

MRMPL WIND POWER PROJECT



Document Prepared by Infinite Solutions

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TABLE OF CONTENTS

1 Project Details 3

1.1 Summary Description of the Implementation Status of the Project 3

1.2 Sectoral Scope and Project Type 3

1.3 Project Proponent 3

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 Other Programs 6

1.10 Sustainable Development 6

2 Implementation Status 7

2.1 Implementation Status of the Project Activity 7

2.2 Deviations 7

2.2.1 Methodology Deviations 7

2.2.2 Project Description Deviations 7

2.3 Grouped Project 7

2.4 Safeguards 7

2.4.1 No Net Harm 8

2.4.2 Local Stakeholder Consultation 8

3 Data and Parameters 8

3.1 Data and Parameters Available at Validation 8

3.2 Data and Parameters Monitored 10

3.3 Monitoring Plan 12

4 Quantification of GHG Emission Reductions and Removals 14

4.1 Baseline Emissions 14

4.2 Project Emissions 15

4.3 Leakage 15

4.4 Net GHG Emission Reductions and Removals 15

1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The project sponsor is Modern Road Makers Pvt. Ltd. (herein referred to as MRMPL). It is a subsidiary of IRB Infrastructure Developers Limited (IRBIDL). It is involved in the construction, operation and maintenance of roads through various infrastructure projects in the road sector and is one of the major road developers in India.

The project is the generation of electricity from wind power by installation of 16 Wind Turbine Generators (WTG) at Jaisalmer, Rajasthan. Each WTG has an installed capacity of 1.25 MW. The total installed capacity of the project is 20 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 “Jodhpur Vidyut Vitran Nigam Limited” (JVVNL) to export the electricity to local grid.

The project displaces electricity from the grid (North East West North East (NEWNE) grid, India). This helps in significant reduction of GHG emissions as the NEWNE Grid is mostly dependent on fossil fuel generated electricity. The estimated annual emission reduction is 32,788 tCO_{2e} per year.

The project is registered with UNFCCC CDM (UN ref. no. 3839) on 27/11/2010 with crediting period 27/11/2010 to 26/11/2020.

The monitoring period is from 01st May 2012 to 30th April 2018. The total GHG emission reductions or removals generated in this monitoring period are 129,672 tCO₂.

1.2 Sectoral Scope and Project Type

Project type: Renewable energy projects

Sectoral Scope: 1- Energy Industries (renewable/non-renewable sources).

Project Type : I - Renewable Energy Projects

Methodology : ACM0002: Grid-connected electricity generation from renewable sources - Version 10

(The project is registered with CDM against applied version 10 of Methodology ACM0002)

The project is not a grouped project activity.

1.3 Project Proponent

Organization name	Modern Road Makers Pvt Ltd.
Contact person	A. D. Yadav
Title	Chief Financial Officer
Address	A – 201, Universal Business Pard, 2 nd Floor, Kamani Oil Mill Road, Chandivli Estate, Andheri (East)
Telephone	+91 22 6733 5959

Email	info@irb.co.in
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1.4 Other Entities Involved in the Project

Organization name	Infinite Solutions
Role in the project	Project Consultant
Contact person	Jimmy Sah
Title	Head – Sustainability
Address	611, Chetak Centre Main, 12/2 RNT Marg Indore
Telephone	+91-96441-30430
Email	jimmy@infisolutions.org

1.5 Project Start Date

Project Start Date: 28-September-2008

The project start date is the date on which first 5 MW of the project was commissioned.

