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REBUTTAL TESTIMONY OF

FRANCIS R. PUYLEART, ELIZABETH A. KIRBY, AND BARTHOLOMEW A. MCMANUS

Witnesses for Bonneville Power Administration

SUBJECT: GENERATION INPUTS BALANCING RESERVE FORECAST **Page**

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Section 1: Introduction and Purpose

Q. Please state your names and qualifications.

A. My name is Francis R. Puyleart, and my qualifications are contained in BP-22-Q-BPA-30.

A. My name is Elizabeth A. Kirby, and my qualifications are contained in BP-22-Q-BPA-19.

A. My name is Bartholomew A. McManus, and my qualifications are contained in BP-22-Q-BPA-45.

Q. Please state the purpose of your testimony.

A. The purpose of our testimony is to respond to the Direct Testimony of JP01 regarding the Balancing Reserve Quantity Capacity Forecast.

Section 2: Balancing Reserve Quantity Capacity Forecast

Q. Did any parties raise issues with the Balancing Reserve Quantity Capacity Forecast in the Initial Proposal?

A. Yes. Joint Party 01 (JP01) argues that BPA only needs to hold enough balancing reserve capacity to comply with the North American Electric Reliability Corporation (NERC) Reliability Standard BAL-001-2. According to JP01's analysis, this results in a balancing reserve capacity requirement of 117.81 megawatts (MW) incremental reserves (INC) and 227.50 MW decremental reserves (DEC) compared to the 705 MW INC and 852 MW DEC balancing reserve requirement we set forth in our Initial Proposal. Tilghman & Goggin, BP-22-E-JP01-01, at 25.

Q. How do you respond to JP01's proposed methodology?

A. We disagree strongly with JP01's proposed methodology. Our proposed methodology reflects the realities of how BPA actually operates its balancing authority area (BAA), whereas JP01's proposed methodology does not. BPA's operational decisions are not rate case issues, but it is necessary to explain these operational parameters in order to show why JP01's proposed methodology is so problematic.

JP01 cherry-picks a single requirement from one reliability standard, Requirement 2 from BAL-001-2, to base its analysis on, but ignores other requirements. In addition, JP01 fails to consider the effect that allowing Area Control Error (ACE) to deviate will have on system frequency for the entire Western Interconnection. In short, JP01's proposed methodology would both jeopardize reliability and lead to frequent use of Operational Controls for Balancing Reserves (OCBR) or potentially other measures impacting all resources in the BAA to maintain reliability.

Q. Please explain how JP01 ignores other requirements from NERC Reliability Standard BAL-001-2.

A. JP01 claims that they "calculate the actual level of balancing reserves BPA needs to comply with the relevant NERC standard," and that "[their] analysis indicates that BPA could still fully comply with NERC's BAL-001-2 standard." *Id.* JP01's analysis only considers Requirement 2 of BAL-001-2, the Balancing Authority Area Control Error Limit (BAAL), but did not consider Requirement 1 of BAL-001-2, Control Performance Standard 1 (CPS1). The chart provided in JP01's own testimony shows CPS1 limits plotted in blue, and those limits are much stricter than those of BAAL. *Id.* at 27. Therefore, if we adopted JP01's methodology, BPA would be unable to comply with the stricter CPS1.

Q. Please explain the impacts JP01's proposed methodology would have on system frequency.

A. JP01 asserts that BPA can hold a small amount of balancing reserves because (1) the BAAL set under NERC Reliability Standard BAL-001-2 is so lenient when frequency is close to 60 hertz (Hz) and (2) the Western Interconnect frequency is nearly always close to 60 Hz. *Id.* These assumptions are incorrect; the main reason Western Interconnection frequency is nearly always close to 60 Hz is because most balancing authorities (BAs) operate more stringently than just meeting minimal compliance with the BAAL requirement. For instance, many BAs in the region impose their own limit on top of the BAAL in the near-60 Hz range to avoid having to correct for extremely large ACE when frequency drifts away from 60 Hz. Also, as JP01 points out, the BAAL portion of the BAL-001-2 standard requires 100 percent compliance, so BAs generally aim to both return well below the limits set by BAAL and well before the 30-minute timer runs out. *See id.* at 26.

