



Monitoring report form for CDM project activity
(Version 07.0)

MONITORING REPORT

Title of the project activity	GEI Wind Power Project in Karnataka, India	
UNFCCC reference number of the project activity	4144	
Version number of the PDD applicable to this monitoring report	7.0	
Version number of this monitoring report	03	
Completion date of this monitoring report	01/10/2020	
Monitoring period number	03	
Duration of this monitoring period	01/01/2013 to 31/12/2019 (Inclusive of both start and end dates)	
Monitoring report number for this monitoring period	Not applicable	
Project participants	Generacion Eolica India Limited	
Host Party	India	
Applied methodologies and standardized baselines	ACM0002 ver. 11 - Consolidated methodology for grid-connected electricity generation from renewable sources Standardized baseline: Not applicable	
Sectoral scopes	Sectoral Scope 1 : Energy industries (renewable/ non-renewable sources)	
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013
	0 tCO ₂ e	323,633 tCO ₂ e
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	448,841 tCO ₂ e	

SECTION A. Description of project activity

A.1. General description of project activity

The project activity is the successful installation and generation of 31.2 MW through efficient utilization of renewable energy source viz., wind energy at Harthi, Kurtakoti and Malasamudra villages of Gadag district in Karnataka in order to generate electricity to be fed to Southern grid¹.

The purpose of the project activity is to utilize renewable wind energy for generation of electricity. The project activity replaces anthropogenic emissions of greenhouse gases (GHGs) into the atmosphere, by displacing the equivalent amount of electricity generation through the operation of existing fuel mix in the grid comprising mainly fossil fuel based power plants and future capacity expansions connected to the grid.

In the absence of the project activity the equivalent amount of electricity would have been generated from the connected/ new power plants in the Southern grid², which are/ will be predominantly based on fossil fuels. Whereas the electricity generation from operation of WECs is emission free. As per the applicable methodology, the baseline scenario for the project activity is the grid based electricity system, which is also the pre-project scenario.

The project activity involves 39 WTGs of Enercon make (800 kW, E-53) with internal electrical lines connecting the project activity with local evacuation facility. The WECs generates 3-phase power at 400V, which is stepped up to 33 KV at the Project site and further stepped up to 220 KV at the Receiving sub- station for the purpose of interconnection with the KPTCL/HESCOM grid at the sub-station of the KPTCL/HESCOM. The Project can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V \pm 12.5%. The life time of each of the WTGs is 20 years as provided by the equipment supplier. Enercon (India) Ltd (EIL) is the turbine supplier and is the operations and maintenance contractor.

Start date of the project activity is 24/08/2006 that corresponds to the date of placement of purchase order for the WTGs. The project activity was fully commissioned (all WTGs) on 10/10/2008.

The project activity is operational with normal operation and maintenance during current monitoring period i.e. 01/01/2013 to 31/12/2019. The project activity has supplied 349,142.32 MWh electricity to grid during current monitoring period, which has resulted emission reduction of 323,633 tCO_{2e}.

A.2. Location of project activity

The project is located at Harthi, Kurtakoti & Malasamudra villages in Gadag district of Karnataka state in India. The Project consists of 39 E-53 WTGs of 800 kW each. The details of the physical location are as follows-

Sl. No.	Location No.	No. of WTGs	Village	Longitude	Latitude
1	170a	4	Harthi	15°20'53"	75°34'29.2"
2	170			15°20'59"	75°34'27.5"
3	171			15°21'5.8"	75°34'26.1"
4	236			15°21'14.3"	75°34'38.8"

¹ Since 2013, Southern grid and North-East-West and North Eastern (NEWNE) grid have been synchronized to form INDIAN grid

² Since 2013, Southern grid and North-East-West and North Eastern (NEWNE) grid have been synchronized to form INDIAN grid

