

MONITORING REPORT

Beijing Guanting Wind Power Project Phase II and Phase II addition

Reference number: 4413

Monitoring period: (23/12/2009 - 27/02/2011)

Project Title	Beijing Guanting Wind Power Project Phase II and Phase II addition
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PROJECT DETAILS

Summary Description of 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 was commenced on 23/12/2009, The Project has been registered as a CDM project on 28/02/2011¹(UNFCCC registration reference number: 4413).

The Project consists of two projects as follows:

- 1) Beijing Guanting Wind Power Project Phase II (hereafter referred to as the Guanting Phase II), the purpose of Guanting Phase II is to install 33 sets of 1.5MW wind turbine-generator and the total installed capacity is 49.5MW. The operation was started on 23/12/2009.
- 2) Beijing Guanting Wind Power Project Phase II addition (hereafter referred to as the Phase II addition), the purpose of Phase II addition is to install 24 sets of 1.5MW wind turbine-generator and the total installed capacity is 36MW. The operation was started on 23/12/2009.

The total installed capacity of the Project is 85.5MW. 57 sets of wind turbine with unit capacity of 1.5MW were installed by the Project to generate clean renewable electricity. The electricity generated by the Project is supplied to the North China Power Grid (NCPG), displacing part of electricity generated by NCPG which is dominated by fossil fuel fired power plants.

Wind turbines and their corresponding generators employed by the Project were provided by Xinjiang Goldwind Science and Technology Co., Ltd.

Relevant dates for the project activity is as below:

Construction start date: the Guanting Phase II is 20/06/2009, Phase II addition is 07/2009

Commissioning start date: 23/12/2009

Continued operation periods: 20 years

During the monitoring period (23/12/2009 - 27/02/2011), the monitoring activities were conducted strictly in accordance with the monitoring plan in the registered PDD. The Project has operated without any accidental or emergency events that might impact the accuracy and/or implementation of monitoring activities. The net feed-in electricity during this period is 221,132.97MWh. The total emission reductions in this monitoring period are 210,126tCO₂e.

¹ <http://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1296190714.03/view>

Sectoral Scope and Project Type

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

Project Proponent

Organization:	Beijing Jingneng Clean Energy Co., Ltd.
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Other Entities Involved in the Project

There is no any other project participant(s).

Project Start Date

23/12/2009

Project Location

The Project 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, with geographical coordinates of north latitude of 40.3192°~40.3507° and east longitude of 115.6112°~115.6999° for Guanting Phase II and with north latitude of 40.3263°~40.3499° and east longitude of 115.5734°~115.6144° for Phase II addition. The central geographical coordinates for Guanting Phase II are north latitude 40.3375° and east longitude 115.6750°, while the central geographical coordinates for Phase II

addition are north latitude 40.3381° and east longitude 115.6029°.

According to the methodology ACM0002, the spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the project power plant is connected to.

Title and Reference of Methodology

Approved consolidated baseline and monitoring methodology ACM0002 version 11-*Consolidated baseline methodology for grid-connected electricity generation from renewable sources*.

IMPLEMENTATION STATUS

Implementation Status of the Project Activity

Guanting Phase II and Phase II addition started operation on 23/12/2009, and shares the gateway meters with Beijing 48MW Guanting Wind Power Project(ref no. 2013)(hereafter referred to as the Guanting Project) since 23/12/2009. Two pairs of new bi-directional meters with accuracy 0.2S were installed at the outlet of the No.1 main transformer(main meter M5/ backup meter M6), the on-site main transformer of the Guanting Project, and the No.2 main transformer(main meter M7/ backup meter M8), to which the Project was connected.

Yanqing Project started operation on 23/08/2010, connected to the No.2 main transformer and share the electricity meters (main meter M7/ backup meter M8) with the Project. So, 6 pairs of new electricity meters(i.e. M9/M9' to M14/M14') with accuracy 0.5S were installed at each line from line 1 to line 6 (line 1-line 3 for the Guanting Phase II, line 4 and line 5 for the Guanting Phase II addition, line 6 for the Yanqing Project) respectively to measure the electricity supplied by the Project and the Yanqing Project. But the installation of M9/M9'-M13/M13' is later than 23/08/2010, and the readings from M9/M9'-M13/M13' are inaccurate before 21/12/2010, so, the calculation of the electricity exported by the Project to the North China Power Grid in the monitoring report is deviated from the monitoring plan of the registered PDD, and the conservativeness of the deviation was demonstrated in section 4.1 Baseline Emission.

Gateway meters M1/M3 and M2/M4 with accuracy 0.2S recorded the total feed-in electricity and total electricity imported by the Project and other Projects respectively.

The Project had been in normal operation during the monitoring period, without special events such as overhaul or exchange of equipment. There were no events or situations which may impact the applicability of the methodology.

