



**Verified Carbon
Standard**

CROW LAKE WIND EMISSIONS REDUCTION PROJECT



Blue Delta Energy

Document Prepared by
Blue Delta Energy, LLC

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1 PROJECT DETAILS

1.1 Summary Description of the Project

The Crow Lake Wind project site is located east of Chamberlain, South Dakota comprised of 108 wind turbines. The site originally was divided among three owners:

- 100 GE 1.5-megawatt turbines owned by Prairiewinds SD 1, Inc. (PWSD1) - a wholly owned subsidiary of Basin Electric Power Cooperative (BEPC);
- 7 turbines owned by South Dakota Wind Partners (SDWP), a South Dakota limited liability company; and
- 1 turbine owned by the Mitchell Technical Institute (MTI).

Subsequent to the Project's Initial Validation, there have been two significant changes to the ownership structure:

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 Second Crediting Period, 107 of the 108 turbines at the Crow Lake Project site are owned by BEPC, and the output from MTI's turbine is purchased pursuant to the PPA between MTI and BEPC. The 108 turbines described above have an aggregate nameplate capacity of 162 megawatts (MW). Project construction commenced on September 29, 2010, with Commercial Operation effective February 1, 2011, and it has been in continuous operation to date.

In addition to purchasing the output of the MTI turbine, BEPC operates and controls the turbine pursuant to an Operation and Management Agreement with MTI. The wind turbines at the Crow Lake project site are interconnected to the Southwest Power Pool (SPP) at the Wessington Springs (SD) 230-kV switchyard, which is located within the Midwest Reliability Organization (MRO) region. Effective October 1, 2015, the owners elected to join the SPP, and the system's generation is now subject to SPP's oversight. 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).

The Project was developed on a voluntary basis, and it was not and is still not required by any of the owners to meet any state or federal 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 had more cost-effective alternatives to obtain energy from grid connected resources, absent the value of the green attributes.

Project Overview	
Nameplate Capacity	162 MWs
Location	Aurora, Jerauld and Brule counties, east of Chamberlain, South Dakota
Commercial Operation Date	February 1, 2011
Estimated MWh per year	483,622 MWhs (based on 2020 generation)
Project Area under Lease	36,000 acres
Project Interconnection	Project connects to the Southwest Power Pool at the Wessington Springs (SD) 230-kV Switchyard
Turbine Technology	GE 1.5 MW SLE ESS
Estimated Annual GHG Emission Reductions (mTCO ₂ e)	180,391
Estimated Total GHG Emission Reductions (mTCO ₂ e)	1,803,909

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 industries (renewable/non-renewable sources).

The Project is a stand-alone project and is not a grouped project.

1.3 Project Eligibility

The Project qualifies under ACM0002 *“Large Scale Consolidated Methodology: Grid-connected electricity generation from renewable sources”*. The Project achieves GHG emissions reductions as a grid-connected resource supplying zero emissions renewable energy that replaces electricity generated by fossil fuel powered plants.

1.4 Project Design

The Project consists of 108 GE 1.5 MW SLE ESS Wind Turbines that are spaced over approximately 36,000 acres located in Aurora, Jerauld and Brule counties east of Chamberlain, South Dakota. The full output from the wind turbines is delivered to the Southwest Power Pool’s Wessington Springs (SD) 230-kV Switchyard, which is maintained by the Western Area Power Administration (WAPA). Basin Electric is responsible for maintenance of the turbines.

1.5 Project Proponent

The project co-proponents are BEPC and MTI. BEPC's owns 107 turbines (161.5 MW) of the Crow Lake site and MTI owns 1 turbine (1.5 MW).

BEPC is a not-for-profit, wholesale electric generation and transmission cooperative based in North Dakota that is owned by 131 rural distribution companies in 9 states (MT, MN, IA, SD, ND, CO, NM, NB, WY) that provide electricity to 3 million customers. Basin's charter is to provide low cost, reliable electric power to its owner/members. BEPC incorporated a wholly owned subsidiary PrairieWinds SD1 (PWSD1) to develop the Crow Lake Wind project which it subsequently merged into BEPC. BEPC is also purchasing the power and the environmental benefits generated by the MTI turbine.

MTI opened in 1968 as part of a post-high school vocational technical education system in South Dakota that included four area institutes and the South Dakota Office of Adult, Vocational and Technical Education. The central mission of the Institute is to provide job preparatory programs on a full- or part-time basis to all who can benefit. MTI's turbine is used as a teaching tool for students in its wind turbine technician program and is operated by BEPC.

Organization name	Basin Electric Power Cooperative
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Title	Vice President – Resource Planning & Rates
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Telephone	(701) 557-5752
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Organization name	Basin Electric Power Cooperative
Contact person	Zane Zuther
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Telephone	(701) 557-5638
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Organization name	Mitchell Technical College
Contact person	Mark Wilson
Title	President
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1.6 Other Entities Involved in the Project

Organization name	Blue Delta Energy, LLC
Role in the project	Consultant and Authorized Representative responsible for completing the Project Description as well as the First Monitoring Report associated with the Project's Second Crediting Period
Contact person	Kenneth Nelson
Title	President
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1.7 Ownership

At the time of Project construction, BEPC's wholly owned subsidiary PWSD1 owned 100 of the turbines, SDWP owned 7 turbines, and the MTI owned 1 turbine. BEPC operated the wind project pursuant to a Construction, Operations and Management Agreements with the parties, and BEPC had an arms-length power purchase agreement (PPA) with PWSD1, who in turn had PPA's with SDWP and MTI. All PPA's included both the power and the environmental attributes.

In 2017, PWSD1 acquired SDWP's interest in their 7 turbines, and subsequent to the acquisition PWSD1 entered into a merger with BEPC, with the parent (BEPC) emerging as the surviving constituent organization. Therefore BEPC currently owns 107 turbines, MTI owns 1 turbine, and BEPC continues to own the rights to all environmental credits from the Project.

1.8 Project Start Date

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

1.9 Project Crediting Period

The renewal for the second ten-year crediting period is from February 1, 2021 thru January 31, 2031.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	X
Large project	

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
2021	159,803
2022	180,391
2023	180,391
2024	180,391
2025	180,391
2026	180,391
2027	180,391
2028	180,391
2029	180,391
2030	180,391
2031	20,587
Total estimated ERs	1,803,909
Total number of crediting years	10
Average annual ERs	180,391

1.11 Description of the Project Activity

The Project activity is zero emissions, grid-connected electricity generation source. The electricity it generates displaces electricity generated from grid-connected resources in the MRO NERC region. The Project activity is projected to operate for a period of 25 years; at that time it is expected the wind turbines will be repowered for an additional period.

