**Monitoring report form for CDM project activity**

**(Version 09.0)**

*Complete this form in accordance with the instructions attached at the end of this form.*

| **MONITORING REPORT** | | | |
|---|---|---|---|
| **Title of the project activity** | 20 MW Enercon Wind farms (SAI) Pvt. Limited in Maharashtra | | |
| **UNFCCC reference number of the project activity** | 3854 | | |
| **Version number of the PDD applicable to this monitoring report** | 08 | | |
| **Version number of this monitoring report** | 01 | | |
| **Completion date of this monitoring report** | 30/08/2022 | | |
| **Monitoring period number** | 05 | | |
| **Duration of this monitoring period** | 01/03/2017 to 13/12/2020 (Including first and last day of monitoring period) | | |
| **Monitoring report number for this monitoring period** | NA | | |
| **Project participants** | Wind World (India) Ltd. | | |
| **Host Party** | India | | |
| **Applied methodologies and standardized baselines** | Sectoral Scope 01 | | |
| **Sectoral scopes** | ACM0002, Version 11 | | |
| **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 until 31 December 2020 | Amount achieved from 1 January 2021 |
| | - | 62,422 | - |
| **Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD** | 1,31,839 $tCO_2e$ | | |

## SECTION A. Description of project activity

### A.1. General description of project activity

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The objective is development, design, engineering, procurement, finance, construction, operation and maintenance of 20 MW Wind Electricity Generation Project in the state of Maharashtra to provide reliable, renewable power to the NEWNE electricity grid of India. The purpose of the project activity is to utilize renewable wind energy for generation of electricity. The Project will lead to reduction of GHG emissions, as it will displace electricity from fossil fuel-based electricity generation plants.

The project is owned by Enercon Wind farms (SAI) Private Limited. Wind World (India) Limited (will be referred WWIL here onwards) is the operation and maintenance contractor for the Project. The generated electricity is supplied to Maharashtra State Electricity Distribution Company Limited ("MSEDCL") under a long-term power purchase agreement (PPA). The project activity involves installation of 25 number of E - 48 machines (each having capacity of 800 kW) in Ahmednagar in the state of Maharashtra, with internal electrical lines connecting the Project with local evacuation facility. The WECs 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 ± 12.5%.

The first machine under the project activity was commissioned on 28 February, 2007 and last machine was commissioned on 17 March, 2009. The expected operational lifetime of the project is for 20 years.

The total emission reductions achieved under this monitoring period (01/03/2017 to 13/12/2020) is 62,422 tCO2.

The details of issuance of CERs for the previous monitoring periods are as follows:

| Monitoring Period No. | Monitoring Period | CER Issued |
|---|---|---|
| First Issuance | 14 Dec 10 - 31 Jul 11 | 20,054 |
| Second issuance | 01 Aug 11 - 31 Mar 12 | 17,896 |
| Third issuance | 01 Apr 12 - 31 Dec 12 | 27,554 |
| Fourth Issuance | 01 Jan 13 - 28 Feb 17 | 102,778 |

### A.2. Location of project activity

>>

The project is located in Ahmednagar district of Maharashtra.
The details of the geo-coordinates of individual machines have been given below:

| S. No | WEG Loc. No. | Latitude (North) | Longitude (East) |
|---|---|---|---|
| 1 | 523 | 19.6264 | 73.7842 |
| 2 | 524 | 19.6275 | 73.7838 |
| 3 | 525 | 19.6286 | 73.7834 |
| 4 | 526 | 19.6296 | 73.7830 |
| 5 | 527 | 19.6307 | 73.7829 |
| 6 | 79 | 19.7480 | 73.8370 |
| 7 | 529 | 19.6328 | 73.7829 |
| 8 | 530 | 19.6341 | 73.7836 |
| 9 | 504 | 19.6076 | 73.7888 |

| | | | |
|---|---|---|---|
| 10 | 506 | 19.6087 | 73.7888 |
| 11 | 507 | 19.6104 | 73.7887 |
| 12 | 521 | 19.6244 | 73.7849 |
| 13 | 510 | 19.6133 | 73.7888 |
| 14 | 512 | 19.6155 | 73.7889 |
| 15 | 513 | 19.6166 | 73.7887 |
| 16 | 514 | 19.6176 | 73.7884 |
| 17 | 35 | 19.6604 | 73.8144 |
| 18 | 36 | 19.6617 | 73.8145 |
| 19 | 37 | 19.6630 | 73.8146 |
| 20 | 38 | 19.6642 | 73.8144 |
| 21 | 39 | 19.6655 | 73.8141 |
| 22 | 516 | 19.6196 | 73.7877 |
| 23 | 517 | 19.6205 | 73.7871 |
| 24 | 518 | 19.6216 | 73.7866 |
| 25 | 519 | 19.6224 | 73.7859 |

