



## Monitoring report form for CDM project activity (Version 09.0)

### MONITORING REPORT

<b>Title of the project activity</b>	Clean Energy Project in the State of Tamil Nadu		
<b>UNFCCC reference number of the project activity</b>	7537		
<b>Version number of the PDD applicable to this monitoring report</b>	Version-17.0		
<b>Version number of this monitoring report</b>	1.0		
<b>Completion date of this monitoring report</b>	25/04/2023		
<b>Monitoring period number</b>	3 <sup>rd</sup>		
<b>Duration of this monitoring period</b>	01/01/2018 to 05/12/2022 (inclusive of both the dates)		
<b>Monitoring report number for this monitoring period</b>	Not Applicable		
<b>Project participants</b>	Vaayu Renewable Energy (Tapti) Private Limited		
<b>Host Party</b>	India		
<b>Applied methodologies and standardized baselines</b>	ACM0002 ver. 13 - Consolidated baseline methodology for grid-connected electricity generation from renewable sources Standardized baselines- NA		
<b>Sectoral scopes</b>	Sectoral Scope 01, Energy Industries (Renewable/ Non-Renewable Sources).		
<b>Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period</b>	<b>Amount achieved before 1 January 2013</b>	<b>Amount achieved from 1 January 2013 until 31 December 2020</b>	<b>Amount achieved from 1 January 2021</b>
	-	76,295	53,257
<b>Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD</b>	135,692 tCO <sub>2</sub> e		

**SECTION A. Description of project activity****A.1. General description of project activity**

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- (a) *Purpose of the project activity and the measures taken for GHG emission reductions or net anthropogenic GHG removals by sinks;*

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 (GHG's) 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.

The project activity is set up to produce clean power from the wind energy converters (WEC's). The project activity involves supply, erection, commissioning and operation of 18 machines of rated capacity 800 kW each. The machines are Enercon E-53 make. The WEGs generates 3-phase power at 400V, which is stepped up to 33 kV. 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 electricity generated by project activity will be pooled to Tamil Nadu Generation & Distribution Corporation Ltd.

- (b) *Brief description of the installed technology and equipment;*

The project activity involves supply, erection, commissioning and operation of 18 machines of rated capacity 800 KW each. The machines are Enercon E-53 make. Wind World (India) Limited (WWIL)<sup>1</sup> is the turbine supplier and is the operations and maintenance contractor.

- (c) *Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.);*

The first machine under the project activity was commissioned on 29 September 2011 and last machine under the project activity was commissioned on 31 January 2012. The expected operational lifetime of the project is 20 years. This monitoring period is 01/01/2018 to 05/12/2022 (inclusive of both the dates).

- (d) *Total GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period;*

The total emission reductions achieved under current monitoring period (01/01/2018 to 05/12/2022) (inclusive of both the dates) is 129,552 tCO<sub>2</sub>e.

**A.2. Location of project activity**

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<sup>1</sup> Formerly Known as "Enercon (India) Limited" Name changed w.e.f 01/01/2013.

(a) *Host Party(ies)*; India

(b) *Region/State/Province, etc.*; Southern India /Tamilnadu State

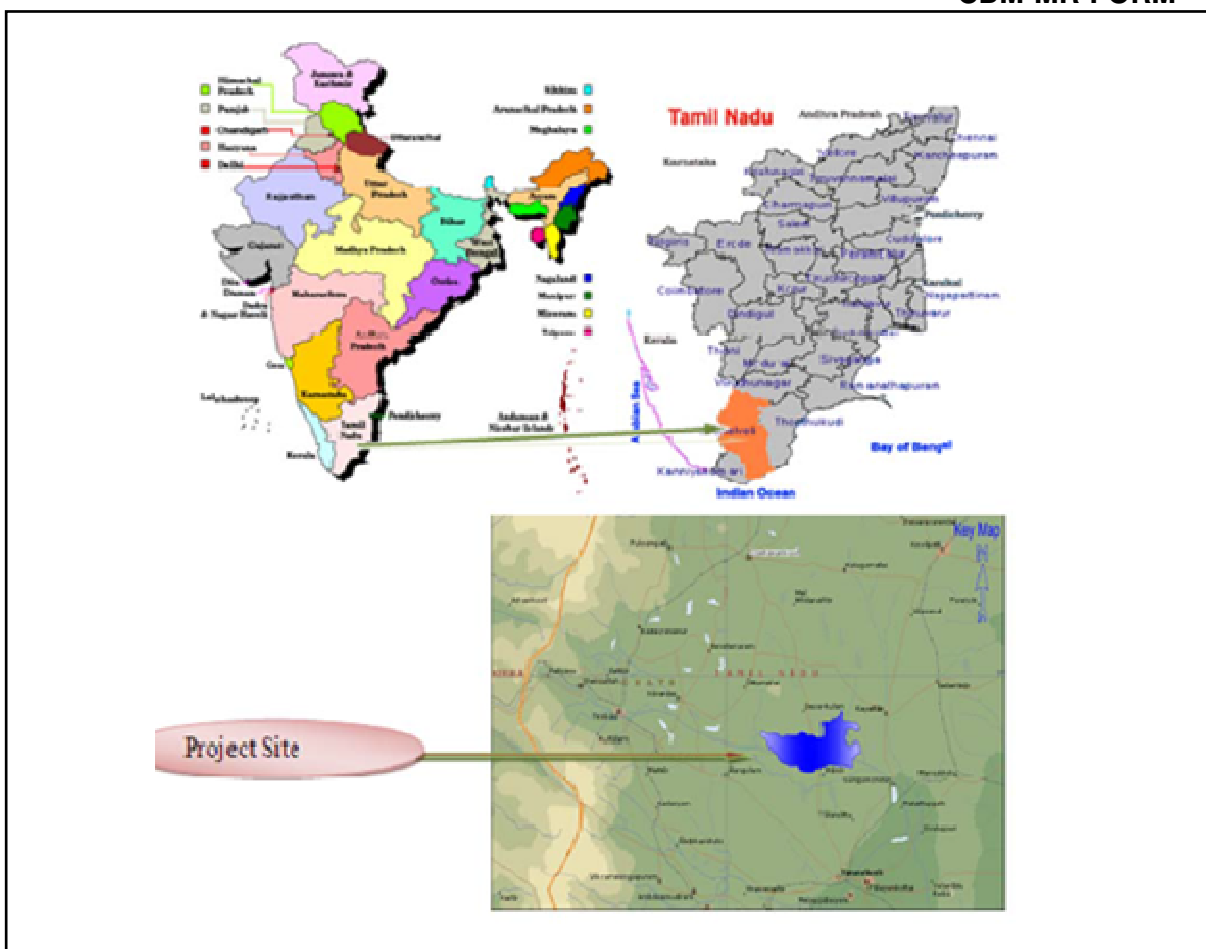
(c) *City/Town/Community, etc.*; The project is located across villages in Kanarpatti, Ettankulam, Kalakudi, Kuruchikulam, Ukkirankottai, Vagaikulam, Kattarakulam and Melelanthaikulam of Tirunelveli & Sankarankoil Taluk, in Tirunelveli District of Tamil Nadu state in India.

