
Attachment B: Peak View Wind Project

Pursuant to Decision No. C15-1182
May 31, 2019



Executive Summary

The Peak View Wind Project is a 60 MW wind facility located in Huerfano and Las Animas counties in southern Colorado. 2018 was the second full year of production for the Peak View Wind Project. Black Hills Energy (“Company” or “Black Hills”) is pleased to report that the operational availability for the facility exceeded expectations with an availability factor of 96.46%. The Company experienced below average wind production in 2018; therefore, per the terms of a settlement agreement by Decision No. C15-1182 (“Decision”) in Proceeding No. 15A-0502E (“Settlement Agreement”), the Company normalized 2018 wind production as outlined by the performance assessment tool. Per Paragraph 27 of the Settlement Agreement, the Company will have a presumption of prudence for the recovery of costs if its calculated cost per MWh is lower than the PPA cost of \$43.29. The Company achieved a normalized price of \$42.05/MWh which is below the 2018 PPA \$43.29 cost per MWh, as reflected in Attachment B – Revenue Requirement.

Peak View Wind Project Procedural Overview

The Commission granted the Company’s request for a Certificate of Public Convenience and Necessity (“CPCN”) to purchase and own the Peak View Wind Project consistent with the terms of the Settlement Agreement in the Decision. This Decision approved the Settlement Agreement that was joined by Black Hills, Staff of the Colorado Public Utilities Commission, the Colorado Office of Consumer Counsel, the Colorado Energy Office, Western Resource Advocates, Invenergy Wind Development Colorado LLC, the Board of Water Works of Pueblo, the Fountain Valley Authority, and the Rocky Mountain Environmental Labor Coalition (collectively, the Settling Parties).

Settlement Agreement

Below are a few key elements of the Settlement Agreement as they relate to the Annual Peak View Revenue Requirement:

- The Company will not place the project into base rates before the end of 2026. Instead, the Company will collect the revenue requirement of the project through a combination of the Energy Cost Adjustment (“ECA”) rider, the Transmission Cost Adjustment (“TCA”) rider, and the Renewable Energy Standard Adjustment (“RESA”).
- The avoided costs of the Peak View Wind Project, which represent the costs “avoided” due to the displacement of fuel and purchased power by the wind energy, were locked down on a \$/MWh basis through 2026. For 2018, this locked down avoided cost value is \$35.13 per MWh.
- The Company will collect the avoided cost amount through a combination of the ECA and TCA. Any incremental costs above the avoided cost will be charged to the RESA account. Since the RESA is already a 2% charge on customers’ monthly bills, this treatment ensures that customers are not paying more from a monthly bill perspective with the addition of the Peak View Wind Project as compared to not having the project.
- Beginning in calendar year 2018, the Company will perform a standalone pro-forma revenue requirement analysis for each of the first ten calendar years of commercial operation of the Peak View Wind Project. Early in the following calendar year, the

Company will conduct an analysis of actual costs and perform a true-up for any under or over-recovery of the Peak View Wind Project costs.

- The Company will report the calculated revenue requirement and rate recovery treatment each year in the Annual RES Compliance Report.
- Attachment 1 of the Settlement Agreement sets forth the confidential Peak View PPA costs and the estimated Peak View Wind Project costs. This Peak View PPA price provides a useful benchmark reflecting the risk premium that a private developer included in a PPA bid price. Black Hills will have a presumption of prudence for the recovery of the Peak View Wind Project costs if its calculated cost per MWh is lower than the confidential Peak View PPA cost per MWh. If the Peak View Wind project cost is higher than the Peak View PPA cost, Black Hills will be required to show the reason(s) for the difference in order to recover that difference in cost and will bear the burden of establishing the prudence of any costs above the Peak View PPA cost prior to recovery.
- If the actual production from the Peak View Wind Project is less than the Settlement Agreement projection of energy production provided, then Black Hills shall be allowed to normalize the actual wind generation measured for the previous year for determining its annual true-up.
- In determining wind normalization, the normalization factor shall be calculated utilizing the software product WindFarm©, Release 4, from ReSoft Limited. The Company shall, at the completion of each calendar year, reanalyze the Peak View Wind project using WindFarm© and the same model inputs with the exception that Black Hills will input the actual recorded meteorological data from the prior year to determine the normalized projected energy production, without degradation. The Settling Parties agree that this approach is consistent with the fundamental regulatory principle that the utility is entitled to the opportunity to recover prudently incurred costs while providing a performance evaluation tool and appropriate benchmark for the Peak View Wind Project annual costs. The normalization technique provides a mechanism to evaluate the performance and costs of the Project. Additionally, the Settling Parties agree that implementation of this approach is consistent with the Commission’s authority under C.R.S. §40-5-101.

