

CROW LAKE WIND EMISSIONS REDUCTION PROJECT



Blue Delta Energy

Document Prepared By

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PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The Crow Lake Wind project site is located east of Chamberlain, South Dakota. The site contains 108 GE 1.5-megawatt turbines, with the ownership originally divided among PrairieWinds SD 1, Inc. (PWSD1) - a wholly-owned subsidiary of Basin Electric Power Cooperative (BEPC) that owned 100 turbines - South Dakota Wind Partners (SDWP), a South Dakota limited liability company that owned 7 turbines, and one turbine owned by Mitchell Technical Institute (MTI), with the power and environmental attributes purchased by BEPC under Power Purchase Agreements (PPAs) with each of the turbine owners listed above. Subsequent to the Project's original Project Description and previous Monitoring Periods, there have been two significant changes to the ownership structure that occurred during this Monitoring Period (January 1, 2015 thru December 31, 2018):

1. On July 14th, 2017 SDWP sold and assigned their 7 turbines to PWSD1
2. On December 31st, 2017, PWSD1 was merged into BEPC and subsequently dissolved

Thus for the portion of the Monitoring Period for which emissions reductions are being calculated in this report (January 1, 2018 thru December 31, 2018), 107 of the 108 turbines at the Crow Lake Project site were owned by BEPC, and the output from MTI's turbine was purchased pursuant to the PPA between MTI and BEPC. The 108 turbines described above have an aggregate generating capacity of 162 megawatts (MW). Construction of the project started September 29, 2010. The commercial operation date of this project is February 1, 2011; and it has been in continuous operation to date.

The wind turbines at the Crow Lake project site are interconnected to the Western Area Power Administration (WAPA) – Upper Great Plains East (UGPE). On October 1, 2015 WAPA and Basin Electric joined the Regional Transmission Organization (RTO) known as the Southwest Power Pool (SPP), which is located within the Midwest Reliability Organization (MRO) region. The turbines on the Crow Lake project site generate emissions reductions by delivering onto the bulk transmission system electricity generated by use of a renewable fuel source (wind).

This project was developed on a voluntary basis, and it was not required to meet any state renewable portfolio requirements. In addition, the monetization of the green attributes from this project was part of the justification of the economics of the project to BEPC as they have more cost-effective alternatives to obtain energy from grid connected resources, absent the value of the green attributes.

As detailed in this report, the Project is not submitting claims for emissions reductions for the period from January 1, 2015 thru December 31, 2017. For the balance of the Monitoring Period (January 1, 2018 – December 31, 2018), the project achieved total net GHG emission reductions of 468,824 tCO₂e.

1.2 Sectoral Scope and Project Type

As a grid-connected renewable energy project, the project activity may be principally categorized under Sectoral Scope Number 1: Energy (renewable/non-renewable sources). Crow Lake Wind is a stand-alone project and is not a grouped project.

1.3 Project Proponent

Organization name	Basin Electric Power Cooperative
Contact person	Zane Zuther
Title	Planning Analyst
Address	1717 East Interstate Avenue Bismarck, North Dakota 58503-0564
Telephone	701-557-5638
Email	zzzuther@bepec.com

Organization name	Basin Electric Power Cooperative
Contact person	David Raatz
Title	Senior Vice President of Asset Management, Resource Planning and Rates
Address	1717 East Interstate Avenue Bismarck, North Dakota 58503-0564
Telephone	701-223-0441
Email	draatz@bepec.com

Organization name	Mitchell Technical Institute
Contact person	Greg Von Wald
Title	President
Address	1800 E. Spruce St. Mitchell, SD 57301
Telephone	605-995-3022
Email	Greg.Vonwald@mitchelltech.edu

1.4 Other Entities Involved in the Project

Organization name	Blue Delta Energy, LLC
Role in the project	Consultant and authorized representative for BEPC
Contact person	Ken Nelson
Title	Authorized Agent
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1.5 Project Start Date

The commercial operation date of the project is February 1, 2011.

