

# GUOHUA WULATE ZHONGQI PHASE I

## 49.5MW WIND FARM PROJECT

Document Prepared By Beijing Ruifang Technology Co., Ltd.

<b>Project Title</b>	Guohua Wulate Zhongqi Phase I 49.5MW Wind Farm Project
<b>Version</b>	2.0
<b>Report ID</b>	/
<b>Date of Issue</b>	23/12/2019
<b>Project ID</b>	1204
<b>Monitoring Period</b>	21/01/2014 to 31/07/2019
<b>Prepared By</b>	Beijing Ruifang Technology Co., Ltd.
<b>Contact</b>	Haidian District, Beijing, PRC China. Teng_hp@126.com

## Table of Contents

<b>1</b>	<b>Project Details</b>	<b>3</b>
1.1	Summary Description of the Implementation Status of the Project	3
1.2	Sectoral Scope and Project Type	3
1.3	Project Proponent	3
1.4	Other Entities Involved in the Project	3
1.5	Project Start Date	4
1.6	Project Crediting Period	4
1.7	Project Location	4
1.8	Title and Reference of Methodology	5
1.9	Other Programs	6
1.10	Sustainable Development	6
<b>2</b>	<b>Implementation Status</b>	<b>6</b>
2.1	Implementation Status of the Project Activity	6
2.2	Deviations	7
2.2.1	Methodology Deviations	7
2.2.2	Project Description Deviations	7
2.3	Grouped Project	7
2.4	Safeguards	7
2.4.1	No Net Harm	7
2.4.2	Local Stakeholder Consultation	9
<b>3</b>	<b>Data and Parameters</b>	<b>10</b>
3.1	Data and Parameters Available at Validation	10
3.2	Data and Parameters Monitored	11
3.3	Monitoring Plan	14
<b>4</b>	<b>Quantification of GHG Emission Reductions and Removals</b>	<b>16</b>
4.1	Baseline Emissions	16
4.2	Project Emissions	16
4.3	Leakage	16
4.4	Net GHG Emission Reductions and Removals	16

## 1 PROJECT DETAILS

### 1.1 Summary Description of the Implementation Status of the Project

Guohua Wulate Zhongqi Phase I 49.5MW Wind Farm Project (hereinafter referred to as “the Project”) is located in Urad Zhongqi, Bayan Nur League, Inner Mongolia Autonomous Region, P.R. China. The total installed capacity of the Project is 49.5MW with 33 sets of turbines and a unit capacity of 1,500kW.

The Project utilizes the wind power for generating electricity which is exported to the North China Power Grid (NCPG) to replace the electricity that would have otherwise been from fossil fuel power plants. Thus it could reduce the emission reductions from fossil fuel consumption. The estimated electricity supplied to the NCPG is 124,300 MWh/year.

The starting date of the construction was 10/06/2008. The first turbine started operation on 30/07/2009. All the turbines were operation on 14/08/2009.

This VCS monitoring period covered the time from 21/01/2014 to 31/07/2019 and the emission reductions in this monitoring period are 811,737 tCO<sub>2</sub>e.

### 1.2 Sectoral Scope and Project Type

According to UNFCCC sectoral scopes definition for CDM projects, the Project Activity is included in the Sectoral Scope 1, category “Energy industries (renewable - / non- renewable sources)”.

The project is a single Greenfield project and is not part of a project group or bundle.

### 1.3 Project Proponent

Organization name	Guohua Bayannaoer (Wulate Zhongqi) Wind Power Co., Ltd.
Contact person	Li Jia
Title	Manager
Address	No.3 South Road of Dongzhimen, Dongcheng District, Beijing, P.R.China
Telephone	+86-10-58151713
Email	lijia@guohua.com.cn

### 1.4 Other Entities Involved in the Project

Organization name	Beijing Ruifang Technology Co., Ltd.
Contact person	Teng Haipeng

Title	Manager
Address	Haidian District, Beijing, PRC China
Telephone	+86-10-86291231
Email	Teng_hp@126.com

### 1.5 Project Start Date

This project starts commissioning on 30/07/2009, which means the date that generates GHG emissions.

### 1.6 Project Crediting Period

The first CDM crediting period is from 01/03/2010 to 28/02/2017, which could be renewed twice. Therefore, the total CDM crediting period is from 01/03/2010 to 28/02/2031.

The first monitoring period that apply for issue under VCS scheme started on 01/08/2009. Therefore, the first VCS crediting period of the Project is from 01/08/2009 to 31/07/2019 (10 years), which could be renewed twice. While according to VCS standard, the total crediting period could be expired on 28/02/2031.

### 1.7 Project Location

The proposed project is located in Urad Zhongqi, the north of Bayan Nur League and the west of Inner Mongolia Autonomous Region, P. R. China. The geographical coordinates of the proposed project is east longitude 108°19'15"-108°23'40" and north latitude 41°54'48"-41°56'35"1. The figure below shows the location of the project.

