



**Verified Carbon
Standard**

BEIJING GUANTING WIND POWER PROJECT PHASE II AND PHASE II ADDITION



ClimateBridge

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Beijing Guanting Wind Power Project Phase II and Phase II addition (hereafter referred to as the Project), developed by Beijing Jingneng Clean Energy Co., Ltd., involves construction and operation of a wind power project that is sited on Northwest side of Beijing, the north bank of Guanting Reservoir which situated in south-east side of Langshan wind valley in Huailai County, Hebei Province, P.R. of China.

The Project consists of two parts as follows:

1) Beijing Guanting Wind Power Project Phase II (hereafter referred to as the Guanting Phase II): the Guanting Phase II has installed 33 sets of 1.5MW wind turbine-generator with a total installed capacity 49.5MW. The type of wind turbine and generator is Goldwind 82/1500.

2) Beijing Guanting Wind Power Project Phase II addition (hereafter referred to as the Phase II addition): the Phase II addition has installed 24 sets of 1.5MW wind turbine-generator with a total installed capacity of 36MW. The type of wind turbine and generator is Goldwind 82/1500.

The Project installed 57 sets of wind turbine-generators with unit capacity of 1.5MW. The total installed capacity is 85.5MW. The electricity generated by the Project is supplied to the NCPG. In the registered PD, the annual estimated electricity supplied to NCPG is 161,119MWh. The estimated emission reductions are 153,099 tCO_{2e} per year during the first crediting period and 133,229 tCO_{2e} per year during the second crediting period.

Relevant dates for the Project are shown as below:

Relevant Date	Guanting Phase II	Phase II addition
Construction start date	20-06-2009	01-07-2009
Commissioning date	23-12-2009	23-12-2009
Continued operation periods	20 years	20 years

This monitoring period covers the period from 01-07-2018 to 30-06-2021, which across both the 1st and 2nd crediting period. During this monitoring period, the project was implemented in accordance with the registered VCS PD. The Project has operated without any accidental or emergency events that might impact the accuracy and/or implementation of monitoring activities. The net electricity supplied to the power grid by the Project during this monitoring period is 487,639.323 MWh, and the emission reductions of the Project in this monitoring period are 429,882 tCO_{2e}.

1.2 Sectoral Scope and Project Type

Sectoral scope: 1 energy industries (Renewable sources).

Project type: Grid connected wind power project.

The project is not a grouped project.

1.3 Project Proponent

Organization name	Beijing Jingneng Clean Energy Co., Ltd
Contact person	GENG Yan
Title	Senior Director
Address	Xibahe Lane 6, Chaoyang District, Beijing, China
Telephone	010-85406130
Email	gengyan@bjnewenergy.com

1.4 Other Entities Involved in the Project

Organization name	Climate Bridge (Shanghai) Ltd.
Role in the Project	VCU buyer
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1.5 Project Start Date

23-12-2009 (operation start date).

1.6 Project Crediting Period

The 1st crediting period of the VCS project was from 23-12-2009 to 22-12-2019. And the 2nd crediting period is from 23-12-2019 to 22-12-2029.

Furthermore, the project was also registered as a CDM project with a seven year twice renewable project crediting period starting from 28-02-2011, it is not eligible for VCU issuance beyond the end of those 21 years. The end date of the 2nd VCS crediting period is within the end of 21 years CDM crediting period.

1.7 Project Location

The Project is sited on Northwest side of Beijing, the north bank of Guanting Reservoir which is situated in south-east side of Langshan wind valley in Huailai County, Hebei Province, with geographical coordinates of north latitude of 40.3192°~40.3507° and east longitude of 115.6112°~115.6999° for the Guanting Phase II and with north latitude of 40.3263°~40.3499° and east longitude of 115.5734°~115.6144° for the Phase II addition. The central geographical coordinates for the Guanting Phase II are north latitude 40.3375° and east longitude 115.6750°, while the central geographical coordinates for the Phase II addition are north latitude 40.3381° and east longitude 115.6029°.

1.8 Title and Reference of Methodology

For the 1st crediting period:

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

Tool to calculate the emission factor for an electricity system version 02.

For the 2nd crediting period:

Applied methodology and tools: ACM0002 Grid-connected electricity generation from renewable sources (version 20.0)

Tool to calculate the emission factor for an electricity system (version 07.0)

Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (Version 03.0)

The applied methodology and tool can be found from the following link:

<https://cdm.unfccc.int/methodologies/PAmethodologies/approved>

1.9 Participation under other GHG Programs

The project is a registered CDM project with reference No. 4413, the detailed information can be found at <https://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1296190714.03/view?cp=1>.