Deviations from the Monitoring Plan

There is no deviation applied to this monitoring period.

Grouped Project

The Project is not a grouped project.

DATA AND PARAMETERS

Data and Parameters Available at Validation

Data Unit / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO ₂ e/MWh
Description:	Baseline emission factor of NCPG in the monitoring period.
Source of data:	<i>Notification on 2008 baseline emission factors for regional power grids in China</i> , issued by China on July 18, 2008 and updated on Dec 30, 2008 and the registered PDD.
Value applied:	0.950225
Purpose of the data:	This data is used for baseline emission calculations
Any comment:	This parameter is ex ante determined in PDD and fixed during the first crediting period.

Data and Parameters Monitored

Data / Parameter:	$EG_{Guanting to trans,y}$
Data unit:	MWh
Description:	Electricity supplied by the Guanting Project in the monitoring period.
Source of data:	Measured by the electricity meters M5/M6
Description of measurement methods and procedures to be applied:	The readings of electricity meter will be continuously measured and monthly recorded. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
Frequency of monitoring/recording:	Continuously measured and monthly recorded
Value monitored:	135,176.80

Monitoring equipment:	The main meter (M5) is a bidirectional meter. Type: electricity meter Accuracy class: 0.2S Serial number: 2005665309 Calibration frequency: at least annually Calibration date: 01/12/2009, 20/04/2010 and 01/01/2011. Calibration validity: till 31/12/2011 The backup meter (M6) is a bidirectional meter. Type: electricity meter Accuracy class: 0.2S Serial number: 2005665308 Calibration frequency: at least annually Calibration date: 01/12/2009, 20/04/2010, and 01/01/2011. Calibration validity:till 31/12/2011
QA/QC procedures applied:	The accuracy of meters is 0.2S, which is consistent with Technical administrative code of electric energy metering (DL/T448-2000). Meters will be calibrated as per the requirement of Technical administrative code of electric energy metering (DL/T448-2000). Data measured by meters will be cross checked by electricity transaction notes.
Calculation method (if applicable):	NA
Any comment:	

Data / Parameter:	$EG_{PJ+Yqto trans,y}$
Data unit:	MWh
Description:	The electricity exported by the Project and the Yanqing Project to the outlet of No.2 main transformer, measured by the meter M7 installed at the outlet of No.2 main transformer.
Source of data:	Measured by the electricity meters M7/M8
Description of measurement methods and procedures to be applied:	The readings of electricity meter will be continuously measured and monthly recorded. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.

Frequency of monitoring/recording:	Continuously measured and monthly recorded.
Value monitored:	242,721.8
Monitoring equipment:	The monitoring meter (M7) is a bidirectional meter. Type: electricity meter Accuracy class: 0.2S Serial number: 2005665307 Calibration frequency: at least annually Calibration date: 01/12/2009, 20/04/2010 and 01/01/2011. Calibration validity: till 31/12/2011 The backup meter (M8) is a bidirectional meter. Type: electricity meter Accuracy class: 0.2S Serial number: 2005665310 Calibration frequency: at least annually Calibration date: 01/12/2009, 20/04/2010 and 01/01/2011. Calibration validity: till 31/12/2011
QA/QC procedures applied:	The accuracy of meters is 0.2S, which is consistent with Technical administrative code of electric energy metering (DL/T448-2000). According to Technical administrative code of electric energy metering (DL/T448-2000), meters will be calibrated at least annually. Data measured by meters will be cross checked by electricity transaction notes.
Calculation method (if applicable):	NA
Any comment:	

Data / Parameter:	$EG_{totaltoGrid,y}$
Data unit:	MWh
Description:	Total electricity exported by the Project and other Projects to the North China Power Grid, measured by the meters M1/M3
Source of data:	Measured by the electricity meter M1.
Description of measurement methods and procedures to be applied:	The readings of the electricity meter will be continuously measured and monthly recorded. Data

	will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
Frequency of monitoring/recording:	Continuously measured and monthly recorded.
Value(s) of monitored parameter:	377,819.75
Monitoring equipment:	The monitoring meter (M1) is a bidirectional meter. Type: electricity meter Accuracy class: 0.2S Serial number: 2001124467 Calibration frequency: at least annually Calibration date: 13/11/2009, 20/04/2010, and 01/01/2011. Calibration validity: till 31/12/2011. The backup meter (M3) is a bidirectional meter. Type: electricity meter Accuracy class: 0.2S Serial number: 2001124470 Calibration frequency: at least annually Calibration date: 13/11/2009, 20/04/2010 and 01/01/2011. Calibration validity: till 31/12/2011.
QA/QC procedures applied:	The accuracy of meters is 0.2S, which is consistent with Technical administrative code of electric energy metering (DL/T448-2000). According to Technical administrative code of electric energy metering (DL/T448-2000), meters will be calibrated at least annually. Data measured by meters will be cross checked by electricity transaction notes and the sum of $EG_{Guantingtotrans,y}$ and $EG_{PJ+Yqtotrans,y}$, the conservative value between them will be adopted.
Calculation method (if applicable):	NA
Any comment:	
Data / Parameter:	$EG_{Gridtototal,y}$
Data unit:	MWh