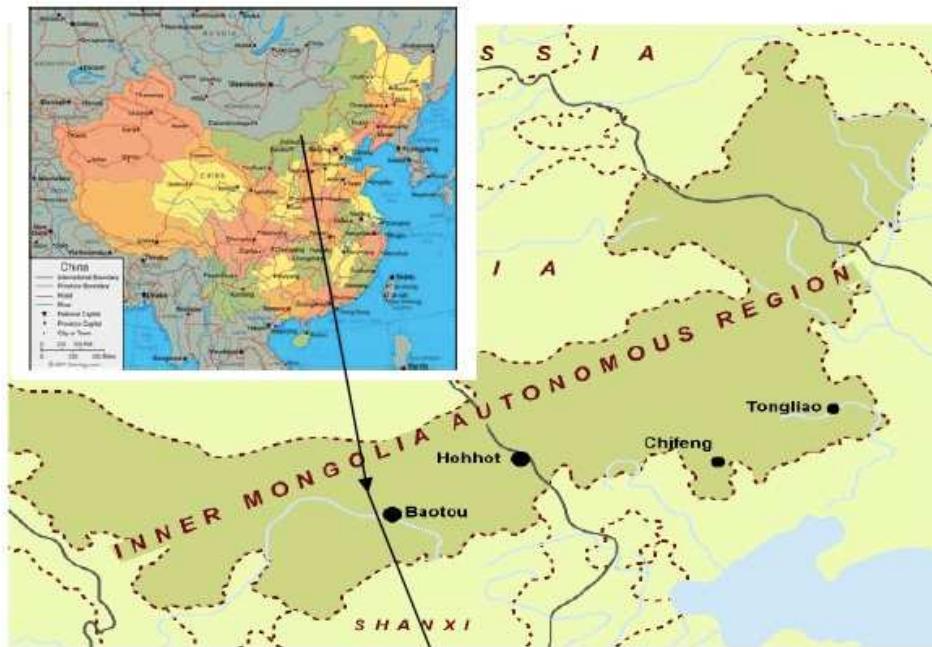


Figure 1. The location of Inner Mongolia Autonomous Region in China



Figure2. The location of the proposed project in Bayan Nur League

## 1.8 Title and Reference of Methodology

The following approved baseline and monitoring methodology is applied to the project:

The approved consolidated baseline and monitoring methodology ACM0002 "Consolidated methodology for grid-connected electricity generation from renewable sources", Version 09.

Tool for the demonstration and assessment of additionality, Version 05.2  
Tool to calculate the emission factor for an electricity system; Version 01.1

For more information on these methodologies, please refer to:  
<http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html>

### **1.9 Other Programs**

This project has been registered as a CDM project on 01/03/2010, and the registration number is 2597. It has been issued carbon credits under CDM mechanism with monitoring period from 01/03/2010 to 28/02/2011, and from 01/03/2011 to 20/01/2014.

The emission reductions from 21/01/2014 to 31/08/2019 has not and will not be counted or issued under CDM or other kind of credits.

The project has not claimed any other forms of environment credit.

### **1.10 Sustainable Development**

The project will not only supply renewable electricity to the grid, but also contribute to sustainable development of the local community, the host country and the world by means of:

Creating local employment 15 job opportunities during the project construction and operation period;

Supplying 124,300MWh green power to NCPG and easing the pressure on the local electricity;

Changing the structure of the local electricity supply and making the electricity structure diversification;

Reducing greenhouse gas emissions carbon dioxide (CO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (such as NO<sub>2</sub>) carbon monoxide (CO) and hydrocarbons.

## **2 IMPLEMENTATION STATUS**

### **2.1 Implementation Status of the Project Activity**

This project installs 33 sets of wind turbines with a unit capacity of 1.5MW will be installed for the project, providing a total capacity of 49.5MW. The annual electricity delivered to the grid is 124,300 MWh. The electricity to be generated is delivered to the on-site substation by 35kV transmission lines, and then transmitted to Substation connected with the NCPG.

All equipments used in the project are domestically-made and there is no international technology transfer.

The key technical specifications of the wind turbines are as follows:

No	Item	Unit	Value
1	Type	KW	1500
2	Diameter	m	77
3	Covering Area	m <sup>2</sup>	4657
4	Rotation speed of wind wheel	r/min	11.1~22.2
5	Cut in wind speed	m/s	3.0
6	Normal wind speed	m/s	12
7	Cut out wind speed	m/s	22

8	Hub height	m	65
9	Norminal voltage	V	690

The starting date of the construction was 10/06/2008. The first turbine started operation on 31/07/2009. All the turbines were operation on 14/08/2009.

During this monitoring period, the Project operated in normal and there was no overhaul or emergencies.

## 2.2 Deviations

### 2.2.1 Methodology Deviations

No deviation in this monitoring period

### 2.2.2 Project Description Deviations

There is a deviation for the crediting period.

The first CDM crediting period is from 01/03/2010 to 28/02/2017, which could be renewed twice. Therefore, the total CDM crediting period is from 01/03/2010 to 28/02/2031.

The first monitoring period that apply for issue under VCS scheme starts on 01/08/2009. Therefore, the VCS crediting period start date would be from 01/08/2009. Therefore, the first VCS crediting period is from 01/08/2009 to 31/07/2019 (10 years), which could be renewed twice. And according to VCS standard, the total crediting period could be expired on 28/02/2031.

Therefore, the total crediting period under VCS is from 01/08/2009 to 28/02/2031.

## 2.3 Grouped Project

N/A

## 2.4 Safeguards

### 2.4.1 No Net Harm

The project uses wind to generate electricity. It is environmentally friendly and there is no harm to the environment.

