6.25 MW Wind Power Generation project of Salora International Limited

Document Prepared by EKI Energy Services Limited

Project Title	6.25 MW Wind Power Generation project of Salora International Limited
Version	3
Report ID	269
Date of Issue	18-March-2021
Project ID	269
Monitoring Period	01- August-2009 to 30-July-2016
Prepared By	Bibhushita Ghose Asst. Manager- Operations EKI Energy Services Limited
Contact	EnKing Embassy, Office No. 201, Plot 48, Scheme 78, Part 2 Vijay Nagar, Near brilliant Convention Centre, Indore- 452010 Madhya Pradesh, India Website: www.enkingint.org Email ID: bibhushita@enkingint.org M: +91 7003202624

CONTENTS

1.1 Summary Description of the Implementation Status of the Project 3
1.2 Sectoral Scope and Project Type 3
1.3 Project Proponent 4
1.4 Other Entities Involved in the Project 4
1.5 Project Start Date 4
1.6 Project Crediting Period 4
1.7 Project Location 4
1.8 Title and Reference of Methodology 5
1.9 Participation under other GHG Programs 5
1.10 Other Forms of Credit 5
1.11 Sustainable Development 6

2 SAFEGUARDS 6
2.1 No Net Harm 6
2.2 Local Stakeholder Consultation 7
2.3 AFOLU-Specific Safeguards 7

3 IMPLEMENTATION STATUS 8
3.1 Implementation Status of the Project Activity 8
3.2 Deviations 9
3.3 Grouped Projects 10

4 DATA AND PARAMETERS 10
4.1 Data and Parameters Available at Validation 10
4.2 Data and Parameters Monitored 14
4.3 Monitoring Plan 15

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS 18
5.1 Baseline Emissions 18
5.2 Project Emissions 20
5.3 Leakage 20
5.4 Net GHG Emission Reductions and Removals 20

APPENDIX I: <METER AND CALIBRATION DETAILS> 21

APPENDIX II: <BREAKDOWN DETAILS> 22

1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Salora International Limited (hereinafter referred to as "SIL"), the project proponent, had initiated the project activity based on renewable energy to partially displace the GHG emission that would have taken place had an equivalent quantity of power as generated in the project activity been met out of combustion of fossil fuels.

The project activity consists of renewable energy based power generation facility at Dhule districts in the state of Maharashtra in India. The project activity utilises the kinetic energy of wind to produce electrical power using five Wind Turbine Generators (WTGs), each with a rated capacity of 1.25 MW and total of 6.25MW(5*1.25MW).The power generated is sold to the Maharashtra State Electricity Distribution Company Limited (MSEDCL). The power generated is evacuated through HV transmission lines to the facility's switchyard and from the switchyard up to the state grid (NEWNE grid) Extra High Voltage (EHV) substation at Khori. The turbines had been manufactured, supplied and erected by M/s Suzlon Energy Limited (hereafter referred to as "SEL"). The capital expenditure in the project activity also includes civil and electrical infrastructure of the wind farm and the land purchased/leased for installation of the WTGs.

This project activity reduces the GHG emissions generated by the current energy mix in India's NEWNE Power Grid. This power grid is dominated by power generated from fossil fuel. The wind power project of SIL provides its entire generation to MSEDCL under a 13 year Power Purchase Agreement signed with the power distribution company i.e.MSEDCL (Maharashtra State Electricity Distribution Company Limited). The total emission reduction for the current monitoring period is 52,863 tCO2.

1.2 Sectoral Scope and Project Type

The project activity falls into Sectoral Category 1, Energy industries (renewable-/nonrenewable sources) adopted by CDM Accreditation Panel (CDM-AP), the project activity is grid-connected renewable power generation.

As per the VCS standard, any combination of GHG projects or project categories that meet the requirements of the VCS 2007 can be registered as a grouped project. The present project activity falls under one single category and is therefore not a grouped project.

