 Monitoring report form for CDM project activity (Version 07.0)		
MONITORING REPORT		
Title of the project activity	Renewable Wind Power generation for promoting energy security	
UNFCCC reference number of the project activity	5553 ¹	
Version number of the PDD applicable to this monitoring report	3.3	
Version number of this monitoring report	01	
Completion date of this monitoring report	20/08/2019	
Monitoring period number	Monitoring period number – 03	
Duration of this monitoring period	Duration – 01 Jan 2016 to 31 July 2019	
Monitoring report number for this monitoring period	03	
Project participants	Gangadhar Narsingdas Agrawal	
Host Party	India	
Applied methodologies and standardized baselines	Methodology: ACM0002 ver. 12.2.0 - Consolidated baseline methodology for grid connected electricity generation from renewable sources. Standardized Baseline: Not Applicable	
Sectoral scopes	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	146,395 tCO ₂ e
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	173,552 tCO ₂ e	

¹ <https://cdm.unfccc.int/Projects/DB/RWTUV1323884888.87/view>

SECTION A. Description of project activity

A.1. General description of project activity

The purpose of the project activity is to produce electric power from wind electric generators (WEGs).

Brief description of the installed technology and equipment:

The project activity involves installation of 26 wind mills of various capacities around various states of India, cumulatively producing 25.5 MW. It consists of 7 WTGs of 1.5 MW each in the state of Karnataka. 4 WTGs of 1.5 MW each in Maharashtra and 15 WTGs of 0.6 MW each in the state of Gujarat.

State	S. No.	WTG Location No.	Capacity (MW)
Maharashtra	1.	N – 131	1.5
	2.	N – 132	1.5
	3.	N – 133	1.5
	4.	N – 23	1.5
Karnataka	1.	K – 377	1.5
	2.	K – 378	1.5
	3.	K – 379	1.5
	4.	K – 381	1.5
	5.	K – 375	1.5
	6.	K – 376	1.5
	7.	K – 380	1.5
Gujarat	1.	VRRB/600/07-08/0736	0.6
	2.	VRRB/600/07-08/0737	0.6
	3.	VRRB/600/07-08/0738	0.6
	4.	VRRB/600/07-08/0739	0.6
	5.	VRRB/600/07-08/0740	0.6
	6.	VRRB/600/07-08/1147	0.6
	7.	VRRB/600/07-08/1149	0.6
	8.	VRRB/600/07-08/1148	0.6
	9.	VRRB/600/07-08/1150	0.6
	10.	VRRB/600/07-08/1151	0.6
	11.	VRRB/600/07-08/1178	0.6
	12.	VRRB/600/07-08/1174	0.6
	13.	VRRB/600/07-08/1175	0.6
	14.	VRRB/600/07-08/1176	0.6
	15.	VRRB/600/07-08/1177	0.6

The project activity comprises of 26 WTGs which will cumulatively produce 25.5 MW. Out of these, 11WTGs have been supplied by Suzlon Energy Ltd. And are of 1.5 MW each (4 in Maharashtra and 7 in Karnataka). The rest 15 WTGs have been supplied by Vestas RRB and are of 0.6 MW each which are in the state of Gujarat.

WTGs wise commissioning dates are as follows: -

State	WTG Location No.	Commissioning date
Maharashtra	N – 131	17/09/2007
	N – 132	17/09/2007
	N – 133	17/09/2007
	N – 23	29/01/2008
Karnataka	K – 377	20/03/2008
	K – 378	20/03/2008
	K – 379	20/03/2008
	K – 381	20/03/2008
	K – 375	20/03/2008
	K – 376	20/03/2008
	K – 380	20/03/2008
Gujarat	VRRB/600/07-08/0736	19/02/2008
	VRRB/600/07-08/0737	02/10/2007
	VRRB/600/07-08/0738	07/02/2008
	VRRB/600/07-08/0739	03/10/2007
	VRRB/600/07-08/0740	05/01/2008
	VRRB/600/07-08/1147	30/03/2008
	VRRB/600/07-08/1149	31/03/2008
	VRRB/600/07-08/1148	30/03/2008
	VRRB/600/07-08/1150	31/03/2008
	VRRB/600/07-08/1151	31/03/2008
	VRRB/600/07-08/1178	31/05/2008
	VRRB/600/07-08/1174	31/05/2008
	VRRB/600/07-08/1175	31/05/2008
	VRRB/600/07-08/1176	31/05/2008
	VRRB/600/07-08/1177	31/05/2008

The technical specifications of the WTGs installed in the project activity are as follows:

Suzlon WTGs (1.5 MW)	
Particulars Details	Particulars Details
Rotor Diameter	82 m
Installed electrical output	1500 kW
Cut-in wind speed	4 m/s
Cut-out wind speed	20 m/s
Rotor swept area	5281 m ²
Rotational speed	15.6/18.4 rpm
Rotor material	Fibre glass Epoxy
Regulation	Pitch/Suzlon Flexislip System
Generator	Asynchronous generator, 4 poles
Rated Output	1500 kW

Rotational speed	1511 rpm
Operational voltage	690 V
Frequency	50 Hz
Gear box	3 stage gear box, 1 planetary and 2 helical
Gear ratio	1:95.09
Nominal Load	1650 kW
Type of cooling	Oil cooling system
Yaw drive system	4 active electrical yaw motors
Yaw bearing	Polyamide slide bearing
Safety system	
Aerodynamic break	3 times independent pitch regulation
Mechanical break	Spring g powered disc break, hydraulically released fail safe
Control unit	Microprocessor controlled, indicating actual operating conditions, UPS backup system
Design standards	As per GL/IEC

RRB Vestas WTGs (0.6 MW)	
Particulars	Details
Overall Data	
Cut in wind in speed	4 m/s
Cut-out wind speed	25 m/s
Survival Wind Speed	70 m/s
Tip Speed	64 m/s
Rotor Speed	26.2 rpm
Hub Height	50 m
Nacelle Tilt angle	5
Generator	
Type	Single Wounded Asynchronous
Rated Power Output	600 kW
Voltage	690 V
Revolutions	1527 rpm
Frequency	50 Hz
Gear box	
Type	Planetary / Helical
Gear ratio	1:58.2
No of Steps	3
Tower	
Type	Lattice
Material	Steel
Sections	6/9
Nacelle Cover	Fibre Glass Polymer
Rotor	
No of Blades	3
Diameter	47 m
Swept Area	1735 m ²

Power Regulation	Pitch Regulated
Brake Systems	
Aerodynamics	Full feathering of blade
Mechanical	Disc brake
Yaw System	Slewing system with gear motors yawing
Controls	Microprocessor based

Total emission reductions for the monitoring period accounts to 71,571 tonnes of CO₂.

A.2. Location of project activity

States of Maharashtra, Karnataka, Gujarat

Sl. No.	State	No. of WTGs	Capacity of each WTG (MW)	Total Capacity (MW)
1.	Maharashtra	4	1.5	6 MW
2.	Karnataka	7	1.5	10.5 MW
3.	Gujarat	15	0.6	9 MW

SN	Location No.	State	District	Taluk	Village
1	N-131 N-132 N-133 N-23	Maharashtra	Sangli	Kawathemahakal	Nagaj (Dhalgaon)
2	K-377 K-378 K-379 K-381 K-375 K-376 K-380	Karnataka	Bellary	Huvinahadagali	Thimmalapur & Navali
3	VRRB/600/07-08/736 VRRB/600/07-08/737 VRRB/600/07-08/738 VRRB/600/07-08/739 VRRB/600/07-08/740 VRRB/600/07-08/1147 VRRB/600/07-08/1148 VRRB/600/07-08/1149 VRRB/600/07-08/1150 VRRB/600/07-08/1151 VRRB/600/07-08/1174 VRRB/600/07-08/1175 VRRB/600/07-	Gujarat	Kutch	Bhachhau	Kumbhariya