(d) *Physical/ Geographical location:*

The Project is located in Tirunelveli district in the Indian State of Tamil Nadu. Tirunelveli railway station is about 25 kms away from the site. Nearest airport is at Tuticorin about 70 kms from the site.

The project consists of 18 numbers of Enercon make E-53 WECs of 800 kW each. The latitude and longitude of the project activity are given below:

Vagaikulam Site, Tirunelveli District, Tamil Nadu								
Sl. No	HTSC No	Village	Latitude			Longitude		
			Deg.	Min.	Sec.	Deg.	Min.	Sec.
1	3957	Kanarpatti	8	52	57.09	77	38	51.01
2	3919	Kattarakulam	8	55	21.00	77	40	24.28
3	3947	Ettankulam	8	52	59.92	77	38	12.89
4	3914	Kalakudi	8	53	17.24	77	36	21.54
5	3915	Kuruchikulam	8	52	49.24	77	35	10.40
6	3916	Kuruchikulam	8	52	31.66	77	35	7.49
7	3917	Kuruchikulam	8	52	53.03	77	34	59.05
8	3918	Vagaikulam	8	54	51.25	77	36	56.19
9	3949	Ukkirankottai	8	55	13.76	77	36	36.15
10	3986	Vagaikulam	8	55	0.00	77	37	22.10
11	3955	Vagaikulam	8	54	41.45	77	36	37.58
12	3948	Ukkirankottai	8	55	4.55	77	36	37.69
13	3959	Kanarpatti	8	53	5.50	77	38	45.70
14	3954	Kuruchikulam	8	52	38.92	77	35	38.99
15	3981	Kattarakulam	8	55	17.00	77	41	9.70
16	3920	Melelanthaikulam	8	55	36.25	77	40	42.29
17	3921	Kanarpatti	8	53	21.95	77	39	23.63
18	3999	Kanarpatti	8	52	33.80	77	38	56.40



### A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Government of India (Host)	Vaayu Renewable Energy (Tapti) Private Limited	No

### A.4. References to applied methodologies and standardized baselines

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Project Type: Type I - Renewable Energy Projects

Category : Grid Connected Renewable Electricity Generation and

Reference : ACM0002 ver. 13

<http://cdm.unfccc.int/methodologies/DB/RSCTZ8SKT4F7N1CFDXCSA7BDQ7FU1X>

1. "Tool to calculate the emission factor for an electricity system" Version 7.0

2. Tool for the demonstration and assessment of additionality 7.0.0

### A.5. Crediting period type and duration

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The length of the Crediting period of the project activity as per registered PDD is 10 years (Fixed).

Start date of crediting period: 06/12/2012

End date of crediting period: 05/12/2022

## SECTION B. Implementation of project activity

### B.1. Description of implemented project activity

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The project activity consists of 18 WEGs (800 kW) of Enercon make E-53. The first machine under the project activity was commissioned on 29 September 2011 and last machine under the project activity was commissioned on 31 January 2012. The commissioning dates for all the machines include in the project activity are given in the table below.

Sr No.	HTSC No.	No of WEGs Connected	Date of Commissioning
1	3914	01	29-Sep-11
2	3915	01	29-Sep-11
3	3916	01	29-Sep-11
4	3917	01	29-Sep-11
5	3918	01	29-Sep-11
6	3919	01	29-Sep-11
7	3920	01	29-Sep-11
8	3921	01	29-Sep-11
9	3947	01	30-Sep-11
10	3948	01	30-Sep-11
11	3949	01	30-Sep-11
12	3954	01	07-Oct-11
13	3955	01	07-Oct-11
14	3957	01	20-Oct-11
15	3959	01	21-Oct-11
16	3981	01	28-Dec-11
17	3986	01	10-Jan-12
18	3999	01	31-Jan-12

WWIL operations and maintenance activities are ISO 9001:2008 certified and all the events are recorded in the log book available at the project site. Referring to the data available it can be inferred that there have not been any major special events for any of the machines that are included in the project activity. As a part of regular maintenance the machines are stopped for mechanical and electrical maintenance for 16 to 18 hours annually and for visual inspection for 6 to 7 hours quarterly. During the monitoring period there were no events or situations occurred, which may impact the applicability of the methodology.