1.6 Project Crediting Period

The project crediting period for the projects started on February 1, 2011, and will conclude January 31, 2021, for a total of 10 years. Previous verifications of the Project covered the periods from:

- February 1, 2011 thru December 31, 2012
- January 1, 2013 thru December 31, 2013
- January 1, 2014 thru December 31, 2014

This verification covers the periods from January 1, 2015 – December 31, 2018. Please note however that the Project is claiming no emissions reductions for the period from January 1, 2015 thru December 31, 2017 as the environmental benefits associated with the Project's generation for that period were claimed and retired as Renewable Energy Certificates and are therefore ineligible to be used for calculating emission reductions under the VCS. As a result, the only emissions reductions being calculated for this verification are associated with the Project's generation for the period from January 1, 2018 thru December 31, 2018.

1.7 Project Location

The Crow Lake Wind project is located across the span of Aurora, Jerauld and Brule counties, east of Chamberlain, South Dakota on a 36,000-acre plot of land at grid coordinates:

Latitude: 43.8°N Longitude: -98.8°.



Figure 1 Map of Project location



Figure 2 Image of Project

1.8 Title and Reference of Methodology

1.8.1 Title

ACM0002 - Consolidated baseline methodology for grid-connected electricity generation from renewable sources

1.8.2 Reference

<http://cdm.unfccc.int/filestorage/V/A/1/VA17EM2PNDJWBTFY34KGRLZO68S9UQ/Consolidated%20baseline%20methodology%20for%20grid-connected%20electricity%20generation%20from%20renewable%20sources.pdf?t=NXV8bHVwdzh6fDAPIdA2Htix3vUsiCteQTKR>

1.8.3 Version

Version 12.1.0

1.8.4 Tools used

- Tool for the demonstration and assessment of additionality - version 5.2.1
- Tool to calculate the emission factor for an electricity system - version 2.2.0

1.9 Other Programs

The Crow Lake project site is currently listed in M-RETS (the Midwest Renewable Energy Tracking System), a third-party registry created to record the generation of renewable energy MWhs and renewable energy credits (RECs). An MRETS approved Qualified Reporting Entity, Basin Electric QRE (Basin-QRE), reports the number of MWhs generated each month to M-RETS, which in turn assigns unique serial numbers for each MWh. For the creation of VCUs, the MWhs for which VCUs are being claimed will be retired in M-RETS and the reason for doing this (VCU creation) will be documented in M-RETS. The retirement of these credits and subsequent identification of the reason will ensure that those RECs will not be double sold, and that VCUs can be created with confidence.

No entity has applied for, or been denied acceptance under, any other GHG program with respect to the turbines located at the Crow Lakes project site.

1.10 Sustainable Development

While BEPC is committed to meeting one hundred percent of its environmental compliance obligations, the Crow Lake project was not developed per any specific corporate commitment or federal or state obligation, and its output is not currently required to be monitored or reported per any such program.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

Crow Lake Wind came online on February 1, 2011 and overall has experienced normal operations since then, until the period ending December 31st, 2018.

Western Area Power Administration (WAPA) occasionally requests facilities to derate or shutdown in order to check the over-supply of power into the grid. Additionally – in accordance with the information found in the Project Description – BEPC demonstrates continued efforts to minimize the project's avian impacts. Over the course of the Monitoring Period the Project experienced the following events that impacted its electrical generation:

- 1-17-2018 - Heater for 182 Breaker failed
 - Start: 1-17-2018 @ 9:19
 - End: 1-17-2018 @ 11:45
- 8-10-2018 - Line Fault
 - Start: 8-9-2018 @ 23:53
 - End: 8-10-2018 @ 11:08
- 10-24-2018 - WAPA requested derate
 - Start: 10-24-2018 @ 9:06
 - End: 10-24-2018 @ 18:00
- 12-3-2018 - Winter storm tripped 230KV transmission line
 - Start: 12-2-2018 @ 00:00
 - End: 12-3-2018 @ 06:30

Other than these curtailments, no other unscheduled outages or events took place and the project operated normally.

