BUNDLED WIND POWER GENERATION PROJECT BY SAVITA OIL TECHNOLOGIES LTD, INDIA

Document Prepared by (EKI Energy Services Limited)

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Prepared By	EKI Energy Services Limited
Contact	NRK Business Park, 903, B-1 9th Floor, Mangal City Service Rd, Scheme 54 PU4, Indore, Madhya Pradesh 452010 Email – registry@enkingint.org ,priyanka.mukherjee@enkingint.org Website www.enkingint.org

[1] https://registry.verra.org/app/projectDetail/VCS/891

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The project activity is the generation of electricity from wind power by installation of 3 nos. 1.25 MW Wind Turbine Generators (WTGs) of Suzlon make in Sadawaghapur forest site in Satara district of Maharashtra and 3 nos. of 1.5 MW Wind Turbine Generators (WTGs) of Regen make at Thadichery & Koduvilarpatti site in Theni district of Tamil Nadu. The total installed capacity of the project is 8.25 MW. The purpose of the project is to produce power from clean source and to reduce the dependence on fossil fuels for energy requirements. Project proponent has signed a power purchase agreement (PPA) with "Maharashtra State Electricity Distribution Company Limited" (MSEDCL) for the WTGs in Maharashtra and "Tamil Nadu Electricity Board" (TNEB) for the WTGs in Tamil Nadu to export the electricity to local grid. The project displaces electricity from the Indian grid. This helps in significant reduction of GHG emissions as the Grid is mostly dependent on fossil fuel generated electricity. The details of the WTG and their commissioning details are as follows:

Name of Investor	Location	Model /Type	Capacity	Commissioning Date
Maharashtra	S-40	S-66	1.25	30-March-2010
	S-63	S-66	1.25	
	S-64	S-66	1.25	
Tamil Nadu	T45	Vensys 77	1.5	18-March-2010
	T46	Vensys 77	1.5	18-March-2010
	T75	Vensys 77	1.5	29-March-2010

The total actual GHG Emission reductions achieved in current monitoring period of 01-January 2018 to 17-March-2020 are 26,030 tCO_2e through displacing 27,895.64 MWh of electricity from fossil-fuel dominated electricity grid with electricity generation using wind energy resources.

1.2 Sectoral Scope and Project Type

As per the UNFCCC CDM Guidelines, the project activity belongs to:
Sectoral Scope : 01 - Energy industries (renewable / non-renewable sources)
The project is not a grouped project activity

1.3 Project Proponent.

Organization name	Savita Oil Technologies Limited,
Contact person	Poorva Sood

Title	Ms.
Address	66/67, Nariman Bhavan, Nariman Point, Mumbai- 400021, Maharashtra, India
Telephone	+91 22 2288 3061
Email	psood@savita.com

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the Project	Project Consultant
Contact person	Manish Dabkara
Title	CEO
Address	NRK Business Park, 903, B-1 9th Floor, Mangal City Service Rd, Scheme 54 PU4, Indore, Madhya Pradesh 452010 Website www.enkingint.org
Telephone	+91-9907534900
Email	manish@enkingint.org, registry@enkingint.org

1.5 Project Start Date

The start date of the project activity is defined as the "the date on which the project began reducing or removing GHG emissions". For this project activity, the start date of the project activity was 18-March-2010, which is the date of commissioning of the first WTG.

1.6 Project Crediting Period

Crediting Period Start date: 18- March-2010
Crediting Period End date: 17-March-2020.

1.7 Project Location

Village: Sadawaghapur
Taluka: Patan
District: Satara
State: Maharashtra
Country: India