The project activity comprises of 18 wind energy converters (WECs) of Enercon make (800 kW E-53) with internal electrical lines connecting the project activity with local evacuation facility. The project uses technology that is environmentally clean and safe since there are no GHG emissions associated with the electricity generation from the windmills. The WECs generates 3-phase power at 400V, which is stepped up to 33 KV. The project activity can operate in the frequency range of

47.5–51.5 Hz and in the voltage range of 400 V  $\pm$  12.5%. The average lifetime of the WEC is around 20 years as per information provided by the supplier. The other salient features of the state-of art technology are:

Turbine Model	Enercon E-53
Rated Power	800 kW
Rotor Diameter	53 m
Hub Height	75 m
Turbine Type	Gearless horizontal axis wind turbine with variable rotor speed
Power Regulation	Independent electromechanical pitch system for each blade
Cut in wind speed	2.5 m/s
Rated wind speed	12 m/s
Cut out wind speed	28-34 m/s
Extreme Wind Speed	59.5 m/s
Rated rotation speed	29 rpm
Operating range rot. Speed	12-29 rpm
Orientation	Upwind
No. Of Blades	3
Blade Material	Fiber Glass Epoxy reinforced with integral lightning protection
Gear box type	Gearless
Generator type	Synchronous generator
Braking	Aerodynamic
Output Voltage	400 V
Yaw System	Active yawing with 4 electric yaw drives with brake motor & friction bearing
Tower	74 m concrete

## **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**

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The corrections to project information were approved on 05/01/2015 with effective approval date from 23/12/2014 (PRC ref- PRC-7537-002).

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

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Not Applicable

### **B.2.4. Inclusion of monitoring plan**

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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**

>> Permanent changes to the registered monitoring plan were approved on 05/01/2015 with effective approval date from 23/12/2014 (PRC ref- PRC-7537-002).

**B.2.6. Changes to project design**

>> The changes to project design were approved on 05/01/2015 with effective approval date from 23/12/2014 (PRC ref- PRC-7537-002).

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

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Not Applicable

**SECTION C. Description of Monitoring System**

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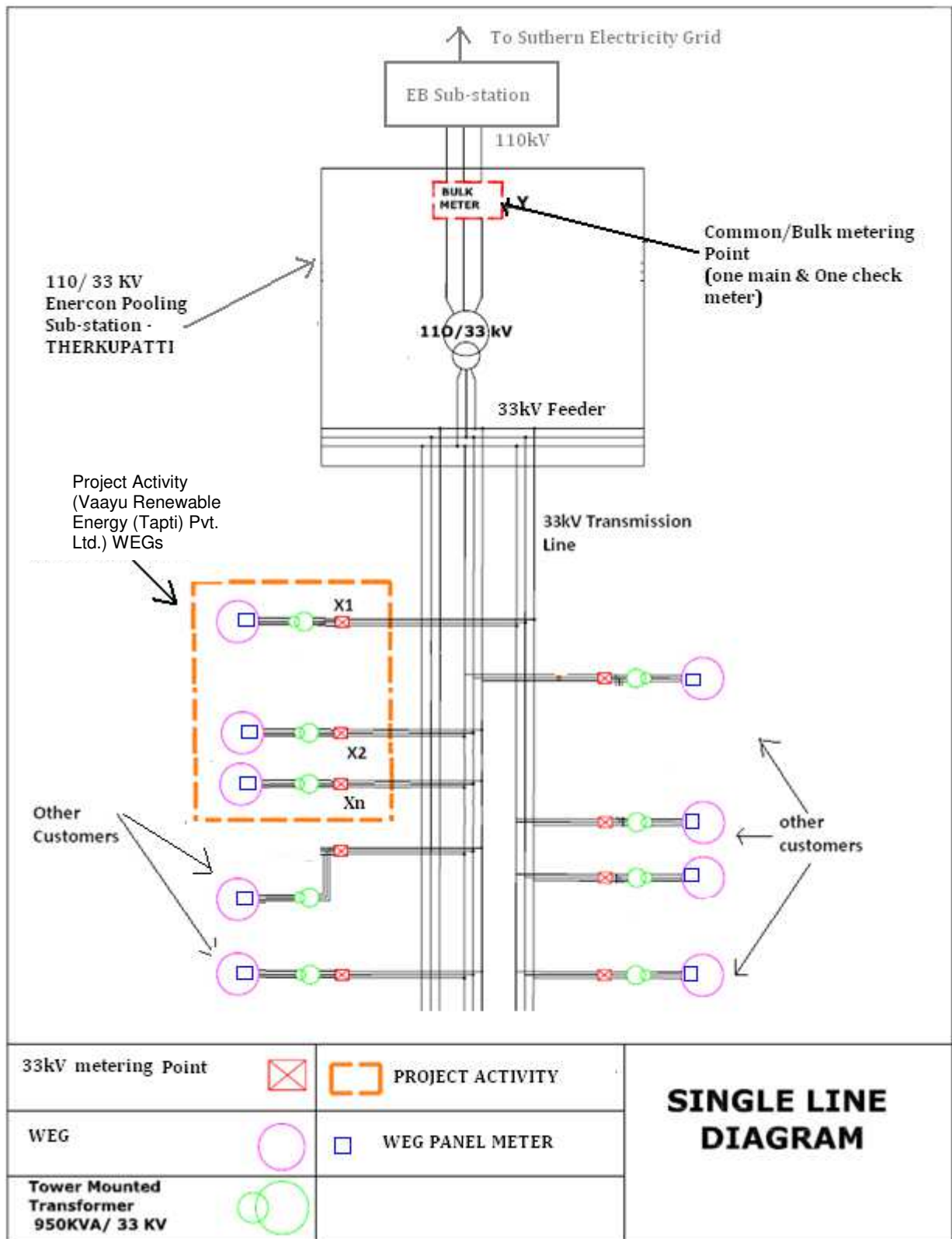
Approved consolidated baseline and monitoring methodology ACM0002, Version 13.0.0, EB-67 to be used to monitor the emission reductions.

