



**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 estimated annual feed-in electricity of is 161.119GWh and the total emission reductions are 153,099tCO_{2e} per year.

Relevant dates for the Project is 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

During this monitoring period (28-07-2012 to 30-06-2018), the monitoring activities were conducted strictly in accordance with the monitoring plan in the registered 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 978,874.77MWh; the emission reductions of the Project in this monitoring period are 930,149tCO_{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
Contact person	Gao Zhiwen
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

23-12-2009 (operation start date).

1.6 Project Crediting Period

The project crediting period is ten years, twice renewable for a total of 30 years. However, as the project is also registered as a CDM project with a seven year twice renewable project crediting

period, it is not eligible for VCU issuance beyond the end of those 21 years. The project's first crediting period is from 23-12-2009 to 22-12-2019.

1.7 Project Location

The Project is sited on Northwest side of Beijing, the north bank of Guanting Reservoir which is sited 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

Applied methodology 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.

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

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 of the project for detailed information.

Communications with Local stakeholders are being carried out at periodic intervals. Key implementation schedules or changes of the project will be communicated to the local authority, who will inform the neighborhood committee and local residents, the comments and suggestions from residents will be collected by the local authority meanwhile. In this monitoring period, the project owner carried out questionnaire survey for the local stakeholders to collect the relevant comments and suggestions every two years. Meanwhile, the local authority has also conducted spot checks on the implementation of the project from time to time as per the request from the local governments' regulations. There were no negative comments received for the project.

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 monitoring activities were conducted strictly in accordance with the monitoring plan in the registered 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 first renewable crediting period of the project should be updated from 23-12-2009 ~ 27-02-2011 to 23-12-2009 ~ 22-12-2019.

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:

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

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';

$EG_{Line3 totrans,y}$ is the electricity supply by line 3 of the Guanting Phase II measured by M11/M11';

$EG_{Line4 totrans,y}$ is the electricity supply by line 4 of the Phase II addition measured by M12/M12';

$EG_{Line5 totrans,y}$ 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.

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
Value applied	0.950225
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	Fixed for the first crediting period

4.2 Data and Parameters Monitored

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. From 28-07-2012 to 27-11-2012, the meter readings will be recorded at 24:00 hr of 27th of a month. For the rest months in this monitoring period, the meter readings will be recorded at 24:00 hr of last day of the each month.		
Value monitored	Year	Monitored Value	
	2012	15,225.688	
	2013	33,325.716	
	2014	28,392.547	
	2015	30,592.780	
	2016	24,299.703	
	2017	24,043.600	
	2018	13,055.000	
	Total	168,935.034	
	Monitoring equipment	Electricity meter	M14
Serial Number		96716065	96716082
Accuracy		0.5S	0.5S
Calibration frequency		Annually	Annually
Calibration date		17-01-2012	17-01-2012
		17-01-2013	17-01-2013
		17-01-2014	17-01-2014
	17-01-2015	17-01-2015	
	17-01-2016	17-01-2016	

		17-01-2017	17-01-2017
		17-01-2018	17-01-2018
	Calibration validity	16-01-2013	16-01-2013
		16-01-2014	16-01-2014
		16-01-2015	16-01-2015
		16-01-2016	16-01-2016
		16-01-2017	16-01-2017
		16-01-2018	16-01-2018
		16-01-2019	16-01-2019
QA/QC procedures to be applied	Cross check by readings from the electricity meter M14 and the electricity meter M14'.		
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. From 28-07-2012 to 27-11-2012, the meter readings will be recorded at 24:00 hr of 27th of a month. For the rest months in this monitoring period, the meter readings will be recorded at 24:00 hr of last day of the each month.		
Value monitored	Year	Monitored Value	
	2012	44,245.985	
	2013	105,652.437	
	2014	87,522.947	
	2015	79,375.657	