1.12 Project Location

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

Latitude: 43.8° N Longitude: -98.8°.

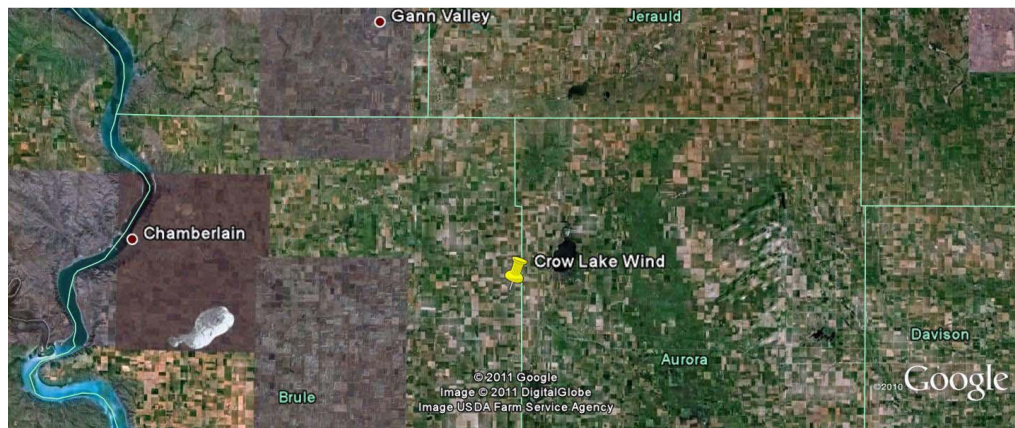


Figure 1: Map of Project Location



Figure 2: Image of Project

1.13 Conditions Prior to Project Initiation

This project was constructed on a greenfield site. Therefore the baseline scenario is the same as the conditions existing prior to the project initiation (see *Section 3.4 - Baseline Scenario*).

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

This project was constructed in accordance with all applicable Federal, State and local laws. BEPC (PWSD1) were required to complete an extensive environmental impact assessment for the turbines included in this project as it was seeking a loan guarantee from the Rural Utility Service (RUS) for its turbines and was seeking interconnection to the Integrated System through WAPA for all of the turbines to be located at the Crow Lake project site. Since both RUS and WAPA are federal agencies a review of the project was required by the National Environmental Protection Act (NEPA), which resulted in the development of an Environmental Impact Statement (EIS). The EIS compared construction of a wind project at the (eventually chosen) Crow Lake site, an alternative site (Winner), and no construction scenario. The evaluation involved extensive public workshops and assessment of numerous impacts, including:

- Air Emissions Impacts - none were found.

- Avian impacts – a potential impact to the whooping crane was found. BEPC voluntarily arranged for offsets to address these issues at significant expense (\$240,000) after lengthy discussions with the Fish and Wildlife Service.
- Wetland / Grassland impacts – Basin included voluntary conservation measures to offset indirect impacts in its EIS, and this impact was resolved to the satisfaction of RUS and WAPA.
- Archaeology – no significant impacts were found. Any identified potential cultural resources were avoided.

Both RUS and WAPA concluded that impacts were minimized at the Crow Lake Wind site and allowed the project to proceed. The Final Environmental Impact Statement, the WAPA and RUS decisions in the Federal Register approving the projects, and the letter detailing BEPC's offsets were all included as Attachment #1 in the Initial Project Description. In sum, BEPC/PWSD1 complied with all necessary legal and regulatory processes in developing Crow Lake Wind.

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

The Project is not registered or seeking registration in any other GHG Program.

1.15.2 Projects Rejected by Other GHG Programs

The Project has neither applied for nor been rejected by any other GHG Program.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The Project is not subject to any other emissions trading programs or binding limits.

1.16.2 Other Forms of Environmental Credit

The Project 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 issues renewable energy credits (RECs) corresponding to that generation. BEPC has a Qualified Reporting Entity (QRE) group that reads the meter and 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 RECs 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.

The RECs generated by the Project are eligible under the Center for Resource Solutions' Voluntary Green-e Energy program thru January 31, 2026. They are also eligible for compliance with the Minnesota and Iowa Renewable Portfolio Standards. As noted above, the Project's RECs generated for which VCUs are being claimed during this Monitoring Period were not used, claimed, or retired in any of the listed programs.

1.17 Sustainable Development Contributions

While the Project does align with several of the UN Sustainable Development Goals, it does not directly contribute to any nationally stated sustainable development priorities, and therefore does not provide for monitoring and reporting same.

1.18 Additional Information Relevant to the Project

Leakage Management

The Project is a renewable wind facility that delivers the electricity it generates to the power grid and does not participate in any activity that generates emissions. Per the methodology, no leakage is applicable.

Commercially Sensitive Information

Commercially sensitive information that was provided in the initial Project Description includes:

- PPA price and terms and conditions
- Certain avoided cost data
- Load Forecasts and BEPC future Renewable Energy Requirements
- Any other financial data
- Certain aspects of BEPC's 2007 Power Supply Analysis
- Certain aspects of the Environmental Assessment and BEPC's interactions with the U.S. Fish and Wildlife Commission.

Further Information

None.

2 SAFEGUARDS

2.1 No Net Harm

The largest potentially negative environmental impact is avian mortality, and BEPC is committed to operating the project to minimize the occurrence of such events. During various times BEPC has 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; any contractors who are scheduled to be onsite during the migration period are also required to take the training. 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 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 local taxes to as well as wind lease payments to the local landowners. In addition, the involvement of SDWP attracted more than 600 local farmers and residents as investors, who benefited financially from either equity or debt interests in the Project. The South Dakota Farm Bureau, the South Dakota Farmers Union and the South Dakota Corn Growers Association worked with BEPC in structuring this unique community-based carve out that serves as a model for public participation and engagement.

2.2 Local Stakeholder Consultation

As detailed in the Initial Project Description and summarized below in Sections 2.3 and 2.4, there was extensive stakeholder consultation during the initial permitting phase of the project. At this point communications are primarily limited to when issues arise. To that end BEPC maintains the following policies:

- Crow Lake Wind, 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 (EIA) 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 Project has and continues to enjoy tremendous local support. There have been to date no stakeholder requests for project modifications other than an inquiry from GE Renewable Energy regarding the potential to repower the facility. At this time the plan is to re-power the facilities starting in the early 2030's.