Wind World (India) Limited is the O&M contractor for the project activity. Wind World (India) Limited will be responsible for maintaining all the monitoring data on behalf of PP in respect of the project activity. Wind World (India) Limited has implemented the management structure for managing the monitored data.

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. Further, wind based electricity generation is not associated with any kind of leakages. Hence, the sole parameter for monitoring is the electricity generated by the project and supplied to the grid.

**Description of metering arrangement for project activity:**

Single Line diagram of Metering arrangement for project activity is shown in below picture:



From the above line diagram it is clear metering system for the project activity consists of individual metering points at 33kV at project site. Each 33kV metering points will have one main meter of 0.2s of accuracy class which is exclusively be connected to WECs of the project activity i.e. there will be no WECs of other project owners that are connected to these metering point. There are total 18 individual metering points at 33kV for project activity.



In addition the 33kV metering points there is one set of main & check meter of 0.2s accuracy class at 110kV WWIL Pooling sub-station (common/Bulk metering point) where all the WECs of project activity and non-project activity are connected.

**Monitoring Information:**

Monthly statements showing the electricity generated through windmills given by Tamilnadu Electricity Board (TNEB)/ Tirunelveli Electricity Distribution Circle, Tirunelveli) contains the following data:-

1. Electricity Export ( $EG_{\text{export}}$ )
2. Electricity Import ( $EG_{\text{import}}$ )
3. Line Loss between 33 kV and 110 kV metering points
4. Net Export /Generation to the Grid by the project WEGs

There is a bi-directional tri-vector energy meter (also called as TNEB Meter) of accuracy class 0.2s adjacent to the individual wind turbine. Apart from the individual TNEB meter, there is a main and check meter of accuracy class 0.2s located at the WWIL pooling station. The main and check meter connected at this pooling station has both, the project activity as well as the non-project activity wind turbines connected to it.

The electricity export as well as the electricity imported by the project activity wind mills are recorded at the TNEB meter as well as at the main and check meter of the WWIL pooling station on a monthly basis, in the presence of representatives of TNEB and the Project Participant. Based on this monthly recording, the TNEB representatives apportion the transmission line losses amongst the various wind turbines (project activity as well as non-project activity) to deduce the net electricity supplied by the individual wind turbines to the grid/third party. The net electricity supplied to the grid, so deduced, is indicated in the 'Monthly Statement of Energy' issued by TNEB. The procedure for such apportioning is conducted and controlled by the TNEB and neither the Project Participant nor the Project Participant representatives have any role to play in the same. Since the substation is under the supervision of WWIL, so during the joint meter reading people of WWIL are also present. The Joint meter reading is taken by the officials of TNEB and based of this JMR, TNEB representatives apportion the transmission line losses amongst the various wind turbines (project activity as well as non-project activity) to deduce the net electricity supplied by the individual wind turbines to the grid. Based on the 'Monthly Statement of Energy' issued by TNEB, the Project Participant prepares the invoice and submits it to the third for payment.

The recording and monitoring of both the meters i.e. TNEB Meters & Main & Check meters at WWIL Pooling substation is done on monthly basis.

PP will forgo the generation in the calculation of emission reduction for that particular month if the start date of the crediting period does not match with the start date of the energy generation as per the monthly statement and will start the monitoring period from the next monthly statement.

Net electricity exported by the windmills will be calculated by Electricity Board independently. Either Wind World (India) Limited or PP doesn't have any role or control on calculation of net electricity generation/export.

The Electricity Export, Electricity Import, Line Loss and net electricity supplied (Net Generation) to the grid, can be cross checked from energy statement issued by state utility for net electricity exported to the grid.

**Procedure for data uncertainty:-**

1. In case the main meter at 110kV is not in service due to maintenance, repair, testing, defective display, the same will be either replaced/repared or calibrated immediately. During this interim period the generation from the Check Meter shall be used during that period.
2. In case the check meter at 110kV is not in service due to maintenance, repair, testing, defective display, the same will be either replaced/repared or calibrated immediately. However, in that case the recording of the electricity generation will not be affected as it will be taken from the main meter.
3. During the calibration if the main meter at 110kV is found to be outside the permissible limits of the error and if the main meter readings have been used in JMR, the CERs would be calculated by conservative approach by applying an error factor (–ve) as identified during the calibration to the net electricity export value ( $EG_{BL,y}$ ) since the date of last calibration. The main meter would be calibrated or replaced immediately with new calibrated meter.
4. During the calibration if the check meter at 110kV is found to be outside the permissible limits of the error and if the check meter readings have been used in JMR, the CERs would be calculated by conservative approach by applying an error factor (–ve) as identified during the calibration to the net electricity export value ( $EG_{BL,y}$ ) since the date of last calibration. The check meter would be calibrated or replaced immediately with new calibrated meter.
5. During the calibration if both main meter and check meters at 110kV is found to be outside the permissible limits of the error, the CERs would be calculated by conservative approach by applying an error factor (–ve) as identified during the calibration to the net electricity export value ( $EG_{BL,y}$ ) since the date of last calibration. The main meter and check meter would be calibrated or replaced immediately with new calibrated meter.
6. During the calibration if the TNEB meter at 33kV is found to be outside the permissible limits of the error the CERs would be calculated by conservative approach by applying an error factor (–ve) as identified during the calibration to the net electricity export value ( $EG_{BL,y}$ ) since the date of last calibration. The TNEB meter would be calibrated or replaced immediately with new calibrated meter.
7. In case the TNEB meter at 33kV is not in service due to maintenance, repair, testing, defective display or operate outside the permissible limit of error, the same will be either replaced/repared or calibrated immediately and then the net electricity export will be calculated by state utility pursuant to provision of PPA.