5	229	6	Malasamudra	15°21'59.9"	75°34'23"
6	181			15°21'16.6"	75°33'57.8"
7	180			15°22'10.4"	75°34'0.9"
8	163			15°22'8.3"	75°34'44.8"
9	226			15°22'19.2"	75°34'13.5"
10	230			15°21'52.7"	75°34'23.9"
11	173	8	Harthi	15°21'19.4"	75°34'15.5"
12	231		Malasamudra	15°21'46.8"	75°34'27.7"
13	174		Harthi	15°21'31.5"	75°34'15.5"
14	233			15°21'33.3"	75°34'30.6"
15	232			15°21'39.6"	75°34'28.6"
16	234			15°21'27.8"	75°34'33.5"
17	169A			15°21'20"	75°34'3.7"
18	237			15°21'8.1"	75°34'41.3"
19	168	10	Kurthkoti	15°21'29.5"	75°34'1.5"
20	169		Harthi	15°21'29.5"	75°34'1.5"
21	235			15°21'21.3"	75°34'39.2"
22	136			15°20'26.5"	75°34'5.7"
23	137			15°20'32.6"	75°34'4.6"
24	138			15°20'39.9"	75°34'4.9"
25	139			15°20'44.8"	75°33'57.3"
26	140			15°20'50.9"	75°33'57.3"
27	141			15°20'59.2"	75°33'56.9"
28	179		Malasamudra	15°22'3.6"	75°34'2.6"
29	228	4	Malasamudra	15°22'15.2"	75°34'18.1"
30	172		Harthi	15°21'15.2"	75°34'22.3"
31	227		Malasamudra	15°22'15.2"	75°34'41.2"
32	239		Harthi	15°20'52.8"	75°34'41.2"
33	167	4	Kurthkoti	15°21'42.8"	75°33'54.3"
34	176		Harthi	15°21'44.5"	75°34'9.5"
35	178		Kurthkoti	15°21'58.1"	75°34'5.6"
36	164		Kurthkoti	15°22'2.8"	75°33'48.1"
37	165	3	Kurthkoti	15°21'55.3"	75°33'50.5"
38	166		Kurthkoti	15°21'49.3"	75°33'51.3"
39	177		Malasamudra	15°21'51.4"	75°34'8.1"
Total		39			

A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (host)	Generacion Eolica India Limited (Private entity)	No

A.4. References to applied methodologies and standardized baselines

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

ACM0002 ver. 11.0 - Consolidated methodology for grid-connected electricity generation from renewable sources (EB 52, Annex 7)³

The methodology draws upon following tools:

³ <https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG>

- Tool to calculate the emission factor for an electricity system – Version 02 (EB 50, Annex 14)⁴
- Tool for the demonstration and assessment of additionality – Version 05.2 (EB 39, Annex 10)⁵

A.5. Crediting period type and duration

This project activity has considered fixed crediting period of 10 years.
The crediting period starts on 01/04/2011 and ends on 31/03/2021.

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

The start date of the project activity is 24/08/2006, which is the date of placement of purchase order for the WTGs. The first WTG under this project activity was commissioned on 17/12/2007 and the last WTG was commissioned on 10/10/2008. All 39 WTGs are Enercon make (E-53), having a capacity of 800 kW each. There is no such event occurred during the monitoring period, which may impact the applicability of the methodology.

The commissioning date for all the WECs included in the project activity is given in the table below.

Sl. No.	Commissioning Date	No. of WTGs	Location No. of WTGs
1	17/12/2007	4	170a
2			170
3			171
4			236
5	17/03/2008	6	229
6			181
7			180
8			163
9			226
10			230
11	25/06/2008	8	173
12			231
13			174
14			233
15			232
16			234
17			169A
18			237
19	07/07/2008	10	168
20			169
21			235
22			136
23			137
24			138
25			139
26			140
27			141
28			179

⁴ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.pdf>

⁵ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf>

29	11/09/2008	4	228
30			172
31			227
32			239
33	29/09/2008	4	167
34			176
35			178
36			164
37	10/10/2008	3	165
38			166
39			177

B.2. Post-registration changes

B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents

Not applicable

B.2.2. Corrections

Not applicable

B.2.3. Changes to the start date of the crediting period

There was no change in crediting period start date.

B.2.4. Inclusion of monitoring plan

Not applicable

B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

There were no changes from registered monitoring plan, applied methodology during current monitoring period.

B.2.6. Changes to project design

No change in project design during current monitoring period.

B.2.7. Changes specific to afforestation or reforestation project activity

As the project activity falls under Sectoral Scope 1: Energy industries (renewable - / non-renewable sources) this section is not applicable.

SECTION C. Description of monitoring system

The Approved monitoring methodology ACM0002 Version 11.0, Sectoral Scope: 1, "Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources", by CDM – Meth Panel is proposed to be used to monitor the emission reductions.

This approved monitoring methodology requires monitoring of the following:

- Electricity generation from the project activity; and
- Operating margin emission factor and build margin emission factor of the grid, where ex-post determination of grid emission factor has been chosen

Since the baseline methodology is based on ex-ante determination of the baseline, the monitoring of operating margin emission factor and build margin emission factor is not required.

There is one main and check meter dedicated to the machines of the project activity at 33 kV metering point (billing point) as shown in the line diagram below. The 33 kV metering points are further connected to step up transformers and subsequently to the bulk meters (there is one set of main and check meter as bulk meter) at 220 kV metering point for the machines of the project activity.

In order to determine the net electricity supplied to the grid by the project, the State utility applies the transmission loss to the meter reading recorded at 33 kV metering point. The reading at 33 kV metering point will be taken by the representatives of Enercon and the State utility. This reading is recorded in the form of JMR (Form B) and is signed by the representatives of Enercon and State Utility. Both electricity export and import are metered at this metering point.