1.3 Project Proponent

Organization name	Salora international Ltd.
Contact person	Mr. Gopal Sitaram Jiwarajka
Title	Vice Chairman & Managing Director
Address	D – 13/4, Okhla Industrial Area, New Delhi
Telephone	011 – 29207100
Email	gkj@salora.com

1.4 Other Entities Involved in the Project

Organization name	**EKI Energy Services Limited**
Role in the Project	Project Consultant
Contact person	Bibhushita Ghose
Title	Assistant Manager(Operations)
Address	EnKing Embassy, Office No 201, Plot 48, Scheme 78, Part 2, Vijay Nagar, Indore- 452010, Madhya Pradesh, India.
Telephone	+91-7003202624
Email	bibhushita@enkingint.org

1.5 Project Start Date

Start date of the project activity is the earliest date of interconnection with the grid i.e. 31-07-2006.

1.6 Project Crediting Period

Crediting Period Start date: 31-July-2006

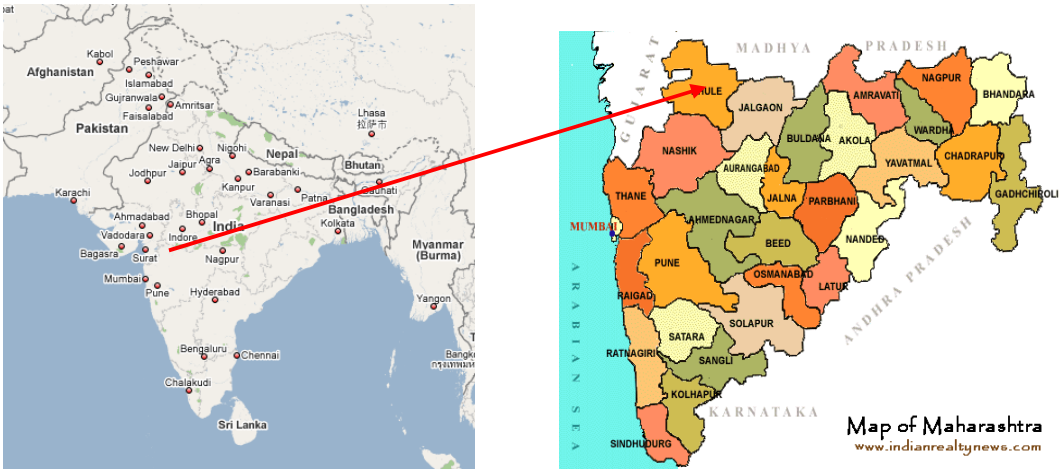
Crediting Period End date: 30-July-2016

The project activity adopts fixed crediting period of 10 years period.

1.7 Project Location

The project activity is located in the Dhule district of Maharashtra, India. The WTG wise location are listed below:

Sr.No.	WTG	Location	Latitude	Longitude	Feeder Name
1	J104	R.S.No.59 & R.S.No.01 Village: Petle , Panhalipada, Isharde;Taluka Sakri; Dist Dhule; Maharashtra	N21 12 15.0	E74 19 22.9	Jamde Feeder 08
2	J106		N21 13 25.7	E74 19 06.5	Jamde Feeder 03
3	J107	R.S.No.138 , R.S.No.01 & R.S.No.16 ,Village: Petle ;Taluka Sakri; Dist Dhule; Maharashtra	N21 13 45.1	E74 19 06.8	Jamde Feeder 03
4	J108		N21 13 16.3	E74 18 59.8	Jamde Feeder 03
5	J109		N21 14 39.0	E74 18 55.7	Jamde Feeder 03



1.8 Title and Reference of Methodology

AMS-I.D Ver 13[1]: Grid connected renewable electricity generation.

1.9 Participation under other GHG Programs

The project has not applied for credit from any other GHG program.

1.10 Other Forms of Credit

The project has not created any other form of environmental credit. The project proponent provided undertaking that there is no double accounting of emission reduction with any other GHG program during the current VCS monitoring period.

[1] https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK

1.11 Sustainable Development

The contribution of the project towards sustainable development are as below:

- Reduction in the consumption of fossil fuels in the grid for generating additional electricity equivalent to that generated by the wind mills;
- Reduction of GHG emission through development of renewable energy based technology.
- The project has reduced air pollutants and environmental impacts due to increased share of electricity generation through wind power.
- Since the project uses renewable wind resources for power generation, it does not lead to any emissions in the environment.
- Generation of employment opportunities for the people during the construction phase of the project leading to improvement in living standards of the local population.
- The project has created business opportunity in the nearby area.
- The economic well being of the nation is improved by the project activity due to reduced dependence on fossil fuel in power generation.

