the potential gen-tie raised in this proceeding would directly connect the Wind Facilities to Tulsa.[287] However, in the Wind Catcher proceeding, SWEPCO's modeling projected that there would still be congestion costs even with the gen-tie.[288] SWEPCO stated that these congestion costs were "associated with the delivery of its output from Tulsa to AEP loads."[289] Given this, it is not clear why SWEPCO assumed, without modeling, that a gen-tie built in 2026 would eliminate 100% of congestion costs from the Wind Facilities for every year thereafter.[290]

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[283] SWEPCO Ex. 8, Torpey Dir. at 14.

[284] Tr. at 417:1-4 (Torpey Cross) (Feb. 25, 2020); Tr. at 382:14-17 (Ali Cross) (Feb. 25, 2020).

[285] Tr. at 382:14-383:1 (Ali Cross) (Feb. 25, 2020: Tr. at 437:22-438:7 (Torpey Cross) (Feb. 25, 2020). As Mr. Torpey testified, the gen-tie cases also have higher congestion costs forecasted for the period prior to 2026.

[286] Tr. at 383:5-13 (Ali Cross) (Feb. 25, 2020).

[287] Tr. at 383:2-4 (Ali Cross) (Feb. 25, 2020).

[288] TIEC Ex. 57. Specifically, SWEPCO forecasted that congestion costs associated with Wind Catcher would start out at $2.63/MWh and increase to $5.68/MWh by 2045. *Id.* These congestion costs would reflect the higher power prices that SWEPCO assumed in the Wind Catcher proceeding. *Id.*

[289] TIEC Ex. 56; Tr. at 383:20-384:2, 386:11-20 (Ali Cross) (Feb. 25, 2020).

[290] Tr. at 451:11-21 (Torpey Cross) (Feb. 25, 2020).

Impact of Understating Congestion Costs

As discussed, SWEPCO understated congestion costs in three ways. As to SWEPCO's flawed assumption that congestion costs stay flat starting in 2029, Mr. Griffey quantified the impact of escalating congestion costs after that time at the escalation rate of the ICE SPP South Hub forward prices, which resulted in decreasing net benefits by $49 million NPV.[291] If higher power prices are assumed, then the downward adjustment to net benefits would be even greater.

The other flaws in SWEPCO's congestion forecast (making no adjustment for PROMOD understating congestion, and understating the likely growth of wind generation in the SPP), are not readily quantifiable with precision. However, a reasonable proxy for the issues would be making the same 5% curtailment adjustment that SWEPCO used in the Generic Wind case. After all, SWEPCO admits that PROMOD understates curtailment risk, and the addition of more wind generation than SWEPCO projects would tend to exacerbate that risk. If the 5% curtailment adjustment made by Mr. Pfeifenberger in the Wind Catcher proceeding was applied to the Wind Facilities, it would reduce the projected NCF by 5%, from 44.01% to 41.81%,[292] or a reduction in NCF of 2.2 percentage points. As explained above in Section III.B.2.c, each percentage point reduction in NCF results in a $32.8 million NPV reduction in SWEPCO's low/no-carbon case. A 2.2 percentage point reduction would reduce the net benefits by $72 million NPV.[293]

3. Capacity Value

SWEPCO's assumption that the Wind Facilities will begin providing capacity value starting in 2037[294] should be rejected. For each gas/carbon price scenario, SWEPCO developed two optimized portfolios of resources, one with and one without the Wind Facilities.[295] SWEPCO then took the difference in cost between those two portfolios as the capacity value of the Wind Facilities.[296] However, these estimates of capacity value are based on mere projections of what SWEPCO's needs will be in future years. As Mr. Pollock testified, whether and when the Wind

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[291] TIEC Ex. 2, Griffey Dir. at 43-44.

[292] 95% * 44.01% = 41.81%

[293] 2.2 * 32.8 = $72.16 million.

[294] Tr. at 542:6-543:18 (Aaron Cross) (Feb. 25, 2020).

[295] Tr. at 427:9-16 (Torpey Cross) (Feb. 25, 2020).