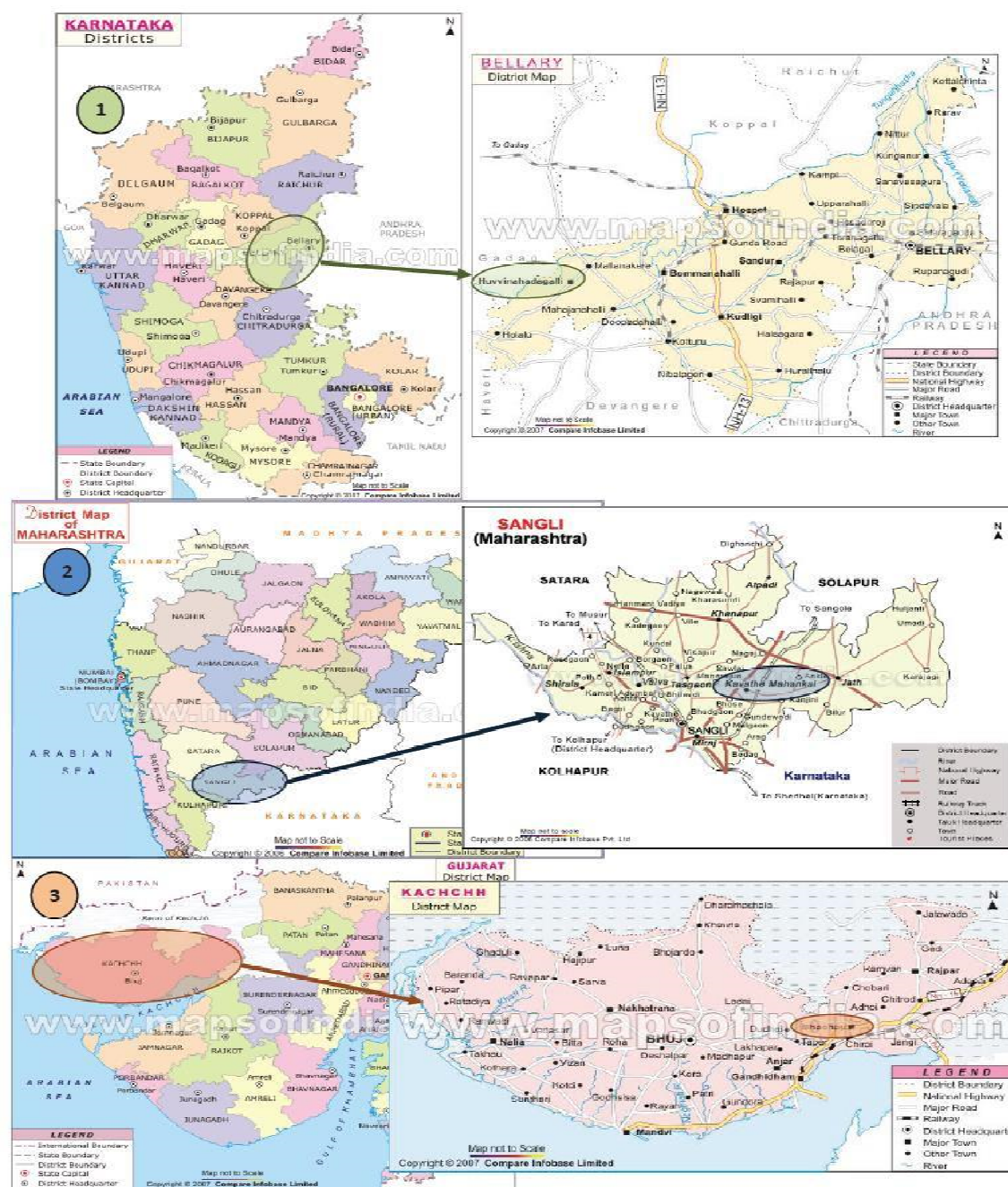
	08/1176 VRRB/600/07- 08/1177 VRRB/600/07- 08/1178				
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The Latitude and Longitude of the physical location of the project activity for unique identification is given in the table below:

WTG No.	State	District	Latitude	Longitude
N-131	Maharashtra	Sangli	17°09'29.4" N	74°55'10.6" E
N-132			17°09'44.7" N	74°55'00.9" E
N-133			17°09'39.2" N	74°54'34.9" E
N-23			17°12'00.4" N	74°57'03.6" E
K-377	Karnataka	Bellary	15°01'09.0" N	75°51'14.2" E
K-378			15°01'03.2" N	75°51'21.4" E
K-379			15°00'56.3" N	75°51'28.0" E
K-381			15°00'50.9" N	75°51'35.0" E
K-375			15°00'43.8" N	75°51'40.1" E
K-376			15°00'38.3" N	75°51'47.0" E
K-380			15°00'33.0" N	75°51'53.2" E
VRRB/600/07-08/736	Gujarat	Kutch	23°19'32.9" N	70°41'51.4" E
VRRB/600/07-08/737			23°17'30.5" N	70°40'19.4" E
VRRB/600/07-08/738			23°17'32.2" N	70°40'3.6" E
VRRB/600/07-08/739			23°17'49.8" N	70°39'36.9" E
VRRB/600/07-08/740			23°18'24" N	70°39'57.3" E
VRRB/600/07-08/1147			23°18'34.7" N	70°39'56.4" E
VRRB/600/07-08/1148			23°19'16.9" N	70°42'14.2" E
VRRB/600/07-08/1149			23°19'5.5" N	70°40'45.9" E
VRRB/600/07-08/1150			23°19'31.6" N	70°42'12.4" E
VRRB/600/07-08/1151			23°18'54.8" N	70°39'42.4" E
VRRB/600/07-08/1174			23°19'40.1" N	70°41'47.8" E
VRRB/600/07-08/1175			23°19'57" N	70°42'22.3" E
VRRB/600/07-08/1176			23°20'29" N	70°41'58.7" E
VRRB/600/07-08/1177			23°19'19.3" N	70°42'1" E



Project Activity Location, States



Project Activity Location, District

A.3. Parties and project participants

Party involved(host) indicates a host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate whether the Party involved wishes to be considered as project participant (yes/no)
India (Host Country)	Gangadhar Narsingdas Agrawal (Private Entity)	No

A.4. References to applied methodologies and standardized baselines

ACM0002 "Consolidated baseline methodology for grid connected electricity generation from renewable sources" (Version 12.02.0);

Project activity also refers to the following tools:

- Tool for the demonstration and assessment of additionality (Version 06.0.0); EB 65
- Tool to calculate the emission factor for an electricity system, (Version 02.2.1); EB 63

A.5. Crediting period type and duration

Crediting Period: 01/04/2012 – 31/03/2022 (Fixed)

Start date of crediting period: 01/04/2012

Third Monitoring period: 01/01/2016– 31/07/2019

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

All WEGs part of the project activity have been commissioned and are operating. The project activity is undergoing verification for its second monitoring period.