1.6 Project Crediting Period

Crediting Period Start date: 01-May-2012

Crediting Period End date: 30-April-2022

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

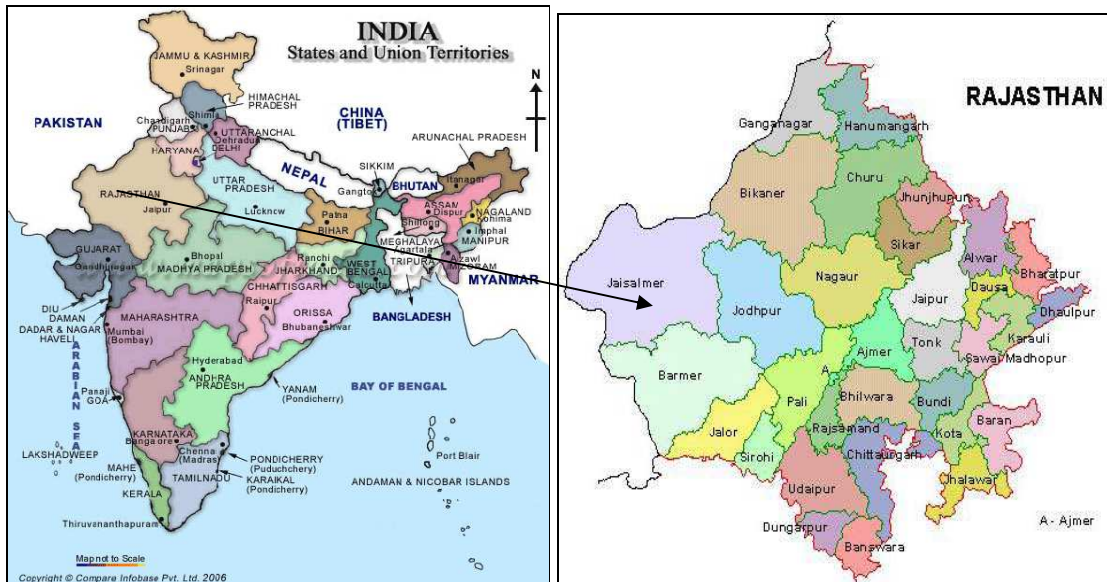
1.7 Project Location

The project activity is located at villages Mudari, Ganesh ki Dhani, Dhava and Dedha in the district of Jaisalmer, Rajasthan. The nearest railway station and airport to reach the site is the town of Jaisalmer located approximately 30 kms from the project site. The coordinates of the WTGs have been tabled below:

Sr No.	Location No.	Latitude	Longitude
1	R060	N 260 48' 45.8"	E 700 44' 16.3"
2	R061	N 260 48' 36.8"	E 700 44' 26.1"

3	R078	N 260 49' 15.4"	E 700 51' 35.4"
4	R007	N 260 48' 58.4"	E 700 51' 37.2"
5	R008	N 260 48' 41.7"	E 700 51' 39.4"
6	R063	N 260 48' 54.6"	E 700 43' 33.2"
7	R064	N 260 48' 45.1"	E 700 43' 43.5"
8	R069	N 260 48' 36.8"	E 700 43' 23.5"
9	R070	N 260 48' 27.3"	E 700 43' 33.8"
10	R071	N 260 48' 17.7"	E 700 43' 44.2"
11	R072	N 260 48' 08.2"	E 700 43' 54.5"
12	R073	N 260 47' 58.6"	E 700 44' 04.9"
13	R074	N 260 47' 49.1"	E 700 44' 15.2"
14	R016	N 260 49' 21.4"	E 700 49' 30.9"
15	R062	N 260 48' 25.3"	E 700 44' 37.1"
16	R067	N 260 48' 00.3"	E 700 44' 34.7"

The map of the project location is shown below:



1.8 Title and Reference of Methodology

ACM0002: Grid-connected electricity generation from renewable sources - Version 10

1.9 Other Programs

Include the following information, as applicable:

- Emission Trading Programs and Other Binding Limits:

The project is registered under CDM mechanism, project id 3839. Project Proponent has submitted undertaking that they will not claim same emission reductions of the project from CDM and VCS for the same monitoring period.

The emission reductions from the VCS monitoring period would not be used for compliance with emission trading program to meet binding limits on GHG emissions.

- Other Forms of Environmental Credit: The Project is registered with as CDM project, no. 3839. The Project Proponent has submitted undertaking for not availing other forms of environmental credit for the same monitoring period under consideration.
- Participation under Other GHG Programs: The project is registered under CDM mechanism, project id 3839. Project Proponent has submitted undertaking that they will not claim same emission reductions of the project from CDM and VCS for the same monitoring period.
- The project has undergone CDM verification till 30-04-2012, the current monitoring period is from 01/05/2012 to 31/05/2018. The Project Proponent has submitted undertaking for not availing other forms of environmental credit as well participation in other GHG programs for the same monitoring period under consideration under any other mechanism.