The electricity supplied to the grid is apportioned based on transmission Loss. The Joint meter reading contains the following data:-

1. Electricity Export
2. Electricity Import
3. Transmission Loss (Between the 33 kV metering point and 220 kV pooling substation)
4. Net Electricity supplied to the Grid [Electricity Export-115% of Electricity Import-Transmission Loss]

$$EG_y = G_p - L_i = (G_{p_e} - 115\% * G_{p_i}) - L_i$$

Where,

EG_y = Net Electricity supplied to grid by the project activity $G_p = (G_{p_e} - 115\% * G_{p_i})$

Where,

G_{p_e} = Electricity Export recorded at the meter(s) connected 39 machines of the project activity

G_{p_i} = Electricity Import recorded at the meter(s) connected 39 machines of the project activity.

L_i = Transmission loss

Transmission loss is certified by the state utility in the JMR (Form B). The procedure for calculation of transmission loss by the State utility is as follows:

$$L = \sum jG_j - N$$

Where,

$\sum jG_j$ = Summation of electricity generation data measured at all the feeders connected to pooling substation

N = Electricity generation data measured at substation from the feeders emanating from the pooling substation

$$L = \text{Total transmission loss } L_i : G_p * (L / \sum Gh_j)$$

Where,

G_p = Generation of electricity by the project activity recorded at the feeder connected to 39 turbines of the project activity [Export (G_{p_e}) - 115% * Import (G_{p_i})]

Transmission Loss is directly applied from the Joint Meter Report (Form B) for the project activity and the JMR (Form B) is signed jointly by the representatives of the Company (Enercon) and the state utility.

Therefore, Energy Supplied to the Grid after adjustment of transmission loss is as follows: $EG_y = EG_{\text{export}} - 115\% * EG_{\text{import}} - \text{Transmission Loss}$

The meter readings (both export and import), transmission loss and net electricity supplied to the grid are recorded in the JMR (Form B). Hence, all these values are sourced from the JMR for the calculation emission reduction. Please refer to section D.2 for details on calibration and QA/QC procedures.

The net electricity supplied to the grid can be cross checked from the invoices raised on the state utility for supply of net electricity supplied to the grid.

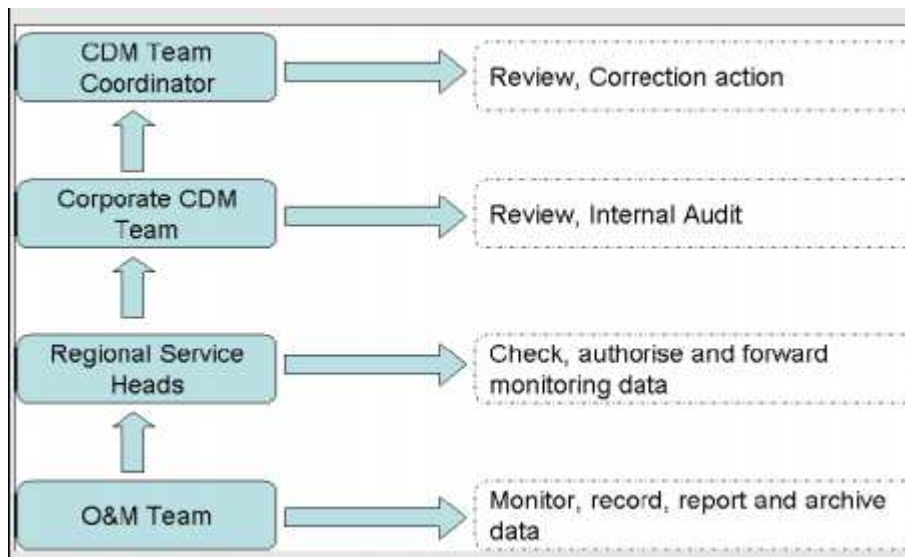
The Project is operated and managed by GEI. The operational and maintenance contract for the project is with Enercon. Enercon is an ISO 9001:2000 certified Quality Management system from Germanischer Lloyd. Enercon (India) Limited follows the documentation practices to ensure the reliability and availability of the data for all the activities as required from the identification of the site, wind resource assessment, logistics, finance, construction, commissioning and operation of the wind power project.

The accuracy of monitoring parameter is ensured by adhering to the calibration and testing procedure. All the meters will be tested for accuracy once every year. The project will adhere to all the mandatory regulatory and statutory requirements at the state as well as national level. Enercon is Operation and Maintenance contractor for the project activity and provides the daily generation report to the project proponent.