### 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 Country) | Wind World (India) Ltd. (Private) | No |

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

>>

**Title:** "*Consolidated baseline methodology for grid-connected electricity generation from renewable sources"*

**Reference:** Approved consolidated baseline and monitoring methodology ACM0002 (Version 11, EB 52)

Tool: "Tool to calculate the emission factor for an electricity system" – version 2

"Tool for the demonstration and assessment of additionality" – version 5.2

References:

http://cdm.unfccc.int/methodologies/DB/UB3431UT9I5KN2MUL2FGZXZ6CV71LT

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

>>

Type of crediting period : Fixed
Start date and End dates : 14/12/2010- 13/12/2020
Length of crediting period : 10 years (fixed crediting period)

## SECTION B. Implementation of project activity

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

>>

The first machine under the project activity was commissioned on 28 February, 2007 and last machine was commissioned on 17 March, 2009. The project activity consists of 25 WECs (800 kW) of Enercon make E-48 models. The commissioning date for all the machines included in the project activity is given in the table below:

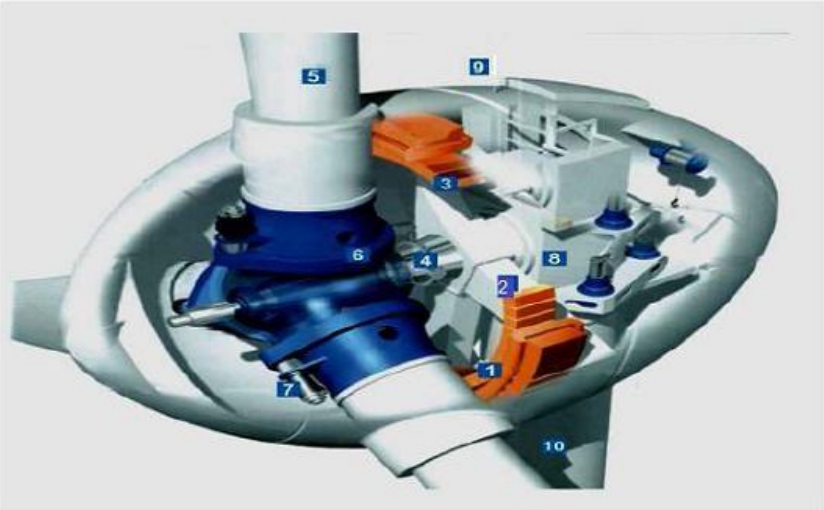
| S. NO. | WEG Location no. | Unique Identification No. | Date of Commissioning |
|---|---|---|---|
| 1 | 523 | EWFSPL -01 | 17 March, 2009 |
| 2 | 524 | EWFSPL -02 | 26 February, 2009 |
| 3 | 525 | EWFSPL -03 | 26 February, 2009 |
| 4 | 526 | EWFSPL -04 | 11 February, 2009 |
| 5 | 527 | EWFSPL -05 | 11 February, 2009 |
| 6 | 79 | EWFSPL -06 | 22 May, 2008 |
| 7 | 529 | EWFSPL -07 | 26 February, 2009 |
| 8 | 530 | EWFSPL -08 | 17 March, 2009 |
| 9 | 504 | EWFSPL -09 | 17 March, 2009 |
| 10 | 506 | EWFSPL -10 | 26 February, 2009 |
| 11 | 507 | EWFSPL -11 | 11 February, 2009 |
| 12 | 521 | EWFSPL -12 | 4 December, 2008 |
| 13 | 510 | EWFSPL -13 | 4 December, 2008 |
| 14 | 512 | EWFSPL -14 | 4 December, 2008 |
| 15 | 513 | EWFSPL -15 | 13 September, 2008 |
| 16 | 514 | EWFSPL -16 | 13 September, 2008 |
| 17 | 35 | EWFSPL -17 | 28 February, 2007 |
| 18 | 36 | EWFSPL -18 | 28 February, 2007 |
| 19 | 37 | EWFSPL -19 | 28 February, 2007 |
| 20 | 38 | EWFSPL -20 | 28 February, 2007 |
| 21 | 39 | EWFSPL -21 | 28 February, 2007 |
| 22 | 516 | EWFSPL -22 | 13 September, 2008 |
| 23 | 517 | EWFSPL -23 | 24 September, 2008 |
| 24 | 518 | EWFSPL -24 | 4 December, 2008 |
| 25 | 519 | EWFSPL -25 | 4 December, 2008 |

WWIL's operation and maintenance activities are ISO 9001:2008 certified and all the events are recorded at the project site. Referring to the data available, it can be inferred that there have not been any major special event for any 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.

