29.70 MW WIND POWERPROJECT IN KARNATAKA, INDIA

Document Prepared by Kosher Climate India Private Limited

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Project Title	29.70 MW WIND POWER PROJECT IN KARNATAKA, INDIA
Version	02.1
Report ID	0051
Date of Issue	11-August-2021
Project ID	0051
Monitoring Period	01-January-2012 to 31-December-2017
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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The project activity is the installation wind power projects at two sites Arasinagundi and Anabaru in close proximity in district Davangere in the Indian State of Karnataka. The total capacity of the project is 29.7 MW comprises of 18 No's of 1.65 MW WTGs. Acciona Wind Energy Pvt. Ltd. (AWEPL) is the project developer which is the 100% subsidiary of the Spanish Acciona group of companies, i.e. Acciona Energia Internacional, S.A. and Acciona, S.A.

The entire capacity of the project is connected to the Indian national grid and supplying generated renewable power to the Karnataka State electricity grid i.e. Bangalore Electricity Supply Company (BESCOM).

All the WTGs involved in the project activity were commissioned in two phases. Commissioning details of all the WTGs are given below:

Sl. No	Site Name	WTG ID	Commissioning Date
01	Arasinagundi site	30166, 30167, 30168, 30169, 30170, 30171, 30172, 30173	06/06/2008
02	Anaburu Site	30436, 30437, 30438, 30439, 30440, 30441, 30442, 30443, 30444, 30445	29/09/2008

The project activity is a Greenfield project for generation of electrical energy using wind which is a renewable source of energy. In wind energy generation, kinetic energy of the wind is converted into mechanical energy and subsequently into electrical energy. Since electricity is generated from wind energy, no emissions are attributed to the project emissions and due to that equivalent amount of fossil-fuel dominated grid can be displaced due to the project activity.

During the monitoring period 01-January-2012 to 31-December-2017, the total emission reductions achieved by this project activity were 512,372 tCO2e through displacing 550,941MWh of electricity from fossil-fuel dominated electricity grid with electricity generation using wind energy resources.

1.2 Sectoral Scope and Project Type

Sectoral Scope 1: Energy Industries (renewable / non-renewable sources)

Project Type: Renewable Energy Project (Wind)

1.3 Project Proponent

Organization name	Acciona Wind Energy Pvt. Ltd. (AWEPL)[1]
Contact person	Rajnish Krishanlal Sapra
Title	Mr.
Address	C1-001, Tower C, The Millennia, 1&2 Murphy Road, Ulsoor, Bangalore 560 008.
Telephone	(+91) 80 4155 7102
Email	rsapra@acciona.com

1.4 Other Entities Involved in the Project

Organization name	Kosher Climate India Private Limited
Role in the Project	Project Representative
Contact person	Vamsi Krishna
Title	Mr.
Address	#109, 2nd Floor, 27th Main, Sector – 1, HSR Layout, Bangalore-560102, India.
Telephone	Mobile: +91- 9945343475 Ph: +91- 80- 25720814
Email	carbon@kosherclimate.com, vamsi@kosherclimate.com

1.5 Project Start Date

The project start date is 06-June-2008 which is the date of commissioning of the first phase of WTGs of the 29.7 MW wind power project

1.6 .Project Crediting Period

The crediting period of the project activity is fixed for 10 years.

[1] In the CDM PDD, the project proponent name was wrongly mentioned as Accion Wind Energy Pvt. Ltd. Later, the PP name was corrected to Acciona Wind Energy Pvt. Ltd. This correct PP name can be verified form CDM & VCS project database.

The crediting period start date is considered from 06-June-2008 for the project activity. The crediting period chosen is of 10 years (i.e. from 06-June-2008 to 31-May-2018)[2] which is not applicable to renew further as per the VCS project standard version 4.1

1.7 Project Location

The project activity is located at Anabaru and Arasinagundi villages of the Jagalur Taluk in the district of Davangere, Karnataka state, India. The project site is well connected from airport and railway station respectively. Anabaru and Arasinagundi are approximately 35 kms from Chitradurga town, and approximately 250 kms from Bangalore, the capital city of Karnataka.