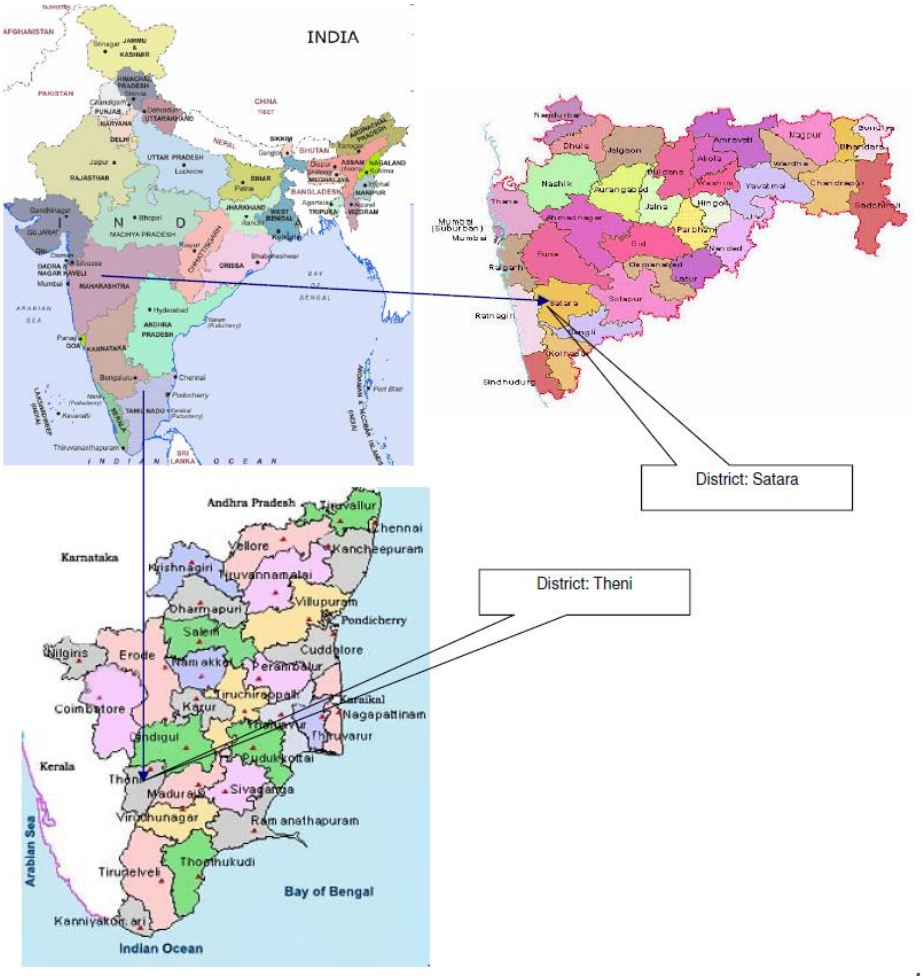
. The Coordinates are

WTG	Latitude (N)	Longitude (E)
S- 40	17°24'00"	73°56'18"
S- 63	17°25'16.8"	73°55'33.6"
S-64	17°25'22.8"	73°55'40.2"

Village: Thadichery & Koduvilarpatti
Taluka: Theni
District: Theni
State: Tamil Nadu
Country: India

The Coordinates are

WTG	Latitude (N)	Logitude (E)
T45	9°56'38.06"	73°56'18"
T46	9°56'44.20"	77°27'37.70"
T75	9°56'42.78"	73°29'39"



1.8 Title and Reference of Methodology

Title: Grid-connected electricity generation from renewable sources

Reference: The project activity meets the eligibility criteria of small-scale project as it is less than 15 MW
Methodology: Grid-connected electricity generation from renewable sources AMS-I. D (Version 16.0)[2]

Type I: Energy industries (renewable / non-renewable sources)
Category: Approved Consolidated Methodology (AMS-I.D.: Grid connected renewable electricity generation --- Version 16.0)[3]

Tools referred with above methodology and applicable for project activity are:
Tool to calculate the emission factor for an electricity system - Version 02.2.1 (EB 63, Annex 19)[4]

1.9 Participation under other GHG Programs

The project has been registered under CDM 5485 [5] but the project activity will not claim any form of environmental credits for the given monitoring period other than voluntary emission reductions. Hence there will not be any double counting for the said monitoring period.

1.10 Other Forms of Credit

Include the following information, as applicable:
Emission Trading Programs and Other Binding Limits: The PP has not applied this project in any Emission Trading Programs and other Binding Limits.

Other Forms of Environmental Credit: The PP has not applied this project in any other form of environmental credits.

1.11 Sustainable Development Contributions

Contribution to sustainable development:
Ministry of Environment, Forest and Climate Change has stipulated economic, social, environment and technological well-being as the four indicators of sustainable development. The project contributes to sustainable development using the following ways.
Social well-being: The project has helped in generating employment opportunities during the construction and operation phases. The project activity has lead to development in infrastructure in the region like development of roads and also may promote business with improved power generation.
Economic well-being: The project is a clean technology investment in the region, which would not have been taken place in the absence of the VCS benefits the project activity has also helped to reduce the demand supply gap in the state.
Technological well-being: The successful operation of project activity would lead to promotion of wind power generation and would encourage other entrepreneurs to participate in similar projects

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

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

[4] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.1.pdf

[5] https://cdm.unfccc.int/Projects/DB/LRQA%20Ltd1323423959.3/view

Environmental well-being: Wind energy being a renewable source of energy, it reduces the dependence on fossil fuels and conserves natural resources which are on the verge of depletion. Due to its zero emission, the Project activity also helps in avoiding significant amount of GHG emissions and specific pollutants like SOx, NOx, and SPM associated with the conventional thermal power generation facilities.

Sustainable Development Contributions

According to the Appendix 2- the document history mentioned in the VCS Standard Version 4.2 (latest version), it is clearly mentioned that Project Proponent is required to demonstrate contributions to a minimum of three SDGs, effective immediately for all projects registered on or after 20-January-2023. Since this project is registered before 20-January-2023[6], SDG reporting is not required for the current version and the PP will demonstrate contribution to at least three SDGs by 20-January-2025. Thus for current monitoring period, this is not applicable.

[6] https://registry.verra.org/app/projectDetail/VCS/376

Table 1: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	By supplying 27,895.63 MWh clean electricity to Indian grid, the project avoided release of 26,030 tCO_2 in to the atmosphere during the reporting period.	First Monitoring Period: 18-March-2010 to 31-December-2011 (Inclusive of both the dates) 30,096 tCO_2 Second Monitoring Period: 01-January-2012 to 31-December-2017 (Inclusive of both the dates) 88,356 tCO_2 Current Monitoring Period: 01-January-2018 to 17-March-2020 (Inclusive of both days) 26,030 tCO_2 Total: 144,482 tCO_2

2)	7.2	Increase substantially the share of renewable energy in the global energy mix by 2030	Implemented activities to increase	About 27,895.63 MWh renewable electricity was supplied to the Indian grid during the current monitoring period that helps to increase the renewable energy share in the energy mix.	First Monitoring Period: 18-March-2010 to 31-December-2011 (Inclusive of both the dates) 32,151.39MWh Second Monitoring Period: 01-January-2012 to 31-December-2017 (Inclusive of both the dates) 94,452.43MWh Current Monitoring Period: 01-January-2018 to 17-March-2020 (Inclusive of both days) 27,895.63 MWh Total: 154,499.45.MWh
3)	8.5	Employment of local men and women	Implemented activities to increase	The Project Proponent has targeted to employ 15 persons by the year 2025 and minimum 1 person per annum after 2025.	0

2 SAFEGUARDS

2.1 No Net Harm

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[7]. 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

2.2 Local Stakeholder Consultation

The local stakeholder meeting was carried out for the project activity and the details of the same can be referred from the registered VCS PD. (section – 6.0)

Ref. web link - https://registry.verra.org/app/projectDetail/VCS/891

The stakeholders identified for the project were: the usual occupants of villages around and the local communities, NGOs, governmental agencies, employees, contractors. Local population is considered to be a major stakeholder with respect to the project activity.