The SEL meter measures the amount of power generated on a continuous basis; data is aggregated hourly and is reported in a MV90 report with 8760 separate data points for the number of kWh generated each hour. WAPA and Basin-QRE read this meter on a twice per month, and Basin-QRE on a monthly basis reports the number of megawatt hours (MWhs) generated to the Midwest Renewable Energy Tracking System (MRETS), which then issues Renewable Energy Credits (RECs) to the project's account. As noted in the project description, the project's registration in MRETS is being used for reporting purposes only – all certificates for which VCUs are being generated will be retired.

Per the project description, both the MV90 data and the corresponding MRETS generation records are being provided to corroborate the number of MWhs generated. There was a very minor discrepancy identified during the meter testing in April 2018, and as a result Basin reduced the amount of generation recorded by WAPA by approximately 11 MWHrs; this lower generation figure was used to create the RECs for that month, and WAPA adjusted its billing records accordingly. Other than this one instance, while it has been acknowledged in previous verifications that at times there can be a small difference between the value reported in the MV90 report and the value in MRETS, the only other variations for 2018 were due to the rounding of fractional MW's. Given the April correction, for the period January 1 thru December 31, 2018, the difference between the annual MRETS value and the MV90 value is an extremely small 0.0002%.

BEPC uses a WAPA-owned revenue grade meter installed at the Wessington Springs Interconnection point to measure the total amount of power delivered to the grid by the Crow Lake project. The SEL meter, Serial No. 2009160413, Model 734 was tested on 4/11/2018 and found to be operating in a satisfactory manner.

2.2 Deviations

2.2.1 Methodology Deviations

No methodology deviations were applied during this monitoring period.

No methodology deviations were applied during previous reporting periods.

2.2.2 Project Description Deviations

As previously discussed in Section 1.1, there were two changes in project ownership that occurred since the last reporting period:

1. On July 14th, 2017 SDWP sold and assigned their 7 turbines to PWSD1
2. On December 31st, 2017, PWSD1 was merged into BEPC and subsequently dissolved

The first change involved a reapportionment of a small subset of the project among the existing owners, and the second was a consolidation of a non-profit subsidiary company with its non-profit parent organization. Neither change involved a “new” or outside entity assuming an interest in the project and did not impact the applicability of the methodology, additionality or the appropriateness of the baseline scenarios.

There was also a change in the metering and reporting of the generation data. Prior to October 1, 2015, a JemStar revenue grade meter (Serial No. 10 21 13576, Model JS-09R6110-C3) generated the MV90 data. The meter was read by WAPA, who in turn served as a Qualified Reporting Entity (QRE) for reporting the data to MRETS.

On October 1, 2015 Basin Electric joined the Southwest Power Pool Regional Transmission O. At that time Basin elected to have its Member Revenue Division, a subset of the Asset Management, Resource Planning and Rate Department responsible for handling the acquisition and management of the company’s meter data, serve as the QRE for reporting to MRETS. They are referred to as “Basin-QRE”. This arrangement is approved under the MRETS Operating Procedures and does not impact the applicability of the methodology additionality or the appropriateness of the baseline scenarios.

No project description deviations were applied during previous reporting periods.

2.3 Grouped Project

Crow Lake Wind is a stand-alone project and is not a grouped project.

2.4 Safeguards

2.4.1 No Net Harm

The largest potentially negative environmental impact concerns avian mortality, and BEPC is committed to operating the project to minimize the occurrence of such events. During the last monitoring period BEPC temporarily shut down the project due to whooping cranes in the project area. BEPC has developed a formal program and conducts training for all project employees

twice a year on the whooping cranes' spring and fall migrations as well as any contractors who are scheduled to be onsite during the migration period. The training program describes how to recognize a whooping crane, how to track them once spotted and how to protect them from the wind turbines.