	2016	75,895.988	
	2017	83,361.200	
	2018	48,302.800	
	Total	524,357.014	
Monitoring equipment	Electricity meter	M5	M6
	Serial Number	2005665309	2005665308
	Accuracy	0.2S	0.2S
	Calibration frequency	Annually	Annually
	Calibration date	17-01-2012	17-01-2012
		17-01-2013	17-01-2013
		17-01-2014	17-01-2014
		17-01-2015	17-01-2015
		17-01-2016	17-01-2016
		17-01-2017	17-01-2017
		17-01-2018	17-01-2018
	Calibration validity	16-01-2013	16-01-2013
		16-01-2014	16-01-2014
		16-01-2015	16-01-2015
		16-01-2016	16-01-2016
		16-01-2017	16-01-2017
		16-01-2018	16-01-2018
		16-01-2019	16-01-2019
QA/QC procedures to be applied	Cross check by readings from the electricity meter M5 and the electricity meter M6		
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. From 28-07-2012 to 27-11-2012, the meter readings will be recorded at 24:00 hr of 27th of a month. For the rest months in this monitoring period, the meter readings will be recorded at 24:00 hr of last day of the each month.		
Value monitored	Year	Monitored Value	
	2012	97,087.450	
	2013	239,145.962	
	2014	202,246.714	
	2015	176,108.025	
	2016	174,385.012	
	2017	189,503.000	
	2018	112,621.600	
	Total	1,191,097.763	
Monitoring equipment	Electricity meter	M7	M8
	Serial Number	2005665307	2005665310
	Accuracy	0.2S	0.2S
	Calibration frequency	Annually	Annually
	Calibration date	17-01-2012 17-01-2013 17-01-2014 17-01-2015 17-01-2016 17-01-2017 17-01-2018	17-01-2012 17-01-2013 17-01-2014 17-01-2015 17-01-2016 17-01-2017 17-01-2018
	Calibration validity	16-01-2013 16-01-2014 16-01-2015 16-01-2016	16-01-2013 16-01-2014 16-01-2015 16-01-2016

		16-01-2017	16-01-2017
		16-01-2018	16-01-2018
		16-01-2019	16-01-2019
QA/QC procedures to be applied	Cross check by readings from the electricity meter M7 and the electricity meter M8		
Purpose of the data	Calculation of baseline emissions		
Calculation method	-		
Comments	-		

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	Year	Monitored Value	
	2012	81,861.762	
	2013	205,820.246	
	2014	173,854.167	
	2015	145,515.245	
	2016	150,085.309	
	2017	165,459.400	
	2018	99,566.600	
	Total	1,022,162.729	
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	<i>EG_{totaltoGrid,y}</i>																													
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. From 28-07-2012 to 27-11-2012, the monthly cut-off time was 24:00 hr of 27th of a month. For the rest months in this monitoring period, the cut-off time was 24:00 hr of the last day of each month.																													
Value monitored	<table><tr><td>Year</td><td colspan="2">Monitored Value</td></tr><tr><td>2012</td><td colspan="2">135,757.600</td></tr><tr><td>2013</td><td colspan="2">330,739.200</td></tr><tr><td>2014</td><td colspan="2">278,951.200</td></tr><tr><td>2015</td><td colspan="2">246,708.000</td></tr><tr><td>2016</td><td colspan="2">246,998.400</td></tr><tr><td>2017</td><td colspan="2">269,702.400</td></tr><tr><td>2018</td><td colspan="2">159,139.200</td></tr><tr><td>Total</td><td colspan="2">1,667,996.000</td></tr></table>			Year	Monitored Value		2012	135,757.600		2013	330,739.200		2014	278,951.200		2015	246,708.000		2016	246,998.400		2017	269,702.400		2018	159,139.200		Total	1,667,996.000	
Year	Monitored Value																													
2012	135,757.600																													
2013	330,739.200																													
2014	278,951.200																													
2015	246,708.000																													
2016	246,998.400																													
2017	269,702.400																													
2018	159,139.200																													
Total	1,667,996.000																													
Monitoring equipment	<table><tr><td>Electricity meter</td><td>M1</td><td>M3</td></tr><tr><td>Serial Number</td><td>2001124467</td><td>2001124470</td></tr><tr><td>Accuracy</td><td>0.2S</td><td>0.2S</td></tr><tr><td>Calibration frequency</td><td>Annually</td><td>Annually</td></tr><tr><td>Calibration date</td><td>17-01-2012</td><td>17-01-2012</td></tr><tr><td></td><td>17-01-2013</td><td>17-01-2013</td></tr></table>			Electricity meter	M1	M3	Serial Number	2001124467	2001124470	Accuracy	0.2S	0.2S	Calibration frequency	Annually	Annually	Calibration date	17-01-2012	17-01-2012		17-01-2013	17-01-2013									
Electricity meter	M1	M3																												
Serial Number	2001124467	2001124470																												
Accuracy	0.2S	0.2S																												
Calibration frequency	Annually	Annually																												
Calibration date	17-01-2012	17-01-2012																												
	17-01-2013	17-01-2013																												