Training and maintenance requirements:

Training on the machine is an essential pre-requisite, to ensure necessary safety of man and machine. Further, in order to maximize the output from the Wind Energy Converters (WECs), it is extremely essential, that the engineers and technicians understand the machines and keep them in good health. In order to ensure that Enercon's staffs that are positioned to take care all the activities starting from project construction to operation and maintenance, Enercon Training Academy provides need based periodical training to meet the requirements of the project. The training is contemporary, which results in imparting focused knowledge leading to value addition to the attitude and skills of all the trainees. The training facility is located at Daman and is fully functional and equipped with qualified trainers, training equipments, classrooms and hostel facilities.

The operational and management structure implemented is as follows:



Metering details & QA/ QC procedures

Metering Equipments: Metering system for the project activity consists of one main and one check meter at 33 kV metering point & one main & one check meter (bulk meters) at 220 kV substation end. Both the meters are two-way tri-vector meters of accuracy class 0.2s capable of recording import and export of electricity. The metering equipment is calibrated annually.

Meter Readings: The Net electricity supplied to the grid is recorded in the form of Joint Meter Reading (JMR) (Form B) in the presence of State Utility and the representative of the Project proponent (Enercon). The Joint meter reading contains the value of energy imported and exported and the net supply to the grid during the recording period. This JMR is certified by the Authorized representative of the state utility and representative of the Company (Enercon). These certified readings are then used to prepare the invoices to be raised on State Utility. Therefore, the net electricity supplied to the grid as mentioned in the JMR can be cross-checked with the invoices.

Inspection of Energy Meters: All main and check energy meters (export and import) are of 0.2s accuracy class. Each meter is jointly inspected and sealed on behalf of the Parties and is not to be interfered with by either Party except in the presence of the other Party or its accredited representatives.

Meter Test Checking: All the main & check meters are to be tested for accuracy with a standard

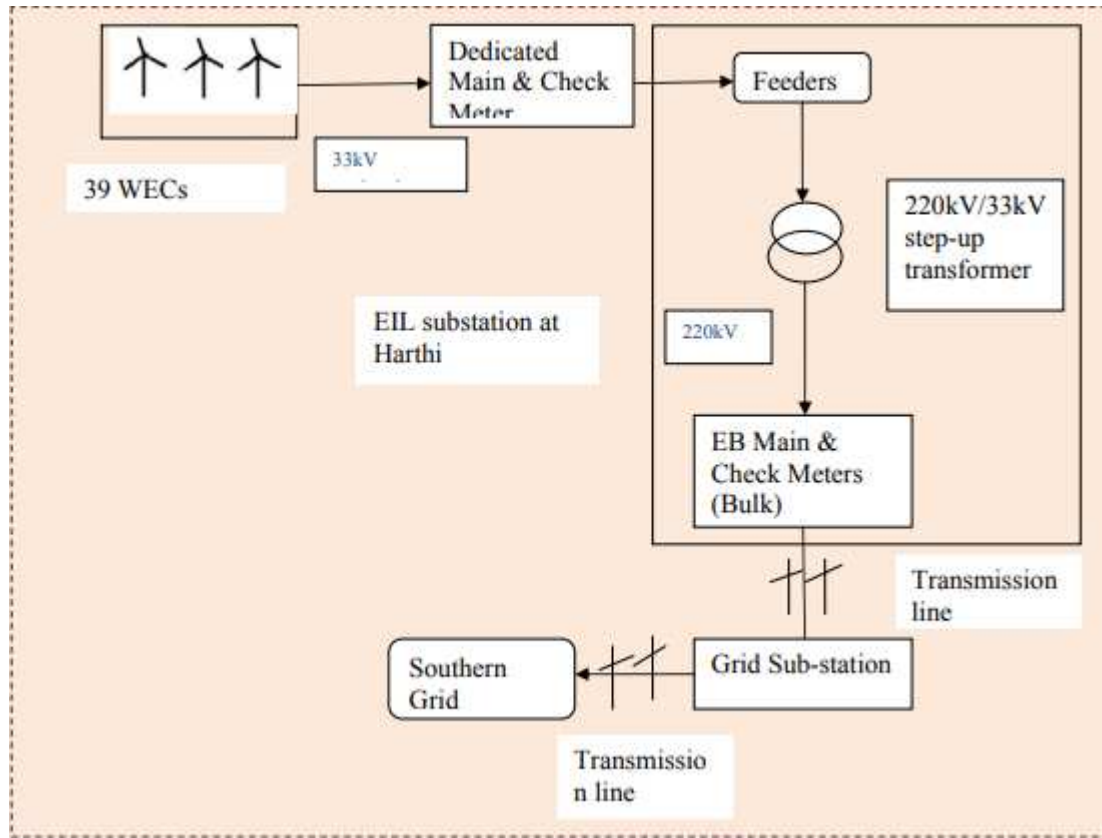
All the parameters mentioned in the monitoring plan are being maintained at the plant. The entire process of monitoring is made available in the required format during the verification process and for subsequent useful purposes. The calibration of monitoring equipment is being maintained as per the requirement of KPTCL and the same is being done regularly.