The sites of Anabaru and Arasinagundi are located at a latitude and longitude of around 14°28' – 14°34' N and 76°20' – 76°23' E. They are at 700-810 meters from the mean sea level.

Project Location

[2] PP already claimed emission reduction under VCS for the period for the period from 06-June-2008 to 21-November-2008. This is second monitoring period under VCS

Geographical coordinate of each WTG are given below:

No	WTG ID	Latitude (°N)	Longitude (°E)
1	30166 (AG-01)	14.47483843	76.34994999
2	30167 (AG-02)	14.47622071	76.34911615
3	30168 (AG-03)	14.47770168	76.34873595
4	30169 (AG-04)	14.47905862	76.34792056
5	30170 (AG-05)	14.4804490	76.34716652
6	30171 (AG-06)	14.48224514	76.34583481
7	30172 (AG-07)	14.48371893	76.34587135
8	30173 (AG-08)	14.48534657	76.34559676
9	30436 (AN-01)	14.5839420	76.39723901
10	30437 (AN-02)	14.58197308	76.39601927
11	30438 (AN-03)	14.57905375	76.39291931
12	30439 (AN-04)	14.57716689	76.39296658
13	30440 (AN-05)	14.57508726	76.39244188
14	30441 (AN-06)	14.57290476	76.39131367
15	30442 (AN-07)	14.57003982	76.39328443
16	30443 (AN-08)	14.56706873	76.39135659
17	30444 (AN-09)	14.56497052	76.39054455
18	30445 (AN-10)	14.56267174	76.39003996

1.8 Title and Reference of Methodology

Methodology Title: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" ACM0002 version 06.

Following tools have been referred in the project demonstration

- Tool for the demonstration and assessment of additionality, Version 03.

1.9 Participation under other GHG Programs

The project activity has also been registration with UNFCCC under Clean Development Mechanism (CDM) program, with UN reference number is 1949[3]. The project proponent has provided undertaking that it will not claim any GHG credits for UNFCC CDM during the current monitoring period.

However, GHG credits for this project activity were issued for the monitoring period of 06-June-2008 to 21-November-2008 under CDM and GHG credits for the

[3] https://cdm.unfccc.int/Projects/DB/DNV-CUK1216117082.43/view

monitoring period of 20-November-2008 to 31-December-2011were issued under CDM.

1.10 Other Forms of Credit

India is Non-annex1 country and there is no compliance with an emission trading program or to meet binding limits on GHG emissions for this project activity. The project is registered under CDM with UNFCCC (Registration ID 1949). However, the project proponent (PP) has submitted undertaking that they will not claim GHG credits under CDM in the current monitoring period. PP has also provided undertaking that it would not use net GHG emission reductions by the projects for compliance with emission trading program to meet binding limits on GHG emissions.

Besides, the project proponent has also submitted undertaking for not availing other forms of environmental credits including that of Renewable Energy Certificate (REC) for the same crediting period under consideration.

1.11 Sustainable Development

The National CDM Authority (NCDMA), which is the Designated National Authority (DNA) for the Government of India (GOI) under the Ministry of Environment and Forests (MoEF) has mentioned four indicators for the sustainable development. The project participant's view on the contribution of this project activity towards sustainable development is explained below:

Social Well-Being:

- The installation of the wind power project contributed to the rural and basic infrastructure development like roads and sanitation in the surrounding rural villages .

Economic Well-Being:

- The installation of wind power project in rural areas will result in generating local employment opportunities and capacity building of the local employees. This would result in the improvement in living standards of the local community.
- The project will provide encouragement to other entrepreneurs to invest into renewable energy sources.

Environmental Well-Being:

- The power plant generating electricity through renewable resource such as wind power, would lead to reduction in usage of fossil fuels e.g. Coal, oil, natural gas.
- The reduction in usage of fossil fuels for electricity generation will result in reduction of the release of associated GHG emissions (CO2 and CH4 emissions).