2 SAFEGUARDS

2.1 No Net Harm

Wind power is one of the cleanest sources of renewable energy, with no associated emissions and waste products. As per the Schedule 1 of Ministry of Environment, Forests and Climate Change (Government of India) notification dated September 14, 2006, wind power projects do not require an Environmental Impact Assessment. However, certain foreseen impacts due to the project activity are discussed below:

Noise Pollution

Most of the wind turbines are in isolated areas or on designated wind zones and hence do not cause any concern to the residents of the area. In the same vein, construction activities also have not caused noise pollution due to the isolated nature of the area.

Water Pollution

There is no gaseous, liquid or solid effluent from the Wind Turbine Generators. Hence there is no contamination of water bodies due to operation of Wind Turbine Generators.

Air Pollution

Minimal air pollution might have occurred during the construction of the Project due to transportation. However, these were not found to affect the surrounding persons nor the environment in any significant manner. Wind energy plants are known to contribute to zero atmospheric pollution as no fuel combustion is involved during any stage of the operation.

Hence, project does not involve any potential negative environmental and socio economic impacts and hence this criteria is not applicable to this project activity.

The project activity does not involve any major construction activity. It primarily requires the installation of the wind turbines, interfacing the generators with the State Electricity Board by setting up HT transmission lines and installation of other accessories.

The report on "Developmental Impacts and Sustainable Governance Aspects of Renewable Energy Projects" prepared by MNRE dated September 2013. This report clearly mentioned that wind project activity operations do not result in direct air pollution, noise pollution. Please refer below web link for the same.

Thus there are no any significant impacts due to implementation of project activity on air, water, soil quality and ambience are envisaged due to the project activity.

Hence it can be concluded that there are no negative impacts associated with the mentioned Project.

2.2 Local Stakeholder Consultation

A special stakeholder consultation meeting was organized at each of the sites of this project activity. A stakeholder consultation meeting was organized at Dhulia on 10/06/2009. Invitations to stakeholders were sent out through advertisement in newspaper and through public notice and personal invitation letter dated 26.05.2009. Before that no formal meeting had been held, though informal consultation with the local residents had taken place before the meeting. PP have taken due care of the comments received during LSC.

The process of Local Stakeholder Consultation is continuous. During the current monitoring
period, the project proponent kept grievance register at project site office and sought suggestions/feedback from local stakeholders including local community and local public administrative personnel; however, no major comments/feedbacks received from the stakeholders.

2.3 AFOLU-Specific Safeguards

Not applicable to this as this is not an AFOLU project activity.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project has been completed and the monitoring equipments were installed to monitor the parameters as described in the registered Project Description (PD). The project start date is 31/07/2006 All the WTGs involved in the project activity are already commissioned and operational. The WTGs are under operation since the date of commissioning and no event has been identified which may impact GHG emission reduction. The commissioning dates of all the WTGs are provided as below.

Sr. No.	WTG	Date of financial commitment(PO)	Date of commissioning
1	J104	16/12/2005	31/07/2006
2	J106	16/12/2005	03/08/2006
3	J107	16/12/2005	01/08/2006
4	J108	16/12/2005	01/08/2006
5	J109	16/12/2005	01/08/2006

The technical specifications of WTGs are described below:

ROTOR	
Rotor diameter	69.1 m
Hub height	74 m
Rotor swept area	3750 m^2
Rotational speed	13.2/19.8 rpm
Rotor material	GRP
Regulation	Pitch
OPERATIONAL DATA	
Cut-in wind speed	3 m/s
Rated wind speed	12 m/s
Cut-out wind speed	20 m/s
GENERATOR	
Type	Asynchronous generator, 4/6 poles
Rated output	250/1250 kW
Rotational speed	1010/1515 rpm
Operating voltage	690 V
Frequency	50 Hz
Protection	IP 56
Insulation glass	“H”
Cooling system	Air Cooled
GEARBOX	
Type	3 stage gear box, 1 planetary 2 helical
Manufacturer	Winergy

Gear ratio	1:77.848
Nominal load	1390 kW
Type of cooling	Oil cooling system
YAW DRIVE	
Yaw drive system	4 active electrical yaw motors
Yaw bearing	Polyamide slide bearing
TOWER	
Type	Tubular tower
Erection	With crane
Design standards	GL /IEC
Tower height	To suit hub height
Construction	Welded
CONTROL UNIT	
Control unit	Microprocessor control, with graphic backlight LCD display indicating operation conditions. Control includes thyristor switchgear watchdog for operation, monitoring, log with real time, local control and servicing interface. Optional remote monitoring and operation. UPS back-up system.
SAFETY SYSTEM	
Brake System 1	3 times independent pitch regulation
Brake System 2	Spring applied, hydraulically released disc brake

3.2 Deviations

3.2.1 Methodology Deviations

No Methodology Deviation is applied during the monitoring period.