2.3 Environmental Impact

Unlike private developers and IOUs that can avoid an automatic trigger of the National Environmental Policy Act (NEPA) provision, rural electric cooperatives such as BEPC could not avoid this trigger since it relied on Rural Utility Service (RUS) loan guarantees for this Project. A private developer will only trigger NEPA if they incur a Federal "nexus", such as developing a project on land managed by the Bureau of Land Management, which most developers will try to avoid in order to limit permitting risk. BEPC did not have this option. The impact of this step in the permitting process is significant in terms of timing and cost, as NEPA requires the preparation of a very extensive Environmental Assessment or Environmental Impact Statement. For the Project, this lengthy permitting process took ~3 years and cost BEPC in excess of \$1.9 million in preparation costs (in addition to the cost of conservation offsets totaling ~\$240,000). The NEPA process for Crow Lake Wind entailed the following:

- Public Participation (Scoping Meetings)
 - Notice of Intent published in Federal Register
 - Scoping meetings in Winner, SD and Plankinton, SD
- Multiple interagency meetings to encourage federal, state and local agencies to participate in Scoping discussions
- Open House and Public Hearings in February 2010 with wind resource maps, EIS process, timeline, turbine and transmission siting parameters, etc.
 - A court reporter was made available to record public feedback
- Publishing of a draft Environmental Impact Statement (EIS) and a public comment period, with BEPC agreeing to undertake various mitigation measures
- Assessment of multiple alternatives (Crow Lake site and Winner Site) to satisfy NEPA process – this step adds considerable cost because all studies must be repeated for both locations to ensure that the site with the least impact is chosen.
- Impact Assessments
 - Geology and Soils
 - Water Resources
 - Climate Change and Air Quality

- Biological resources
 - Avian studies (bats, whooping cranes, other birds)
 - This assessment resulted in BEPC purchasing conservation offsets to preserve habitat for the whooping crane, at a cost of \$240,000.
- Cultural Resources – BEPC had to do considerable assessment with a number of tribal lands in the region, again adding to the time and expense of completing the project.
- Land Use
- Transportation
- Visual Resources
- Noise
- Socioeconomics
- Environmental Justice
- Health and Safety

2.4 Public Comments

As mentioned previously, the fact that the Project relied upon RUS loan guarantees in its financing required the RUS to conduct a comprehensive public commenting period, which besides those from the general public included comments from multiple federal, state and local agencies as well as Native American tribes. Two Scoping Meetings open to the public were held on April 28, 2009 in Winner, SD and on April 29, 2009 in Plankinton, SD, and an Inter-agency Meeting was held in Pierre, SD on April 28, 2009. The meetings were advertised in local newspapers as well thru direct mailer postcards. The RUS “Notice of Availability of Record of Decision” published in the Federal Register on October 5, 2010 summarized the rest of the process as follows:

On April 7, 2009, RUS and Western (Area Power Administration) published in the Federal Register a Notice of Intent to prepare an EIS for the proposed Project. The U.S. Environmental Protection Agency acknowledged receipt of the Draft EIS on January 15, 2010. The 45-day comment period ended on March 1, 2010. A public hearing to receive comments on the Draft EIS was held in Chamberlain, South Dakota, on February 11, 2010. All comments received were addressed in the Final EIS. The U.S. Environmental Protection Agency acknowledged receipt of the Final EIS on July 30, 2010. The 30-day review period ended on August 28, 2010. Two comment letters were received; they were addressed in RUS’s ROD.

2.5 AFOLU-Specific Safeguards

This section is not applicable as Crow Lake is not considered an AFOLU project.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Title: ACM0002 – “Grid-connected electricity generation from renewable sources”

Version: 20.0

Reference:

<https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG>

Tools applied by the Project include:

TOOL07 – “Tool to calculate the emission factor for an electricity system” (Version 7.0)

TOOL11 – “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period” (Version 3.0.1).

3.2 Applicability of Methodology

The Project is a grid-connected renewable energy power generation project that meets the definition of a Greenfield power plant and utilizes wind power; therefore the methodology is applicable under ACM0002 Sections 2.2(3)(a) and 2.2(4)(a).

3.3 Project Boundary

Source		Gas	Included?	Justification/Explanation
Baseline	CO2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO ₂	Yes	Main emission source
		CH ₄	No	Minor emission source
		N ₂ O	No	Minor emission source

3.4 Baseline Scenario

The original approved Baseline Scenario was the following:

Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the Tool to calculate the emission factor for an electricity system.

The appropriate Baseline Scenario to be used for this renewal of the crediting period is determined using CDM TOOL11 – “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period” (Version 03.0.1). The required Steps, their application and results are as follows:

Step 1: Assess the validity of the current baseline for the next crediting period.

The validity of the current baseline is assessed using the following Sub-steps:

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

The Project activity is not mandated by any State of South Dakota nor US Federal law. The current baseline complies with all US Federal and State of South Dakota laws, including those that have been promulgated since the request for the initial crediting period was submitted.

Step 1.2: Assess the impact of circumstances

Fossil fuel power plants continue to provide electricity to the grid to which the Project is connected. In fact, according to the EPA in its most recent assessment, coal fired plants still serve as the single largest source of generation for EPA's eGRID MROW Subregion¹, which roughly corresponds to the MRO region as defined by the North American Electric Reliability Council (NERC). Therefore the wind generation provided by the Project continues to displace fossil fuel fired power.

Step 1.3: Assess whether the continuation of use of the current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested.

This is not applicable as the project activity is considered baseline grid activity and not a continuation.

Step 1.4: Assessment of the validity of the data and parameters

The GHG emissions factors are updated as required. The revised GHG emissions factor calculations are documented in Section 4, while the data and parameters are documented in Section 5.

Step 2: Update the current baseline and the data and parameters.

This step is applicable since Step 1.4 showed that the data and parameters need to be updated.

Step 2.1: Update the current baseline

¹ <https://www.epa.gov/egrid/power-profiler#/> (Data source: 2020 data from the Emissions & Generation Resource Integrated Database (eGRID) released January 27, 2022)

The current baseline, applied in the context of the sectoral policies and circumstances that are applicable at the time of request for renewal of the crediting period, is still applicable and therefore was not updated.

Step 2.2: Update the data and parameters

The data and parameters that were only determined at the start of the crediting period and not monitored during the crediting period are no longer valid and are updated in Section 5.

3.5 Additionality

Per Section 3.8.9 of the VCS Standard Version 4.3, a full reassessment of additionality is not required when renewing a project's crediting period. Regarding the VCS' requirement pertaining to Regulatory Surplus, BEPC has not in the past and currently is still not subject to any law, statute, or other regulatory framework that gives comparative advantage to less emission intensive technologies or activities relative to more emission intensive technologies or activities, nor is the Project being used as a means of compliance with any South Dakota or US federal law or requirement. The Project was and remains voluntary, and the Project's emission reductions should be considered surplus in nature.