1.10 Sustainable Development

The project proponent has considered the sustainable development of the region due to the project activity. Ministry of Environment and Forests, Govt. of India has stipulated the following indicators for sustainable development in the interim approval guidelines for CDM projects:

Social well-being:

- The project activity contributes towards local socio-economic development around its area of operation through provision of employment opportunities (direct and indirect) for local population.
- It contributes towards improving the India's power deficit situation by contributing to the power grid and making power accessible to more people.

Environmental well-being:

- The project activity causes sustenance and improvement in regional air quality by avoiding commonly used fossil fuels for power generation. It thereby, also, results in maintenance of the ecosystem and human health due to avoidance in the use of GHG emissive fuels such as coal.

- It also leads to conservation of natural resources such as coal, oil etc.

Economic well-being:

- By providing employment opportunities, this project activity leads to development in the local economy.
- Through bringing in revenue to India through CDM process, it demonstrates how certain real and perceived financial barriers can be overcome for implementing clean energy measures.

Technological well-being:

- The successful implementation of the project activity will result in encouraging the use of cleaner technology. This will lead to replacement of the non-eco-friendly sources of power generation like thermal energy which are the major sources of power in the country.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

The implementation status of the project activity is as follows;

- The project is the generation of electricity from wind power by installation of 16 Wind Turbine Generators (WTG) at Jaisalmer, Rajasthan. Each WTG has an installed capacity of 1.25 MW. The total installed capacity of the project is 20 MW. The project has been operational except for minor breakdowns. There are no such events that would impact the emission reductions.
- The project is not an AFOLU project. Where applicable, describe how leakage and non-permanence risk factors are being monitored and managed for AFOLU projects.
- No other changes are observed for the project activity.

2.2 Deviations

2.2.1 Methodology Deviations

The project activity does not involve any methodology deviations.

2.2.2 Project Description Deviations

The project activity does not involve any methodology deviations.

2.3 Grouped Project

The project is not a grouped project.

2.4 Safeguards

2.4.1 No Net Harm

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

2.4.2 Local Stakeholder Consultation

Discussions with Local stakeholders are being carried out at periodic intervals.

There are no negative comments received for the project. In line with VCS requirements the following process has been implemented to receive comments from local stakeholders as well as communicate with them at periodic intervals.

Methods	Details
Communication Book or Register	<p>Communication Register is maintained at Admin office at project site office.</p> <p>Any comments/inputs/grievance received shall be processed in line with procedure.</p>
Telephone access Internet/email access	<p>Mr. Anil Yadav Mobile number +91 22 6733 5959 Email Id: Anil.Yadav@irb.co.in</p> <p>An employee of the company is responsible for handling any stakeholder's comment.</p> <p>The comments mentioned shall be recorded in the Communication register and shall be processed in line with procedure.</p>

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data / Parameter	EF _{Grid,OM,y}
Data unit	tCO2/MWh
Description	Weighted Average Simple Operating margin of the grid
Source of data	Central Electricity Authority database (Version 4.0)
Value applied:	1.0086
Justification of choice of data or description of	The value has been sourced from Central Electricity Authority database (Version 4.0)

measurement methods and procedures applied	
Purpose of the data	The value has been used form the Central Electricity Authority (CEA) database (Version 4.0, dated 1st September 2008) for the calculation of the Baseline emissions
Comments	-

Data / Parameter	EF_{Grid,BM,y}
Data unit	tCO2/MWh
Description	Build Margin of the grid.
Source of data	Central Electricity Authority database (Version 4.0)
Value applied:	0.5977
Justification of choice of data or description of measurement methods and procedures applied	The value has been sourced from Central Electricity Authority database (Version 4.0)
Purpose of the data	The value has been used form the Central Electricity Authority (CEA) database (Version 4.0, dated 1st September 2008) for the calculation of the Baseline emissions.
Comments	-