3.2.2 Project Description Deviations

The below deviations is requested during current monitoring period.

As per registered monitoring plan “The net electricity supplied to grid is sourced from JMR /Monthly report and same is cross checked with invoices”. However for period from August 2009 to Dec 2010, June 2011, October 2013 to December 2013, Feb 2016, May 2016 and June 2016, PP do not have JMRs available and only Invoices are available. Hence PP has considered Deviation for that months only.

The minimum value of export from invoice and calculated value after subtracting maximum transmission loss from controller meter reading is considered for VCUs calculations. This deviation approach is conservative. Since JMR data and Invoices data are consistent for rest of period, the consideration of conservative values for non-availability of JMR for above mentioned period is appropriate. For further comparison, the controller data has

been provided for monitoring period and it is noted that controller data is higher than JMR/Invoice values.

Also For Nov 2010 and Dec 2010, there is no JMR as well as Invoices available with PP, hence for these 2 months no electricity data considered and VCUs are considered as zero for these 2 months. This is conservative approach for these 2 months period.

3.3 Grouped Projects

The project is not a grouped project thus this is not applicable.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	**$EF_{Grid,BM,y}$**
Data unit	tCO2e/MWh
Description	Build Margin Emission Factor of NEWNE Grid
Source of data	"User's Guide - CO_2 Baseline Database for Indian Power Sector" Version 4.0 October 2008 published by the Central Electricity Authority, Ministry of Power, Government of India. The User's Guide CO_2 Baseline Database for Indian Power Sector" Version 4.0[2] dated October 2008 available at www.cea.nic.in
Value applied	0.60 tCO_2/MWh
Justification of choice of data or description of measurement methods and procedures applied	Central Electricity Authority, the National Authority on electrical systems in India has calculated the emission factors using the 'Tools to calculate the emission factor for an electricity system' Ver 01.1 and publishes their result in User's Guide of 'CO2 Baseline Database for The Indian Power Sector'
Purpose of Data	Not required
Comments	The ex-ante Build Margin Emission Factor, i.e. Option 1 as

[2] https://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver4.pdf

	given on Pg 13 of Tool to calculate the emission factor for an electricity system Ver 01.1, has been considered for calculating the emission factor of the grid. This value will remain constant throughout the crediting period.

Data / Parameter	**$EF_{Grid,OM,y}$**
Data unit	tCO2e/MWh
Description	Operating Margin Emission Factor of NEWNE Grid
Source of data	"User's Guide - CO_2 Baseline Database for Indian Power Sector" Version 4.0 October 2008 published by the Central Electricity Authority, Ministry of Power, Government of India. The User's Guide CO_2 Baseline Database for Indian Power Sector" Version 4.0[3] dated October2008 available at www.cea.nic.in
Value applied	1.01 tCO_2/MWh
Justification of choice of data or description of measurement methods and procedures applied	Central Electricity Authority, the National Authority on electrical systems in India has calculated the emission factors using the 'Tools to calculate the emission factor for an electricity system' Ver 01.1 and publishes their result in User's Guide of 'CO2 Baseline Database for The Indian Power Sector'
Purpose of Data	Not required
Comments	The ex-ante option for Simple Operating Margin as given on Pg 4 of Tool to calculate the emission factor for an electricity system Ver 01.1, has been chosen for calculating the emission factor of the grid. The calculation is provided in Section 3.2 of this VCS-PD. This value will remain constant throughout the crediting period.

[3] https://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver4.pdf

Data / Parameter	w_{BM}
Data unit	Percentage
Description	Weighting of Build Margin emission factor for wind power generation project activities
Source of data	'Tool to calculate the emission factor for an electricity system' Ver 01.1
Value applied	25%
Justification of choice of data or description of measurement methods and procedures applied	Weighting factor to be used as per the guidelines of UNFCCC
Purpose of Data	Not required
Comments	This value will remain constant throughout the entire crediting period.