If during the meter test checking,

- the main meter is found to be within the permissible limit of error and the corresponding check meter is beyond the permissible limits, then the meter reading will be as per the main meter as usual. The check meter shall, however, be calibrated immediately.
- the main meter is found to be beyond permissible limits of error, but the corresponding check meter is found to be within permissible limit of error, then the meter reading for the month up to the date and time of such test shall be as per the check meter. The main meter shall be calibrated immediately and meter reading for the period thereafter till the next monthly meter reading shall be as per the calibrated main meter.
- both the main meters and the corresponding check meters are found to be beyond the permissible limits of error, both the meters shall be immediately calibrated and the correction will be applied to the reading registered by the main meter to arrive the correct reading of energy supplied to the grid for the period up to the last test.

In case of the failures such as burning of the meter and the erratic display of the metered parameters and when the error found in testing the meters is beyond the permissible limit of error, the meter shall be calibrated immediately and the correction will be applied to the reading registered by the main meter to arrive the correct reading of energy supplied to the grid for the period up to last test.

The line diagram of the metering system for the project activity is as follows:



The calibration details for the meters (both main & check meter) at 33 kV metering point have been shown below:

Meter Type	Meter Serial No.	Make	Accuracy Class	Calibration date		Year wise Calibration Validity	
Main Meter	05389382	L & T	0.2s	2012	15/09/2012	2013	14/09/2013
				2013	06/06/2013	2014	27/11/2014
					28/11/2013		
				2014	28/05/2014	2015	24/10/2015
					25/10/2014		
				2015	20/08/2015	2016	09/12/2016
					10/12/2015		
				2016	31/03/2016	2017	05/12/2017
					06/12/2016		
				2017	14/06/2017	2018	27/12/2018
					28/12/2017		
Check Meter	07022924	L & T	0.2s	2018	21/07/2018	2019	20/07/2019
				2019	04/02/2019	2020	15/05/2020
					16/05/2019		
				2013	06/06/2013	2014	27/11/2014

					28/11/2013		
				2014	28/05/2014	2015	24/10/2015
					25/10/2014		
				2015	20/08/2015	2016	09/12/2016
					10/12/2015		
				2016	31/03/2016	2017	05/12/2017
					06/12/2016		
				2017	14/06/2017	2018	27/12/2018
					28/12/2017		
				2018	21/07/2018	2019	20/07/2019
				2019	04/02/2019	2020	15/05/2020
					16/05/2019		

Considering the calibration dates of energy meters and next due date of calibration, it can be concluded that there has not been any delay in calibration.

The calibration details for the bulk meters (both main & check meters) in feeder-2 (the WTGs of Generacion Eolica India Limited is connected to feeder-2) at 220 kV sub-station have been shown below:

Meter Type	Meter Serial No.	Make	Accuracy Class	Calibration date		Year wise Calibration Validity	
Main Meter	07022908	L & T	0.2s	2012	25/09/2012	2013	24/09/2013
				2013	Calibration ⁶ certificates not available	2014	NA
				2014	Calibration certificates not available	2015	NA
				2015	Calibration certificates not available	2016	NA
				2016	Calibration certificates not available	2017	NA
				2017	Calibration certificates not available	2018	NA
				2018	27/09/2018	2019	26/09/2019
				2019	09/09/2019	2020	08/09/2020
Check Meter	07022915	L & T	0.2s	2012	25/09/2012	2013	24/09/2013
				2013	Calibration certificates not	2014	NA

⁶ Bulk meters (both main and check) were calibrated annually by regional electricity transmission utility, but the calibration certificates are not available with PP; hence calibration of the bulk meters for the period 01/09/2013 to 30/09/2018 have not been considered and error factor of 0.2% has been applied to the values of transmission values for this period

					available	2015	NA
				2014	Calibration certificates not available	2016	NA
				2015	Calibration certificates not available	2017	NA
				2016	Calibration certificates not available	2018	NA
				2017	Calibration certificates not available	2019	26/09/2019
						2020	08/09/2020
				2018	27/09/2018		
				2019	09/09/2019		

The project activity WTGs (39 machines) are connected to above two meters at 220 KV substation and for transmission loss from 33 KV Pooling station to 220 KV substation, only two meters at 220 KV substation and two meters at 33 KV substation are used.