**Calibrations Details of Meters:**

The metering equipment were inspected & calibrated by State Utility. As per the registered monitoring plan all the meters are required to be calibrated once in 5 years by state utility.

Calibration details for the all the cluster meters at 33kV level are as follows:-

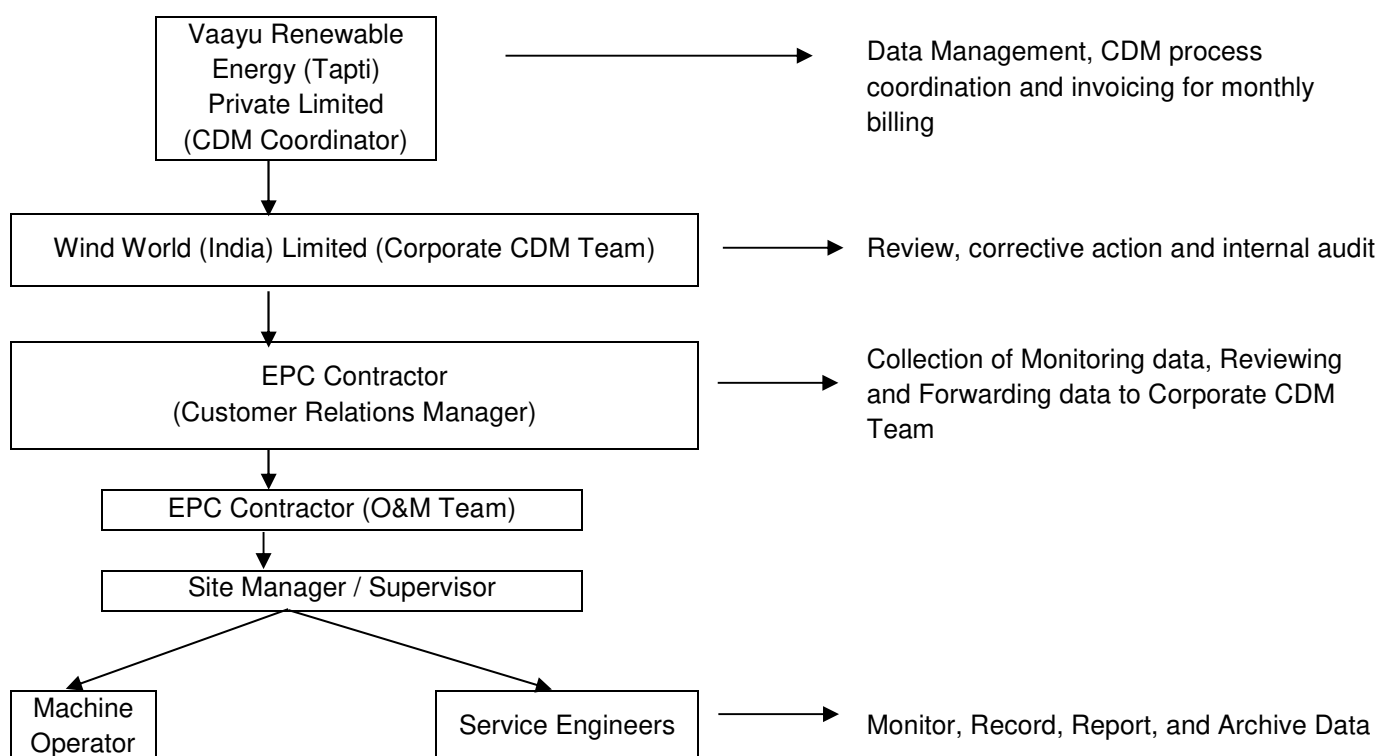
Sr. No.	Loc No.	HTSC No.	Accuracy Class	Meter Sr. No.	Calibration Dates	Calibration Dates	Calibration Due Dates	Calibration Delay
1	V98	3914	0.2s	HT2110213	17-04-2013	16-06-2017	15-06-2022	15/06/2022 to 05/12/2022
2	V50	3915	0.2s	HT2120670	17-04-2013	15-07-2017	14-07-2022	14/07/2022 to 05/12/2022
3	V52	3916	0.2s	HT2110210	17-04-2013	15-07-2017	14-07-2022	14/07/2022 to 05/12/2022
4	SF141	3917	0.2s	HT2110217	17-04-2013	31-10-2017	30-10-2022	30/10/2022 to 05/12/2022
5	168	3918	0.2s	HT2110199	17-04-2013	18-07-2017	17-07-2022	17/07/2022 to 05/12/2022
6	118	3919	0.2s	HT2110209	17-04-2013	28-11-2017	27-11-2022	27/11/2022 to 05/12/2022
7	120	3920	0.2s	HT2110212	17-04-2013	30-10-2017	29-10-2022	29/10/2022 to 05/12/2022
8	V213	3921	0.2s	HT2110596	17-04-2013	30-10-2017	29-10-2022	29/10/2022 to 05/12/2022
9	SF177	3947	0.2s	HT2110227	17-04-2013	30-10-2017	29-10-2022	29/10/2022 to 05/12/2022
10	SF135	3948	0.2s	HT2110197	17-04-2013	18-07-2017	17-07-2022	17/07/2022 to 05/12/2022
11	V117	3949	0.2s	HT2110221	17-04-2013	18-07-2017	17-07-2022	17/07/2022 to 05/12/2022
12	V76	3954	0.2s	HT2110593	17-04-2013	15-07-2017	14-07-2022	14/07/2022 to 05/12/2022
13	170	3955	0.2s	HT2110595	17-04-2013	18-07-2017	17-07-2022	17/07/2022 to 05/12/2022
14	V200	3957	0.2s	HT2110588	17-04-2013	30-10-2017	29-10-2022	29/10/2022 to 05/12/2022
15	136	3959	0.2s	HT2110584	17-04-2013	30-10-2017	29-10-2022	29/10/2022 to 05/12/2022
16	126	3981	0.2s	HT2110538	17-04-2013	18-07-2017	17-07-2022	17/07/2022 to 05/12/2022
17	173	3986	0.2s	HT2110531	17-04-2013	28-11-2017	27-11-2022	27/11/2022 to 05/12/2022
18	V202	3999	0.2s	HT2110530	17-04-2013	30-10-2017	29-10-2022	29/10/2022 to 05/12/2022