Data / Parameter	w_{OM}
Data unit	Percentage
Description	Weighting of Operating Margin emission factor for wind power generation project activities
Source of data	'Tool to calculate the emission factor for an electricity system' Ver 01.1
Value applied	75%
Justification of choice of data or description of measurement methods and procedures applied	Weighting factor to be used as per the guidelines of UNFCCC
Purpose of Data	Not required
Comments	This value will remain constant throughout the entire crediting period.

Data / Parameter	$EF_{Grid,CM,y}$
Data unit	tCO2e/MWh

Description	Combined Margin Emission Factor of NEWNE Grid
Source of data	Calculated using values from "User's Guide - CO_2 Baseline Database for Indian Power Sector" Version 4.0 October 2008 published by the Central Electricity Authority, Ministry of Power, Government of India. The User's Guide CO_2 Baseline Database for Indian Power Sector" Version 4.0[4] dated October2008 available at www.cea.nic.in
Value applied	0.9075 tCO_2/MWh
Justification of choice of data or description of measurement methods and procedures applied	Following the direction given on paragraph 9a of AMS-I.D Ver 13, the Combined Margin emission factor for the electricity distribution grid has to be calculated using the 'Tool to calculate the emission factor for an electricity system' Ver 01.1. Central Electricity Authority, the National Authority on electrical systems in India has calculated the emission factors using the same tool and has published their result in User's Guide Ver 4 of 'CO2 Baseline Database for The Indian Power Sector' Ver 4. The Combined Margin emission factor for wind energy systems has been calculated as per equation (13) on Pg 14 of 'Tool to calculate the emission factor for an electricity system' Ver 01.1 using ex- ante option for the Simple Operating Margin emission factor, and Option 1, i.e. ex-ante Build Margin emission factor as given in Table B Appendix C - Grid Emission Factors of User's Guide Ver 4 of 'CO2 Baseline Database for The Indian Power Sector' Ver 4.
Purpose of Data	Not required
Comments	The ex-ante Combined Margin Emission Factor for NEWNE Grid will remain constant throughout the crediting period for the purpose of calculating the emission reduction due to the project activity.

[4] https://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver4.pdf

4.2 Data and Parameters Monitored

<table>
<tr><td>Data / Parameter</td><td>EG_y</td></tr>
<tr><td>Data unit</td><td>MWh</td></tr>
<tr><td>Description</td><td>Net annual electricity supplied to the grid by the Project</td></tr>
<tr><td>Source of data</td><td>Monthly Report / Joint Monitoring Report submitted by MSEDCL.</td></tr>
<tr><td>Description of measurement methods and procedures to be applied</td><td>Actual as obtained during monitoring of project activity as per the Monitoring Plan as given in Section 4.3 of this VCS-MR.</td></tr>
<tr><td>Frequency of monitoring/recording</td><td>Continuous monitoring and monthly recording</td></tr>
<tr><td>Value monitored</td><td>Year wise generation is shown below:
<table>
<tr><th>Year</th><th>Generation(MWh)</th></tr>
<tr><td>2009</td><td>2,835.549</td></tr>
<tr><td>2010</td><td>7,185,897</td></tr>
<tr><td>2011</td><td>8,688.943</td></tr>
<tr><td>2012</td><td>10,080.617</td></tr>
<tr><td>2013</td><td>9,363.843</td></tr>
<tr><td>2014</td><td>8,384.270</td></tr>
<tr><td>2015</td><td>6,142.830</td></tr>
<tr><td>2016</td><td>5,572.636</td></tr>
<tr><td>Total</td><td>58,254.588</td></tr>
</table>
Please refer deviation request for consideration of conservative value in absence of JMR for few months.</td></tr>
<tr><td>Monitoring equipment</td><td>MSEDCL Meter. The meter details is described on Appendix I.</td></tr>
<tr><td>QA/QC procedures to be applied</td><td>The quantity of net electricity supplied will be cross- verified from the invoice raised on MSEDCL by the project proponent</td></tr>
</table>

