

25.5 MW WIND ENERGY FARM AT NANDURBAR MAHARASHTRA BY HZL



Document Prepared By EKI Energy Services Limited

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Hindustan Zinc Ltd. (HZL), a vertically integrated natural resources enterprise, headquartered at Udaipur, Rajasthan having broad operations ranging from exploration, mining, ore processing to smelting of non-ferrous metals is the owner and project proponent of the proposed project activity.

The project activity primarily aims at reducing Green House Gas (GHG) emissions through utilization of renewable energy technology for generation of electrical energy. The electricity generated from the project activity (approximately 45,033 MWh annually) will displace equivalent electricity generation in grid connected power plants. The project activity will reduce the anthropogenic GHG emissions (approximately 42,912 tCO₂ annually) associated with the equivalent amount of electricity generation from the fossil fuel based grid connected power plants.

The project activity involves installation and operation of seventeen Suzlon make 1.5 MW Wind Electric Generators (WTGs) by Hindustan Zinc Limited (HZL) in the state of Maharashtra. All of these 17 WTGs are commissioned in the month of Sept 2011. The cumulative capacity of the project activity is 25.5 MW. The electricity generated from the project activity will be exported to regional Grid.

The technology employed by the project activity converts kinetic energy of wind to mechanical energy and mechanical energy to electrical energy using wind turbine generators (WTGs). In this process, there are no greenhouse gas emissions or burning of any fossil fuels. The electricity is generated through sustainable means without causing any negative effect to the environment and therefore the technology is environmentally safe and sound.

Wind turbines produce electricity by using the natural power of wind to drive a generator. Wind has considerable amount of kinetic energy when blowing at high speeds. When this kinetic energy passes through the blades of the wind turbines, it is converted into mechanical energy and rotates the wind blades. When the wind blades rotate, the connected generator also rotates, thereby producing electricity. The Project activity envisages installation of WTGs of S-82 Suzlon make (1500 kW WTGs). The WTGs generate 3-phase power at 400V, which is stepped up to 33 KV. The project can operate in the frequency range of 46–54 Hz and in the voltage range of 400 V $\pm$ 20%.

The technical specifications of the WTGs are as below:

WEG (S82 ,1.5 MW, 50 Hz) TECHNICAL DATA

Rated capacity: 1500 kW

Rotor diameter: 82 m

Hub height: 78.5 m

Rotor with Pitch Control

Type: Upwind rotor with active pitch control

Number of blades: 3

Swept area: 6082 m²

Blade material: The rotor blades are made epoxy bonded fibre glass

Rotor speed: 16.30 rpm

Tip speed: 70 m/s

Generator:

Type: Single fed Induction Generator with slip-rings, variable rotor resistance with SUZLON-FLEXI-SLIP control system.

Hub: Cast spherical hub

Bearings: High tensile double-row ball-bearing

Braking System: 3 independent Aero Brakes with power back up supply. Yaw Control: Active through adjustment gears, friction damping

Tower: Steel Tubular, 76 m height

Details of the commissioning of the project activity as follows;

