



**Verified Carbon
Standard**

XINJIANG JIMUNAI CGN PHASE I WIND FARM PROJECT



Document Prepared by Climate Bridge (Shanghai) Ltd.

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Project Title	Xinjiang Jimunai CGN Phase I Wind Farm Project
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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The Xinjiang Jimunai CGN Phase I Wind Farm Project (hereinafter referred to the project) is to utilize wind resources for electricity generation through the construction of a wind farm with the installation of 33 wind turbines with capacities of 1,500 kW each, which amount to a total installed capacity of 49.5 MW in Jimunai County, Xinjiang Uygur Autonomous Region, P.R. China. The electricity generated from the Project is sold to Xinjiang Uygur Power Grid, an integral part of the Northwest China Power Grid (NWPG). By replacing the electricity generated from fossil fuel-fired power plants dominated NWPG. The Project achieves greenhouse gas (GHG) emission reductions by avoiding CO₂ emissions. The estimated annual net electricity output and emission reductions of the project are 117,315 MWh and 107,695 tCO₂e, respectively.

The Project started construction on 25/07/2010, and the first wind turbine was put into operation on 19/03/2011, and all wind turbines were put into operation on 23/03/2011. The expected operation period of the Project is 20 years as stated in the registered VCS PD Version 01 dated 20/11/2013 and registered CDM PDD Version 3 dated 19/08/2011. The first renewable crediting period of the project updated from 19/03/2011- 27/10/2011 to 19/03/2011-18/03/2021.

The project has been registered as VCS project with Ref. VCS1183 and VCU of 61,417tCO₂e have been issued for the monitoring period from 19/03/2011 to 27/10/2011. The project also has been registered as CDM project with Ref. 5289, and CERs of 431,578tCO₂e have been issued for the monitoring period from 28/10/2011 to 31/12/2016.

During this monitoring period from 01/01/2017 to 31/12/2020, the total emission reduction achieved is 340,692 tCO₂e.

1.2 Sectoral Scope and Project Type

Sectoral scope: 1. Energy industries (renewable/non-renewable sources);

Project type: Energy industries (renewable/non-renewable sources)

The project is not a grouped project.

1.3 Project Proponent

Organization name	Xinjiang Jimunai CGN Wind Power Co., Ltd.
Contact person	Lei Shi
Title	Vice General Manager

Address	No.2 Building, Area 12 of Advanced Business Park, No. 188 west of South 4th Ring Road, Beijing, P. R. China
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1.4 Other Entities Involved in the Project

Organization name	Climate Bridge (Shanghai) Ltd.
Role in the Project	Consultancy
Contact person	Zhiwen Gao
Title	General Manager
Address	Block B, Level 24, Jiangong Mansion, 33 Fushan Road, Pudong New Area, Shanghai, China 200120
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1.5 Project Start Date

The project started on 19/03/2011 (operation start date)

1.6 Project Crediting Period

The project crediting period is applicable to a maximum of 10 years which may be renewed at most two times. However, as the project is also registered as a CDM project with a seven year twice renewable project crediting period and furthermore, the project has the lifetime of 20 years, it is not eligible for VCU issuance beyond 18/03/2031. The project first crediting period is from 19/03/2011 to 18/03/2021.

1.7 Project Location

The project is located at the southwest of Jimunai County, Xinjiang Uygur Autonomous Region, P. R. China. The geographical coordinates of the project is 86.0054° - 86.8443° east longitude and 47.5454° - 47.5796° north latitude. Figures 1 and 2 below show the geographical location of the project.



Figure 1. The location of the project in the map of P. R. China



Figure 2. The location of the project in the map of Xinjiang Uygur Autonomous Region, P. R. China

1.8 Title and Reference of Methodology

The methodology applied to the project is as follows:

Methodology:

ACM0002: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (version 12.1.0).

Reference:

<http://cdm.unfccc.int/UserManagement/FileStorage/VA17EM2PNDJWBTFY34KGRLZO68S9UQ>

The applied tools:

“Tool for the demonstration and assessment of additionality” (version 05.2)

“Tool to calculate the emission factor for an electricity system” (version 02.1.0)

Reference:

<https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf>

<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.1.0.pdf>

1.9 Participation under other GHG Programs

The project has been registered as CDM project and the registration number is 5289, the first CDM crediting period is from 28/10/2011 to 27/10/2018, and the crediting period has been successfully renewed on 02/05/2019 with the 2nd CDM crediting period from 28/10/2018 to 27/10/2025. Total GHG emission reductions of 431,578 tCO₂ generated from 28/10/2011 to 31/12/2016 (both days included) by the project has been issued as CER under CDM program (As shown in the following table) .

Period	emission reductions(tCO ₂ e)
28/10/2011 to 27/05/2012	74,517
28/05/2012 to 31/12/2012	Awaiting issuance request
01/01/2013 to 31/12/2016	357,061
Total	431,578

Please refer to the following link for details:

<https://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1317203879.14/view?cp=1>

1.10 Other Forms of Credit

Emission Trading Programs and Other Binding Limits

Total GHG emission reductions of 431,578 tCO₂ generated from 18/10/2011 to 31/12/2016 (both days included) by the project has been issued as CER under CDM program.

The GHG emission reductions generated by the project from 01/01/2017 to 31/12/2020 will not be used for compliance with emission trading programs or to meet binding limits on GHG emissions.

All credits from 01/01/2017 to 31/12/2020 will be claimed under VCS program as VCUs for the project to avoid double counting.

Other Forms of Environmental Credit

The project hasn't sought or received another form of environmental credits.