Also in order to ensure continuous and ongoing mechanism of stakeholder's inputs or concerns the PP also placed a grievance register onsite in order to ensure ongoing communication with relevant stakeholders where they can put down his/her complain and the same if found genuine will be addressed immediately. During the current monitoring period, no negative comments are received from the local stakeholders. Thus, no any mitigations has been applied.

2.3 AFOLU-Specific Safeguards

Not Applicable

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The Project has been completed as planned and described in the registered CDM PDD.
The purpose of the project is to generate electricity by wind energy which is clean form of energy. After the project activity has been commissioned, project proponent has not made any changes in the project boundary.

[7] https://smartnet.niua.org/sites/default/files/resources/report-on-developmental-impacts-of-RE.pdf

State	Location No.	Substation	Feeder Name/No.	Date of Commissioning
Maharashtra	S-40	Sadawaghapur	Feeder 03	30-March-2010
	S-63	Sadawaghapur	Feeder 04	30-March-2010
	S-64	Sadawaghapur		30-March-2010
Tamil Nadu	T45	Theni	-	18-March-2010
	T46	Theni	-	18-March-2010
	T75	Theni	-	29-March-2010

There has been no major shut down observed for Sadawaghapur however for Theni the breakdown details is as follow

Date	Downtime	Analysis
01-May-2018	50:06:00	W1W2W3(6.33):LC Taken by ReGen_O&M Dept;W1W2(10):Feeder Breakdown;W3(8):Feeder Breakdown;W1(2.67):error_profi_node_43_diag
16-May-2018	67:50:00	W1W2(24):Feeder Breakdown;W3(19.5):Feeder Breakdown
31-May-2018	43:31:00	W1(17.67):Feeder Breakdown;W2(18):Feeder Breakdown;W3(7.24):LC Taken by ReGen_O&M Dept
12-July-2018	39:31:00	W1(24):error_converter_generator_contactor;W2(7.09):LC Taken by Electricity Board;W3(7.82):LC Taken by Electricity Board
01-August-2018	42:25:00	W1(24):error_converter_generator_contactor;W2(17.82):error_safety_system_safety_system_ok_from_pitch;W3(0.03):error_converter_step_up_IGBT
02-August-2018	48:00:00	W1(24):error_converter_generator_contactorW2(24):error_safety_system_safety_system_ok_from_pitch
03-August-2018	48:00:00	W1(24):error_converter_generator_contactorW2(24):error_safety_system_safety_system_ok_from_pitch
04-August-2018	48:03:00	W1(24):error_converter_generator_contactorW2(24):error_safety_system_safety_system_ok_from_pitch;W3(0.03):error_converter_signal_IGBT_overcurrent_peak
05-August-2018	51:35:00	W1(24):error_converter_generator_contactorW2(24):error_safety_system_safety_system_ok_from_pitch;W3(3.35):Substation incoming Loadshedding
06-August-2018	48:11:00	W1(24):error_converter_generator_contactorW2(24):error_safety_system_safety_system_ok_from_pitch;W3(0.11):error_converter_step_up_IGBT
07-August-2018	48:02:00	W1(24):error_converter_generator_contactorW2(24):error_safety_system_safety_system_ok_from_pitch;W3(0.02):error_converter_signal_IGBT_overcurrent_peak
13-August-2018	39:21:00	W1(24):error_converter_generator_contactor;W2(14.56):error_converter_signal_DC_link_max;W3(0.25):EL Tripped at Substation
15-August-2018	41:43:00	W1(24):error_converter_generator_contactor;W2(8.85):Substation incoming Loadshedding;W3(8.58):Substation incoming Loadshedding

16-August-2018	40:16:00	W1(24):error_converter_generator_contactor;W2W3(6.52):Substation incoming Loadshedding;W2(2.95):High/Low Voltage from Substation;W3(0.17):Storm
16-November-2018	67:00:00	W1W2(24):Feeder Breakdown;W3(18.6):Feeder Breakdown
17-November-2018	72:00:00	W1W2W3(24):Feeder Breakdown
18-November-2018	57:51:00	W1W2W3(19.17):Feeder Breakdown
07-January-2019	40:09:00	W1W2W3(12.83):Feeder Breakdown;W1(1.6):error_hydraulic_working_time
17-July-2019	54:06:00	W1(8.18):Substation incoming Loadshedding;W2(8.16):Substation incoming Loadshedding;W3(7.66):Substation incoming Loadshedding
08-August-2019	42:09:00	W1W2(1):Substation incoming Loadshedding;W3(5.37):Substation incoming Loadshedding;W1(16.55):Feeder Breakdown;W2(18.14):Feeder Breakdown;W3(0.03):error_converter_signal_DC_link_min
09-August-2019	63:26:00	W1W2(24):Feeder Breakdown;W3(12.86):Feeder Breakdown;W3(2):Substation incoming Load shedding
28-October-2019	39:48:00	W1W2W3(13.16):Substation incoming breakdown
04-December-2019	40:16:00	W1W2(3):LC Taken by ReGen_O&M Dept;W1(4.15):Substation incoming Loadshedding;W3(4.23):Substation incoming Loadshedding;W1(1.78):error_profi_node_10_diag;W2(24):error_converter_generator_contactor
22-January-2020	43:21:00	W1W3(0.4):Substation monthly Maintenance;W2(24):error_converter_generator_contactor
04-March-2020	52:39:00	W2(24):error_converter_generator_contactor;W1W2(12.83):Substation incoming breakdown;W3(3):error_safety_system_prog_ts_gr1_com_error

3.2 Deviations

2.1.1 Methodology Deviations

The project activity has been implemented as described in the VCS-PD and there was no methodological deviation applied during the monitoring plan.

