



**Verified Carbon
Standard**

RENEWABLE ENERGY PROJECT BY LNB GROUP



**INFINITE
SOLUTIONS**

Document Prepared by Infinite Solutions

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CONTENTS

1	PROJECT DETAILS	3
1.1	Summary Description of the Implementation Status of the Project.....	3
1.2	Sectoral Scope and Project Type	4
1.3	Project Proponent	5
1.4	Other Entities Involved in the Project	5
1.5	Project Start Date.....	5
1.6	Project Crediting Period.....	5
1.7	Project Location	6
1.8	Title and Reference of Methodology.....	7
1.9	Participation under other GHG Programs	7
1.10	Other Forms of Credit	7
1.11	Sustainable Development.....	7
2	SAFEGUARDS	7
2.1	No Net Harm	7
2.2	Local Stakeholder Consultation.....	7
2.3	AFOLU-Specific Safeguards.....	8
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	11
4.3	Monitoring Plan	12
5	QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS	16
5.1	Baseline Emissions.....	17
5.2	Project Emissions	18
5.3	Leakage	19
5.4	Net GHG Emission Reductions and Removals.....	19
	APPENDIX 1: CALIBRATION DETAILS OF THE ENERGY METERS	20

1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The project activity involves the installation of Wind and Solar Power Projects. The total installed capacity of the project is 27.20 MW; which involves operation of 18 Wind Turbine Generators (WTGs) with total capacity of 22.20 MW & 1 Solar power plants with total capacity of 5.00 MW located at different states; Rajasthan and Maharashtra in India. The project is promoted by individual sub project investors, the details of which are as follows:

Wind Project Investor	Capacity (MW)	Technology	Purpose	Regional Grid	State
Manifold Agricrops Pvt. Ltd.	5 x 2.00	Wind	Sale to EB	NEWNE	Rajasthan
Parmarth Wind Energy Pvt. Ltd.	12 x 0.85	Wind	Sale to EB	NEWNE	Maharashtra
Sidhidata Power LLP	1 x 2.00	Wind	Sale to EB	NEWNE	Maharashtra
Total Capacity of Wind Projects	22.20 MW				

Solar Project Investor	Capacity (MW)	Technology	Purpose	Regional Grid	State
Sidhidata Solar Urja Ltd.	5.00	Solar	Sale to EB	NEWNE	Rajasthan
Total Capacity of Solar Projects	5.00 MW				

Hence, Total Capacity of Project is 27.20 MW

The purpose of the project activity is to generate energy electricity by the utilization of wind velocity/solar power and further selling the generated energy to the respective Grid. In this process there is no consumption of any fossil fuel and hence it does not lead to any greenhouse gas emissions. Thus, electricity would be generated through sustainable means without causing any negative impact on the environment.

A comprehensive list of WTGs commissioning dates are provided under:

Wind Project Investor	Capacity (MW)	Machine ID	Commissioning Date
Manifold Agricrops Pvt. Ltd.	2.00	DAN-T-12	31-Mar-13
	2.00	DAN-T-59	31-Mar-13
	2.00	DAN-T-60	31-Mar-13

	2.00	DAN-T-61	31-Mar-13
	2.00	DAN-T-88	31-Mar-13
Parmarth Wind Energy Pvt. Ltd.	0.85	GAL-03	29-Mar-14
	0.85	GAL-06	29-Mar-14
	0.85	GAL-07	29-Mar-14
	0.85	GAL-08	29-Mar-14
	0.85	GAL-09	29-Mar-14
	0.85	GAL-10	29-Mar-14
	0.85	GAL-18	29-Mar-14
	0.85	GAL-22	29-Mar-14
	0.85	GAL-23	29-Mar-14
	0.85	GAL-24	29-Mar-14
	0.85	GAL-26	29-Mar-14
	0.85	GAL-33	29-Mar-14
Sidhidata Power LLP	2.00	MVT-83	31-Mar-14
Total Capacity of Wind Projects	22.20 MW		

Solar Project Investor	Capacity (MW)	Location ID	Commissioning Date
Sidhidata Solar Urja Ltd.	5.00	-	11-Aug-14
Total Capacity of Solar Projects	5.00 MW		

The total GHG emission reductions or removals generated in this monitoring period, i.e. 1-Dec-2017 to 29-Feb-2020 (inclusive both days) is 74,871 tCO₂.