- The use of renewable energy for power generation will avoid the emission of air pollutants such as Suspended Particulate Matter (SPM), Sulphur Dioxide (SO2) and Nitrogen Oxides (NOx) thereby improvising the surrounding air quality

Technological Well-Being:

- The project activity involves installation and operation of state-of-art wind turbine generators (WTGs) of Vestas make. The implementation of these new technologies will help in increasing reliability of renewable energy generation and encourage development of even better technology in the future.
- The project activity deploys the technology, which is environmentally safe and sound, as it does not produce greenhouse gases and any toxic or radioactive waste.

2 SAFEGUARDS

2.1 No Net Harm

The project does not involve any potential negative environmental and socio economic impacts and hence this criteria is not applicable to this project activity.

2.2 Local Stakeholder Consultation

Project Proponent conducted local stakeholder consultation extensively during registration of the project - identification of local stakeholders, invitation of them, held meeting where project activity was explained in details and the PP also took due care of comments/suggestions of the local stakeholders.

The process of local stakeholder consultation is continuous. During the current monitoring period, the project proponent has kept grievance register in plant site office and sought comments/grievances/suggestions from local stakeholders including local community, government agencies and NGOs. Besides, the PP has also kept provision for submitting comments/grievances/suggestions from local stakeholders through direct mail and through writing. All comments/grievances/suggestions received from stakeholders through mail and writing will be recoded in a grievance register maintained at site. The site in-charge is responsible for addressing the grievances. However, no major comments/grievances/suggestions have been received from the aforementioned stakeholders during the current monitoring period and all such minor suggestions have been take care by the PP

2.3 AFOLU-Specific Safeguards

Not applicable to this as this is not an AFOLU project activity

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project has been completed and the monitoring equipments were installed to monitor the parameters as described in the registered Project Description Document (PDD).

The Project activity is the installation of 18 No's of 1.65 MW Wind turbine generators generating power and supplying to the national grid. Project activity installs 1.65 MW Vestas make V82 model Wind Turbine Generators (WTGs). All the WTGS involved in the project are already commissioned and operational. The project was commissioned in two phases 8 WTGs were commissioned on 06-June 2008 and 10 WTGS were commissioned on 29-September-2008.

Technical specifications of the WTGs installed are provided below.

Description	**Specifications**
Tower/Rotor Height	78 Meter
Rotor Diameter	82 Meter
Installed electrical output	1,650 kW
Cut-in wind speed	3.5 m/s.
Rated wind speed	7.5 m/s.
Cut-out wind speed	20 m/s. (10 minute average)
Rotor swept area	5,281 sq. meters.
Rotational speed	14,4 rpm
Rotor material Blades Material	Carbon fibre/epoxy/wood/glass
Regulation	Active Stall
Generator	1-speed, water cooled.
Rated output	1,650 kW
Rotational speed at rated power	1,012 rpm
Operating voltage	3 x 690 V
Frequency	50 Hz
Insulation class	F/B
Cooling system	Oil cooler/Radiator: Cooling capacity 37.5 kW Water cooler/Radiator: Cooling capacity 46.2 kW

Gear Box	1. step planet, 2. step helical
Manufacturer	Vestas
Gear ratio	1:70,2
Nominal load Gearbox Mechanical power	1,800 kW
Yaw Drive System	Planetary gear motor.
Yaw bearing	Ball bearing, internal gearing.
Aerodynamic brake	Hydraulic disc brake
Mechanical brake	Hydraulic disc brake
Control unit	SCADA

All the WTGs involved in the project activity are already commissioned and operational. The WTGs are under operation since the date of commissioning and no event has been identified which may impact GHG emission reduction.

The project was in operation continuously with minor outages during the current monitoring period. The logbook records for the outages are provided to the DOE for verification.

3.2 Deviations

2.3.1 Methodology Deviations

No Methodology deviation is applied during this monitoring period.

2.3.2 Project Description Deviations

No deviations occurred to monitoring plan or methodology in this project activity.