BEPC is unaware of any potentially negative socio-economic impacts. In fact, the local community has been very involved in the project and has benefited from it both economically as well as in a number of social criteria. The project was originally developed with a first-of-its-kind community wind investment partnership, where a group of local landowners invested alongside BEPC and owned seven of the project's turbines (as mentioned above the landowners later sold the turbines to BEPC). The Mitchell Technical Institute, a local public technical school with its main campus in Mitchell, SD and a Regional Education Center in Yankton, SD, also participated in the partnership and continues to own one of the turbines, incorporating it as part of their wind technician training program. The project spent a great deal of money improving the local roads during the construction phase and also contributes to the local economy thru its payment of taxes to the three counties in which it operates (Aurora, Brule, and Jerauld) as well as wind lease payments to the local landowners.

2.4.2 Local Stakeholder Consultation

We believe there are three primary categories of local stakeholders: government, local landowners, and first responders. While there was extensive stakeholder engagement during the initial permitting phase of the project, for the most part at this point communications are limited to when issues arise. To that end BEPC maintains the following policies:

- Crow Lake, like all wind projects, is subject to certain local, state and federal oversight and has staff that is responsible for all ongoing reporting requirements as well as any ad hoc requests. Many of these reports are in the public domain (e.g. the Energy Information Association publishes annual generation data from the facility).
- During the permitting and construction phase there were regularly scheduled meetings with the public. Beginning with the project's commencement of commercial operations there are no formally scheduled meetings, and issues are addressed as they arise. At this time BEPC is unaware of any pending land owner issues, though when BEPC is notified of a stakeholder concern they have procedures in place to direct the concern to the appropriate department, such as the Plant Operations, Right of Way or Legal team.
- Regarding first responders, BEPC holds annual emergency response meetings on the wind farm site, where the safety coordinator invites all local public officials including the Sheriff's Department, Fire Department, ambulance services, emergency dispatch center, and emergency management coordinator.

Due to the substantial economic and social benefits it has generated for the community, the Crow Lake wind farm has and continues to enjoy tremendous local support. There have been to date no stakeholder requests for project modifications.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data / Parameter	EF _{grid,CM,y}
Data unit	Metric tons / MWhr
Description	The CO ₂ emissions factor for the grid displaced due to the project activity, during the year y in metric tons CO ₂ /MWh, as calculated by the combined operating margin (CM), which is a weighted average of the Simple Operating Margin and Build Margin.
Source of data	Calculated based on Tool for calculating emissions intensity of the grid; Sources include EIA 923/860 databases, EIA fuel emissions factors
Value applied:	0.8422
Justification of choice of data or description of measurement methods and procedures applied	w1 * Simple OM + w2 * Build Margin, where w1 = 0.75, w2 = 0.25, Simple OM = 0.98542 and Build Margin = 0.4126. For detailed calculations see Section 3 of the Project Description .
Purpose of the data	Calculation of baseline emissions
Comments	The ex-ante option is chosen

Data Unit / Parameter:	EF _{grid,OMsimple,y}
Data unit:	Metric tons / MWh
Description:	Simple Operating Margin CO ₂ emissions factor in year y
Source of data:	Calculated based on Tool for calculating emissions intensity of the grid; Sources include EIA 923/860 databases, EIA fuel emissions factors
Value applied:	0.98542
Justification of choice of data or description of measurement methods and procedures applied	Calculated based in tool for calculating emissions intensity of the grid. For detailed calculations see Section 3 of the Project Description .
Purpose of Data	Calculation of baseline emissions
Any comment:	The ex-ante option is chosen

Data Unit / Parameter:	EG _{m,y}
Data unit:	MWh
Description:	Net quantity of electricity generated by power unit m in year y (m includes all power units except low cost must run power units)
Source of data:	EIA 923/860 databases
Value applied:	Varies by unit
Justification of choice of data or description of measurement methods and procedures applied	N/A
Purpose of Data:	Calculation of baseline emissions
Any comment:	N/A