1.2 Sectoral Scope and Project Type

The project activity falls under the following Sectoral scope and Project Type:

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

Project Type : I - Renewable Energy Projects

Methodology:

ACM0002: Grid-connected electricity generation from renewable sources --- Version 16.0

<http://cdm.unfccc.int/methodologies/DB/EY2CL7RTEHRC9V6YQHLAR6MJ6VEU83>.

PP hereby confirms that the project is not a grouped project, **LNB Renewable Energy Private Limited** is the project proponent and **Infinite Solutions** is the carbon consultant of the project.

1.3 Project Proponent

Organization name	LNB Renewable Energy Private Limited
Contact person	Rohan Jhavar
Title	Director – Renewables
Address	L.N.Bangur Group of Companies, 3rd Floor, Uptown Banjara, Road No. 3, Banjara Hills, Hyderabad- 500034.
Telephone	+91-40-23553354
Email	rjhavar@lnbgroup.com

1.4 Other Entities Involved in the Project

Organization name	Infinite Solutions
Role in the Project	Carbon Consultant
Contact person	Jimmy Sah
Title	Head - Sustainability
Address	611, Chetak Centre Main, 12/2, Rabindranath Tagore Marg, South Tukoganj, Tukoganj, Indore, Madhya Pradesh 452001
Telephone	+91-731-4050174
Email	jimmy@infisolutions.org

1.5 Project Start Date

Project Start Date: 31-Mar-2013

1.6 Project Crediting Period

Crediting Period Start date: 31-Mar-2013

- Crediting Period End date: 30-Mar-2023 Estimated life time of the project:
 - 20 Years 00 Months - For Wind Projects
 - 25 Years 00 Months - For Solar Projects

The project activity adopts renewable crediting period of 10 years period which can be renewed for maximum 2 times.

1.7 Project Location

Investor	Capacity (MW)	Machine ID	Location	Latitude			Longitude		
				Deg	Min	Sec	Deg	Min	Sec
Manifold Agricrops Pvt. Ltd.	2.00	DAN-T-12	Malusar, Dangri Area, Jaisalmer, Rajasthan	26	33	38.2	71	21	1.5
	2.00	DAN-T-59		26	31	23.4	71	25	55.0
	2.00	DAN-T-60		26	31	6.8	71	25	58.3
	2.00	DAN-T-61		26	31	36.2	71	25	44.3
	2.00	DAN-T-88		26	31	17.6	71	27	0.6
Parmarth Wind Energy Pvt. Ltd.	0.85	GAL-03	Bhendawade, Shahuwadi, Kolhapur, Maharashtra	17	0	13	73	55	16
	0.85	GAL-06	Altur, Shahuwadi, Kolhapur, Maharashtra	16	59	59	73	55	15
	0.85	GAL-07		16	59	51	73	55	19
	0.85	GAL-08		16	59	45	73	55	18
	0.85	GAL-09		16	59	56	73	54	59
	0.85	GAL-10		16	59	50	73	54	59
	0.85	GAL-18		17	0	12	73	55	36
	0.85	GAL-22		17	0	7	73	55	38
	0.85	GAL-23		17	0	2	73	55	45
	0.85	GAL-24		16	58	53	73	54	52
	0.85	GAL-26	Karungale, Shahuwadi, Kolhapur, Maharashtra	16	58	48	73	54	49
	0.85	GAL-33	Kotoli, Shahuwadi, Kolhapur, Maharashtra	16	58	24	73	55	55
Sidhidata Power LLP	2.00	MVT-83	Jath, Sangli, Maharashtra	17	04	8.1	75	15	17.3
Sidhidata Solar Urja Ltd.	5.00	-	Bhadla, Phalodi, Jodhpur, Rajasthan	27	30	0	71	54	0

1.8 Title and Reference of Methodology

Methodology:

ACM0002: Grid-connected electricity generation from renewable sources --- Version 16.0, Sectoral Scope: 01, EB 81, Annex 9

<https://cdm.unfccc.int/methodologies/DB/EY2CL7RTEHRC9V6YQHLAR6MJ6VEU83>

The project activity also takes reference from following Tools from the tools prescribed by applied methodology:

1. Tool for the demonstration and assessment of additionality --- Version 07.0.0, EB 70, Annex 8

<https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf>

2. Tool to calculate the emission factor for an electricity system --- Version 04.0, EB 75, Annex 15

<https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf>

1.9 Participation under other GHG Programs

The project proponent hereby confirms that the project has not participated under Other GHG Programs.