3.3 Grouped Projects

The project is not a grouped project thus this is not applicable.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{OM,Y}$
Data unit	tCO_2/MWh
Description	Operating margin emission factor for southern regional grid.
Source of data	Referred from CO_2 Baseline Database for the Indian Power Sector prepared by Central Electricity Authority, Version 2.0.
Value applied	1.004 tCO_2/MWh

Justification of choice of data or description of measurement methods and procedures applied	Calculated as per ACM0002 with 3 years vintage data and option of *ex-ante* calculation based on Simple Operating Margin Method. Computed once during PDD finalization (ex-ante).
Purpose of Data	Calculation of baseline emissions
Comments	The value is fixed and it is same for the entire crediting period

Data / Parameter	$EF_{BM,Y}$
Data unit	tCO_2/MWh
Description	Build margin emission factor for southern regional grid.
Source of data	Referred from CO_2 Baseline Database for the Indian Power Sector prepared by Central Electricity Authority, Version 2.0.
Value applied	0.711 tCO_2/MWh
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per ACM0002 with 3 years vintage data and option of ex-ante calculation based on "20% of total generation approach". Computed once during PDD finalization (ex-ante).
Purpose of Data	Calculation of baseline emissions
Comments	The value is fixed and it is same for the entire crediting period

Data / Parameter	$EF_{,Y}$
Data unit	tCO_2/MWh
Description	Combined margin CO_2 emission factor for southern regional grid.
Source of data	Estimated figure based on 75% of OM and 25% of BM values, referred from CO2 Baseline Database for the Indian Power Sector prepared by Central Electricity Authority, Version 2.0.
Value applied	0.93 tCO_2/MWh
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per ACM0002 with 3 years vintage data and option of ex-ante calculation based on 75% of OM and 25% of BM values approach". Computed once during PDD finalization (ex-ante).
Purpose of Data	Calculation of baseline emissions
Comments	The value is fixed and it is same for the entire crediting period

4.2 Data and Parameters Monitored

Data / Parameter	EG_y

<table>
<tr><td>Data unit</td><td>MWh</td></tr>
<tr><td>Description</td><td>Net electricity supplied to BESCOM facility using KPTCL network.</td></tr>
<tr><td>Source of data</td><td>Joint energy meter reading available at project grid integration point and invoice to DISCOM.</td></tr>
<tr><td>Description of measurement methods and procedures to be applied</td><td>Measurement methods and procedures are according to that detailed in the Power Purchase Agreement. Energy exported and imported from the project activity is measured & recorded by the energy meter located at BESCOM Sub-station. Monthly readings are recorded in the presence of the site personnel and BESCOM representative.
Measurement methods and procedures:
Data Typed: Measured and Calculated (Export -Import)
Monitoring: Energy Meter is used for monitoring
Meter Calibration Frequency: Once in a Quarter
Archiving Policy: Paper & / Electronic</td></tr>
<tr><td>Frequency of monitoring/recording</td><td>Monitoring Frequency: Continuously
Recording Frequency: Monthly, summarized annually</td></tr>
<tr><td>Value monitored</td><td>550,941MWh</td></tr>
<tr><td>Monitoring equipment</td><td>Two meters (main and check) are installed at the high voltage side of the each of the step-up transformers at the Hiremallanahole substation. The main and check meters have the same accuracy level of 0.2s. Both the energy meters are bi-directional tri-vector meters.
Energy Meter Details of two sites provided below

Arasinagundi:
<table>
<tr><th colspan="5">ARA-HMP-01</th></tr>
<tr><th rowspan="2">Meter Change date</th><th colspan="2">Old Meters</th><th colspan="2">New Meters</th></tr>
<tr><th>Main Meter No</th><th>Check Meter No</th><th>Main Meter No</th><th>Check Meter No</th></tr>
<tr><td>4/6/2012</td><td>6675265</td><td>6760793</td><td>11071507</td><td>11071509</td></tr>
<tr><td>11/4/2014</td><td>11071507</td><td>11071509</td><td>13191099</td><td>No Change</td></tr>
<tr><td>27/10/2018</td><td>13191099</td><td>11071509</td><td>17074782</td><td>17074787</td></tr>
</table>
Anabaru site:
<table>
<tr><th colspan="5">ANA-HMP-03</th></tr>
<tr><th rowspan="2">Meter Change date</th><th colspan="2">Old Meters</th><th colspan="2">New Meters</th></tr>
<tr><th>Main Meter No</th><th>Check Meter No</th><th>Main Meter No</th><th>Check Meter No</th></tr>
<tr><td>4/6/2012</td><td>6767617</td><td>6774503</td><td>11071510</td><td>11071511</td></tr>
</table></td></tr>
</table>