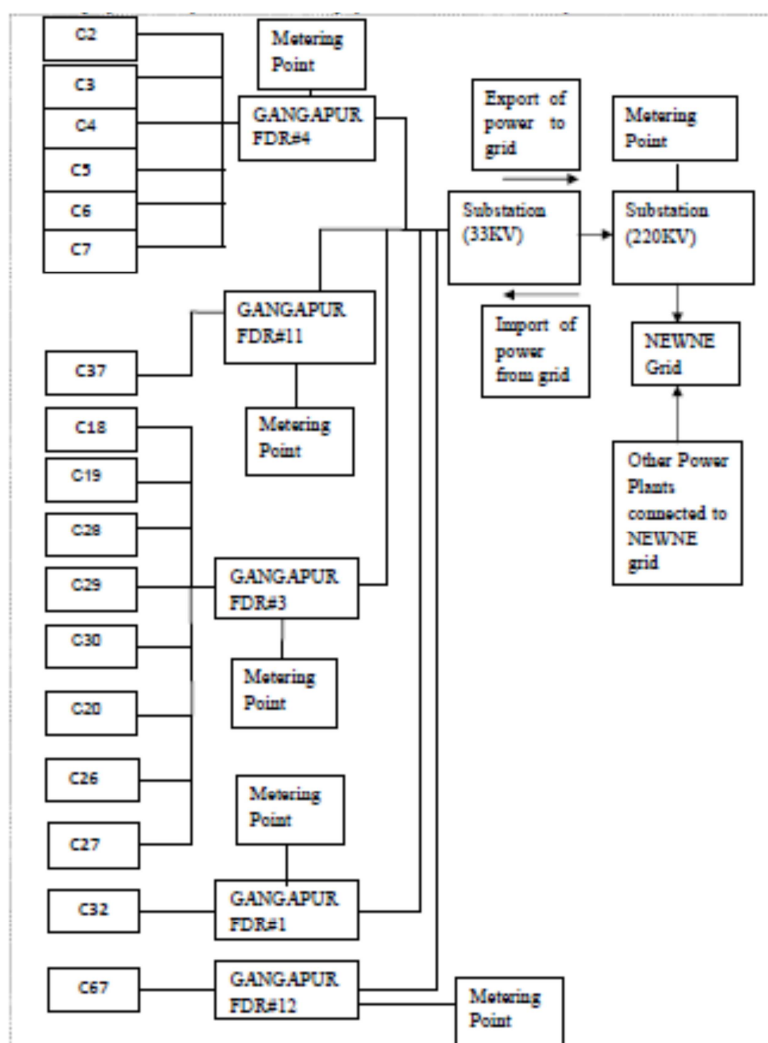
Location No	Date of Commissioning	Connected Load (MW)
C-02,06,07,28,29,30,32	02/09/2011	10.5 MW
C-05,20	09/09/2011	3.0 MW
C-04,18,37,67	15/09/2011	6.0 MW
C-03,19	21/09/2011	3.0 MW
C-26,27	29/09/2011	3.0 MW

The timeline followed towards implementation of the project activity are as follows:

Sr No.	Particulars	Date
1.	Offer Letter from Suzlon	04/12/2010
2.	Note for approval for the project activity	10/12/2010

3.	Purchase order raised for Civil works, electrical works, O&M	28/03/2011
4.	Commissioning and Grid synchronization	02/09/2011, 09/09/2011, 15/09/2011, 21/09/2011, 29/09/2011

The project is being connected to the state electricity grid at Gangapur Feeder and is being depicted via the following schematic diagram:



The total GHG emission reduction in this monitoring period 27th Dec 2012 to 31st Dec 2016 is 209,298 tCO₂e.

1.2 Sectoral Scope and Project Type

Sectoral Scope 01: Energy Industries (renewable/non-renewable sources).

Project Type: Renewable Energy Projects

1.3 Project Proponent

Organization name	Hindustan Zinc Limited
Contact person	Mr. V. Jayaraman
Title	VP & Head (EOHS)
Address	CPP-CLZS Chanderiya Lead Zinc Smelter, Putholi Chittorgarh-312021, Rajasthan INDIA
Telephone	91-1472-257950
Email	v.jayaraman@vedanta.co.in

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the project	Project Consultant
Contact person	Mr. Manish Dabkara
Title	MD & CEO
Address	Enking Embassy, Office no. 201, Plot 48, Scheme 78 part 2, Vijay Nagar, Indore-452010 (M.P, India)
Telephone	+91 99 07 53 4900
Email	manish@enkingint.org

1.5 Project Start Date

02/09/2011, date of commissioning of first WTG

1.6 Project Crediting Period

This is the second monitoring under VCS and covers the activity from 27/12/2012 to 31/12/2016 (inclusive of both dates).

Project activity has Renewable crediting period of 21 years for the CDM project.

Thus VCS crediting period should be maximum of 10 years and renewed twice till end date of CDM crediting period.

The first VCS crediting period is 02/09/2011 to 01/09/2021.

Start date of crediting period for VCS verification: 02/09/2011 (Date of commissioning of first WTG)

1.7 Project Location

The project activity consists of seventeen 1.5 MW wind turbines in the district of Nandurbar in the state of Maharashtra, India. The nearest railway station to Nandurbar is Nandurbar railway station and nearest airport is situated at Nasik which is 188 Kms from Nandurbar. Details of the location of the project activity:

Sr No.	WTG No.	Latitude	Longitude
1	C-02	21°18'10"N	74°18'32"E
2	C-03	21°17'55"N	74°18'28"E
3	C-04	21°17'17"N	74°18'16"E
4	C-05	21°17'30"N	74°18'32"E
5	C-06	21°17'47"N	74°18'09"E
6	C-07	21°17'59"N	74°18'05"E
7	C-18	21°17'14"N	74°17'51"E
8	C-19	21°17'29"N	74°17'51"E
9	C-20	21°17'43"N	74°17'49"E
10	C-26	21°18'47"N	74°17'09"E
11	C-27	21°18'54"N	74°16'51"E
12	C-28	21°17'31"N	74°17'05"E

1.8 Title and Reference of Methodology

Title of the baseline methodology: "Consolidated Baseline Methodology for grid connected electricity generation from renewable sources".