3.6 Methodology Deviations

None.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Per the CDM Methodological Tool07 (v7.0), baseline emissions include only CO₂ emissions from electricity generation in fossil fuel fired plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid connected power plants and the addition of new grid connected power plants.

The baseline emissions are $BE_y = EG_{PJ,y} * EF_{grid,CM,y}$ where

BE_y = Baseline emissions in year y (tCO₂e / yr)

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)

$EF_{grid,CM,y}$ = Combined margin CO2 emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (tCO2 / MWh)

Since the project is a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, then:

$$EG_{PJ,y} = EG_{facility,y}$$

Where:

$EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)

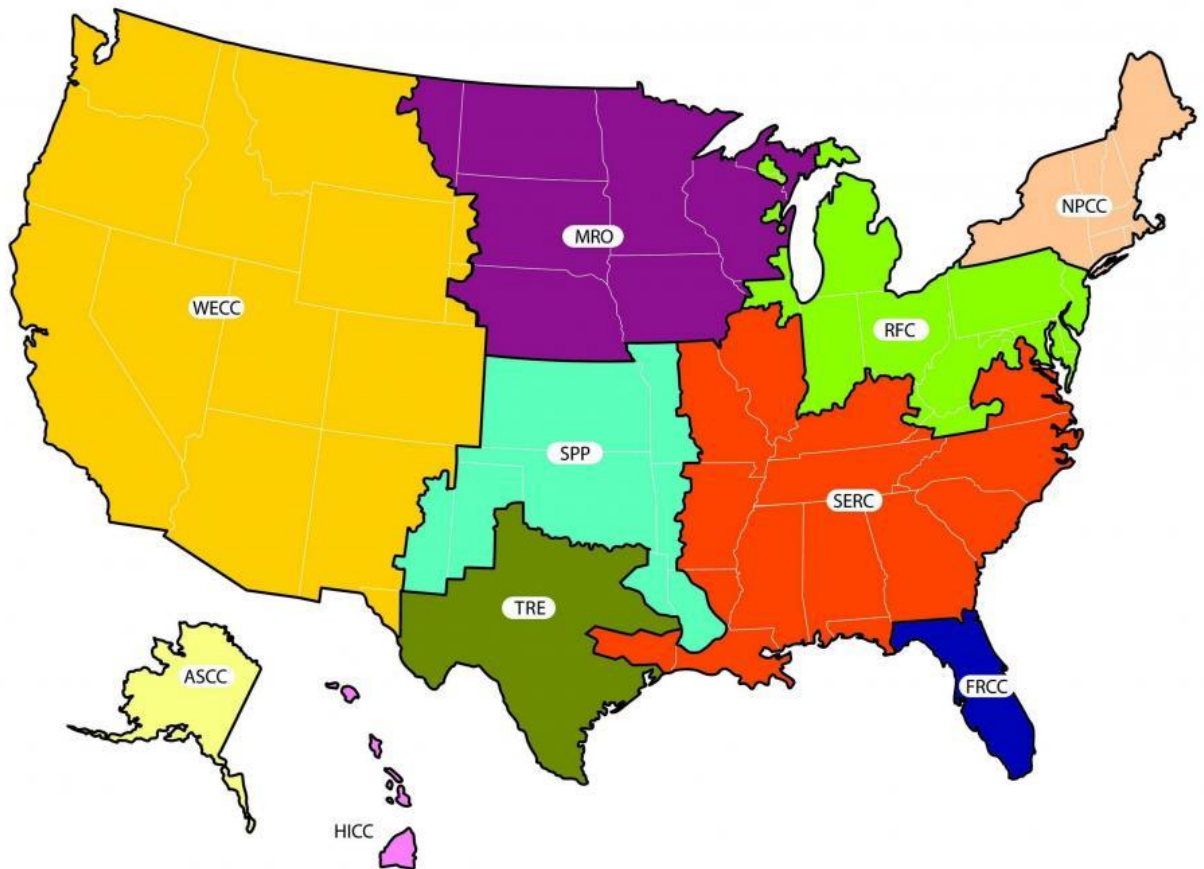
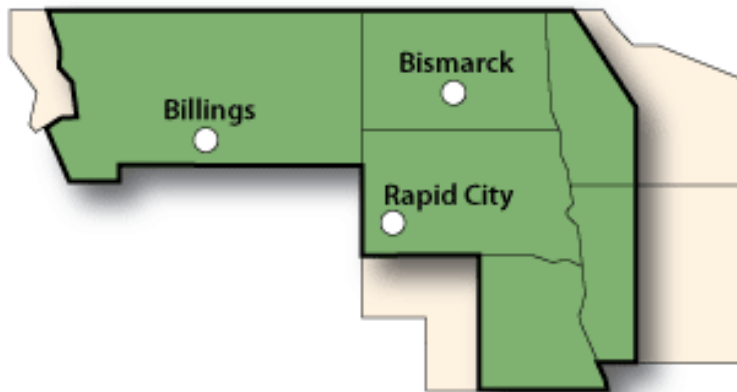
We then calculate $EF_{grid,CM,y}$ using the CDM Tool’s Baseline methodology procedure, applying the six steps:

Step 1: Identify the relevant electricity systems.

For the purpose of determining the electricity emission factors, a project electricity system is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity (e.g. the renewable power plant location or the consumers where electricity is being saved) and that can be dispatched without significant transmission constraints. The protocol requires that if electricity systems are well defined in the country in question, that those official designations be used.

The United States has a well-defined electricity system, with eight regional electric systems defined by the North American Electric Reliability Council (NERC). The BEPC facility is interconnected to the Southwest Power Pool at the Wessington Springs (SD) 230-kV Switchyard, which is part of the MRO NERC region:

UPPER GREAT PLAINS SERVICE AREA



This is a representational map; many of the boundaries shown on this map are approximate because they are based on companies, not on strictly geographical boundaries.
September 2015

In the Initial Project Description the MRO was presented as a clear grid boundary for the project, and we continue to use the MRO as the appropriate boundary and for this Second Crediting Period Project Description.

Step 2: Choose whether to include off grid power plants

We choose not to include off grid power plants, as this is optional in the methodology, and we do not have access to that data. Hence, we follow Option 1, only grid connected power plants are included in the calculation.

Step 3: Select a method to determine the operating margin (OM).

