

CECIC HKE Zhangbei Lvnaobao Wind Power Project

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Monitoring Period	01-09-2015 to 27-10-2017
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1 Project Details

1.1 Summary Description of the Implementation Status of the Project

CECIC HKE Zhangbei Lvnaobao Wind Power Project (hereafter referred as “the Project”) is a Greenfield grid-connected wind power project. The project is invested, constructed and operated by CECIC HKE Wind Power Co., Ltd. The total installed capacity of the project is 100.5MW equipped with 67 sets of wind turbines with a unit installed capacity of 1,500kW. The project has been registered as a CDM project on 28/10/2010 (No. 3399). The project has been registered as a VCS project (No. 727).

The objective of the project is to generate electricity by using wind resource and deliver the generated electricity to North China Power Grid (NCPG) via a 220 KV transmission line. As a renewable energy source, the project generates emission reductions by avoiding CO₂ emissions from the same amount of electricity generation from NCPG, which is mainly dominated by fossil fuel-fired power plants. The project contributes to annual GHG reductions estimated at 254,960tCO₂e.

Relevant dates for the project are as follows:

The construction of the project started on 30/03/2008, the first wind turbine of the project has been put into operation on 26/07/2010 and the commissioning time of all 67 wind turbines was 24/09/2010. The date of CDM registration date is 28/10/2010, and the CDM crediting period (renewable) is 28/10/2010 – 27/10/2017.

During the monitoring period (from 01/09/2015 to 27/10/2017), the monitoring activities were conducted strictly in accordance with the monitoring plan in the registered PDD. The project has operated without any accidental or emergency events that might impact the accuracy and/or implementation of monitoring activities. The net feed-in electricity during this period is 454,140.555MWh, and the emission reduction achieved by the project in this monitoring period is 479,049tCO₂e. The emission reductions in the monitoring period will be verified and issued under VCS rules.

1.2 Sectoral Scope and Project Type

This category would fall within sectoral scope 1: energy industries (Renewable sources).

Project type: wind power project.

1.3 Project Proponent

Organization name	CECIC HKE Wind Power Co., Ltd.
Contact person	Teng Haipeng
Title	Project manager

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1.4 Other Entities Involved in the Project

N/A

1.5 Project Start Date

26/07/2010. (It is the date when the first turbine was commissioned.)

1.6 Project Crediting Period

Renewable crediting period (7yrs×3) is adopted by the project, so the first 7-year renewable crediting period is from 28/10/2010 to 27/10/2017.

1.7 Project Location

The Project is located at Zhangbei County, Zhangjiakou City, Hebei Province, P.R.China. The Project has geographical coordinates with North Latitude of 41°03'50", East Longitude of 114°32'30".

1.8 Title and Reference of Methodology

Approved consolidated baseline and monitoring methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (Version 10).

1.9 Other Programs

Emission Trading Programs and Other Binding Limits:

The project has been registered as a CDM project on 28/10/2010, for which a renewable crediting period of 3×7 years will be used under the CDM GHG Program. The project proponent confirmed that, once emission reductions generated from 01/09/2015 to 27/10/2017 are issued under VCS rules, those credits will not be claimed as CERs and will be claimed as zero in the possible future CER monitoring report. And issued VCUs will be sold only once to one particular buyer.

Once the project proponent are included in an emissions trading program or any other mechanism that includes GHG allowance trading, the VCU issuance under VCS rules will be stop immediately since the date of included in an emissions trading program or any other mechanism that includes GHG allowance trading.

Other Forms of Environmental Credit:

The Project is a renewable energy generation project, which discharges no emission during operation period. Thus, the project doesn't fall into categories that creating GHG emissions primarily for the purpose of its subsequent removal or destruction.

The Project has not created another form of environmental credit, which will be verified by DOE. And the Project will not create other environmental credit in the future.

Participation under Other GHG Programs:

The Project has been registered as a VCS project with registration number 727.

The Project has been registered as a CDM project with registration number 3399.

1.10 Sustainable Development

The Project promotes sustainable development through the following aspects:

Reduce greenhouse gas emissions compared to the business-as-usual scenario;

Help to stimulate the growth of the wind power industry in China;

Reduce the emission of other pollutants resulting from the power generation industry in China, compared to a business-as-usual scenario;

Create local employment opportunities during the construction and operation of the Project;

Stimulate the development of local tourism industry.