Further, JP01's proposed methodology rests on the assumption that error in the BPA BAA has limited impact to system frequency. BPA's impact on Western Interconnection frequency normally ranges between 800 MW/0.1 Hz and 1000 MW/0.1 Hz. For instance, if BPA had an area control error between -800 MW and -1000 MW, frequency would shift down to 59.9 Hz, resulting in a much tighter ACE limit when error in the BAA is high. This relationship of high error (and thus high ACE) and tighter ACE limit, not reflected in JP01's analysis, would result in a much higher reserve requirement to ensure 100 percent compliance with the requirement. In fact, BPA previously reflected its expected frequency impact and operational control mechanism for BAAL in its balancing reserve study and, as noted by JP01, found much more modest reserve reductions than those calculated in JP01's analysis. *Id.* at 29.

Thus, to appropriately calculate the BAAL, it is necessary to reflect the expected shift in frequency due to error in the BAA.

Q. Is there anything else you would like to add regarding JP01's proposed methodology?

A. Yes, it is worth emphasizing that BAs are responsible for maintaining system reliability, and while performance standards inform BAs on their ability to do so, it is up to each BA to determine how best to ensure reliability. As far back as 2010, BPA moved to controlling reserve deployments based on compliance with BAAL, participating in the Western Electricity Coordinating Council (WECC) reliability-based control (RBC) field trial until the official implementation of the BAAL requirement in BAL-001-2 (though BPA maintained its planning standard-based reserve requirement). However, as of the summer of 2018, BPA no longer operates on "BAAL control" for various reasons, including reliability concerns and operational impacts, and has moved back to its previous control mechanism ("tight control"), under which we exceed both requirements of BAL-001-2 (BAAL and CPS1). The purpose of the balancing reserve capacity forecast is to produce a forecast that most accurately reflects the realities of BPA's system, including both the expected error and the way in which BPA operates to correct that error. If BPA adopted JP01's methodology, BPA could not operate its BAA in accordance with its operational practices.

Q. Are there additional flaws in the methodology presented by JP01?

A. Yes. JP01's proposed methodology also fails to account for several factors that BPA includes in its analysis. These factors include: (1) changes to generation and load in the BPA BAA for the BP-22 rate period; (2) changes to scheduling practices for the BP-22 rate period; (3) impacts of different weather regimes on the variability of load and solar and wind generation; and (4) corrections for known irregularities in the historical data.

First, JP01's methodology only uses raw historical data and fails to model changes in generation and load for the rate period, including the changes in solar and wind generation capacity. Modeling of generation needs to include both the removal of historical generation that is no longer part of the BPA BAA and modeling of new generation in the BPA BAA. The impacts of these changes would be felt in all aspects of JP01's analysis, altering the historical values of BPA's ACE, balancing reserves deployed and system frequency. BPA captures all of these impacts on generation and load through implementation of the modeling methodologies. *See* Generation Inputs Study, BP-22-E-BPA-06, at 8-19. BPA forecasts 200 MW solar and 470 MW wind generation to come online by the end of the BP-22 rate period, above and beyond the historical generation captured in the data set. *See* Generation Inputs Study Documentation, BP-22-E-BPA-06A, Table 2.1. Furthermore, BPA accounts for load growth (or decline) through scaling of the historical load. Generation Inputs Study, BP-22-E-BPA-06, at 18-19. All of these changes to the topology of the BPA BAA have influential impacts on the variability BPA will experience in the rate period and need to be accurately accounted for in the balancing reserve capacity forecast.

Second, JP01's analysis fails to account for the changes in scheduling behaviors for the BP-22 rate period. The historical data reflects solar and wind scheduling elections that will not be available in BP-22, including all persistence scheduling elections and BPA's solar "matrix" scheduling option. *See* Fredrickson *et al.*, BP-22-E-BPA-29, at 8. BPA's methodology allows BPA to remove these obsolete scheduling practices, substituting the proper scheduling behaviors and/or more accurate proxies. In addition, BPA's methodology allows for BPA to properly model the BP-22 load scheduling practices that BPA anticipates for the rate period. *See* Generation Inputs Study, BP-22-E-BPA-06, at 19-20. Absent the changes implemented by BPA to address future scheduling practices, JP01's historical dataset inaccurately portrays the variability forecasted for the BP-22 rate period.