An Environmental Impact Assessment (EIA) for the project was completed in March 2007 by Inner Mongolia Institute of Water and Electricity Surveying & Designing. The EIA was approved by Inner Mongolia Environment Protection Bureau on 27/07/2007. A summary of the impacts is presented below.

**Analysis of environmental impacts during construction duration****Ecological environmental impact analysis**

There is no endangered species living in this area. The project owner will strictly control the on-site construction scope, take vegetation protection into account; meanwhile, restore vegetation generation based on restoration framework, so it will not influence the ecological environment very much.

**Atmospheric environmental impact analysis**

The largest impact scope of dust emission is 420 meters. The closest distance between construction site and local village is 500 meters. Therefore, there is not so much environmental impact on local air quality.

The dust will make the greatest impact to the atmospheres during construction duration. Construction of the atmospheric environment is the impact of dust. The effective prevention measures such as sprinkling water in time, stamping sail heap on the construction site, will be implemented so as to reduce the impact on the environment. The scale of the project construction is small so that the construction is relatively simple and construction period is short. The period of excavation and transport is short, so partial impact on the region's air quality does not have a greater influence.

**Water environmental impact analysis**

The source of wastewater duration is mainly from construction wastewater and sewage wastewater. The construction wastewater will be handled directly by sedimentation tanks. Clear water can be emitted directly and sedimentation mud can be deal with construction garbage. Sewage wastewater will be handled with the construct wastewater so that the standard will accord with "Urban Sewage Treatment Plant Pollution Emission Standards." Therefore, surface water will not be polluted.

**Noise environmental impact analysis**

Noise during construction is mainly caused by equipment installation and operation. There are a few households in the wind farm site, so it is the best to set up the wind machines far from 250m, which will not make the significant impact to the sound quality of the environment of these residents. Noise on the impact of small wild animals is small. Therefore, the noise is acceptable during the construction.

**Solid waste**

Solid waste will be reasonably treated, which include clean up the extra earth in time, clam the landscape, recover the previous plants, protect the natural environment with less destruction, so the destruction level of local natural environment by this project implementation is controlled relatively low, therefore the project implementation doesn't have obvious impacts on local natural environment

**Analysis of environmental impacts after put into production****Atmospheric environmental impact analysis**

During the production period, office building and employers houses will be warmed by electric heating equipment so there is no pollution source for the atmosphere and it will not cause health damage to local people.

**Surface water environmental impact analysis**

The wastewater will be handled by sedimentation tanks. The standard will accord with "Urban Sewage Treatment Plant Pollution Emission Standards.", so the clear water on surface can be emitted directly. Therefore, the wastewater will cause little impact to surface water.

**Noise environmental impact analysis**

After the project is put into production, the equipments are functioning stably and noise impact ends to smooth, especially outside 600m, sound environmental condition is better. Therefore, there are less noise impact to nearby residents and wildlife during the production.

**Solid waste**

The project will not produce waste during the production so this project will not influence the local ecological environment

In conclusion, no net harm is generated in this project.

**2.4.2 Local Stakeholder Consultation**

In order to collect suggestions from the stakeholder, the project owner introduces to the project by poster and broadcast. Furthermore, the stakeholder comment meeting was held in Urad Zhongqi, Bayan Nur League, Inner Mongolia Autonomous Region, on 14/01/2008. The meeting consists of four parts, which were summarized as follows:

- The project basic information introduced by project owner,
- The CDM basic concept introduced by Mr. Wang Weiquan from Chinese the Renewable Energy Industries Association;
- Free discussion, and;
- The participants filled out questionnaires.

The questionnaire includes below contents:

1. Do you know this project?
2. Do you think the proposed project will be helpful to improve the local economy?
3. Will the project impact your livelihood positively or negatively?
4. Do you think the location of the proposed project is reasonable or unreasonable?

5. Will the proposed project impact the environment?

6. Do you support the construction of the project?

There are specific people responsible for records filed for the representative speech and recovery the questionnaire and do some statistics work. Part.E.2. summarized questionnaire statistics result.

The forum issued a total of 30 copies of the questionnaire, 30 recoveries, 100% recovery rate. There were 6 items to be interviewed in this public investigation and interview comments are summarized as follows.

- 97% of the respondents know the proposed project; 3% of the respondents know a little about the project
- 100% of the respondents argue that the project will promote the local economic;
- 69% agree that the proposed project will affect their life positively; and 31% believe that the project has no effects on their life;
- 100% think that the project is located reasonably;
- 56% think that the project has good impact on the environment and 44% think that the proposed project has no bad impact on the environment;
- 100% of the respondents support the proposed project.

### **Conclusion**

From the comments above, it can be concluded most representatives think the project will do good to local environment and economy and all support it.

