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BEFORE THE

ARKANSAS PUBLIC SERVICE COMMISSION

IN THE MATTER OF THE APPLICATION OF SOUTHWESTERN ELECTRIC POWER COMPANY FOR APPROVAL TO ACQUIRE A WIND GENERATING FACILITY AND TO CONSTRUCT A DEDICATED GENERATION TIE LINE	**)**	**17-038-U**

REDACTED DIRECT TESTIMONY

OF

JOHN G. ATHAS

ON BEHALF OF THE GENERAL STAFF OF THE

ARKANSAS PUBLIC SERVICE COMMISSION

December 5, 2017

DOCKET NO. 17-038-U

REDACTED DIRECT TESTIMONY OF JOHN G. ATHAS

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I. INTRODUCTION

Q. Please state your name, position, and business address.

A. My name is John G. Athas and I work as a Principal Consultant for Daymark Energy Advisors (Daymark), 370 Main St, 3rd Floor, Worcester, MA 01608

Q. Please summarize your professional experience and qualifications.

A. I am an electric utility industry planning specialist with nearly 35 years of experience in areas including strategic planning, integrated resource planning, generation planning, economic and financial analysis, marketing, wholesale power market analysis and forecasting, electric power retail marketing, and rates and pricing.

I have served in my current role as a Principal Consultant at Daymark since February 2006. I also have served the firm in a management function as Treasurer. In addition to my responsibilities as a Principal consultant, I am currently the Vice President of Business Development. Since joining Daymark, my work has included several aspects of power systems planning and electric industry restructuring, including wholesale and retail market formation, generation asset valuation, resource planning, independent monitor involving wind generating capacity and resource adequacy studies, rates, contracting and retail power marketing.

Prior to joining Daymark, I worked as an independent consultant with Direct Energy developing retail electric business plans. From 2001 to 2005, I was an Associate Director of North American Electric Power at Cambridge Energy Research Associates (CERA). In that capacity I was responsible for market analysis and forecasting of power prices for the regions of the Eastern Interconnect for the US and Canada. Prior to joining CERA, I had various planning positions at Northeast Utilities Service Company (NU) on behalf of corporate NU and its regulated and competitive companies from 1981 through 2000. From 1987 to 1991, I was the Manager of Strategic Analysis and Long-Term Resource Planning at NU, where my responsibilities included conducting NU's Integrated Resource Planning, the analysis of the NU utility companies' competitive position, and various strategic planning efforts regarding diversification leading to the acquisition of HEC, Inc., an energy service company, and the formation of Charter Oak Energy, a competitive generation affiliate of NU. As part of my generation planning experience at NU I performed economic analysis on projects such as new generation as well as generation betterment projects. Also, during my time at NU I spent several years working as part of the budget committee working to review and recommend transmission, distribution and customer service related projects. Attachment JGA-1 contains a complete description of my qualifications.

Q. Please summarize Daymark and its business.

A. Daymark provides integrated policy, planning and strategic decision support services to the North American electricity and natural gas industries.[1] Daymark serves a diverse clientele from our offices in Worcester, Massachusetts and Portland, Maine by providing consulting services to organizations involved with energy markets, including renewable energy producers, private and public utilities, transmission owners, energy producers and traders, energy consumers and consumer advocates, regulatory agencies, and public policy and energy research organizations. Our technical skills include cost allocation, rates and pricing, power market forecasting models and methods, economics, management, planning, energy procurement, contracting and portfolio management, and reliability assessments. Our experience includes detailed analyses of energy and environmental performance of electric systems, economic planning for transmission and distribution, and market analytics.

Q. Have you previously testified before this Commission or others?

A. Yes. I submitted testimony in Docket No. 11-069-U regarding Entergy Arkansas, Inc.'s (EAI) application to acquire the KGen Hot Spring generation facility; in Docket No. 12-012-U regarding the Arkansas Electric

[1] Daymark Energy Advisors is the new name of the firm previously known as La Capra Associates. The name change occurred on November 9, 2015.

Cooperative Corporation's application to acquire the Hot Spring Plant near Malvern, Arkansas; in Docket No. 12-038-U evaluating EAI's application to designate certain wholesale base load as capacity available to serve EAI retail customers; in Docket No. 12-067-U regarding Oklahoma Gas and Electric's request for a temporary surcharge to recover costs from the Crossroads wind project; in Docket No. 13-033-U regarding Southwestern Electric Power Company's petition that certain renewable energy purchase agreements are prudent; in Docket No. 14-118-U regarding EAI's acquisition of the Union Power Station; in Docket No. 15-014-U regarding EAI's power purchase agreement with a renewable energy resource; and in Docket No. 16-060-U regarding EAI's Application for the Approval of Investment in Advanced Metering. A listing of my appearances is included in Exhibit JGA-2.

Q. On whose behalf are you appearing in these proceedings?

A. I am testifying on behalf of the General Staff (Staff) of the Arkansas Public Service Commission (Commission).

II. PURPOSE OF TESTIMONY

Q. What is the purpose of your testimony?

A. Staff retained Daymark to assist in the review of Southwestern Electric Power Company's (SWEPCO or Company) Application for approval to acquire a wind generation facility and to construct a dedicated generation

tie (Gen-Tie) line. Daymark's review of SWEPCO's Application included but is not limited to the cost / benefit analysis submitted.

Q. What information have you reviewed in preparing this testimony?

A. I reviewed the Application and the Direct Testimony and Exhibits of the SWEPCO witnesses, in particular those of Mr. Weber, Mr. Pfeifenberger, Mr. Bletzacker, Mr. Pearce, Ms. Hawkins, and Mr. Bradish as well as their workpapers. I also reviewed SWEPCO's responses to discovery requests issued by Staff and the Attorney General in this Docket. All discovery request responses cited in my testimony are included in my Direct Exhibit JGA-3.

I focused on the purchase price of the Wind Catcher generation assets, the costs and configuration of the Gen-Tie Line, the strategic fit that these assets have within the Company's latest Integrated Resource Plan (IRP), the soundness of the economic analysis in terms of assumptions and methodology, and the risks associated with the economics being dependent upon qualifying for the Production Tax Credit (PTC).