Third, JP01 suggests relying on just a single year of historical data. JP01 asserts that a large amount of wind generation left the BPA BAA in December 2017 and July 2018, likely reducing the amount of required balancing reserves. Tilghman & Goggin, BP-22-E-JP01-01, at 29. What JP01 fails to consider is a significant portion of that generation participated in the Customer Served Generation Imbalance program, under which reserves were self-supplied, making the impact to reserves upon their departure minimal. Thus, the earlier five years should not be dismissed on that basis. The wide range of values produced by JP01's methodology over the six-year period highlights why a multi-year data set is necessary to calculate the required balancing reserve capacity. Focusing on a single year of data fails to capture multiple seasons of varying weather regimes, climatological phenomenon, and seasonal fluctuations, including all of their impacts on the time-synchronized variability of load and generation of all types in the BAA. BPA's use of six full years of historical data captures all of these variations.

Lastly, JP01 failed to properly correct for irregularities in the historical data. These irregularities include periods of OCBR generation limitations, oversupply management, and contingency reserve deployments. These irregularities impact ACE, frequency and balancing reserves deployed to various degrees. Impacts of these irregularities would be difficult to accurately remove from ACE and frequency data (data points which are used by JP-01 and not used in BPA's methodology). BPA's methodology accounts for these impacts by correcting periods of irregularities at the resource level, dramatically increasing the accuracy of BPA results. Generation Inputs Study, BP-22-E-BPA-06, at 9-17.

Q. *How do you respond to JP01's assertion that its proposed methodology has been used in other rate cases? Tilghman & Goggin, BP-22-E-JP01-01, at 30-31.*

A. Both cases cited by JP01 ended in black box settlements. While we have no reason to question that Mr. Goggin advocated for this methodology in other rate cases and it appears the settled rate decreased from what was initially proposed, we cannot tell whether those cases actually adopted JP01's proposed methodology or any portion of it. Of note, PacifiCorp's initial proposal, which JP01 claims used a similar methodology, resulted in an INC balancing reserve estimate of 654 MW, significantly higher than the 117 MW suggested by Mr. Goggin, and on a system with similar levels of load and generation. *PacifiCorp*, FERC Docket No. ER17-219-000, Tariff Filing, Attachment D, Ex. No. PAC-14, at 31, Table 3 (Oct. 28, 2016).

Q. *Did JP01 point out any other issues with your Initial Proposal?*

A. Yes. JP01 also asserts that we made the following errors in our proposed methodology: 1) arbitrary use of the 99.7 percent planning standard; 2) failure to improve wind forecast accuracy over time; 3) failure to properly account for times of OCBR or oversupply limitations; 4) assumption of a perfect correlation between a future wind plant and existing wind plants; 5) failure to account for improved wind plant technology; 6) failure to account for the diversity benefits of joining the EIM; and 7) including the cost of all power purchases in the capacity cost charged to Generation Inputs. Tilghman & Goggin, BP-22-E-JP01-01, at 33-45.

Q. *How do you respond to JP01's assertions regarding BPA's use of the 99.7 percent planning standard for calculating balancing reserve needs?*

A. JP01 argues that the 99.7 percent planning standard is no longer needed because under NERC Reliability Standard BAL-001-2, BPA can exclude more deviations without violating the BAAL for more than 30 minutes. *Id.* at 34-35. As stated previously, JP01's narrow focus on compliance with Requirement 2 of BAL-001-2 is flawed, because it does not account for CPS1 and other realities of operating a BAA.

Moreover, BPA sets reserves using the 99.7 percent planning standard to maintain system reliability and comply with NERC standards, while limiting the need to use reliability tools such as OCBR. As part of the TC-20 settlement, BPA established Schedule 10 to its Tariff, which provided for a Balancing Reserve Capacity Business Practice to forecast the capacity needed to provide generator balancing services. The Balancing Reserve Capacity Business Practice provides the 99.7 percent planning standard for the calculation of balancing reserve capacity, and establishes the use of OCBR "to manage balancing error events not covered by the 99.7 percent planning standard." Balancing Reserve Capacity Business Practice § C.1, *available at* https://www.bpa.gov/transmission/Doing%20Business/bp/tbp/Balancing-Reserve-Capacity-BP.pdf. OCBR provides physical relief of balancing error on the BPA system, while allowing resources to save costs and BPA to hold less reserves to maintain reliability and compliance. Holding less than the 99.7 percent planning standard would subject customers to larger and more frequent use of OCBR.