The emission reductions during period 28-02-2011 to 27-07-2012 have been issued as CERs under CDM program.

All emission reductions during this monitoring period have not and will not seek CDM CER issuance. Emission reductions during this monitoring period will only seek issuance under VCS program.

1.10 Other Forms of Credit

Not applicable.

Emission Trading Programs and Other Binding Limits

The project does not reduce GHG emissions from activities that are included in an emissions trading program or any other mechanism that includes GHG allowance trading.

Other Forms of Environmental Credit

The project has not sought or received another form of GHG-related environmental credit, including renewable energy certificates, during this monitoring period.

1.11 Sustainable Development

The development and implementation of the Project fits into the priority areas of the development of China's energy industry. The Project not only supplies renewable electricity to grid, but also contributes to sustainable development of the local community, the host country by means of:

- Compared to conventional power generation, reducing the emission of other pollutants resulting from the power generation industry in China, the preliminary estimate of which can reach pollutant reduction of SO₂ and NO_x.
- Helping to stimulate the growth of the wind power industry in China, encouraging and promoting the technological progress and commercial popularization of renewable energy generating technologies in China.
- Creating local employment opportunities during assembling and installing the generating equipment and during the project construction and operation period as well as simulating the development of local tourism industry.
- Providing 20 long-term positions during the operation of the Project.

2 SAFEGUARDS

2.1 No Net Harm

The Environmental Impact Assessment (EIA) of the project has been conducted and approved by local government officials. The EIA report has assessed every possible aspect of environmental impact of the project and recommended corresponding measures, where applicable. The

environmental impacts, treatment and effect arising from the Project during operation are analyzed below:

Noise

Noise of environmental background in the region of the Project is around 50dB. Noise value at 160m from the turbine is close to that of environmental background. And there are no environmental protection objectives within the range of 500m outside the site, so the impact from operation of the Project on the atmospheric environment is little.

Dust and exhaust gas

By means of driving turbines by wind to generate electricity, the Project itself will not generate dust and exhaust gas.

Waste water

During the operation phase the wastewater mainly from sewage, it will be used for the greening work after being treated by sewage disposal system and Aerobic biological device. As a result of direct-drive turbine, during repair process little water of oil sales will be produced. The Project satisfied level I standard of the Integrated Wastewater Discharge Standard (GB8978).

Solid waste

After the Project is put into operation, electric boilers will be used for heating generation, thus no discarded residue will be generated. There remains only the household garbage which will be collectively disposed in order to eliminate the impact of household garbage on the environment.

Electromagnetic impact

The speed of the turbines of the Project is small and strength of electromagnetic induction is less than 4V/m, so there is no effect on nearby residents.

Ecological impact

The project site is not on the migration route of migratory bird, there is no wild birds given state-level priority protection nearby, and the height of fans installed is lower than that at which migratory birds fly, spatial area of the fans is relatively small, therefore migration or flight of birds will not be impacted.

Furthermore, the project makes positive contribute to the sustainable development as described in section 1.11 of this report.

In conclusion, the project has no negative impacts on local environment and socio-economy. No net harm on local environment and social community has been detected for the project.

2.2 Local Stakeholder Consultation

LSC prior to the project implementation

Local stakeholder consultation has been conducted in August 2009. All comments received have been well addressed. Please refer to section E of the CDM-PDD (version 5.4 dated 13/01/2011) of the project for detailed information.

LSC during the operation period

Communications with Local stakeholders have been carried out at periodic intervals. Key implementation schedules and changes of the project have been communicated to the local authority, the neighbourhood committee, and local residents. The comments and suggestions from residents were collected by the local authority, if any.

The project owner carried out questionnaire survey for the local stakeholders to collect the relevant comments and suggestions every two or three years. The local authority also conducts spot checks on the implementation of the project at periodic intervals as per relevant regulations. There have been no negative comments received for the project so far.

In line with VCS requirements all the processes have been implemented to receive comments from local stakeholders as well as communicate with them at periodic intervals.

2.3 AFOLU-Specific Safeguards

Not applicable.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

57 sets of wind turbine-generators with unit capacity of 1.5MW have been installed at the project site. The electricity generated by the Project is supplied to the NCPG.

Wind turbines and generators employed by the Project are manufactured by Xinjiang Goldwind Science and Technology Co., Ltd. Technical parameters of the key equipment employed by the Project are illustrated below.