1.11 Sustainable Development

The project makes contribution to the local sustainable development as follows:

1. GHG emission reduction

The project activity achieves obvious greenhouse gas (GHG) emission reductions by avoiding CO₂ emissions, as grid-connected fossil fuel-fired power dominates in the NWPG.

2. Pollutants emission reduction through replacing fossil fuel combustion

The project is to replace grid-connected fossil fuel-fired power plants in the NWPG, and thus reduce fossil fuel consumption and avoid pollutants emission, such as sulfur dioxide and dust, brought by fossil fuel combustion. Therefore, the project has obvious environmental benefit.

3. Employment opportunities

The conducting of the project offered job opportunities for local people. The temporary work included assembly and installation of the wind turbines and the long-term maintenance of the facilities, etc.

4. Economy development

The region can achieve economic growth and booming of local tourism through the construction and operation of the project. Furthermore, the project contributes to local government with more tax revenues and poverty eradication.

2 SAFEGUARDS

2.1 No Net Harm

The project doesn't cause significant impact on the environment and socio-economic as to the conclusion of the EIA. The conclusions of EIA are documented below:

Ambient air

The impact on ambient air quality of the project is mainly from dust during the construction phase. The excavation work is the primary emission source; however, it is a ground source and the particle size are quite large so that dust deposit quickly on the ground. Immediately replant the areas where construction has completed, and sprinkling water on the road frequently should be conducted. Therefore, the project doesn't pose any threat on the quality of ambient air.

Impact from noise

There is some noise during the operation of wind turbines. The equipments and techniques with lower noise was chosen to apply. Improvement on construction process and strengthening of equipment maintenance is emphasized. Meanwhile, the project site is very far from the village or resident.

Consequently, the noise of operation has little impact to the surrounding environment. As a result, the noise doesn't impact the work and daily life of local residents.

Electromagnetic impact

The operation of the wind farm generates electromagnetic pollution, whereas the pollution is slight. In addition, the project is very far from local residents and village. Therefore, the electronic magnetic pollution to the surrounding environment is insignificant.

Impact from Solid waste

Solid wastes generated from the project activity are excavated earth material and domestic solid waste. Part of the excavated earth material was backfilled, and the rest was used for land levelling and road construction near the project site. The domestic solid waste was collected and treated together with the waste from local residents. As the report indicates, solid waste is handled properly.

Impact from Wastewater

Wastewater is mainly domestic wastewater. Wastewater quantity is fairly small and treatment methods was applied for on-site primary treatment, and then the wastewater was treated together with the local wastewater. Small-scale septic tanks should be built on the site, through which the wastewater can meet the second-degree standard of discharge after treatment. Therefore, the impact of wastewater is limited and mitigate.

Impact on natural environment

In order to protect the landscape, vehicles are prohibited from driving on the landscape randomly and timely afforestation is required; hunting wild animals is strictly forbidden at the same time. The lands permanently taken by wind farms are normally mountain ridges, where most of the vegetation is grass and shrub, without rare plants. Hence, the project construction has little impact on the mountain's eco-environment.

The fly height of birds is usually higher than 150m, which is about 50m higher than the height of wind turbines and birds usually can avoid obstacles as far as 100-200 meters away. In addition, the project site locates on mountainous area, with no lakes and marshes around, thus it is not a habitat for birds. Hence, the project construction and operation have insignificant influence on the birds.

2.2 Local Stakeholder Consultation

Brief description how comments by local stakeholders have been invited and compiled:

The project developer has sent out questionnaires to the stakeholders in the local County for the comments of the project construction on 30/06/2010. 40 copies of questionnaire were distributed, and 38 pieces of reply were received. The recovery ratio is 95%. Among the interviewees, there were 35 farmer, 2 government officials and 1 student. 15 of them have educational level of middle school, 22 of high school and 1 of college.

An invitation notice for stakeholder comments was later issued by the project owner, representatives of local stakeholders, including governmental officials of the local county and local residents, etc attended the meeting in Jimunai County government meeting room on 02/07/2010 to discuss the questionnaires collected, introduce the project and further expressed their concerns or opinions. No negative opinion on construction of the project is heard and environmental considerations expressed by stakeholders are discussed on the meeting.

The questions regarding the proposed project were mainly as follows:

- a) Is the current living and/or working environment quiet?
- b) Do you currently experience electromagnetic interference when watching TV at home?
- c) Are there any negative impacts of the proposed project on the everyday life of local residents?
- d) Is the proposed project going to help improve the living and/or working environment?
- e) Which is the environmental topic that concerns you the most during the construction and operation of the proposed project?
- f) Do you support the proposed project?

Summary of the comments received:

The summary of survey is listed as the following:

- 37 of them consider their current living and/or working environment is quiet, only one person is unsure.
- 37 of them currently do not experience electromagnetic interference when watching TV at home, and only 1 person is unsure.
- 38 of them think there are not any negative impacts on their daily life.
- 38 of them think the project will help improve their living and/or working environment.
- Regarding the construction and operation of the propose project, 32 of them are most concerned with the noise level, and 6 of them are most concerned with wastewater from the project.
- 38 of them support the implementation of the project.

Conclusion:

The local community possesses basically positive comments on the effects of the proposed project. The interviewees considered that local social, economic and environmental development would be beneficial from the proposed project. The response was overall supportive to the project implementation.

Report on how due account was taken of any comments received:

As shown in the questionnaires, local residents were most concerned with noise level, and some of them were concerned with wastewater. As discussed in the EIA report, these issues are well illuminated and instructions were given to mitigate the potential impacts of these issues. With good implementation of the above-mentioned measures by the project developer, the proposed project will not have significant negative impact on the local environment.