2.1.2 Project Description Deviations

Deviation 1:

The project activity has been implemented as described in the VCS-PD however during the current monitoring period there has been a deviation that has observed in terms of meter change in which the meter accuracy class was changed from 0.5s to 0.2s. The meter were being changed as per the directive from TNEB (State Electricity Board) and change of meter has got no implication on emission reduction calculation.

Thus, deviation is sought from the Verra for the present and subsequent verification

Deviation 2
The contact details of the project proponent and other entities has been updated in section 1.3 and 1.4 of the Monitoring report.
Hence a project description deviation is requested to approve the changes done in section 1.3 and 1.4 of the present Monitoring Report.

The above-mentioned deviations are of permanent nature and does not have any impact on the project scenario

3.3 Grouped Projects

Not applicable as the project is non-grouped project activity.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{NEWNE,CM,y}$
Data unit	tCO_2/MWh
Description	Combined Margin Grid emission factor for NEWNE grid (now unified Indian Grid)
Source of data	CEA website Version :05 (Valid from 01-November 2009)
Value applied	0.9224
Justification of choice of data or description of measurement methods and procedures applied	As required by the methodology AMS-I.D data from the official source need to be used for the calculation of emission factor and emission reduction. To meet this requirement here, emission factor is calculated using EFGrid,OM and EFGrid,BM. Following formula is used in calculation
Purpose of Data	$EF_{NEWNE,CM,y} = 0.75 \times EF_{NEWNE,OM,y} + 0.25 \times EF_{NEWNE,BM,y.}$
Comments	For the calculation of the Baseline Emission

Data / Parameter	$EF_{South,CM,y}$
Data unit	tCO_2/MWh
Description	Combined Margin Grid emission factor for South Grid (now unified Indian grid)
Source of data	CEA website Version :05 (Valid from 01- November -2009)
Value applied	0.9445
Justification of choice of data or description of	As required by the methodology AMS-I.D data from the official source need to be used for the calculation of emission factor and emission reduction. To meet this requirement here, emission

measurement methods and procedures applied	factor is calculated using $EF_{Grid,OM}$ and $EF_{Grid,BM}$. Following formula is used in calculation $EF_{NEWNE,CM,y} = 0.75 \times EF_{NEWNE,OM,y} + 0.25 \times EF_{NEWNE,BM,y}$.
Purpose of Data	For the calculation of the Baseline Emission
Comments	Data will be kept for crediting period + 2 Years.

Data / Parameter	$EF_{NEWNE,OM,y}$
Data unit	tCO_2/MWh
Description	Weighted average of 3 years (2006-07, 2007-08, 2008-09) CO2 Operating Margin emission factor of the NEWNE grid (now unified Indian Grid)
Source of data	CEA website Version :05 (Valid from 01-November-2009)
Value applied	1.0049
Justification of choice of data or description of measurement methods and procedures applied	The combined margin emissions factor is calculated as follows: $EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$ Where: $EF_{grid,BM,y}$= Build margin CO_2 emission factor in year *y* (tCO_2/MWh) $EF_{grid,OM,y}$= Operating margin CO_2 emission factor in year *y* (tCO_2/MWh) W_{OM} = Weighting of operating margin emissions factor (%) = 75% W_{BM}= Weighting of build margin emissions factor (%) = 25%
Purpose of Data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	$EF_{South,OM,y}$
Data unit	tCO_2/MWh
Description	Weighted average of 3 years (2006-07, 2007-08, 2008-09) CO_2 Operating Margin emission factor of the South grid (now unified Indian Grid)
Source of data	CEA website Version :05 (Valid from 01- November-2009)
Value applied	0.9868
Justification of choice of data or description of measurement methods and procedures applied	The combined margin emissions factor is calculated as follows: $EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$ Where: $EF_{grid,BM,y}$= Build margin CO_2 emission factor in year *y* (tCO_2/MWh) $EF_{grid,OM,y}$= Operating margin CO_2 emission factor in year *y* (tCO_2/MWh) W_{OM} = Weighting of operating margin emissions factor (%) = 75% W_{BM}= Weighting of build margin emissions factor (%) = 25%
Purpose of Data	For the calculation of the Baseline Emission

Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	$EF_{NEWNE,BM,y}$
Data unit	tCO_2/MWh
Description	CO_2 Built Margin emission factor of the NEWNE grid (now Unified Indian Grid)
Source of data	CEA website Version :05 (Valid from 1st November 2009)
Value applied	0.6752
Justification of choice of data or description of measurement methods and procedures applied	As required by the methodology AMS-I.D data from the official source need to be used for the calculation of emission factor and emission reduction. To meet this requirement here, emission factor is estimated and officially published by Central Electricity Authority, Government of India.
Purpose of Data	For the calculation of the Baseline Emission
Comments	Data will be kept for crediting period + 2 Years.

Data / Parameter	$EF_{South,BM,y}$
Data unit	tCO_2/MWh
Description	CO_2 Built Margin emission factor of the South grid (now unified Indian Grid)
Source of data	CEA website Version :05 (Valid from 1st November 2009)
Value applied	0.8179
Justification of choice of data or description of measurement methods and procedures applied	As required by the methodology AMS-I.D data from the official source need to be used for the calculation of emission factor and emission reduction. To meet this requirement here, emission factor is estimated and officially published by Central Electricity Authority, Government of India
Purpose of Data	For the calculation of the Baseline Emission
Comments	Data will be kept for crediting period + 2 Years.