## **3 DATA AND PARAMETERS**

### **3.1 Data and Parameters Available at Validation**

Data / Parameter	EF <sub>grid,CM,y</sub>
Data unit	tCO <sub>2</sub> /MWh
Description	Baseline Emission Factor
Source of data	Official national public data
Value applied	1.0755
Justification of choice of data or description of measurement methods and procedures applied	The data are from official national public data. The detail can be seen in the registered CDM PDD.
Purpose of the data	Calculation of baseline emissions
Comments	/

### 3.2 Data and Parameters Monitored

Data / Parameter	EG <sub>y</sub>																						
Data unit	MWh																						
Description	Net electricity supplied to the NCPG by the project in period y																						
Source of data	Electricity meter																						
Description of measurement methods and procedures to be applied	Calculated by $EG_{export, y} - EG_{import, y}$																						
Frequency of monitoring/recording	Monitoring continuously and recorded monthly																						
Value monitored	754,755.349 (net electricity supplied to the grid in this monitoring period)																						
Monitoring equipment	There are three main electricity meters and a backup meter. The detail information is in following table.																						
QA/QC procedures to be applied	<p>The electricity meters are calibrated and checked for accuracy periodically (once a year) according to the industry standards so that the metering equipment have sufficient accuracy.</p> <table border="1"> <thead> <tr> <th>Serial No.</th> <th>Calibration date</th> <th>valid</th> <th>Accuracy</th> </tr> </thead> <tbody> <tr> <td>LY806380 (M1.1)</td> <td>06/01/2014 26/12/2014 12/12/2015 01/02/2016 23/01/2017 16/01/2018 09/01/2019</td> <td>05/01/2015 25/12/2015 11/12/2016 31/01/2017 22/01/2018 15/01/2019 08/01/2020</td> <td>0.5S 0.5S 0.5S 0.5S 0.5S 0.5S 0.5S</td> </tr> <tr> <td>LY807098 (M1.2)</td> <td>06/01/2014 26/12/2014 12/12/2015 01/02/2016 16/01/2018 09/01/2019</td> <td>05/01/2015 25/12/2015 11/12/2016 31/01/2017 15/01/2019 08/01/2020</td> <td>0.5S 0.5S 0.5S 0.5S 0.5S 0.5S</td> </tr> <tr> <td>LY807108 (M1.3)</td> <td>06/01/2014 26/12/2014 12/12/2015 01/02/2016 23/01/2017 16/01/2018 09/01/2019</td> <td>05/01/2015 25/12/2015 11/12/2016 31/01/2017 22/01/2018 15/01/2019 08/01/2020</td> <td>0.5S 0.5S 0.5S 0.5S 0.5S 0.5S 0.5S</td> </tr> <tr> <td>94743524(M2)</td> <td>20/02/2013 13/02/2014 06/02/2015 25/01/2016 17/01/2017 11/01/2018</td> <td>19/02/2014 12/02/2015 05/02/2016 24/01/2017 16/01/2018 10/01/2019</td> <td>0.2S 0.2S 0.2S 0.2S 0.2S 0.2S</td> </tr> </tbody> </table>			Serial No.	Calibration date	valid	Accuracy	LY806380 (M1.1)	06/01/2014 26/12/2014 12/12/2015 01/02/2016 23/01/2017 16/01/2018 09/01/2019	05/01/2015 25/12/2015 11/12/2016 31/01/2017 22/01/2018 15/01/2019 08/01/2020	0.5S 0.5S 0.5S 0.5S 0.5S 0.5S 0.5S	LY807098 (M1.2)	06/01/2014 26/12/2014 12/12/2015 01/02/2016 16/01/2018 09/01/2019	05/01/2015 25/12/2015 11/12/2016 31/01/2017 15/01/2019 08/01/2020	0.5S 0.5S 0.5S 0.5S 0.5S 0.5S	LY807108 (M1.3)	06/01/2014 26/12/2014 12/12/2015 01/02/2016 23/01/2017 16/01/2018 09/01/2019	05/01/2015 25/12/2015 11/12/2016 31/01/2017 22/01/2018 15/01/2019 08/01/2020	0.5S 0.5S 0.5S 0.5S 0.5S 0.5S 0.5S	94743524(M2)	20/02/2013 13/02/2014 06/02/2015 25/01/2016 17/01/2017 11/01/2018	19/02/2014 12/02/2015 05/02/2016 24/01/2017 16/01/2018 10/01/2019	0.2S 0.2S 0.2S 0.2S 0.2S 0.2S
Serial No.	Calibration date	valid	Accuracy																				
LY806380 (M1.1)	06/01/2014 26/12/2014 12/12/2015 01/02/2016 23/01/2017 16/01/2018 09/01/2019	05/01/2015 25/12/2015 11/12/2016 31/01/2017 22/01/2018 15/01/2019 08/01/2020	0.5S 0.5S 0.5S 0.5S 0.5S 0.5S 0.5S																				
LY807098 (M1.2)	06/01/2014 26/12/2014 12/12/2015 01/02/2016 16/01/2018 09/01/2019	05/01/2015 25/12/2015 11/12/2016 31/01/2017 15/01/2019 08/01/2020	0.5S 0.5S 0.5S 0.5S 0.5S 0.5S																				
LY807108 (M1.3)	06/01/2014 26/12/2014 12/12/2015 01/02/2016 23/01/2017 16/01/2018 09/01/2019	05/01/2015 25/12/2015 11/12/2016 31/01/2017 22/01/2018 15/01/2019 08/01/2020	0.5S 0.5S 0.5S 0.5S 0.5S 0.5S 0.5S																				
94743524(M2)	20/02/2013 13/02/2014 06/02/2015 25/01/2016 17/01/2017 11/01/2018	19/02/2014 12/02/2015 05/02/2016 24/01/2017 16/01/2018 10/01/2019	0.2S 0.2S 0.2S 0.2S 0.2S 0.2S																				