The project involves 25 wind energy converters (WECs) of Enercon make (800 kW E-48) with internal electrical lines connecting the project with local evacuation facility. The Project can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V ± 12.5%. The salient features of the technology are:

- Gearless Construction - Rotor & Generator Mounted on same shaft eliminating the Gearbox.
- Variable speed function – has the speed range of 18 to 33 RPM thereby ensuring optimum efficiency at all times.
- Variable Pitch functions ensuring maximum energy capture.
- Near Unity Power Factor at all times.
- Minimum drawl (less than 1% of kWh generated) of Reactive Power from the grid.
- No voltage peaks at any time.
- Operating range of the WEC with voltage fluctuation of -20 to +20%.
- Less Wear & Tear since the system eliminates mechanical brake, which are not needed due to low speed generator which runs at maximum speed of 33 rpm and uses Air Brakes.
- Three Independent Braking Systems.

- Generator achieving rated output at only 33 rpm.
- Incorporates lightning protection system, which includes blades.
- Starts Generation of power at wind speed of 3 m/s.




1. Generator
2. Generator Stator
3. Generator Rotor
4. Main Pin
5. Rotor Blade
6. Blade Flange
7. Pitch Drive
8. Main Carrier
9. Wind Sensor
10. Tower

## B.2. Post-registration changes

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

>>

Temporary Deviations and Standardised baselines are not applicable

### B.2.2. Corrections

>>

The PP has revised the PDD to incorporate the change and the same has been approved on 02 January, 2013, as post registration changes (PRC-3854-001) during the second verification of the project (Source: https://cdm.unfccc.int/Projects/DB/DNV-UK1279516994.31/view).

The PP has revised the PDD to incorporate the change and the same has been approved on 05 October, 2017, as post registration changes PRC-3854-002, during the fourth verification of the project (Source: http://cdm.unfccc.int/PRCContainer/DB/prcp198978178/view ).

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

>>

Not Applicable

### 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

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The PP has revised the PDD to incorporate the change and the same has been approved on 02 January, 2013, as post registration changes (PRC-3854-001) during the second verification of the project (Source: https://cdm.unfccc.int/Projects/DB/DNV-UK1279516994.31/view).

The PP has revised the PDD to incorporate the change and the same has been approved on 05 October, 2017, as post registration changes PRC-3854-002, during the fourth verification of the project (Source: http://cdm.unfccc.int/PRCContainer/DB/prcp198978178/view ).

### B.2.6. Changes to project design

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Not applicable

### 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 monitoring methodology ACM0002 / Version 11 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.

The generated electricity is measured through a two-step procedure wherein the first metering is carried out at the controller of the machine with on-board meter. The monitoring of all these wind turbines is done from a common monitoring station as a part of central monitoring system. $EG_{gross,\ y}$ is the electricity generated from an individual wind turbine measured through its panel. The summation of total Electricity generated from wind turbine of the project proponent from individual meters (panel meter) in MWh is presented as:

$$\sum_{y=0}^{n} EG_{gross,y}$$

*where* n = *number of WEGs of SAI connected at common MSEDCL meter*

and the summation of total Electricity generated (panel data) from the other wind turbines (total number of WEGs = m) attached to the common MSEDCL meter at the sub-station in MWh is presented as

$$\sum_{y=0}^{m} EG_{gross,y}$$

*where m = number of WEGs of other customer connected at common MSEDCL meter*

The second metering is carried out at grid interconnection point (sub-station) wherein the Joint Meter Reading (JMR) is carried out on first day of every month in presence of the representatives of the project proponent & the state electricity utility (MSEDCL). This JMR is used for calculation of the amount of electricity supplied to the grid against which the utility makes the payment to the project proponent. The JMR gives both the "export" ($EG_{JMR,export}$) and "import" ($EG_{JMR,import}$) of the electricity to/ from the NEWNE grid based on common MSEDCL meter readings.

The apportioning of electricity generated from the various wind turbines is done by DISCOM (Maha Vitran), based on the power generation from the individual wind turbines connected to this MSEDCL meter. This report contains details of power exported/imported to/from the grid by each of the wind turbines connected. This apportioned value (calculated by DISCOM) is then used by the project proponent to raise invoice to MSEDCL.
The break-up sheet reflecting net electricity supplied by the project activity to the grid is prepared by DISCOM based on the allocation procedure explained below.