	and the readings available from the check meter available at site. Also refer Section 4.3 below.
Purpose of the data	To determine baseline emissions
Calculation method	Net electricity supplied to the NEWNE grid is calculated based on the difference between measured values of "export" and "import" on the MSEDCL meter. The joint reading is taken by representative of the project proponent or the Operation & Maintenance contractor employed by the project proponent on one hand, and MSEDCL officials on the other. Since this meter is common to project activity and other wind turbines that are not under this project activity, the apportioning of net electricity is done based on electricity generated from individual wind turbines.
Comments	The data will be archived for the entire crediting period and an additional period of two years after the crediting period is over or the last issuance of CERs for the project, whichever occurs later.

4.3 Monitoring Plan

The Monitoring and Verification (M&V) procedures define a project-specific standard against which the project's performance (i.e. GHG reductions) and conformance with all relevant criteria will be monitored and verified. It includes:

- suitable data collection, collation and archiving methods
- data interpretation with respect to its accuracy, adequacy and consistency

These provide for a clear, credible and accurate monitoring for arriving at the key performance indicator of the project activity, i.e. reduction in GHG emissions, which can be reviewed and verified.

The general monitoring principles are based on

- Frequency of monitoring
- Minimizing uncertainty and improving performance reliability of the project
- Reporting, reviewing and archiving the data used for accounting of emission reduction due

to the project activity

Frequency of monitoring

The applied small-scale methodology, AMS-I-D, requires monitoring of the electricity supplied to the grid.

The electricity generated by the WTGs is measured through a two step procedure wherein the first metering is carried out continuously at the controller of the machine with on-board meter. The monitoring of the WTGs is done from a common monitoring station as a part of central monitoring system. The system consists of a state-of-the- art controlling and monitoring system of O&M contractor.

Project proponent has appointed an 'Operation and Maintenance' contractor for ten years to operate the WTGs. The performance of the WTGs, safety in operation and scheduled /breakdown maintenance are organized and monitored by the O&M contractor. The O&M contractor appointed by SALORA monitors the electrical power generation of the WTGs daily on regular basis and will maintain daily generation record for each WTG connected to the MSEDCL meters to which the WTGs are connected.

A long term (13 years) energy purchase agreement (EPA) has been signed with Maharashtra State Electricity Distribution Company Limited (MSEDCL). The meter readings at the Metering Point are undertaken jointly by the representatives of the State Grid/MSEDCL on one hand and the representative of M/s SEL and/or the appointed contractor for Operation & Maintenance of the WTG every month. Thereafter, MSEDCL submits a monthly report that among other things also contain the apportioned values of power supplied to and drawn from the NEWNE Grid by the individual WTGs. The method of apportioning is given below. These values of the measured parameters are thereafter entered in the project monitoring worksheet, a MS Excel based spreadsheet for calculation of emission reduction due to the project activity.

Uncertainties and Reliability

The amount of emission reduction is directly proportional to the amount of power generated in the project activity. The reliability of the monitoring system is dependent on the quality of the measurement devices. Hence all measuring instruments are calibrated and maintained as per the planned frequency for ensuring reliability of the data used for calculating emission reduction.

In case of failure or errors in any of the meters used for arriving at the final power generation figure, the officials of MSEDCL would immediately rectify the meter or replace it

with a calibrated meter. The generation of wind power during the meter replacement would be considered from the back-up meters available and provided for such an eventuality. If in case both the meters, main and back-up, malfunctions, there will be no emission reduction accruing for the period.

In the event that any on-board meter on the WTGs, including those that are external to the project activity, fails, the average daily generation of the rest of the month will be taken to compute the total generation of the WTG in the period that the meter is down. The on-board meters are connected to the SCADA system and the power generation of each WTG can be monitored in real-time at the Central Monitoring Station (CMS) of the wind farm. The snapshot of generation for the month will be taken on the last day of every calendar month and will be kept as a record both in electronic as well as printed (paper) form.