Since there was delay in Meter Calibration at substation and delayed calibration result is within permissible limit of accuracy class, an error factor (0.2% accuracy class) is applied to Transmission losses from months of September 2013 to September 2018.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/Parameter	EF _{grid, OM, y}
Unit	tCO ₂ / MWh
Description	Operating Margin Emission Factor of (erstwhile) Southern Regional Electricity Grid
Source of data	"CO ₂ Baseline Database for Indian Power Sector" Version 04 ⁷ , published by the Central Electricity Authority, Ministry of Power, Government of India.
Value(s) applied	0.998157
Choice of data or measurement methods and procedures	Operating Margin Emission Factor has been calculated by the Central Electricity Authority using the simple OM approach in accordance with ACM0002, Version 11.0
Purpose of data/parameter	For the calculation of baseline emissions
Additional comments	The value is calculated on ex-ante basis and it will remain same throughout the crediting period

Data/Parameter	EF _{grid, BM, y}
Unit	tCO ₂ / MWh
Description	Build Margin Emission Factor of (erstwhile) Southern Regional Electricity Grid

⁷ https://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver4.pdf

Source of data	"CO ₂ Baseline Database for Indian Power Sector" Version 4 ⁸ published by the Central Electricity Authority, Ministry of Power, Government of India.
Value(s) applied	0.71332
Choice of data or measurement methods and procedures	Build Margin Emission Factor has been calculated by the Central Electricity Authority in accordance with ACM0002, Version 11.0
Purpose of data/parameter	For the calculation of baseline emissions
Additional comments	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

Data/Parameter	EF_{grid, CM, y}
Unit	tCO ₂ / MWh
Description	CO ₂ Build margin emission factor of the grid
Source of data	"CO ₂ Baseline Database for Indian Power Sector" Version 04 ⁹ , published by the Central Electricity Authority, Ministry of Power, Government of India.
Value(s) applied	0.92694
Choice of data or measurement methods and procedures	Combined Margin Emission Factor has been calculated by the Central Electricity Authority in accordance with CDM methodologies: ACM0002 Version 11.0 and Tool to Calculate the emission Factor for an Electricity System. In case of wind power projects default weights of 0.75 for EF _{OM} and 0.25 for EF _{BM} are applicable as per ACM0002.
Purpose of data/parameter	For the calculation of baseline emissions
Additional comments	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

D.2. Data and parameters monitored

Data/Parameter	EG_y																		
Unit	MWh																		
Description	Net Electricity supplied to grid by the project																		
Measured/calculated/default	Calculated																		
Source of data	Electricity supplied to the grid as per Joint Meter Reading (FORM-B) taken at 33 kV metering point. This value can be cross-checked by the tariff invoices raised on KPTCL/HESCOM.																		
Value(s) of monitored parameter	<table> <tr> <th>Year</th><th>Net Electricity supplied to grid</th></tr> <tr> <td>2013</td><td>54,264.06</td></tr> <tr> <td>2014</td><td>50,052.72</td></tr> <tr> <td>2015</td><td>48,396.53</td></tr> <tr> <td>2016</td><td>44,603.67</td></tr> <tr> <td>2017</td><td>49,586.83</td></tr> <tr> <td>2018</td><td>50,729.08</td></tr> <tr> <td>2019</td><td>51,509.44</td></tr> <tr> <td>Total</td><td>349,142.32</td></tr> </table>	Year	Net Electricity supplied to grid	2013	54,264.06	2014	50,052.72	2015	48,396.53	2016	44,603.67	2017	49,586.83	2018	50,729.08	2019	51,509.44	Total	349,142.32
Year	Net Electricity supplied to grid																		
2013	54,264.06																		
2014	50,052.72																		
2015	48,396.53																		
2016	44,603.67																		
2017	49,586.83																		
2018	50,729.08																		
2019	51,509.44																		
Total	349,142.32																		

⁸ https://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver4.pdf

⁹ https://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver4.pdf

Monitoring equipment	Particulars	Main Meter	Check Meter
	Serial No.	05389382	07022924
	Accuracy Class	0.2s	0.2s
	Make	L&T	L&T
	<p>Details of calibration of meters have been provided in Section C.</p> <p>The check meter with serial number 07022924 has been replaced by new meter 19008132 on 24/07/2020 (beyond end date of current monitoring period).</p>		
Measuring/reading/recording frequency	Continuous monitoring and Monthly recording		
Calculation method (if applicable)	Net Electricity supplied to the Grid [Electricity Export-115% of Electricity Import- Transmission Loss]		
QA/QC procedures	The value of this parameter can be cross checked with all the invoices generated for the sold electricity during the year y. Energy meters are calibrated once in a year		
Purpose of data/parameter	For the calculation of baseline emissions		
Additional comments	This data will be kept in electronic form and hard copy format for 2 years after the end of crediting period or the last issuance of CERs for this project activity whichever occurs later		