[296] *Id.*

Facilities would actually defer capacity additions is entirely speculative.[297] The need for future resource additions turns on a number of factors, such as forecasted load growth, that are subject to change.[298] Moreover, assuming capacity value for the Wind Facilities is premature because the SPP has not accredited the Wind Facilities for capacity, and there are no approved generation interconnection agreements.[299]

Indeed, SWEPCO's recent integrated resource plans (IRPs) demonstrate that even under the Company's own forecast, the Wind Facilities are not needed for capacity until at least 2038. The Wind Facilities, if they receive capacity accreditation from the SPP, would provide capacity value of 123 MW.[300] As seen in Mr. Torpey's testimony, under the optimized resource plan in SWEPCO's most recent IRP, SWEPCO will have more than 123 MW of capacity reserves above SPP's margin requirement for the entire study period, which ends at 2038.[301] Thus, SWEPCO could remove the capacity associated with the Wind Facilities from its optimized resource plan and would still have adequate capacity for no fewer than the next 18 years.[302]

It is substantially uncertain whether the Wind Facilities will provide the capacity value that SWEPCO projects. What is certain, however, is that SWEPCO does not have any current need for the capacity the Wind Facilities would provide. Consequently, SWEPCO's speculation about the future capacity value of the Wind Facilities, which are $29 million NPV in the low/no carbon case, should not be taken into account in the economic analysis of costs and benefits.

4. Production Tax Credits

The PTCs that would be generated by the Wind Facilities are tied to performance, and the primary risk associated with realizing the value of the PTCs is the energy production level.[303] As set forth above, the probability distribution of NCFs presented by SWEPCO is not a true reflection of the expected energy production of the Wind Facilities because it excludes the consideration of

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[297] TIEC Ex. 1, Pollock Dir. at 12.

[298] Tr. at 428:21-429:5 (Torpey Cross).

[299] TIEC Ex. 1, Pollock Dir. at 12.

[300] Tr. at 429:15-18 (Torpey Cross) (Feb. 25, 2020).

[301] *Id.* at 429:6-430:13; SWEPCO Ex. 8, Torpey Dir. at 9.

[302] Tr. at 430:7-13 (Torpey Cross) (Feb. 25, 2020).

[303] Tr. at 151:22-152:12 (Brice Cross) (Feb. 24, 2020).

force majeure events and curtailment. A reduction in the energy production level from 44.01% (P50) to 38.13% (P95) results in a reduction in the value of the PTCs from $630 million NPV to $546 million NPV.[304] SWEPCO's energy production guarantee only ensures that customers will receive the value of PTCs at the P95 level of 38.13%, and does not even protect customers against force majeure events or curtailments that further reduce the NCF.[305] Moreover, SWEPCO's PTC guarantee does not protect customers against change in law, a risk that SWEPCO witness Mr. Brice stated that the company is unwilling to take on.[306]

Much of the value of the Wind Facilities are driven by the PTCs during the first ten years, and the projected PTC benefits are not certain. Rather, the value of the PTCs is highly dependent upon the Wind Facilities performing at the energy production levels that SWEPCO's wind consultant forecasted, as well as no force majeure or curtailment events occurring.

5. Deferred Tax Asset

The economic value of the PTCs is also affected by AEP's inability to use the PTCs in the years that they are generated. Although SWEPCO is proposing to flow to customers the value of the PTCs as they are earned, AEP does not have the tax appetite to use the PTCs during the early years of the project.[307] SWEPCO is proposing to record the unused PTCs in a deferred tax asset (DTA) that SWEPCO proposes to include in rate base and earn a return on at its regulated weighted-average cost of capital (WACC).[308] At the P50 level, the DTA represents a $123 million NPV cost to ratepayers.[309]

The impact of the DTA is dependent upon, among other factors, AEP's future taxable income, which SWEPCO admits is difficult to forecast with certainty.[310] Recognizing the risk that lower-than-expected taxable income could impose on ratepayers, SWEPCO limited that uncertainty in the Wind Catcher proceeding by (i) capping the DTA balance such that the balance

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[304] *Compare* SWEPCO Ex. 8, Torpey Dir. at Ex. JFT-3 at 1 *with id.* at Ex. JFT-3 at 6.

[305] Tr. at 114:2-6 (Brice Cross) (Feb. 24, 2020).

[306] Tr. at 152:24-153:19 (Brice Cross) (Feb. 24, 2020).

[307] Tr. at 47:12-49:10 (Smoak Cross) (Feb. 24, 2020).

[308] Tr. at 51:3-8 (Smoak Cross) (Feb. 24, 2020).