1.10 Other Forms of Credit

- Emission Trading Programs and Other Binding Limits: The project is not a part of any emission trading program.
- Other Forms of Environmental Credit: The project proponent hereby confirms that the project has not sought or received any other GHG related environmental credit.

1.11 Sustainable Development

The project is not part of any nationally stated sustainable development priorities.

2 SAFEGUARDS

2.1 No Net Harm

There are no negative environmental and/or socio-economic impacts due to the project

2.2 Local Stakeholder Consultation

The Stakeholders of the project activity were invited through submission of the invitation letter and Public Notice to attend the stakeholder meeting at the project site. The meeting was attended by Local community, Local village administration, Technology suppliers, Local vendors and representatives of PPs.

Project Promoters' Name	Invitation Date	Meeting Date	Location of the LSM
Manifold Agricrops Pvt. Ltd.	11-Feb-15	25-Feb-15	Jaisalmer, Rajasthan

Parmarth Wind Energy Pvt. Ltd.	11-Feb-15	28-Feb-15	Kolhapur, Maharastra
Sidhidata Power LLP	11-Feb-15	27-Feb-15	Sangli, Maharastra
Sidhidata Solar Urja Ltd.	11-Feb-15	26-Feb-15	Bhadhla, Jodhpur, Rajasthan

The stakeholders were explained about the project activity and the various benefits arising out of the project activity. A discussion was held in which the views of the local stakeholders were addressed. No negative comments received.

Nevertheless, PP is open for the continuous stakeholder interaction and formed a grievance/suggestion register and a grievance box placed at the project site for the comments at any point of time during the project crediting period. PP has explained this mechanism for on-going communication to the local stakeholders and transparently kept the notice mentioning the grievance register and box at the project site.

The accounting of all and any input received during ongoing communication should be taken in consideration to take the appropriate measure to resolve the grievance.

Discussions with Local stakeholders is being carried out at periodic intervals. There are no negative comments received for the project. In line with VCS requirements all the processes has been implemented to receive comments from local stakeholders as well as communicate with them at periodic intervals.

However, no negative feedback received during the current monitoring period.

2.3 AFOLU-Specific Safeguards

Not Applicable

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The Project Activity has total installed capacity of 27.20 MW; which involves operation of 18 Wind Turbine Generators (WTGs) with total capacity of 22.20 MW & 1 Solar power plants with total capacity of 5.00 MW located at different states; Rajasthan and Maharashtra in India.

Wind Power Project Technology Details –

Technical details for WT 2000 DF2, 2000 KW Machine

Particulars	Details
Model	INOX DF 93.3
Rated power	2000 kW
Cut-in wind speed	3 m/s

Cut-out wind speed	20 m/s
Rated wind speed	≤11.5 m/s
Survival wind speed	52.5 m/s
Hub height	80 m
Rotor Speed	15.9 rpm
Diameter	93.3 m
Swept area	6,795 m ²
Design Lifetime	20 years

Technical details for Gamesa G-583, 850 KW Machine

Particulars	Details
Model	Gamesa G58 850kW
Rated power	850kW
Cut-in wind speed	3 m/s
Cut-out wind speed	23 m/s
Rated wind speed	From 14.6 rpm to 30,8 rpm
Diameter	58 m
Swept area	2642 m ²
Design Lifetime	20 years

Solar Power Project Technology Details –

Technical specifications for 5.00 MW Solar power plant.

1. Solar Panels: IBC PolySol 245 (Ecoline)
No. of Panels installed of each type = 245 Wp - 22440 Nos.
2. Inverters: M/s Sungrow Power Supply Co.Ltd.
No. of Inverter Installed = SGKTL 30 KW - 156 Nos.