Q. Please summarize your conclusions and recommendations.

A. Based on the materials reviewed and analysis conducted to date, the Wind Catcher Project appears to have many positive attributes. SWEPCO has brought forward a solid option to deliver over 1,300 MW of wind

generation capacity to its system. The Wind Catcher Project appears well executed in terms of setting up the means to be in-service as swiftly as possible. However, at this stage in the proceeding, I am not yet able to offer a recommendation to the Commission as to whether it is in the public interest for SWEPCO to acquire the Wind Catcher Facility and associated Gen-Tie line as proposed in its Application. At this time, my conclusions and recommendations are as follows:

1. SWEPCO has not demonstrated that the Wind Catcher Project is among the least cost alternatives that would provide 1,330 MW of wind capacity for the SWEPCO system.
2. I recommend that SWEPCO supplement the record in its Rebuttal Testimony and provide analyses and testimony addressing its justification for acquiring the assets of the Wind Catcher Facility and associated Gen-Tie line compared to the Generic Wind Case as well as the bids received from the 2016 RFPs of SWEPCO and Public Service Company of Oklahoma (PSO).

With this additional information, I should be able to provide a recommendation to the Commission regarding whether the proposed purchase of the Wind Catcher Project and the associated Gen-Tie Line is in the public interest in my Surrebuttal Testimony.

III. PROJECT OVERVIEW

The Wind Catcher Facility

Q. Please describe the Wind Catcher Facility.

A. According to SWEPCO's Application, the Wind Catcher Facility will be a 2,000 MW wind generation facility located in Cimarron County and Texas County, Oklahoma. The Wind Catcher Facility will consist of 800 General Electric 2.5 MW wind turbine generators and will have 34.5 kV collection systems and 34.5 kV to 345 kV substations. The Wind Catcher Facility will interconnect into the Tulsa North Substation through a dedicated Gen-Tie line (together, I refer to the Wind Catcher Facility and the Gen-Tie line as the Wind Catcher Project).

The Wind Catcher Facility is expected to have a net capacity factor of 51%. Construction of the project began in 2016 and is expected to be complete during the third quarter of 2020.

The Wind Catcher Facility is being developed by Invenergy and is to be owned by States Edge Wind Holding I LLC, an Invenergy single purpose subsidiary.

Membership Interests Purchase Agreement (MIPA) with Invenergy

Q. Please describe the MIPA with Invenergy

A. On July 26, 2017, American Electric Power Service Company (AEPSC) acting on behalf of SWEPCO and PSO, both operating units within

American Electric Power Company, Inc. (AEP), entered into a Membership Interests Purchase Agreement (MIPA) with States Edge Wind Holding I LLC to acquire the Wind Catcher Facility. The closing of the transaction will occur after the project reaches Substantial Completion and all other closing conditions have been met.

Under the MIPA, SWEPCO will purchase 70% (1,330 MW) of the project and PSO will purchase the remaining 30%.

Gen-Tie Generation Interconnection Facilities

Q. Please describe the Wind Catcher Gen-Tie Line.

A. The Wind Catcher Gen-Tie Line is a dedicated 765 kV extra high voltage generation tie line. It will extend 350 to 380 miles and interconnect the Wind Catcher Facility into the PSO Tulsa North Substation.[2] As with the Wind Catcher Facility, the Gen-Tie Line will be jointly owned by SWEPCO and PSO with the same 70/30 percentage split. The AEPSC, acting on behalf of SWEPCO and PSO, has contracted with an engineering, procurement, and construction (EPC) contractor, Quanta Services (Quanta), to construct the Gen-Tie Line under a fixed price agreement. AEPSC has issued a number of Limited Notices to Proceed (LNTPs) to allow some preliminary work by Quanta to proceed. These have been

[2] Direct Testimony of Robert W. Bradish, p. 9.

issued to maintain the project timing so that construction is completed in time for commercial operation on December 31, 2020.

Q. What is the Installed Cost of the Wind Catcher Facility?

A. According to the testimony of Michael Bright, the total installed cost of the Wind Catcher Facility will be $2.902 billion.[3] Given the 2,000 MW nameplate capacity, this equates to an installed cost of approximately $1,451/kW.

Q. How does the installed cost of the Wind Catcher Facility compare to similar projects?

A. The installed cost of the Wind Catcher Facility is in line with similar projects in the region. According to the United States Department of Energy's Wind Technologies Market Report, installed costs for wind projects in the interior region in 2016 averaged $1,530/kW.[4] Therefore, the projected installed cost of the Wind Catcher Facility is slightly less than the installed cost of the average interior region project in 2016.

Q. How much does the Gen-Tie line add to the installed costs?

[3] Direct Testimony of Michael Bright, Southwestern Electric Company, July 31, 2017. Exhibit MLB-1
[4] U.S. Department of Energy. 2016 Wind Technologies Market Report. Page 51. https://energy.gov/sites/prod/files/2017/10/f37/2016_Wind_Technologies_Market_Report_101317.pdf.

A. According to the testimony of Brian Weber, the total costs of the Gen-Tie line are $1.624 billion. This adds approximately $812/kW to the cost of the Wind Catcher Project for a total cost of approximately $2,263/kW.

IV. SWEPCO INTEGRATED RESOURCE PLAN

Q. When was SWEPCO's most recent IRP filed?

A. SWEPCO's most recent IRP was filed with the Commission in Docket No. 07-011-U on December 1, 2015.[5]

Q. What is the role of wind generation in the IRP?

A. The preferred portfolio put forth in the IRP is to use renewables, especially wind, to reduce SWEPCO's reliance on solid fuel and natural gas generation and thereby enhance fuel diversity. When the IRP was filed, wind generation accounted for 7% of SWEPCO's energy mix. The IRP aims to increase this to 17% by adding wind capacity to offset the market share held by solid fuels, specifically coal.[6]

Q. How much nameplate wind capacity does the IRP propose to add to the SWEPCO system?

[5] http://www.apscservices.info/pdf/07/07-011-U_25_1.pdf.
[6] 2015 IRP. Page ES-7, lines 4-7, and figures ES-4 and ES-5.