	23/09/2015	11071510	11071511	No Change	14193209
	12/5/2017	11071510	14193209	16196539	No Change
QA/QC procedures to be applied	Total Energy exported and imported is measured by a main meter and a check meter having facilities to record export and import of energy. The Project Proponent would raise bill to the BESCOM on monthly basis for the Net energy fed into the grid after deducting the energy imported from the grid from energy exported to the grid. Energy meters are of accuracy class 0.2s and will be calibrated once in a quarter as per PPA. Sales record to the grid and the invoice raised for receiving payment from state electricity board are used to cross check this data and hence ensure consistency. All the energy meters for the current monitoring period from 1 January 2012 to 31 December 2017, calendar quarter tests for accuracy were done both for Arasinagundi and Anabaru on the same dates Meter calibration details are provided in Appendix 1.				
Purpose of the data	Calculation of baseline emissions				
Calculation method	Measured and Calculated (Export - Import)				
Comments	The Monitored Data to be kept for a minimum of two years after the end of the crediting period or the last issuance whichever is later.				

4.3 Monitoring Plan

Acciona Wind Energy Pvt. Ltd. has entered into a Maintenance and Services Agreement (MSA) with Vestas Wind Technology India Pvt. Ltd. for carrying out the necessary operation and maintenance of the project activity.

Project Owner has set out the monitoring plan for metering, recording, meter readings, meter inspections, Test & Checking and communication as per the law applicable and implemented in practice to the wind farm in the State of Karnataka and / or standard PPA (power purchase agreement) with DISCOM.

Net electricity supplied to the grid by the project is measured through approved electricity metering instruments.

Metering: The Delivered Energy is metered by the DISCOM and AWEPL at the high voltage side of the grid integration point at the Project Site.

Metering Equipment: Metering equipment is electronic trivector meter, which is required for the Project. KPTCL approved energy meter is installed by AWEPL and maintained in accordance with the prevailing electricity standards, which also involved calibrating the

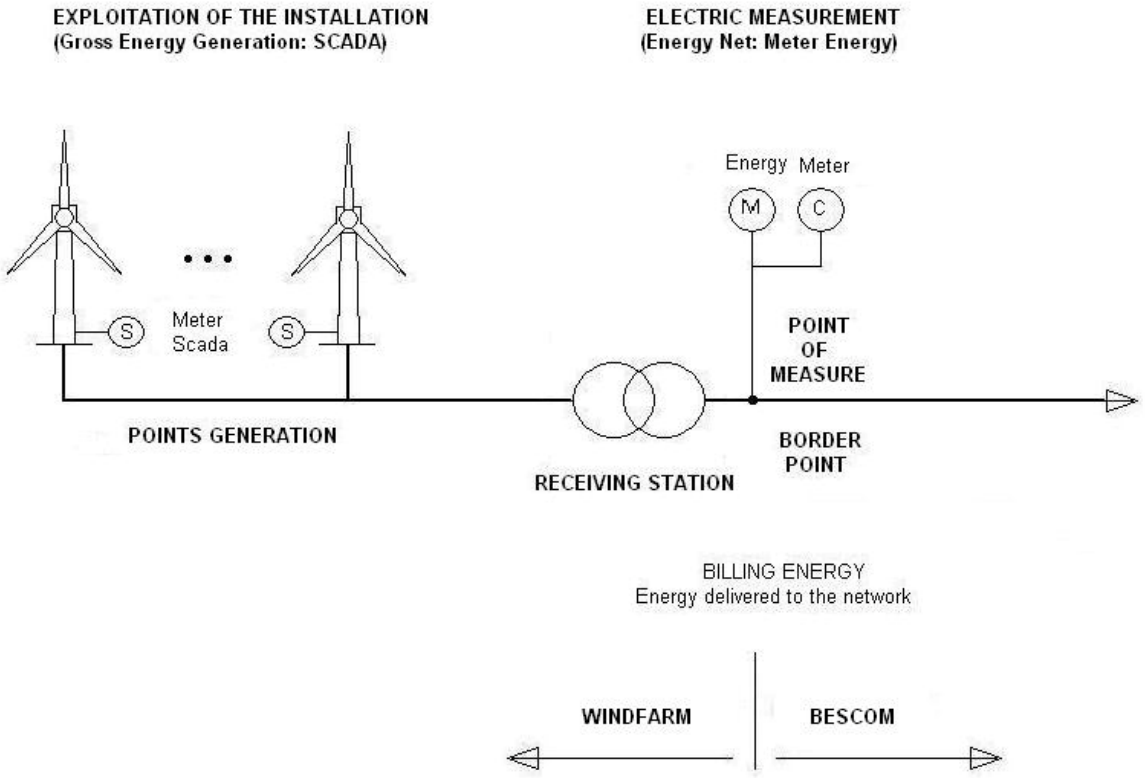
same at regular prescribed intervals under the supervision of KPTCL and/or DISCOM. The meter has the capability of recording hourly and monthly readings.