Q. How do you respond to JP01's assertion that your methodology failed to account for improved wind forecast accuracy over time?

A. We do not see any direct evidence provided by JP01 showing that improved wind forecasts justify making any adjustments for this rate period. As an initial matter, we must correct JP01's claim that "BPA's assumed wind forecast accuracy for the FY 2022-23 rate period will be based on actual wind forecast accuracy nearly a decade earlier." Tilghman & Goggin, BP-22-E-JP01-01, at 35. The wind forecasts used in BPA's balancing reserve capacity forecast were produced in the proceeding hour for the given hour of the forecast, so the forecasts used represent the forecasting methodology used at that given point in history. For example, while forecasts for the first hour of the six-year data set represent the forecasting methodology used in October 2013, forecasts for the last hour of the six-year data set represent the forecasting methodology used in September 2019 (two years prior to the start of the forecast rate period and only six months prior to when the balancing reserve capacity forecast analysis was run).

As to JP01's claims that our analysis did not account for improvements in wind forecasting accuracy, we do not see any evidence of such improvements at this time. JP01 does not point to any specific improvements or explain how we should incorporate forecasting improvement into our analysis. JP01 cites, without explanation, a paper from the National Renewable Energy Laboratory (NREL), as an example. *Id.* at 36, n.64. Upon review of this paper, BPA does not agree that it shows relevant improvement from the forecast model addressed in the paper. Interestingly, the paper compared a baseline and a proposed forecast methodology applied to BPA's aggregate wind fleet, analyzing results for the months of April 2016, July 2016, October 2016, and January 2017. Tilghman & Goggin, BP-22-E-JP01-01-AT02, at 104. The paper itself notes that "in general, small improvements [in error metrics] are seen in winter and fall but some degradations are noticeable in spring and summer." *Id.* If we focus specifically on the forecast errors displayed in the paper associated with the one-hour out forecasts (as are used in BPA's balancing reserve capacity forecast study), we see inconsistent results with an improvement in one month, virtually no changes in two months, and degradation in the other month.

Q. While you state there is no evidence of wind forecasting accuracy improvements at this time, could there be improvements in the future?

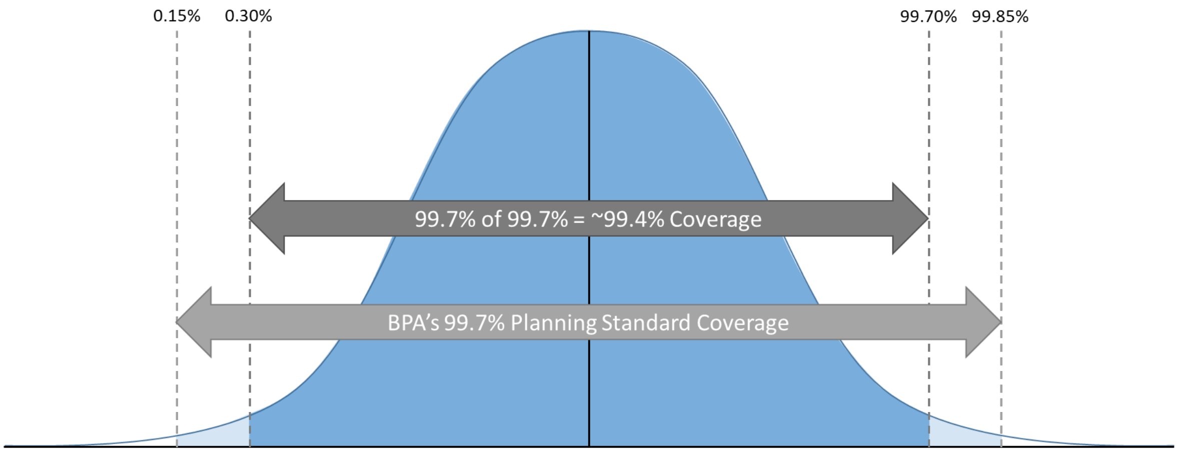
A. Yes, of course. Technology and techniques are always improving, and there may be changes to forecasting methodology over the length of our rate case data sets that could impact the balancing reserve calculation. BPA is always open to considering updates to its methodology, and working with its wind forecasting vendor on the feasibility of reflecting forecast improvements in BPA's balancing reserve capacity forecast study.

