

APPENDIX C-3

Energy Performance Report

PacifiCorp was awarded Wyoming's 2021 Industry Wildlife Stewardship Award for its efforts to understand and minimize impacts to wildlife. In an effort to continuously advance this stewardship, PacifiCorp requests that all bidders include an appropriate deduction to its resource production estimates provided in Appendix C-2 to account for potential voluntary outages, cut-in speed adjustments and/or curtailment due to impacts to avian, wildlife and fish species, including impacts to eagles and bats. Such project curtailments would be non-compensable in any contract awarded in this RFP.

PacifiCorp prefers that all energy performance reports be prepared by an independent third party. However, should a bidder have a resident (in-house) renewable resource evaluation team, acceptance of bidder's in-house performance report will be subject to PacifiCorp being able to replicate the results via an independent third-party expert contracted by PacifiCorp. The energy performance report should be consistent with and support performance estimates provided in the **Appendix B-2 Bid Proposal Instructions and Required Information** bid narrative and also the **Appendix C-2 Bid Summary and Pricing Input Sheet**. Bidder must provide the expected performance of the resource as it varies with ambient conditions and other factors that will impact the performance of the resource. To the extent pricing, capability and/or availability vary based on specific characteristics of the facility and/or ambient conditions, the bidder must clearly identify that relationship in tabular form.

The energy performance report should detail how it was prepared, answer the specific questions listed below for each resource type, and provide the minimum data requirements:

- BTA bid data requirements: Wind resource bid submittals must include a minimum of two years of on-site meteorological tower data, converted to an estimated MWh of production on an hourly time scale. PacifiCorp will accept two years of solar irradiance satellite data provided from Solargis or SolarAnywhere in lieu of on-site solar panel met data for all solar PPA and BTA bids. However, should a solar BTA bidder be selected to the final shortlist, to remain on the final shortlist, bidder must commit to install at least one solar monitoring station on the proposed solar site within 45 days of being selected to the final shortlist with the ability to capture solar irradiance data for at least four months prior to executing agreements following a final shortlist acknowledgement. If a solar BTA bidder is selected to the final shortlist, bidder will commit to maintaining at least one on-site solar monitoring station through the entire construction period and provide the solar monitoring station and all collected solar irradiance data to PacifiCorp at BTA closing.
- PPA bid data requirements: Wind resource bids must include a minimum of one year of on-site meteorological tower data converted to an estimated MWh production on an hourly time scale. PacifiCorp will accept one year of solar irradiance satellite data provided from Solargis or SolarAnywhere in lieu of on-site solar panel met data for all solar PPA bids.

Wind Resource Bids – Specific Questions

1. In addition to the BTA and PPA data requirements listed above, wind bids should answer the following questions related to their site data:
 - a. How was the wind data collected, certified and correlated to the reference points?
 - b. Who provided the wind data analysis service?
 - c. What is reference height, or heights, of the meteorological data?
 - d. How was the wind data adjusted for the turbine hub height?

- e. What is the estimated wind shear and how was the wind shear calculated?
 - f. What is the accuracy of the wind and energy forecast?
 - g. What is the basis year of the underlying data? Are the references years high, low, or average years?
 - h. How was generation output calculated from the meteorological data?
 - i. Identify the specific de-ratings included in the energy forecast (wind array losses, line losses, blade degradation, site elevation, etc.)?
2. Energy Production Estimate
- a. Predicted hub height mean wind speed and gross and net energy production for the full project.
 - b. Predicted long-term site air density.
 - c. Turbine power curve employed and description of any adjustments made to the power curve.
 - d. Description of methodology employed to calculate energy losses due to array effects
 - e. Clear breakdown of applied energy loss factors.
 - f. Monthly and diurnal pattern of predicted energy production with an explanation of the variation.
 - g. Analysis of the uncertainty associated with the predictions provided in the assessment.
3. Bidders may be asked to provide the following:
- a. Site Wind Data
 - i. Raw hourly or ten-minute wind speed and direction data.
 - ii. Description of equipment used to record data.
 - iii. Calibration certificates for equipment.
 - iv. Conversion factors (e.g. m/s per Hz) applied in recording wind speeds.
 - v. Maintenance records for the monitoring equipment.
 - vi. Location, height and orientation relative to mast of all sensors.
 - b. Reference Wind Data
 - i. Hourly or ten-minute wind speed and direction data.
 - ii. Description of equipment used to record data.
 - iii. Calibration certificates for equipment.
 - iv. Maintenance records for the monitoring work.
 - v. Location, height and orientation relative to mast of all sensors.
 - c. Wind Project Information
 - i. Layout of wind project turbine array using latitude and longitude coordinates.
 - ii. Detailed topographic maps of project area with all mast and turbine locations.
 - d. Verification and Analysis
 - i. Details of instrument configurations and measurement periods for each site mast and reference station.
 - ii. Summary of mast maintenance records and explanations for significant periods of missing data.
 - iii. Data recovery rates and measured monthly means for masts employed in the assessment.
 - e. Prediction of Wind Regime
 - i. Description of methodology employed to adjust measured wind speeds on site to the long-term.
 - ii. Correlation plots and coefficients for relevant correlations in the assessments.
 - iii. Predicted long-term mean wind speeds at measurement heights and hub height at all masts employed in the assessment.