2018 Actual Revenue Requirement after Weather Normalization

Time Period	Actual Avoided Costs (ECA)	Actual Incremental Cost/(Benefit) (RESA)	Actual Total Costs	Annual Gross Production (MWh)	Normalized Production (MWh)	Cost per MWh
January 1, 2018 – December 31, 2018	\$8,157,342	\$1,600,186	\$9,757,528	212,652	232,050	\$42.05

Peak View Wind Project's actual production was 6,159 MWh (gross) less than originally forecasted. As such, the Company utilized the performance assessment tool detailed in the Settlement Agreement to normalize wind production. Per Paragraph 43 of the Settlement Agreement, the normalization factor shall be calculated utilizing the software product WindFarm©, Release 4, from ReSoft Limited. Black Hills shall reproduce the analysis using the same model inputs with the exception that actual recorded meteorological data for the prior year will be used to determine the normalized projected energy production without degradation. In addition, Black Hills is allowed to normalize the actual production for actual wind conditions by multiplying the production by the calculated ratio, if wind production is less. For calendar year 2018, Black Hills did perform the normalization as Peak View Wind Project's annual production was 6,159 MWh less than originally forecasted amount from Proceeding No. 13A-0445E.

Using the same model inputs and actual recorded meteorological data, Black Hills normalized 2018 net wind production to be 232,050 MWh. Please note that the same model inputs considered were electrical efficiency, availability, and environmental shutdowns. The Company hired a 3rd party consultant, Black & Veatch, to independently review and verify the performance modeling methodology used by the Company. For 2018 production, Black & Veatch concluded that the method used by the Company to calculate relative project performance is sound. Refer to Attachment B – Black & Veatch Performance Review for the memorandum from Black & Veatch. Based on the weather normalization calculated, the Company achieved a \$42.05/MWh based on total 2018 costs of \$9,757,528 and normalized wind production of 232,050 MWh. Since the cost per MWh is below the 2018 PPA price of \$43.29, filed with the Settlement Agreement in Proceeding No. 15A-0502E, the Company has achieved the presumption of prudence for 2018 cost recovery.

Conclusion

Black Hills achieved the presumption of prudence for 2018 Peak View Wind Project cost recovery. Black Hills' normalized 2018 wind production, coupled with \$9,757,528 of annual costs, achieved a \$42.05/MWh price, which is \$1.24 below the 2018 PPA price of \$43.29.



MEMORANDUM

Black Hills Energy
Peak View Wind
Project Performance Review

B&V Project 402332

30 May 2019

To: Matt Jester, Black Hills Energy

From: Steve Block, Black & Veatch

CC: Don Stahl, Black Hills Energy
Michael Fisher, Black & Veatch

Summary

Black & Veatch reviewed the detailed performance modeling methodology and results for the Peak View Wind Farm reported by Black Hills Energy for the production year 2018 [1]. This memorandum builds on the previous review of the production year 2017 [2] analysis. The modeling reported in [1] was based on project horizontal wind speed (HWS) measurements acquired by nacelle anemometry mounted on the wind turbines (WTGs). These model results were compared to actual project performance reported in monthly operating reports [3].

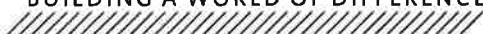
Black & Veatch previously undertook a similar review for the production year 2017 [2], in which model results were compared to predictions based on correlations between actual project performance and relevant long-term reference wind data sources [2].

The Peak View Modeling report for production year 2018 [1] concludes that wind conditions in that year were below pre-construction long-term estimates prepared by Invenergy, and that project performance exceeded expected performance based on the observed wind conditions for this year.

The modeling approach appears a reasonable way to characterize project performance in a given year relative to pre-construction expectations. Correlation of actual production with independent sources of long-term reference wind data, reported in [2], indicated the correct relationship between production for 2017 and long-term estimates.