Meter Readings: The monthly meter reading is taken jointly by DISCOM and AWEPL and the frequency of metering will be as per the law applicable and implemented in practice to the wind farm in the State of Karnataka. At the conclusion of each meter reading an appointed representative of the DISCOM and AWEPL sign a document indicating the number of Kilowatt-hours indicated by the meter.

Meter Test Checking: The energy meter is tested for accuracy at regular intervals as mandated by prevalent law applicable and implemented in practice to the wind farms in the State of Karnataka, and conducted by KPTCL/DISCOM with reference to a "portable standard meter". All the meters are tested for accuracy with reference to a portable standard meter. The portable standard meter is owned by KPTCL/DISCOM; however, AWEPL will have no control over KPTCL/DISCOM or other government agencies to perform such checks in accordance with any stipulated schedule. The meters shall be deemed to be working satisfactorily if the errors are within specifications for meters. The consumption registered by the trivector meter on the KPTCL/DISCOM end at the evacuation sub-station alone will hold good for the purpose of metering electricity supplied to the grid.

Net energy export: Auxiliary power supply will be required for operation of equipment like hydraulic motors and yaw system for which active power will be drawn from the grid. The metering of the drawn power will be done by the same trivector meter provided at the DISCOM end since it is an import export meter.

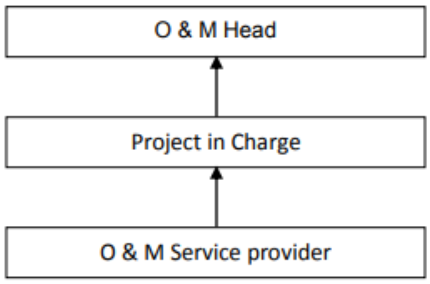
A diagram representation of the turbine, receiving station and meters:



The organizational structure for the monitoring plan for the sites is shown below.

Designation	Responsibilities
O & M Head	Holds complete control over monitoring aspects pertaining to the project
Project in charge	• Recording • Verification • Storage of Data
Operation and Maintenance service provider	• Operation and Maintenance • Storage of data • Data Recording

The management/organization structure is given in the figure below:



Training of Monitoring Personnel:
The project employs qualified and experienced persons for plant operation. The training period shall be for three months, as this would be adequate and necessary to ensure proper imparting of the objective. The training course will be thoroughly and meticulously designed, highlighting the objectives, salient features, operational aspects and trouble shooting.

Emergency Preparedness
In case Main meter or Check meter is found to be outside the acceptable limits of accuracy or faulty or not functioning properly, it will be repaired, recalibrated or replaced as soon as possible. In the event that the Main meter is not in service as a result of maintenance, repairs or testing, the Check meter will be used for readings.