	04/01/2019	03/01/2020	0.2S
Purpose of the data	Calculation of baseline emissions		
Calculation method	/		
Comments	/		

Data / Parameter	EG <sub>export,y</sub>			
Data unit	MWh			
Description	The electricity exported to NCPG by the project in year y.			
Source of data	Electricity meter			
Description of measurement methods and procedures to be applied	The electricity exported to the grid is monitored and measured by electricity meters.			
Frequency of monitoring/recording	Monitoring continuously and recorded monthly			
Value monitored	757,109.850 (total exported electricity to grid in this monitoring period)			
Monitoring equipment	There are two electricity meters and the detail information is in the following table.			
QA/QC procedures to be applied	The metering equipment are calibrated and checked for accuracy periodically (once a year) according to the industry standards so that the metering equipment shall have sufficient accuracy.			
	Serial No.	Calibration date	valid	Accuracy
LY806380 (M1.1)	06/01/2014	05/01/2015	0.5S	
	26/12/2014	25/12/2015	0.5S	
	12/12/2015	11/12/2016	0.5S	
	01/02/2016	31/01/2017	0.5S	
	23/01/2017	22/01/2018	0.5S	
	16/01/2018	15/01/2019	0.5S	
	09/01/2019	08/01/2020	0.5S	
LY807098 (M1.2)	06/01/2014	05/01/2015	0.5S	
	26/12/2014	25/12/2015	0.5S	
	12/12/2015	11/12/2016	0.5S	
	01/02/2016	31/01/2017	0.5S	
	16/01/2018	15/01/2019	0.5S	
	09/01/2019	08/01/2020	0.5S	
	06/01/2014	05/01/2015	0.5S	
LY807108 (M1.3)	26/12/2014	25/12/2015	0.5S	
	12/12/2015	11/12/2016	0.5S	
	01/02/2016	31/01/2017	0.5S	
	23/01/2017	22/01/2018	0.5S	
	16/01/2018	15/01/2019	0.5S	
	09/01/2019	08/01/2020	0.5S	
	06/01/2014	05/01/2015	0.5S	

	94743524(M2)	20/02/2013	19/02/2014	0.2S
		13/02/2014	12/02/2015	0.2S
		06/02/2015	05/02/2016	0.2S
		25/01/2016	24/01/2017	0.2S
		17/01/2017	16/01/2018	0.2S
		11/01/2018	10/01/2019	0.2S
		04/01/2019	03/01/2020	0.2S
Purpose of the data	Calculation of baseline emissions			
Calculation method	/			
Comments	/			

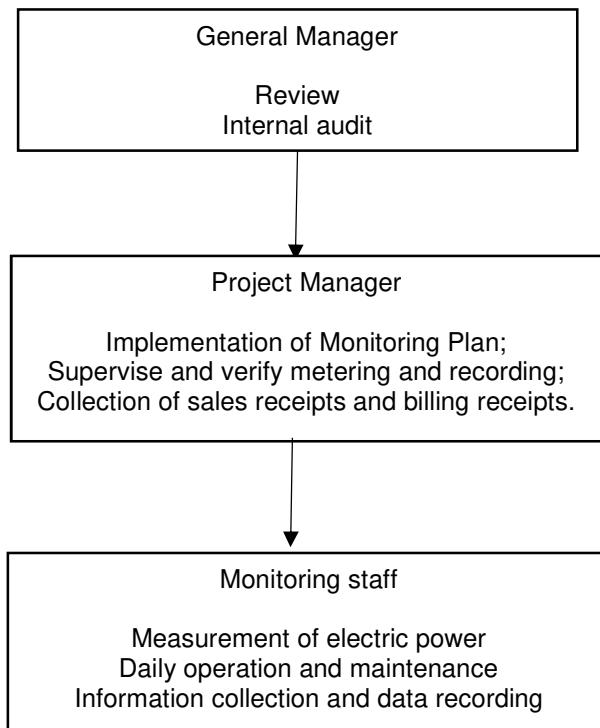
Data / Parameter	EG <sub>import,y</sub>			
Data unit	MWh			
Description	The electricity imported by the project from the NCPG in year y.			
Source of data	Electricity meter			
Description of measurement methods and procedures to be applied	The electricity imported is monitored by the electricity meter and recorded by working staff.			
Frequency of monitoring/recording	Monitoring continuously and recorded monthly			
Value monitored	1,898.750 (total imported electricity from grid in this monitoring period)			
Monitoring equipment	Electricity meters and the detail is in following table			
QA/QC procedures to be applied	The metering equipment are calibrated and checked for accuracy periodically (once a year) according to the industry standards so that the metering equipment shall have sufficient accuracy.			
	Serial No.	Calibration date	valid	Accuracy
	LY806380 (M1.1)	06/01/2014	05/01/2015	0.5S
		26/12/2014	25/12/2015	0.5S
		12/12/2015	11/12/2016	0.5S
		01/02/2016	31/01/2017	0.5S
		23/01/2017	22/01/2018	0.5S
		16/01/2018	15/01/2019	0.5S
		09/01/2019	08/01/2020	0.5S
		06/01/2014	05/01/2015	0.5S
	LY807098 (M1.2)	26/12/2014	25/12/2015	0.5S
		12/12/2015	11/12/2016	0.5S
		01/02/2016	31/01/2017	0.5S
		16/01/2018	15/01/2019	0.5S
		09/01/2019	08/01/2020	0.5S
		06/01/2014	05/01/2015	0.5S