2 Implementation Status

2.1 Implementation Status of the Project Activity

The project is a greenfield grid-connected wind power project. The total installed capacity of the project is 100.5MW equipped with 67 sets of wind turbines with a unit installed capacity of 1.5MW. Electricity generated by the project is delivered to NCPG via a 220 KV transmission line.

Construction of the project was started on 30/03/2008. The date of first wind turbine started operation was 26/07/2010. And the date of all wind turbine started full operation was 24/09/2010.

Major technical parameters of the key equipments employed by the project are illustrated in the following table.

Table 1. Key technical parameters of turbines in the project

Key Technology Parameter	FD77B
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Rated power (kW)	1500
Number of Blades	3
Rotor diameter (m)	77
Swept area(m2)	4657
Rated Rotational speed (rpm)	9.6-17.3
Cut-in wind speed (m/s)	3
Rated wind speed (m/s)	12.5
Cut-out wind speed (m/s)	20
Hub height of the wind turbines (m)	70
Capacity (kW)	1500
Rated Voltage (V)	690

During this monitoring period from 01/09/2015 – 27/10/2017, the project has a normal operation with the actual annual emission reductions of 222,177 tCO₂e, which is 12.86% less than the estimated value in the registered PDD. The project has smooth data transfer and grid connection as per the registered CDM-PDD without any emergencies or special events, which might impact the applicability of the chosen methodology.

2.2 Deviations

2.2.1 Methodology Deviations

There is no deviation applied to this monitoring period.

2.2.2 Project Description Deviations

There is no deviation applied to this monitoring period.

2.3 Grouped Project

The Project is not a grouped project.

2.4 Safeguards

2.4.1 No Net Harm

On 19/11/2007, the Environmental Protection Bureau of Hebei Province approved the Environmental Impact Assessment (EIA) of the Project. The summary of EIA are shown as above:

1. The analysis of the environment impact during the construction period

- Dust: Since the local residential area is at least 500m away from the wind farm site, the impact of construction dust to the local region is limited. Several measures will be implemented to reduce the impact of dust on local residents and the construction staff, including watering and earthwork covering.
- Noise: Construction machines, transportation vehicles and construction work will generate noise. However, the noise levels are within acceptable levels at the nearest habitation, which is 500m away from the project site. Furthermore, using machinery and equipments with low noise levels, and arranging the construction times during day time, reduces the impact to the environment significantly.
- Solid waste: The solid wastes from the construction include waste soil and stone and construction wastes, as well as some waste from human life. All these wastes are collected and disposed properly to the landfill site of Zhangbei County.
- Waste water: The waste water will be generated from construction work and the project office. The total volume is small and it can be treated and re-used as watering or sprinkler.
- Ecosystem: After construction, the land temporally occupied by the Project will be recovered by grass, so as to recreate the original ecosystem. So the Project has little impact to the ecosystem.

2. The analysis of the environment impact during operation period

- Noise: The operating noise of these turbines ranges from 101 dB to 105dB. With at least 500 meters far from the turbines, where residential areas are located, the noise has been greatly weakened to about 37 db, dropping down below the national standard (No. GB 3096-93) of 45dB in night and 55 db in daytime. There are no effects on the local residential life from the operational noise.
- Waste: Solid waste and waste water will be produced by operation staff during operation period. The emitted waste quantity is very small and will cause no interference with the environment after proper treatment or integrated utilization.
- Impact on birds: The site of the Project is not the main habitat of migratory bird, and also not on the main line of bird migratory. Also the often-seen birds in this region are commonly with a small size and flexible in flying. They are easy to find the huge wind blades and avoid the hitting. So the Project will not bring obvious effects on birds.

3. Conclusion

Wind power is green power and the impact caused by wind farm on the surrounding ecosystem and residents, water, and atmosphere etc is very little. Therefore, the Project is feasible from aspect of environment protection.

2.4.2 Local Stakeholder Consultation

Local Stakeholder Consultation during the project preparation stage:

In 10/03/2008, consultations were carried out in the Zhangbei County by CECIC HKE Wind Power CO., LTD. The consultations, which included two parts, one is the discussions among local people with the developer and another, a questionnaire survey.