Data storage and Archiving
In accordance with the methodology all the data collected during the crediting period will be archived electronically and kept for at least two years after the end of crediting period. 100% of the data is monitored and the meters owned by DISCOM/PP are calibrated at regular intervals to ensure low uncertainty in the monitored data.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The baseline scenario is electricity delivered to the grid by the project that would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources.

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The baseline emissions are calculated as follows:

$$\mathbf{BE_y = EG_{PJ,y} \times EF_{grid,CM,y}}$$

BE_y = Baseline emissions in a year y (tCO_2)

$EG_{p,j,y}$ or EG_y = Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)

$EG_{P,J,y} = EG_y$

$EF_{CO2,grid,y}$ = CO_2 emission factor of the grid in year y (tCO_2/MWh)

BE_y = 550,941 MWh * 0.93 tCO_2 = 512,372 tCO_2e

Hence the baseline emission calculated for the reported monitoring period is 532,926tCO2e

i.e. BE_y = 512,372 tCO2e

5.2 Project Emissions

No project emissions are applicable to this wind electric power project, since the electricity generation is based on wind resources, which does not involve in combustion or generation of emissions from fossil fuels. Hence, these emission sources are neglected.

i.e. PE_y = 0

5.3 Leakage

No leakage emissions are considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, and transport). These emission sources are neglected.

i.e. LE_y = 0

5.4 Net GHG Emission Reductions and Removals

The Formula used to calculate the net emission reduction for the project activity is

ERy = BEy – PEy – LEy

Where,
ER_y : Emission Reduction in tCO_2/year
BE_y : Baseline emission in tCO_2/year
PE_y : Project emissions in tCO_2/year
LE_y : Leakage Emissions in tCO_2/year

For the project activity during the current monitoring period, as per section 5.1
BE_y = 512,372 tCO2e

PE_y = 0
LE_y = 0

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
2012	69,871	0	0	69,871
2013	94,882	0	0	94,882
2014	90,020	0	0	90,020
2015	84,265	0	0	84,265
2016	87,639	0	0	87,639
2017	85,695	0	0	85,695
Total	512,372	0	0	512,372

As per the registered PDD, the amount of CERs generated annually is 88,240.11 tCO2e. Therefore, the amount of estimated ex ante for this monitoring period is identified as explained below.

The total number of days in this monitoring period of 01-January-2012 to 31-December-2017(first and last day included) is 2192 days. Hence, the amount of estimated ex ante for this monitoring period
= 88240.11 * (2192/365) = 529,924 tCO_2e.

The actual VER is about 3.3% lower than the estimated VER. This variation is majorly due to the variations in wind flow pattern, grid availability and other parameters which are not in the control of PP. The above variation is conservative.

APPENDIX 1: METER CALIBRATION DETAILS

Meter Details:

During the current monitoring period Energy Meters were found to be changed for both the sites Arasinagundi and Anabaru site. Details of new meters changed during the current monitoring period are provided below.

All the previous and changed energy meters are L&T Make and 0.2s class of accuracy.

Arasinagundi:

ARA-HMP-01					
Meter Change date	**Old Meters**		**New Meters**		**Remarks on meter change**
	Main Meter No	**Check Meter No**	**Main Meter No**	**Check Meter No**	
04/06/2012	6675265	6760793	11071507	11071509	As per the DISCOMS advise to replace all age old CTs and PTs action has been taken to replace the old energy meters with new calibrated energy meters. No defect has been found in the main and check meters and the calibration error is within the permissible limit of 0.2% before replacing the meters with the new meters. However Calibration error of 0.2% has been applied on conservative manner for the energy import and export for the delayed calibration period of both the months of May and

					June 2014 while calculating the emission reductions.
11/4/2014	11071507	11071509	13191099	No Change	The Main meter 'B' Phase CT link is failed and open circuited. Hence meter is replaced with new meter and is rated ok. Check meter reading has been considered for billing and emission reduction calculation in this month. Since the meter change is happened within the due date of calibration and the calibration error is within the permissible limit of 0.2% no error correction has been required to the emission reductions during this change.
27/10/2018	13191099	11071509	17074782	17074787	As per the DISCOMS advice to replace all age old CTs and PTs action has been taken to replace the old energy meters with new energy meters. Since the current monitoring period covered till 31-December-2017, this period of change is not covered in the current monitoring period.