	LY807108 (M1.3)	06/01/2014	05/01/2015	0.5S
		26/12/2014	25/12/2015	0.5S
		12/12/2015	11/12/2016	0.5S
		01/02/2016	31/01/2017	0.5S
		23/01/2017	22/01/2018	0.5S
		16/01/2018	15/01/2019	0.5S
		09/01/2019	08/01/2020	0.5S
		94743524(M2)	20/02/2013	19/02/2014
			13/02/2014	12/02/2015
			06/02/2015	05/02/2016
			25/01/2016	24/01/2017
			17/01/2017	16/01/2018
			11/01/2018	10/01/2019
			04/01/2019	03/01/2020
Purpose of the data	Calculation of baseline emissions			
Calculation method	/			
Comments	/			

### 3.3 Monitoring Plan

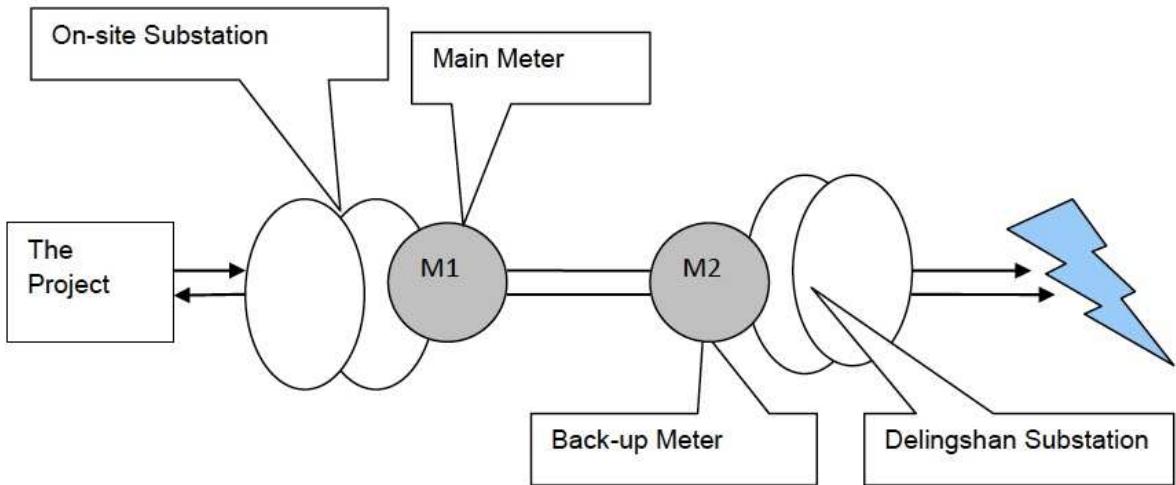
#### 1. Monitoring system organization

The project monitoring organization is as follows:



#### 2. Metering

The electricity exported to the NCPG by the project ( $EG_{\text{export}, y}$ ) and the electricity imported by the project from the NCPG ( $EG_{\text{import}, y}$ ) were measured continuously by M1. The positions of the meters are showed as Figure 3-2. The sales receipts for the electricity exported to the NCPG by the project and electricity imported by the project from the NCPG were issued based on the records of M1.



### 3. Calibration of Meters & Metering

The main meter is owned, operated and maintained by the proposed project owner, and the backup meter is owned, operated and maintained by the Grid Company. The main meter are calibrated and checked for accuracy:

- 1) The main meter equipment shall have sufficient accuracy so that error resulting from such equipment shall not exceed +0.5% of full-scale rating.
- 2) All the meters installed shall be tested within 10 days after:
  - (a) The detection of a difference larger than the allowable error in the reading of both meters
  - (b) The repair of all or part of the meter caused by the failure of one or more parts to operate in accordance with the specifications.

Calibration is carried out by the qualified third party, and the calibration report should be provided to the project owner.

### 4. Data management system

Physical document such as paper-based maps, diagrams and environmental assessments were collated in a central place, together with this monitoring plan. The project owner also kept the copies of sale receipts and prepared this monitoring report.

And all data including calibration records is kept until 2 years after the end of the total crediting period of the project.

## 4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

### 4.1 Baseline Emissions

According to latest ACM0002 (Version 09), the baseline emissions calculated as follows:

$$BE_y = EG_y * EF_{grid,CM,y} = (EG_{export,y} - EG_{import,y}) * EF_{grid,CM,y}$$

Where:

BE <sub>y</sub>	Baseline emissions in year y (tCO <sub>2</sub> /yr)
EG <sub>y</sub>	Net electricity supplied by the project activity to the grid in period y (MWh)
EG <sub>export,y</sub>	The electricity exported to the NCPG by the project in period y(MWh)
EG <sub>import,y</sub>	Electricity imported by the project from NCPG in period y(MWh)
EF <sub>grid,CM,y</sub>	Combined margin CO <sub>2</sub> emission factor for grid in year y(tCO <sub>2</sub> e/MWh). The baseline emission factor EF <sub>grid, CM, y</sub> is 1.0755 tCO <sub>2</sub> /MWh. (tCO <sub>2</sub> /MWh)

The ER vintage and monitoring values are as follows.

vintage	EG <sub>y</sub> (MWh)	EF <sub>grid,CM,y</sub> (tCO <sub>2</sub> /MWh)	BE <sub>y</sub> (tCO <sub>2</sub> )
21/01/2014-31/12/2014	134,228.235	1.0755	144,362
01/01/2015-31/12/2015	135,974.337	1.0755	146,240
01/01/2016-31/12/2016	132,586.722	1.0755	142,597
01/01/2017-31/12/2017	135,738.973	1.0755	145,987
01/01/2018-31/12/2018	137,269.686	1.0755	147,633
01/01/2019-31/10/2019	78,957.396	1.0755	84,918
Total in this monitoring period 21/01/2014-31/07/2019 (2018days)	754,755.349	1.0755	811,739

The monthly data and ER breakdown are shown in appendix 1.