Description:	Total electricity imported by the Project and other Projects from the North China Power Grid, measured by the meter M2.
Source of data:	Measured by the electricity meter M2.
Description of measurement methods and procedures to be applied:	The readings of electricity meter will be continuously measured monthly recorded. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
Frequency of monitoring/recording:	Continuously measured and monthly recorded.
Value(s) of monitored parameter:	1,971.20
Monitoring equipment:	The monitoring meter (M2) is a bidirectional meter. Type: electricity meter Accuracy class: 0.2S Serial number: 2001124469 Calibration frequency: at least annually Calibration date: 13/11/2009, 20/04/2010, 01/01/2011. Calibration validity: till 31/12/2011. The backup meter (M4) is a bidirectional meter. Type: electricity meter Accuracy class: 0.2S Serial number: 2001124468 Calibration frequency: at least annually Calibration date: 13/11/2009, 20/04/2010 and 01/01/2011. Calibration validity: till 31/12/2011.
QA/QC procedures applied:	The accuracy of meters is 0.2S, which is consistent with Technical administrative code of electric energy metering (DL/T448-2000). According to Technical administrative code of electric energy metering (DL/T448-2000), meters will be calibrated at least annually. Data measured by meters will be cross checked by electricity transaction notes.
Calculation method (if applicable):	NA
Any comment:	

Data / Parameter:	$EG_{Yanqingto trans,y}$
Data unit:	MWh
Description:	Electricity supplied by Yanqing Project in the monitoring period.
Source of data:	Measured by the electricity meter M14. Measured by the electricity meter M14/M14'
Description of measurement methods and procedures to be applied:	The readings of electricity meter was continuously measured and monthly recorded. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
Frequency of monitoring/recording:	Continuously measured and monthly recorded.
Value monitored:	19,591.60
Monitoring equipment:	The main meter (M14) is a bidirectional meter. Type: electricity meter Accuracy class: 0.5S Serial number: 96716065 Calibration frequency: at least annually Calibration date: 19/08/2010, 20/12/2010 Calibration validity: till 19/12/2011 The backup meter (M14') is a bidirectional meter. Type: electricity meter Accuracy class: 0.5S Serial number: 96716082 Calibration frequency: at least annually Calibration date: 19/08/2010, 20/12/2010 Calibration validity: till 19/12/2011
QA/QC procedures applied:	The accuracy of meters is 0.5S, which is consistent with Technical administrative code of electric energy metering (DL/T448-2000). Meters will be calibrated as per the requirement of Technical administrative code of electric energy metering (DL/T448-2000). Data measured by meters will be cross checked by electricity transaction notes.
Calculation method (if applicable):	NA
Any comment:	

Description of the Monitoring Plan

1. Data collection procedures

The electric energy metering system was equipped according to the requirements of the *Technical administrative code of electric energy metering* (DL/T448-2000).

Guanting Phase II and Phase II addition shares the gateway meters with Guanting Project since 23/12/2009. Two pairs of new bi-directional meters with accuracy 0.2S were installed at the outlet of the No.1 main transformer(main meter M5/ backup meter M6), the on-site main transformer of Guanting Project, and the No.2 main transformer(main meter M7/ backup meter M8), to which the Project was connected.

On 23/08/2010, Yanqing Project was operated and connected to the No.2 main transformer and share the electricity meters (main meter M7/ backup meter M8) with the Project. So, 1 pair of new electricity with accuracy 0.5S was installed at the line 6 for measuring the electricity delivered by the Yanqing Project. In 12/2010, for satisfying the requirement of the monitoring plan of the registered PDD, 5 pairs of new electricity meters (i.e. M9/M9' to M13/M13') with accuracy 0.5S were installed at each line from line 1 to line 5 (line 1-line 3 for the Guanting Phase II, line 4 and line 5 for the Guanting Phase II addition) respectively to measure the electricity supplied by the Project. But the installation of M9/M9'-M13/M13' is later than 23/08/2010, and the readings from M9/M9'-M13/M13' are inaccurate before 21/12/2010, so, the calculation of the electricity exported by the Project to the North China Power Grid in the monitoring report is deviated from the monitoring plan of the registered PDD, and the conservativeness of the deviation was demonstrated in section 4.1 Baseline Emission.