Anabaru site:

ANA-HMP-03					
Meter Change date	**Old Meters**		**New Meters**		**Remarks on meter change**
	Main Meter No	**Check Meter No**	**Main Meter No**	**Check Meter No**	
04/06/2012	6767617	6774503	11071510	11071511	As per the DISCOMS advise to replace all age old CTs and PTs action has been taken to replace the old energy meters with new calibrated energy meters. No defect has been found in the main and check meters and the calibration error is within the permissible limit of 0.2% before replacing the meters with the new meters. However Calibration error of 0.2% has been applied on conservative manner for the energy import and export for the delayed calibration period of both the months of May and June 2014 while calculating the emission reductions.
23/09/2015	11071510	11071511	No change	14193209	Since the calibration error of check meter is more than 0.2% it is recommended to replace with the new meter. However main meter is tested to be

					accurate and the error limit is within the permissible error limit of 0.2%. Since the change of meter is happened within the calibration due date and the main meter is working with in the permissible limit no correction has been required for the emission reductions.
12/05/2017	11071510	14193209	16196539	No change	Main mater has been replaced due to its CT failure. Check meter is also advised to be changed as early as possible. On conservative basis calibration error of 0.2% has been applied to both the energy import and export values from the last calibration period to the latest meter change month. i.e. from March 2017 till July 2017 for ANA HMP-03 Location.

Calibration tests for all the energy meters (Both Main and Check meter) of two sites have been conducted in the same dates during the current monitoring period. Calibration dates for the current monitoring period are provided below

Year	**Calibration Details-ARA(HMP-01) & ANA(HMP-03)**				
	Calibration Date and Due date				
2012	22/02/2012	22/05/2012	**2015**	11/02/2015	11/05/2015
	04/06/2012	04/09/2012		18/05/2015	18/08/2015
	14/08/2012	14/11/2012		21/08/2015	21/11/2015
	16/11/2012	16/02/2013		20/11/2015	20/02/2016

2013	16/02/2013	16/05/2013	**2016**	19/02/2016	19/05/2016
	16/05/2013	16/08/2013		08/06/2016	08/09/2016
	19/08/2013	19/11/2013		16/09/2016	16/12/2016
	11/11/2013	11/02/2014		16/12/2016	16/03/2017
2014	11/02/2014	11/05/2014	**2017**	17/03/2017	17/06/2017
	16/05/2014	16/08/2014		10/07/2017	10/10/2017
	12/08/2014	12/11/2014		24/10/2017	24/01/2018
	11/11/2014	11/02/2015	**2018**	12/01/2018	12/04/2018
				11/07/2018	11/10/2018

Considering the dates of meter calibration, it has been observed that there have been delays in calibration for the following periods.

22-May-2012 to 04-June-2012
14-Nov-2012 to 16-Nov-2012
16-Aug-2013 to 19-Aug-2013
11-May-2014 to 16-May-2014
11-May-2015 to 18-May-2015
18-Aug 2015 to 21-Aug-2015
19-May-2016 to 08-June-2016
08-Sept-2016 to 16-Sept-2016
16-Mar-2017 to 17-Mar-2017
17-June-2017 to 10-July-2017
10-Oct-2017 to- 24-Oct-2017

Hence, permissible error factor of 0.2% has been applied on the electricity export and import values for the months of May-2012, June-2012, Nov-2012, Aug-2013, May-2014, May-2015, Aug-2015, May-2016, June-2016, Sept-2016, March-2017, April 2017, May 2017 June-2017, July-2017, & Oct-2017

Project developer has applied the following procedure while applying for the calibration error correction in line with the "GUIDELINES FOR ASSESSING COMPLIANCE WITH THE CALIBRATION FREQUENCY REQUIREMENTS" version 01.

Parameter	**Measured Value**	**Corrected Value**
Energy Export	X	X*(1-0.2%) or X* (1-identofoed error) whichever is conservative
Energy Import	Y	Y*(1+0.2%) or or Y* (1+identofoed error) whichever is conservative.