A. The IRP proposed 200 MW of additional nameplate wind capacity in 2017, growing over time to 1,200 MW by 2032.[7]

Q. What is the rationale provided in the IRP to support these wind additions?

A. While not explicitly stated, the rationale for the additional wind as well as the other renewable additions seems to be primarily compliance with environmental regulations, specifically for air quality, greenhouse gas emissions, and the previously enacted Clean Power Plan, along with anticipated retirements of 528 MW of coal-fired and 700 MW of gas-fired generation units.[8]

Q. Does the IRP provide any economic analysis to support the additional wind?

A. No. SWEPCO did not cite any economic analysis done to support the proposed wind additions suggested in its IRP.

Q. Please give a brief overview of SWEPCO's IRP and how it relates to the Wind Catcher Project.

A. The IRP is intended to be a roadmap for SWEPCO's portfolio development going forward. The Wind Catcher Project is proposed as a means to achieve a portion of that portfolio development, namely the increased wind capacity stated in SWEPCO's preferred portfolio.

[7] SWEPCO's Wind Catcher Application, page 4-5.
[8] Integrated Resource Planning Report to the Arkansas Public Services Commission, 2015.

Q. What are the primary differences that you found between the IRP and the Wind Catcher Project Application?

A. The major difference seems to be the presence of a thorough economic analysis. The IRP states it would like to include additional wind in the SWEPCO portfolio; and while it mentions complying with environmental regulations as a rationale, it does not provide quantitative support that those additions are the most economic option. The Wind Catcher Project Application and supporting workpapers include thorough economic analysis intended to show that the Wind Catcher Project is a reasonable resource to meet the identified need.

Q. How much wind capacity is SWEPCO proposing to add through the Wind Catcher Project?

A. The Wind Catcher Project would add 2,000 MW[9] of nameplate wind capacity (1,900 MW delivered) to the AEP companies. SWEPCO's 70% share in the project would result in the addition of 1,400 MW of nameplate wind capacity and 1,330 MW of delivered wind capacity.

Q. What rationale does SWEPCO provide to reconcile both the difference in timing and in nameplate capacity between the Wind Catcher Project and the IRP?

[9] After transmission losses through the Gen-Tie Line, 1,900 MW of wind capacity is expected to be delivered to the Tulsa North Substation, Direct Testimony of Michael L. Bright p. 5.

A. SWEPCO's IRP proposed the addition of 1,200 MW of wind between 2017 and 2034. The Wind Catcher Project would result in the addition of 1,330 MW of wind by 2020, based on the anticipated in-service date.[10] SWEPCO also states that the accelerated timing of the project would allow the Company to delay the costs of adding additional natural gas capacity as well as obtain added benefit from the PTC.

Q. What are your final thoughts with regard to the IRP as it relates to the Wind Catcher Project?

A. Wind is an important element of SWEPCO's resource plan, based upon its most recent IRP. The benefits of wind are demonstrated in the thorough economic analysis done on the Wind Catcher Project. The additional capacity from the Wind Catcher Project when compared to the additional wind capacity proposed in the IRP does not seem unreasonable, and the timeline of the Wind Catcher Project is in line with SWEPCO's most recent IRP. All in all, the Wind Catcher Project is in line with SWEPCO's most recent IRP.

V. SUMMARY OF PROJECT BENEFITS

Q. Please summarize the forecasted benefits and costs of the Wind Catcher Project.

[10] Direct Exhibit JGA-3, SWEPCO Response to Staff Data Request APSC 4-7

A. Table I, featured below, was included in the testimony of Kelly D. Pearce and outlines the total net benefits of the Wind Catcher Project.[11]

Table I. Total SWEPCO Net Benefits of Project

Company Costs and Benefits	**SWEPCO Savings and Costs Total 2021 - 2045** (NPV $Millions)
1.Avoided Costs Benefits (Exhibit KDP-1 Ln1+Ln2+Ln3)	$3,973
2.Revenue Requirement of Wind Facility and Gen-Tie Line (Cost) (Exhibit KDP-1 Ln4 + Ln6)	($3,906)
3.PTCs including tax gross-up (Exhibit KDP-1 Ln5)	$1,873
4.**Net Customer Benefits**	**$1,940**

The Wind Catcher Project is estimated to generate $3.973 billion in avoided costs benefits and $1.873 billion from the PTC, including the tax gross-up. The projected revenue requirement for the Wind Catcher Facility and the Gen-Tie Line amounts to a cost of $3.906 billion. The estimated net customer benefit associated with the Wind Catcher Project is $1.940 billion, with an estimated $377 million of these savings flowing back to Arkansas retail customers. The value of $1.940 billion reflects the difference between the cost and benefits of the change-case scenario (Project Case) and a baseline scenario (Base Case) used in the

[11] Direct Testimony of Kelly D. Pearce, p. 7.

evaluation. All of the abovementioned values are NPV values expressed in 2020 dollars.[12]

Q. Do these Company costs and benefits seem reasonable?

A. Overall, the methodologies used to calculate the benefits seem reasonable, and therefore the avoided costs and revenue requirement values appear to be justifiable. These methodologies will be discussed in detail below. Since the avoided costs benefits value of $3.973 billion and the revenue requirement cost of $3.906 billion are essentially offsetting, the estimated value of the PTCs is critical to determining the value of the net customer benefits. Therefore, understanding how the economics of the project may vary due to changes to the PTC is important. I have conducted an analysis of the Wind Catcher Project's viability based on the different PTC qualification percentages, which will be discussed later in my testimony.

VI. DETERMINATION OF BENEFITS

Q. What are the components of the costs and benefits values displayed in Table I above.

A. The forecasted avoided costs (Line 1) is composed of estimated adjusted production cost (APC) savings, congestion and loss cost, and capacity value. The projected revenue requirement of the Project (Line 2) is

[12] *Id.*, pp. 6-7.

calculated from the revenue requirements of both the wind facility and the Gen-Tie Line. The forecasted value of the PTCs (Line 3) includes the tax gross-up.[13] As mentioned previously, these values reflect the difference between the cost and benefits of the Project Case and the Base Case. The costs and benefits derived from comparing the Project Case to the Generic Wind Case involve the same components, except the estimated capacity value is omitted and curtailment costs are added into the calculation.