		17-01-2014	17-01-2014
		17-01-2015	17-01-2015
		17-01-2016	17-01-2016
		17-01-2017	17-01-2017
		17-01-2018	17-01-2018
	Calibration validity	16-01-2013	16-01-2013
		16-01-2014	16-01-2014
		16-01-2015	16-01-2015
		16-01-2016	16-01-2016
		16-01-2017	16-01-2017
		16-01-2018	16-01-2018
		16-01-2019	16-01-2019
	QA/QC procedures to be applied	Cross check by sales receipts	
	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. From 28-07-2012 to 27-11-2012, the monthly cut-off time was 24:00 hr of 27th of a month. For the rest months in this monitoring period, the cut-off time was 24:00 hr of the last day of each month.

Value monitored	Year	Monitored Value	
	2012	362.064	
	2013	2,472.800	
	2014	2,490.300	
	2015	2,868.800	
	2016	2,789.600	
	2017	2,604.800	
	2018	1,487.200	
	Total	15,075.564	
Monitoring equipment	Electricity meter	M2	M4
	Serial Number	2001124469	2001124468
	Accuracy	0.2S	0.2S
	Calibration frequency	Annually	Annually
	Calibration date	17-01-2012	17-01-2012
		17-01-2013	17-01-2013
		17-01-2014	17-01-2014
		17-01-2015	17-01-2015
		17-01-2016	17-01-2016
		17-01-2017	17-01-2017
		17-01-2018	17-01-2018
	Calibration validity	16-01-2013	16-01-2013
		16-01-2014	16-01-2014
		16-01-2015	16-01-2015
		16-01-2016	16-01-2016
		16-01-2017	16-01-2017
		16-01-2018	16-01-2018
		16-01-2019	16-01-2019
QA/QC procedures to be applied	Cross check by sales receipts		
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. Beijing Jingneng Clean Energy Co., Ltd. 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.