The commissioning date for all the projects can be refer from section A.1.

The project is in operation since the commissioning of all WTGs. There is no exchange of equipment's or major breakdown of equipment's during the current monitoring period. Also, no such event occurred during the current monitoring period that may have impact on the applicability of methodology.

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

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

Post registration change has been applied for change in calibration frequency of electricity meters. Revised PDD, Version 3.3 dated: 26/03/2015 has been submitted. This is already approved on 19/06/2015.

No any further changes envisaged for current monitoring period.

B.2.6. Changes to project design

Not Applicable

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

Not Applicable

SECTION C. Description of monitoring system

The project proponent has engaged various experienced O&M service providers for the management of the WTGs. O&M team is responsible for preventive maintenance, handling emergency situation and improvement measures.

Maharashtra

Operation and Maintenance contract for the WTGs in Maharashtra have been awarded to Suzlon Energy Ltd for the management of WTGs. O & M team is responsible for preventive maintenance, handling emergency situations and improvement measures.

Metering & Monitoring:

The WTGs supply power to MSEDCL Grid at common metering point, at 220/33KV Ghatnandre Sub Station. Actual electricity supplied by WTGs each month is monitored by MSEDCL. Monthly share of electricity is prorated by the state electricity board based on the individual WTG generation and the total electricity supplied by the wind farm.

Tower wise electricity generation is measured by using WTG controller at the project site. Electricity exported to grid is measured using MSEDCL meter installed on uploading station (220 KV/33 KV)

Ghatnandre Sub- Station, this reading would be taken monthly by joint team of Operation and Maintenance (O&M) team at wind farm and MSEDCL personnel.

MSEDCL issues monthly certificate for actual power exported by various WTGs in the wind farm. This reading is derived using above meters. Reading recorded in this certificate for the WTGs in the project activity would be used for actual estimations. This reading can be cross verified with the actual invoices presented to MSEDCL. Calibration of the substation meter is carried on an annual basis.

If main meter and check meter are found faulty, energy generation would be monitored in accordance with procedures described in PPA as follows.

If during testing both the Main and Check meter are found within the permissible limit of error i.e. 0.5%, the energy computation is as per the Main meter. If during test, any of the main meters is found to be within the permissible limits of error but the corresponding check meter is beyond the permissible limit, the energy computation is as per the Main meter. The check meter should calibrate immediately.

If during the tests, the Main meter is found to be beyond permissible limits of error, but the corresponding check meter is found to be within the permissible limits of error, then the energy computation for the month test check is in accordance with check meter. The main meter is calibrated immediately and the energy for the period thereafter is as per the calibrated main meter. If during any of the monthly meter readings, the variation between the main meter and the check meter would become more than 0.5%, all the meters should be re-tested and calibrated immediately by MSEDCL.

The correction required as per result of the testing is applied to the generation and consumption of energy for the period from last meter reading to the time of such test checks. Energy for the periods thereafter shall be in accordance with the calibrated main meter.

Data storage and Archiving:

The energy credit document should be kept at safe storage for verification of emission reductions generated from the project activity. Supporting documents such as invoices presented would also be kept in safe storage for later verification by an independent third party. The period of storage would be 2 years after the end of crediting period or till the last issuance of CERs for the project activity whichever occurs later.

Gujarat

Operation and Maintenance contract for the wind mills in Gujarat have been awarded to Vestas RRB India Ltd. for the management of WTGs. O & M team is responsible for preventive maintenance, handling emergency situations and improvement measures.

Metering & Monitoring:

The generated power is stepped up to 33KV at the Project Site and further stepped up to 66KV at the Chandrodi substation (Sending Station). The Chandrodi site substation is connected to GETCO's (Gujarat Energy Transmission Corporation Limited) Shivilakha Substation. Net electricity exported to grid by the wind farm is measured using GETCO meters installed at HT end of the 33/66 KV substation at Chandrodi. This is the joint meter reading and is taken monthly in presence of GETCO, GEDA and O & M personnel. Tower wise generation for WTGs in the wind farm would be measured by various transformer yard meters at the project site. This should be done on a daily basis and a monthly compilation sent to GEDA.