Q. Please explain the scenarios used by the Company to evaluate the Wind Catcher Project's benefits.

A. The Company utilized both a baseline scenario (Base Case) where no new wind resource additions were assumed for SWEPCO and a change-case scenario featuring the project (Project Case). The difference between the two cases for the modeled period, 2021 to 2045, was then compared. In line with the 2015 IRP, additions of natural gas combined cycle units to SWEPCO's resources in both the Base Case and Project Case were assumed during the modeled period in order to maintain the 12% capacity reserve margin mandated by SPP.[14] Additionally, the Project Case was compared to a scenario (Generic Wind Case) where an equivalent 1,900

[13] *Id*., Direct Exhibit KDP-1, p. 1.
[14] *Id*., p. 9.

MW of generic wind resources was procured through power purchase agreements (PPAs) by the Company.

Q. What benefits did the Company utilize to analyze the net value of the Wind Catcher Project?

A. The Company utilized several different benefits such as APC Savings, additional congestion and loss savings, wind curtailment cost savings, and avoided/deferred capacity cost savings.[15] The Company also considered the benefits associated with the assumption that the facility qualifies for the full value of the PTC.

Q. How were the APC savings determined by the Company?

A. Forecasted total variable costs were used to estimate the APC savings and were tied to a MWh generation forecast for each SWEPCO generation unit. This forecast was created using the simulation model PLEXOS®. The PLEXOS® model determines forecasted generation output, costs, and revenues based on each unit's cost of energy, outages, and forecasted energy market prices.

PLEXOS® simulations were used to analyze all three cases annually for 2021-2045.[16] The model compared the total hourly energy output of SWEPCO's generation resources with SWEPCO's hourly

[15] Direct Testimony of Johannes P. Pfeifenberger, p.7.
[16] *Id*., p. 24.

internal load energy requirement.[17] Therefore, the APC featured the cost of production less the cost of purchases and the revenues from additional off-system sales (OSS).

Q. How were the cost savings from reducing congestion and transmission losses determined?

A. The Company estimated savings by utilizing the PROMOD-based hourly congestion and marginal loss spreads between wind sites and SPP's AEP zone load in 2020 and 2025, as well as the simultaneous wind generation outputs.[18] Transmission losses were evaluated by using the marginal pricing spreads between generation and AEP zone load and the loss components tied to purchases imported into the AEP zone. Monthly-level congestion and loss charges were calculated and entered into the PLEXOS®-based cost-of-service calculations. The cost savings associated with congestion and losses were calculated as the difference between the costs for each individual case.

Q. How were the wind curtailment costs calculated?

[17] Direct Testimony of Kelly D. Pearce, p. 9.
[18] *Id*., p. 24.

A. The contemporaneous monthly average load price from PROMOD was used with an assumed 5% curtailment of total annual generic wind production. This curtailment occurred in the nighttime hours of March, April, October, November, and December. The additional benefit associated with the project is derived from the difference between the curtailment costs of the Generic Wind Case and the Project Case. Monthly curtailment charges were integrated into the PLEXOS®-based cost-of-service calculations.[19]

Q. How were capacity cost savings evaluated by the Company?

A. The incremental value of capacity for the Wind Catcher Project was forecasted by the Company based on the 12% reserve margin required by SPP. The Project Case enables SWEPCO to defer investment in a combined-cycle unit from 2026 to 2030 and avoid adding a second combined-cycle unit in 2038 through the end of the model period, 2045.[20] The Wind Catcher Project's capacity was valued at $269 million on an NPV basis.

[19] *Id*.
[20] *Id*., p.12.

An additional valuation of the avoided capacity was conducted based on the AEP Fundamentals Forecast[21] of SPP capacity costs. In order to be conservative, the Company assumed a zero value of the incremental capacity from the Project until 2026, which is the first year in which SWEPCO has a forecasted need for additional capacity. Beginning in 2026, the Company assumed that 15% of the Wind Catcher Project's delivered capacity would be the SPP capacity credit for the wind facility, or 199.5 MW. The wind facility is estimated to generate an economic value to the Company of $146 Million in NPV from 2026 to 2045.

Q. Please provide further detail regarding the Generic Wind Case methodology.

A. For the Generic Wind Case, the Company modeled 1,900 MW of wind resources with SWEPCO receiving a 70% allocation of the output similar to the Project Case. Because the congestion caused by adding 1,900 MW of wind without a Gen-Tie Line in the same area of Oklahoma as the Wind Catcher Project is unrealistic, the General Wind Case was modeled as being distributed and sourced from different delivery points in western Oklahoma, Kansas, Texas, Nebraska, and Missouri.[22] In total, there were

[21] According to the Direct Testimony of SWEPCO witness Bletzacker, at page 5, the Fundamentals Forecast is a long-term, weather-normalized commodity market forecast made available to all AEP operating companies. It is often referenced for purposes such as fixed asset impairment accounting, capital improvement analyses, resource planning, and strategic planning.
[22] *Id*., p.16.

24 wind locations within the five states that were utilized in the PROMOD simulations.[23] The energy price used in the Generic Wind Case was a year one purchase price of $18.62/MWh with an annual escalation of 2.25% and was based on reported estimates from the U.S. Energy Information Agency's 2017 Annual Energy Outlook. The price is based on the assumption that the PTCs are captured before expiration. Additionally, an assumed $90 million contingency cost was included.

Comparing the benefits and costs of the Generic Wind Case to the Project Case, the Project Case is estimated to generate approximately $686 million more in customer savings than the Generic Wind Case. While the Generic Wind Case has similar benefits to the Project Case and avoids the cost of the Gen-Tie, its APC is higher than the Project APC because of the purchase cost of wind. The Generic Wind Case also generates notable congestion in SPP without the Gen-Tie line and will incur curtailments by SPP.[24]

Q. Please explain the components of the revenue requirement of the Wind Catcher Project.

[23] Direct Testimony of Johannes P. Pfeifenberger, p.15.
[24] *Id.*., p. 17.