2.3 AFOLU-Specific Safeguards

NA

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project involves the installation of 33 wind turbines with capacities of 1500 kW each, which amount to a total installed capacity of 49.5 MW. The wind turbines are supplied by a domestic manufacturer – Goldwind Co., Ltd. The Project uses domestic wind turbines. The main technical specifications of the wind turbine are provided in the following Table.1:

Table 1 Key Technical specifications of wind turbines and generator

Wind Turbine		
Item	Unit	Index
Model	-	77/1500
Rated capacity	kW	1500
Number of blades	-	3
Rotor diameter	m	77
Swept area	m ²	4656
Rotor speed	m/s	36.28/69.75
Cut-in speed	m/s	3.0
Rated wind speed	m/s	11.5
Cut-out speed	m/s	22
Height of hub	m	65
Rated voltage	V	620
Generator		
Rated power	kW	1580
Rated current	A	660
Lifetime	years	20

The project started construction on 25/07/2010. The first wind turbine of the project has been put into operation on 19/03/2011. And all the 33 wind turbines have been put into operation on 23/03/2011. The expected operation period of the Project is 20 years as stated in the registered CDM PDD Version 3 dated 19/08/2011.

The electricity generated from the Project is delivered to Xinjiang Uygur Power Grid, an integral part of the Northwest China Power Grid (NWPG). During this monitoring period, the meters M1 and M2 have been replaced with new ones on 07/06/2017, since the accuracy and function of the meters are equivalent to the previous meters, there was no significant malfunction or any emergency occurred for the Project during this monitoring period. No events occurred during this monitoring period which may impact the applicability of the methodology.

3.2 Deviations

3.2.1 Methodology Deviations

There is no deviation applied to this monitoring period.

3.2.2 Project Description Deviations

In the registered PD, the crediting period is described as from 19/03/2011 to 27/10/2011. A deviation is requested for the crediting period in the registered PD. The project is registered under VCS Standard Version 3.4 and completed validation before 19/03/2020. thus, it remains eligible to apply the crediting period requirements under VCS Standard Version 3.4 which shall be a maximum of ten years and may be renewed at most twice, so the first renewable crediting period of the project should be updated from 19/03/2011- 27/10/2011 to 19/03/2011-18/03/2021.

3.3 Grouped Projects

The Project is not a grouped project.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

The baseline grid emission factor $EF_{grid,CM,y}$ is obtained directly from the official source Notification on Determining Baseline Emission Factor of China's Grid by China's DNA. Thus, the relevant basis parameters for calculation of $EF_{grid,CM,y}$ are not described in detail here. With consideration of the fact of the Project, data and parameters that are available at validation are summarized in below tables.

Data / Parameter	$EF_{grid,CM,y}$
------------------	------------------

Data unit	tCO ₂ e/MWh
Description	Combined margin emission factor for grid connected power generation in year y
Source of data	Registered CDM PDD Version 3 dated 19/08/2011
Value applied	0.9180
Justification of choice of data or description of measurement methods and procedures applied	Not applicable
Purpose of Data	Baseline emission calculations
Comments	The baseline emission factor was determined ex ante and will be used throughout the first crediting period.

4.2 Data and Parameters Monitored

Data / Parameter	EG _{Facility,y}												
Data unit	MWh												
Description	Quantity of net electricity generation supplied to the grid by the Project in year y												
Source of data	Electricity meter readings from the meters at the project site												
Description of measurement methods and procedures to be applied	Calculated												
Frequency of monitoring/recording	Continuously measured, and monthly recorded												
Value monitored	<table> <tr> <th>Year</th><th>Value</th></tr> <tr> <td>01/01/2017-31/12/2017</td><td>80,861.880</td></tr> <tr> <td>01/01/2018-31/12/2018</td><td>79,754.400</td></tr> <tr> <td>01/01/2019-31/12/2019</td><td>105,813.840</td></tr> <tr> <td>01/01/2020-31/12/2020</td><td>104,695.360</td></tr> <tr> <td>Total</td><td>371,125.480</td></tr> </table>	Year	Value	01/01/2017-31/12/2017	80,861.880	01/01/2018-31/12/2018	79,754.400	01/01/2019-31/12/2019	105,813.840	01/01/2020-31/12/2020	104,695.360	Total	371,125.480
Year	Value												
01/01/2017-31/12/2017	80,861.880												
01/01/2018-31/12/2018	79,754.400												
01/01/2019-31/12/2019	105,813.840												
01/01/2020-31/12/2020	104,695.360												
Total	371,125.480												
Monitoring equipment	Please refer to the monitoring equipment information in the table of parameters EG _{export,y} , EG _{import,y} and EG _{im-backup,y}												
QA/QC procedures to be applied	The net electricity supplied to the grid by the project can also be monitored and recorded at the central control room. The project												

	operator is responsible for recording such data. Receipts for electricity sales are kept for verification.
Purpose of the data	Baseline emission calculations
Calculation method	Quantity of net electricity generation supplied to the grid by the Project is measured as electricity supplied to the grid by the Project ($EG_{\text{export},y}$) minus imports ($EG_{\text{import},y}$ and $EG_{\text{im-backup},y}$). $EG_{\text{export},y}$, $EG_{\text{import},y}$ and $EG_{\text{im-backup},y}$ is measured by electricity meters as the following table shows.
Comments	-