There has been no events other than events mentioned above that may have an impact on the GHG emissions or removals during the current monitoring period.

There was no major breakdown occurred during the current monitoring period except for minor operational and maintenance issues which are continuously being worked upon by the dedicated O&M contractor for the project.

Further, there are no changes to the project participant or the project activity during the monitoring period.

3.2 Deviations

2.3.1 Methodology Deviations

There is no methodology deviations.

2.3.2 Project Description Deviations

There is no Project Description deviations

3.3 Grouped Projects

This is not a grouped project activity.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	EF _{grid,OM,y}
Data unit	tCO ₂ /MWh
Description	Operating Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 10, December 2014 ¹
Value applied	0.9862 (NEWNE Grid)
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per "Tool to calculate the emission factor for an electricity system, version 04.0.0" as 3-year generation weighted average using data for the years 2011-2012, 2012-2013 & 2013-2014. The data are obtained from "CO ₂ Baseline Database for Indian Power Sector" version 10.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
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 _{grid,BM,y}
Data unit	tCO ₂ /MWh
Description	Build Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 10, December 2014
Value applied	0.9495 (NEWNE Grid)
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per "Tool to calculate the emission factor for an electricity system, version 04.0.0" for the year 2013-2014. The data is obtained from "CO ₂ Baseline Database for Indian Power Sector" version 10.0, published by the Central Electricity Authority, Ministry of Power, Government of India.

¹ http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver10.pdf

Purpose of Data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO ₂ /MWh
Description	Combines Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 10, December 2014 ²
Value applied	0.9770 (NEWNE Grid)
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 CO₂ emission factor in year y (tCO₂/MWh) $EF_{grid,OM,y}$ = Operating margin CO₂ emission factor in year y (tCO₂/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.

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{PJ,y}$
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project (Wind or Solar) plant/unit to the grid in year y
Source of data	Monthly electricity share certificates/note or Credit Note or Joint Meter Reading Report
Description of measurement methods and procedures to be applied	The value of net electricity generation supplied to the grid as per Monthly electricity share certificates/note or Credit Note or Joint Meter Reading Report forms the basis for calculation of the emission reductions; which can be cross checked from the invoice raised to DISCOM. Net electricity supplied to grid is calculated as the difference of the measured values of "export" and "import" of electricity through the

² http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver10.pdf

	dedicated SEB energy meter (electronic trivector bidirectional main meter & check meter which measures both export & import concurrently) installed at the delivery point (i.e. the connected substation). Net electricity generated and supplied by the project (Wind or Solar) plant/unit to the grid = Electricity Export to the grid - Electricity Import from the grid Monthly meter readings are taken from the main and check meter installed at the substation and certified by the representatives of SEB Officials and the representatives of the project proponent. Same are crosschecked with Invoices raised by PP towards State Utilities. For apportioning procedure refer section 4.3
Frequency of monitoring/recording	Continuous monitoring, hourly measurement and at least monthly recording
Value monitored	76,635 MWh
Monitoring equipment	Monitoring: Tri vector meter is used Data type: Measured Type of meter: Static type meter (Main & Check). Both are Bidirectional meters. Class of meter: 0.2s
QA/QC procedures to be applied	- The energy meter reading are taken on monthly basis - Energy meters is calibrated³ once in a three year and faulty meters will be duly replaced immediately. - All the energy meters are under the control of state utility and calibration/testing of energy meters is also under the jurisdiction of state utility. The Net electricity exported to the grid is cross checked against the invoice raised by the PP towards the DISCOM
Purpose of the data	Calculation of Baseline emissions
Calculation method	-
Comments	The data would be archived electronically and maintained for the entire crediting period plus two years

4.3 Monitoring Plan

The monitoring methodology specified in the methodology requires that the project-monitoring plan to consist of monitoring of quantity of net electricity supplied to the grid in the year y. 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.

³ Energy Meter Calibration details has been provided under Appendix 1.