A. The revenue requirement of the Wind Catcher Project includes financing cost, depreciation expense, operation and maintenance (O&M) expense, and various other expenses, net of the PTC.[25]

Q. What is the total estimated installed capital cost of the Wind Facility?

A. The total installed capital cost estimated for the Wind Facility is approximately $2.902 billion. This value includes the purchase price, owner's cost, other estimated costs, and contingency. The owner's cost was estimated to be approximately $22.6 million and includes the direct cost for project management, engineering and construction, personnel and expenses, legal and regulatory costs, O&M mobilization and telecommunications, and IT support and equipment. Other costs and adjustments that can contribute to the cost of the wind facility include interconnection costs associated with the Tulsa North Substation, potential generator and load bank costs tied to the late completion of the Western 765 kV Generation Substation, O&M building construction costs, costs tied to Collection System changes, O&M mobilization costs, GridLiance operating fee, and capital spare parts costs.[26]

Q. Explain the components of the projected O&M costs for the wind facility.

[25] Direct Testimony of Kelly D. Pearce, p. 13.
[26] Direct Testimony of Michael L. Bright, pp. 17-18.

A. The O&M activities required to support the wind facility include on-site O&M support, remote operation/monitoring, and major maintenance activities. The on-site O&M support include daily O&M activities such as routine inspections, equipment monitoring, acknowledgement and troubleshooting of equipment alarms, preventive maintenance, and resetting of relays and devices. Remote operation and monitoring of equipment tasks will include following facility output dispatch instructions, removing or placing wind turbine generators in service and monitoring equipment performance and issues. Major maintenance activities include blade replacements, switchbox repairs, and gearbox repairs. Other O&M costs include day-ahead production forecasting services, IT/telecom costs, land lease payments, taxes, and facility contract administration costs.[27]

Q. Does SWEPCO's estimate of the project's benefits include any anticipated tax breaks or credits?

A. Yes, the analysis assumes that the project qualifies for the full value of the PTC.

Q. Please briefly explain qualification for the PTC.

A. There are two methods that a taxpayer may use to establish that construction of a qualified facility has begun: (1) A taxpayer must establish the beginning of construction by beginning physical work of a significant

[27] *Id*., pp.19-21.

nature; or (2) by meeting the safe harbor requirement.[28] Physical work of a significant nature refers to work performed by the taxpayer or another party under binding written contract with the taxpayer that is considered integral to the activity of the facility.[29] The Safe Harbor requirement states that, in general, construction of a facility will be considered as having begun, if (1) the taxpayer pays or incurs 5% or more of the total cost of the facility, and (2) thereafter, the taxpayer makes continuous efforts to advance towards completion of the facility. Whether a taxpayer makes continuous efforts to advance the facility will be determined by the relevant facts and circumstances.[30] The amount of PTC is subject to phase out depending on when construction is assessed to begin, that is, when the project is assessed to have met one of the above standards.

Q. What is the current phase-out schedule of the PTC?

A. Any facility that begins construction after December 31, 2016, and before January 1, 2018 will receive 80% of the total value of the PTC. Any facility the construction of which begins after December 31, 2017, and before January 1, 2019 will receive 60% of the total value of the PTC. Any facility

[28] IRS Notice 2013-29
[29] *Id.*
[30] *Id.*

the construction of which begins after December 31, 2018, and before January 1, 2020 will receive 40% of the total value of the PTC.[31]

Q. How is SWEPCO qualifying for the full PTC?

A. Construction of the Wind Catcher Facility began before the December 31, 2016 cut-off date for qualifying for the full PTC. SWEPCO asserts that the Company has been continuously working on the facility to such an extent that it satisfies the physical work test.[32]

Q. Has SWEPCO done any analysis of the risk to PTC revenues for not satisfying the continuous effort standard or for losses of PTC revenues due to permitting or contractor delays?

A. SWEPCO did not prepare an analysis with regard to satisfying the continuous effort standard.[33] They did perform risk analysis with regard to delays in permitting and construction delays within the context of their MIPA contract with Invenergy.[34]

Q. What protections are there to SWEPCO's PTC revenues?

A. The IRS lays out a list of excusable disruptions to construction that will not affect the PTC revenues for the project. These include such things as

[31] U.S. Code §45(b)(5)
[32] Direct Exhibit JGA-3, SWEPCO Response to Staff Data Request APSC 5-3
[33] *Id.*
[34] Direct Exhibit JGA-3, SWEPCO Response to Staff Data Request APSC 5-6

delays in permitting and interconnection.[35] Additionally, the MIPA contract with Invenergy details compensation remedies to SWEPCO as to make up for potential loss of the PTC revenue due to inexcusable construction delays.[36]

Q. Has SWEPCO done any analysis to determine the viability of the project if they were to only qualify for a percentage of the PTC or to not qualify for the PTC at all?

A. No, SWEPCO has not prepared such an analysis.[37]

Q. Have you done such an analysis?

A. Yes. Using the cashflow analysis provided in Pearce's Final Wind Catcher Model, I was able to examine the viability of the project if it were to qualify for 80% of the PTC, 60% of the PTC, 40% of the PTC and 0% of the PTC.

Q. Please briefly explain the aforementioned analysis and the primary conclusions

A. The analysis was done by taking the above percentages of the total value of the PTC as it is applied in the NPV calculations and determining the new NPV of the project. This was done across the four scenarios SWEPCO witness Pearce addresses in his Exhibits KDP-1, KDP-2, KDP-

[35] IRS Notice 2016-31
[36] Direct Exhibit JGA-3, SWEPCO Response to Staff Data Request APSC 5-6 & Exhibit JFG-2: Membership Interests Purchase Agreement
[37] Direct Exhibit JGA-3, SWEPCO Response to Staff Data Request APSC 5-2

3, and KDP-6. These are a base case, a low natural gas price case, a high natural gas price case and a comparison to the generic wind case.