Data / Parameter	EG _{export, y}		
Data unit	MWh		
Description	Electricity supplied to the grid by the project in year y.		
Source of data	Electricity meter reading (M1 as main meter, M2 as backup meter) at the on-site substation		
Description of measurement methods and procedures to be applied	Continuously measurement and monthly recording		
Frequency of monitoring/recording	Continuously measurement and monthly recording		
Value monitored	Year		Value
	01/01/2017-31/12/2017		81,140.400
	01/01/2018-31/12/2018		80,014.000
	01/01/2019-31/12/2019		106,035.600
	01/01/2020-31/12/2020		104,882.800
	Total		372,072.800
Monitoring equipment	Electricity meter reading (M1 as main meter, M2 as backup meter) at the on-site substation.		
	Old meters		
	Meter	Main meter M1	Backup meter M2
	Serial No.	4200415011003274797	4200415011003274798
	Type	DTSD718	

	Accuracy	0.2S	
	Date of Calibration	15/10/2016	
	Validity	From 15/10/2016 to 14/10/2017	
	New meters (replaced on 07/06/2017):		
	Meter	Main meter M1	Backup meter M2
	Serial No.	800000287822	800000287824
	Type	DTSD718	
	Accuracy	0.2S	
	Date of Calibration	07/06/2017 01/06/2018 30/05/2019 30/05/2020	
	Validity	From 07/06/2017 to 06/06/2018 From 01/06/2018 to 31/05/2019 From 30/05/2019 to 29/05/2020 From 30/05/2020 to 29/05/2021	
The meters were calibrated by Xinjiang Electricity Science Research Institute. The validity of the accreditation certificate of the calibration entity is from 10/04/2013 to 09/04/2018 and from10/04/2018 to 09/04/2023.			
QA/QC procedures to be applied	The electricity exported to the grid by the project is monitored and recorded at the central control room. The project operator is responsible for recording such data. Receipts for electricity sales are kept for verification.		
Purpose of the data	Baseline emission calculations		
Calculation method	-		
Comments			
Data / Parameter	EG _{import, y}		
Data unit	MWh		
Description	Electricity purchased from the grid by the project in year y.		

Source of data	Electricity meter reading (M1 as main meter, M2 as backup meter) at the on-site substation																																
Description of measurement methods and procedures to be applied	Continuously measured and monthly recorded																																
Frequency of monitoring/recording	Continuously measured and monthly recorded																																
Value monitored	<table><tr><th>Year</th><th>Value</th></tr><tr><td>01/01/2017-31/12/2017</td><td>278.520</td></tr><tr><td>01/01/2018-31/12/2018</td><td>259.600</td></tr><tr><td>01/01/2019-31/12/2019</td><td>221.760</td></tr><tr><td>01/01/2020-31/12/2020</td><td>187.440</td></tr><tr><td>Total</td><td>947.320</td></tr></table>			Year	Value	01/01/2017-31/12/2017	278.520	01/01/2018-31/12/2018	259.600	01/01/2019-31/12/2019	221.760	01/01/2020-31/12/2020	187.440	Total	947.320																		
Year	Value																																
01/01/2017-31/12/2017	278.520																																
01/01/2018-31/12/2018	259.600																																
01/01/2019-31/12/2019	221.760																																
01/01/2020-31/12/2020	187.440																																
Total	947.320																																
Monitoring equipment	Electricity meter reading (M1 as main meter, M2 as backup meter) at the on-site substation. Old meters <table><tr><td>Meter</td><td>Main meter M1</td><td>Backup meter M2</td></tr><tr><td>Serial No.</td><td>4200415011003274797</td><td>4200415011003274798</td></tr><tr><td>Type</td><td colspan="2">DTSD718</td></tr><tr><td>Accuracy</td><td colspan="2">0.2S</td></tr><tr><td>Date of Calibration</td><td colspan="2">15/10/2016</td></tr><tr><td>Validity</td><td colspan="2">From 15/10/2016 to 14/10/2017</td></tr></table> New meters (replaced on 07/06/2017): <table><tr><td>Meter</td><td>Main meter M1</td><td>Backup meter M2</td></tr><tr><td>Serial No.</td><td>800000287822</td><td>800000287824</td></tr><tr><td>Type</td><td colspan="2">DTSD718</td></tr><tr><td>Accuracy</td><td colspan="2">0.2S</td></tr></table>			Meter	Main meter M1	Backup meter M2	Serial No.	4200415011003274797	4200415011003274798	Type	DTSD718		Accuracy	0.2S		Date of Calibration	15/10/2016		Validity	From 15/10/2016 to 14/10/2017		Meter	Main meter M1	Backup meter M2	Serial No.	800000287822	800000287824	Type	DTSD718		Accuracy	0.2S	
Meter	Main meter M1	Backup meter M2																															
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Type	DTSD718																																
Accuracy	0.2S																																
Date of Calibration	15/10/2016																																
Validity	From 15/10/2016 to 14/10/2017																																
Meter	Main meter M1	Backup meter M2																															
Serial No.	800000287822	800000287824																															
Type	DTSD718																																
Accuracy	0.2S																																

	Date of Calibration	07/06/2017 01/06/2018 30/05/2019 30/05/2020
	Validity	From 07/06/2017 to 06/06/2018 From 01/06/2018 to 31/05/2019 From 30/05/2019 to 29/05/2020 From 30/05/2020 to 29/05/2021
	The meters were calibrated by Xinjiang Electricity Science Research Institute. The validity of the accreditation certificate of the calibration entity is from 10/04/2013 to 09/04/2018 and from 10/04/2018 to 09/04/2023.	
QA/QC procedures to be applied	The electricity purchased from the grid is monitored and recorded at the central control room. The project operator is responsible for recording such data. Receipts for electricity sales are kept for verification.	
Purpose of the data	Baseline emission calculations	
Calculation method	-	
Comments	-	

Data / Parameter	EG _{im-backup,y}
Data unit	MWh
Description	Electricity imported from the grid by the Project through the backup power line in the year y.
Source of data	Electricity meter reading (M3) at the project site.
Description of measurement methods and procedures to be applied	Continuously measurement and monthly recording
Frequency of monitoring/recording	Continuously measurement and monthly recording