Item		Unit	Value
Wind turbine	Mode	-	Goldwind 82/1500
	Rotor diameter	m	82
	Rated Power	MW	1.5
	Rated wind speed	m/s	10.3
	Hub height	m	65

	Quantity	-	57
Generator	Type	-	Permanent-magnet synchronous generator
	Rated Power	MW	1.5
	Rated Voltage	V	690
	Quantity	-	57

During this monitoring period, the project was implemented in accordance with the registered VCS PD. The Project has operated without any accidental or emergency events that might impact the GHG emission reductions or removals and monitoring.

3.2 Deviations

3.2.1 Methodology Deviations

As plant specific fuel consumption and electricity generation data are not publicly available in China, the Guidance caused by DNV's request for deviation of Chinese project activities for the baseline methodology AM0005 has been applied for calculating the build margin (BM) emission factor of this project activity. Moreover, the result of BM and OM are sourced from local government.

The deviation has no impact on conservativeness of the quantification of GHG emission reductions or removals.

3.2.2 Project Description Deviations

The project is registered under VCS Version 3.1 and completed validation before 19/03/2020. thus, it remains eligible to apply the crediting period requirements under VCS version 3.1 which shall be a maximum of ten years and may be renewed at most twice, so the 1st renewable crediting period of the project should be updated from 23-12-2009 ~ 27-02-2011 to 23-12-2009 ~ 22-12-2019. And the 2nd crediting period is from 23-12-2019 to 22-12-2029.

In the registered CDM-PDD, the electricity supplied to the No. 2 main transformer by the Project ($EG_{Pjtotrans,y}$) is monitored by 10 electricity meters (M9/M9' – M13/M13') installed at line 1-line 5 of the project. And $EG_{Pjtotrans,y}$ is calculated as follows:

$$\begin{aligned}
 EG_{PhaseI totrans,y} &= EG_{Line1 totrans,y} + EG_{Line2 totrans,y} + EG_{Line3 totrans,y} \\
 EG_{PhaseIadtotrans,y} &= EG_{Line4 totrans,y} + EG_{Line5 totrans,y} \\
 EG_{Pjtotrans,y} &= EG_{PhaseI totrans,y} + EG_{PhaseIadtotrans,y}
 \end{aligned}$$

Where

$EG_{Line1 totrans,y}$ is the electricity supply by line 1 of the Guanting Phase II measured by M9/M9';

$EG_{Line2 totrans,y}$ is the electricity supply by line 2 of the Guanting Phase II measured by M10/M10';

$EG_{Line3totrans,y}$ is the electricity supply by line 3 of the Guanting Phase II measured by M11/M11';

$EG_{Line4totrans,y}$ is the electricity supply by line 4 of the Phase II addition measured by M12/M12';

$EG_{Line5totrans,y}$ is the electricity supply by line 5 of the Phase II addition measured by M13/M13'.

However, the readings of the 10 electricity meters (M9/M9' – M13/M13') were not recorded during this monitoring period, hence alternative measure is adopted for the monitoring of $EG_{PJtotrans,y}$ during this monitoring period.

Electricity generated by the project and Yanqing project is supplied to the grid through No. 2 main transformer. Electricity meters M7/M8 with accuracy of 0.2S have been installed at the outlet of No. 2 main transformer to measure the total electricity supplied by the project and Yanqing project ($EG_{PJ+Yqtotrans,y}$). Meters M14/M14' with accuracy of 0.5S have been installed at the transmission line (line 6) of the Yanqing project to measure the electricity supplied to No. 2 main transformer by Yanqing project ($EG_{Yanqingtotrans,y}$), hence the electricity supplied to No. 2 main transformer by the project ($EG_{PJtotrans,y}$) is calculated as the difference of $EG_{PJ+Yqtotrans,y}$ and $EG_{Yanqingtotrans,y}$, shown as below.

$$EG_{PJtotrans,y} = EG_{PJ+Yqtotrans,y} - EG_{Yanqingtotrans,y}$$

The 10 electricity meters (M9/M9' – M13/M13') are no longer included in the monitoring system of the project during this monitoring period, calibration information of the 10 meters does not need to be reported in this monitoring report.

The monitoring of remaining data and parameters in the registered PD during this monitoring period is in compliance with the registered monitoring plan.

This deviation from the registered monitoring plan does not impacts the applicability of the methodology, additionality or the appropriateness of the baseline scenario. The deviation also does not lower the accuracy and conservativeness of the monitoring system and the project remains in compliance with VCS Program rules.

In the renewed VCS PD of the 2nd crediting period, the monitoring plan has been revised as per the deviation to reflect the actual implementation of the monitoring system.