From this analysis I found that the project has positive benefits regardless of the PTC amount if either the baseline or high natural gas price scenarios playout. Additionally, the project has positive benefits in the low natural gas scenario unless the project receives zero PTC.

Q. How do changes in the percentage of the PTC affect the net benefits of the Project?

A. Table II below shows the effects of different PTC percentages on the net benefits calculated from the Project Case Less Base Case scenario.

Table II. Comparison of NPV in Project Less Baseline Case with Different PTC Percentages

2020 NPV	100% PTC	80% PTC	60% PTC	40% PTC	0% PTC
1. Adjusted Production Cost Savings	$4,079	$4,079	$4,079	$4,079	$4,079
2. Congestion and Loss Cost	($375)	($375)	($375)	($375)	($375)
3. Capacity Value	$269	$269	$269	$269	$269
4.Wind Facility Revenue Requirement	($2,689)	($2,689)	($2,689)	($2,689)	($2,689)
5. Production Tax Credits	$1,873	$1,498	$1,124	$749	$0
6. Gen-Tie Line Revenue Requirement	($1,217)	($1,217)	($1,217)	($1,217)	($1,217)
7. Total Benefits/(Cost)	**$1,940**	**$1,565**	**$1,191**	**$816**	**$67**

The table shows how the total net benefits value is significantly affected by the percentage of the PTC.

Q. Based on the information displayed in the PTC comparison tables above, how important is the PTC percentage to the economics of the project?

A. The tables clearly show that the PTC is integral to ensuring that the project generates a net benefit. The net benefit value is critical to helping offset the cost of the Gen-Tie Line and therefore capturing the full value of the PTC as soon as possible is key to making this project economically viable.

Q. In your opinion, given your analysis, how likely is it that SWEPCO would qualify for less than 80% of the PTC making the Generic Wind Case more economical?

A. It seems unlikely that the project would fail to qualify for less than 80% of the PTC. The project began construction of a significant nature prior to the December 31, 2016 cut-off date and the IRS includes the safety-net of excusable disruptions to construction that would protect the project's PTC if needed.

Q. Can you please state any changes to the PTC in the new proposed tax bill?

A. The new tax bill proposes taking out escalation of the PTC and putting it back to its original value of 1.5 cents/kWh.[38]

Q. How does this proposed change to the PTC affect the economics of the Wind Catcher Facility?

A. Because the facility started construction in 2016, these proposed changes would have no effect on the PTC for the Wind Catcher Facility.

Q. What do you conclude about the effect of the PTC on the Project's benefits?

A. Given our analysis of the project, the benefits seem robust to potential decreases of the PTC. Additionally, the measures SWEPCO has taken to ensure against any potential loss of the PTC seem reasonable in their robustness and the additional remedies for any loss as they are laid out in the MIPA contracts seem sufficient to protect ratepayers from any burden.

Sensitivities

Q. Has the Company provided any sensitivity analysis to show if the economics in favor of the Wind Catcher Project are robust given future uncertainties?

[38] AWEA. 2017. House reneges tax deal, puts American jobs at risk. Retrieved from: https://www.awea.org/HouseTaxProposal2017.

A. Yes. The Company has performed a sensitivity analysis where the benefits are based upon analysis incorporating high and low natural gas price forecasts. In addition, a sensitivity analysis was performed to test the value of the project as compared to a case where the Company obtains wind resources through purchase power agreements priced with generic assumptions.

Q. What is the Generic Wind Case?

A. "The Company considered the feasibility and economics of attempting to capture the benefits of the PTCs on the same scale as the Project, without the Gen-Tie Line. To compare this generic wind case (Generic Wind Case) with the Project, the Company modeled 1,900 MW of wind resources with SWEPCO receiving the same 70% allocation of the output. However, the congestion created by adding 1,900 MW of wind in the same area of the Oklahoma Panhandle as the Project, but without the Gen-Tie Line, is not realistic given the expected magnitude of congestion that would be created. Therefore, the Company modeled the Generic Wind case as being distributed and sourced from several delivery points in western Oklahoma, Kansas, Texas, Nebraska and Missouri. For the PROMOD cases used to determine LMP price impacts, 7,509 GWhs of annual output were modeled based on data from the National Renewable Energy Laboratory. For the PLEXOS® modeling, which determines the value of the wind resources, the output was increased to 7,991 GWhs of annual output, as described by

Company witness Pfeifenberger. The Project's forecasted average annual output is 8,722 GWhs delivered to PSO's existing Tulsa 18 North 345 kV substation after reducing for Gen-Tie losses."[39] "The Company assumed a year one purchase price of $18.62/MWh with an annual escalation of 2.25%."[40]

Q. How did the Company evaluate the effect natural gas prices may have on the estimated costs and benefits of the Project?

A. The Company modeled the impacts of both low and high natural gas price forecasts on the Project. These prices were used in the 2020 and 2025 PROMOD models to estimate the SPP energy market prices. These SPP market prices were then interpolated and extrapolated for each year featured in the study and entered into the PLEXOS® model.[41]

Q. How do the cost and benefits of the project change as a result of the low and high natural gas price forecasts?

A. The Company estimated that the lower natural gas price forecast lowers the Project's net benefit by 18% while the high natural gas price forecast increases the benefits by 21%.[42] Table III below was created from Mr. Pearce's Exhibits KDP-1, KDP-2, and KDP-3 and compares the 2020 NPV costs and benefits of the projects across the Project Case less the Base

[39] Direct Testimony of Kelly D. Pearce p. 16 lines 4-19
[40] *Id.,* p. 16 lines 20-21
[41] Direct Testimony of Kelly D. Pearce, p. 15.
[42] *Id*.

Case, Project Case-Low Natural Gas less Base Case-Low Natural Gas, Project Case-High Natural Gas less Base Case-High Natural Gas, and Project Case less Generic Wind Case scenarios.