The developer introduced the background of the Project firstly according to the meeting schedule and respondents filled in a questionnaire, and then a discussion meeting is raised to get the comments and suggestions from local people.

- Project brief introduction
- Respondents' information on name, gender, education level etc.
- Questions on:

1. Is the environment quiet where you are living, working and studying?
2. Do you feel any impact on surrounding environment (air, noise & water) by the project construction?
3. Are there any adverse impacts on your and your family's life, work and study by the project construction? (if yes, please explain in the attached pages.)
4. Whether the completion of the Project will bring about positive impacts to you?
5. What is the issue that you are most concerned with during the construction and operation period of the Project? (Options: Noise, air pollution, equipment safety, waste water, electromagnetic interference, or landscape destroy)
6. Do you agree with the development & construction of the Project?
7. Do you think which environmental protection measures should be undertaken during the construction and operation period of the Project?
8. Do you have any further comment and suggestion about the Project?

The questionnaires were sent to 35 respondents and the survey had a 100% response rate. The statistical results of the questionnaire survey to the stakeholders are summarised as following:

Indicator	Total	Male	Female	Young (10-35)	Middle (35-55)	Elder (55-70)
Number of Respondents	35	26	9	11	18	6

Indicator	Below junior high school	Junior high school	Above junior high school	Student	Farmer	Worker	Officials
Number of Respondents	12	20	3	1	30	3	1

Questionnaire	Yes (Num.)	No (Num.)	Not clear (Num.)		
1. Is the environment quiet where you are living, working and studying?	33	1	1		
2. Do you feel any impact on surrounding environment (air, noise & water) by the project construction?	7	23	5		
3. Are there any adverse impacts on your whole family's life, work and study by the project construction?	1	29	5		
4. Whether the completion of the project will bring about positive impacts to you?	24	1	10		
5. Which issue you are most concerned with during the construction and operation period of the project?	(Multi options)				
Noise	Air Pollution	Equipment safety	Waste water discharge	Elec-magnetic wave disturb	Sight damage
16	7	18	0	4	16
6. Do you agree with the development & construction of the project?	31	0	4		

Most respondents (31/35) agree and support the development of the Project. Some respondents provide their concern in the section of Question 5 and descriptive questions on the possible negative impacts possible caused by the Project, including land occupation, grass and road destroy, noise of truck at night etc, which possibly occur at the period of construction and all of these were mentioned and designed to be solved in EIA report.

Conclusions of the meeting discussions:

With respect to local economic development, this wind farm project is expected to greatly promote the development of wind power in Hebei. Hopefully this project could also help drive the local economic growth and contribute much to local fiscal revenues. Wind electricity can provide “green energy” for the Hebei power grid and boost local sustainable development.

With respect to environmental protection, the environmental impact analysis (EIA) for this project shows that noise level associated with the operation of this wind-turbine can meet the permitted range of China’s national standard. As is known this project is geographically located far from the downtown of Zhangbei, apparently without the possibility of telecommunication signal jamming. In addition, no migratory bird is flying over this region.

With respect to local people’s life and employment, the project is basically without negative impact on the people’s daily life, but can be possible to employ some local farmers or herdsmen nearby. During the construction and operation of this project, the related purchases and consumptions could promote local business and trade, thus increasing local farmer’s income.

To sum up, the stakeholders are very supportive of this project and looking forward to the operation of the Project as early as possible. And the project owner will strengthen the communication with the stakeholders, and confirm the measurements given in the EIA report will be implemented totally to solve the issues the local people concern mostly, including land occupation, grass and road destroy, noise of truck at night etc at the construction period.

Local Stakeholder Consultation during the project implementation stage:

Communications 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.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data / Parameter	EF _{CM}
Data unit	tCO ₂ e/MWh
Description	Baseline emission factor: the combined emission factor of the project grid system. EF _{CM} was not directly available at validation but calculated based on other parameters in the PDD available at validation, therefore in the MR, only EF _{CM} is included and the rest of the parameters are either used to calculate EF _{CM} or not used in the MR.
Source of data	Registered PDD
Value applied:	1.05485
Justification of choice of data or description of measurement	Notification on 2008 baseline emission factors for regional power grids in China, issued by China on

methods and procedures applied	July18, 2008 and updated on Dec 30, 2008 and the registered PDD.
Purpose of the data	Baseline emission calculations.
Comments	The emission factor of the Project was ex-ante determined and is fixed during the first crediting period. All data and parameters had been determined at registration.