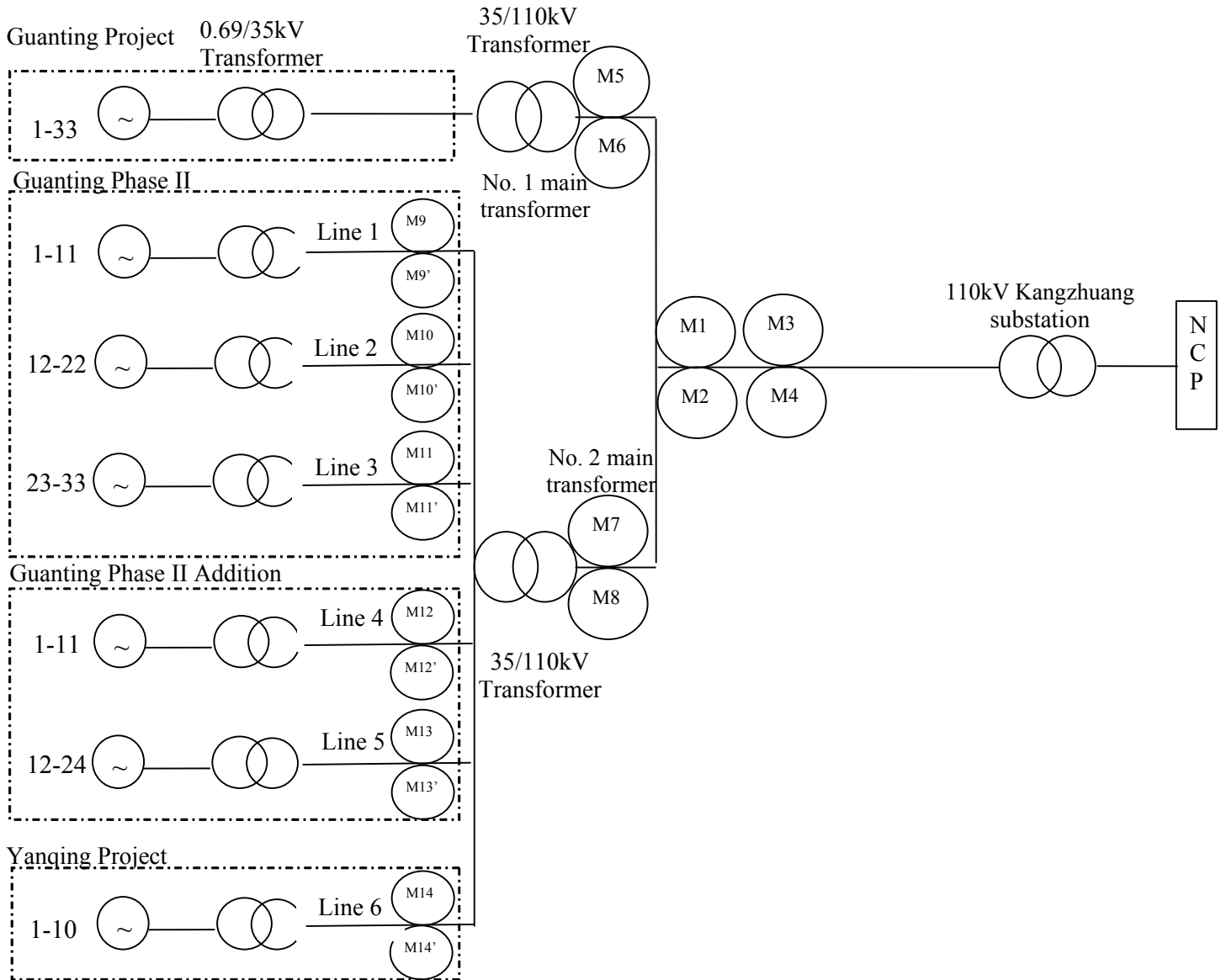
Gateway meters M1/M3 and M2/M4 with accuracy 0.2S recorded the total feed-in electricity and total electricity imported by the Project and other Projects respectively. The electricity supplied to the grid by the Guanting project ($EG_{GuantingtoTrans,y}$), Yanqing Project ($EG_{YanqingtoTrans,y}$), total electricity exported by the Project and other Projects to the North China Power Grid($EG_{totaltoGrid,y}$) and that bought from the grid ($EG_{GridtoPJ,y}$) by the Project will be directly measured by gateway meters installed at the inlet of kangzhuang Substation. The net feed-in electricity ($EG_{facility,y}$) will be obtained using formula $EG_{facility,y} = EG_{PJtoGrid,y} - EG_{GridtoPJ,y}$. The measured electricity will be double checked by the receipts of electricity purchase and sale. For the relevant monitoring requirements, please refer to the Power Purchase Agreement of the Project. The project owner ensures that all of the readings of electricity meters are available for DOE's verification.

Please see table 2 and figure 2 for more details.

Table 2. Meter equipments in the Project.