Table III. Comparison of NPV of all Project Scenarios

2020 NPV	Project Less Baseline Case	Project Less Baseline Case with Low Natural Gas Scenario	Project Less Baseline Case with High Natural Gas Scenario	Project Less Generic Wind
1. Adjusted Production Cost Savings	$4,079	$3,727	$4,544	$1,699
2. Congestion and Loss Cost	($375)	($371)	($429)	$768
3. Capacity Value	$269	$269	$269	$161
4.Wind Facility Revenue Requirement	($2,689)	($2,689)	($2,689)	($2,599)
5. Production Tax Credits	$1,873	$1,873	$1,873	$1,873
6. Gen-Tie Line Revenue Requirement	($1,217)	($1,217)	($1,217)	($1,217)
7. Total Benefits/(Cost)	**$1,940**	**$1,592**	**$2,351**	**$685**

As Table III shows, the total net benefits increase to $2.351 billion under the high natural gas scenario while the net benefits decrease to $1.592 billion under the low natural gas scenario.

However, when the project is compared to SWEPCO's Generic Wind Case which purchases wind power via PPAs, the Project Case is still beneficial but at a lesser amount of just under $700 million.

Q. How do changes in the percentage of the PTC affect the net benefits of the Project less Generic Wind?

A. Table IV below displays the impact of varying percentages of the PTC on the net benefits calculated for the Project Case less the Generic Wind Case.

Table IV. Comparison of NPV in Project Less Generic Wind with Different PTC Percentages

2020 NPV	100% PTC	80% PTC	60% PTC	40% PTC	0% PTC
1. Adjusted Production Cost Savings	$1,699	$1,699	$1,699	$1,699	$1,699
2. Congestion and Loss Cost	$768	$768	$768	$768	$768
3. Capacity Value	$161	$161	$161	$161	$161
4.Wind Facility Revenue Requirement	($2,599)	($2,599)	($2,599)	($2,599)	($2,599)
5. Production Tax Credits	$1,873	$1,498	$1,124	$749	$0
6. Gen-Tie Line Revenue Requirement	($1,217)	($1,217)	($1,217)	($1,217)	($1,217)
7. Total Benefits/(Cost)	**$685**	**$310**	**($64)**	**($439)**	**($1,188)**

As with Table II, this table shows how important the PTC percentage is to determine the total net benefits of the project. However, if the Project was only able to qualify for 60% of the PTC, it would not be beneficial to pursue the Wind Catcher Project and bring this significant amount of wind energy into the system earlier than anticipated by the IRP.

Q. After reviewing the Wind Catcher Project's cost and benefits, do you have any concerns regarding the methodology and the Company's calculations?

A. No. The analysis is reasonable but not as comprehensive as I would have expected for such a large investment.

Q. Do the results of the economic analysis mean that the SWEPCO has identified and proposed the least cost project for the addition of wind capacity?

A. No. SWEPCO has not demonstrated that the Wind Catcher Project is among the least cost alternatives to meet the identified need. The Company has only provided information that the Project Case could be beneficial when compared to the no additional wind Base Case and a Generic Wind Case, nothing more.

Q. Are there better options than the proposed Wind Catcher Project?

A. I do not know that for sure. However, reviewing the economics of the project provided in Table I reveals that the value of the Wind Catcher Project is presented to be about $1.9 billion. Table I also reflects that this net value is essentially created by the benefits created from the PTCs. This information also demonstrates that in the analysis period the present value of the revenue requirement from the Gen-Tie Line is $1.2 billion. The cost of this line is a major reason why the value does not capture a greater portion of the Avoided Cost Savings Benefits. This means that alternatives to the Gen-Tie Line require additional consideration.

Q. Hasn’t the economic analysis presented shown that the Wind Catcher Project is “Least Cost”?

A. No, the Company has only demonstrated that the Project, including the Gen-Tie Line is lower in cost than two alternatives.

Q. Has SWEPCO provided an analysis that compares the Wind Catcher Project to other options in the market today?

A. No.

Q. What basis did SWEPCO put forward in the record that they have confidence that this project is competitive in today's market?

A. In the Application, SWEPCO refers to its "recent market experience"[43] regarding the acquisition of wind resources. In this, SWEPCO is referring to two RFPs issued in 2016, one by SWEPCO and one by PSO.[44] SWEPCO added that the results of the bidding caused the Company to reassess the potential for accelerated wind development.[45] SWEPCO was soliciting bids for projects to be sold by the bidder, either completed or under development. PSO was seeking bids for Renewable Energy Purchase Agreements (REPAs) for 20-years.

Q. Did SWEPCO pursue expanding its wind resource acquisition with a large number of the respondents to the RFPs?

A. I have not found anything on the record that indicates such activities.

[43] Direct Testimony of Venita Mccellon-Allen p. 14 line 8
[44] *Id.,* lines 9-17
[45] *Id*., lines 11-13

Q. Did SWEPCO offer comparisons of the Wind Catcher / Gen-Tie project to the bids received in the RFPs?

A. No, the results of the RFPs were only added to the record in responses to information requests by the Attorney General.[46]

Q. Have you examined the information provided on the RFPs and the summary of the results?

A. Yes.

Q. How does the Wind catcher / Gen-Tie Project compare with the bids received from the SWEPCO RFP on a cost per kilowatt basis?

A. I mentioned earlier that the cost of the project, including both the wind facilities and the generation interconnection Gen-Tie costs is $2,263/kW. The short list of bids selected by SWEPCO has costs ranging from [redacted] to [redacted].[47] [redacted]

Q. How do these bids on the short list compare to the Wind Catcher Project on a levelized cost of electricity (LCOE) basis?

A. The LCOE of the proposed project compares favorably. I estimate the LCOE for the Wind Catcher / Gen-Tie project, when the Gen-Tie capital

[46] Direct Exhibit JGA-3, SWEPCO Responses to AG 2-9 and 2-10
[47] Direct Exhibit JGA-3, SWEPCO Response to AG 2-9, Confidential Attachment 2

costs are included, to be $18.74/MWh. This is significantly higher than the $12.09/MWh.[48] My estimated LCOE of the Wind Catcher / Gen-Tie project of $18.74/MWh is [redacted].[49]

Q. How do you reconcile the higher capital cost of the Wind Catcher / Gen-Tie Project and yet lower LCOE?

A. I have not been able to do that analysis. SWEPCO has not made the details of the RFP analysis part of the record at the time of my testimony being filed.