Reference: ACM0002, Version 12.3.0 (EB 66), Sectoral Scope: 01

The following tools and guidance's have been followed (References):

1. Tool to calculate the emission factor for an electricity system (Version 02.2.1)
2. Tool for the demonstration and assessment of additionality (Version 06.0.0)

1.9 Other Programs

The project has been registered with UNFCCC having registration number 7981¹. However the project will avail either CDM or VCS revenues for any monitoring period to avoid any double accounting. Also it can be crosschecked that PP is not claiming REC benefits, the same can be verified with the REC accreditation body of India².

1.10 Sustainable Development

The National CDM Authority (NCDMA), which is the Designated National Authority (DNA) for the Government of India (GOI) under the Ministry of Environment and Forests (MoEF), has mentioned four indicators for the sustainable development in the interim approval guidelines for Clean Development Mechanism (CDM) projects from India³. Thus the project's contribution towards sustainable development has been addressed based on the following sustainable development aspects:

Social well being

- Contribution to the development of an otherwise underdeveloped area.
- Generation of employment opportunities for local people during various phases of the project activity.

Economical well being

- Since, the project uses renewable wind resources for power generation it does not lead to any emissions in the environment.
- Avoiding further depletion of the already over-exploited, limited non-renewable sources like coal, oil, etc.

Environmental well-being:

¹ <http://cdm.unfccc.int/Projects/DB/DNV-CUK1351776938.73/view>

² https://recregistryindia.nic.in/index.php/general/publics/accredited_regens_pdf

³ http://www.cdmindia.in/approval_process.php

- The project activity generates clean and green power thus causing negligible emissions of greenhouse gases. In the absence of the project activity, equivalent power would have been generated based on the fossil fuels resulting in more Green House Gas emissions into the atmosphere.
- The project activity has reduced the dependence on fossil fuels for power generation thus conserving the natural reserves. The project has led to greenhouse gas emission reduction and hence contributed in mitigating climate change.

Technological well being

- The technology selected for the power project would use well established Horizontal Pelton type turbines and the project activity would promote the use of such technology.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

Start date is 02/09/2011 (commissioning date of first WTG)

Details of the project activity are as follows;

LOCATION No	Date of commissioning	Connected Load (MW)
C-02,06,07,28,29,30,32	02/09/2011	10.5 MW
C-05,20	09/09/2011	3.0 MW
C-04,18,37,67	15/09/2011	6.0 MW
C-03,19	21/09/2011	3.0 MW
C-26,27	29/09/2011	3.0 MW

The project promoter signed operation and maintenance agreements with the O & M contractor of the wind turbines. The performance of the turbines, safety in operation and scheduled / breakdown maintenances is the responsibility of O & M contractor and are organized and monitored by them, hence the authority and responsibility of project management on site lies with the O & M contractor will maintains all the data / records for the project monitoring. Suzlon is the O&M contractor for the project activity.

During the monitoring period no such events or situations occurred which will cause impact on the actual operation of the project activity.

All the WTGs are in operation and No abnormal circumstance occurred during this monitoring period. Suzlon operation and maintenance activities are ISO certified and all the events are recorded in the log book available at the project site. As a part of regular maintenance the machines are stopped for mechanical and electrical maintenance.

As per the VCS guidelines 'if the energy generating equipment is transferred from another activity, leakage is to be considered'. In the project activity, there is no transfer of energy

generating equipment and therefore the leakage from the project activity is considered as zero. There are no changes like project proponent or other entities during the monitoring period

2.2 Deviations

2.2.1 Methodology Deviations

No methodology deviation is applied during the monitoring period.

2.2.2 Project Description Deviations

Not Applicable.

2.3 Grouped Project

Not applicable as the project is not a group project.

2.4 Safeguards

2.4.1 No Net Harm

The project activity does not cause any harm to the local ecology. It primarily requires the installation of the wind power project, interfacing the generators with the State Electricity Board by setting up HT transmission lines and installation of other accessories.

Also as per the Central Pollution Control Board of India notification⁴ wind project falls under White Category and are practically non-polluting.

However, there are no negative impacts on air, water, soil quality and ambience are envisaged due to the project activity.