Data / Parameter	W_{om}
Data unit	Dimensionless
Description	Weightage for Operating Margin
Source of data	Tool to calculate the emission factor for an electricity system. (Version 02.2.1)
Value applied	0.75
Justification of choice of data or description of	As required by the Tool to calculate the emission factor for an electricity system. (Version 02.2.1)

measurement methods and procedures applied	
Purpose of Data	For the calculation of the Baseline Emission
Comments	Data will be kept for crediting period + 2 years

Data / Parameter	W_{BM}
Data unit	Dimensionless
Description	Weightage for Operating Margin
Source of data	Tool to calculate the emission factor for an electricity system. (Version 02.2.1)
Value applied	0.25
Justification of choice of data or description of measurement methods and procedures applied	As required by the Tool to calculate the emission factor for an electricity system. (Version 02.2.1)
Purpose of Data	For the calculation of the Baseline Emission
Comments	Data will be kept for crediting period + 2 years

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{y,Mah}$
Data unit	MWh
Description	Net electricity exported to grid
Source of data	Electricity generation statements
Description of measurement methods and procedures to be applied	Monitoring: Monitored through the meter readings from bidirectional main meter (electronic tri-vector meter) capable of monitoring electricity export and electricity import. Meter shall be located at sub-station. Meter accuracy class 0.2. Data type: Measured & Calculated Archiving: Electronic Recording Frequency: Continuous monitoring, hourly measurement and at least monthly recording Responsibility: The site-in-charge shall be responsible for the regular recording of data. Calibration Frequency: The meters shall be calibrated annually Calibration details:-Refer to Appendix 1

Frequency of monitoring/recording	Continuous monitoring, hourly measurement and at least monthly recording
Value monitored	14,188.47
Monitoring equipment	Electrical Energy Meters which are electronic tri-vector meters of accuracy class 0.2s (Main & Check meters).
QA/QC procedures to be applied	Meter calibration shall be conducted annually in Maharashtra and internal audit system is in place as mentioned in Section B.7.2. Measurement results shall be cross checked with records for sold/purchased electricity (e.g., invoices/receipts)
Purpose of the data	Calculation of baseline emissions
Calculation method	As described in section 4.3 of this document
Comments	Data archived: The data will be kept for two years after the end of the crediting period or the last issuance of VERs for this project activity, whichever occurs later.

Data / Parameter	$EG_{y\ TN}$
Data unit	MWh/year
Description	Net electricity exported to grid
Source of data	Electricity generation statements
Description of measurement methods and procedures to be applied	Monitoring: Monitored through the meter readings from bidirectional main meter (electronic tri-vector meter) capable of monitoring electricity export and electricity import. Meter accuracy class 0.5 Data type: Measured & Calculated Archiving: Electronic Recording Frequency: Continuous monitoring, hourly measurement and at least monthly recording Responsibility: The site-in-charge shall be responsible for the regular recording of data. Calibration Frequency: The meters shall be calibrated once every three years. Calibration Details: Refer to Appendix 2
Frequency of monitoring/recording	Continuous monitoring, hourly measurement and at least monthly recording
Value monitored	13,707.17
Monitoring equipment	Electrical Energy Meters which are electronic tri-vector meters of accuracy class 0.2s

QA/QC procedures to be applied	Meter calibration shall be conducted once every three years in Tamil Nadu and internal audit system is in place as mentioned in Section B.7.2. Measurement results shall be cross checked with records for sold/purchased electricity (e.g., invoices/receipts)
Purpose of the data	Calculation of baseline emissions
Calculation method	As described in section 4.3 of this document
Comments	Data archived: The data will be kept for two years after the end of the crediting period or the last issuance of VERs for this project activity, whichever occurs later.

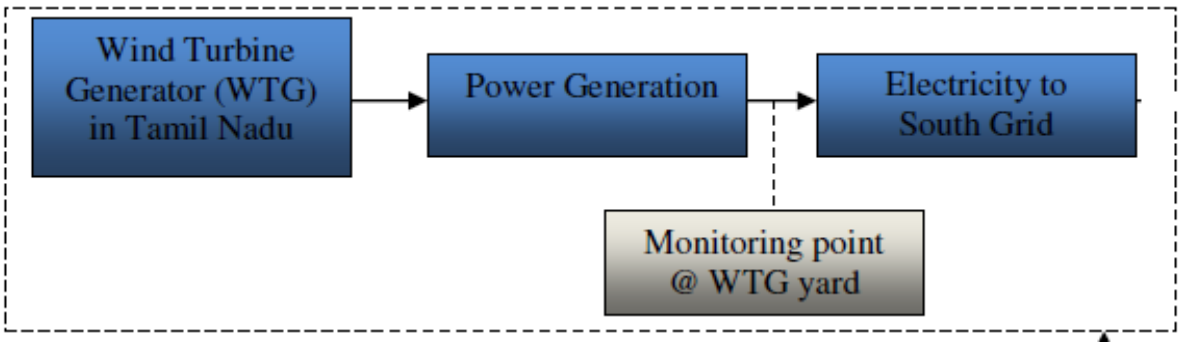
4.3 Monitoring Plan

The project activity is in accordance with approved small scale methodology AMS I.D, and therefore, can use the monitoring methodology for type I.D of 'Appendix B of the simplified M&P for small-scale CDM project activities-Version 16.0 - Grid connected renewable electricity generation.