Q. Is SWEPCO basing its case that the Wind Catcher / Gen-Tie project is economic for ratepayers on the basis of the LCOE comparisons with the results of the SWEPCO RFP?

A. No, SWEPCO only provided the RFP information in response to information requests from the Attorney General's office.[50]

Q. What is the total amount of wind nameplate capacity for the projects selected on the short list of the SWEPCO RFP?

A. [redacted].[51]

[48] Direct Testimony of Pearce p. 14 lines 5-6
[49] Direct Exhibit JGA-3, SWEPCO Response to AG 2-9, Confidential Attachment 3
[50] Direct Exhibit JGA-3, SWEPCO Response to AG 2-9
[51] Direct Exhibit JGA-3, SWEPCO Response to AG 2-9, Confidential Attachment 3

Q. Did you compare the Wind Catcher Project to the results of the PSO RFP?

A. Yes. I compared the LCOE of the REPA bids received and short listed by PSO to those of the project. The LCOEs of the REPA bids range on the PSO short list from [redacted] to [redacted].[52] My estimate of $18.74/MWh LCOE for the Wind Catcher / Gen-Tie project [redacted].

Q. Has SWEPCO provided any analysis comparing the project to the bids received in the two RFPs?

A. No.

Q. What is the total amount of wind nameplate capacity for the projects selected on the short list of the PSO RFP?

A. Approximately [redacted],[53] making a total of [redacted] of nameplate wind project capacity, was potentially available from the short list of projects.

Q. What do you observe from the discussion above after your examination of the summary of results from the two RFPs?

[52] Exhibit JGA-3, SWEPCO Response to AG 2-10, Confidential Attachment 3
[53] Exhibit JGA-3, SWEPCO Response to AG 2-10, Confidential Attachment 3

A. While SWEPCO has not shown a specific analysis of the project economics compared to the bids received in the RFPs or other current projects, the comparisons I have made indicate that the project might compare favorably to an aggregation of the projects bid into the RFPs. To enable an assessment of the Wind Catcher Project against the two RFPs, SWEPCO should supplement the record in its Rebuttal Testimony to include analyses and testimony comparing the Wind Catcher Project to the results of the two RFPs. SWEPCO should address how that information justifies that its proposed acquisition of the Wind Catcher Project is a reasonable selection in light of other market opportunities. SWEPCO should provide analyses and supporting testimony specifically comparing the cost of the Wind Catcher Project with the results of the two RFPs and the Generic Wind Case.

VII. SUMMARY OF FINDINGS AND CONCERNS

Q. What are your key findings resulting from your review of the Wind Catcher Project application for approval?

A. My findings are as follows:

1. SWEPCO has brought forward a solid option to deliver over 1,300 MW of wind generation capacity to its system. The Wind Catcher Project appears well executed in terms of setting up the means to be in-service as swiftly as possible.

2. The acquisition of wind generation assets at a fixed price protects ratepayers from potential capital cost overruns often associated with energy projects.

3. The use of an external highly qualified firm to construct the over 300-mile Gen-Tie line under a fixed price and performance incented EPC contract with Quanta, also minimizes risks of higher than anticipated capital costs and/or project delays. The impact of any delay would be at least partially mitigated through penalties that result from any loss of benefits.

4. The economic analysis presented by SWEPCO has been limited in that it only compares the Wind Catcher Project to a no new wind Base Case and a case with like amounts of Generic Wind capacity utilizing purchase power agreements. SWEPCO has not yet demonstrated that the acquisition price of the wind generation or the cost or configuration of the Gen-Tie Line have been 'market tested' with alternatives.

5. The methodology that SWEPCO has used in determining the comparative economics of the Wind Catcher Project is reasonable as it accounts for the impact on production costs, congestion costs, curtailment, and deferral of alternative generation investment.

6. The methodology utilized only one metric, 25-year net present value (NPV), leaving unknown the trade-offs being made on the rates throughout the 25-year horizon.

7. The economic analysis serves the purpose of showing some value of the Wind Catcher Project after the project was conceived rather than demonstrating the analysis and considerations that SWEPCO, PSO, and AEPSC had before them to choose this project configuration as one of the best ways to add over 1,300 MW of wind capacity to the SWEPCO system.

8. The economic testing that was provided and performed by SWEPCO only considered a limited amount of analysis of the project value given an uncertain future, by running sensitivities only to higher and lower price projections for natural gas. No other risk analysis was presented.

9. The Wind Catcher Project could be a reasonable option to add 1,330 MW of wind generation to SWEPCO's generation portfolio, but SWEPCO has not yet provided sufficient justification that the Wind Catcher Project is a reasonable resource to meet the need identified in its IRP.

10. SWEPCO is lacking analysis that demonstrates that the Wind Catcher Project is a reasonable resource to meet the need identified in its IRP when compared to the wind resources bid into the SWEPCO and PSO 2016 RFPs and the Generic Wind Case.

VIII. CONCLUSIONS AND RECOMMENDATIONS

Q. Please summarize your conclusions and recommendations.

A. Based on the materials reviewed and analysis conducted to date, my conclusions and recommendations are as follows:

1. SWEPCO has not demonstrated that the Wind Catcher Project is among the least cost alternatives available in 2017 that would provide 1,330 MW of wind capacity for the SWEPCO system.

2. I recommend that SWEPCO supplement the record in its Rebuttal Testimony and provide analyses and testimony addressing its justification for acquiring the assets of the Wind Catcher Facility and associated Gen-Tie line compared to the Generic Wind Case as well as the bids received from the 2016 RFPs.

Q. Does this conclude your testimony?

A. Yes.

CERTIFICATE OF SERVICE

I, Dawn Kelliher, hereby certify that a copy of the foregoing has been served on all parties of record by electronic mail and/or first class mail, postage prepaid, this 5th day of December 2017.

/s/ Dawn R. Kelliher
Dawn R. Kelliher