2.4.2 Local Stakeholder Consultation

The project proponents organized stakeholders meeting in order to take into account the concerns of the nearby villagers regarding the project implementation. As a part of continuous feedback from stakeholders, there were no other major comments or protest raised by the stakeholders and they were totally in support for setting up of these kinds of projects in the region. The PP also placed a grievance register onsite in where the stakeholder can put down his/her complain and the same if found genuine will be addressed immediately.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data / Parameter	EF _{grid,CM,y}
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⁴ http://envfor.nic.in/sites/default/files/Latest_118_Final_Directions.pdf

Data unit	tCO ₂ /MWh		
Description	Combined Margin CO ₂ emission factor for NEWNE grid		
Source of data	Calculated based on values given in the CO2 Baseline Database Version 7.0 for the Indian Power Sector prepared by Central Electricity Authority		
Value applied	0.9529		
Justification of choice of data or description of measurement methods and procedures applied	The combined margin emission factor has been determined based on data published by the CEA, applying a 75% weightage for EF _{grid,OM,y} and 25% for EF _{grid,BM,y} in accordance with the 'Tool to calculate the emission factor for an electricity system.'		
	Combined Margin Estimation for NEWNE Grid (tCO ₂ /MWh)		
	Operating Margin (EF _{grid,OM,y})		0.9842
	Build Margin (EF _{grid,BM,y})		0.8123
	Combined Margin (EF _{CO2grid,y})		0.9529
Purpose of the data	For the calculation of the Baseline Emission		
Comments	This value is determined ex-ante and will be fixed for the crediting period		

Data / Parameter	EF _{grid,OM,y}
Data unit	tCO ₂ /MWh
Description	Operating Margin emission Factor for NEWNE grid
Source of data	Referred from CO ₂ Baseline Database for the Indian Power Sector prepared by Central Electricity Authority, Version 7.0.
Value applied	0.9842
Justification of choice of data or description of measurement methods and procedures applied	The operating margin emission factor has been published by CEA in accordance with the 'Tool to calculate the emission factor for an electricity system.' The option of ex ante calculation based on Simple Operating Margin Method have been applied using a three year generation weighted average (2008-09, 2009-10 and 2010-11)
Purpose of the data	For the calculation of the Baseline Emission
Comments	This value is determined ex-ante and will be fixed for the crediting period

Data / Parameter	EF _{grid,BM,y}
Data unit	tCO ₂ /MWh
Description	Build Margin CO ₂ emission factor in year y

Source of data	Referred from CO ₂ Baseline Database for the Indian Power Sector prepared by Central Electricity Authority Version 6.0.
Value applied	0.8123
Justification of choice of data or description of measurement methods and procedures applied	The build margin emission factor has been published by CEA in accordance with the 'Tool to calculate the emission factor for an electricity system.' The build margin is calculated as the average emissions intensity of the 20% most recent capacity additions in the grid based on net generation. The build margin has been taken corresponding to the year 2009-10, the latest year for which data is available.
Purpose of the data	For the calculation of the Baseline Emission
Comments	This value is determined ex-ante and will be fixed for the crediting period

3.2 Data and Parameters Monitored

Data / Parameter	EG _{facility, y}
Data unit	MWh
Description	Net electricity supplied to grid
Source of data	MSEDCL reports on energy delivered at MSEDCL grid (Credit Notes)
Description of measurement methods and procedures to be applied	The net electricity supplied to the grid is the basis for estimating emission reductions from the project activity. The power generated by each WEG is stepped up via a step-up transformer and fed into the 33 kV Feeder line. Power from WTGs of other project activities is also fed in the same 33 kV feeder line. This common feeder line culminates at the 33 kV/220 kV substation, where the joint-metering is done on monthly basis. A Main Meter and Check Meter of 0.2s accuracy class are connected to individual feeders at the sub-station where all the WTGs (including that of the project activity) are connected. Electricity exported and imported from each feeder (measured by main meter and check meter) is recorded on a monthly basis by MSEDCL officials and representatives of the project promoter (O&M contractors). Based on this monthly recording, MSEDCL calculate the net electricity supplied by the project activity WTGs to the grid.
Frequency of monitoring/recording	Continuous monitoring, hourly measurement and monthly recording
Value monitored	219,643.92
Monitoring equipment	Energy Meters of Accuracy class 0.2s. Please refer Annex 1 for detailed schedule of Calibration
QA/QC procedures to	The quantity of net electricity supplied will be cross-verified from the

be applied	invoices/sales receipts raised to the state utility. It is to be noted here that in the Month of May & June 2014, June 2015 and June to Aug 2016 delay in calibration has been observed, hence maximum permissible error has been applied on export and import values as per the accuracy class of meters to retain conservativeness.
Purpose of the data	Calculation of Baseline emissions
Calculation method	The net electricity supplied to the grid is calculated as follows: Net Electricity supplied to the grid by Project Activity = Total electricity exported by project activity - Total electricity imported by project activity
Comments	The data will be kept for two years after the end of the crediting period