Black Hills Peak View Performance Modeling Review

Black & Veatch reviewed the Peak View Performance Modeling report and results for the 2018 test year [1]. As previously reported in [2], the modeling approach uses WindFarm, a wind farm development and performance modeling tool that is typically used to characterize expected performance during project development. A typical workflow for pre-construction analysis with a tool like WindFarm is outlined in Figure 1.



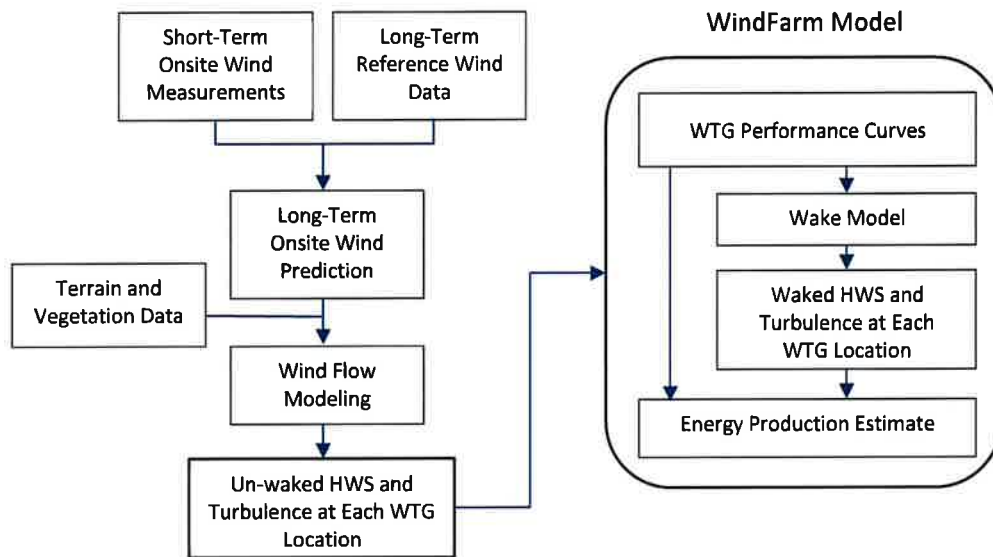


Figure 1. Typical Wind Modeling Process

The WindFarm model expects un-waked (free stream) HWS characteristics as input. It then calculates the wakes caused by each WTG and applies the effect of these wakes to the free stream HWS to calculate total expected wake deficit and wake-adjusted HWS at each WTG location. These wake-adjusted HWS values are then used to calculate energy production at each WTG location. Additional losses such as electrical and availability are then applied to convert the results to net energy production.

The Performance Modeling approach used in the Black Hills study follows the circled right-hand side of the process above but feeds the WindFarm model with HWS values measured by the individual WTG weather stations and recorded by the plant SCADA system rather than modeled HWS values. The WTG level data still includes wake deficits caused by the rest of the WTGs in the wind farm and therefore represents waked HWS characteristics, rather than un-waked (free stream) winds.

The figures reported in [1] for production year 2018 show the model output has correctly processed the wake losses to avoid possible double counting. The WindFarm energy yield output used in [1] as the base yield to which losses are applied does not include topographic or wake losses (Figure 7 in [1]) and the losses applied to model a net output for comparison with the observed actual net production also do not include topographic or wake losses, as these are both already represented by the HWS values used by the model as input to calculate the base yield.

Black & Veatch therefore concludes that the method used by Black Hills to calculate relative project performance and wind normalization for the production year 2018 is sound in principle, and Black & Veatch considers the results of the Black Hills analysis to be valid.

Conclusions

- The modeling approach adopted for production year 2017 that was discussed in [2] has been adjusted to avoid double counting of wake losses when modeling net production figures for production year 2018.
- The modeling approach is considered reasonable and sound.
- The modeling results are considered to be valid.

References

- [1] Black Hills Energy, *Peak View Modeling – Production Year 2018*, Rev. 0, 16 January 2019
- [2] Black & Veatch, *Black Hills Energy Peak View Wind Project Performance Review*, B&V Project 400500, Memorandum, 29 November 2018
- [3] Peak View Wind Energy, *Monthly Operating Report*, December 2018