Calibration details for the Bulk meter at 110kV level installed at sub-station are as follows:-

Meter Serial No.(Old)	Make	Accuracy Class	Calibration (Previous)	Date	Meter Serial No (New)	Make	Calibration Date (Recent)	Calibration Due
HT1100044	Wallaby	0.2s	07/12/2012	20/04/2015	17055050 <sup>2</sup>	L&T	07/04/2018	06/04/2023
HT1100045	Wallaby	0.2s	09/12/2012	20/04/2015	17055062 <sup>3</sup>	L&T	07/04/2018	06/04/2023

### 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 Wind World's service staff is deft at handling technical snags on top of the turbine, the necessity of ensuring that they are capable of climbing the tower with absolute ease and comfort has been established. The Wind World Training Academy provides need-based training to meet the training requirements of Wind World projects. The training is contemporary, which results in imparting focused knowledge leading to value addition to the attitude and skills of all trainees. This ultimately leads to creativity in problem solving.



<sup>2</sup> Main meter with serial number HT1100044 was replaced with meter serial no. 17055050 on 07/04/2018, the meters are shifted to advanced type ABT DLMS.

<sup>3</sup> Check meter with serial number HT1100045 was replaced with meter serial no. 17055062 on 07/04/2018, the meters are shifted to advanced type ABT DLMS.

## Monitoring Roles & Responsibilities

PP will be monitoring the data sent by the O&M contractor and the data for electricity generated by the project activity will be kept as records for the period of 10+2 years i.e. 2 years beyond the term of crediting period. WWIL is O&M contractor and will be responsible for data recording.

The Project is operated by WWIL (O&M contractor for the project activity) and managed by the PP. The operational and maintenance contract for the project is with Enercon. Enercon is an ISO 9001:2008 certified Quality Management system from Germanischer Lloyd. Enercon 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 of the metering equipment once in 5 years. Enercon is Operation and Maintenance contractor for the project activity and provides the daily generation report to the Project proponent. The project proponent also maintains the records of daily generation report and joint meter report

The project proponent is Vaayu Renewable Energy (Tapti) Private Limited will be keeping and monitoring the data for electricity generation and calibration reports post project implementation. WWIL being the O&M contractor have the responsibility of activities such as maintaining electricity generation records, calibration records and maintenance of the WECs (Wind Energy Generators).

## SECTION D. Data and parameters

### D.1. Data and parameters fixed ex ante

<b>Data/Parameter</b>	EF <sub>grid,OM,y</sub>
Unit	tCO <sub>2e</sub> /MWh
Description	Operating Margin Emission Factor of Southern Regional Electricity Grid.
Source of data	<p>"CO<sub>2</sub> Baseline Database for Indian Power Sector", version 6.0 published by the Central Electricity Authority, Ministry of Power, Government of India.</p> <p>The "CO<sub>2</sub> Baseline Database for Indian Power Sector" is available at <a href="https://cea.nic.in/cdm-co2-baseline-database/?lang=en">https://cea.nic.in/cdm-co2-baseline-database/?lang=en</a></p>
Value(s) applied	0.95210
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
Purpose of data/parameter	Calculation of Baseline Emissions
Additional comments	Value is fixed ex-ante for entire crediting period.

<b>Data/Parameter</b>	EF <sub>BM,y</sub>
Unit	tCO <sub>2e</sub> /MWh

**CDM-MR-FORM**

Description	Build Margin Emission Factor of Southern Regional Electricity Grid
Source of data	<p>"CO<sub>2</sub> Baseline Database for Indian Power Sector", by the Central Electricity Authority, Ministry of Power, Government of India. (Source: <a href="http://www.cea.nic.in">http://www.cea.nic.in</a>)</p> <p>The "CO<sub>2</sub> Baseline Database for Indian Power Sector" is available at <a href="https://cea.nic.in/cdm-co2-baseline-database/?lang=en">https://cea.nic.in/cdm-co2-baseline-database/?lang=en</a></p>
Value(s) applied	0.73389
Choice of data or measurement methods and procedures	Build Margin Emission Factor has been calculated by the Central Electricity Authority using the simple OM approach in accordance with ACM0002
Purpose of data/ parameter	Calculation of Baseline Emissions
Additional comment	None