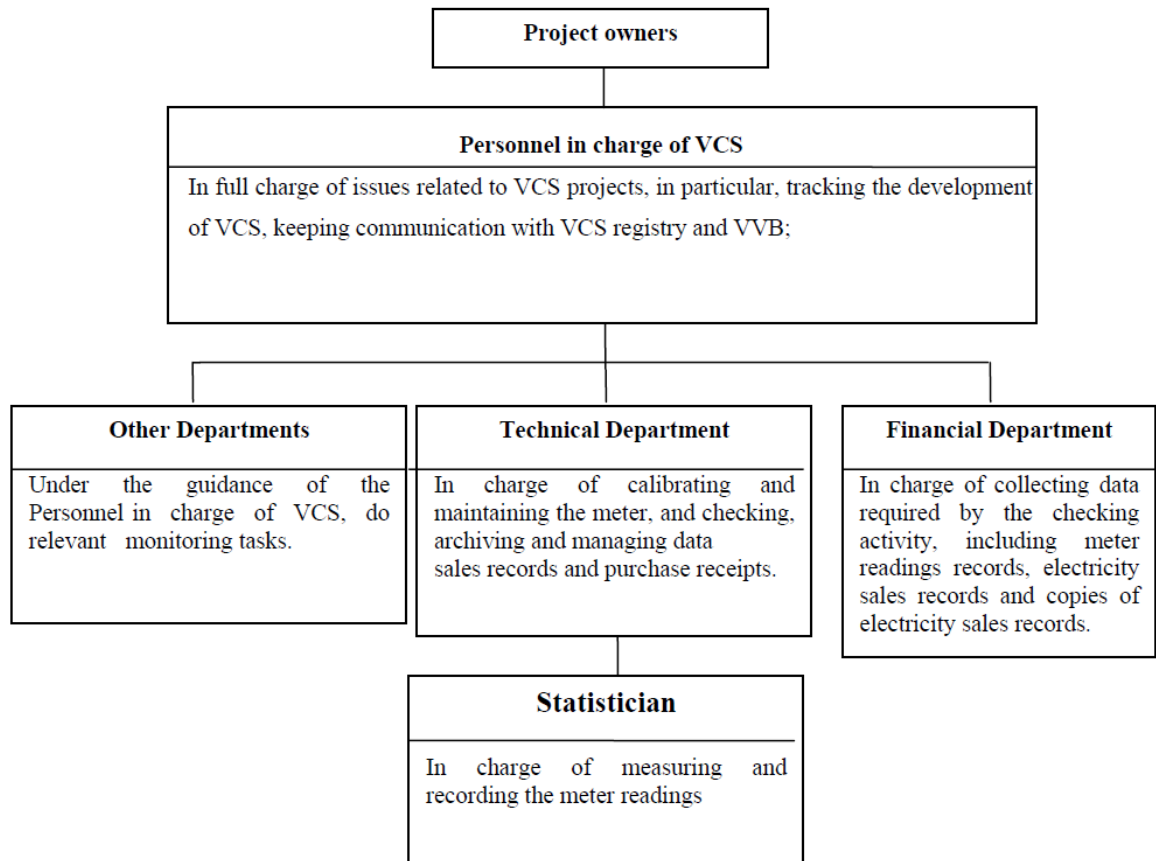


Figure 1 Management structure of the project

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 ($EG_{grid\text{to}total,y}$) 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 ($EG_{Guantingtotrans,y}$).

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 ($EG_{PJ+Yqtotrans,y}$). 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 ($EG_{Yanqingtotrans,y}$), 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.

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

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

$$EG_{facility,y} = EG_{PJtogrid,y} - EG_{gridtoPJ,y} \quad (2)$$

$$EG_{gridtoPJ,y} = EG_{gridtototal,y} \quad (3)$$

$$EG_{PJtogrid,y} = EG_{PJ+Yqtogrid,y} \times \frac{EG_{PJtotrans,y}}{EG_{PJ+Yqtotrans,y}} \quad (4)$$

$$EG_{PJ+Yqtogrid,y} = EG_{totaltogrid,y} \times \frac{EG_{PJ+Yqtotrans,y}}{EG_{PJ+Yqtotrans,y} + EG_{Guantingtotrans,y}} \quad (5)$$