Data Unit / Parameter:	For simple operating margin - $EF_{EL,m,y}$
Data unit:	Metric tons / MWh
Description:	CO ₂ emissions factor of power unit m in year y (tCO ₂ / MWh)
Source of data:	EIA 923/860 databases
Value applied:	Varies by unit
Justification of choice of data or description of measurement methods and procedures applied	Calculated using EIA 923 / EIA 860 databases and EIA Fuel emissions factors
Purpose of Data	Calculation of baseline emissions
Any comment:	N/A

Data Unit / Parameter:	$FC_{i,m,y}$ and $NCV_{i,y}$
Data unit:	MMBtus
Description:	Amount of fossil fuel type i consumed by power unit m in year y (mass or unit volume) and the Net Calorific Value (energy content) of fossil fuel type i in year y
Source of data:	EIA 923/860 databases and EIA Fuel Emissions Factors
Value applied:	Varies by unit
Justification of choice of data or description of measurement methods and procedures applied	The EIA 923 database provides the product of these two factors and provides the MMBtus consumed for electricity generation for each plant in the grid.
Purpose of Data	Calculation of baseline emissions
Any comment:	N/A

Data Unit / Parameter:	$EF_{CO_2,i,y}$
Data unit:	Kg CO ₂ e/MMBtu
Description:	CO ₂ emissions factor of fossil fuel type i in year y
Source of data:	EIA 923/860 databases and EIA Fuel Emissions Factors
Value applied:	Varies by fuel type
Justification of choice of data or description of measurement methods and procedures applied	EIA fuel emissions factors are default values that have been used to prepare GHG inventories.
Purpose of Data	Calculation of baseline emissions
Any comment:	N/A

Data Unit / Parameter:	$EF_{grid,BM,y}$
Data unit:	Metric Tons / MWh
Description:	CO ₂ emissions factor of fossil fuel type i in year y
Source of data:	Calculated using Option A2 for simple OM, but including all units as defined in the methodology. EIA 923/860 databases and EIA Fuel Emissions Factors
Value applied:	0.4126
Justification of choice of data or description of	For detailed calculations see Section 3 of the Project Description

measurement methods and procedures applied	
Purpose of Data	Calculation of baseline emissions
Any comment:	N/A

Data Unit / Parameter:	For Build Margin - $EF_{EL,m,y}$
Data unit:	Metric tons / MWh
Description:	CO2 emissions factor of power unit m in year y (tCO2 / MWh)
Source of data:	EIA 923/860 databases
Value applied:	Varies by unit
Justification of choice of data or description of measurement methods and procedures applied	Calculated using EIA 923 / EIA 860 databases and EIA Fuel emissions factors, based on Option A2 as described under the Simple OM found in Section 3 of the Project Description .
Purpose of Data	Calculation of baseline emissions
Any comment:	This factor uses the power generation efficiency factor and the CO2 emissions factor of fossil fuel type l in year y.

Data Unit / Parameter:	For Build Margin - $n_{m,y}$
Data unit:	MMBtus / MWh
Description:	Average net energy conversion efficiency of power unit m in year y
Source of data:	Default table, Annex 1
Value applied:	Varies by unit
Justification of choice of data or description of measurement methods and procedures applied	This is required by the Tool for the option chosen.
Purpose of Data	Calculation of baseline emissions
Any comment:	N/A