$EG_{export}$ the electricity supplied to the grid by the project activity is calculated as follows:

$$EG_{export} = \frac{EG_{JMR,\,export} \times \sum_{y=0}^{n} EG_{gross,\,y}}{\left(\sum_{y=0}^{n} EG_{gross,\,y} + \sum_{y=0}^{m} EG_{gross,\,y}\right)}$$

$EG_{import}$ the electricity drawn from the grid by the project activity is calculated as follows:

$$EG_{import} = \frac{EG_{JMR,\,import} \times \sum_{y=0}^{n} EG_{gross,\,y}}{\left(\sum_{y=0}^{n} EG_{gross,\,y} + \sum_{y=0}^{m} EG_{gross,\,y}\right)}$$

EGy, the net electricity supplied to the grid by the project activity, is calculated as follows:

$EGy = EG_{export} - EG_{import}$

The apportioning of electricity generated by the all WEGs (project activity and non-project activity) is entirely under the jurisdiction of the DISCOM. The project participant has no role in computing and furnishing the apportioned electricity generated for them or any other project developer. The above apportioning procedure for deriving the apportioned electricity generated by the project activity has been included only to bring clarity to the apportioning and overall monitoring procedure.

***Details of the monitoring equipment, QC/ QA procedures followed:***

- **Metering Equipment:** The metering equipment (main and check) are capable of recording and storing half hourly readings of all the electrical parameters with digital output.

- **Meter Readings:** The monthly meter readings (both main and check meters) are taken jointly by the parties each month. At the conclusion of each meter reading an appointed representative of MSETCL and WWIL sign a document indicating the number of Kilowatt-hours indicated by the main meter.

- **Inspection of Energy Meters:** The entire main and check energy meters (export and import)

and all associated instruments, transformers installed at the Project are of 0.2% 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:** The entire meter Test Checking: main and check meters are tested for accuracy with reference to a portable standard meter. The portable standard meter is owned by MSETCL. If during testing, both the Main and Check Meter are found within the permissible limit of error i.e. 0.2%, the energy computation will be as per the Main Meter. The consumption registered by the main meters alone will hold good for the purpose of metering electricity supplied to the grid as long as the error in the main meters is within the permissible limits.

- The main meter readings are apportioned based upon the LCS meter readings from the individual WTGs to compute net electricity supplied from individual WTGs. The LCS meter readings are archived electronically on continuous basis. Joint meter reading at the EB substation is noted each month. Therefore cumulative LCS meter reading for each month is used for purpose of allocation of net electricity supplied to the grid from the project activity.

- The LCS meters do not require calibration as the energy readings of electricity generated at the LCS meter is cross verified by the energy calculated by inverting system installed in the WEGs. In case there is any mismatch in the energy values recorded by the LCS meter and the energy values calculated by the inverting system; the machine will stop working and generate the error report. The operations and maintenance staff will attend to the problem immediately in order to identify the error and correction factor will be determined.

  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 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. There will be a revision in the meter reading for the period from the previous calibration test up to the current test based on the readings of 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 main meters shall be immediately calibrated and the correction applied to the reading registered by the main meter to arrive the correct reading of energy supplied for metering electricity supplied to the grid for the period from the last month's meter reading up to the current test. Meter reading for the period thereafter till the next monthly reading shall be as per the calibrated main meter.
  - If during any of the monthly meter readings, the variation between the main meter and the check meter is more than the permissible limit for meters of 0.2% accuracy class, all the meters shall be re-tested and calibrated immediately.

Meter details

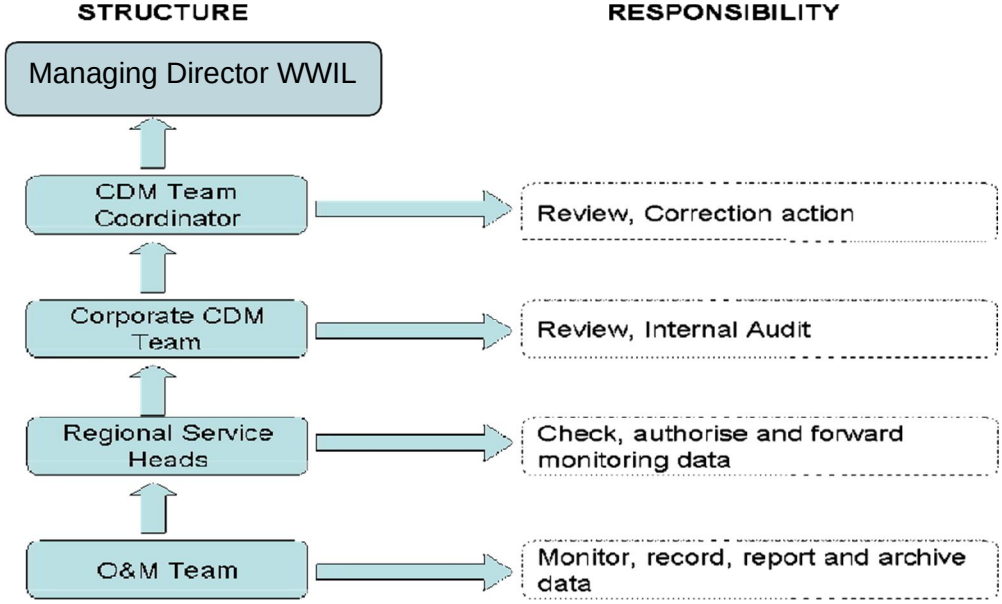
| ***Loc No*** | ***Total Capacity (MW)*** | ***Feeder*** | ***Meter Serial Number*** | ***Accuracy Class*** | ***Make*** |
|---|---|---|---|---|---|
| 526, 527 | 1.6 | 2 | Main: 14831534<br>Check: 14831528 | 0.2 | Elster |
| 524, 525, 529 | 2.4 | | | | |
| 523, 530 | 1.6 | | | | |
| 513, 514, 516 | 2.4 | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 517 | 0.8 | 3 | Main: 14831529<br>Check: 14831530 | 0.2 | Elster |
| 510, 512, 518, 519, 521 | 4.0 | | | | |
| 507 | 0.8 | | | | |
| 506 | 0.8 | | | | |
| 504 | 0.8 | | | | |
| 35 to 39 | 4.0 | 4 | Main: 14831520<br>Check: 14831521 | 0.2 | Elster |
| 79 | 0.8 | 6 | Main: 14831533<br>Check: 14831535 | 0.2 | Elster |