In the event that the crediting period of the project activity falls in-between the billing cycle of MSEDCL, the same would be recorded and made available during verification of emission reduction due to the project activity. The following apportioning procedure will be followed to arrive at the generation of power in that crediting period:

Description	Unit	Calculation
Power generation at Controller of WTG for the specific part of the Month included in the crediting period(kWh)	kWh	EG_P
Total generation at Controller for the same month	kWh	EG_C
Generation as per MSEDCL generation report for the month	kWh	EG_M
Power generation used for calculating emission reduction for the specific part of the Month included in the crediting period(kWh)		$EG_M * (EG_P / EG_C)$

Reporting and Archiving

Verification is done on the basis of power export and import figures available from the monthly 'Certificate for Share of Electricity Generated by Wind Farm" submitted by MSEDCL on the basis of the Joint Meter Reading undertaken along with MSEDCL. Power generation in WTG J-104,J-106,J-107, J-108 & J-109. is demonstrated from data logged in SCADA.

Roles and Responsibilities

The representative of SIL is responsible for

- Monitoring the project activity for smooth operation of the WTGs,
- Coordination with the O&M contractor to ensure highest possible availability of the WTGs for generation,
- Collection and updation of all data in the project monitoring worksheet,
- Generation and distribution of monthly reports to the Management of the Project Proponent accounting for
- The actual emission reduction achieved
- Any specific event affecting the performance of the project
- Periodic internal audit to verify the data
- Archiving all data from their respective sources for the purpose of verification for the entire crediting period and an additional period of two years after the end of the crediting period, or the last issuance of VCUs for the project, whichever occurs later.
- Annual internal audit to verify the data updated in the emission reduction calculation worksheet against the Monthly Joint Monitoring Report (JMR) as submitted by MSEDCL.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

Procedure for calculating emission reduction due to the project activity:

Step 1: Net annual electricity generated and exported to grid by WTG

$\mathbf{EG_y} = EG_{WTGi,exp} - EG_{WTGi,imp}$

The

Step 2: Combined Margin emission factor of NEWNE Grid

$\mathbf{EF_{CM,y}} = (EF_{BM,y} * w_{BM}) + (EF_{OM,y} * w_{OM})$

Step 3: Baseline emission of the project activity

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

Step 4: GHG emission due to the project activity

$\mathbf{PE_y}$=0

Step 5: GHG emission due to leakage as a result of the project activity

$\mathbf{LE_y}$ = 0

Step 6: GHG emission reduction due to the project activity

$\mathbf{ER_y}$ =BE_y – PE_y - LE_y

where

$EG_{WTGi,exp}$ Electricity supplied to NEWNE Grid by WTG_i, MWh

$EG_{WTGi,imp}$ Electricity drawn from NEWNE Grid by WTG_i, MWh EG_y

EGy Net electricity supplied to the grid by the Project, MWh

$EF_{Grid,BMy}$ Ex-ante (Option 1) Build Margin emission factor of NEWNE Grid, tCO2/MWH

$EF_{Grid,OMy}$ Ex-ante Operation Margin emission factor of NEWNE Grid, tCO2/MWH

w_{BM} Weighting factor for Build Margin emision factor, 25%

w_{OM} Weighting factor for Operating Margin emission factor, 75%

The calculation of yearly baseline emissions is provided in the table below:

Sl. No.	Period	Net Electricity Export (MWh)	Baseline Emission Factor (tCO2/MWh)	Baseline Emissions (tCO2)
1	01/08/2009 to 31/12/2009	2,835.549	0.9075	2,573
2	01/01/2010 to 31/12/2010	7,185,898	0.9075	6,521
3	01/01/2011 to 31/12/2011	8,688.943	0.9075	7,885
4	01/01/2012 to 31/12/2012	10,080.617	0.9075	9,148
5	01/01/2013 to 31/01/2013	9,363.844	0.9075	8,497
6	01/01/2014 to 31/01/2014	8,384.270	0.9075	7,608
7	01/01/2015 to 31/12/2015	6,142.830	0.9075	5,574
8	01/01/2016 to 30/07/2016	5,572.636	0.9075	5,057
	Total	**58,254.588**		**52,863**

5.2 Project Emissions

The project activity uses wind power to generate electricity and hence the emissions from the project activity are taken as nil.

$PE_y = 0$

5.3 Leakage

Leakage emissions on account of the project activity is considered as zero as neither the Wind Energy Generators are transferred from another activity nor any existing equipment of the project site would be transferred from the project site in accordance with the applied methodology.