3.2 Data and Parameters Monitored

Data / Parameter	EG _{to grid,y}						
Data unit	MWh						
Description	Quantity of annual electricity exported to the grid by the Project.						
Source of data	Meter reading records of onsite main meter.						
Description of measurement methods and procedures to be applied	<p>Two sets of bi-direction ammeters are employed at the newly-built 220kV substation by the Project, one of which is for backup. The electricity delivered to the grid will be monitored through the bi-direction metering equipment.</p> <p>Monthly power exported to NCPG will be approved and signed off by monitoring and auditing staff before it is accepted and stored.</p>						
Frequency of monitoring/recording	Measuring continuously/Reading monthly.						
Value monitored:	455,764.430						
Monitoring equipment	Type	Serial No.	Accuracy	Calibration date	Validity of the Calibration	Calibration frequency	
	ACE8000	37006426 Main meter	0.2s	19/08/2015	18/08/2016	Annually	
				20/07/2016	19/07/2017	Annually	
				11/07/2017	10/07/2018	Annually	
	ACE8000	37006420 Backup meter	0.2s	19/08/2015	18/08/2016	Annually	
				20/07/2016	19/07/2017	Annually	
				11/07/2017	10/07/2018	Annually	
QA/QC procedures to be applied	<p>The meters will be calibrated according to the national rules. The calibration frequency is once a year.</p> <p>The project operator is responsible for recording such data. Crosscheck measurement results with electricity sales receipts.</p>						
Purpose of the data	Calculation of baseline emissions or baseline net GHG removals by sinks.						
Calculation method	-						

Comments	-
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Data / Parameter	EG _{fromgrid,y}						
Data unit	MWh						
Description	Quantity of annual electricity imported from the grid by the Project.						
Source of data	Meter reading records of onsite main meter.						
Description of measurement methods and procedures to be applied	<p>Two sets of bi-direction ammeters are employed at the newly-built 220kV substation by the Project, one of which is for backup. The electricity imported from the grid will be monitored through the bi-direction metering equipment.</p> <p>Monthly power imported from NCPG will be approved and signed off by monitoring and auditing staff before it is accepted and stored.</p>						
Frequency of monitoring/recording	Measuring continuously/Reading monthly.						
Value monitored:	1,623.875						
Monitoring equipment	Type	Serial No.	Accuracy	Calibration date	Validity of the Calibration	Calibration frequency	
	ACE8000	37006426 Main meter	0.2s	19/08/2015	18/08/2016	Annually	
				20/07/2016	19/07/2017	Annually	
				11/07/2017	10/07/2018	Annually	
	ACE8000	37006420 Backup meter	0.2s	19/08/2015	18/08/2016	Annually	
				20/07/2016	19/07/2017	Annually	
				11/07/2017	10/07/2018	Annually	
QA/QC procedures to be applied	<p>Monthly power exported and imported to the NCPG are cross-checked against sales receipts.</p> <p>The calibrations are done by a qualified organization once per year for the main meter and backup meter according to local industry standards.</p>						
Purpose of the data	Calculation of baseline emissions or baseline net GHG removals by sinks.						
Calculation method	-						
Comments	-						

Data / Parameter	EG _y
Data unit	MWh

Description	Net electricity supplied to the grid by the Project.					
Source of data	Meter reading records of onsite main meter.					
Description of measurement methods and procedures to be applied	$EG_y = EG_{to\text{grid},y} - EG_{from\text{grid},y}$ EG_y is electricity exported to the grid by the project ($EG_{to\text{grid},y}$) minus electricity imported from the grid by the project ($EG_{from\text{grid},y}$).					
Frequency of monitoring/recording	Measuring continuously/Reading monthly					
Value monitored:	454,140.555					
Monitoring equipment	Type	Serial No.	Accuracy	Calibration date	Validity of the Calibration	Calibration frequency
	ACE8000	37006426 Main meter	0.2s	19/08/2015	18/08/2016	Annually
				20/07/2016	19/07/2017	Annually
				11/07/2017	10/07/2018	Annually
	ACE8000	37006420 Backup meter	0.2s	19/08/2015	18/08/2016	Annually
				20/07/2016	19/07/2017	Annually
11/07/2017				10/07/2018	Annually	
QA/QC procedures to be applied	Monthly power exported and imported to the NCPG are cross-checked against sales receipts. The calibrations are done by a qualified organization once per year for the main meter and backup meter according to local industry standards.					
Purpose of the data	Calculation of baseline emissions or baseline net GHG removals by sinks.					
Calculation method	-					
Comments	-					

3.3 Monitoring Plan

The implementation of monitoring system and Management organization for the Project are fully in consistent with the description in the PDD Monitoring Plan.