Meter	Serial number	Description	Accuracy Class
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M1	2001124467	Main meter to record the total electricity exported by the Project and other projects to the North China Power Grid. Controlled by the grid company.	0.2S
M2	2001124469	Main meter to record the electricity imported by the Project and other projects from the grid. Controlled by the grid company.	0.2S
M3	2001124470	Back up meter of M1. Controlled by the grid company.	0.2S
M4	2001124468	Back up meter for M2. Controlled by the grid company.	0.2S
M5	2005665309	Main meter to record the electricity exported by the Guanting Project to No.1 main transformer, installed at the outlet of No.1 main transformer.	0.2S
M6	2005665308	Back up meter of M5.	0.2S
M7	2005665307	Main meter to record the electricity exported by the Project and other projects to No.2 main transformer, installed at the outlet of No.2 main transformer.	0.2S
M8	2005665310	Back up meter of M7.	0.2S
M14	96716065	Main meter M14 to record the electricity exported by the Yanqing project to No.2 main transformer, installed at the inlet of No.2 main transformer.	0.5S
M14'	96716082	Back up meter of M14	0.5S



Note: The No. 1 main transformer and the No. 2 main transformer are located at the 110kV substation of Beijing Guanting Wind Farm one by one, and all of meters are located at the Substation.

Meters M5/M6 are installed at the outlet of No. 1 main transformer, meters M7/M8 are installed at the outlet of No. 2 main transformer, meters M1-M4 are installed near to M5-M8. The meters M1-M8 are located at one cabinet(110kV Line cabinet). So, the line loss from M5/M6 and M7/M8 to M1-M4 is same and can be omitted.

Those meters M9/M9'-M14/M14' are installed the inlet of the No. 2 main transformer. Those meters M9/M9'-M14/M14' are located at one room. The distance between the room M1-M8 located and the room M9/M9'-M14/M14' located is no more than 30m.

Figure 2. The connection structure and the meter location

2. Organizational structure

The monitoring of the emission reductions is carried out according to the scheme shown in figure 3. 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.