Monthly share of electricity certificate is prorated by GEDA based on actual generation of various WTGs and the net total electricity supplied by the Wind Farm. Reading recorded in this certificate for the WTGs in the project activity would be used for actual estimations. This value can be cross verified with the actual invoices presented to GUVNL. Calibration of WTG meters and substation meter should be carried on an annual basis.

If main meter and check meter are found faulty, energy generation is monitored in accordance with procedures described in PPA as follows.

In case, both the main meters and check meter are found to be beyond permissible limit of error, both the meters shall be calibrated immediately and the correction applicable to main meter shall be applied to the energy registered by the main meter at the correct energy for the purpose of energy account/billing for the actual period during which inaccurate measurements were made, if such period can be determined or, if not readily determinable, shall be the shorter of.

- the period since the immediately preceding test of the relevant main meter, (OR)
- One hundred and eighty (180) days immediately preceding the test at which the relevant Main meter was determined to be defective or inaccurate.

Data storage and Archiving:

The energy credit document should be kept at safe storage for verification of emission reductions generated from the project activity. Supporting documents such as actual invoices presented to GUVNL should also be kept in safe storage for later verification by an independent third party. The period of storage would be 2 years after the end of crediting period or till the last issuance of CERs for the project activity whichever occurs later.

Karnataka

Operation and Maintenance contract for the wind mills in Karnataka have been awarded to Suzlon Energy Ltd for the management of WTGs. O&M team is responsible for preventive maintenance, handling emergency situations and improvement measures.

Metering & Monitoring:

The wind machines supply power to KPTCL grid at common metering point, at 33/66 KV substation at Gujanur. Actual energy supplied by wind mills each month is estimated by KPTCL. KPTCL issued a certificate for the share of electricity generated every month. Monthly share of electricity certificate is prorated by KPTCL based on actual generation of wind mills and the net total electricity supplied by the Wind Farm.

Metering equipment shall be electronic tri-vector meters. The metering equipment shall be maintained in accordance with electricity standards. Actual power generated by wind mills is measured using transformer yard meter at the project site. Both main meter and check meter are installed. Net electricity exported to grid by the wind farm is measured using meter installed at HT end of the 33/66 kV substation at Gujanur. Both main meter and check meter are installed. Both of these are joint meter readings and are taken on monthly basis in the presence of KPTCL/BESCOM and representative of the project proponent (Operation and maintenance personnel). Based on this BESCOM issued a certificate for share of net electricity exported by the wind mills to the grid. Reading recorded in this certificate for the WTGs in the project activity would be used for actual estimations. This reading can be cross verified with the actual invoices presented to BESCOM.

Calibration of WTG meter and substation meter should be carried on an annual basis. If main meter and check meter are found faulty, energy generation is monitored in accordance with procedures described in PPA as follows:

Main meter and check meter should be tested for every year with reference to a portable standard meter the meters should be deemed to be working satisfactorily if the errors are within specifications for the meters. If both the main meters and the corresponding check meters are found to be beyond the permissible limits of error, both the meters should be immediately calibrated and the correction applied to the reading registered by the main meter to arrive at the correct reading of energy supplied for billing purposes for the period from the last month's meter reading up to the current test. Billing for the period thereafter till the next monthly meter reading should be as per the calibrated meter. Records of calibration certificates would be maintained for verification. Hence, high quality is ensured with the above parameters. Sales records would be used and kept for checking the consistency of the recorded data.

The monthly Invoice for each billing is in accordance with the below mentioned equation as detailed in the Power Purchase Agreement

$$DE = X_1 - (X \cdot Z \%)$$

Where,

DE is the delivered energy pertaining to the project.

X_1 is the reading of the energy meter installed at the project site.

Z is the percentage transmission line loss incurred in the transmission line between the project and the receiving station

$$Z = \left\{ \frac{(X_1 + X_2 + X_3 + X_4 + \underline{\hspace{2cm}}) - Y}{(X_1 + X_2 + X_3 + X_4 + \underline{\hspace{2cm}})} \right\} \times 100$$

Where

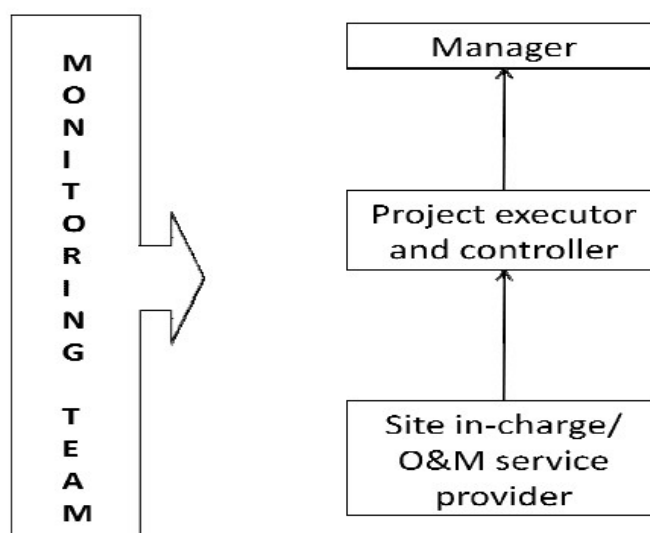
Y is the reading of the bulk energy meter installed on the 66 KV side of the receiving station.