Data / Parameter	EG _{y,export}
Data unit	MWh
Description	Sum of Gross electricity generated by all 17 WTGs of project activity connected to substation of the state utility
Source of data	MSEDCL report on energy delivered at MSEDCL grid (Credit Notes)
Description of measurement methods and procedures to be applied	- There is a main meter and check meter for each feeder at the respective sub-station to which the project activity WTGs are connected. - The meters are electronic TOD meters with an accuracy class of 0.2s. - The electricity export data will be monitored via monthly joint meter readings of the energy meters connected to feeders at sub-stations. - The joint meter readings would be carried out for Main & Check Energy meters of each feeder at the relevant substation by representatives of the project promoter (O&M contractors) and representatives of MSEDCL. - The O&M contractor would provide WTG controller generation data to MSEDCL for the respective month. MSEDCL would generate a credit note reporting the electricity export and import for the project activity WTGs. The credit note will be forwarded to the project proponent.
Frequency of monitoring/recording	Continuous monitoring, hourly measurement and monthly recording
Value monitored	220,369.8
Monitoring equipment	Energy Meters of Accuracy class 0.2s. Please refer Annex 1 for detailed schedule of Calibration
QA/QC procedures to be applied	Testing of energy meters will be carried out by MSEDCL officials on an annual basis. The primary monitoring is done through a main meter which is located at the sub-station. In the case the main meter malfunctions, the Check meter readings would be considered

	for billing purposes.
Purpose of the data	Calculation of Baseline emissions
Calculation method	-
Comments	The data will be kept for two years after the end of the crediting period

Data / Parameter	EG _{y,import}
Data unit	MWh
Description	Electricity imported from the grid by the project activity
Source of data	MSEDCL report on energy delivered at MSEDCL grid (Credit Notes)
Description of measurement methods and procedures to be applied	- There is a main meter and check meter for each feeder at the respective sub-station to which the project activity WTGs are connected. - The meters are electronic TOD meters with an accuracy class of 0.2. - The electricity import data will be monitored via monthly joint meter readings of the energy meters connected to feeders at sub-stations. - The joint meter readings would be carried out for Main & Check Energy meters of each feeder at the relevant substation by representatives of O&M contractors and representatives of MSEDCL. - The O&M contractor would provide WTG controller generation data to MSEDCL for the respective month. - MSEDCL generate the Credit Note based on the joint meter readings and the WTG controller data. The credit note report the electricity imported by the project activity . The credit note will be forwarded to the project promoter from MSEDCL.
Frequency of monitoring/recording	Continuous monitoring, hourly measurement and monthly recording
Value monitored	725.88
Monitoring equipment	Energy Meters of Accuracy class 0.2s. Please refer Annex 1 for detailed schedule of Calibration
QA/QC procedures to be applied	Testing of energy meters will be carried out by MSEDCL officials on an annual basis. The primary monitoring is done through a main meter which is located at the sub-station. In the case the main meter malfunctions, the Check meter readings would be considered for billing purposes.
Purpose of the data	Calculation of Baseline emissions
Calculation method	-
Comments	The data will be kept for two years after the end of the

	crediting period
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3.3 Monitoring Plan