1. Organizational structure and responsibilities

Overall responsibility for monitoring and carrying out the monitoring following this monitoring plan lies with CECIC HKE Wind Power Co., Ltd. The CDM Manager of the CECIC HKE Wind Power Co., Ltd is responsible for the monitoring and reporting of the generation and emission reductions of the project activity. The operating and management structure is illustrated as followed:

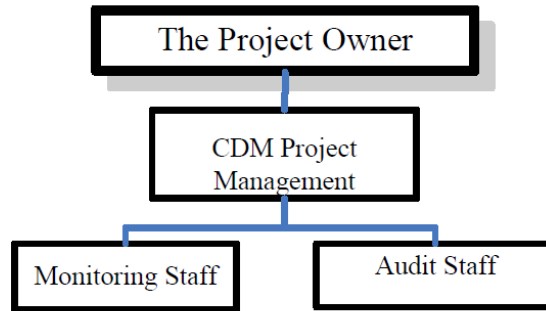
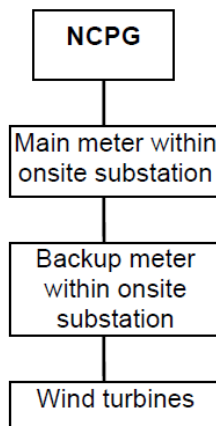


Figure2. Monitoring system organizations

2. Data collection and management

As described in the monitoring plan, the Project wind farm records reading monthly from the meter equipment within the project site.

The net electricity generation of the Project was monitored through the main bi-directional metering equipment installed at the high level of the onsite 220kV substation, recording exported to the grid by the Project ($EG_{to\text{grid},y}$) and imported from the grid by the Project ($EG_{from\text{grid},y}$). The meters reading are recorded monthly at the last day 24:00 each month. The net generation supplied is calculated as exports minus imports. The data was monitored continuously, and the results of reading was recorded and supplied to Zhangjiakou Electric Power Company monthly. The monitoring points shows below:



Designated personnel of the wind farm read and record the readings of the meters mentioned above monthly. The CDM manager of the Project wind farm checked out the reported data against with the sales receipts before archived.

All data including calibration records was kept until 2 years after the end of the total crediting period of the Project.

3. Emergency Procedures

If any errors are detected the party owning the meter shall repair, recalibrate or replace the meter giving the other party sufficient notice to allow a representative to attend during any corrective activity.

Should any previous month's reading of the main meter be inaccurate by more than the allowable error, or otherwise functioned improperly, the net generation output shall be determined by:

- (a) first, by reading backup meter, unless a test by either party reveals it is inaccurate;
- (b) if the backup system is not with acceptable limits of accuracy or operation is performed improperly, the project owner and the grid company shall jointly prepare a reasonable and conservative estimate of the correct reading, and provide sufficient evidence that this estimation is reasonable and conservative when DOE undertakes verification; and
- (c) if the two parties fail to agree then the matter will be referred for arbitration according to agreed procedures.

The Project is operated and implemented smoothly during this monitoring period. Neither emergencies happened to the monitoring system, nor did events or situations occur during the monitoring period.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

According to ACM0002 and the registered PDD of the Project, The baseline emission BE_y during the monitoring period results from:

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

$$EG_{PJ,y} = EG_{to\ grid,y} - EG_{from\ grid,y}$$

Where:

BE_y is the baseline emissions of the Project;

EF_{CM} is the combined margin baseline emission factor of the NCPG;

EG_y is the net electricity supplied to the grid by the Project;

EG_{to\ grid,y} is the quantity of electricity exported to the grid by the Project;

EG_{from\ grid,y} is the quantity of electricity imported from the grid by the Project.