X_1, X_2, X_3, X_4 etc., are the readings of the energy meters installed at various individual windmill power projects being developed to be set up in the area and connected to the receiving station.

Data storage and Archiving:

The energy credit document would be kept at safe storage for verification of emission reductions generated from the project activity. Supporting documents such as invoices presented to BESCOM should also be kept in safe storage for later verification by an independent third party. The period of storage will be 2 years after the end of crediting period or till the last issuance of CERs for the project activity whichever occurs later.

Organizational Structure & Responsibilities:



The project activity is operated and managed by the PP with the help of site in appointed by PP) and site O&M contractor (personnel appointed by supplier of WTG/PP). For the accurate execution of the project abides and will abide by all regulatory and statutory requirements as prescribed under the state and central laws and regulations. The project team is delegated with the responsibility to electricity generated and also safe keeping of the recorded data.

The electricity being generated is monitored at each wind mill/common metering point as per the provision in the site using calibrated energy meters of which is in electricity boards. This meter records the electricity generated on a continuous basis.

Every month officials of the respective electricity board visits each metering point in the presence of site in- charge and the meter reading is taken recorded. The electricity generation invoice which is obtained from the grid is then cross-checked with the data recorded by meter to avoid any differences. The energy meter is inspected and sealed on behalf of the Electricity Board an either party except in the presence of the other party or its accredited representatives.

The project team is also responsible for calculation of actual creditable emission reduction in the most transparent and relevant manner. All the monitoring data is stored/will be recorded and kept under safe custody. In case of the faulty meters it will be changed immediately and the necessary correction in the electricity generation will be adjusted in agreement with the state electricity board.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/Parameter	$EF_{SR,OM,y}$
Unit	tCO ₂ /MWh
Description	Operating Margin of the Southern Grid of India
Source of data	CO ₂ Baseline Database for the Indian Power Sector, Version 4.0, published by Central Electricity Authority, Ministry of Power, Government of India This is available at http://www.cea.nic.in/planning/c%20and%20e/database_publishing_ver4.zip
Value(s) applied	0.9982
Choice of data or measurement methods and procedures	CO ₂ Baseline Database for the Indian Power Sector, Version 4.0, published by CEA is consistent with the Tool to calculate the emission factor for an electricity system published by CDM Executive Board
Purpose of data/parameter	Calculation of Baseline emissions
Additional comments	

Data / Parameter	$EF_{SR,BM,y}$
Unit	tCO ₂ /MWh
Description	Build Margin of the Southern Grid of India
Source of data	Central Electricity Authority of India (CEA): CO ₂ Baseline Database, Version 4.0 http://www.cea.nic.in/planning/c%20and%20e/database_publishing_ver4.zip
Value(s) applied	0.7133
Choice of data or Measurement methods and procedures	CO ₂ Baseline Database for the Indian Power Sector, Version 4.0, published by CEA is consistent with the Tool to calculate the emission factor for an electricity system published by CDM Executive Board
Purpose of data	Calculation of Baseline emissions
Additional comment	

Data / Parameter	$EF_{NEWNE,OM,y}$
Unit	tCO ₂ /MWh
Description	Operating Margin of the NEWNE Grid of India
Source of data	CO ₂ Baseline Database for the Indian Power Sector, Version 4.0, published by Central Electricity Authority, Ministry of Power, Government of India This is available at http://www.cea.nic.in/planning/c%20and%20e/database_publishing_ver4.zip
Value(s) applied	1.0086
Choice of data or Measurement methods and procedures	CO ₂ Baseline Database for the Indian Power Sector, Version 4.0, published by CEA is consistent with the Tool to calculate the emission factor for an electricity system published by CDM Executive Board
Purpose of data	Calculation of Baseline emissions
Additional comment	

Data / Parameter	EF_{NEWNE,BM,y}
Unit	tCO ₂ /MWh
Description	Build Margin of the NEWNE Grid of India
Source of data	Central Electricity Authority of India (CEA): CO ₂ Baseline Database, Version 4.0 http://www.cea.nic.in/planning/c%20and%20e/database_publishing_ver4.zip
Value(s) applied	0.5977
Choice of data or Measurement methods and procedures	CO ₂ Baseline Database for the Indian Power Sector, Version 4.0, published by CEA is consistent with the Tool to calculate the emission factor for an electricity system published by CDM Executive Board
Purpose of data	Calculation of Baseline emissions
Additional comment	