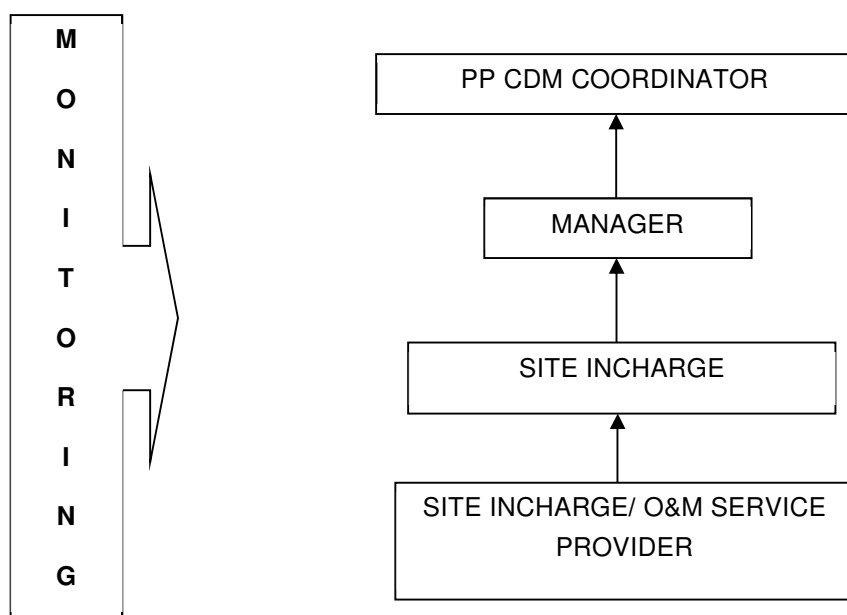
Since the baseline emission factor is based on an ex-ante determination, monitoring of this parameter is not required. The sole parameter for monitoring is the net electricity exported to the grid.

Aim of monitoring:

The monitoring procedure will set guidelines for the project investor to monitor the parameters regularly and to ensure quality and accuracy in monitoring. It elaborates on the functions of the monitoring team and procedures to be followed in monitoring of the CDM parameters.

The monitoring shall include all the equipments that contribute towards reduction in GHG emissions. Since the project activity focuses mainly on the generation of renewable power, it is important to monitor all the equipments involved in the metering of all the necessary instruments.

The project investor has a well-defined management structure for monitoring the project activity.



Organizational Structure for monitoring (Common for all states):

Designation	Responsibilities
PP CDM COORDINATOR	Overall project monitoring including collecting and aggregating JMRs/Invoices for all WTG/solar investors
MANAGER	Holds complete control over monitoring aspects pertaining to the project
SITE INCHARGE	- Recording - Verification - Storage of Data

SITE INCHARGE/ O&M SERVICE PROVIDER	• Operation and Maintenance • Storage of data • Data Recording
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Personnel Training (Common for All states):

The project personnel, including those involved in data recording, maintenance and direct data assessments will be provided with training on the application and usage of the manual.

Training and maintenance requirements (Common for All states):

O&M operator would provide training to the on-site staffs on operation and maintenance of the metering system and adherence to the Monitoring Plan of the project activity. Training for operation of both Wind and Solar projects shall be provided by the respective O&M Operators.

For WTGs, Training on the machine is an essential pre-requisite, to ensure necessary safety of man and machine. Further, in order to maximize the output from the WTGs, it is extremely essential, that the engineers and technicians understand the machines and keep them in good health. In order to ensure that technology providers' service staff is deft at handling technical snags on top of the turbine, the necessity of ensuring that they are capable of climbing the tower with absolute ease and comfort has been established.

Reading and Correction of Meters:

For the purpose of energy accounting, O&M operator will provide ABT compliant meters at the interface points. Interface metering will confirm to the Central Electricity Authority (Installation and Operation Meters) Regulation, 2006. In the event that the main meter is not in service as a result of maintenance, repairs or testing, then the check meter will be used during the period the main meter is not in service.

Calibration of Meters:

Calibration of all the meters will be undertaken at least once in 3 years and faulty meters will be duly replaced immediately. Calibration will be done by an authorized agency or reputed laboratory.

Apportioning Procedure for (Solar) Power Project

As individual main & check meter are installed for each Solar Plant, hence no apportioning is required for Solar Projects.