Value monitored	Year		Value ¹
	01/01/2017-31/12/2017		0.000
	01/01/2018-31/12/2018		0.000
	01/01/2019-31/12/2019		0.000
	01/01/2020-31/12/2020		0.000
	Total		0.000
Monitoring equipment	Meter	Main meter M3 ²	
	Serial No.	01000002217676	
	Type	DSZ188	
	Accuracy	0.5S	
QA/QC procedures to be applied	Electricity imported from the grid through the backup line is double checked according to electricity sales receipts.		
Purpose of the data	Baseline emission calculations		
Calculation method	-		
Comments	-		

4.3 Monitoring Plan

This Monitoring plan sets out a number of monitoring tasks in order to ensure the complete, consistent, clear and accurate monitoring and the accurate calculation of the emission reduction in the crediting period. This plan is mainly implemented by the project owner with the cooperation of the grid company.

1. Monitoring Object

The main objective data is the net electricity, which is calculated according to the generated electricity and the purchased electricity and supplied to the grid, thus to calculate the emission reduction of the project.

2. Monitoring Implementers

¹ Based on the statement issued by the grid company, it is confirmed that during this monitoring period from 01/01/2017-31/12/2020, no electricity was imported via the 35KV backup line, thus the value of EG_{im-backup,y} is 0.

² The calibration of the meter M3 is not available since there is no electricity via the 35KV backup line and the meter calibration arrangement is controlled by the grid company

The General Manager of the project entity appoint a CDM project manager or a chief officer. The operational and monitoring manager of the plant, the Financial Chief, and the Technical Chief are responsible for the collection of the data and information required in the monitoring plan. The collected information is documented and sent to the CDM manager or responsible staffs of the project entity monthly. The CDM manager is in charge of the implementation of the Monitoring Plan and report to the General Manager of the company. The General Manager of the company makes the confirmations on monitoring, calculation data and reports.

The organization of the monitoring implementers is illustrated in the table below:

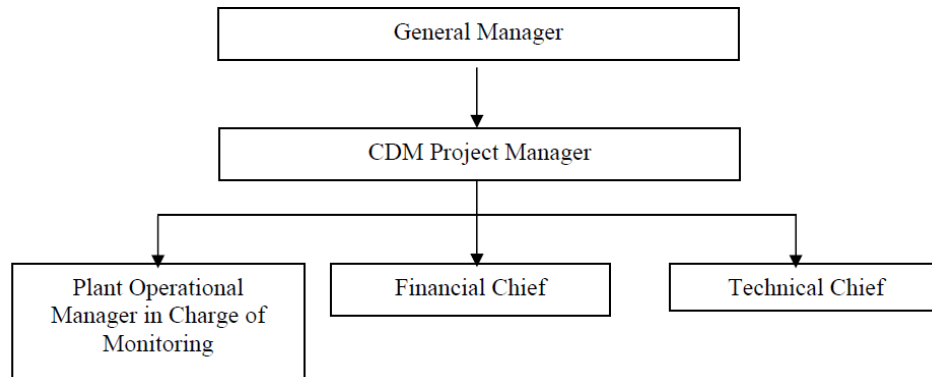


Figure 3 Operations and Monitoring Procedure of the Project

3. Monitoring Program and Equipment

The power connection and monitoring system is shown as below.

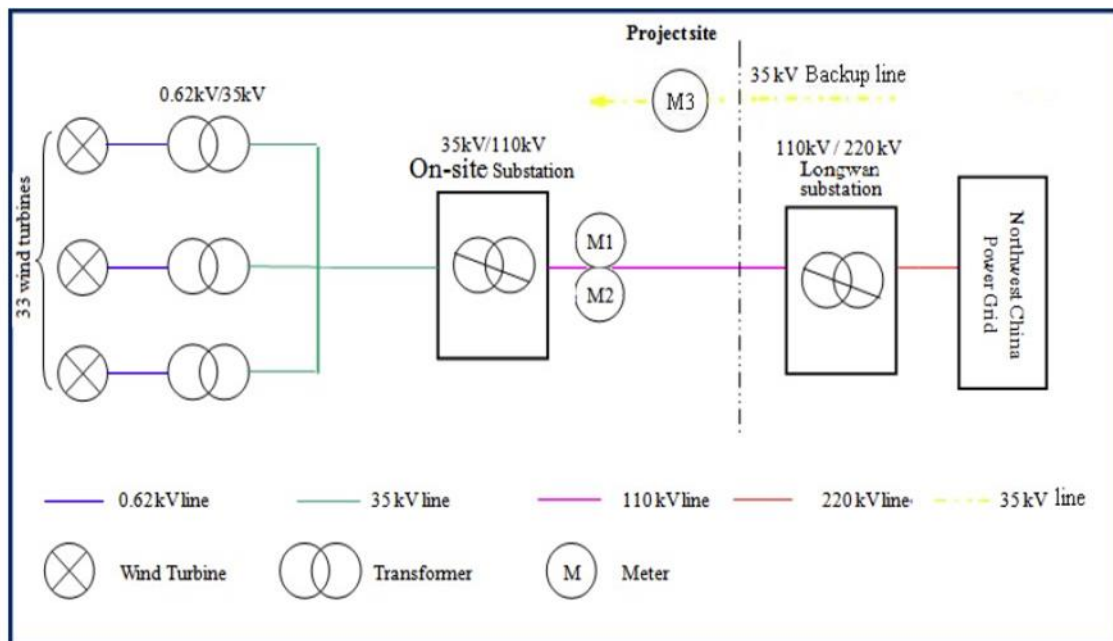


Figure 4: The location of meters

Monitoring equipments include two meters, the main meter (M1) and the backup meter (M2). All the meters are the multifunctional electricity meters (accuracy degree is 0.2s, bidirectional). M1 as the main meter is used to monitor the electricity supplied to the grid by the Project and the electricity purchased from the Grid. M2 is used to monitor the electricity supplied to the grid and imported from the grid by the Project in case M1 is damaged. The main meter (M1) and backup meter (M2) are equipped at the high pressure site (110kV) of the 110kV on-site substation of the Project and the project owner is responsible for conducting the meters monitoring. And the settlement time of M1 is at 24:00 on the last day of every month.