- iv. Annual wind speed and direction frequency distribution for long-term site masts.
- v. Plot of annual wind rose for long-term site masts.
- vi. Description of methodology employed to extrapolate mean wind speeds at measurement heights to hub height.
- f. Prediction of Wind Speed Variations
 - i. Description of methodology employed to predict wind speed variations across the site.
 - ii. Details of wind flow modeling employed and any inputs to the model (where applicable).

Solar

In addition to the BTA and PPA data requirements listed above, solar bids should answer the following questions related to their site data:

1. How was the resource data collected, certified and correlated to the reference points?
2. Who provided the data analysis service?
3. What is the accuracy of the raw data for the resource and energy forecast?
4. Was a typical weather year (highly preferred), an average year, or a specific weather year (i.e. 2016) used as the basis of the energy analysis for the project? If a specific weather year or an average of weather years was used, are the reference years high, low, or average years?
5. How the generation output was calculated from the meteorological and solar insolation data.
6. Identify the specific de-ratings included in the energy forecast (i.e., soiling, mismatch, wiring, inverter, transformation losses, etc.)?

Storage

PacifiCorp is battery chemistry and technology agnostic. Because there are no revenue grade, ANSI-approved DC meters, PacifiCorp requires AC-coupled systems, with centralized storage designs, when storage is collocated with a generating facility, because of the risk to the resource of not meeting its 2026 online date with a DC connected system. As part of the **Appendix C-3 Energy Performance Report** response, BESS bids must identify the collocated renewable energy resource, if applicable, and provide a detailed description of any shared facilities and/or equipment with the associated renewable resource. BTA bids must conform to both the *generating resource specifications* and the *BESS specifications* in **Appendix A - Technical Specifications and Required Submittals**.

Appendix C-3 Energy Performance Report should be consistent with responses in **Appendix B-2 Bid Proposal Instructions and Required Information** and **Appendix C-2 – Bid Summary and Pricing Input Sheet** and other bid documents such as **Appendix A-2 Interconnection Studies and Agreements**.

All bids including a storage resource must provide a description of the plant communications and control plan. The plan shall include a description and diagrams (as applicable) that demonstrate how bidder will provide BESS systems data, including state of charge, power charge/discharge status, and asset health indicators (temperature, HVAC alerts, emergency status, etc.) as well as BESS system control, including limitation of charging only from renewable energy production, if applicable, charge/discharge scheduling, and station service load.

BESS bidders will also be required to provide an emergency response plan and a remediation plan in the event of battery accidents.

Appendix C-3 Energy Performance Report for storage bids should answer the following questions:

- Manufacture, model, and chemistry of battery
- Manufacture and model of control system for battery
- Manufacture and model of energy management system

- Manufacture and model of inverters
- Confirmation that collocated BESS proposal is AC-coupled system
- Discharge capacity at point of delivery (MW)
- Storage capacity at point of delivery (MWh)
- Cycling capability and limitations (must be consistent with **Appendix C-2 Bid Summary and Pricing Input Sheet Instructions** submittal)
- Depth of charge capabilities and limitations
- Round trip efficiency (%) (must be consistent with **Appendix C-2** submittal)
- Annual degradation by contract year (%) (must be consistent with **Appendix C-2** submittal)
- Expected capacity by contract year (%) as applicable (must be consistent with **Appendix C-2** submittal)
- Guaranteed storage annual availability (%)
- Bidder to describe their ability to provide PacifiCorp with an option to grid charge along with description of what is required to upgrade system for battery charging from grid.

Pumped Storage Hydro (PSH) Systems.

PSH bids shall include an engineer report describing 1) proposed location and technology; 2) water resource; 3) operational limitations; 4) expected availability and depreciable life; 5) operational budget including capital, personnel and consumable expenses; 6) point of interconnection and LGIA status; 7) project Schedule through COD; and 8) regulatory & FERC licensing status.

Geothermal

Geothermal bids should address the following:

1. Minimum of one production well and one injection well flow results to support the viability and capacity of geothermal resource. For results in excess of three (3) years, summarize the results for all years and provide the detail for the past three (3) years of production well flow tests.
2. Summary of all collected geothermal data for the proposed generating facility site.
3. Characterization the geothermal resource quality, quantity and projected production levels.
4. Graph or table that illustrates the annual and monthly projection of geothermal resources.
5. Description of any other existing geothermal facilities in the resource area and characterize their production and their anticipated impact, if any, on the generating facility.

Biomass and Biogas

Biomass and biogas bids should address the following:

1. Fuel makeup and its source.
2. Third-party resource assessment reports of available fuel for the generating facility and its proximity to the generating facility. Such resource assessments should include a discussion of long-term fuel price risk and availability risk issues.
3. Identify competing resource end-uses.
4. Provide a plan for obtaining the fuel, including a transportation plan.
5. Identify any contracts or option agreements to acquire and transport the fuel.
6. Provide an agreement or option agreement with a fuel source for a period of ten (10) years or greater.