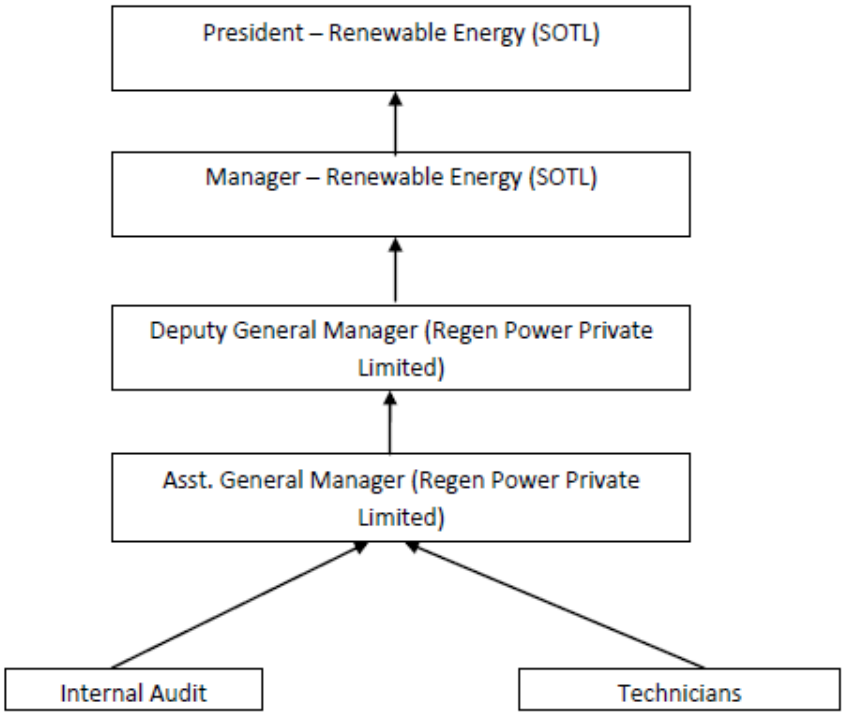
The monitoring methodology specified in the methodology requires that the project-monitoring plan to consist of metering the electricity generated by the renewable technology. In order to monitor the mitigation of GHG due to the project activity, the total energy exported needs to be measured. The net energy supplied to grid by the project activity multiplied by emission factor for regional grid, would form the baseline for the project activity.

Since the baseline methodology is based on ex ante determination of the baseline, the monitoring of baseline emission factor is not required. The sole parameter for monitoring is the electricity exported to the grid:

Line Diagram for Tamil Nadu



Monitoring at Tamil Nadu
The Project is operated and managed by M/s Regen Powertech Pvt. Ltd. (RPPL) in Tamil Nadu. The operational and management structure implemented by RPPL is as follows:



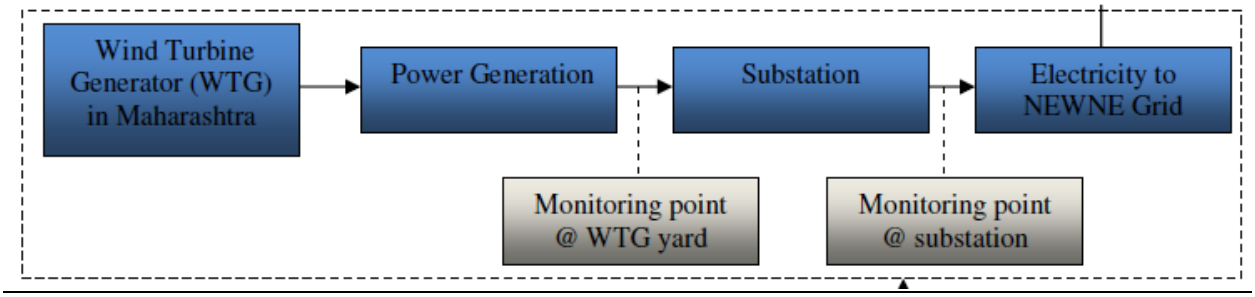
RPPL has provided panel meter on each WTG panel where the daily generation is monitored by the O&M service provider. Daily meter reading on panel is be taken by site-in-charge or personnel from O&M contractor. Meter reading is noted electronically.
However, Tamil Nadu Electricity Board (TNEB) have installed TNEB owned electronic tri-vector meters (Main meters) at each WTG transformer yard where the export and import of electrical energy is metered and the readings are taken by TNEB officials in presence of site-in-charge once in a month. The net energy generated from the specific WTG is calculated as a difference between electricity export and import values of the recording meter. These export/import values are obtained by multiplying the export/import readings of the recording meter with the multiplying factor of the recording meter. Monthly TNEB statement of net generation is provided to SOTL on the basis of which invoices are raised.
Main meters are calibrated at least once in three years as per the CEA Metering Regulations 2006.
The performance of the machines is monitored through:
1. Electric meters: Daily generation is monitored on panel meter provided on the WTG panel
2. Main meter by TNEB for recording the actual generation.
Daily Report: Daily report is generated and sent to SOTL by O&M service provider. Report consists of number of units produced, generation hours, grid and machine availability hours, and details of downtime due to machine/grid.

Internal audits & Performance review
The records are regularly audited and checked by the senior officials from project proponent on an annual basis. The officials monitor the actual emission reduction. The personnel responsible for taking readings at site are adequately trained.