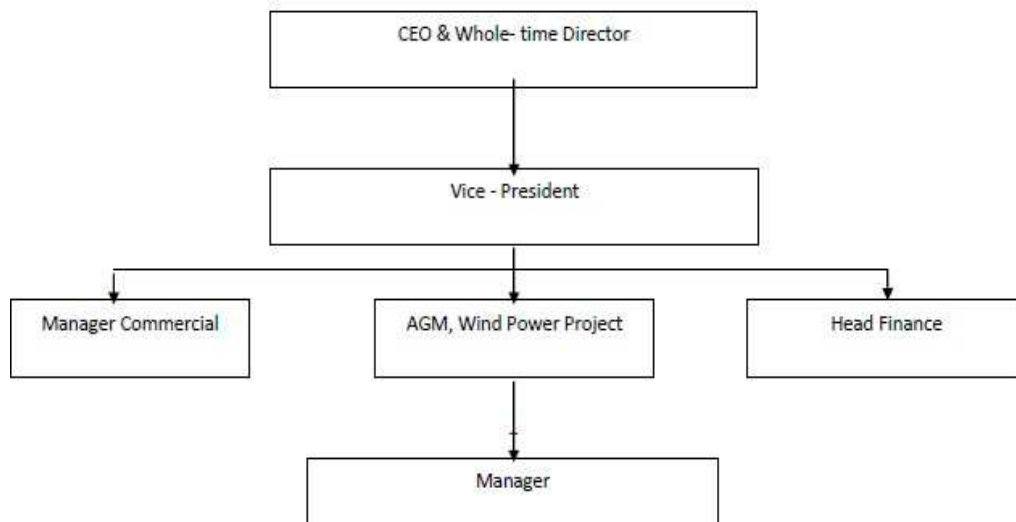
The purpose of the monitoring plan is to define the organizational structure of the monitoring team, monitoring practices, QA and QC procedures and archiving procedures. The monitoring plan will ensure that the emission reductions from the project activity are reported accurately and transparently.

Roles and Responsibilities of the Monitoring Team

The responsibility of project management as well as monitoring, measurement and reporting lies with HZL. The project proponent has formulated a Monitoring Team to ensure proper and continuous monitoring of the emission reductions as well as performance of turbines and generation of power.

To ensure trouble free operation of all the wind turbines, HZL has entered into a comprehensive Operation and Maintenance agreement with the manufactures of the turbines. The contractor, Suzlon Infrastructure Limited, would be responsible for the operation and maintenance of the WTGs. The O&M personnel are qualified engineers and are trained at the WEG manufacturing facility of Suzlon Infrastructure Limited.

The monitoring will interact with the O&M contractors as well as the State Utility officials for executing the monitoring plan. The structure of the Monitoring Team is as follows:



The site engineer from HZL shall supervise the wind power plant operations under the guidance of the Manager. The Site Engineer of HZL will also interact with the O&M contractors and ensure that the WTG generation reports and JMR statements are forwarded to the Manager for review and electronic archiving. The O&M contractors would be responsible for forwarding monitoring data to Manager of HZL. The Manager would review the monitoring records and suggest corrective action as and when required. The Manager – Commercial will

ensure that records of payments for sale of electricity to the state utility are maintained and archived electronically. HZL management will have a CDM review meeting on a bi-annual basis for review of the emission reductions and performance of the project activity.

Metering Arrangements and Procedures

The general conditions set out for metering, recording, meter readings, meter inspections, Test & Checking and communication shall be as per the PPA (power purchase agreement). The electricity exported from the sub-station will be metered using electronic TOD meters. A main and check meter of 0.2s accuracy class would be installed for every feeder at the sub-station of the state electricity board. On a monthly basis, a joint meter reading will be carried out in the presence of the state electricity board officials and representatives of the project promoters.

The total electricity exported and imported by the project activity has been provided by state electricity board. The MSEDCL issue a credit note to project promoter which included the details of the energy generated, exported and imported by the each WEG of the project proponent. This credit note is used for the emission reduction calculation.

Quality control and Quality Assurance procedures:

Calibration Procedures:

Main meters and check meters are installed for monitoring the energy exported. The main and check meters shall be calibrated on an annual basis with reference to a portable standard meter. The meters shall be deemed to be working satisfactorily if the errors are within specifications for meters of 0.2s accuracy class. The data registered by the main meter alone will be adopted for the purpose of calculation as long as the error in the main meter is within permissible limits. If during the annual accuracy tests, the main meter is found to be within the permissible limit of error and the corresponding check meter is beyond the limits, the main meter reading shall be considered as usual. However, the check meter shall be calibrated immediately. If the main meter is found to be beyond the permissible limits of error, but corresponding check meter is within limits, then the check meter reading shall be adopted for that period. The main meter shall be calibrated immediately.

Apportioning Procedures in case the dates of monitoring period do not match with billing cycle dates

The monitoring period for the project activity may start from a date that does not coincide with the date of the initial reading of the respective JMR statement. For instance the monitoring period may start on the 20th of the month whereas the JMR Statement may report the net electricity generation data from the first of the month to the first of the next month. In such a scenario, the net electricity generation data from the start of the monitoring period to the first date of the next month (the apportioning period) would be determined as follows:

$$\begin{array}{l} \text{Apportioned} \\ \text{Net Electricity} \\ \text{Generation} \end{array} = \begin{array}{l} \text{Apportioning} \\ \text{Ratio} \end{array} \times \begin{array}{l} \text{Net Electricity} \\ \text{Generation} \\ \text{as per JMR} \\ \text{Statement} \end{array}$$