Upon reviewing the OM methods and the associated conditions that need to be met to apply a specific OM, it was determined that the calculation of the operating margin emission factor ($EF_{grid,OM,y}$) should be based on the Simple Operating Margin (Simple OM, Step 3, option a). In addition, the ex-ante option is chosen for the Simple OM.

The Simple OM is allowed to be used if low cost must run resources (LCMR) constitute less than 50% of the total grid generation in the five most recent years using the approved outlined approaches based on five most recent years of historical data². Per the definition in the CDM Rule Section 4(10)(i), low cost must run resources:

are defined as power plants with low marginal generation costs or are dispatched independently of the daily or seasonal load of the grid. They include as hydro, geothermal, wind, low-cost biomass, nuclear, and solar generation. If a fossil plant is dispatched independently of the daily or seasonal load of the grid and it can be demonstrated based on publicly available data, it should be considered as a low cost/must run. Electricity imports shall be treated as one LCMR plant.

Regarding LCMR technologies, we also choose to include Waste Heat Recovery plants that generate electricity from the steam created by a non-electric process and thus are dispatched independently of grid operations. Regarding units utilizing other technologies, we designate any other unit with a capacity factor of 80% or greater as being LCMR. This follows the precedent that EPA used in developing their eGRID database, where base-load units are defined as those with a capacity factor over 80%. The EIA-923 report is the source of the generation data by plant/prime mover for each fuel type.

² Per the Energy Information Administration's website, the most recent year for which data had been finalized during the preparation of this report was 2020.

The LCMR 5-year average is then determined per the following chart:

Low Cost Must Run Unit Generation as Percentage of Total Grid

	2020	2019	2018	2017	2016
LCMR Unit Generation (MWh)	118,079,936	106,930,736	103,540,975	100,698,400	88,825,544
Total Grid MWhs	234,012,055	240,375,985	242,914,997	228,995,036	222,471,443
LCMR Percentage	50.46%	44.48%	42.62%	43.97%	39.93%
Five Year Average					44.29%

Since the LCMR 5-year average is less than 50%, the Simple Operating Margin is applicable and will be used. The ex-ante option for the Simple OM is chosen.

Step 4: Calculate the operating margin emissions factor according to the selected method

The Simple OM is calculated using Option A, based on the net electricity generation and the CO₂ emission factor of each power unit. Per Equation (3),

$$EF_{grid,OMsimple,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

$EF_{grid, OM simple y}$ - Simple operating margin CO₂ emissions factor in year y

$EG_{m,y}$ - Net quantity of electricity generated by power unit m in year y

$EF_{EL, m, y}$ - CO₂ emission factor of power unit m in year y (tCO₂ / MWh)

m - All power units serving the grid except low cost must run units

y - Relevant year

Per Equation (4), $EF_{EL, m, y}$ is determined by:

$$EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_{m,y}}$$

$FC_{i,m,y}$ - Amount of fossil fuel type i consumed by power unit m in year y (Mass or Unit Volume)

$NCV_{i,y}$ - Net Calorific value (energy content) of fossil fuel type i in year y (GJ/mass or unit volume)³

$EF_{CO2,i,y}$ - CO₂ Emissions Factor of Fossil Fuel type i in year y (tCO₂/GJ)

$EG_{m,y}$ - Net quantity of electricity generated by power unit m in year y (MWh)

m - All power units serving the grid except low cost must run units

y - Relevant year

i - Fossil fuel types combusted in power unit m in year y.

³ The EIA 923 data lists fuel use by energy content (MMBTUs) and represents the product of $FC_{i,m,y}$ and $NCV_{i,y}$

Since the ex-ante option was chosen, the three most recent years of grid data are used in our calculations. The emissions for each unit are then calculated using the following process:

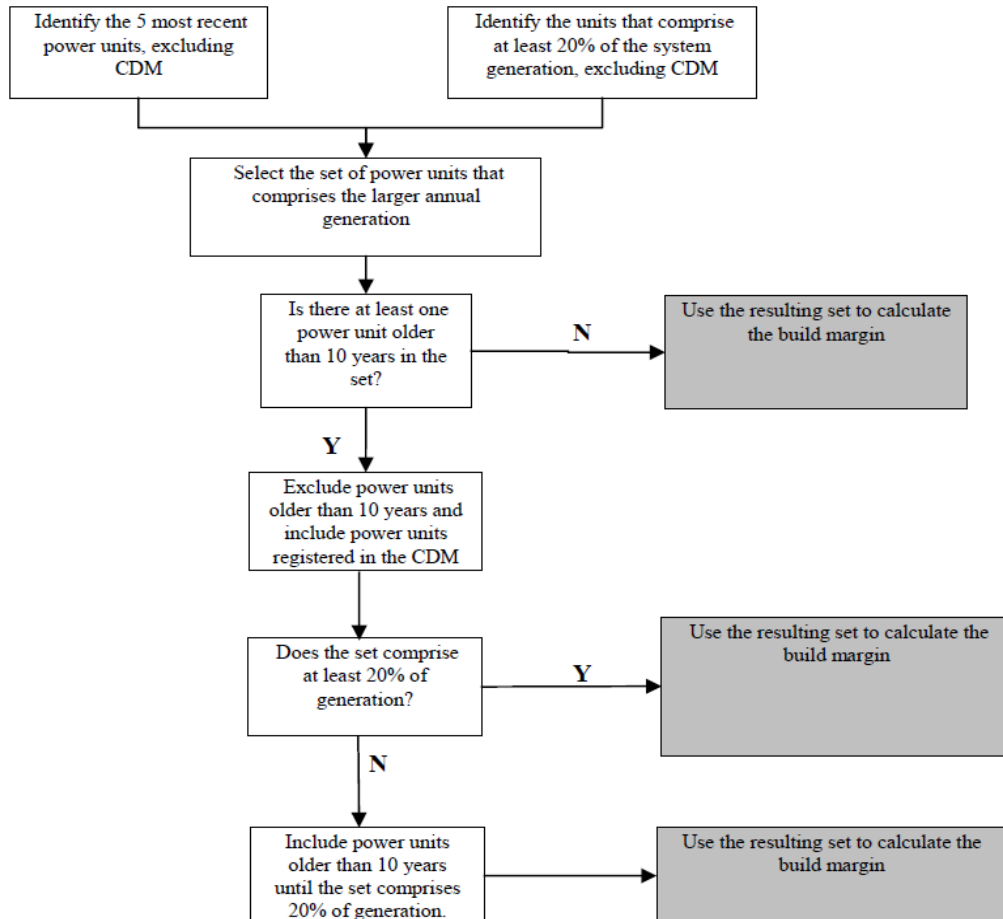
- 1) The EIA 923 Report provides the “Elec Fuel Consumption” (in MMBtus) for each fuel used at a plant to generate electricity and represents the product of $NCV_{i,y}$ and $FC_{i,m,y}$.
- 2) For each fuel type used at a specific unit, we look up the EIA’s GHG combustion factor by fuel type. This combustion factor is provided by EIA for each fuel type and is used for the preparation of GHG inventories.
- 3) The “Elec Fuel Consumption” for a specific fuel type used at a plant is then multiplied by the EIA’s GHG combustion factor (in kg CO₂ / MMBtu) for that fuel type. The total emissions for that unit are the SUM of emissions from each fuel type divided by 1000 to convert it into Metric Tonnes (tCO₂).
- 4) The total MWhs generated by the MRO grid connected units were calculated (and explained above under the LCMR analysis section).