A backup power line is used for supplied electricity in emergent case that the main power line fails to supply power. A meter (hereafter referred as meter M3) is installed to measure the electricity imported via this line. This meter is owned, maintained and monitored by the local grid company. This meter is owned, maintained and monitored by the local grid company. The accuracy of the meter is 0.5s.

The receipts of the electricity supplied to the power grid by the Project and the electricity purchased from the grid is issued based on the power purchase agreement (PPA) signed between the project owner and the grid company and the readings from the main meter (M1).

The net electricity supplied by the Project is calculated as electricity supplied to the grid by the Project minus imports.

Baseline Emissions are calculated by multiplying the ex-ante Baseline Emission factor by annual power generation.

$$EG_{Facility,y} = EG_{export,y} - EG_{import,y} - EG_{im-backup,y} \dots \dots \dots (1)$$

Where:

$EG_{facility,y}$ = Quantity of net electricity generation supplied to the grid by the Project in year y.

$EG_{export,y}$ = Electricity supplied to the grid by the project in year y.

$EG_{import,y}$ = Electricity purchased from the grid by the project in year y.

$EG_{im-backup,y}$ = Electricity imported from the grid by the Project through the backup power line in the year y.

4. Data Collection

The quality assurance and quality control procedures for recording, maintaining and archiving data are developed as part of this CDM project activity. This is an on-going process that will be ensured through the CDM activity in terms of the need for verification of the emissions on an annual basis according to the registered CDM PDD Version 3 dated 19/08/2011 and the CDM manual.

Monthly data of electricity supply and import will be approved and signed by the Manager before it is accepted and stored. This audit will check compliance with monitoring procedures in this monitoring plan. This internal audit will also identify potential improvements to procedures to improve monitoring and reporting in future years. The monitoring staff will also attend a training session organized by the CDM consultant. The purpose of training is to assure those staff are competent to conduct the monitoring plan, thus to make the monitored data accurate. Sales invoices will be used and kept for checking consistency of the recorded data.

The verification uses the main meter's data as long as the inaccuracy of the meter is within the permissible tolerance. The main procedures are as follows:

I. According to the requirements of power purchase/sales agreement, the project owner and the grid company should collect the two meters' data periodically, and check them at the same time.

II. The project owner supplied the electricity to the grid company, and provided an electricity sales invoice to the Grid Company. A copy of the invoice is stored by the project owner, together with a record of the payment by the grid company.

III. When the electricity generated by this project cannot meet the electricity self-use requirement of the power plant, the grid company supplies the electricity to the project owner. The Grid Company provides an electricity sales invoice to the project owner and the invoice is stored by the project owner.

IV. The project owner records the power supplied to and purchased from the grid, and hence calculate the net electricity supplied to the grid.

V. The records of the main meter's data readings are provided by the Grid company to the project owner monthly and for verification by the DOE.

If the fault of the main meter exceeds the allowable tolerance or its malfunction occurs, the grid-connected electricity generated by the project will be resolved by following measures:

I. Adopting the backup meter's data, unless a test by either party reveals it is inaccuracy.

II. If the inaccuracy of the backup meter is not within the acceptable limits or it cannot work properly, the project owner and the grid company will discuss and calculate a conservative estimate of power supplied to the grid. A statement will be prepared indicating

- ▶ the background to the damage to metering equipment
- ▶ the assumptions used to estimate net electricity generation supplied to the grid for the days when no record was available
- ▶ the estimation of electricity supplied to the grid. The statement will be signed by representatives from the project owner and the grid company.

If any error is detected, the party owning the meter shall repair, recalibrate or replace the meter and give the other party sufficient notice to allow a representative to attend during any corrective activity.

The project entity furthermore documented all efforts taken to restore normal monitoring procedures.

5. Calibration of Meters & Metering

The metering equipment is properly calibrated and checked annually for accuracy. The project owner prepares backup procedures to deal with any errors occurred to the meters. The calibration records carried out by the grid company should be provided to the project owner, and these records are maintained.

Meters should be tested by a qualified organization co-agreed by the project owner and the grid company within 10 days after:

- I. The detection of the reading difference between the main meter and the backup meter that exceeds the allowable tolerance.
- II. The equipments malfunction caused by improper operation All the calibration test records should be maintained safely for the verification.

6. Data Management System

To keep safely the record of the data collected during monitoring, this project sets up a complete data management system. The project perfects the whole monitoring procedure by developing the CDM manual, tracking information from the primary source to the end-data calculations in paper document format. Physical documentation such as paper-based maps, diagrams and environmental assessment were collated in a central place, together with this monitoring plan. All paper-based information was stored by the project owner and kept at least one copy.

At the end of each month, the monitoring data was filed in a spreadsheet and stored electronically and the paper-based printout should be also archived. Furthermore, the project owner collects the sales receipts for the electricity supplied to the grid as a cross-check, and compiled the monitoring report including the monitoring data and relevant evidence at the end of each crediting year.