Data /Parameter	EF_{SR,CM,y}
Unit	tCO ₂ e/MWh
Description	Combined Margin Emission factor for Southern regional electricity grid
Source of data	Calculated value based on weights of 75:25 for OM and BM "CO ₂ Baseline Database for Indian Power Sector" published by the Central Electricity Authority, Ministry of Power, Government of India. Version 4.
Value(s) applied	0.9269
Choice of data or Measurement methods and procedures	CO ₂ Baseline Database for the Indian Power Sector, Version 4.0, published by CEA is consistent with the Tool to calculate the emission factor for an electricity system published by CDM Executive Board
Purpose of data	Calculation of baseline emission
Additional comment	-

Data / Parameter	EF_{NEWNE,CM,y}
Unit	tCO ₂ e/MWh
Description	Combined Margin Emission factor for NEWNE regional electricity grid
Source of data	Calculated value based on weights of 75:25 for OM and BM "CO ₂ Baseline Database for Indian Power Sector" published by the Central Electricity Authority, Ministry of Power, Government of India. Version 4.
Value(s) applied	0.9059
Choice of data or Measurement methods and procedures	CO ₂ Baseline Database for the Indian Power Sector, Version 4.0, published by CEA is consistent with the Tool to calculate the emission factor for an electricity system published by CDM Executive Board
Purpose of data	Calculation of baseline emission
Additional comment	-

D.2. Data and parameters monitored

Data / Parameter:	EG_{ym}
Unit:	MWh
Description:	Quantity of net electricity supplied by the WTGs in Maharashtra associated with the project activity to the grid in year y
Measured /calculated	Measured

/default:	
Source of data:	Certificate for share of electricity for power exported by the project activity WTGs issued by Maharashtra State Electricity Dist. Co. Ltd. (MSEDCL)
Value(s) of monitored parameter:	53470.8
Monitoring equipment	Energy Meter
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	<p>The value of EG_{ym} reported in these monthly share of electricity certificates for WTGs in the project activity at Sangli (Location no. N-131, N-132, N133, N-23) are calculated values. Monthly share of electricity is apportioned by the MSEDCL based on the individual WTG generation and the total electricity supplied by the wind farm.</p> <p>WTG wise electricity generation is measured using WTG controller at the project site. Net Electricity exported to grid by the wind farm is measured using MSEDCL meter installed at sub-station. The meter is a trivector meter which records both import and export. This reading is taken monthly by joint team of Operation and Maintenance (O&M) team at the wind farm and MSEDCL personnel. The accuracy of MSEDCL meter used for Joint Meter Readings is 0.2. The WTG controller data is recorded by O&M team and communicated to MSEDCL.</p>
QA/QC procedures:	Calibration of the MSEDCL meter would be carried out at least once in five years. Net electricity exported by the project activity can be cross verified with the actual invoices presented to MSEDCL
Purpose of data	Calculation of Baseline emissions
Additional comments	The period of storage of data will be 2 years after the end of crediting period or till the last issuance of CERs for the project activity whichever occurs later.

Data / Parameter:	EG_{yg}
Unit:	MWh
Description:	Quantity of net electricity supplied by the WTGs in Gujarat associated with the project activity to the grid in year y WTG, j, of GNCL connected to feeder i
Measured /calculated /default:	Measured
Source of data:	Certificate for share of electricity for power exported by Wind Farm at Chandrodi issued by Gujarat Energy Development Agency (GEDA)
Value(s) of monitored parameter:	26,346.113 MWh
Monitoring equipment	Energy Meter
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	<p>Actual energy supplied by WTGs each month is calculated by Gujarat Energy Development Agency. GEDA issues a certificate for the share of electricity generated every month. Monthly share of electricity certificate is apportioned by GEDA based on actual generation of various WTGs and the net total electricity supplied by the Wind Farm.</p> <p>Actual power generated by various WTGs is measured using transformer yard meter at the project site. The accuracy class of WTG meter is 0.5s. These are monitored on daily basis and a compilation of this data is sent to GEDA every month. Net electricity exported to grid by the wind farm is measured using GETCO meters installed at HT end of the 33/66 KV</p>

	substation at Chandrodi. This is the joint meter reading and is taken in the presence of GETCO, GEDA and O & M personnel. Accuracy class of GETCO meters is 0.2s. Based on this GEDA issues certificate for share of electricity generated by various power producers.
QA/QC procedures:	This value can be cross verified with the actual invoices presented to GUVNL. Calibration of GETCO meter will be carried out on at least 5 year basis.
Purpose of the data	Calculation of Baseline emissions
Additional Comments	The period of storage of data will be 2 years after the end of crediting period or till the last issuance of CERs for the project activity whichever occurs later.