Operating Margin Calculation

	2020	2019	2018	
Total Power Generated (MWhs)	234,013,337	240,375,985	242,914,997	
Total GHG Emissions (tCO ₂)	99,661,317	116,891,761	125,557,316	
Emissions Intensity per MWh (tCO ₂ /MWh)	0.4259	0.4863	0.5169	
Three Year Average			0.4763	tCO₂/MWh

Step 5: Calculate the Build Margin Emission Factor (BM)

The build margin is calculated using Option 1, requiring that the BM is updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period. Thus we are using EIA 860 and 923 data from 2020. The build margin uses the following procedure:



Using this Unit Generation in MWhs factor, the above procedure is implemented to identify the set of plants for the Build Margin. The substeps for Step 5 is as follows:

Step 5a: Identify the set of five power units, excluding power units registered as CDM (VCS) project activities, that started to supply electricity to the grid most recently and determine their annual electricity generation (AEG).

Per the EIA-860 and EIA-923 combined model, we show that there were three solar units that declared a commercial operations date of January 2021 and 19 units that began generating in December 2020, all of which are wind or solar units. We select the two wind units as the largest units from the 19 December 2020 units and using liberal capacity factors of 20% for

the solar units and 55% for the wind units (the highest observed capacity factors for any wind or solar unit from the 2020 EIA-923 report), we estimate a combined annual generation of the 17 units of 756,864 MWhs.

Step 5b: Determine the annual electricity generation of the project electricity system and identify the set of power units that started to supply electricity to the grid and comprise 20% of the total

Using the Total generation from the 2020 EIA-923, we calculate:

$$AEG_{Set>20\%} = 234,012,055 \text{ MWhs} \times 20\% = 46,802,411 \text{ MWhs}$$

Step 5c: Since the number in step 5b is larger than 5a, the Set_{sample} is the set which comprises 20% of the total generation.

Step 5d: Review the units comprising the Set_{sample} to determine if there are any units older than 10 years old.

Since the Operational Month and Year of the marginal unit is January 2014, there are no units older than 10 years old and the Set_{sample} is the set which comprises 20% of the total generation.

The build margin is then calculated using Equation 15:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

$EG_{m,y}$ - Net quantity of electricity generated by power unit m in year y

$EF_{EL,m,y}$ - CO2 emission factor of power unit m in year y (tCO2 / MWh)

m – those units comprising 20% of the year y grid generation (Set_{sample})

y - Relevant year

As before, a combination of the EIA 860 and EIA 923 data is used for this calculation. The EIA 860 Data for each year surveys units by fuel types used and operating status and provides the Operating Month and Year of every unit. On the other hand, the EIA-923 only releases unit level data for a small subset of plants (none of which were a part of the Set_{sample}). The comprehensive data required for this calculation is aggregated based on plant and prime mover. In order to model multiple units at a single plant that have the same prime mover, we allocate the associated generation and fuel data to each unit as follows:

- 1) Using the EIA 860 data, calculate the total nameplate capacity for all units at a plant sharing a prime mover ($\Sigma_{\text{Plant, Prime Mover}}$).
- 2) Calculate a Unit Scaling Factor for each unit for which unit level EIA 923 generation data is unavailable by taking each unit's capacity and dividing it by $\Sigma_{\text{Plant, Prime Mover}}$.
- 3) Multiply the Plant/Prime Mover Total generation from the EIA-923 by the Unit Scaling Factor to get the Estimated Unit Generation.
- 4) Sum the amount of generation by Month/Year of Operation until we arrive at the set that constitutes 20% of the grid generation to determine the units to include in $\text{Set}_{\text{sample}}$
- 5) Calculate the fuel consumed by the units included in $\text{Set}_{\text{sample}}$
- 6) Calculate the emissions associated with the fuel used by the units in $\text{Set}_{\text{sample}}$ by using the EIA fuel emissions factors.
- 7) In case there are multiple units that comprise the marginal generation to achieve the 20% threshold, determine the pro rata contribution of the units to arrive at the 20% generation threshold. We observed that the generation that began operation in December 2016 was sufficient to fulfill the 20% obligation, and since all of those units had a zero emission factor, there was no need to calculate a pro rata contribution.

Step 5e: Calculate the build margin emission factor.

The build margin is calculated to be the following:

Build Margin Calculation

	2020	
Total Power Generated (MWhs)	234,012,055	
20% Threshold for Build Margin Calculation (MWhs)	46,802,411	
Total GHG Emissions from Most Recently Operational Units comprising 20% of Total Power Generated (tCO ₂)	2,946,259	
Build Margin	0.0630	tCO₂/MWh

Step 6: Calculate the combined margin (CM) emissions factor.

Finally, the Combined Margin $EF_{grid,CM,y}$ is calculated to be:

$$EF_{grid,CM,y} = 0.75 * 0.4763 + 0.25 * 0.0630 = 0.3730 \text{ metric tons / MWh.}$$

Hence, the baseline emissions for this project are based on the MWhs generated by the wind unit and are 0.3730 metric tonnes / MWh combined margin.

We use the 2020 project generation data to calculate the baseline emissions:

$$483,622 \text{ MWhs} * 0.3730 \text{ metric tons / MWh} = 180,391 \text{ metric tons per year.}$$

4.2 Project Emissions

Per ACM0002, project emissions are considered to be zero unless the renewable technology employed is geothermal, solar thermal or hydroelectric. Since the Project utilizes wind, the project emissions are considered to be zero.

4.3 Leakage

Per ACM0002, leakage emissions are not considered.