All the data were kept for two years following the end of the last crediting period

7. Monitoring Report

After the CDM project manager collects and sorts the monitored data, the monitoring report is prepared by the project developer alone or with some consultancy Company. The project developer and/or the designated third party have to make sure that the format and content of the monitoring report are consistent with the monitoring methodology in the registered CDM PDD Version 3 dated 19/08/2011.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

In accordance with the registered CDM PDD Version 3 dated 19/08/2011, baseline emissions are calculated according to the following formula:

$$EG_{Facility,y} = EG_{export,y} - EG_{import,y} - EG_{im-backup,y} \dots \dots \dots (1)$$

$$BE_y = EG_{facility,y} \times EF_{grid,CM,y} \dots \dots \dots (2)$$

Where:

BE_y	=	Baseline emission in year y (tCO ₂ /yr).
$EG_{Facility,y}$	=	Quantity of net electricity generation supplied to the grid by the Project in year y. (MWh/yr).
$EF_{grid,CM,y}$	=	Combined margin CO ₂ 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” (tCO ₂ e/MWh).
$EG_{export,y}$	=	Electricity supplied to the grid by the project in year y.
$EG_{import,y}$	=	Electricity purchased from the grid by the project in year y.
$EG_{im-backup,y}$	=	Electricity imported from the grid by the Project through the backup power line in the year y.

Quantity of net electricity generation supplied by the project to the grid in year y ($EG_{facility,y}$) in this monitoring period (01/01/2017 - 31/12/2020) as in the table below:

Table1 Quantity of net electricity supplied to the grid during the Monitoring Period

Period		EG _{export,y} (MWh)			EG _{import,y} (MWh)			EG _{im-spare,y} (MWh)	EG _{facility,y} (MWh)
		a			b			c	d=a-b-c
		Data monitored	Data on the sales receipts	Conservative value	Data monitored	Data on the sales receipts	Conservative value	value	Value
01/01/2017	31/01/2017	1,827,647.776	5,570.400	5,570.400	16.720	16.720	16.720	0.000	5,553.680
01/02/2017	28/02/2017	1,830,170.998	5,469.200	5,469.200	22.880	22.880	22.880	0.000	5,446.320
01/03/2017	31/03/2017	1,832,695.875	5,899.520	5,899.520	24.640	24.640	24.640	0.000	5,874.880
01/04/2017	30/04/2017	1,835,308.230	7,028.120	7,028.120	24.640	24.640	24.640	0.000	7,003.480
01/05/2017	31/05/2017	1,837,922.416	8,143.960	8,143.960	30.360	30.360	30.360	0.000	8,113.600
01/06/2017	06/06/2017	1,839,509.204	7,788.000	7,788.000	34.320	34.320	34.320	0.000	7,738.720
07/06/2017	30/06/2017	1,840,795.988			14.960	14.960	14.960	0.000	
01/07/2017	31/07/2017	1,843,156.399	6,837.600	6,837.600	16.720	16.720	16.720	0.000	6,820.880
01/08/2017	31/08/2017	1,845,819.144	8,065.200	8,065.200	12.760	12.760	12.760	0.000	8,052.440
01/09/2017	30/09/2017	1,848,440.832	6,041.200	6,041.200	25.080	25.080	25.080	0.000	6,016.120
01/10/2017	31/10/2017	1,851,064.351	7,150.000	7,150.000	12.320	12.320	12.320	0.000	7,137.680
01/11/2017	30/11/2017	1,853,689.760	7,801.200	7,801.200	24.640	24.640	24.640	0.000	7,776.560
01/12/2017	31/12/2017	1,856,317.000	5,346.000	5,346.000	18.480	18.480	18.480	0.000	5,327.520
Subtotal (2017)		23,942,537.973	81,140.400	81,140.400	278.520	278.520	278.520	0.000	80,861.880
01/01/2018	31/01/2018	1,858,989.231	3,577.200	3,577.200	10.120	10.120	10.120	0.000	3,567.080
01/02/2018	28/02/2018	1,861,533.988	5,192.000	5,192.000	28.600	28.600	28.600	0.000	5,163.400
01/03/2018	31/03/2018	1,864,080.400	7,158.800	7,158.800	12.320	12.320	12.320	0.000	7,146.480
01/04/2018	30/04/2018	1,866,715.020	6,217.200	6,217.200	28.160	28.160	28.160	0.000	6,189.040
01/05/2018	31/05/2018	1,869,351.471	5,640.800	5,640.800	14.520	14.520	14.520	0.000	5,626.280
01/06/2018	30/06/2018	1,871,989.812	4,347.200	4,347.200	38.720	38.720	38.720	0.000	4,308.480
01/07/2018	31/07/2018	1,874,629.984	10,709.600	10,709.600	12.760	12.760	12.760	0.000	10,696.840
01/08/2018	31/08/2018	1,877,315.359	6,001.600	6,001.600	31.680	31.680	31.680	0.000	5,969.920
01/09/2018	30/09/2018	1,879,959.312	6,375.600	6,375.600	11.880	11.880	11.880	0.000	6,363.720
01/10/2018	31/10/2018	1,882,605.096	8,940.800	8,940.800	32.120	32.120	32.120	0.000	8,908.680
01/11/2018	30/11/2018	1,885,252.770	6,160.000	6,160.000	26.840	26.840	26.840	0.000	6,133.160