Data / Parameter	EF_{Grid,CM,y}
Data unit	tCO2/MWh
Description	Combined Margin emission factor of the grid
Source of data	Central Electricity Authority database (Version 4.0)
Value applied:	0.9058
Justification of choice of data or description of measurement methods and procedures applied	The value has been sourced from Central Electricity Authority database (Version 4.0)

Purpose of the data	This value is used for the calculation of the Baseline emissions
Comments	-

3.2 Data and Parameters Monitored

Data / Parameter	EG _y
Data unit	MWh
Description	Total electricity exported to grid
Source of data	Credit notes from the state electricity utility
Description of measurement methods and procedures to be applied	Responsibility: The O&M site-in-charge shall be responsible for the regular recording of data.
Frequency of monitoring/recording	Monthly
Value monitored:	143,754.602
Monitoring equipment	Monitoring: Electrical Energy Meters which are electronic tri-vector meters of accuracy class 0.2s (Main & Check meters) Data type: Measured & Calculated Archiving: Paper & Electronic
QA/QC procedures to be applied	Meter calibration shall be conducted annually for the meters; Details of Main Meter: <ul style="list-style-type: none"> • Meter No: RJB00316 • Accuracy: 0.2 Details of Check Meter: <ul style="list-style-type: none"> • Meter No: RJB00317 • Accuracy: 0.2 The calibration has been conducted by third party NABL accredited lab.
Purpose of the data	Calculation of baseline emissions

Calculation method	The calculation procedure is detailed under section 4.3 above
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	ECy
Data unit	MWh
Description	Total Electricity Import from Grid
Source of data	Credit Notes from the state electricity utility
Description of measurement methods and procedures to be applied	<p>Monitoring: Electrical Energy Meters which are electronic tri-vector meters of accuracy class 0.2 (Main & check meters)</p> <p>Data type: Measured and calculated</p> <p>Archiving: Paper and Electronic</p> <p>Recording Frequency: Daily</p> <p>Responsibility: The O&M site-in-charge is responsible for the regular recording of data.</p>
Frequency of monitoring/recording	Daily
Value monitored:	593.074
Monitoring equipment	Electrical Energy Meters which are electronic tri-vector meters of accuracy class 0.2 (Main & check meters)
QA/QC procedures to be applied	<p>Meter calibration shall be conducted annually for the meters;</p> <p>Details of Main Meter:</p> <ul style="list-style-type: none"> • Meter No: RJB00316 • Accuracy: 0.2 <p>Details of Check Meter:</p> <ul style="list-style-type: none"> • Meter No: RJB00317 • Accuracy: 0.2 <p>The calibration has been conducted annually by Rajasthan Rajya Vidhyut Prasaran Nigam Ltd. a government agency authorized for calibration in the state.</p>

Purpose of the data	Calculation of baseline emissions
Calculation method	As described in section 2.1 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 CERs for this project activity, whichever occurs later.

The calibration frequency is annual and the details are as follows;

Meter no.	Type	Class	2012	2012	2013	2014
RJB00316	Main	0.2	14-04-2012	22-12-2012	13-12-2013	12-10-2014
RJB00317	Backup	0.2	14-04-2012	22-12-2012	13-12-2013	10-12-2014

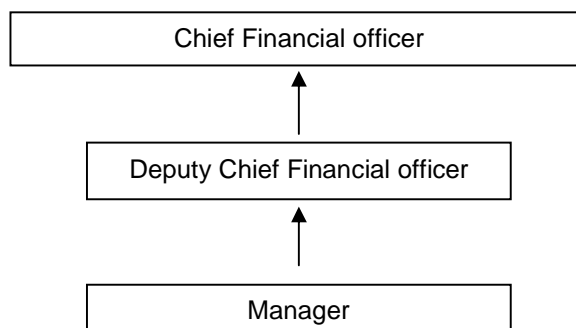
Meter no.	Type	Class	2015	2016	2017	Due date
RJB00316	Main	0.2	25-11-2015	22-11-2016	20-11-2017	19-11-2018
RJB00317	Backup	0.2	25-11-2015	22-11-2016	20-11-2017	19-11-2018

3.3 Monitoring Plan

Monitoring Process at Rajasthan

Project participant has implemented 20 MW Wind energy power generation project. Power generation using renewable energy like wind power is eligible for carbon credit benefits. Following is a monitoring plan for project activity:

Organizational Structure:



Responsibility:

Analysis of power generation reports, performance report and monthly meter reading is handled by project proponents on regular basis. The data collection on daily basis is done by O&M team contracted by project proponent. An automated generation report is sent to the manager. The manager maintains the generation reports.