Apportioning Procedure for (Wind) Power Project

The net electricity supplied to the grid would be reported as the difference between the net export and import from the WTG. The electricity export and import data will be monitored via main and check meters connected to feeders at the respective sub-station.

In case of NEWNE grid, multiple WTGs would be connected to the feeder, one of which would be part of the project activity and rest of which would not be part of the project activity (WTGs owned by other entities). The import and export of electricity is continuously monitored by the export/ import meter and the data is recorded on a monthly basis jointly by the proponent and the electricity board. The meter is located at the delivery point of wind power in the grid. This

accounts for the import of electricity that is used by the Project proponent. Hence the net electricity generated is calculated from the joint meter reading and recorded /archived in paper/electronic.

SEB/O&M Contractor follows an apportioning procedure to account for electricity generation from individual WTGs based on data from individual WTG controllers.

Following the joint meter readings, apportioning of net electricity supplied to grid by each WTG is done by the SEB/O&M Contractor based on the individual meter readings

recorded from the controller panel meter of each WTG and based on the meter reading recorded from the meters situated at the connected substations.

In case of Maharashtra only, based on the monthly export and import data as per main/check meters and the WTG controller readings, SEB provides a break-up of the electricity exported and imported for each WTG.

Rajasthan

A monthly joint meter reading of the energy meters is taken by State Electricity Board officials and O&M contractors (representatives of the project investor). Apportioning of net electricity generation from each WTG connected to NEWNE grid is then determined as follows:

1.	Apportioning Ratio	=	$\frac{\text{Generation at WTG Controller}}{\text{Total Generation of All WTG Controller for the feeder}}$
2.	Electricity Export to the grid by WTG (EG_{export})	=	Export from Main/Check Meter * Apportioning Ratio
3.	Electricity Import from the grid by WTG (EG_{import})	=	Import from Main/Check Meter * Apportioning Ratio
4.	Net electricity generated by WTG	=	Electricity Export to the grid by WTG – Electricity Import from the grid by WTG

Above steps for calculation of EG_{export} and EG_{import} are carried out by O&M Contractor & energy break-up sheet is issued by the O&M Contractor which is certified by the representatives of SEB Officials. Based on the break-up sheets Project investor raises invoice to DISCOM which forms the cross-check for the net electricity generated. The Project investor has no role in the entire procedure of apportioning

Maharashtra

A monthly joint meter reading of the energy meters is taken by MSEDCL officials and O&M contractors (representatives of the project investor). Apportioning of net electricity generation from each WTG connected to NEWNE grid is then determined as follows:

1.	Apportioning Ratio	=	$\frac{\text{Generation at WTG Controller}}{\text{Total Generation of All WTG Controller for the feeder}}$
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2.	Electricity Import from WTG by the grid (EG_{import})	=	Import from Main/Check Meter * Apportioning Ratio
3.	Electricity Export to the WTGs by the grid (EG_{export})	=	Export from Main/Check Meter * Apportioning Ratio
4.	Net electricity generated by WTG	=	Electricity Import from WTG by the grid – Electricity Export to the WTGs by the grid

Above steps for calculation of EG_{import} and EG_{export} are carried out by MSEDCL Officials & energy break-up sheet is issued by the MSEDCL Officials. Based on the break-up sheets Project investor raises invoice to DISCOM which forms the cross-check for the net electricity generated. The Project investor has no role in the entire procedure of apportioning

Emergency Preparedness and Uncertainty Procedure:

In case Main meter or check meter is found to be outside the acceptable limits of accuracy or faulty or not functioning properly, it will be repaired, recalibrated or replaced as soon as possible. In the event that the Main meter is not in service as a result of maintenance, repairs or testing, the check meter will be used. In case both the main and check meter are found to be outside the acceptable limits of accuracy or faulty or not functioning properly, both the meters shall be calibrated immediately and the error percentage found in the main meter during its calibration shall be applied to its metered energy data for the entire period since its last calibration to obtain the corrected value of net electricity exported to the grid.