01/12/2018	31/12/2018	1,887,902.275	9,693.200	9,693.200	11.880	11.880	11.880	0.000	9,681.320
Subtotal (2018)		22,480,324.718	80,014.000	80,014.000	259.600	259.600	259.600	0.000	79,754.400
01/01/2019	31/01/2019	1,890,597.136	9,847.200	9,847.200	24.640	24.640	24.640	0.000	9,822.560
01/02/2019	28/02/2019	1,893,163.428	10,546.800	10,546.800	19.360	19.360	19.360	0.000	10,527.440
01/03/2019	31/03/2019	1,895,731.375	7,497.600	7,497.600	19.800	19.800	19.800	0.000	7,477.800
01/04/2019	30/04/2019	1,898,388.260	9,033.200	9,033.200	30.800	30.800	30.800	0.000	9,002.400
01/05/2019	31/05/2019	1,901,046.976	10,155.200	10,155.200	13.640	13.640	13.640	0.000	10,141.560
01/06/2019	30/06/2019	1,903,707.582	6,358.000	6,358.000	25.080	25.080	25.080	0.000	6,332.920
01/07/2019	31/07/2019	1,906,370.019	8,034.400	8,034.400	9.240	9.240	9.240	0.000	8,025.160
01/08/2019	31/08/2019	1,909,078.024	8,487.600	8,487.600	19.360	19.360	19.360	0.000	8,468.240
01/09/2019	30/09/2019	1,911,744.242	6,371.200	6,371.200	18.040	18.040	18.040	0.000	6,353.160
01/10/2019	31/10/2019	1,914,412.291	8,932.000	8,932.000	11.000	11.000	11.000	0.000	8,921.000
01/11/2019	30/11/2019	1,917,082.230	8,232.400	8,232.400	24.640	24.640	24.640	0.000	8,207.760
01/12/2019	31/12/2019	1,919,754.000	12,540.000	12,540.000	6.160	6.160	6.160	0.000	12,533.840
Subtotal (2019)		22,861,075.563	106,035.600	106,035.600	221.760	221.760	221.760	0.000	105,813.840
01/01/2020	31/01/2020	1,922,471.491	9,996.800	9,996.800	9.680	9.680	9.680	0.000	9,987.120
01/02/2020	29/02/2020	1,925,103.180	10,753.600	10,753.600	34.320	34.320	34.320	0.000	10,719.280
01/03/2020	31/03/2020	1,927,736.611	10,661.200	10,661.200	13.200	13.200	13.200	0.000	10,648.000
01/04/2020	30/04/2020	1,930,415.822	8,241.200	8,241.200	25.960	25.960	25.960	0.000	8,215.240
01/05/2020	31/05/2020	1,933,096.864	10,133.200	10,133.200	9.240	9.240	9.240	0.000	10,123.960
01/06/2020	30/06/2020	1,935,779.796	8,329.200	8,329.200	17.600	17.600	17.600	0.000	8,311.600
01/07/2020	31/07/2020	1,938,464.559	6,784.800	6,784.800	12.760	12.760	12.760	0.000	6,772.040
01/08/2020	31/08/2020	1,941,195.256	7,361.200	7,361.200	13.640	13.640	13.640	0.000	7,347.560
01/09/2020	30/09/2020	1,943,883.800	7,466.800	7,466.800	13.640	13.640	13.640	0.000	7,453.160
01/10/2020	31/10/2020	1,946,574.175	8,954.000	8,954.000	16.720	16.720	16.720	0.000	8,937.280
01/11/2020	30/11/2020	1,949,266.440	6,767.200	6,767.200	12.760	12.760	12.760	0.000	6,754.440
01/12/2020	31/12/2020	1,951,960.536	9,433.600	9,433.600	7.920	7.920	7.920	0.000	9,425.680
Subtotal (2020)		23,245,948.530	104,882.800	104,882.800	187.440	187.440	187.440	0.000	104,695.360
Total (01/01/2017-31/12/2020)		92,529,886.784	372,072.800	372,072.800	947.320	947.320	947.320	0.000	371,125.480

Among which, $EF_{grid,CM,y}$ is 0.9180 tCO₂/MWh in this crediting period,

Period	$EG_{facility,y}$ (MWh)	$EF_{grid,CM,y}$ (tCO ₂ /MWh)	BE_y (tCO ₂)
01/01/2017 to 31/12/2017	80,861.880	0.9180	74,231
01/01/2018 to 31/12/2018	79,754.400	0.9180	73,214
01/01/2019 to 31/12/2019	105,813.840	0.9180	97,137
01/01/2020 to 31/12/2020	104,695.360	0.9180	96,110
Total	-	-	340,692

Therefore, the baseline emissions $BE_y = 340,692$ tCO₂e

5.2 Project Emissions

According to registered CDM PDD Version 3 dated 19/08/2011, the project is a GHG zero-emission electricity generating activity; therefore, no project emissions from the project activity were identified $PE_y = 0$.

5.3 Leakage

According to registered CDM PDD Version 3 dated 19/08/2011, the project needn't consider leakages, i.e., $LE_y = 0$.

5.4 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)
01/01/2017~31/12/2017	74,231	0	0	74,231
01/01/2018~31/12/2018	73,214	0	0	73,214
01/01/2019~31/12/2019	97,137	0	0	97,137
01/01/2020~31/12/2020	96,110	0	0	96,110
Total	340,692	0	0	340,692

This monitoring period started from 01/01/2017 to 31/12/2020, with totally 1,461 days. The annual average emission reductions estimated in the registered CDM PDD Version 3 dated 19/08/2011 is 107,695 tCO₂, so the amount of emission reductions for this monitoring period would be $107,695 \text{ tCO}_2\text{e} / 365 \text{ d} \times 1,461 \text{ d} = 431,075 \text{ tCO}_2\text{e}$. The actual emission reductions in this monitoring period (1,461 days) are 340,692 tCO₂e, which is 20.97% less than the estimation in the registered CDM PDD Version 3 dated 19/08/2011.