**Calibration Details**

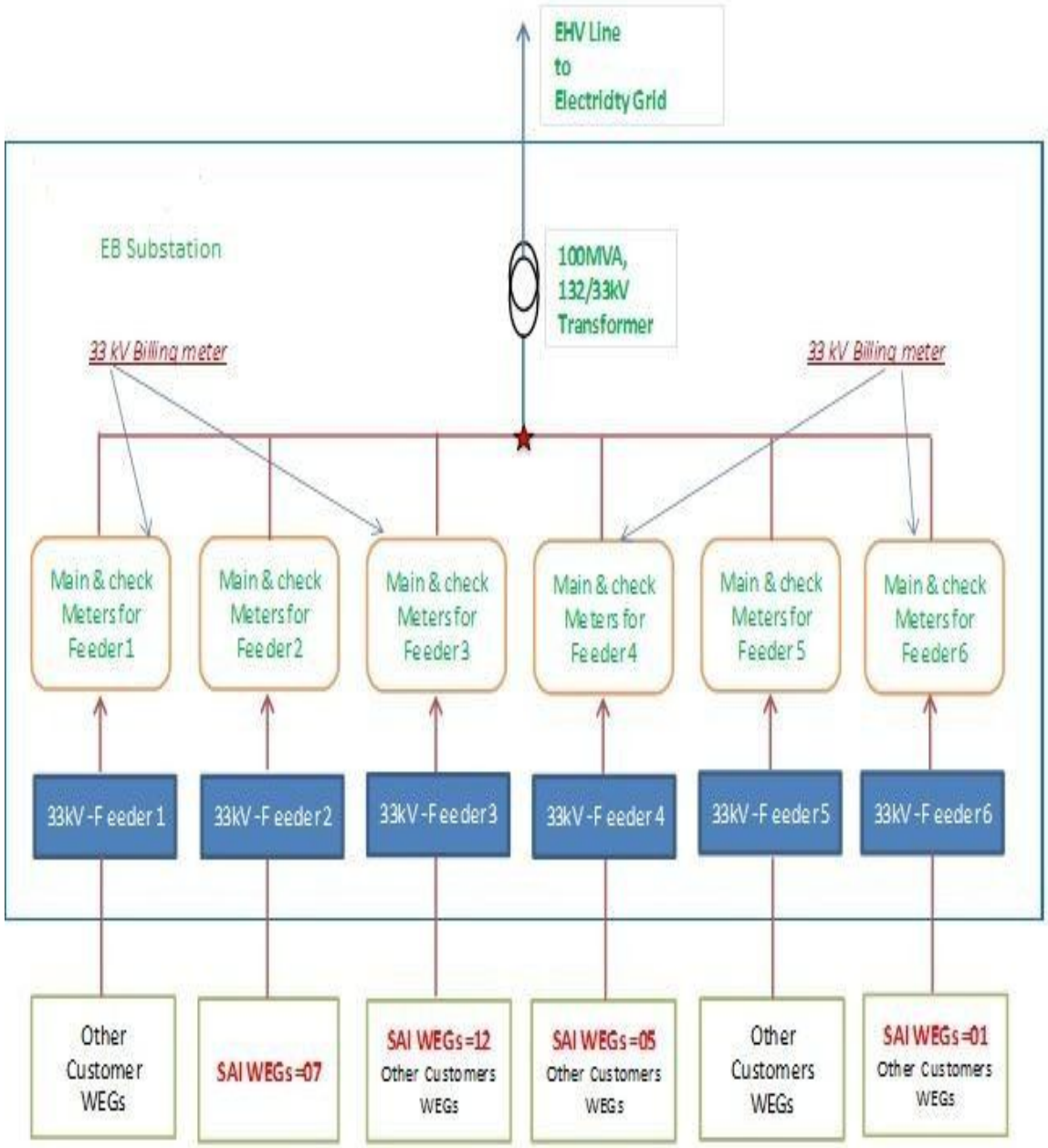
The metering equipment are inspected & calibrated by state utility. Calibration details for the all the main and backup meters are provided below (the calibration of Main meter and back up meters is done on annual basis). The detail of meter calibration has been provided in Annex 1.
The line diagram showing all relevant monitoring points are in Annex 2.