The monthly electricity data is listed in following table 2:

Table2. Calculation of the net electricity supplied to the grid by the Project

Period	Electricity exported to the grid by the Project $EG_{\text{to grid},y}$ (MWh)	Electricity imported from the grid by the Project $EG_{\text{from grid},y}$ (MWh)	Net electricity supplied to the grid by the Project EG_y (MWh)
	A	B	$EG_{\text{to grid},y}$ minus $EG_{\text{from grid},y}$ $C=A-B$
01/09/2015-30/09/2015	5,109.775	44.000	5,065.775
01/10/2015-30/11/2015	21,848.475	36.575	21,811.900
01/11/2015-30/11/2015	10,553.125	92.950	10,460.175
01/12/2015-31/12/2015	22,451.469	64.900	22,386.569
Total from 01/09/2015 to 31/12/2015	59,962.844	238.425	59,724.419
01/01/2016-31/01/2016	21,392.397	12.375	21,380.022
01/02/2016-29/02/2016	22,690.473	82.775	22,607.698
01/03/2016-31/03/2016	20,737.004	27.500	20,709.504
01/04/2016-30/04/2016	24,577.052	35.475	24,541.577
01/05/2016-31/05/2016	27,207.227	24.475	27,182.752
01/06/2016-30/06/2016	14,248.872	50.875	14,197.997
01/07/2016-31/07/2016	12,999.465	64.350	12,935.115
01/08/2016-31/08/2016	9,373.874	101.475	9,272.399
01/09/2016-30/09/2016	12,152.595	99.550	12,053.045
01/10/2016-31/10/2016	17,887.839	35.475	17,852.364
01/11/2016-30/11/2016	22,813.005	10.725	22,802.280
01/12/2016-31/12/2016	19,846.459	69.850	19,776.609
Total in 2016	225,926.262	614.900	225,311.362
01/01/2017-31/01/2017	20,571.432	40.150	20,531.282
01/02/2017-28/02/2017	21,339.999	31.625	21,308.374
01/03/2017-31/03/2017	19,340.600	54.450	19,286.150
01/04/2017-30/04/2017	24,033.459	29.700	24,003.759
01/05/2017-31/05/2017	19,588.323	75.350	19,512.973
01/06/2017-30/06/2017	12,567.939	135.575	12,432.364
01/07/2017-31/07/2017	10,433.365	134.475	10,298.890
01/08/2017-31/08/2017	14,782.044	108.075	14,673.969
01/09/2017-30/09/2017	15,447.338	60.225	15,387.113
01/10/2017-27/10/2017	11,770.825	100.925	11,699.900
Total from 01/01/2017 to	169,875.324	770.550	169,104.774

27/10/2017			
Total	455,764.430	1,623.875	454,140.555

Year	EG _{togrid,y} (MWh)	EG _{fromgrid,y} (MWh)	EG _y (MWh)
01/09/2015-31/12/2015	59,962.844	238.425	59,724.419
01/01/2016-31/12/2016	225,926.262	614.900	225,311.362
01/01/2017-27/10/2017	169,875.324	770.550	169,104.774
Total	455,764.430	1,623.875	454,140.555

Year	EG _y (MWh)	EF _{CM}	BE _y (tCO ₂ e)
01/09/2015-31/12/2015	59,724.419	1.05485	63,000
01/01/2016-31/12/2016	225,311.362	1.05485	237,669
01/01/2017-27/10/2017	169,104.774	1.05485	178,380
Total	454,140.555		479,049

4.2 Project Emissions

Project emission (PE_y) is 0 tCO₂e as per the registered PDD.

4.3 Leakage

No leakage emissions are considered as per the applied methodology ACM0002 version 10 and the registered PDD.

4.4 Net GHG Emission Reductions and Removals

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)
01/09/2015-31/12/2015	63,000	0	0	63,000

01/01/2016- 31/12/2016	237,669	0	0	237,669
01/01/2017- 27/10/2017	178,380	0	0	178,380
Total	479,049			479,049

The estimated annual emission reductions are 254,960tCO₂e as per registered PDD. The monitoring period covers 787 days. The estimated emission reductions during this monitoring period are $254,960/365 \times 787 = 549,736$ tCO₂e. The actual emission reductions in this period are, 479,049 tCO₂e, which are 12.86% less than the estimated value.