3.3 Grouped Projects

Not applicable.

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 /MWh
Description	Combined margin CO ₂ emission factor of the power grid in year y
Source of data	2009 Baseline Emission Factors for Regional Power Grids in China published by China DNA (for 1 st crediting period) 2019 Baseline Emission Factors for Regional Power Grids in China published by China DNA (for 2 nd crediting period)
Value applied	0.950225 (for 1 st crediting period) 0.8269 (for 2 nd crediting period)
Justification of choice of data or description of measurement methods and procedures applied	Official data published by government official
Purpose of Data	Calculation of baseline emissions
Comments	Ex-ante determined and fixed for the 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	Calculated based on measurements from more than one electricity meters
Description of measurement methods and procedures to be applied	Calculated based on measurements from more than one electricity meters
Frequency of monitoring/recording	Continuously measured and monthly recorded
Value monitored	487,639.323
Monitoring equipment	-

QA/QC procedures to be applied	-
Purpose of the data	Calculation of baseline emissions
Calculation method	Calculated as per equation below: $EG_{facility,y} = EG_{totalto\ grid,y} \times \frac{EG_{PJtotrans,y}}{EG_{PJ+Yqtotrans,y} + EG_{Guantingtotrans,y} - EG_{gridtotal,y}}$ $EG_{totalto\ grid,y}$: Electricity supplied to the grid by the Project and other projects in year y. $EG_{PJtotrans,y}$: Electricity supplied to No. 2 main transformer by the Project in year y. $EG_{PJ+Yqtotrans,y}$: Electricity supplied by the Project and the Yanqing Project in year y. $EG_{Guantingtotrans,y}$: Electricity supplied by Guanting project in year y $EG_{gridtotal,y}$ is the quantity of electricity consumed by the Project and other projects from the grid in year y, this is conservative
Comments	-

Data / Parameter	$EG_{Yanqingtotrans,y}$		
Data unit	MWh		
Description	Electricity supplied to No. 2 main transformer by Yanqing project in year y		
Source of data	Electricity meters M14/M14'		
Description of measurement methods and procedures to be applied	Directly measured by electricity meters with precision no lower than 0.5s installed at the line 6. The proportion of data to be monitored is 100% and the data will be archived electronically and kept during the crediting period and 2 years after.		
Frequency of monitoring/recording	Continuously measured and monthly recorded and aggregated. Designated staff of project owner read the meter readings of Meter M14/M14' monthly and recorded in the monthly reading record.		
Value monitored	77,280.000		
Monitoring equipment	Electricity meter	M14	M14'
	Type	ZMD	ZMD
	Serial Number	96716065	96716082
	Accuracy	0.5S	0.5S

	Calibration frequency	Annually	Annually
	Calibration date	17-01-2018	17-01-2018
		13-12-2018	13-12-2018
		12-11-2019	12-11-2019
		10-10-2020	10-10-2020
	Calibration validity	16-01-2019	16-01-2019
		12-12-2019	12-12-2019
		11-11-2020	11-11-2020
		09-10-2021	09-10-2021
QA/QC procedures to be applied	Cross check by readings from meter M14 and meter M14'. Electricity meters were calibrated at periodic intervals.		
Purpose of the data	Calculation of baseline emissions		
Calculation method	-		
Comments	-		

Data / Parameter	<i>EG_{Guantingtotrans,y}</i>		
Data unit	MWh		
Description	Electricity supplied by Guanting project in year y		
Source of data	Electricity meters M5/M6		
Description of measurement methods and procedures to be applied	Directly measured by electricity meters with precision 0.2s installed at No. 1 main transformer. The proportion of data to be monitored is 100% and the data will be archived electronically and kept during the crediting period and 2 years after.		
Frequency of monitoring/recording	Continuously measured and monthly recorded and aggregated. Designated staff of project owner read the meter readings of Meter M5/M6 monthly and recorded in the monthly reading record.		
Value monitored	259,586.600		
Monitoring equipment	Electricity meter	M5	M6
	Type	DTSD341	DTSD341
	Serial Number	2005665309	2005665308
	Accuracy	0.2S	0.2S
	Calibration frequency	Annually	Annually
	Calibration date	17-01-2018	17-01-2018
		13-12-2018	13-12-2018
		12-11-2019	12-11-2019
		10-10-2020	10-10-2020
	Calibration validity	16-01-2019	16-01-2019
		12-12-2019	12-12-2019