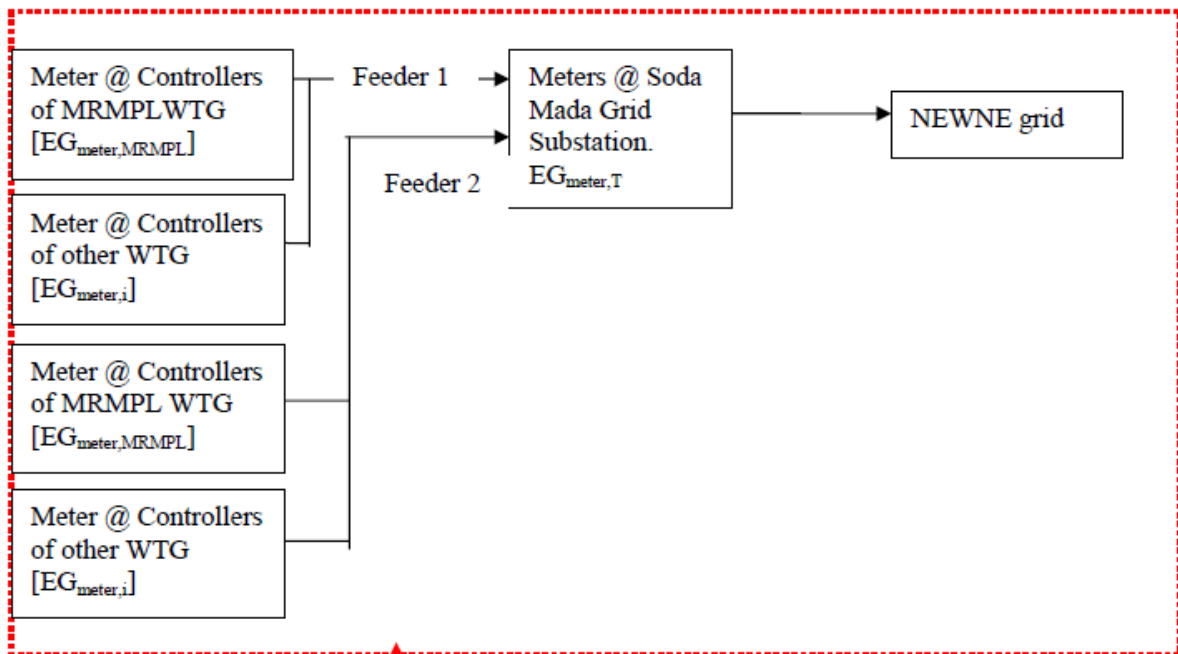
The Deputy chief Financial officer is assisted by the manager on the project. He is responsible to plan and allocate the annual budget for operation, estimation of the likely operating cost, electricity dispatch, organizing third party contractors, revenue collection etc. The deputy CFO reports to the chief financial officer who is responsible for the overall project management.

O&M team is responsible for preventive maintenance, handling emergency situations and improvement measures. O&M team ensures that joint monthly reading, issuance of credit notes and meter testing on regular basis.

Data Monitoring:

The delivered energy is metered by the authorities of JVVNL in the presence of representatives of the technology supplier at the substation at Soda Mada. Metering equipment used is electronic tri-vector meters. The metering equipment is maintained in accordance with electricity standards. The monthly meter readings at the project sites (controller reading) and the receiving station are taken simultaneously and jointly by the parties. The controller readings of the Wind mills are also recorded by the technology supplier by a Central Monitoring system installed at the wind site. Daily and monthly generation reports are sent to MRMPL.