Data Recording and Archiving:

O&M operator will keep complete and accurate records of operating log at the Power Plant. The data will be archived electronically as well as in log books at the power plant and will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

In case the dates of a particular monitoring period do not match with the dates of the billing cycle, the net electricity exported to the grid would be calculated from:

- Apportioning the net electricity exported to grid, as recorded in the consolidated Share Certificate / JMR Report / Credit Notes certified by the respective state discom, based on the number of days in the monitoring period and the number of days for which Share Certificate / JMR Report / Credit Notes was prepared.

The calculated value after apportioning would be used for calculation of emission reductions during that period.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

Vintage-wise Calculation	MAPL	PWEPL	SPLLP	SSUL	Total (MWh)
Year	Net Export (MWh)	Net Export (MWh)	Net Export (MWh)	Net Export (MWh)	
2017	751	1,114	130	690	2,685
2018	9,089	15,004	3,132	9,442	36,667
2019	7,457	13,971	3,224	9,087	33,739
2020	946	904	181	1,513	3,544
Total Net Export					76,635

5.1 Baseline Emissions

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$$

Where:

BE_y = Baseline emissions in year y (t CO₂/yr)

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)

$EF_{grid,CM,y}$ = Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO₂/MWh)

Calculation of $EG_{PJ,y}$

If the project activity is the installation of a Greenfield power plant, then:

$$EG_{PJ,y} = EG_{facility,y}$$

Where:

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)

$EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)

Therefore, $EG_{PJ,y} = 76,635$ MWh

Calculation of $EF_{grid,CM,y}$

Calculation of Baseline Emission Factor ($EF_{grid,y}$)

The baseline emission factor $EF_{grid,y}$ is calculated as the weighted average of the Operating Margin emission factor ($EF_{grid,OM,y}$) and the Build Margin emission factor ($EF_{grid,BM,y}$):

$$EF_{grid,y} = w_{OM} * EF_{grid,OM,y} + w_{BM} * EF_{grid,BM,y}$$

Where,

W_{OM}	75% weight of operating margin emissions factor (%)
W_{BM}	25% weight of build margin emissions factor (%)
$EF_{grid,OM,y}$	Operating margin CO ₂ emission factor of a particular grid in year y; calculated as described in Steps 3&4 above (tCO ₂ /MWh)
$EF_{grid,BM,y}$	Build margin CO ₂ emission factor of a particular grid in year y; calculated as described in Steps 5 above (tCO ₂ /MWh)

Baseline Emission factor (NEWNE Grid)

$$EF_{NEWNE,CM,y} = 0.75 \times 0.9862 + 0.25 \times 0.9495$$

$$= 0.9770 \text{ tCO}_2/\text{MW}$$

Therefore, Baseline Emissions:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$$

$$BE_y = 76,635 \times 0.9770 = 74,871 \text{ tCO}_2$$

5.2 Project Emissions

The project emission calculation as per para 35 of ACM0002 version 16,

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y}$$

Where:

PE_y = Project emissions in year y (t CO₂e/yr)

$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y (t CO₂/yr)

$PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year y (t CO₂e/yr)

$PE_{HP,y}$ = Project emissions from water reservoirs of hydro power plants in year y (t CO₂e/yr)

$$PE_{FF,y} = 0$$

As per para 37 of ACM0002 version 16,

‘For all renewable energy power generation project activities, emissions due to the use of fossil fuels for the backup generator can be neglected’.

$$PE_{GP,y} = 0$$

Not applicable for the wind & solar power projects

$$PE_{HP,y} = 0$$

Not applicable for the wind & solar power projects

5.3 Leakage

As per para 60 of ACM0002 version 16, No leakage emissions need to be considered for the project activity.

5.4 Net GHG Emission Reductions and Removals

As per para 61 of ACM0002 version 16; Emission Reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where:

ER_y = Emission reductions in year y (t CO₂e/yr)

BE_y = Baseline emissions in year y (t CO₂/yr)

PE_y = Project emissions in year y (t CO₂e/yr)

Therefore, Net GHG Emission Reductions and Removals are calculated as follows:

$$ER_y = BE_y - PE_y$$

$$ER_y = 74,871 - 0 = 74,871 \text{ tCO}_2$$

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2017	2,623	0	0	2,623
2018	35,823	0	0	35,823
2019	32,963	0	0	32,963
2020	3,462	0	0	3,462
Total	74,871			74,871

Year	Wind	Solar
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2017	1949	674
2018	26,598	9225
2019	24,085	8878
2020	1984	1478
Total	54,616	20,255

APPENDIX 1: CALIBRATION DETAILS OF THE ENERGY METERS

Manifold Agricrops Pvt. Ltd.