		11-11-2020 09-10-2021	11-11-2020 09-10-2021
QA/QC procedures to be applied	Cross check by readings from meter M5 and meter M6. Electricity meters were calibrated at periodic intervals.		
Purpose of the data	Calculation of baseline emissions		
Calculation method	-		
Comments	-		

Data / Parameter	$EG_{PJ+Yqtotrans,y}$		
Data unit	MWh		
Description	Electricity supplied by the Project and the Yanqing Project in year y		
Source of data	Electricity meters M7/M8		
Description of measurement methods and procedures to be applied	Directly measured by electricity meters with precision 0.2s installed at No. 2 main transformer. The proportion of data to be monitored is 100% and the data will be archived electronically and kept during the crediting period and 2 years after.		
Frequency of monitoring/recording	Continuously measured and monthly recorded and aggregated. Designated staff of project owner read the meter readings of Meter M7/M8 monthly and recorded in the monthly reading record.		
Value monitored	578,586.400		
Monitoring equipment	Electricity meter	M7	M8
	Type	DTSD341	DTSD341
	Serial Number	2005665307	2005665310
	Accuracy	0.2S	0.2S
	Calibration frequency	Annually	Annually
	Calibration date	17-01-2018 13-12-2018 12-11-2019 10-10-2020	17-01-2018 13-12-2018 12-11-2019 10-10-2020
	Calibration validity	16-01-2019 12-12-2019 11-11-2020 09-10-2021	16-01-2019 12-12-2019 11-11-2020 09-10-2021
QA/QC procedures to be applied	Cross check by readings from meter M7 and meter M8. Electricity meters were calibrated at periodic intervals.		
Purpose of the data	Calculation of baseline emissions		
Calculation method	-		

Comments	-
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Data / Parameter	$EG_{PJtotrans,y}$
Data unit	MWh
Description	Electricity supplied to No. 2 main transformer by the Project in year y
Source of data	Calculated from $EG_{Yanqingtotrans,y}$ and $EG_{PJ+Yqtotrans,y}$
Description of measurement methods and procedures to be applied	-
Frequency of monitoring/recording	Monthly recorded and aggregated.
Value monitored	501,306.400
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of the data	Calculation of baseline emissions
Calculation method	$EG_{PJtotrans,y} = EG_{PJ+Yqtotrans,y} - EG_{Yanqingtotrans,y}$
Comments	-

Data / Parameter	$EG_{totaltoGrid,y}$
Data unit	MWh
Description	Electricity supplied to the grid by the Project and other projects in year y
Source of data	Electricity meters M1/M3
Description of measurement methods and procedures to be applied	Directly measured by gateway meters with precision 0.2s. The proportion of data to be monitored is 100% and the data will be archived electronically and kept during the crediting period and 2 years after.
Frequency of monitoring/recording	Continuously measured and monthly recorded and aggregated. Designated staff of project owner read the meter readings of Meter M1/M3 monthly and recorded in the monthly reading record. The monthly meter readings of M1/M3 were transmitted to the Grid company automatically through remote control system. Sales receipts were issued after confirmation of the meter readings by both parties.
Value monitored	828,933.600

Monitoring equipment	Electricity meter	M1	M3
	Type	DTSD51	DTSD51
	Serial Number	2001124467	2001124470
	Accuracy	0.2S	0.2S
	Calibration frequency	Annually	Annually
	Calibration date	17-01-2018	17-01-2018
		13-12-2018	13-12-2018
		12-11-2019	12-11-2019
10-10-2020		10-10-2020	
Calibration validity	16-01-2019	16-01-2019	
	12-12-2019	12-12-2019	
	11-11-2020	11-11-2020	
	09-10-2021	09-10-2021	
QA/QC procedures to be applied	Cross check by sales receipts. Electricity meters were calibrated at periodic intervals.		
Purpose of the data	Calculation of baseline emissions		
Calculation method	-		
Comments	-		

Data / Parameter	<i>EG_{Gridtotal,y}</i>		
Data unit	MWh		
Description	Electricity consumed by the Project and other projects from the grid in year y		
Source of data	Electricity meters M2/M4		
Description of measurement methods and procedures to be applied	Directly measured by gateway meters with precision 0.2s. The proportion of data to be monitored is 100% and the data will be archived electronically and kept during the crediting period and 2 years after.		
Frequency of monitoring/recording	Continuously measured and monthly recorded and aggregated. Designated staff of project owner read the meter readings of Meter M2/M4 monthly and recorded in the monthly reading record. The monthly meter readings of M2/M4 were transmitted to the Grid company automatically through remote control system. Sales receipts were issued after confirmation of the meter readings by both parties		
Value monitored	8,113.600		
Monitoring equipment	Electricity meter	M2	M4
	Type	DTSD51	DTSD51