Q. *Do you agree with JP01 that you did not properly account for times of OCBR or oversupply limitations?*

A. No. JP01 argues that BPA should not replace times of OCBR or oversupply limitations with estimated wind data because BPA will use these tools in the future, and the altered output of wind generation captured in the historical data more accurately reflects future wind generation. Tilghman & Goggin, BP-22-E-JP01-01, at 36-37. However, if BPA did not replace these periods with estimated wind generation, it would not capture the full variability of wind, and planned reserves would thus not meet the 99.7 percent planning standard. *See* Puyleart *et al.*, BP-22-E-BPA-24, at 13-14.

In accordance with the Balancing Reserve Capacity Business Practice, BPA uses the 99.7 percent planning standard to establish the balancing reserve capacity requirement, and uses OCBR to manage balancing error events not covered by the 99.7 percent planning standard. For instance, considering the impacts of OCBR, the 99.7 percentile of an already mitigated data set with 0.3 percent outliers discarded is approximately 99.4 percentile coverage of original unmitigated data. As a result, 99.4 percentile coverage would result in more frequent OCBR events of increased magnitude, impacting all customers of the BPA BAA. Figure 1 below illustrates the impact of JP01's proposal regarding OCBR data mitigation would have on BPA's planned reserves.

Figure 1: Standard bell curve representing BPA's 99.7 % planning standard coverage and the reduced coverage of discarding 0.3 % outliers twice to the same data set.



Conversely, oversupply pushes wind generation below forecasted output, creating significantly more error in the wind generation than would occur from its unaltered output, which would cause BPA's balancing reserve forecast to exceed the 99.7 percent planning standard. Thus, failing to mitigate for OCBR and oversupply generation limitations in the dataset would result in BPA failing to provide the planning standard as established.

JP01's own proposal recognizes the need to correct data for OCBR and oversupply events. JP01 removes a period of OCBR and oversupply from their analysis as "[i]t appears that the *inc* reserve deployment indicated in the data coincided with a large curtailment of wind generation due to oversupply mitigation and [OCBR] limits." Tilghman & Goggin, BP-22-E-JP01-01, at 32. While JP-01 identifies the period of data based on a large deployment of balancing reserves, they justify removing and replacing the data due to BPA's OCBR and oversupply impacts.

Q. *What about JP01's assertions about correlating future wind plants with existing wind plants? Do you agree?*

A. No. JP01 claims that "BPA's assumption [that two wind plants are perfectly correlated] overstates the correlation between the output of two wind plants, and thus understates the reduction in total wind fleet variability from adding new geographically diverse wind resources." *Id.* at 37. JP01 fails to justify its claim although it tries to support it by citing a paper from the NREL, quoting the following passage:

> A common error [in wind and solar integration studies] is to scale the output of an existing generator to represent the expected output of a larger fleet. This greatly overstates the variability of wind and likely overstates the variability of solar . . . It is similarly inappropriate to simulate a new wind plant simply by time delaying or advancing the output of an existing plant based on prevailing wind speed and direction.

Id. at 38 (quoting M. Milligan *et al.*, NREL Cost Causation and Integration Cost Analysis for Variable Generation, 27 (2011) ("Milligan Paper")).

We agree that using a single plant scaled to fleet size does not capture geographic diversity, which is, in fact, part of the reason BPA developed both the wind and solar data synthesis methodologies used in BPA's balancing reserve capacity forecast. However, we do not agree that it is inappropriate to simulate a new plant by the time-shifting of an existing plant. BPA found that the *Milligan Paper* provides no evidence in support of this claim. In fact, the *Milligan Paper* cites another NREL publication that compares two plants 200 kilometers (km) from each other, which finds high correlation when one plant is time-shifted relative to the other. Wan, Y.H., *Wind Power Plant Behaviors: Analyses of Long-Term Wind Power* Data, at 25 (2004) ("*Wan Paper*"). The *Wan Paper* goes on to state, "[m]eteorologists can predict how fast a weather front travels and when it will reach a certain point. With this knowledge and knowledge of the wind power plant characteristics, the output of the downwind plant can be predicted from the output power of the upwind wind power plant." *Id.* We believe this analysis undercuts the *Milligan Paper's* claim.