Type of meter	Main Meter	Check Meter
Installed at	GSS Akal	GSS Akal
Accuracy class	0.2s	0.2s
Meter Sr. No.	RJB 78210	RJB 78212
Meter Make	Secure	Secure
Model	R3M021-436	R3M021-436

Calibration Details	Main Meter	Check Meter
Previous Calibration	31-Mar-13	31-Mar-13
Calibration (2014)	9-Oct-14	9-Oct-14
Calibration (2015)	28-Dec-15	28-Dec-15
Calibration (2017)	16-Mar-17	16-Mar-17
Due date of calibration**	15-Mar-20	15-Mar-20

Parmarth Wind Energy Pvt. Ltd.

Type of meter	Main Meter	Check Meter
Installed at	Bambawade S/Stn	Bambawade S/Stn
Accuracy class	0.2s	0.2s
Meter Sr. No.	13769361	16595547
Meter Make	Elster	Elster

Model	Alpha A 1800	Alpha A 1800
Calibration Details	Main Meter	Check Meter
Previous Calibration	29-Mar-14	29-Mar-14
Current Calibration	9-Mar-15	9-Mar-15
Due date calibration**	8-Mar-18	8-Mar-18

Delay in meter Calibration has been identified in Parmarth Wind Energy Pvt. Ltd during the current monitoring period. PP would like to clarify that the calibration is not under the direct control or purview of the Project Participant (PP) and is performed by the state govt. authority / DISCOM, which is the authorized body for energy meter testing. The meters are tested, sealed and maintained by DISCOM officials only in the presence of authorized representative of the PP who also signs the results. As per CEA order⁴ para 18 b “all energy meter shall be tested once in five years.” Therefore, sometimes meter calibrations may not done within the three years of specified period. However, PP has followed conservative approach and hence, an error factor equating the maximum permissible limit (0.2%) of error for the meters has been applied for the delayed period to the monthly electricity export to the grid and electricity import from the grid during the monitoring period from Mar-18 to Feb-20.

Sidhidata Solar Urja Ltd.

Type of meter	Main Meter	Check Meter
Installed at	SPD Site (Plant)	SPD Site (Plant)
Accuracy class	0.2s	0.2s
Meter Sr. No.	13194928	13194929
Meter Make	Larsen & Toubro	Larsen & Toubro
Model	ER300P	ER300P

Calibration Details	Main Meter	Check Meter
Previous Calibration	11-Aug-14	11-Aug-14
Calibration (2015)	7-Aug-15	7-Aug-15
Calibration (2016)	13-Aug-16	13-Aug-16
Calibration (2017)	23-Sep-17	23-Sep-17
Due date calibration**	22-Sep-20	22-Sep-20

Sidhidata Power LLP

At the time of commissioning

Type of meter	Main Meter	Check Meter
Installed at	Jath S/Stn	Jath S/Stn
Accuracy class	0.2s	0.2s
Meter Sr. No.	15687855	15687856
Meter Make	Elster	Elster

Calibration Details	Main Meter	Check Meter
Installation Date	31-Mar-14	31-Mar-14

During the monitoring Period:

⁴ https://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf

Type of meter	Main Meter	Check Meter
Installed at	Shedyal S/Stn	Shedyal S/Stn
Accuracy class	0.2s	0.2s
Meter Sr. No.*	HT01140157 (Feeder No. 4) HT01131245 (Feeder No. 5)	HT01140158 (Feeder No. 4) HT01131246 (Feeder No. 5)
Meter Make	EDMI	EDMI

Calibration Details	Main Meter	Check Meter
Calibration Date (2015)	8-Oct-15	8-Oct-15
Calibration (2017)	6-Nov-17	6-Nov-17
Due date calibration**	5-Nov-20	5-Nov-20