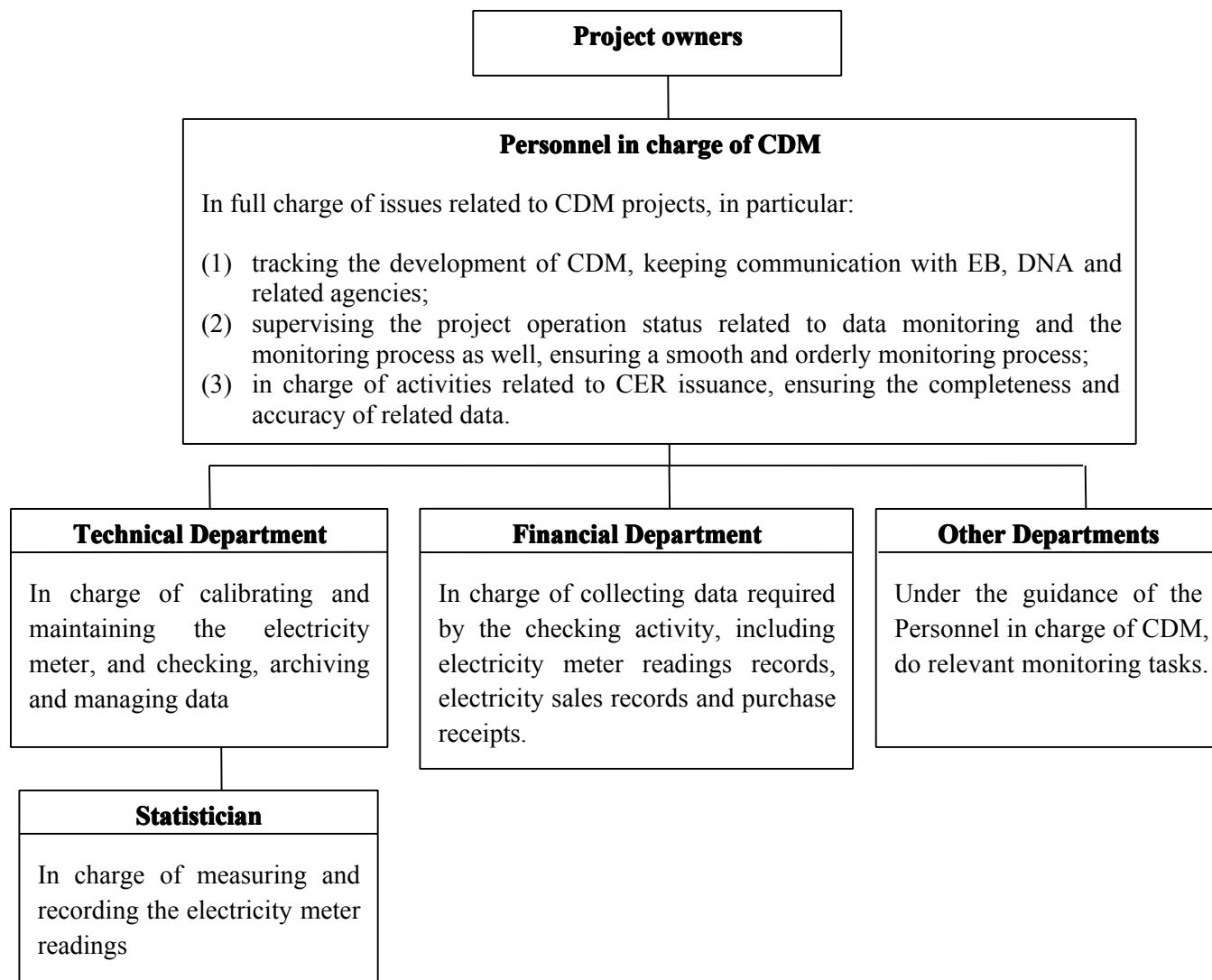


Figure 3. Management Structure of Monitoring Plan

3. Emergency procedures

Note: M1/M3 and M2/M4 record the feed-in electricity and the electricity bought from the grid of the Project, Guanting Project and Yanqing Project; M5/M6 records the feed-in electricity from Guanting Project; M7/ M8 records the feed-in electricity of the Project and Yanqing Project; M14/ M14' records the feed-in electricity of Yanqing Project. When main meters are under malfunction, the readings of backup meters will be used.

QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

Baseline Emissions

Baseline emissions in the monitoring period are calculated by multiplying the fixed baseline emission factor determined in the registered PDD of the project ex ante by net electricity supplied by the Project to the NCPG in the monitoring period.

$$BE_y = EG_y \times EF_y \quad (1)$$

$$EG_y = EG_{facility,y} = EG_{PJtoGrid,y} - EG_{GridtoPJ,y} \quad (2)$$

So,

$$BE_y = (EG_{PJtoGrid,y} - EG_{GridtoPJ,y}) \times EF_y \quad (3)$$

Where

BE_y Baseline emissions of the Project in the monitoring period.

$EG_{PJtoGrid,y}$ Electricity exported by the Project to the North China Power Grid.

$EG_{GridtoPJ,y}$ Electricity imported by the Project from the North China Power Grid.

$EG_{facility,y}$ Net electricity exported by the Project to the North China Power Grid.

EG_y is net quantity of electricity supplied by the Project to the North China Power Grid during the year y in MWh.

EF_y Baseline emission factor in the monitoring period (calculated ex-ante and will not be changed during the first crediting period). As per the registered PDD of the project the value is 0.950225tCO₂e/MWh.

(1) From 23/12/2009 to 22/08/2010, Yanqing Project was not operated. The electricity exported by the Project to the North China Power Grid after sharing gateway meters with other projects is calculated as follow:

$$EG_{PJtoGrid,y} = \frac{EG_{totaltoGrid,y}}{EG_{PJtotrans,y} + EG_{Guantingtotrans,y}} \times EG_{PJtotrans,y} \quad (4)$$

(2) Since 23/08/2010, Yanqing Project was operated. From 23/08/2010 to 21/12/2010,, the electricity exported by the Project and Yanqing Project to the North China Power Grid is calculated as follow:

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

But the installation of M9/M9'-M13/M13' is later than 23/08/2010, and the readings from M9/M9'-M13/M13' are inaccurate before 21/12/2010,so, the calculation of the electricity exported by the Project was deviated from

$$EG_{PJtoGrid,y} = \frac{EG_{PJtotrans,y}}{EG_{PJtotrans,y} + EG_{Yanqingtotrans,y}} \times EG_{PJ+Yqto grid,y} \quad (6)$$

to

$$EG_{PJtoGrid,y} = EG_{PJ+Yqto grid,y} - EG_{Yanqingtotrans,y} \quad (7)$$

The calculation for $EG_{GridtoPJ,y}$ and $EG_{facility,y}$ was consistent with the monitoring plan of the registered PDD:

$$EG_{GridtoPJ,y} = EG_{Gridtotal,y}, \text{ for conservativeness.} \quad (8)$$

$$EG_{facility,y} = EG_{PJtoGrid,y} - EG_{GridtoPJ,y} \quad (9)$$

The calculation of the electricity exported by the Project is not consistent with the monitoring plan of the registered PDD, but the calculation method is conservative. The conservativeness was demonstrated as follow:

As per the registered PDD

$$EG_{Phase1totrans,y} = EG_{Line1totrans,y} + EG_{Line2totrans,y} + EG_{Line3totrans,y} \quad (10)$$

$$EG_{Phase4totrans,y} = EG_{Line4totrans,y} + EG_{Line5totrans,y} \quad (11)$$

$$EG_{PJtotrans,y} = EG_{Phase1totrans,y} + EG_{Phase4totrans,y} \quad (12)$$

$$EG_{PJ+Yqto grid,y} = \frac{EG_{PJ+Yqtotrans,y}}{EG_{PJ+Yqtotrans,y} + EG_{Guantingtotrans,y}} \times EG_{totaltoGrid,y} \quad (13)$$

$$EG_{PJtoGrid,y} = \frac{EG_{PJtotrans,y}}{EG_{PJtotrans,y} + EG_{Yanqingtotrans,y}} \times EG_{PJ+Yqto grid,y} \quad (6)$$