The apportioning ratio would be determined as the ratio of the electricity generation at the WTG for the apportioning period to the electricity generation at the WTG for the entire period covered under the JMR statement. This procedure would only have to be followed for the first and last month of the monitoring period if the start and end dates do not coincide with the date of the joint meter readings of the energy meters

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Baseline emissions (BE_y in tCO_2e) are the product of the baseline emissions factor (EF_y in tCO_2/MWh) times the electricity supplied by the project activity to the grid (EG_y in MWh) as described in registered PDD.

$$BE_y = EF_{CO_2,grid,y} \times EG_{BL,y}$$

Where,

BE_y baseline emissions, tCO_2e

$EG_{BL,y}$ Net Quantity of Electricity exported to MSEDCL facility

$EF_{CO_2,grid,y}$ grid emission factor, i.e. $0.9529 t CO_2/MWh$ (it has been fixed ex-ante)

$$EG_{BL,y} = EG_{y,Export} - EG_{y,Import}$$

$$= 219,643.92 \times 0.9529 = 209,298 tCO_2e \text{ (Rounded down)}$$

4.2 Project Emissions

There are no Project emissions from the project activity

4.3 Leakage

Leakage emission is neglected as per the requirement of the methodology.

4.4 Net GHG Emission Reductions and Removals

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

$$ER_y = BE_y - PE_y$$

Where,

ER_y = Emission Reduction in $tCO_2/year$

BE_y = Baseline emission in $tCO_2/year$

PE_y = Project emissions in $tCO_2/year$

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
2012	164	0	164

2013	57,700	0	57,700
2014	47,662	0	47,662
2015	47,504	0	47,504
2016	56,268	0	56,268
Total	209,298	0	209,298

It is to be noted here that as per the registered PD, the emission reductions during the current monitoring period was estimated to be 172,353 tCO₂e, whereas actual emission reductions achieved are 209,298 tCO₂e, which is approximately 21.44% higher than the estimated emission reductions. The generation of electricity depends upon the wind flow, which is influenced by natural phenomena and not within the control of the project participant.

ANNEXURE 1: CALIBRATION DETAILS FOR THE CURRENT MONITORING PERIOD

				Calibration Date												
Feeder No.	WTG No.	Meter Type	Serial No.	2012	Validity	2013	Validity	2014	Validity	2015	New Meter	Validity	2016	Validity		
1	C 32	Main	MSP 32644	30/07/2012	29/07/2013	21/05/2013	20/05/2014	04/06/2014	03/06/2015	26/06/2015		25/06/2016	11/06/2016	10/06/2017		
		Check	MSP 32642	30/07/2012	29/07/2013	21/05/2013	20/05/2014	04/06/2014	03/06/2015	26/06/2015		25/06/2016	11/06/2016	10/06/2017		
3	C18,C19,C20,C26,C27,C28,C29,C30	Main	14831497	30/07/2012	29/07/2013	21/05/2013	20/05/2014	04/06/2014	03/06/2015	26/06/2015		25/06/2016	11/06/2016	10/06/2017		
		Check	14831498	30/07/2012	29/07/2013	21/05/2013	20/05/2014	04/06/2014	03/06/2015	26/06/2015		25/06/2016	11/06/2016	10/06/2017		
4	C02,C03,C04,C05,C06,C07	Main	14796438	25/07/2012	24/07/2013	22/05/2013	21/05/2014	04/06/2014	03/06/2015	26/06/2015	02811283 ⁵	29/07/2016	09/08/2016	08/08/2017		
		Check	14796439	25/07/2012	24/07/2013	22/05/2013	21/05/2014	04/06/2014	03/06/2015	26/06/2015	02811284 ⁶	29/07/2016	09/08/2016	08/08/2017		
11	C37	Main	MSP32637	25/07/2012	24/07/2013	22/05/2013	21/05/2014	17/06/2014	16/06/2015	25/06/2015		24/06/2016	09/08/2016	08/08/2017		
		Check	MSP32638	25/07/2012	24/07/2013	22/05/2013	21/05/2014	17/06/2014	16/06/2015	25/06/2015		24/06/2016	09/08/2016	08/08/2017		
12	C67	Main	MSP32639	30/07/2012	29/07/2013	22/05/2013	21/05/2014	17/06/2014	16/06/2015	25/06/2015		24/06/2016	11/06/2016	10/06/2017		

⁵ It is to be noted that at Feeder 4, Main and Check Meter has been replaced on 30/07/2015. Main Meter 14796438 has been replaced and Meter Number 02811283 has been installed. Likewise Check Meter 14796439 has been replaced and Meter Number 02811284 has been installed.