The operational and management structure implemented by WWIL is as follows:




**Training procedure:** 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 WWIL'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 WWIL Training Academy** provides need-based training to meet the training requirements of WWIL projects. This includes emergency preparedness and handling of routine and non routine tasks so as to ensure 100% satisfactory service to the customers. 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.
Approved consolidated baseline and monitoring methodology ACM0002/ Version 11, Sectoral Scope: 1, "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", by CDM - Meth Panel is proposed to be used to monitor the emission reductions.

Line diagram showing the relevant metering points.




**Meter Test Checking Details:**

The metering equipment were inspected & tested by State Utility. Meter details & calibration details for the all the main and check meters are as follows:-

| **Meter Sr.No** | **Feeder** | **Calibration Due Date** | **Calibration Date** | **Correction Factor Applied( for Months)** | **Calibration Due Date** | **Calibration Date** | **Correction Factor Applied( for Months)** | **Calibration Due Date** | **Calibration Date** | **Correction Factor Applied( for Months)** | **Calibration Due Date** | **Calibration Date** | **Correction Factor Applied(for Months)** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Main:14831534 Check:14831528 | 2 | 14-Dec-17 | 20-Mar-18 | 01 Dec 2017 to 31 Mar 2018 | 20-Mar-19 | 28-Mar-19 | 01 Mar 2019 to 31 Mar-19 | 28-Mar-20 | 08-May-20 | 01 Mar-20 to 31 May 2020 | 08-May-21 | 22-Mar-22 | 01 May-20 to 13 Dec 2020 |
| Main:14831529 Check:14831530 | 3 | 14-Dec-17 | 20-Mar-18 | 01 Dec 2017 to 31 Mar 2018 | 20-Mar-19 | 28-Mar-19 | 01 Mar 2019 to 31 Mar-19 | 28-Mar-20 | 08-May-20 | 01 Mar-20 to 31 May 2020 | 08-May-21 | 22-Mar-22 | 01 May-20 to 13 Dec 2020 |
| Main:14831520 Check:14831521 | 4 | 14-Dec-17 | 20-Mar-18 | 01 Dec 2017 to 31 Mar 2018 | 20-Mar-19 | 28-Mar-19 | 01 Mar 2019 to 31 Mar-19 | 28-Mar-20 | 08-May-20 | 01 Mar-20 to 31 May 2020 | 08-May-21 | 22-Mar-22 | 01 May-20 to 13 Dec 2020 |
| Main:14831533 Check: 14831535 | 6 | 14-Dec-17 | 20-Mar-18 | 01 Dec 2017 to 31 Mar 2018 | 20-Mar-19 | 28-Mar-19 | 01 Mar 2019 to 31 Mar-19 | 28-Mar-20 | 08-May-20 | 01 Mar-20 to 31 May 2020 | 08-May-21 | 22-Mar-22 | 01 May-20 to 13 Dec 2020 |

Note: As per Guidelines for assessing compliance with the calibration frequency requirements, (CDM Standard : CDM validation and verification standard for project activities VVS Version 01.0 para 369 (a)) states that: “Applying the maximum permissible error of the instrument to the measured values taken during the period between the scheduled date of calibration and the actual date of calibration, if the results of the delayed calibration do not show any errors in the measuring equipment, or if the error is smaller than the maximum permissible error”

## SECTION D. Data and parameters

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

| Data/Parameter | $EF_{OM, y}$ |
|---|---|
| Unit | $tCO_2e/MWh$ |
| Description | Operating Margin Emission Factor of Western Regional Electricity Grid |
| Source of data | "$CO_2$ Baseline Database for Indian Power Sector", version 2 published by the Central Electricity Authority, Ministry of Power, Government of India. |
| Value(s) applied | 0.9985 |
| Choice of data or measurement methods and procedures | "$CO_2$ Baseline Database for Indian Power Sector", version 2 published by the Central Electricity Authority, Ministry of Power, Government of India |
| Purpose of data/parameter | Baseline Emission Calculations |
| Additional comments | None |