Where

$EG_{Line1totrans,y}$ is the electricity supply by line 1 of the Guanting Phase II measured by M9/M9’;

$EG_{Line2totrans,y}$ 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’;

$EG_{Yanqingtotrans,y}$ is the electricity supply by line 6 of the Yanqing Project to the No. 2 main transformer measured by M14/M14';

$EG_{PhaseIItotrans,y}$ is the electricity supply by the Guanting Phase II to the No. 2 main transformer;

$EG_{PhaseIIaddtotrans,y}$ is the electricity supply by the Phase II addition to the No. 2 main transformer;

$EG_{PJ+Yqtotrans,y}$ is the electricity supply by Guanting Phase II, Phase II addition and Yanqing Project to the No. 2 main transformer measured by M7/M8;

$EG_{Guantingtotrans,y}$ is the electricity supply by Guanting Project to the No. 1 main transformer measured by M5/M6;

$EG_{PJtotrans,y}$ is the electricity supply by the Project to the No. 2 main transformer;

$EG_{PJ+YqtoGrid,y}$ is the electricity supply of the Project and Yanqing Project to the grid;

$EG_{totaltoGrid,y}$ is the total electricity supply of the Project and other projects to the grid measured by M1/M3;

$EG_{Gridtotal,y}$ is total electricity bought by the Project and other projects from the grid measured by M2/M4;

$EG_{PJtoGrid,y}$ is the electricity supply by the Project to grid;

Consider the line loss and loss for transformer from meters of line i(i=1 to 5) to the meters(M7/M8), where we called loss together, then

$$EG_{PJ+YqtoGrid,y} = \sum_{i=1}^5 (EG_{Lineitotrans,y} - EG_{i,loss,y}) + (EG_{Yanqingtotrans,y} - EG_{Yanqing,loss,y}) \quad (14)$$

Defined

$$EG_{loss,y} = \sum_{i=1}^5 EG_{i,loss,y} + EG_{yanqing,loss,y} \quad (15)$$

Then, equation (14) was simplified as

$$EG_{PJ+YqtoGrid,y} = EG_{PJtotrans,y} - EG_{loss,y} = EG_{PJ+YqtoGrid,y} - EG_{Yanqingtotrans,y} \quad (16)$$

$$EG_{PJtotrans,y} - EG_{loss,y} = EG_{PJ+YqtoGrid,y} - EG_{Yanqingtotrans,y} \quad (17)$$

$EG_{i,loss}$ is the line loss and loss for transformer from meters installed at line i to the meter M7/M8;

$EG_{Yanqing,loss}$ is the line loss and loss for transformer from meters(M1/M14') installed at line i to the meter M7/M8;

$EG_{loss,y}$ the total energy loss of the Project and the Yanqing Project

As per equation(5) and (16)

$$\begin{aligned} EG_{PJtoGrid,y} &= \frac{EG_{PJtotrans,y}}{EG_{PJtotrans,y} + EG_{Yanqingtotrans,y}} \times EG_{PJ+YqtoGrid,y} \\ &= \frac{EG_{PJtotrans,y}}{EG_{PJtotrans,y} + EG_{Yanqingtotrans,y}} \times (EG_{PJtotrans,y} + EG_{Yanqingtotrans,y} - EG_{loss,y}) \\ &= EG_{PJtotrans,y} - \frac{EG_{PJtotrans,y}}{EG_{PJtotrans,y} + EG_{Yanqingtotrans,y}} \times EG_{loss,y} \\ &= EG_{PJtotrans,y} - \frac{1}{1 + \frac{EG_{Yanqingtotrans,y}}{EG_{PJtotrans,y}}} \times EG_{loss,y} \end{aligned}$$

As per the deviation in the monitoring report, i.e equation(7)

$$\begin{aligned} EG_{PJtoGrid,y} &= EG_{PJtotrans,y} + EG_{Yanqingtotrans,y} - EG_{loss,y} - EG_{Yanqingtotrans,y} \\ &= EG_{PJtotrans,y} - EG_{loss,y} \end{aligned}$$

Due to $EG_{Yanqingtotrans,y} \geq 0$, so, $1 + \frac{EG_{Yanqingtotrans,y}}{EG_{PJtotrans,y}} \geq 1$

Then

$$\begin{aligned} EG_{PJtotrans,y} - \frac{1}{1 + \frac{EG_{Yanqingtotrans,y}}{EG_{PJtotrans,y}}} \times EG_{loss,y} &\geq EG_{PJtotrans,y} - EG_{loss,y} \\ EG_{PJtotrans,y} - \frac{1}{1 + \frac{EG_{Yanqingtotrans,y}}{EG_{PJtotrans,y}}} \times EG_{loss,y} &\geq EG_{PJ+YqtoGrid,y} - EG_{Yanqingtotrans,y} \end{aligned}$$

So, the deviation in the monitoring report is conservative.