The single line diagram for the metering may be represented as follows:



All the Main and Check meters are tested for accuracy annually with reference to a portable standard meter. As the instruments are calibrated and marked at regular intervals, the accuracy of measurement can be assured at all times. To ensure accurate and continuous monitoring, MRMPL has a standby meter, calibrated by an authorized agency.

The allocation of electricity is executed as per the following procedure:

1. Enter the value of electricity received from meter at the controller (kWh).
2. Enter the value of electricity supplied to meter at the controller (kWh).
3. Take the difference of electricity received and supplied to meter at the controller (kWh)
4. Take the difference of electricity as per the above steps 1 to 3 for each of the WTGs (of owner i) connected to the feeder of the MRMPL WTG. [EG_{meter,i}]
5. Take the sum of all the controller readings as calculated in Step 4. [Σ EG_{meter,i}]
6. Divide individual difference by total calculated as per step 5 and multiply by 100 to find % allocation for each of the WTG of MRMPL. [EG_{meter MRMPL} / Σ EG_{meter,i}) x 100]
7. Enter the value of electricity received from the feeder at the substation (kWh).
8. Enter the value of electricity supplied to the feeder at the substation (kWh).
9. Take the difference of electricity received and supply to meter at the substation. (kWh) [EG_{meter,T}]
10. Multiply the value calculated as per step 9 by % allocation calculated as per step 6 to calculate the net electricity export allocated to the WTGs of MRMPL connected to the feeder. [EG_{net,MRMPL}, i.e., E_{Gy} and E_{Cy}]

The project owner uses the credit notes sent by state electricity board for respective the WTGs at different locations. The cumulative power supplied to grids is tabulated and multiplied by respective Grid Emission Factor to calculate number of VER

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Baseline emissions are calculated by multiplying the Net electricity exported to the grid with net baseline emission factor, as per the CDM approved methodology.

$BE_y = \text{Baseline Emission Factor (EF}_{\text{grid, CM, y}}) \times \text{Net electricity supplied to Regional Grid (EG}_{\text{facility,y}})$

Where,

BE_y = Baseline Emissions (tons/year)

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

$EF_{\text{grid, CM, }y}$ = 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” (tCO₂/MWh)

The Baseline emission factor is calculated in the registered CDM PDD as per “**Tool to calculate the emission factor for an electricity system**”, **Version 02, EB 50**.

Thus, as per the CDM PDD, the calculated Baseline emission factor is;

$EF_{\text{grid, CM, }y} = 0.9058 \text{ tCO}_2/\text{MWh}$

The Baseline Emission Factor is fixed.

The net export from the project activity is 143,162 MWh. Hence the baseline emissions are calculated (rounded down value in yearly basis) as below:

$$\begin{aligned} \text{Baseline Emissions (BE}_y) &= 0.9058 * 143,162 \\ &= 129,672 \text{ tCO}_2 \end{aligned}$$

4.2 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, $PE_y = 0$.

4.3 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. Hence, $LE_y = 0$

4.4 Net GHG Emission Reductions and Removals

The emission reductions are calculated as per the equation:

$$ER = BE_y - PE_y - LE_y$$

ER – Emission Reduction (tCO₂/year)

BE_y - Baseline Emissions (tCO₂/year)

PE_y – Project Emissions (tCO₂/year)

LE_y - Leakage Emissions (tCO₂/year)

ER = BE_y – PE_y – LE_y

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)
2012	20,326	-	-	20,326
2013	21,507	-	-	21,507
2014	21,340	-	-	21,340
2015	18,328	-	-	18,328
2016	22,317	-	-	22,317
2017	21,473	-	-	21,473
2018	4,381	-	-	4,381
Total	129,672	0	0	129,672

Further, the comparison for estimated emission reductions as per validated VCS PD and actual observed are detailed below. The emission reductions are lower than the estimated value.

Parameters	tCO ₂ e
Annual Emission Reduction as per registered PDD and VCS PD	32,788
Emission Reductions for the monitoring period as per registered PDD (2191 days)/ Joint PD & MR	196,818
Emission reductions achieved in monitoring period	129,672
Percentage of variation when compared with estimated ERs in CDM PDD/ Joint PD & MR	-34.12 %