	Serial Number	2001124469	2001124468
	Accuracy	0.2S	0.2S
	Calibration frequency	Annually	Annually
	Calibration date	17-01-2018 13-12-2018 12-11-2019 10-10-2020	17-01-2018 13-12-2018 12-11-2019 10-10-2020
	Calibration validity	16-01-2019 12-12-2019 11-11-2020 09-10-2021	16-01-2019 12-12-2019 11-11-2020 09-10-2021
QA/QC procedures to be applied	Cross check by sales receipts. Electricity meters were calibrated at periodic intervals.		
Purpose of the data	Calculation of baseline emissions		
Calculation method	-		
Comments	-		

4.3 Monitoring Plan

Organizational structure

The monitoring of the emission reductions is carried out according to the scheme shown in figure 1. The project owner holds the overall responsibility for the monitoring process. The plant operation staff record the electricity exported to and imported from the grid and also keep record of daily operations of the Project.

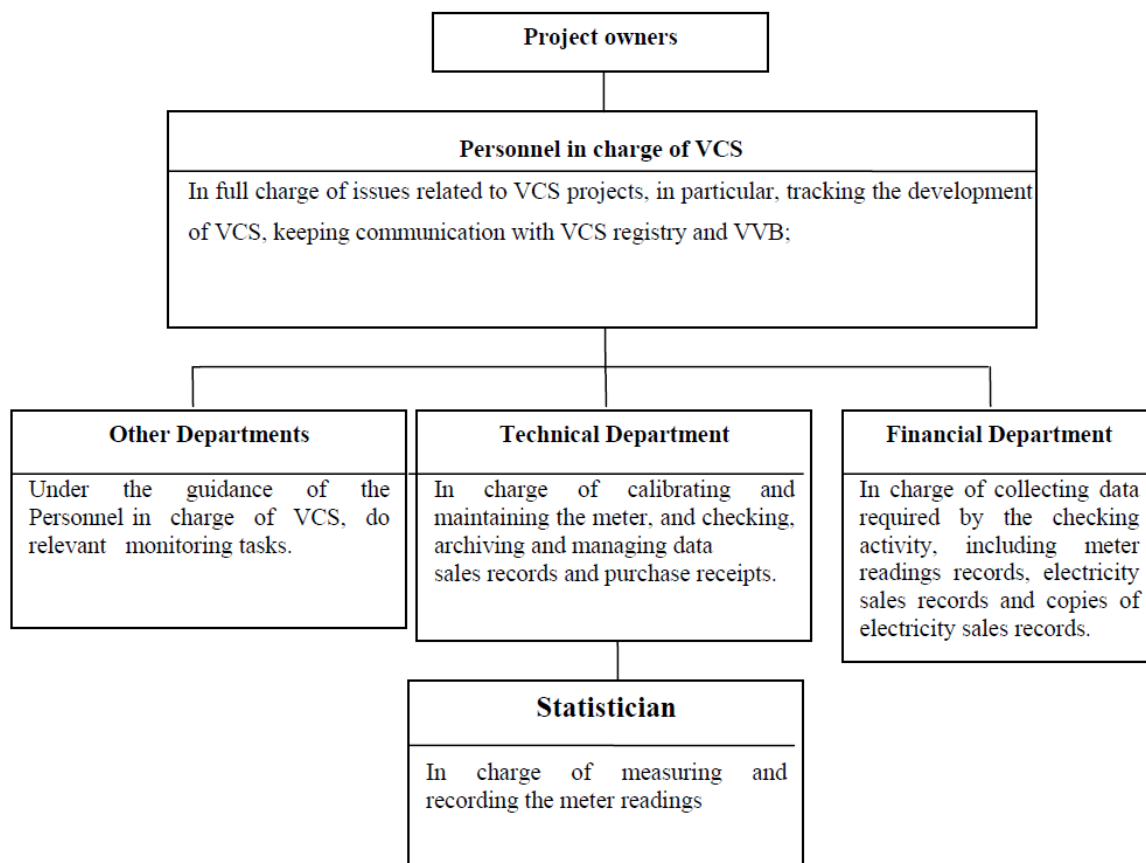


Figure 1 Management structure of the project

Monitoring system

The Project shares gateway meters with Yanqing Project and Guanting Project. The total electricity supplied to the grid by the Project, Yanqing Project and Guanting Project ($EG_{totalto\text{grid},y}$) is measured by gateway meters M1/M3 and electricity bought from the grid by the Project, Yanqing Project and Guanting Project ($EG_{gridto\text{total},y}$) is measured by gateway meters M2/M4. Meter M1/M3 and M2/M4 were installed at the 110kV substation of Beijing Guanting wind farm.