3.2 Data and Parameters Monitored

Data / Parameter	EG facility,2018
Data unit	MWhs/yr
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWhs/yr)
Source of data	Project activity revenue meter at the site (SEL Meter)
Description of measurement methods and procedures to be applied	Revenue grade meters record power generated on a continuous basis. Production is then aggregated at an hourly interval so that an 8760 hourly production shape is available for each year. Data monitoring takes place when WAPA and Basin-QRE read the meters twice per month and Basin-QRE submits the data monthly to the Midwest Renewable Energy Tracking System (MRETS). This monthly data from MRETS is what will be used to calculate the emissions reductions.
Frequency of monitoring/recording	Data Recording: Continuous Data Aggregation: Hourly Data Monitoring: Monthly
Value monitored:	EG facility,2018 = 556,666 MWh
Monitoring equipment	The project operator has installed a SEL revenue grade meter (Serial No. 2009160413, Model 734) metering device.
QA/QC procedures to be applied	Per the interconnection agreement and WAPA Metering Guidelines. This meter was tested on 4/11/2018
Purpose of the data	Calculation of baseline emissions
Calculation method	Meter readings
Comments	N/A

3.3 Monitoring Plan

3.3.1 Relationship of the parties involved

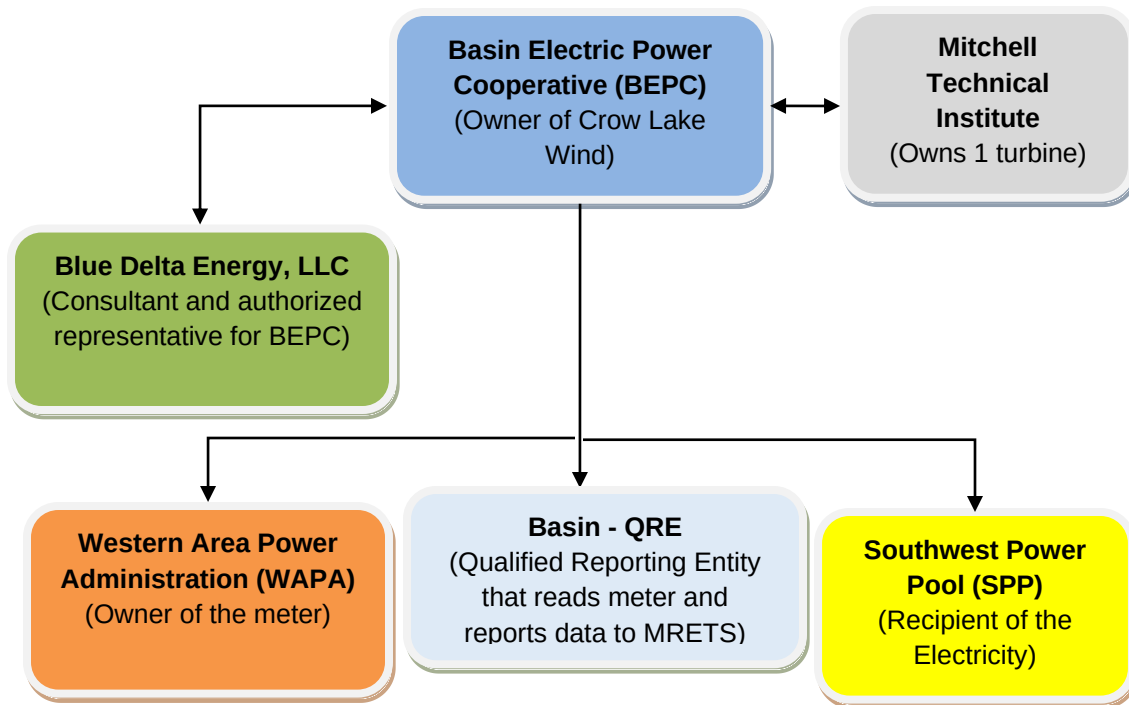


Figure 3 Relationship of parties involved in the project

Basin Electric Power Cooperative (BEPC): Owner and operator of the project (except for 1 turbine owned by the Mitchell Technical Institute).

Mitchell Technical Institute: MTI is the owner of 1 turbine at the project site. The output of MTI's turbine is purchased by BEPC.

Basin-QRE: Basin Electric's Member Revenue Division, a subset of the Asset Management, Resource Planning and Rate Department responsible for handling the acquisition and management of the company's meter data, that serves as the Qualified Reporting Entity (QRE) for reporting data to MRETS.