⁶ It is to be noted that at Feeder 4, Main and Check Meter has been replaced on 30/07/2015.

		Che ck	MSP32 640	30/07/ 2012	29/07/ 2013	22/05/ 2013	21/05/ 2014	17/06/ 2014	16/06/ 2015	25/06/ 2015		24/0 6/20 16	11/0 6/20 16	10/0 6/20 17
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ANNEXURE 2: BREAKDOWN DETAILS FOR THE CURRENT MONITORING PERIOD

Gen. Date	MW	Loc. No.	Breakdown Remark	Breakdown Hrs.
29-Mar-2013	1.50	C20	Line Breakdown due to Earthfault	0.40
29-Mar-2013	1.50	C05	FSS Fault	2.30
29-Mar-2013	1.50	C26	PID Diff GenSpeed SP To Act	6.00
29-Mar-2013	1.50	C29	Line Breakdown due to Earthfault	0.40
29-Mar-2013	1.50	C67	Elec FB YawCW Error	6.10
29-Mar-2013	1.50	C18	Line Breakdown due to Earthfault	0.40
29-Mar-2013	1.50	C19	Rep SE RebootPLC	2.20
29-Mar-2013	1.50	C18	Elec YawSensor ErrStop	0.10
29-Mar-2013	1.50	C07	Rep Elec CurrentAsymmetry	2.30
30-Mar-2013	1.50	C07	Elec UPSBattChange	1.00
30-Mar-2013	1.50	C19	WTG Preventive Maintenance	7.90
31-Mar-2013	1.50	C37	Line Breakdown due to Earthfault	0.30
01-Apr-2013	1.5	C37	FSS Fault	0.2
02-Apr-2013	1.5	C05	Elec UPSBattChange	1.7
02-Apr-2013	1.5	C26	Pitch Akku3Voltage LowStop	0.3
02-Apr-2013	1.5	C37	Line Breakdown due to Earthfault	0.2
02-Apr-2013	1.5	C26	Rep Pitch CANComFail	3.4
02-Apr-2013	1.5	C32	Monthly Lubrication	0.9
02-Apr-2013	1.5	C27	WTG Preventive Maintenance	7.9
04-Apr-2013	1.5	C18	Elec YawSensor ErrStop	0.5
04-Apr-2013	1.5	C07	Pitch FreqConvPitch3 ErrStop	0.2
05-Apr-2013	1.5	C67	Elec UPSBattChange	1.6
06-Apr-2013	1.5	C29	Mech RpmFSS GenCnt DiffStop	2.2
07-Apr-2013	1.5	C29	FSS Fault1	14.2
08-Apr-2013	1.5	C07	Pitch FreqConvPitch3 ErrStop	0.2
08-Apr-2013	1.5	C06	Elec PowerConsumptionStop	1.4
01-Apr-2015	1.5	C04	Line Breakdown due to Earthfault	0.7
01-Apr-2015	1.5	C05	Line Breakdown due to Earthfault	0.7
01-Apr-2015	1.5	C06	Line Breakdown due to Earthfault	0.7
01-Apr-2015	1.5	C07	Line Breakdown due to Earthfault	0.7
01-Apr-2015	1.5	C18	Line Breakdown due to Earthfault	1.1
01-Apr-2015	1.5	C18	WTG Preventive Maintenance	7.6

01-Apr-2015	1.5	C19	VCB Tripped	3.7
01-Apr-2015	1.5	C19	Pitch CAN3ComFail	0.4
01-Apr-2015	1.5	C19	Line Breakdown due to Earthfault	1.1
01-Apr-2015	1.5	C20	VCB Tripped	0.2
01-Apr-2015	1.5	C20	Line Breakdown due to Earthfault	1.1
01-Apr-2015	1.5	C26	Line Breakdown due to Earthfault	1.1
01-Apr-2015	1.5	C27	Line Breakdown due to Earthfault	1.1
01-Apr-2015	1.5	C28	Line Breakdown due to Earthfault	1.1
01-Apr-2015	1.5	C28	Shut Down Taken By OMS Team	0.3
01-Apr-2015	1.5	C29	Rep Pitch CANComFail	4.8
01-Apr-2015	1.5	C29	Shut Down Taken By OMS Team	0.3
01-Apr-2015	1.5	C29	Line Breakdown due to Earthfault	1.1