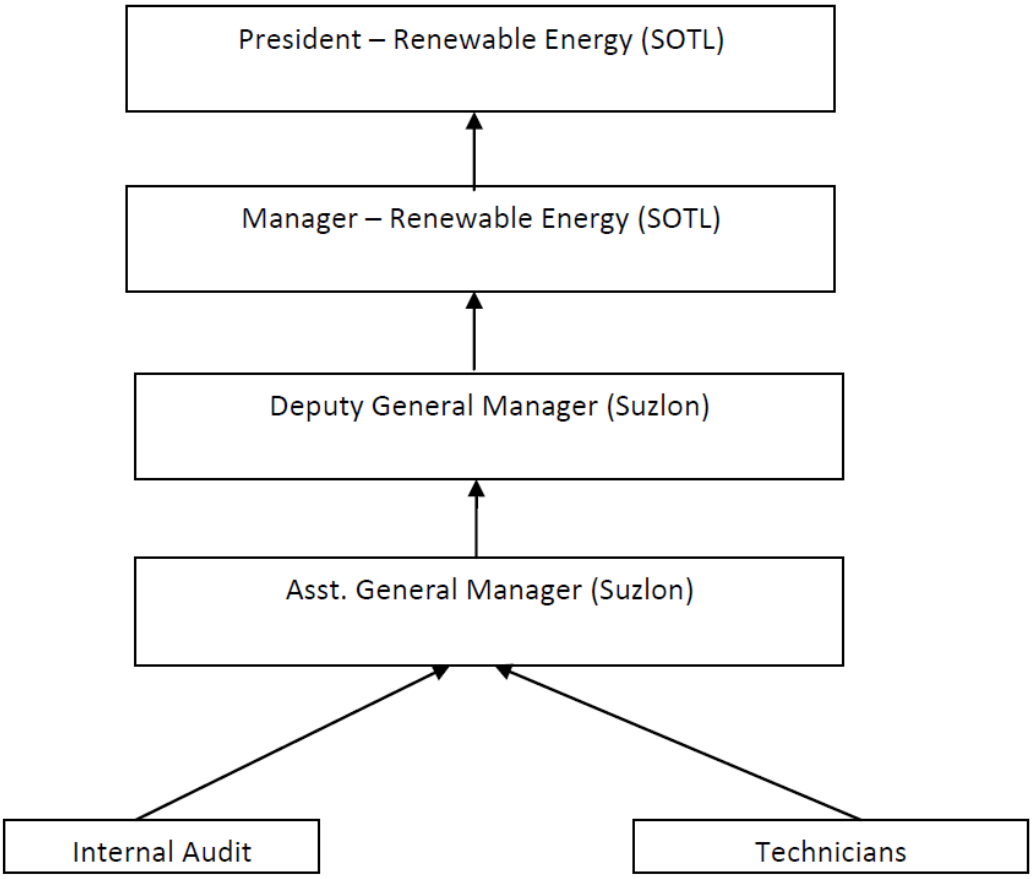
Emergency Preparedness
In the context of the project activity, the main meters are kept in sealed by TNEB and all maintenance is taken up by TNEB only. With reference to clause (4) of the Article 4 of the Energy Purchase agreement as provided below:

"(4) The State Transmission Utility/Distribution Licensee may provide Check Meters of the same specification as Main meters", the project proponents have not opted for check meters. Further, it may please be noted as per clause (8) and (9) of Article 4 of the Energy Purchase agreement:
"(8) Check meter readings shall be considered when Main Meters are found to be defective or stopped. Provided that, if difference between the readings of main and check meters vis-à-vis main meter reading exceeds twice the Percentage error applicable to the relevant class, both meters shall be tested and the one found defective shall be immediately replaced and reading of other will be considered.
(9) If during test or calibration, both the main meter and check meter are found to have errors beyond permissible limits, the bill shall be revised for the previous 3 (Three) months or the exact period if known and agreed upon by the parties, by applying correction as determined by the meter testing Wing of the STU/Distribution Licensee to the consumption registered by the meter with lesser error
Hence, in case of failure of the main meter clause (9) of Article 4 of the Energy Purchase agreement will come into effect and the generation would be accordingly calculated and approved by the meter testing Wing of the State Transmission Utility/Distribution Licensee.
In continuation to the above clause, the correction would be taken in accordance with Clause (viii) of the Circular dated 06/01/1993 issued by the Chief Engineer, TNEB, which states:
"During the defective period of the meters, the units generated can be computed based on the units recorded in the panel of the windmill and by comparison with the nearby windmill generator."
The project promoters have contracted the technology supplier for providing O&M services for the power project. The service provider would be responsible for maintenance of the necessary spare parts and consumables for the maintenance of the WTGs such as anemometers, wind vanes and sensors, oil filters, batteries, auxiliary motors and pumps, WTG controllers, slip rings, limit switches and sensors, detergents & solvents etc. The service provider would also be responsible for supply of necessary main components of the WTG such as main gearboxes, blades, generators, towers, hubs, main shafts & bearings, ground and top controller and hydraulic systems. The service provider would also ensure that occupational health and safety procedures are adhered to during the operation & maintenance activities. Additionally, spare meters would also be kept available at the site for replacement in case of failure of any of the monitoring equipment

Line diagram for Maharashtra



Monitoring at Maharashtra
The Project is operated and managed by Suzlon in Maharashtra. The operational and management structure implemented by Suzlon is as follows:



All the WTGs are connected & captured in a digital system located at that site only. The daily generation reports are made available to SOTL by the O&M service providers. SOTL has the overall responsibility for collating the monitored data received from all the three locations. Any failure in the WTG, including in its monitoring system, will trigger the interlocking circuit which will stop generation of electricity immediately.

A particular feeder may comprise of WTGs belonging to owners other than SOTL but belonging to the same O&M service provider. At the MSEDCL sub-station, the total export & import to this feeder is monitored using the main meter & the check meter, which are electronic trivector meters. The total export at this meter is generally arrived at by multiplying the monthly meter reading to the multiplying factor of the meter concerned. The monthly meter reading is arrived at as the difference between the current meter reading and the previous meter reading. The period between these two readings is usually a period of 30 days which may vary. In a similar fashion, total import at this meter is also calculated. Hence, net electricity export is calculated as the difference between total export and total import at the meter. Additionally, MSEDCL receives daily export & import figures for each WTG from the O&M service provider with the help of which it calculates the electricity export by each WTG at the WTG controller. The WTG controller is located within the WTG assembly itself. It then arrives at the export value of each WTG by apportioning the reading of the main/check meter in the same ratio at which each of the WTG had exported electricity. The formula applied on each WTG of a particular feeder is as follows:

Export of WTG to Grid = (% generation of individual WTG connected to feeder) x (Net Electricity Export @ MSEDCL meter for the feeder)

where, % generation of individual WTG connected to feeder

= (Controller reading @ Individual WTG)/(Sum of Controller reading of all WTGs connected on feeder)

The electricity export reports are generated by MSEDCL on credit notes and sent to SOTL through the O&M service provider on a monthly basis. Thus, to further elaborate, it may be said, that every month, SOTL receives credit notes from MSEDCL for all its WTGs from the O&M service provider. Some of the information mentioned in the credit notes is as follows:

1. Current meter reading of total export of the concerned feeder
2. Previous meter reading of total export of the concerned feeder
3. Current meter reading of total import of the concerned feeder
4. Previous meter reading of total import of the concerned feeder
5. Multiplying factor of meter
6. % generation of individual WTG connected to meter

Upon receipt of these reports, SOTL generates invoices on sale of electricity and sends to MSEDCL. Thereafter MSEDCL makes payments against the invoices.