(3) From 21/12/2010 to 27/02/2011, the calculation of the electricity exported by the Project is consistent with the monitoring plan of the registered PDD, but the above calculation method is conservative and can still be applied to this period.

So, the $EG_{facility,y}$ are listed as follow:

Monitoring period	Exported	Imported	Net electricity
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	Electricity (MWh)	Electricity (MWh)	to the grid (MWh)
23/12/2009 to 27/02/2011	223,104.17	1,971.20	221,132.97

$$BE_y = 221,132.97 \times 0.950225 = 210,126 \text{ tCO}_2\text{e}$$

Project Emissions

The Project is a zero-emission renewable electricity generating activity. Therefore no emission from the project activity was identified, and $PE_y = 0$.

Leakage

According to the methodology ACM0002, the project leakage is not considered, and therefore, $L_y = 0$.

Summary of GHG Emission Reductions and Removals

$$ER_y = BE_y - PE_y$$

Total baseline emissions in the monitoring period: $BE_y = 210,126 \text{ tCO}_2\text{e}$

Total project emissions in the monitoring period: $PE_y = 0$

Total emission reductions in the monitoring period: $ER_y = 210,126 \text{ tCO}_2\text{e}$

ADDITIONAL INFORMATION

During the monitoring period (23/12/2009 to 27/02/2011), the emission reductions are 210,126 tCO₂e, about 16.23% higher than the ex-ante estimated emission reductions of the registered CDM-PDD.

The wind speed measurement data was provided to demonstrate that the excessive emission reduction was resulted from higher wind speed than that of the design representative year.

According to the local wind measurement data from December 2009 to February 2011 (shown in table 2) which is provided by local Meteorological station (Huailai Meteorological Station), the actual local wind speed from December 2009 to February 2011 is 3.49 m/s, much higher than the 30years historical average wind speed from Huailai Meteorological Station, 2.8m/s(1977-2006), The relevant wind speed data from Huailai Meteorological Station were listed as following:

Table 2. The wind speed from Dec, 2009 to Feb, 2011 from Huailai Meteorological Station

Year	2009.12	2010.01	2010.02	2010.03	2010.04	2010.05	2010.06	2010.07
Wind speed(m/s)	4.1	5.0	3.3	3.8	4.0	3.7	2.5	2.1
Year	2010.08	2010.09	2010.10	2010.11	2010.12	2011.01	2011.02	Average
Wind speed(m/s)	2.2	1.9	3.0	3.3	5.2	5.1	3.2	3.49

(Source: Huailai Meteorological Station, at 10m height)

Table 3 The historical month average wind speed (1977 to 2006)

from Huailai Meteorological Station

Month	1	2	3	4	5	6	7	8	9	10	11	12	Average
Wind speed(m/s)	3.5	3.2	3.1	3.9	2.5	2.2	2.1	1.7	1.4	2.0	4.1	3.6	2.8

(Source: Huailai Meteorological Station, at 10m height and FSR)

Table 4. The wind speed from 1977 to 2006 from Huailai Meteorological Station

Year	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Wind speed(m/s)	2.8	3.1	3.0	3.0	3.0	2.6	2.6	2.8	2.8	2.7
Year	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Wind speed(m/s)	2.7	2.8	2.5	2.5	2.7	2.7	2.7	2.6	2.6	2.5
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Wind speed(m/s)	2.4	2.3	2.5	2.4	2.4	2.4	2.3	2.5	2.9	2.5

Average(m/s)	2.8
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(Source: Huailai Meteorological Station, at 10m height and FSR)

The energy available in a wind stream is proportional to the cube of its speed³, the wind speed in the monitoring period is 24.64% higher than historical month average wind speed, which means the wind energy in the monitoring period is 93.64% higher than that of the historical average wind speed theoretically. So, it is reasonable that actual emission reductions during this monitoring period (from 23/12/2009 to 27/02/2011) 16.23% higher than the estimated emission reductions in the registered PDD. It can be concluded to the increase of emission reductions is due to wind speed fluctuation and not under the control of the project owner.

³ $P = \frac{1}{2} \rho A v^3$, where P is the kinetic power, ρ is the air density, A is the area, v is the wind speed, source from Page 48 of *Developing Wind Power Projects: Theory and Practice* (written by Tore Wizelius), so, the wind energy is the proportional to the cube of its speed.