### 4.2 Project Emissions

According to the ACM0002 methodology, the project emissions (PE<sub>y</sub>) are zero for wind power projects, and therefore the emission reductions are equal to the baseline emissions.

### 4.3 Leakage

According to ACM0002, no leakage needs to be considered.

### 4.4 Net GHG Emission Reductions and Removals

$$ER_y = BE_y - PE_y = BE_y = 811,737$$

Year	Baseline emissions or removals (tCO <sub>2</sub> e)	Project emissions or removals (tCO <sub>2</sub> e)	Leakage emissions (tCO <sub>2</sub> e)	Net GHG emission reductions or removals (tCO <sub>2</sub> e)
21/01/2014-31/12/2014	144,362	0	0	144,362
01/01/2015-31/12/2015	146,240	0	0	146,240
01/01/2016-31/12/2016	142,597	0	0	142,597
01/01/2017-31/12/2017	145,987	0	0	145,987
01/01/2018-31/12/2018	147,633	0	0	147,633
01/01/2019-31/10/2019	84,918	0	0	84,918
<b>Total</b>	<b>811,737</b>	<b>0</b>	<b>0</b>	<b>811,737</b>

The estimated annual emission reductions are 133,685tCO<sub>2</sub>e as per registered PDD. The monitoring period covers 2018 days. The ex-ante emission reductions during this monitoring period are 133,685/365\*2018=739,113tCO<sub>2</sub>e. The actual emission reductions in this period are 811,737 tCO<sub>2</sub>e, which are 9.8% more than the estimated value.

This would not influence the additionality of the project. According to the registered PDD, the IRR is still less than the benchmark of 8% when the net exported electricity increases 10%. The reasons for electricity increase are as follows: First, in this monitoring period, the wind volume is larger than the estimation in project FSR. Second, the wind turbine generators operate at good status.

### Appendix 1. Electricity Record and ER breakdown

Period	The electricity exported to the NCPG by the project in period y(MWh) ( $EG_{\text{export}, y}$ )			Electricity imported by the project from NCPG in period y(MWh) ( $EG_{\text{import}, y}$ )			Net electricity supplied by the project activity to the grid in period y (MWh) $EG_y$	Combined margin $\text{CO}_2$ emission factor for grid in year y(t $\text{CO}_2\text{e}/\text{MWh}$ ) $EF_{\text{grid,CM},y}$	Baseline emissions in year y(t $\text{CO}_2\text{e}$ ) $BE_y$	Project emissions in year y(t $\text{CO}_2\text{e}$ ) $PE_y$	Leakage emissions in year y(t $\text{CO}_2\text{e}$ ) $L_y$	Emissions reductions in year y(t $\text{CO}_2\text{e}$ ) $ER_y$
	Sales receipts	Meter readings (M1.1; M1.2; M1.3)	Conservative value	Sales receipts	Meter readings (M1.1; M1.2; M1.3)	Conservative value						
	A	B	C=Min(A,B)	D	E	F=Max(D, E)	G=C-F	H	I=G*H	J	K	L=I-J-K
21/01/2014-31/01/2014	2,860.131	2,863.350	2,860.131	14.627	11.900	14.627	2,845.504					
01/02/2014-28/02/2014	12,576.987	12,583.200	12,576.987	66.534	64.050	66.534	12,510.453					
01/03/2014-31/03/2014	12,472.956	12,481.350	12,472.956	40.449	38.500	40.449	12,432.507					
01/04/2014-30/04/2014	13,448.982	13,449.800	13,448.982	24.214	23.100	24.214	13,424.768					
01/05/2014-31/05/2014	13,964.376	13,965.700	13,964.376	17.745	16.100	17.745	13,946.631					
01/06/2014-30/06/2014	11,913.888	11,922.400	11,913.888	23.719	22.750	23.719	11,890.169					
01/07/2014-31/07/2014	11,657.690	11,660.250	11,657.690	18.608	15.750	18.608	11,639.082					
01/08/2014-31/08/2014	10,347.311	10,349.500	10,347.311	41.880	40.600	41.880	10,305.431					
01/09/2014-30/09/2014	11,489.158	11,495.750	11,489.158	26.433	23.450	26.433	11,462.725					
01/10/2014-31/10/2014	11,640.833	11,641.700	11,640.833	25.626	23.800	25.626	11,615.207					