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

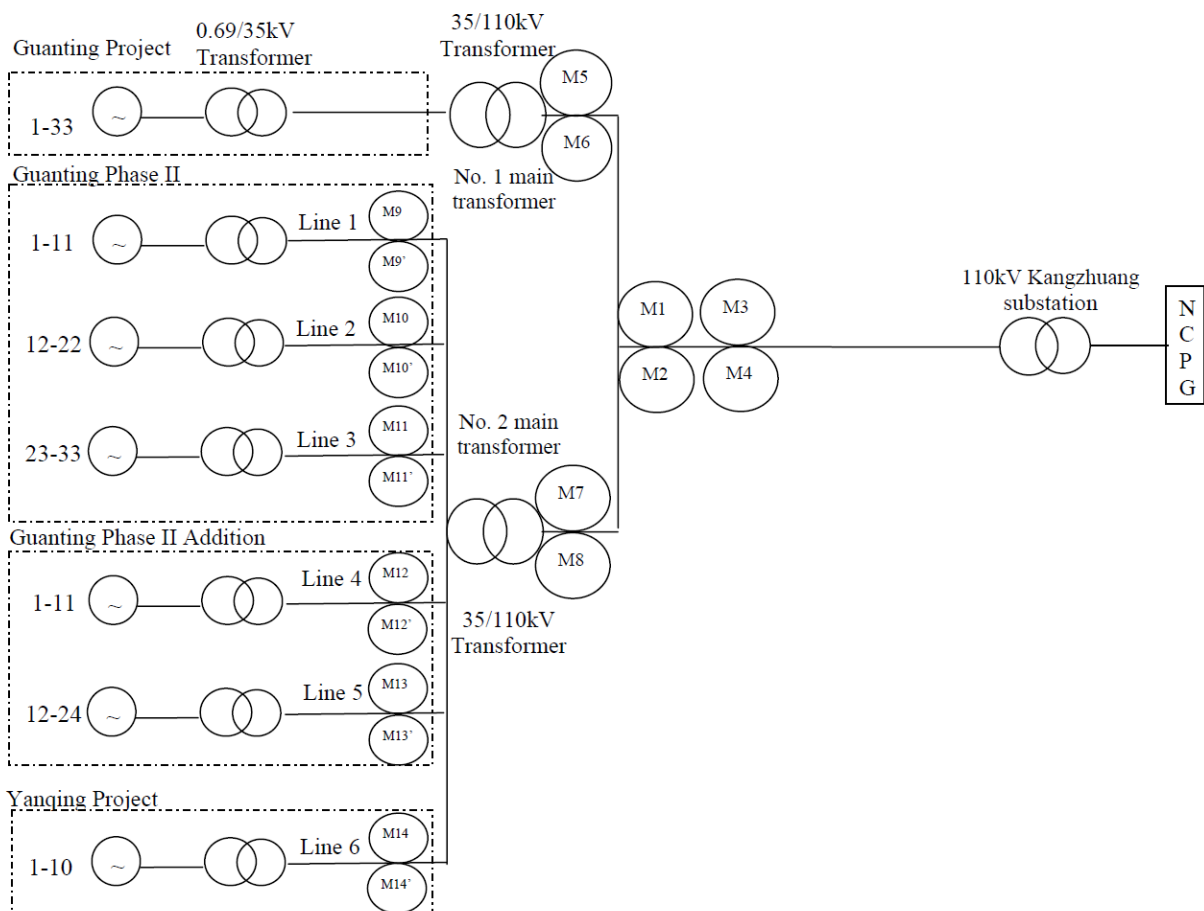


Figure 2 Monitoring system of the project

Data collection and QA/QC procedures

The plant operation staff recorded meter readings from all meters involved monthly. The electricity transaction between the project proponent and the grid company was conducted monthly according to the meter readings of gateway meters. Sales receipts were issued accordingly.

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 project proponent periodically to ensure the accuracy. All main meters have been equipped with backup meters. In case of main meter malfunctioning, meter readings from backup meters will be applied.

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 first crediting period. The baseline emission of the project is calculated in the table 1 as below.

Table 1 Baseline Emission Calculation

Years	$EG_{facility,y}$ (MWh)	$EF_{grid,CM,y}$ (tCO ₂ /MWh)	BE_y (tCO ₂)
28-07-2012 to 31-12-2012	78,312.52	0.950225	74,414
01-01-2013 to 31-12-2013	194,935.99	0.950225	185,233
01-01-2014 to 31-12-2014	164,811.14	0.950225	156,607
01-01-2015 to 31-12-2015	137,632.88	0.950225	130,782
01-01-2016 to 31-12-2016	145,308.08	0.950225	138,075
01-01-2017 to 31-12-2017	160,909.33	0.950225	152,900
01-01-2018 to 30-06-2018	96,964.83	0.950225	92,138
Total	978,874.77	-	930,149

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	$EG_{totaltogrid,y}$ (MWh)	$EG_{gridtototal,y}$ (MWh)	$EG_{PJ+Yqtotrans,y}$ (MWh)	$EG_{Guantingtotrans,y}$ (MWh)	$EG_{Yanqingtotrans,y}$ (MWh)
28-07-2012 to 31-12-2012	135,757.600	362.064	97,087.450	44,245.985	15,225.688
01-01-2013 to 31-12-2013	330,739.200	2,472.800	239,145.962	105,652.437	33,325.716
01-01-2014 to 31-12-2014	278,951.200	2,490.300	202,246.714	87,522.947	28,392.547
01-01-2015 to 31-12-2015	246,708.000	2,868.800	176,108.025	79,375.657	30,592.780

01-01-2016 to 31-12-2016	246,998.400	2,789.600	174,385.012	75,895.988	24,299.703
01-01-2017 to 31-12-2017	269,702.400	2,604.800	189,503.000	83,361.200	24,043.600
01-01-2018 to 30-06-2018	159,139.200	1,487.200	112,621.600	48,302.800	13,055.000
Total	1,667,996.000	15,075.56 4	1,191,097.76 3	524,357.014	168,935.034

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)
28-07-2012 to 31-12-2012	74,414	0	0	74,414
01-01-2013 to 31-12-2013	185,233	0	0	185,233
01-01-2014 to 31-12-2014	156,607	0	0	156,607
01-01-2015 to 31-12-2015	130,782	0	0	130,782
01-01-2016 to 31-12-2016	138,075	0	0	138,075
01-01-2017 to 31-12-2017	152,900	0	0	152,900

01-01-2018 to 30-06-2018	92,138	0	0	92,138
Total	930,149	0	0	930,149

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
28-07-2012 to 30-06-2018	930,149	907,089	2.54%

The actual emission reduction achieved during this monitoring period is 2.54% 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. The difference is due to fluctuation of wind source at the project and is within reasonable variation range.