<b>Data/Parameter</b>	<b>EF<sub>CO<sub>2</sub>, grid, y</sub></b>
Unit	tCO <sub>2</sub> e/MWh
Description	Combined Margin Emission Factor of Southern Regional Electricity Grid
Source of data	<p>Combined Margin Emission Factor (<b>EF<sub>CM, y</sub></b>) is calculated as the weighted average of Operation Margin Emission Factor (<b>EF<sub>OM, y</sub></b>) and Build Margin Emission Factor (<b>EF<sub>BM, y</sub></b>)</p> <p>"CO<sub>2</sub> Baseline Database for Indian Power Sector", by the Central Electricity Authority, Ministry of Power, Government of India. (Source: <a href="http://www.cea.nic.in">http://www.cea.nic.in</a>)</p>
Value(s) applied	0.89755
Choice of data or measurement methods and procedures	Combined Margin Emission Factor has been calculated by the Central Electricity Authority using the simple OM approach in accordance with ACM0002
Purpose of data/ parameter	Calculation of Baseline Emissions
Additional comment	None

**D.2. Data and parameters monitored**

<b>Data/Parameter</b>	<b>EG<sub>BL, y</sub></b>
Unit	MWh (Mega-watt hour)
Description	Net Electricity exported to the grid/third party by the project activity
Measured/calculated/ Default	Calculated
Source of data	Monthly statement showing the electricity generated through wind turbines issued by Tamil Nadu Electricity Board (TNEB)/ Tirunelveli Electricity Distribution Circle, Tirunelveli (TANGEDCO).
Value(s) of monitored parameter	1,44,340.89 MWh

Monitoring equipment	Please refer section 'C' (Description of monitoring system) for the details of meter type, accuracy class, serial number, calibration frequency, date of last calibration and validity under the heading 'Calibrations Details of Meters'
Measuring/reading/recording frequency	Refer section C for an illustration of the provisions for measurement methods. The calibration of energy meter is done once in five years.
Calculation method (if applicable)	$EG_{BL, y} = EG_{Export, y} - EG_{Import, y} - \text{Transmission loss}$
QA/QC procedures	<p>Cross checking of net electricity export:</p> <p>The electricity generated by the project activity is supplied to the industrial unit of the third party (SRF Limited), where electricity from other sources is also consumed. Hence, the electricity bill raised by state utility to the third party does not have the figure of net electricity export specifically for the project activity. Bill reflects the cumulative consumption figure by the industrial unit (including the value of the project activity along with other sources of electricity), based on which the invoice is raised (which also shows a cumulative figure). Hence, cross-checking of net electricity export specifically for the project activity through the invoice is not feasible.</p> <p>Further, net electricity export can only be compared with the readings of LCS meters, which are fitted at the controller panel of each WEC and measure the electricity generation of each WEC. However, the aggregate of electricity recorded at LCS meters is always higher than the net electricity export recorded at HTSC meters owing to transmission and transformation loss.</p> <p>Hence, in order to ensure conservativeness, the net export value as mentioned in the monthly statement provided by electricity board (document issued/validated by State Government Authority) would be used for emission reduction calculation.</p>
Purpose of data/parameter	To calculate emission reduction achieved by the project activity
Additional comments	The data will be archived both in electronic and hard paper format for crediting period + 2 years.

<b>Data/Parameter</b>	<b><math>EG_{Export, y}</math></b>
Unit	MWh (Mega-watt hour)
Description	Electricity exported to the grid/third by the project activity recorded at 33kV metering point (TNEB Meter)
Measured/calculated/Default	Measured
Source of data	Monthly statement showing the electricity generated through wind turbines given by Tamil Nadu Electricity Board (TNEB)/ Tirunelveli Electricity Distribution Circle, Tirunelveli (or TANGEDCO).
Value(s) of monitored parameter	1,47,594.86 MWh

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Monitoring equipment	Please refer section 'C' (Description of monitoring system) for the details of meter type, accuracy class, serial number, calibration frequency, date of last calibration and validity under the heading 'Calibrations Details of Meters'
Measuring/reading/recording frequency	Monthly Refer section C for an illustration of the provisions for measurement methods.
Calculation method (if applicable)	-
QA/QC procedures	All the meters (project activity TNEB meters as well as main & check meter at WWIL pooling sub-station) are calibrated by state utility once in 5 years as per the Power Purchase Agreement & CEA metering code and records are available with PP.
Purpose of data/parameter	To calculate emission reduction achieved by the project activity
Additional comments	The data will be archived both in electronic and hard paper format for crediting period + 2 years.

<b>Data/Parameter</b>	<b>EG<sub>Import,y</sub></b>
Unit	MWh (Mega-watt hour)
Description	Electricity imported by the project activity recorded at 33kV metering point (TNEB Meter)
Measured/calculated/Default	Measured
Source of data	Monthly statement showing the electricity imported by wind turbines as given by Tamil Nadu Electricity Board (TNEB)/ Tirunelveli Electricity Distribution Circle, Tirunelveli (or TANGEDCO).
Value(s) of monitored parameter	566.62 MWh
Monitoring equipment	Please refer section 'C' (Description of monitoring system) for the details of meter type, accuracy class, serial number, calibration frequency, date of last calibration and validity under the heading 'Calibrations Details of Meters'
Measuring/reading/recording frequency	Monthly Refer section C for an illustration of the provisions for measurement methods.
Calculation method (if applicable)	-
QA/QC procedures	All the meters (project activity TNEB meters as well as main & check meter at WWIL pooling sub-station) are calibrated by state utility once in 5 years as per the Power Purchase Agreement & CEA metering code and records are available with PP.
Purpose of data/parameter	To calculate emission reduction achieved by the project activity
Additional comments	The data will be archived both in electronic and hard paper format for crediting period + 2 years.