Data/Parameter	Gp _e		
Unit	MWh		
Description	Electricity Export recorded at the meter(s) connected 39 machines of the project activity.		
Measured/calculated/default	Measured		
Source of data	Electricity export to the grid as per Joint Meter Reading (Form B) taken at 33 kV metering point. This value can be cross-checked by the tariff invoices raised on HESCOM		
Value(s) of monitored parameter	Year		Electricity Exported by the project activity to grid
	2013		54,625.35
	2014		50,403.60
	2015		48,853.35
	2016		44,933.85
	2017		50,029.20
	2018		51,267.45
	2019		51,957.75
	Total		352,070.55
Monitoring equipment	Particulars	Main Meter	Check Meter
	Serial No.	05389382	07022924
	Accuracy Class	0.2s	0.2s
	Make	L&T	L&T
	Details of calibration of meters have been provided in Section C. The check meter with serial number 07022924 has been replaced by new meter 19008132 on 24/07/2020 (beyond end date of current monitoring period).		
Measuring/reading/recording frequency	Continuous monitoring and monthly recording		
Calculation method (if applicable)	This parameter is measured by the equipment (energy meter) and considered accordingly; hence calculation method is not applicable		

QA/QC procedures	The value of this parameter can be cross checked with all the invoices generated for the sold electricity during the year y. Energy meters are calibrated once in a year
Purpose of data/parameter	For the calculation of baseline emissions
Additional comments	This data will be kept in electronic form and hard copy format for 2 years after the end of crediting period or the last issuance of CERs for this project activity whichever occurs later

Data/Parameter	Gp _i		
Unit	MWh		
Description	Electricity Import recorded at the meter(s) connected 39 machines of the project activity.		
Measured/calculated/default	Measured		
Source of data	Electricity import from the grid as per Joint Meter Reading (Form B) taken at 33 kV metering point. This value can be cross-checked by the tariff invoices raised on HESCOM.		
Value(s) of monitored parameter	Year		Net electricity imported from grid by the project activity
	2013		29.25
	2014		33.15
	2015		42.90
	2016		31.20
	2017		37.05
	2018		39.00
	2019		37.05
	Total		249.60
Monitoring equipment	Particulars	Main Meter	Check Meter
	Serial No.	05389382	07022924
	Accuracy Class	0.2s	0.2s
	Make	L&T	L&T
	Details of calibration of meters have been provided in Section C.		
The check meter with serial number 07022924 has been replaced by new meter 19008132 on 24/07/2020 (beyond end date of current monitoring period).			
Measuring/reading/recording frequency	Monthly recording		
Calculation method (if applicable)	This parameter is measured by the equipment (energy meter) and considered accordingly; hence calculation method is not applicable		
QA/QC procedures	The value of this parameter is cross checked with all the invoices generated for the sold electricity during the year y.		
	Furthermore, Energy meters are calibrated once in a year.		
Purpose of data/parameter	For the calculation of baseline emissions		
Additional comments	This data will be kept in electronic form and hard copy format for 2 years after the end of crediting period or the last issuance of CERs for this project activity whichever occurs later		

Data/Parameter	L_i
Unit	MWh
Description	Transmission loss between the metering point for the project activity feeding the pooling substation of Enercon and the metering point at EB Substation.
Measured/calculated/default	Measured

Source of data	Electricity import from the grid as per Joint Meter Reading (Form B) taken at 33 kV metering point. This value can be cross-checked by the tariff invoices raised on HESCOM.	
Value(s) of monitored parameter	Year	Transmission Loss
	2013	327.66
	2014	312.76
	2015	407.49
	2016	294.30
	2017	399.76
	2018	493.52
	2019	405.70
	Total	2,641.19
Monitoring equipment	<p>Refer to Section C of this document for an illustration of the provisions for measurement methods.</p> <p>Calibration details of bulk meter has been provided in Section C. There has been delay in calibration of bulk meter that is used to measure transmission losses – no calibration has been done 25/09/2012 to 27/09/2018 , hence error factor of 0.2% has been applied to value of transmission losses from January 2013 to September 2018.</p>	
Measuring/reading/recording frequency	Monthly recording	
Calculation method (if applicable)	Calculated as per the formula described in section C.	
QA/QC procedures	<p>The value of this parameter is cross checked with all the invoices generated for the sold electricity during the year y.</p> <p>Furthermore, Energy meters are calibrated once in a year</p>	
Purpose of data/parameter	For the calculation of baseline emissions	
Additional comments	This data will be kept in electronic form and hard copy format for 2 years after the end of crediting period or the last issuance of CERs for this project activity whichever occurs later	