[309] SWEPCO Ex. 8, Torpey Dir. at Ex. JFT-3 at 1.

[310] Tr. at 49:11-16 (Smoak Cross) (Feb. 24, 2020).

would not exceed a cumulative, annual average of $560 million and (ii) agreeing that there would not be a return on any DTA after year 13 of the project.[311] In contrast, SWEPCO has not proposed any limits to the DTA for the Wind Facilities in this proceeding.

The lack of a limit on the DTA is particularly concerning because AEP's taxable income in future years may not be as high as it is projecting, especially if AEP pursues all of the renewable projects that it has told investors it is pursuing.[312] [redacted] Five-year accelerated depreciation is available for all renewable projects, meaning that any future renewable projects would also cause significant tax losses due to accelerated depreciation.[314] These tax losses would drive down AEP's taxable income,[315] rendering more PTCs unusable and further growing the DTA. [redacted] At the same time, AEP's recent investor presentations forecast 2,980 MW of renewable additions for its regulated operating companies in the 2023-2027 timeframe and 2,740 MW in the 2028-2030 timeframe.[317] Pursuing those projects would result in significant tax losses in those years such that AEP may not have the tax appetite to use the PTCs for much longer than they are projecting. It is telling that unlike the Wind Catcher proceeding, SWEPCO has not proposed any caps on the DTA that would protect ratepayers against this possibility.

6. Wind Facility Revenue Requirement

While SWEPCO has offered a cost cap on the initial capital investment for the Wind Facilities, the project still imposes significant cost risks on ratepayers that are not captured in SWEPCO's economic analyses and are not capped. Specifically, SWEPCO's economic analyses

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[311] Docket No. 47461, PFD at 50-51.

[312] TIEC Ex. 68.

[313] Tr. at 529:2-20 (Multer Cross) (Feb. 25, 2020) (HSPM).

[314] *Id.* at 537:17-22.

[315] *Id.* at 530:7-21 (HSPM).

[316] *Id.* at 529:2-531:25 (HSPM); TIEC Ex. 66 (HS).

[317] TIEC Ex. 68.

understate the costs associated with ongoing capital and O&M and the potential construction of a dedicated gen-tie.

As explained above, SWEPCO economic analyses include a forecast of interim capital additions and O&M costs for the Wind Facilities for the first ten years. The O&M component of this forecast was based on an O&M agreement with Invenergy that terminates after the first ten years of the project.[318] After year ten, SWEPCO assumed that the ongoing capital and O&M costs would stay flat in real terms.[319] However, as SWEPCO witness Mr. DeRuntz testified, the ongoing capital and O&M forecast does not include risk pricing for contingencies.[320] Nor does it reflect the fact that, as the wind turbine manufacturers specifically stated, O&M expenses would be higher in later years.[321] The total revenue requirement associated with the Wind Facilities is likely to be higher than assumed in the economic analysis, and customers are not protected against that risk by the cost cap.

SWEPCO's economic analyses also understate the costs of a potential gen-tie. As an initial matter, the costs of a gen-tie are only included in certain cases, despite the fact that SWEPCO uses the gen-tie as a justification for assuming that congestion costs stay flat in nominal terms in every scenario that is presented.[322] And the cost cap does not apply to gen-tie costs, meaning that ratepayers have no protection from higher-than-projected costs for such a project. The costs of a gen-tie are highly uncertain at this time, as SWEPCO has neither set a route nor a project timeline.[323] The length of the gen-tie that was assumed for the purpose of the economic analysis was 184 miles.[324] However, that distance could increase significantly in the routing process, similar to what happened to the gen-tie for the Wind Catcher project, which saw its proposed route increase in length from 350 to 380 miles due to landowner concerns.[325]

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[318] Tr. at 725:2-9 (DeRuntz Cross) (Feb. 26, 2020).

[319] *Id.* at 725:10-14.

[320] SWEPCO Ex. 16, DeRuntz Reb. at 4.

[321] *Id.* at JGD-2R at 6; TIEC Ex. 74.

[322] SWEPCO Ex. 20, Pfeifenberger Reb. at 17.

[323] Tr. at 391:7-11 (Ali Cross) (Feb. 25, 2020); TIEC Ex. 59.

[324] TIEC Ex. 59; ETEC/NTEC Ex. 2, Chiles Dir. at 15.