$LE_y = 0$

5.4 Net GHG Emission Reductions and Removals

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
2009	2,573	0	0	2,573
2010	6,521	0	0	6,521
2011	7,885	0	0	7,885
2012	9,148	0	0	9,148
2013	8,497	0	0	8,497
2014	7,608	0	0	7,608
2015	5,574	0	0	5,574
2016	5,057	0	0	5,057
Total	**52,863**	**0**	**0**	**52,863**

The actual VER is about 20% lower than the estimated VER. This variation is majorly due to the variations in wind flow pattern, grid availability and other parameters which are not in the control of PP. This is also affected due the application of error factor. The above variations is conservative.

APPENDIX I: <METER AND CALIBRATION DETAILS>

WTG ID	Feeder Name	Meter No.	Main/Check Meter	Maker's Name	Accuracy	Date of Calibration
J104	Jamde Feeder 08	4738079	Main Meter	Elster	0.2	25/09/2012,29/06/2013, 05/06/2014,16/07/2015, 28/09/2016
J104	Jamde Feeder 08	4738067	Check Meter	Elster	0.2	25/09/2012,29/06/2013, 05/06/2014,16/07/2015, 28/09/2016
J106, J108, J109	Jamde Feeder 03	04862465	Main Meter	Elster	0.2	25/09/2012,29/06/2013, 05/06/2014, 03/07/2015, 09/03/2017
J106, J108, J109	Jamde Feeder 03	04725796	Check Meter	Elster	0.2	25/09/2012,29/06/2013, 05/06/2014, 03/07/2015, 09/03/2017
J107	Jamde Feeder 10	04890562	Main Meter	Elster	0.2	25/09/2012, 28/06/2013, 05/06/2014, 10/07/2015, 13/09/2016
J107	Jamde Feeder 10	04863441	Check Meter	Elster	0.2	25/09/2012, 28/06/2013, 05/06/2014, 10/07/2015, 13/09/2016

The calibration frequency is annual. There is delay in calibration for period Aug 09 to Sept 12, June 15 to July 15, July 16 and delayed calibration result is within permissible limit. Hence error factor of 0.2% accuracy class is applied for delayed calibration period.

APPENDIX II: <BREAKDOWN DETAILS>

The summary of breakdown for current monitoring period is as below

Month	Total Breakdown Hours
Aug-09	7.90
Sep-09	3.90
Oct-09	5.30
Nov-09	19.70
Dec-09	15.60
Jan-10	11.00
Feb-10	3.80
Mar-10	15.80
Apr-10	8.40
May-10	23.50
June-10	8.40
July-10	7.00
Aug-10	11.30
Sep-10	14.50
Oct-10	5.90
Nov-10	9.50
Dec-10	6.50
Jan-11	4.20
Feb-11	1.70
Mar-11	3.90
Apr-11	10.90
May-11	2.00
Jun-11	0
Jul-11	2.50
Aug-11	4.50
Sep-11	4.60
Oct-11	4.50

Month	Total Breakdown Hours
Nov-11	6.40
Dec-11	9.70
Jan-12	17.20
Feb-12	7.70
Mar-12	5.70
Apr-12	11.80
May-12	22.40
Jun-12	2.70
Jul-12	0
Aug-12	0
Sep-12	2.40
Oct-12	9.80
Nov-12	7.10
Dec-12	6.00
Jan-13	4.60
Feb-13	17.50
Mar-13	6.40
Apr-13	0.90
May-13	0
Jun-13	3.10
Jul-13	7.70
Aug-13	0
Sep-13	5.40
Oct-13	0
Nov-13	0
Dec-13	1.60
Jan-14	4.30
Feb-14	3.30
Mar-14	5.70
Apr-14	13.10
May-14	2.20
Jun-14	6.70
Jul-14	12.80
Aug-14	0
Sep-14	9.00
Oct-14	6.60
Nov-14	10.30
Dec-14	10.70
Jan-15	12.90
Feb-15	4.10

Month	Total Breakdown Hours
Mar-15	7.00
Apr-15	7.60
May-15	6.20
Jun-15	3.90
Jul-15	9.20
Aug-15	9.70
Sep-15	9.60
Oct-15	4.10
Nov-15	12.50
Dec-15	8.30
Jan-16	9.30
Feb-16	6.10
Mar-16	8.30
Apr-16	14.10
May-16	7.40
Jun-16	4.40
Jul-16	15.90