JP01 also references another publication, asserting that "50 miles (approximately

80 kilometers) is sufficient to reduce two wind plant's' hourly variability correlation to less than 0.2." Tilghman & Goggin, BP-22-E-JP01-01, at 38 (*citing* H. Holttinen *et al.*, *Design and Operation of Power Systems with Large Amounts of Wind Power: Final Report, IEA WIND Task 25, Phase Three 2006-2008*, at 25 (2009) ("*Holttinen Paper*")). Review of the *Holttinen Paper* reveals, however, that the figure presented does not include any time-shifting, and thus lacks any direct comparison to BPA's methodology.

Regardless of the academic publications cited by JP01, our analysis of correlations used in the BP-22 balancing reserve capacity forecast yields high correlations in all cases. There are four future wind plants analyzed in BPA's BP-22 balancing reserve capacity forecast. As a reminder, BPA uses three years of 10-minute mesoscale[1] wind speed predictions across an approximately 2 km granularity grid produced by NREL and 3TIER (a forecasting company now part of Vaisala), shifting them in time at various intervals, to determine the most highly correlated existing plant to each of the future plants at an optimal time shift. Generation Inputs Study, BP-22-E-BPA-06, at 9-11. In analyzing the mesoscale wind speed information, the analysis found existing plants with a wind speed correlation of 1.0 when shifted by 0 minutes for two of the future plants, 0.95 when shifted by 10 minutes for one of the future plants, and 0.91 for the last plant when shifted by 10 minutes, and each of these four future sites is located between 12 and 27 kilometers from the corresponding highest correlated existing plant. BPA considers these values to indicate substantial correlation, demonstrating that the outputs within hour to be extremely coupled at the associated optimal time lags.

Further, while we cannot compare the mesoscale correlations of these plants to the actual output correlations, as the four plants do not yet exist, we can consider

[1] An intermediate scale, especially that between the scales of weather systems and of microclimates, on which storms and other phenomena occur.

another similarly situated group of three plants for comparison. The North Hurlburt, South Hurlburt, and Horseshoe Bend wind plants sit at distances of 8 km to 21 km. In Table 1 below, we see that high correlations based on the mesoscale wind-speed analysis correspond with correlations between actual one-minute plant outputs that are nearly as high. While JP01 claims that "[e]ven two wind plants located several dozen miles from each other have very low correlation in the sub-hourly output variability . . . ," Tilghman & Goggin, BPA-22-E-JP01-01, at 38, our analysis shows high levels of correlation, as shown in Table 1 below.

Table 1: Correlation Comparison for select BPA Wind Projects

	Distance (km, approx.)	Mesoscale Data Corr.	Real Output Corr.
N. Hurlburt – S. Hurlburt	8	1.0 (0 min. shift)	0.9644 (0 min. shift)
N. Hurlburt – Horseshoe Bend	27	0.9966 (0 min. shift)	0.9210 (1 min. shift)
S. Hurlburt – Horseshoe Bend	14	0.9966 (0 min. shift)	0.9558 (0 min. shift)

Q. *Do you agree with JP01's assertion that you did not properly account for improvements in wind plant technology?*

A. No. JP01 claims that "[m]ultiple studies have documented that newer wind turbines, with longer blades and taller towers, have less variable output than older turbines, reducing the need for balancing reserves and the cost of integrating wind generation." *Id.* at 40. JP01 cites to two sources in support of its claim: Ryan H. Wiser *et al.*, *The Hidden Value Of Large-Rotor, Tall-Tower Wind Turbines In The United States Electricity Markets & Policy* (2020) ("*Wiser Paper*"); Lion Hirth & Simon Muller, *Energy Economics, System-Friendly Wind Power: How Advanced Wind Turbine Design Can Increase The Economic Value Of Electricity Generated Through Wind Power, Energy Economics* (2016) ("*Hirth & Muller Paper*"). Upon review of these sources, BPA does not see compelling evidence of reduction in wind plant error and subsequent reduction in balancing reserve need. In fact, one cited source states:

> Large errors and ramps increase the amount of balancing reserves needed to maintain grid operations in real time. The steeper power curve of low-SP, tall-tower turbines can increase the size of large forecast errors and ramps. However, by spreading these balancing costs across a greater amount of generation [energy], such turbines may result in lower balancing costs on a US$/MWh basis.