4.4 Net GHG Emission Reductions and Removals

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
2021	159,803	0	0	159,803
2022	180,391	0	0	180,391
2023	180,391	0	0	180,391
2024	180,391	0	0	180,391
2025	180,391	0	0	180,391
2026	180,391	0	0	180,391
2027	180,391	0	0	180,391
2028	180,391	0	0	180,391
2029	180,391	0	0	180,391
2030	180,391	0	0	180,391
2031	20,587	0	0	20,587
Total	1,803,909	0	0	1,803,899

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	EF _{grid,OMsimple,y}
Data unit	Metric tons / MWh
Description	Simple Operating Margin CO2 emissions factor in year y.
Source of data	EIA 860 – unit level equipment data of US power plants EIA 923 - plant/prime mover operating data of US power plants EIA fuel emissions factors – CO2 intensity factor per fuel code
Value applied	0.4763
Justification of choice of data or description of measurement methods and procedures applied	The US Energy Information Administration is the most comprehensive source of data for all aspects of the US power grid. All generators with a capacity of 1 MW or greater are required by law to register file their annual operating data.
Purpose of Data	Calculation of baseline emissions
Comments	The ex-ante option is chosen

Data / 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 - plant/prime mover operating data of US power plants
Value applied	Varies by unit by year
Justification of choice of data or description of measurement methods and procedures applied	The US Energy Information Administration is the most comprehensive source of data for all aspects of the US power grid. All generators with a capacity of 1 MW or greater are required by law to register file their annual operating data.
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	$EF_{EL,m,y}$
Data unit	Metric tons / MWh
Description	CO2 emissions factor of power unit m in year y
Source of data	EIA 923 - plant/prime mover operating data of US power plants EIA fuel emissions factors – CO2 intensity factor per fuel code
Value applied	Varies by unit
Justification of choice of data or description of measurement methods and procedures applied	EIA 923 - plant/prime mover operating data of US power plants EPA eGRID 2020 Dataset – derived from EIA 860 and EIA 923 EIA fuel emissions factors – CO2 intensity factor per fuel code
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	$FC_{i,m,y} \times NCV_{i,y}$
Data unit	MMBtu
Description	Quantity of fossil fuel type i in year y
Source of data	EIA 923 - plant/prime mover operating data of US power plants
Value applied	Varies by unit
Justification of choice of data or description of measurement methods and procedures applied	The US Energy Information Administration is the most comprehensive source of data for all aspects of the US power grid. All generators with a capacity of 1 MW or greater are required by law to register file their annual operating data.
Purpose of Data	Calculation of baseline emissions
Comments	Note that the EIA 923 data set is based on measured heat content of fuel used (MMBtus) rather than mass or volume and represents the product of the two parameters.

Data / Parameter	EF _{CO2,i,y}
Data unit	kg CO2e/MMBtu
Description	CO2 emissions factor of fossil fuel type <i>i</i> in year <i>y</i>
Source of data	EIA fuel emissions factors – CO2 intensity factor per fuel code
Value applied	Varies by fuel type
Justification of choice of data or description of measurement methods and procedures applied	The US Energy Information Administration is the most comprehensive source of data for all aspects of the US power grid. The EIA fuel emissions factors are assigned to the fuel codes used in the EIA 923 reports.
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	EF _{grid,BM,y}
Data unit	Metric tons / MWh
Description	Build Margin CO2 emissions factor in year <i>y</i>
Source of data	EIA 860 – unit level equipment data of US power plants EIA 923 - plant/prime mover operating data of US power plants EPA eGRID 2020 Dataset – derived from EIA 860 and EIA 923 EIA fuel emissions factors – CO2 intensity factor per fuel code
Value applied	0.0630
Justification of choice of data or description of measurement methods and procedures applied	The US Energy Information Administration is the most comprehensive source of data for all aspects of the US power grid. All generators with a capacity of 1 MW or greater are required by law to register file their annual operating data.
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	$EG_{m, y}$
Data unit	Metric tons / MWh
Description	Net quantity of electricity generated and delivered to the grid by power unit m in year y
Source of data	EIA 923 - plant/prime mover operating data of US power plants
Value applied	Varies by unit
Justification of choice of data or description of measurement methods and procedures applied	The US Energy Information Administration is the most comprehensive source of data for all aspects of the US power grid. All generators with a capacity of 1 MW or greater are required by law to register file their annual operating data.
Purpose of Data	Calculation of baseline emissions
Comments	

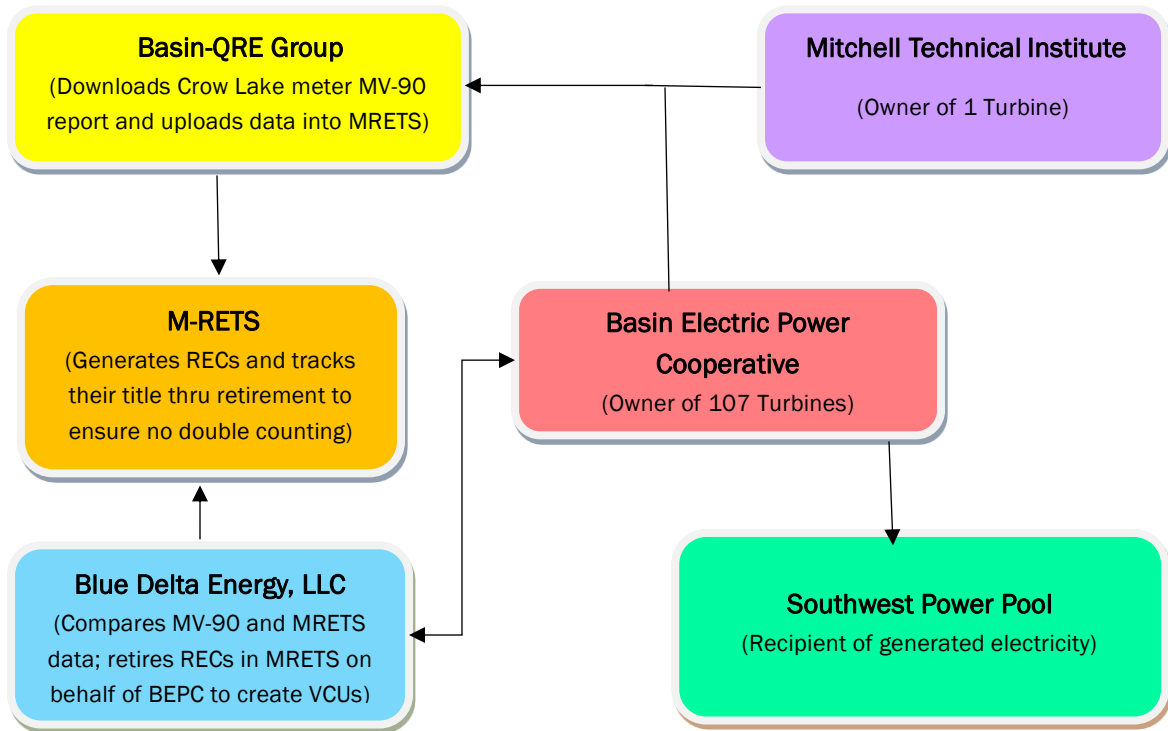
Data / Parameter	$EF_{EL, m, y}$
Data unit	Metric tons / MWh
Description	Emissions factor of power unit m in year y
Source of data	EIA 923 - plant/prime mover operating data of US power plants EPA eGRID 2020 Dataset – derived from EIA 860 and EIA 923 EIA fuel emissions factors – CO2 intensity factor per fuel code
Value applied	Varies by unit
Justification of choice of data or description of measurement methods and procedures applied	The US Energy Information Administration is the most comprehensive source of data for all aspects of the US power grid. All generators with a capacity of 1 MW or greater are required by law to register file their annual operating data.
Purpose of Data	Calculation of baseline emissions
Comments	The ex-ante option is chosen