<b>Data/Parameter</b>	<b>T<sub>E</sub></b>
Unit	MWh (Mega-watt hour)



Description	Line loss between the metering point at 33 kV metering points of project activity and the metering point at 110 kV at the WWIL pooling substation.
Measured/calculated/Default	Measured
Source of data	Monthly statement showing the electricity generated through wind turbines given by Tamil Nadu Electricity Board (TNEB)/ Tirunelveli Electricity Distribution Circle, Tirunelveli (or TANGEDCO).
Value(s) of monitored parameter	5,527.55 MWh
Monitoring equipment	Please refer section 'C' (Description of monitoring system) for the details of meter type, accuracy class, serial number, calibration frequency, date of last calibration and validity under the heading 'Calibrations Details of Meters'
Measuring/reading/recording frequency	Monthly Refer section C for an illustration of the provisions for measurement methods.
Calculation method (if applicable)	-
QA/QC procedures	Value of $T_E$ can be crosschecked from invoice raised on TNEB or state electricity board. QA/QC procedures will be implemented by Discom/ State Utility (TNEB) pursuant to provisions of the PPA except or otherwise explicitly stated in the PDD
Purpose of data/parameter	To calculate emission reduction achieved by the project activity
Additional comments	The data will be archived both in electronic and hard paper format for crediting period + 2 years.

### D.3. Implementation of sampling plan

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Not applicable

## SECTION E. Calculation of emission reductions or net anthropogenic removals

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

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The baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,y} * EF_{grid, CM, y}$$

Where:

$BE_y$  = Baseline emissions in year y (tCO<sub>2</sub>/yr)

$EG_{PJ,y}$  = Net electricity supplied to the grid as a result of the implementation of CDM project in year y (MWh/yr)

$EF_{grid, CM, y}$  = Combined margin CO<sub>2</sub> 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" (tCO<sub>2</sub>/MWh)

Baseline emission factor (Combined Margin) ( $EF_{grid, CM, y}$ ) = 0.89755 tCO<sub>2</sub>e/MWh

Monitoring Period	Net Electricity Exported to the grid by the Project activity. (MWh)	Baseline Emission Factor (tCO <sub>2</sub> e/MWh)	Baseline Emissions (tCO <sub>2</sub> e)
	EG <sub>BL,y</sub>	EF <sub>y</sub>	BE <sub>y</sub>
01/01/2018 to 05/12/2022 (inclusive of both the dates)	144,340.89	0.89755	129,552
		<b>TOTAL</b>	129,552

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

&gt;&gt;

The project activity is a renewable energy project which generates electricity using wind power and hence does not result in project emissions.

**E.3. Calculation of leakage emissions**

&gt;&gt;

No leakage is considered from the project activity as per approved methodology ACM0002

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

	Baseline GHG emissions or baseline net GHG removals (t CO <sub>2</sub> e)	Project GHG emissions or actual net GHG removals (t CO <sub>2</sub> e)	Leakage GHG emissions (t CO <sub>2</sub> e)	GHG emission reductions or net anthropogenic GHG removals (t CO <sub>2</sub> e)			
				Before 01/01/2013	From 01/01/2013 until 31/12/2020	From 01/01/2021	Total amount
<b>Total</b>	1,29,552	-	-	-	76,295	53,257	1,29,552

**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 <sub>2</sub> e)	Amount estimated ex ante for this monitoring period in the PDD (t CO <sub>2</sub> e)
1,29,552	1,35,692

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

&gt;&gt;

As per CDM registered PDD, 27,546 tCO<sub>2</sub>e is the amount of CERs generated annually. Therefore, following unitary method, the amount of estimated ex ante for this monitoring period is 135,692 tCO<sub>2</sub>e.

Annual amount of reductions as per PDD X Number of days in current monitoring year  
 Number of days in a year

#### E.6. Remarks on increase in achieved emission reductions

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There is a difference of 4.53% (reduction) between the actual emission reduction achieved and the amount estimated ex ante for this monitoring period in the PDD.

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

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Not applicable

#### Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
09.0	8 October 2021	Revision to: <ul style="list-style-type: none"> <li>Ensure consistency with version 03.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN).</li> </ul>
08.0	6 April 2021	Revision to: <ul style="list-style-type: none"> <li>Reflect the “Clarification: Regulatory requirements under temporary measures for post-2020 cases” (CDM-EB109-A01-CLAR).</li> </ul>
07.0	31 May 2019	Revision to: <ul style="list-style-type: none"> <li>Ensure consistency with version 02.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN);</li> <li>Add a section on remarks on the observance of the scale limit of small-scale project activity during the crediting period;</li> <li>Add "changes specific to afforestation or reforestation project activity" as a possible post-registration changes;</li> <li>Clarify the reporting of net anthropogenic GHG removals for A/R project activities between two commitment periods;</li> <li>Make editorial improvements.</li> </ul>
06.0	7 June 2017	Revision to: <ul style="list-style-type: none"> <li>Ensure consistency with version 01.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN);</li> <li>Make editorial improvements.</li> </ul>

<i>Version</i>	<i>Date</i>	<i>Description</i>
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: <ul style="list-style-type: none"> <li>• Include provisions related to delayed submission of a monitoring plan;</li> <li>• Provisions related to the Host Party;</li> <li>• Remove reference to programme of activities;</li> <li>• Overall editorial improvement.</li> </ul>
04.0	25 June 2014	Revisions to: <ul style="list-style-type: none"> <li>• Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0));</li> <li>• Include provisions related to standardized baselines;</li> <li>• Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1;</li> <li>• Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>;</li> <li>• Editorial improvement.</li> </ul>
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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