[325] Tr. at 23:14-24:17 (Smoak Cross) (Feb. 24, 2020); Tr. at 395:21-24 (Ali Cross) (Feb. 25, 2020).

Additionally, SWEPCO's economic analysis assumes a 60-year depreciable life for the potential gen-tie,[326] but only includes the first 25 years of revenue requirements in its economic analysis in the gen-tie cases.[327] The result of this assumption is a $154 million asset remaining on SWEPCO's books at the end of 2051 that is completely unaccounted for in the economic analysis.[328] The full cost of the gen-tie should be factored in because any potential gen-tie would be built solely for the purpose of connecting the Wind Facilities to load, and SWEPCO has not demonstrated that the gen-tie would have any purpose after the useful life of the Wind Facilities is over.

D. Economic Evaluation and Summary

1. Economic Evaluation

In addition to the problems with SWEPCO's modeling assumptions explained above, SWEPCO's evaluation of its model results is also flawed. SWEPCO compares cases in which it constructs the Wind Facilities to cases in which it does not.[329] SWEPCO treats both the projected costs and benefits of the Wind Facilities as equally certain in its analysis (using the same discount rate for each), and then surmises that if the NPV of the net benefits shown in its model runs is greater than zero, the projects should be approved.[330] But as Mr. Griffey testified, the "'invest when NPV of benefits > NPV of cost,' rule is only appropriate when (i) there is no uncertainty in the benefits, or (ii) either an investment is reversible at no cost or, if the investment is irreversible, then the investment decision has to be made now."[331] Neither condition is present here.

First, the projected costs of the Wind Facilities are substantially more certain than the benefits. The initial investment SWEPCO would make in the projects is, by SWEPCO's estimates,

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[326] Tr. at 463:10-12 (Torpey Cross) (Feb. 25, 2020).

[327] SWEPCO Ex. 8, Torpey Dir. at Ex. JFT-3 at 10.

[328] Tr. at 465:4-7 (Torpey Cross) (Feb. 25, 2020); TIEC Ex. 60. This exhibit shows a $280 million asset for both PSO and SWEPCO. SWEPCO's share is 55%, or $154 million.

[329] SWEPCO Ex. 8, Torpey Dir. at 17-19.

[330] TIEC Ex. 2, Griffey Dir. at 56.

[331] *Id.* at 54 (citing Investment Under Uncertainty, Dixit and Pindyck, Princeton University Press, 1994, at 6). Mr. Griffey is a former utility manager with extensive experience with utility planning techniques. *Id.* at 2-4.

approximately 90% of the total cost.[332] Thus, once SWEPCO makes the acquisition of the projects and places them in rate base, the costs to ratepayers will be substantially certain (other than for a gen-tie, which SWEPCO does not include in its primary cases).[333] The production cost savings that SWEPCO projects, however, are far less certain. These projected benefits turn on uncertain variables about future market conditions, such as the price of natural gas, congestion levels, and the generation mix in the SPP.[334] As Mr. Griffey summarized, "the investment costs are much more certain than projected energy benefits."[335] Yet SWEPCO's analysis treats the projected costs and benefits of the projects as equally risky.[336] Along these lines, Chairman Walker noted the problems in comparing relatively certain projected costs with uncertain projected benefits in explaining the Commission's decision to deny SWEPCO's Wind Catcher application:

> Chairman Walker: We know that the costs are likely, although some are projected, but the benefits are based on a lot of assumptions that are questionable.[337]

Second, SWEPCO's analysis fails to reflect the fact that—in the absence of a capacity need—it does not have to make an irreversible decision to acquire an economic resource now.[338] If SWEPCO acquires the Wind Facilities, it will be locked into a billion-dollar investment. And, if gas prices remain low, SWEPCO would have no ability to mitigate the costs of the Wind Facilities.[339] However, if SWEPCO does not acquire the Wind Facilities and gas prices escalate as SWEPCO projects, SWEPCO would still have the ability to take action to mitigate the impact on ratepayers, including by procuring renewable power in the future.[340] Thus, the risks of acting now versus waiting are not symmetric. SWEPCO's analysis ignores this risk asymmetry. Notably, in the Wind Catcher case, Commissioner D'Andrea challenged SWEPCO's assumption that building that project was the only way to deal with potential high energy prices in the future:

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[332] *Id.* at 54. Based on SWEPCO's estimates, the O&M costs would be 12% of total costs. *Id.* at 12. There will also be costs associated with the DTA that can fluctuate from projections, though these costs are of a much smaller magnitude than the initial capital cost of the Wind Facilities.