D.3. Implementation of sampling plan

Sampling is not applicable in this project activity

SECTION E. Calculation of emission reductions or net anthropogenic removals

E.1. Calculation of baseline emissions or baseline net removals

As described in the registered PDD, emission reductions (ER_y) are calculated as

$$ER_y = BE_y - PE_y - LE_y$$

Where,

ER_y is the Emission reductions during the year y

BE_y is the Baseline emissions during the year y

PE_y is the Project emissions during the year y

LE_y is the Leakage emissions during the year y

Baseline emissions:

As per the applied methodology, ACM0002, Version 11.0, the baseline emissions are calculated based on the given formula:

$$BE_y = EG_y * EF_{grid,CM,y}$$

Where,

EG_{PJ,y} is Net electricity supplied to the grid in year y and is applied directly from JMR (Form B) certified by state utility. This value can also be cross checked from the invoice.

EF_{grid, CM, y} is CO₂ emission factor of the grid

$$EF_{CO_2, grid, y} = 0.92694 \text{ tCO}_2/\text{MWh}$$

Net electricity supplied to the grid by the Project during current monitoring period i.e. 01/01/2013 to 31/12/2019 = 349,142.32 MWh (Please refer Spreadsheet for details of calculations)

Baseline emissions,

$$BE_y = 349,142.32 \text{ MWh} \times 0.92694 \text{ tCO}_2/\text{MWh} = 323,633 \text{ tCO}_2\text{e (Rounded Down)}$$

Year-wise calculation of Baseline Emissions

Year	EG _y (MWh)	EF _{CO₂, grid, y} (tCO ₂ /MWh)	BE _y (tCO ₂)
2013	54,264.06	0.92694	50,299.52
2014	50,052.72	0.92694	46,395.87
2015	48,396.53	0.92694	44,860.68
2016	44,603.67	0.92694	41,344.92
2017	49,586.83	0.92694	45,964.02
2018	50,729.08	0.92694	47,022.81
2019	51,509.44	0.92694	47,746.16
Total	349,142.32		323,633 (Rounded Down)

Total Baseline Emissions (BE_y) = 323,633 tCO₂e (Rounded Down)

E.2. Calculation of project emissions or actual net removals

As per the applied methodology ACM0002, Version 11.0, the project emissions are zero.

Therefore,

$$PE_y = 0 \text{ tCO}_2\text{e}$$

E.3. Calculation of leakage emissions

As per ACM0002, Version 11.0, leakage emissions are to be taken into account "If the energy generating equipment is transferred from another activity, leakage is to be considered. Since transfer of equipment is not envisaged in the project activity, the leakage emissions will be equal to zero. Therefore,

$$LE_y = 0 \text{ tCO}_2\text{e}$$

E.4. Calculation of emission reductions or net anthropogenic removals

	Baseline GHG emissions or baseline net GHG removals (t CO ₂ e)	Project GHG emissions or actual net GHG removals (t CO ₂ e)	Leakage GHG emissions (t CO ₂ e)	GHG emission reductions or net anthropogenic GHG removals (t CO ₂ e)		
				Before 01/01/2013	From 01/01/2013	Total amount
Total	323,633	0	0	0	323,633	323,633

E.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD

Amount achieved during this monitoring period (t CO ₂ e)	Amount estimated ex ante for this monitoring period in the PDD (t CO ₂ e)
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Amount achieved during this monitoring period (t CO ₂ e)	Amount estimated ex ante for this monitoring period in the PDD (t CO ₂ e)
323,633	448,841

E.5.1. Explanation of calculation of “amount estimated ex ante for this monitoring period in the PDD”

Considering the annual average emission reductions as per the registered PDD which is 64,095 tCO₂e per year, the number of days covered during the current monitoring period comes out to be 2,556 days, based upon which the estimated emission reductions attributed to this monitoring period comes out to be 448,841 tCO₂e. The detailed calculation can be referred from the emission reduction sheet.

E.6. Remarks on increase in achieved emission reductions

During this project activity, the actual emission reductions obtained is lower than the estimated value. The lower value of actual emission reductions has been attributed to variation in wind flow pattern, grid availability and other reasons which are beyond the control of PP.

E.7. Remarks on scale of small-scale project activity

This is not a small scale project activity.

Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
07.0	31 May 2019	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 02.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN); • Add a section on remarks on the observance of the scale limit of small-scale project activity during the crediting period; • Add "changes specific to afforestation or reforestation project activity" as a possible post-registration changes; • Clarify the reporting of net anthropogenic GHG removals for A/R project activities between two commitment periods; • Make editorial improvements.
06.0	7 June 2017	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 01.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN); • Make editorial improvements.
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: <ul style="list-style-type: none"> • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: <ul style="list-style-type: none"> • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB 70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01.0	28 May 2010	EB 54, Annex 34. Initial adoption.

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