Data / Parameter:	EGyk
Unit:	MWh
Description:	Quantity of net electricity supplied by the WTGs in Karnataka associated with the project activity to the grid in year y
Measured /calculated /default:	Measured
Source of data:	Certificate for the net electricity exported to the grid by the WTGs associated with the project activity issued by Bangalore Electricity Supply Company Limited (BESCOM)
Value(s) of monitored parameter:	79,931.8 MWh
Monitoring equipment	Energy Meter
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	<p>Actual energy supplied by WTGs each month is estimated by BESCOM. BESCOM issues a certificate for the share of electricity generated every month. Monthly share of electricity certificate is apportioned based on actual generation of WTGs and the net total electricity supplied by the Wind Farm.</p> <p>Actual power generated by wind mill is measured using transformer yard meters at the project site. Both main meter and check meter are installed. Net electricity exported to grid by the wind farm is measured using KPTCL meters installed at HT end of the 33/66 KV substation at Gujanur. Both main meter and check meter are installed. Both of these are joint meter readings and are taken on monthly basis in the presence of KPTCL/BESCOM and representative of the project proponent (Operation and maintenance personnel). The accuracy class of the above meters is 0.2s.</p> <p>Based on this BESCOM will issue certificate for share of net electricity exported by the wind mills to the grid.</p>
QA/QC procedures:	This value can be cross verified with the actual invoices presented to Bangalore Electricity Supply Company Limited (BESCOM). Calibration of BESCOM meter will be carried out on at least once in five years.
Purpose of the data	Calculation of Baseline emissions
Additional Comments	The period of storage of data will be 2 years after the end of crediting period or till the last issuance of CERs for the project activity whichever occurs later.

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**

This is a project of renewable wind energy generation supplying electricity to the grid. The baseline emissions depend of the quantity of electricity being supplied to the grid and the emission factor of the grid.

Maharashtra:

$$BE_{ym} = EG_{ym} * EF_{NEWNE,CM,y}$$

Where,

EG_{ym} = Quantity of net electricity supplied by the WTGs in Maharashtra associated with the project activity to the grid in year y.

$EF_{NEWNE,CM,y}$ = Combined Margin Emission factor for NEWNE electricity grid in t CO₂e/ MWh

$$\begin{aligned} \text{Baseline emissions (BE)} &= 53,470.8 * 0.9059 \\ &= 48,439.2 \text{ t CO}_2\text{e} \end{aligned}$$

Gujarat

$$BE_{yg} = EG_{yg} * EF_{NEWNE,CM,y}$$

Where,

EG_{yg} = Quantity of net electricity supplied by the WTGs in Gujarat associated with the project activity to the grid in year y.

$EF_{NEWNE,CM,y}$ = Combined Margin Emission factor for NEWNE electricity grid in t CO₂e/ MWh

$$\begin{aligned} \text{Baseline emissions (BE)} &= 26,346.113 * 0.9059 \\ &= 23,867 \text{ t CO}_2\text{e} \end{aligned}$$

Karnataka:

$$BE_{yk} = EG_{yk} * EF_{SR,CM,y}$$

Where,

EG_{yk} = Quantity of net electricity supplied by the WTGs in Karnataka associated with the project activity to the grid in year y.

$EF_{SR,CM,y}$ = Combined Margin Emission factor for south electricity grid in t CO₂e/ MWh

$$\begin{aligned} \text{Baseline emissions (BE)} &= 79,931.8 * 0.9269 \\ &= 74,088.8 \text{ t CO}_2\text{e} \end{aligned}$$

The total baseline emissions for project activity are 146,395 t CO₂e

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

As the project activity does not utilize any fossil fuel, there are no emissions from/due to the project activity. Project Emissions (PE_y) = 0

E.3. Calculation of leakage emissions

There is no leakage due to the project activity. Leakage (LE_y) = 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	Total amount
Total	146,395	0	0	0	0	146,395

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)
146,395	173,552

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

As per the CDM registered PDD, the amount of CERs generated annually is 48,430 tCO₂e. Therefore, the amount of estimated ex ante for this monitoring period is identified as explained below.

The total number of days in this monitoring period is 1,308 days.
Hence, the amount of estimated ex ante for this monitoring period = $48,430 \times (1,308/365)$
= 173,552 tCO₂e

E.6. Remarks on increase in achieved emission reductions

Actual CERs generated are low as compared with ex ante CERs as per registered PDD. This is due to low PLF which is nature dependent.

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

Not Applicable

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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).

<i>Version</i>	<i>Date</i>	<i>Description</i>
01.0	28 May 2010	EB 54, Annex 34. Initial adoption.
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