Data / Parameter	Combined Margin $EF_{grid,CM,y}$
Data unit	Metric tons / MWh
Description	The Combined Margin representing the CO ₂ emissions factor for the grid power displaced due to the project activity, during the year y in metric tons CO ₂ /MWh.
Source of data	Calculated based on tool for calculating emissions intensity of the relevant electric grid; Sources include EIA 923, EIA860, and EPA eGRID databases as well as EIA fuel emissions factors
Value applied	0.3730 t/MWh
Justification of choice of data or description of measurement methods and procedures applied	$w1 * \text{Simple OM} + w2 * \text{Build Margin}$, where: $w1 = 0.75$ $w2 = 0.25$ - Simple OM = 0.4763 - Build Margin = 0.0630.
Purpose of Data	Calculation of baseline emissions
Comments	The ex-ante option is chosen

5.2 Data and Parameters Monitored

Data / Parameter	EG _{facility,y}
Data unit	MWhs
Description	Quantity of net electricity generation supplied by the project plant to the grid in year y (MWh/yr)
Source of data	Schweitzer Engineering Laboratories SEL-734 revenue grade meter
Description of measurement methods and procedures to be applied	The SEL-734 revenue grade meters records power generated on a continuous basis. Production is then aggregated using hourly intervals such that the 8760 hourly production is available for each year. Data monitoring and recording (via RECs) takes place monthly, when Basin-QRE reads the meters and submits data to the Midwest Renewable Energy Tracking System (MRETS). The monthly REC data from MRETS is used to calculate the emissions reductions.
Frequency of monitoring/recording	Data Recording: Continuous Data Aggregation: Hourly Data Monitoring: Monthly
Value applied	The actual unit generation recorded on an annual basis. For 2020: 483,622 MWhs
Monitoring equipment	The project operator has installed a Schweitzer Engineering Laboratories SEL-734 revenue grade meter (Serial No. 2009160413) metering device.
QA/QC procedures to be applied	Per the Interconnection Agreement, the meter is to be calibrated at a minimum of every three years. The project operator will provide a report detailing the calibration activities.
Purpose of data	Calculation of baseline emissions
Calculation method	
Comments	

5.3 Monitoring Plan



Parties Involved in tracking the Project Data:

Basin Electric Power Cooperative: Project operator, owner of 107 Turbines of the Project and purchaser of the power and environmental attributes from the remaining turbine.

Mitchell Technical Institute: owner of 1 Turbine of the Project.

Southwest Power Pool (SPP): the recipient of all electricity generated by the Project.

Basin-QRE Group: the internal entity at BEPC responsible for downloading the aggregated hourly data from the meter using MV-90 software and uploading the monthly electricity generation to the M-RETS Renewable Electricity registry.

M-RETS: an independent non-profit data registry responsible for creating RECs (including verifying the volume based on error checks) and tracking the providence of the RECs from creation thru their retirement as part of the creation of the VCUs.

Blue Delta Energy, LLC: the consultant and authorized representative for BEPC responsible for preparing the verification and validation documents for the Project on behalf of BEPC. Blue Delta personnel were involved with the original Project validation and have completed all the previous Monitoring Reports for the Project.

For contact information of the parties involved in the project, see Sections 1.3 Project Proponents and 1.4 Other Entities Involved in the Project.

The following provides a summary of the data recording, collection, verification and processing procedures for the Project as well as the QA/QC and retention standards:

- Data Monitoring
 - A Schweitzer Engineering Laboratories SEL-734 revenue grade meter (Serial No. 2009160413) records power delivered to the SPP grid on a continuous basis.
 - Data recording takes place on a monthly basis when the Basin-QRE group uses MV-90 software to interrogate the SEL meter and download an Excel report (the “MV-90 report”) which aggregates the generation on an hourly basis.
 - The Basin QRE group then uploads this file into the M-RETS Renewable Electricity registry, which performs validation checks on the input data as a part of its REC creation process.
 - The M-RETS RECs represent the Project’s electricity generation (EG_{facility, year}) used to calculate the Project’s emissions reductions.
 - Based on the Interconnection Agreement between PWSD1 and WAPA as well as the WAPA Metering Guidelines, meter calibrations are to take place every three years at a minimum, though BEPC normally conducts testing on a more frequent basis.
 - BDE’s senior management reviews both the source level MV-90 reports and compares them to the annual quantity of RECs created in MRETS, and also reviews the meter test to see if there were any errors or non-conformities that need to be addressed by BEPC.
 - Once BDE is satisfied with its accuracy, the M-RETS data is used in the calculation of the emissions reductions.
 - BDE retires the RECs in M-RETS prior to the creation of the VCU, and the M-RETS REC retirement report is provided to the Verifier.
 - Monitoring records will be retained for 12 years.
 - The final step of non-conformance resolution is to review and (if necessary) update the appropriate sections of the QA/QC procedures.
- BEPC provides access to the revenue quality metering device as well as information for all test, measurement, and project operating equipment. This information is updated over the life of the project as devices are replaced. The device record will include a basic specification sheet for each metering device used to measure the Project’s generation to the grid.
- Calibration Log: WAPA will perform metering device testing and perform recalibrations as required in the Interconnection Agreement. BEPC will provide WAPA’s report detailing any recalibration activities associated with the project activity.

- Extraordinary Events: BEPC will report any extraordinary and significant unscheduled maintenance or repair activities identified that cause system downtime and would therefore limit the production of emission reductions from the Project.