[333] *Id.* at 54. The cost of the initial investment to ratepayers can fluctuate to some degree based on changes to SWEPCO's rate of return in the future.

[334] *Id.*

[335] *Id.*

[336] *Id.*

[337] *Id* at 13 (quoting Transcript of PUCT Open Meeting on July 26, 2017 for Docket 47461 at 40).

[338] *Id.* at 54.

[339] *Id.*

[340] *Id.* at 55.

> Mr. Coe [for SWEPCO]: What we have here is a choice. We can certify this project or not. Are there risks associated with both choices? Yes, but the risk of not certifying the project is much greater. There's nothing that protects customers from the higher energy prices and gas prices; whereas on the low side the Company has provided many benefits...
>
> Comm. D'Andrea: This is something that keeps coming up. There are good things that can protect them. Right?...You know, if we denied [Wind Catcher], say, presumably you wouldn't just sit on your hands and say, whatever; we're stuck with natural gas now. We're not going to do anything. We're not going to build wind. Right?[341]

SWEPCO's economic evaluation rule (where NPV of net benefits > 0 = grant of CCN), suffers from the same flaws as in the Wind Catcher case. Accordingly, SWEPCO's evaluation understates the risks of the projects. As set forth below, however, due to the flaws in SWEPCO's modeling and its assumption, its application fails even under the simplistic decision criterion it employs.

2. Summary of Projected Costs and Benefits

As laid out in detail throughout this brief, SWEPCO's opaque and convoluted economic modeling is riddled with flawed assumptions that serve to overstate the projected benefits of the Wind Facilities. A precise evaluation of the economics of the Wind Facilities under reasonable assumptions cannot be made without running models with appropriate assumptions. Nevertheless, the record is clear that the Wind Facilities would in all likelihood increase costs for SWEPCO's ratepayers.

First and foremost, even taking all of SWEPCO's other assumptions to be true, the proposed Wind Facilities are projected to be underwater under current, reasonable expectations of the future price of natural gas. SWEPCO's low/no carbon scenario uses a levelized gas price of $4.50/MMBtu.[342] In its application, SWEPCO presented a breakeven gas price[343]—based on P50 NCF levels—of $3.67/MMBtu levelized over the 2021-2051 study period.[344] Recent NYMEX futures, which reflect market expectations for the future price of natural gas, showed a levelized

[341] *Id.* at 14 (quoting Transcript of PUCT Open Meeting on July 26, 2017 for Docket 47461 at 26).

[342] TIEC Ex. 1, Pollock Dir. at 21.

[343] SWEPCO Ex. 5, Bletzacker Dir. at 13-15.

[344] TIEC Ex. 1, Pollock Dir. at 21.

price of $3.10/MMBtu.[345] The EIA's 2020 Low Case, the scenario that the Commission found in the Wind Catcher proceeding to be the most accurate of EIA's cases—and that has since continued to be the most accurate EIA case—forecasts a levelized price of $3.46/MMBtu.[346] Simply adjusting SWEPCO's economic analyses to reflect these reasonable outlooks on the future price of natural gas eliminates all of the purported economic benefits.

Moreover, there are other flaws with SWEPCO's economic analysis that serve to overstate the projected benefits, including SWEPCO's undercounting of future wind penetration in the SPP, its failure to escalate congestion costs with power prices, its use of an unjustified 30-year useful life, and its inclusion of a speculative capacity benefit. Mr. Griffey demonstrated that, even conservatively adjusting for a handful of SWEPCO's erroneous assumptions reduces the expected NPV to ratepayers by $314 million NPV:

Figure 10[347]

Summary of Impacts of Issues For Low Gas/No CO2 Case ($ Millions)

	Individual Impact	Cumulative Impact	Adjusted Low Gas/No CO2 Case
Net Benefits in Low Gas/No CO2 Case	—	—	$236
Gas price forecast is too high	$(396)	$(396)	$(160)
Implied heat rates do not decrease	$(13)	$(409)	$(173)
Congestion is understated	$(49)	$(458)	$(222)
25-Year Useful Life	$(63)	$(521)	$(285)
Capacity benefit is speculative	$(29)	**$(550)**	**$(314)**