| Data/Parameter | $EF_{BM,y}$ |
|---|---|
| Unit | $tCO_2e/MWh$ |
| Description | Build Margin Emission Factor of Western Regional Electricity Grid |
| Source of data | "$CO_2$ Baseline Database for Indian Power Sector", version 2 published by the Central Electricity Authority, Ministry of Power, Government of India. |
| Value(s) applied | 0.6300 |
| Choice of data or measurement methods and procedures | "$CO_2$ Baseline Database for Indian Power Sector", version 2 published by the Central Electricity Authority, Ministry of Power, Government of India |
| Purpose of data/parameter | Baseline Emission Calculations |
| Additional comments | None |

| Data/Parameter | $EF_{CM, y}$ |
|---|---|
| Unit | $tCO_2e/MWh$ |
| Description | Combined Margin Emission Factor of Western Regional Electricity Grid |
| Source of data | "$CO_2$ Baseline Database for Indian Power Sector", version 2 published by the Central Electricity Authority, Ministry of Power, Government of India. |
| Value(s) applied | 0.90641 |
| Choice of data or measurement methods and procedures | "$CO_2$ Baseline Database for Indian Power Sector", version 2 published by the Central Electricity Authority, Ministry of Power, Government of India |
| Purpose of data/parameter | Baseline Emission Calculations |
| Additional comments | None |

### D.2. Data and parameters monitored

| Data/Parameter | EGy |
|---|---|
| Unit | MWh (Mega-Watt hour) |
| Description | Net electricity supplied to the grid by the Project |
| Measured/calculated/ Default | Calculated as the difference of $EG_{Export}$ and $EG_{Import}$ |

| | |
|---|---|
| Source of data | The break-up sheet based on Joint Meter Reading (JMR) prepared & signed by DISCOM. |
| Value(s) of monitored parameter | 68868 MWh |
| Monitoring equipment | The details have been provided in the tabular form in section C. |
| Measuring/reading/recording frequency | Calculated on Monthly basis |
| Calculation method (if applicable) | Please refer to Section C for the procedure. |
| QA/QC procedures | QA/QC procedures will be as implemented by MSETCL pursuant to the provisions of the power purchase agreement. Refer Section C for an illustration of the provisions for QA/QC procedures. The net electricity supplied to the grid can be cross checked from the invoices raised on the state utility. |
| Purpose of data/parameter | Calculation of baseline emissions |
| Additional comments | The data will be archived for crediting period + 2 years. |

| **Data/Parameter** | $\sum_{y=0}^{N} EG_{gross,y}$ |
|---|---|
| Unit | MWh (Mega-watt hour) |
| Description | Summation of $EG_{gross,\ y}$ is the electricity generated from wind turbines of the project activity measured through its panel located in WTG tower. |
| Measured/calculated/ Default | Measured |
| Source of data | Monthly operating logs recorded in electronic format by EPC contractor |
| Value(s) of monitored parameter | 69184MWh |
| Monitoring equipment | The value is recorded continuously by the online monitoring station. This reading can also be seen in the electronic panel installed inside the WEG tower. The LCS meters do not require calibration as the energy readings of electricity generated at the LCS meter is cross verified by the energy calculated by inverting system installed in the WEGs. In case there is any mismatch in the energy values recorded by the Panel meter and the energy values calculated by the inverting system; the machine will stop working and generate the error report. The operations and maintenance staff will attend to the problem immediately in order to identify and correct the error. |
| Measuring/reading/recording frequency | Monthly Recording |
| Calculation method (if applicable) | NA |
| QA/QC procedures | This data parameter will be logged electronically on a monthly basis by EPC contractor on its online portal. |
| Purpose of data/parameter | Calculation of baseline emissions |
| Additional comments | The data will be archived for crediting period + 2 years. |

| **Data/Parameter** | $EG_{Export}$ |
|---|---|
| Unit | MWh (Mega-Watt hour) |
| Description | Electricity exported by the project activity to the grid |
| Measured/calculated/ Default | Calculated as per empirical formula given in section C |
| Source of data | The break-up sheet based on Joint Meter Reading (JMR) prepared & signed by DISCOM. |

| | |
|---|---|
| Value(s) of monitored parameter | 69184MWh |
| Monitoring equipment | Calculated as per empirical formula given in section C |
| Measuring/reading/recording frequency | Monthly Recording |
| Calculation method (if applicable) | Detailed calculation has been explained in section C |
| QA/QC procedures | Refer Section C for an illustration of the provisions for QA/QC procedures. |
| Purpose of data/parameter | Calculation of baseline emissions |
| Additional comments | The data will be archived for crediting period + 2 years. |

| **Data/Parameter** | **$EG_{Import}$** |
|---|---|
| Unit | MWh (Mega-Watt hour) |
| Description | Electricity imported by the project activity from the grid |
| Measured/calculated/ default | Calculated as per empirical formula given in section C |
| Source of data | The break-up sheet based on Joint Meter Reading (JMR) prepared & signed by DISCOM. |
| Value(s) of monitored parameter | 267 MWh |
| Monitoring equipment | Calculated as per empirical formula given in section C |
| Measuring/reading/recording frequency | Monthly Recording |
| Calculation method (if applicable) | Detailed calculation has been explained in section C |
| QA/QC procedures | Refer Section C for an illustration of the provisions for QA/QC procedures. |
| Purpose of data/parameter | Calculation of baseline emissions |
| Additional comments | The data will be archived for crediting period + 2 years. |