Western Area Power Administration: Owner of the meter responsible for its annual testing.

Southwest Power Pool: The Regional Transmission Organization that is the recipient of all electricity generated by the project

Blue Delta Energy, LLC: a renewable energy development and environmental credit marketing company based in New Haven, Connecticut. Blue Delta Energy, LLC (Blue Delta or BDE) is the consultant and authorized representative for BEPC and is undertaking the verification and validation of the VCS project on behalf of BEPC.

For contact information of the parties involved in the project, see section 1.4 Other Entities Involved in the Project.

3.3.2 Data Monitoring

- An SEL Revenue grade meter records power generated on a continuous basis.
- Production is then aggregated at an hourly interval so that an 8,760 hourly production shape is available for each year.
- Data monitoring takes place on a twice monthly basis when Basin-QRE and WAPA read the meters. On a monthly basis Basin-QRE submits the data to the Midwest Renewable Energy Tracking System (M-RETS).
- This monthly data from M-RETS is what will be used to calculate the emissions reductions.
- Monitoring records will be retained for 12 years (two years past the project's crediting period of 10 years).

3.3.3 Metering Devices

- Prior to October 1, 2015, a JemStar revenue grade meter (Serial No. 10 21 13576, Model JS-09R6110-C3) generated the MV90 data. The meter was read by WAPA, who in turn served as a Qualified Reporting Entity (QRE) for reporting the data to MRETS.
- As mentioned earlier, upon BEPC's joining SPP, an SEL revenue grade meter (Serial No. 2009160413, Model 734) generates the MV-90 data. The meter is owned and maintained by WAPA and read by both WAPA and Basin-QRE. Basin-QRE now serves as the reporting the renewable energy output to MRETS.
- Based on the Interconnection Agreement between PWSD1 and WAPA, and the WAPA Metering Guidelines, the meter was required to be tested in 2018. This meter test took place on 4/11/2018.

3.3.4 Extraordinary Events:

No extraordinary events or unscheduled major maintenance took place other than those cited in Section 2.1.

3.3.5 Retirement of RECs:

- As stated in the project description, since this project is registered in MRETS, renewable energy credits are being created for each MWhr generated. These credits have been retired.
- In addition, Basin has provided an attestation that these credits are not being used in any other GHG program.

3.3.6 Internal audit and handling of non-conformities

- All data used for establishing and verifying GHG emission reductions and removals is collected and processed by Blue Delta Energy with the help of other project proponents.

- Data collection and processing is based on BDE's internal QA/QC procedures which include preapproved data and documentation checklists as well as emission reduction calculation methodology.
- All verification data submittal is performed by BDE's senior management. Any errors or non-conformities discovered during internal audits or by third party verifiers are addressed in cooperation with the project proponents by BDE's management team.
- The final step of non-conformance resolution is review and (if needed) update of the appropriate sections of the QA/QC procedures.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

As mentioned above, the environmental attributes associated with the MWHrs generated in 2015, 2016 and 2017 were claimed and retired as RECs and are therefore ineligible to be included in the calculation of emission reductions under the VCS. The total MWHs generated (as reported in MRETS) for the period January 1, 2018 thru December 31, 2018 are: 556,666 MWHs.

The Baseline Emissions are calculated by multiplying the MWHs utilized, by the combined margin (EFgrid,CM,y), which is 0.8422 metric tons CO₂e / MWh.

Hence the Baseline Emissions are:

556,666 MWHs * 0.8422 metric tons / MWh = 468,824 metric tons.

4.2 Project Emissions

Per the methodology ACM0002, project emissions from this project are zero. Per the methodology, we do not consider project emissions because this is not a geothermal, solar thermal, or hydro project.

4.3 Leakage

Per ACM0002, no leakage is considered.

4.4 Net GHG Emission Reductions and Removals

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2015	0	-	-	0
2016	0	-	-	0
2017	0	-	-	0
2018	468,824	-	-	468,824
Total	468,824	-	-	468,824