Mr. Griffey's quantification of the adjustments, which are cumulative and do not double-count the impacts,[348] was not challenged by SWEPCO in rebuttal testimony or at the hearing. The projected

[345] *Id.* These are NYMEX futures as of January 7, 2020. NYMEX futures in fact went down in between the time that Mr. Pollock filed his direct testimony and Mr. Bletzacker filed his rebuttal testimony. *Compare* TIEC Ex. 1B, Pollock Dir. at WP "Exhibit JP 1,3,4 Henry Hub Benchmarks, Implied Heat Rates, Futures Prices (Errata).xslx," Tab "Henry Hub Benchmarks" *with* TIEC Ex. 24 (HSPM).

[346] *Id.*

[347] TIEC Ex. 2, Griffey Dir. at 45.

[348] *Id.*

net benefits would be significantly lower if the Wind Facilities do not achieve SWEPCO's projected P50 energy production level.

This quantification assumes that the forecasted system congestion levels stay the same after 2029, and that they will thus increase along with the assumed increase in power prices. If it is instead assumed that SWEPCO will build a gen-tie, the negative impact is just over $50 million NPV greater, as shown in the following chart. The gen-tie adjustment is calculated by subtracting from net benefits the $233 million NPV revenue requirement SWEPCO estimated for the gen-tie and zeroing out congestion costs starting in 2027, consistent with SWEPCO's methodology for adjusting its non gen-tie cases into gen-tie cases.[349]

Cumulative Impact Assuming Gen-Tie

	Individual Impact	Cumulative Impact	Adjusted Low Gas/No CO2 Case
Net Benefits in Low Gas/No CO2 Case	—	—	$236
Gas price forecast is too high	$(396)	$(396)	$(160)
Implied heat rates do not decrease	$(13)	$(409)	$(173)
Gen-Tie revenue requirement net of removing congestion	$(102)	$(511)	$(275)
25-Year Useful Life	$(63)	$(574)	$(338)
Capacity benefit is speculative	$(29)	**$(603)**	**$(367)**

Notably, the foregoing quantifications do not include the impact of other flawed assumptions and unaccounted-for risks in SWEPCO's economic analysis, including:

- The risk associated with the energy production level, including the assumption in the P-levels that there would be no economic curtailment or force majeure, which impacts both the production cost savings and the

[349] *See supra* Section III.C.6. This calculation can be done using SWEPCO Ex. 8B, Torpey Dir. Workpapers at WP "Updated Torpey Errata Benefits Model Final.xslx." All of the cases shown in this workpaper can be changed from no-gen-tie cases to gen-tie cases by inputting the number "1" in cell B12 on tab "Inputs." The difference between the low/no carbon no gen-tie case ($236 million NPV net benefits) and the low/no carbon gen-tie case ($134 million NPV net benefits) is $102 million NPV.

projected PTC value. Every percentage point reduction in the NCF results in a $32.8 million NPV reduction in net benefits to the low/no carbon case.

- The known limitations of the PROMOD model and the failure to account for additional wind generation in the model, both of which result in congestion costs being understated. A reasonable proxy to quantify the impact of these issues is to make the 5% curtailment adjustment used by Mr. Pfeifenberger in the Wind Catcher proceeding, which would result in a $72 million NPV reduction in net benefits.[350]

- The risk that future renewable penetration in the SPP could be significantly greater than the low level that SWEPCO projects, which cannot be fully captured without rerunning SWEPCO's modeling.[351]

- The assumed cost of the DTA, including the risk that AEP will follow its current plans to build additional renewable projects for its regulated utilities that will further lower taxable income at the parent level and increase the DTA.[352]

- The risk that interim capital and O&M costs would be higher than projected, which SWEPCO assumed to be flat in real terms starting in year 10.[353]

- The assumptions that the gen-tie would be depreciated over sixty years rather than the remaining useful life of the Wind Facilities, and that it would completely eliminate all congestion costs.[354]

IV. Proposed Conditions (P.O. Issue No. 10, 19, 20, 24)

A. SWEPCO Proposed Conditions

SWEPCO has proposed a capital cost cap, a PTC eligibility guarantee, and a minimum energy production guarantee. These guarantees are subject to limitations that render them ineffectual in protecting ratepayers. Additionally, none of these guarantees address the most significant risk of the Wind Facilities: that natural gas and power prices will not continuously escalate at the level that SWEPCO projects. SWEPCO's proposed conditions cannot solve the problem that its proposed Wind Facilities are not economically justified.