The electricity meters M5/M6 were installed at the outlet of No. 1 main transformer to measure the electricity supply of the Guanting Project ($EG_{Guantingto\text{trans},y}$).

Electricity generated by the project and Yanqing project is supplied to the grid through No. 2 main transformer. The electricity meters M7/M8 were installed at the outlet of No. 2 main transformer to measure the electricity supply of the Project and the Yanqing Project ($EG_{PJ+Yqto\text{trans},y}$). Meters M14/M14' were installed at the transmission line (line 6) of the Yanqing project to measure the electricity supplied to No. 2 main transformer by Yanqing project ($EG_{Yanqingto\text{trans},y}$), hence the electricity supplied to No. 2 main transformer by the project ($EG_{PJto\text{trans},y}$) is calculated as the difference of $EG_{PJ+Yqto\text{trans},y}$ and $EG_{Yanqingto\text{trans},y}$, shown as below.

$$EG_{PJtotrans,y} = EG_{PJ+Yqtotrans,y} - EG_{Yanqingtotrans,y} \quad (1)$$

The net electricity supplied to the grid by the project ($EG_{facility,y}$) is calculated as follows:

$$EG_{facility,y} = EG_{totaltogrid,y} \times \frac{EG_{PJtotrans,y}}{EG_{PJ+Yqtotrans,y} + EG_{Guantingtotrans,y}} - EG_{gridtotal,y} \quad (2)$$

The monitoring system of the project is shown in figure 2 below.

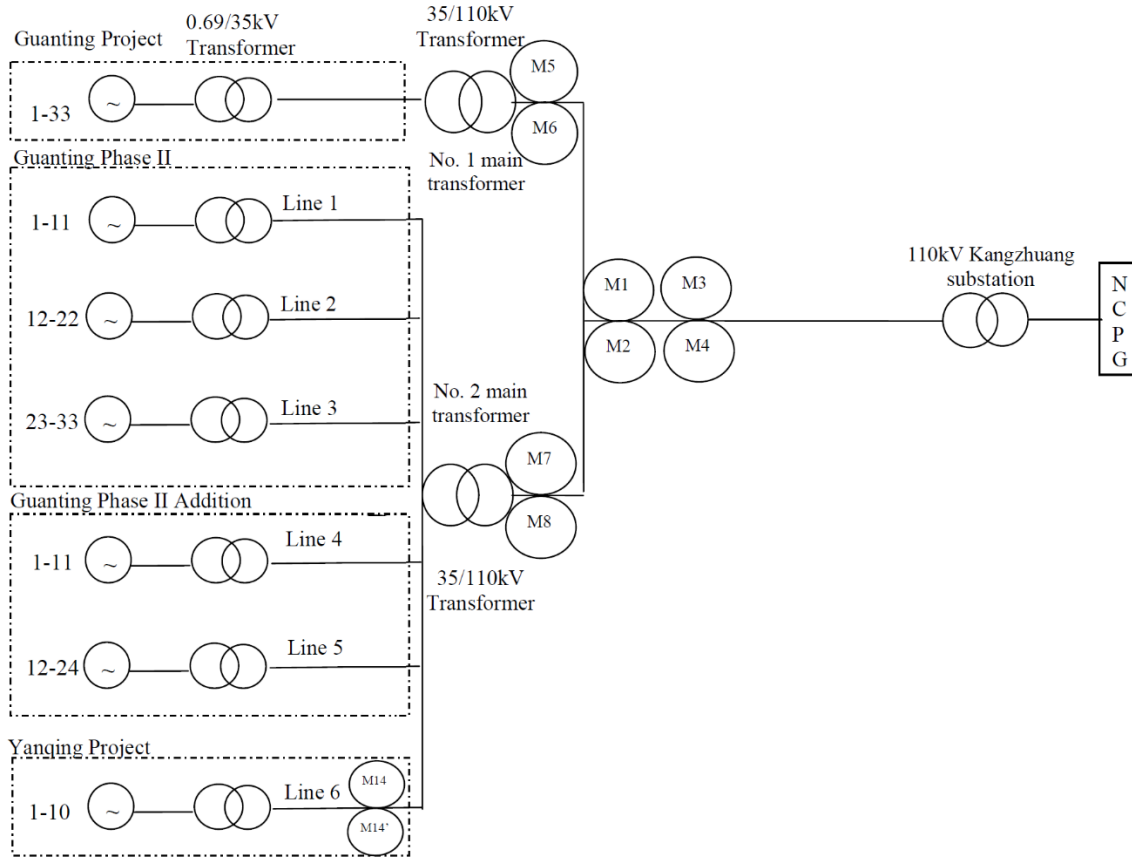


Figure 2 Monitoring system of the project

Installation and calibration of meters

All meters were installed as per the requirements of the Technical administrative code of electric energy metering (DL/T448). Calibration of meters has been carried out by qualified third party at periodic intervals to ensure the accuracy.