### D.3. Implementation of sampling plan

>>

Not Applicable

## 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, the baseline emission (BEy) **= $EG_y$ * $EF_y$**

Where,

**BE** is baseline emissions in year y, $tCO_2e$

**EGy** is the net electricity supplied to the grid in year y and is applied directly from the month credit notes and can be cross-checked by the invoices raised to the State Utility.

**EFy** *is* the $CO_2$ emission factor of the grid (0.90641 $tCO_2e$/ MWh; fixed ex-ante).

Therefore, Baseline Emission calculation for the period of 01/03/2017 to 13/12/2020:

Baseline Emission (BEy) = EGy* EFy

Where, EGy = $EG_{Export} - EG_{Import}$ = 68868 MWh

Therefore,
Baseline Emission (BEy) = 68868 (MWh)[1] * 0.90641 ($tCO_2$/MWh)
**=** 62422 **$tCO_2$**

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

>>

The project activity uses wind power to generate electricity and hence the emissions from the project activity have been taken as zero.

*PEy = 0*

## E.3. Calculation of leakage emissions

>>

No leakage has been considered from the project activity as per the approved methodology ACM0002.
*Ly = 0*

## 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 until 31/12/ 2020 | From 01/01/ 2021 | Total amount |
| **Total** | 62422 | 0 | 0 | - | 62422 | - | 62422 |

## 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) |
|---|---|
| 62422 | 131839 |

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

>>

As per CDM registered PDD, 33,348 tCO2e is the amount of CERs generated annually. Therefore, following unitary method, the amount of estimated ex ante for this monitoring period is identified. The formula to calculate the same is:

$$\frac{\text{Annual amount of reductions as per PDD}}{\text{Number of days in a year}} \times (\text{Number of days in current Monitoring Period})$$

The total number of days in this monitoring period is 1443 = (33348 / 365) x 1443
= 1,31,839 $tCO_2$e

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

>>

The CERs for the current monitoring period is 52.65% lower than the estimated volume in the PDD. This is primarily due to seasonal nature of wind power projects. During the monitoring period CERs are low due to considerably low monsoon availability and low wind availability leading to low PLF. As calculated, PLF of project activity during the monitoring period (01/03/2017 – 13/12/2020) comes out 9.99%, which is well below than the annual PLF of 21% as mentioned under the registered PDD, which clearly shows the low wind availability of wind and less generation and correspondingly less CERs as compared to estimated value in registered PDD.

[1]Net electricity supplied to the grid as discussed in the section C.

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

>>

The project activity during this monitoring period has remained under the limit of Type I every year. The project has only renewable component totalling to 20 MW (Twenty- Five WEC of 800 kW each), which is more than limit of 15 MW large-scale criteria.

- - - - -

## Document information

| *Version* | *Date* | *Description* |
|---|---|---|
| 09.0 | 8 October 2021 | Revision to:<br>• Ensure consistency with version 03.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN). |
| 08.0 | 6 April 2021 | Revision to:<br>• Reflect the "Clarification: Regulatory requirements under temporary measures for post-2020 cases" (CDM-EB109-A01-CLAR). |
| 07.0 | 31 May 2019 | Revision to:<br>• Ensure consistency with version 02.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN);<br>• Add a section on remarks on the observance of the scale limit of small-scale project activity during the crediting period;<br>• Add "changes specific to afforestation or reforestation project activity" as a possible post-registration changes;<br>• Clarify the reporting of net anthropogenic GHG removals for A/R project activities between two commitment periods;<br>• Make editorial improvements. |
| 06.0 | 7 June 2017 | Revision to:<br>• Ensure consistency with version 01.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN);<br>• Make editorial improvements. |
| 05.1 | 4 May 2015 | Editorial revision to correct version numbering. |
| 05.0 | 1 April 2015 | Revisions to:<br>• Include provisions related to delayed submission of a monitoring plan;<br>• Provisions related to the Host Party;<br>• Remove reference to programme of activities;<br>• Overall editorial improvement. |
| 04.0 | 25 June 2014 | Revisions to:<br>• Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0));<br>• Include provisions related to standardized baselines;<br>• Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1;<br>• Change the reference number from *F-CDM-MR* to *CDM-MR-FORM*;<br>• 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. |

| *Version* | *Date* | *Description* |
|---|---|---|
| 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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