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[350] *See supra* Section III.C.2.e.

[351] *See supra* Section III.C.2.b.ii.

[352] *See supra* Section III.C.5.

[353] *See supra* Section III.C.6.

[354] *See supra* Sections III.C.2.e, III.C.6.

1. Capital Cost Cap

The evidence in this case shows that the Wind Facilities are uneconomical based on SWEPCO's assumed capital cost, so applying a cap to that cost does nothing to improve the economics. Further, SWEPCO's proposed cost cap only applies to its initial capital investment of $1.09 billion.[355] It does not apply to any interim capital additions or ongoing O&M, which SWEPCO states will be necessary to maintain the 30-year expected life on which SWEPCO based its economic analysis. Moreover, it does not apply to the $443 million or more gen-tie that SWEPCO may build soon after the Wind Facilities go into service. The cost cap does nothing to rescue the Wind Facilities from their dismal economics. Nor does it provide assurance to ratepayers as to the total cost of the Wind Facilities and gen-tie.

2. Production Tax Credit Eligibility Guarantee

SWEPCO's proposed PTC eligibility guarantee makes customers whole if one of the Wind Facilities does not qualify for PTCs. However, the PTC eligibility guarantee has an exception for changes in law, and SWEPCO has made clear that it is unwilling to take on that risk.[356] Under SWEPCO's proposal, that risk would be left on the ratepayers. Further, SWEPCO offers no guarantee that the Wind Facilities will generate PTCs at the 44.01% capacity level SWEPCO assumes. And even the 38.1% guarantee is subject to force majeure and economic curtailments.

3. Minimum Production Guarantee

SWEPCO proposes to provide a guaranteed minimum production level for the first ten years of the Wind Facilities at the P95 level, which is an NCF of 38.1%. This guarantee, however, would not protect ratepayers for any of the years beyond 2031, nor would it provide any safeguard against force majeure or economic curtailments, which, as explained throughout this brief, are significant risks that were not accounted for in SWEPCO's economic analysis. Additionally, SWEPCO's proposed minimum production guarantee is based on a five-year average, with any make-whole payments coming after the five-year period, meaning that ratepayers could have to wait for up to four years in order to be made whole.[357] SWEPCO's energy production guarantee

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[355] SWEPCO Ex. 2, Brice Dir. at 16.

[356] Tr. at 152:24-153:19 (Brice Cross) (Feb. 24, 2020).

[357] Tr. at 43:16-44:21 (Smoak Cross) (Feb. 24, 2020).

provides very limited protection for ratepayers. Further, the evidence shows that the Wind Facilities are uneconomical at the P50 level, and a lukewarm guarantee at the P95 level does not change that.

B. Conditions Contained in Settlements Filed in Other Jurisdictions

This case should be decided based on SWEPCO's proposal in evidence in this proceeding. SWEPCO made clear in testimony that it was not modifying that proposal.[358] What it or its sister company have proposed or offered elsewhere is irrelevant to the Commission's decision in this case.

C. Staff/Intervenor Proposed Conditions

TIEC has proposed no conditions, and SWEPCO has made clear that the conditions proposed by Commission Staff and other intervenors are unacceptable.

VII. Rate Issues (P.O. Issue Nos. 21, 22, 25, 26, 27, 28, 29, 30, 31)

SWEPCO's application in this case should be denied. The Commission need not reach the issue of any rate treatments that might eventually result from granting approval of the Wind Facilities. Additionally, TIEC notes that this is a CCN case, not a rate case, and that making decisions regarding rate issues would be premature even if the Commission were to decide to grant the application.

IX. Conclusion

For the foregoing reasons, TIEC requests that the Commission deny SWEPCO's application and grant TIEC all other relief to which TIEC is entitled.

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[358] *Id.* at 45:24-47:10.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I, James Z. Zhu, Attorney for TIEC, hereby certify that a copy of the foregoing document was served on all parties of record in this proceeding on this 23rd day of March, 2020 by facsimile, electronic mail and/or first Class, U.S. Mail, Postage Prepaid.

/s/ James Z. Zhu
James Z. Zhu