SOTL is overall responsible for storing and archiving data as well as the preparation of monitoring report and communicate with EB of UNFCCC for project performance, registration and verification of the CDM project activity.

Emergency Preparedness

Incase if monitoring meter failure errors, the grid officials would immediately replace the meter with a calibrated meter. There are two meters provided at each feeder: a Main Meter and a Check Meter. In case of failure of the meters, generation will be calculated based on the corresponding norms (Section 11.02 [c], [d] & [e]) as laid down in the Power Purchase Agreement:

"[c] If during testing, both the Main and Check Meter are found within the permissible limit of error i.e. 0.5s the energy consumption will be 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 consumption will be as per the Main Meter. The Check Meter shall be calibrated immediately.

If during the tests, the Main Meter is found to be beyond the permissible limits of error, but the corresponding Check Meter is found to be within the permissible limits of error, then the energy consumption for the month to-date and time of such test shall be in accordance with Check Meter. The Main Meter shall be calibrated immediately and the energy for the period thereafter shall be as per the calibrated Main Meter.

[d] If during any of the monthly meter readings, the variation between the main meter and the check meter is more than 0.5s, all the meters shall be re-tested and calibrated immediately by MSEDCL, at the Seller's cost.

[e] The correction required as per the result of the testing will be 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."

The O&M service provider is responsible for maintenance of the necessary spare parts and consumables for the maintenance of the WTGs such as anemometers, wind vanes and sensors, oil filters, batteries, auxiliary motors and pumps, WTG controllers, slip rings, limit switches and sensors, detergents & solvents etc. The service provider would also be responsible for supply of necessary main components of the WTG such as main gearboxes, blades, generators, towers, hubs, main shafts & bearings, ground and top controller and hydraulic systems. The service provider would also ensure that occupational health and safety procedures are adhered to during the operation & maintenance activities. Additionally, spare meters would also be kept available at the site for replacement in case of failure of any of the monitoring equipment.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The baseline emissions are to be calculated using the following formula

Baseline Emissions = $EG_{y,Mah}$ x $EF_{NEWNE,CM,y}$ + $EG_{y,TN}$ x $EF_{South,CM,y}$

As per the CDM PDD, the baseline emission factor which is 0.9224tCO_2/MWh for Maharashtra (=$EF_{NEWNE,CM,y}$) and 0.9445 tCO_2/MWh for Tamil Nadu (=$EF_{south,CM,y}$)

The net export from the project activity is:

a) 14,188,46 MWh for Maharashtra

b) 13,707.17 MWh for Tamil Nadu

Hence, BE_y =0.9224 * 14,188.46 +0.9445*13,707.17

= 13,086 +12,944

=26,030 (round down)

Vintage period	Tamil Nadu	Maharashtra	Overall
2018	5,796	6,627	12,423
2019	6,845	5,997	12,842
2020	303	462	765
Total	12,944	13,086	26,030

However the net emission reduction after applying the vintage wise round down is 26,030 tCO_2.

5.2 Project Emissions

The project uses wind energy only for power generation which leads to zero net GHG on-site emissions. Hence there is no net emission within the project boundary.

Hence, PE_y= 0.

5.3 Leakage

The project proponents have identified no anthropogenic greenhouse gases by sources outside the project boundary that are significant, measurable and attributable to the project activity. Hence, no leakage is considered from the project activity.

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)
01-January-2018 to 31-December-2018	12,423	0	0	12,423
01-January-2019 to 31-December-2019	12,842	0	0	12,842
01-January-2020 to 17-March-2020	765	0	0	765
Total	26,030	0	0	26,030

APPENDIX 1: < METER CALIBRATION >

For Sadawaghapur

Location No.	Main Meter No.	Check Meter No.	Substation Feeder no.	Accuracy Class	Date of Calibration	Next Calibration Date	Delay
S40	14796507	14796508	Sadawaghapur Feeder 03	0.2s	20-May-2017	19-May-2018	NA
S63	14796504	14796505	Sadawaghapur Feeder 04	0.2s	26-May-2017	25-May-2018	NA
S64							
S40	14796507	14796508	Sadawaghapur Feeder 03	0.2s	31-May-2018	30-May-2019	Delay by one month
S63	14796504	14796505	Sadawaghapur Feeder 04	0.2s	31-May-2018	30-May-2019	Delay by one month
S64							
S40	14796507	14796508	Sadawaghapur Feeder 03	0.2s	03-June-2019	02-June-2020	Delay by two months
S63	14796504	14796505	Sadawaghapur Feeder 04	0.2s	03-June-2019	02-June-2020	Delay by two months
S64							

For Theni

Location No.	Old Main Meter No.	New Main Meter	Substation	Old Meter Accuracy	New Meter Accuracy Class	Meter Replacement	Next Calibration Date
T45	TNB 04537	625014	Theni	0.5s	0.2s	22-April-2017	21-April-2020
T46	TNB 04534	625015		0.5s	0.2s	27-April-2017	26-April-2020
T47	TNB 04517	624718		0.5s	0.2s	27-April-2017	26-April-2020

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