Data collection and QA/QC

The plant operation staff recorded meter readings from all meters involved monthly. Internal audit is to be carried out by designated staff to ensure the accurate data collection. The electricity transaction between the project proponent and the grid company are to be conducted monthly according to the meter readings of gateway meters. Sales receipts are to be issued accordingly.

All main meters have been equipped with backup meters. In case of main meter malfunctioning, meter readings from backup meters will be applied. In case of malfunctioning of both main meter and backup meter, the electricity will be determined as per the Power Purchase Agreement signed between the project owner and the local grid company.

Data Management System

Specific staff will be appointed by the project owner to take the overall responsibility for monitoring GHG emission reductions and keeping all the data collected as part of monitoring archived electronically and kept at least for two years after the end of the crediting period.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

As per the registered PD, the baseline emission of the project is calculated as below:

$$BE_y = EG_{facility,y} \times EF_{grid,CM,y} \quad (6)$$

$EG_{facility,y}$ is calculated as per equation (2), equation (4) and equation (5), $EF_{grid,CM,y}$ is determined ex-ante and fixed for the crediting period. The baseline emission of the project is calculated in the table 1 as below.

Table 1 Baseline Emission Calculation

Crediting Period	Year	$EG_{facility,y}$ (MWh)	$EF_{grid,CM,y}$ (tCO ₂ /MWh)	BE_y (tCO ₂)
1 st Crediting Period	01-07-2018 to 31-12-2018	69,293.900	0.950225	65,844
	01-01-2019 to 22-12-2019	146,846.477	0.950225	139,537
2 nd Crediting Period	23-12-2019 to 31-12-2019	5,111.637	0.8269	4,226
	01-01-2020 to 31-12-2020	165,111.069	0.8269	136,530
	01-01-2021 to 30-06-2021	101,276.240	0.8269	83,745
Total		487,639.323	-	429,882

The monitored values of parameters stated in section 4.2 of this report are shown in the table below:

Table 2 Monitored value of parameters

Years	$EG_{totalto\ grid,y}$ (MWh)	$EG_{gridto\ total,y}$ (MWh)	$EG_{PJ+Yqto\ trans,y}$ (MWh)	$EG_{Guantingto\ trans,y}$ (MWh)	$EG_{Yanqingto\ trans,y}$ (MWh)
01-07-2018 to 31-12-2018	120,639.200	1,610.400	83,661.200	38,441.200	11,877.600
01-01-2019 to 22-12-2019	249,896.100	2,749.100	174,412.000	78,454.600	23,031.400
23-12-2019 to 31-12-2019	9,237.500	58.100	6,263.600	3,089.800	1,029.000
01-01-2020 to 31-12-2020	281,890.400	2,428.800	196,296.800	88,611.600	26,959.800
01-01-2021 to 30-06-2021	167,270.400	1,267.200	117,952.800	50,989.400	14,382.200
Total	828,933.600	8,113.600	578,586.400	259,586.600	77,280.000

5.2 Project Emissions

As per the registered PD, no project emission is considered.

5.3 Leakage

As per the registered PD, no leakage is considered.

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)
01-07-2018 to 31-12-2018	65,844	0	0	65,844
01-01-2019 to 31-12-2019	143,763	0	0	143,763
01-01-2020 to 31-12-2020	136,530	0	0	136,530

01-01-2021 to 30-06-2021	83,745	0	0	83,745
Total	429,882	0	0	429,882

Comparison of actual emission reduction and the estimation in the registered PD.

Years	Emission reduction achieved (tCO ₂)	Estimated ER in registered PD (tCO ₂)	Difference
01-07-2018 to 30-06-2021	429,882	429,084	0.19%

The actual emission reduction achieved during this monitoring period is 0.19% higher than the estimation for the same period in the registered CDM-PDD. Refer to ER calculation spreadsheet for detailed calculation process. There's no significant increase.