Wiser Paper at 5. In other words, these wind plant technologies do result in more balancing error than previous turbine generations, but the associated increase in capacity factor means that generator owners will make up for the cost of those reserves with the additional energy captured.

Another source cited by JP01 only uses three-hour time granularity data, which is inappropriate to capture reserve requirements from within the hour, and explicitly states that "the primary focus of [this] study is not an assessment of balancing requirements . . . ." Hirth & Muller Paper at 7. Further, the authors recognize a similar concept to the *Wiser Paper*, suggesting that while aggregate wind forecasts may decrease (assuming the higher capacity factor of newer turbine designs reduces the installed capacity need), the steeper power curve of the new designs results in increased forecast error on an individual plant basis. *Id.* at 20. BPA's balancing reserve capacity analysis uses wind forecasts on an individual plant basis since they represent individual plant schedules; therefore, accounting for improvements in wind plant technology in the way JP01 suggests may actually increase balancing reserve capacity requirements.

Q. Review of JP01's sources seems to suggest that newer technology could actually increase balancing reserve requirements. Should BPA increase balancing reserve capacity associated with new wind turbine technologies?

A. No. BPA has little indication of how much and when wind plants in BPA's BAA will incorporate new wind turbine technologies and what impacts will be realized when or if they do. While an increase in balancing reserve capacity due to new wind technology is plausible, BPA lacks site specific data to calculate the diversified impacts new wind technology would have on the BPA BAA.

Q. How do you respond to JP01's assertion that you did not account for the diversity benefits of joining the EIM?

A. We have no basis at this time to account for any diversity benefits for EIM participation. First, the EIM is an energy imbalance optimization market and assumes no responsibility for the reliability obligations of a participating BA, including capacity needed for compliance with NERC Reliability Standards, such as BAL-001-2. Puyleart *et al.*, BP-22-E-BPA-24, at 3. The EIM is not a capacity or ancillary services market. Each BA participating in the EIM retains all responsibility to maintain reliability through real-time balancing of generation, load, and interchanges. This is especially true during times when BPA is not in the market or limited in participating, which are largely beyond the BA's control, such as if BPA does not pass the resource sufficiency tests or there are insufficient transmission donations. As a result, if BPA joins the EIM, BPA will have the same capacity requirement to hold enough balancing reserve capacity to meet its BA obligations.

Second, while other BAs may provide some diversity benefit from EIM participation, as JP01 asserts, BPA has no basis to do so at this time. *See* Tilghman & Goggin, BP-22-E-JP01-01, at 44. BPA will reevaluate the required balancing reserve capacity in light of EIM participation in future rate cases, once experience is gained. If BPA is able to operationally take advantage of a diversity benefit, then we will work to incorporate that benefit into our analysis.

Lastly, we must respond to JP01's assertion that joining the EIM is a net harm for Variable Energy Resources (VER). While BPA does propose removing the persistence scheduling options due to EIM scheduling timelines, the ultimate impact only negatively effects VERs that schedule on a 15-minute basis. BPA has a limited number of Variable

Energy Resource Balancing Service (VERBS) customers that have elected to schedule on a 15-minute basis. For all other VERBS customers, there is actually a net reduction in VERs balancing reserve capacity relative to BP-20 because of our updates to forecast scheduling, and their rate for VERBS is decreasing. Thus, we disagree that joining the EIM has resulted in a detrimental impact to VERs.

Q. Finally, how do you respond to JP01's assertion that you improperly included the costs of all capacity purchases in Generation Inputs?

A. This issue is beyond the scope of the Balancing Reserve Quantity Forecast, and is addressed in Ramse *et al.*, BP-22-E-BPA-40, § 2.

Q. Does this conclude your testimony?

A. Yes.

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