01/11/2014- 30/11/2014	11,982.94 6	11,989.60 0	11,982.946	25.794	24.850	25.794	11,957.15 2					
01/12/2014- 31/12/2014	10,231.52 0	10,235.40 0	10,231.520	32.914	32.550	32.914	10,198.60 6					
Total in 2014	134,586.7 78	134,638.0 00	134,586.77 8	358.54 3	337.400	358.543	134,228.2 35	1.0755	144362	-	-	144,362
01/01/2015- 31/01/2015	8,217.635	8,220.100	8,217.635	38.091	36.400	38.091	8,179.544					
01/02/2015- 28/02/2015	8,105.329	8,112.650	8,105.329	42.163	42.000	42.163	8,063.166					
01/03/2015- 31/03/2015	11,710.05 4	11,712.40 0	11,710.054	40.845	39.550	40.845	11,669.20 9					
01/04/2015- 30/04/2015	13,692.65 2	13,698.65 0	13,692.652	26.148	23.450	26.148	13,666.50 4					
01/05/2015- 31/05/2015	14,217.29 4	14,224.00 0	14,217.294	17.460	16.450	17.460	14,199.83 4					
01/06/2015- 30/06/2015	11,727.68 2	11,735.85 0	11,727.682	22.926	22.750	22.926	11,704.75 6					
01/07/2015- 31/07/2015	11,870.80 1	11,875.85 0	11,870.801	18.012	16.100	18.012	11,852.78 9					
01/08/2015- 31/08/2015	9,924.439	9,930.200	9,924.439	43.361	41.300	43.361	9,881.078					
01/09/2015- 30/09/2015	11,988.50 1	11,989.95 0	11,988.501	24.754	23.450	24.754	11,963.74 7					
01/10/2015- 31/10/2015	12,247.23 2	12,251.75 0	12,247.232	23.968	23.800	23.968	12,223.26 4					
01/11/2015- 30/11/2015	12,208.22 7	12,211.85 0	12,208.227	26.042	25.550	26.042	12,182.18 5					
01/12/2015- 31/12/2015	10,423.35 3	10,425.10 0	10,423.353	35.092	32.550	35.092	10,388.26 1					
Total in 2015	136,333.1 99	136,388.3 50	136,333.19 9	358.86 2	343.350	358.862	135,974.3 37	1.0755	146240	0	0	146,240
1/01/2016- 31/01/2016	8,473.946	8,476.650	8,473.946	36.929	35.700	36.929	8,437.017					
1/02/2016- 28/02/2016	6,619.071	6,626.900	6,619.071	42.265	40.950	42.265	6,576.806					
1/03/2016- 31/03/2016	12,356.10 7	12,365.50 0	12,356.107	38.858	38.500	38.858	12,317.24 9					
1/04/2016- 30/04/2016	13,319.94 2	13,324.85 0	13,319.942	23.220	23.100	23.220	13,296.72 2					
1/05/2016- 31/05/2016	13,826.34 7	13,836.20 0	13,826.347	16.031	15.400	16.031	13,810.31 6					
1/06/2016- 30/06/2016	11,406.73 8	11,415.60 0	11,406.738	24.618	22.750	24.618	11,382.12 0					
1/07/2016- 31/07/2016	11,547.40 5	11,552.10 0	11,547.405	16.387	15.050	16.387	11,531.01 8					
1/08/2016- 31/08/2016	10,949.97 0	10,959.20 0	10,949.970	41.014	40.250	41.014	10,908.95 6					

1/09/2016- 30/09/2016	11,195.31 7	11,198.25 0	11,195.317	24.466	23.450	24.466	11,170.85 1					
1/10/2016- 31/10/2016	11,236.03 5	11,236.75 0	11,236.035	26.651	23.800	26.651	11,209.38 4					
1/11/2016- 30/11/2016	11,871.43 2	11,879.00 0	11,871.432	26.820	24.850	26.820	11,844.61 2					
1/12/2016- 31/12/2016	10,135.05 1	10,140.90 0	10,135.051	33.380	32.200	33.380	10,101.67 1					
Total in 2016	132,937.3 61	133,011.9 00	132,937.36 1	350.63 9	336.000	350.639	132,586.7 22	1.0755	142597	0	0	142,597
1/01/2017- 31/01/2017	8,874.402	8,879.500	8,874.402	39.180	36.750	39.180	8,835.222					
1/02/2017- 28/02/2017	7,773.217	7,782.250	7,773.217	42.785	42.000	42.785	7,730.432					
1/03/2017- 31/03/2017	12,649.86 8	12,654.60 0	12,649.868	40.870	39.550	40.870	12,608.99 8					
1/04/2017- 30/04/2017	13,629.89 8	13,636.35 0	13,629.898	25.157	23.450	25.157	13,604.74 1					
1/05/2017- 31/05/2017	14,149.96 9	14,159.60 0	14,149.969	18.369	16.450	18.369	14,131.60 0					
1/06/2017- 30/06/2017	11,679.31 4	11,682.30 0	11,679.314	23.862	22.750	23.862	11,655.45 2					
1/07/2017- 31/07/2017	11,821.08 5	11,821.95 0	11,821.085	17.584	16.100	17.584	11,803.50 1					
1/08/2017- 31/08/2017	9,882.400	9,884.700	9,882.400	41.740	41.650	41.740	9,840.660					
1/09/2017- 30/09/2017	11,731.71 1	11,741.45 0	11,731.711	25.859	23.450	25.859	11,705.85 2					
1/10/2017- 31/10/2017	12,289.73 1	12,299.35 0	12,289.731	25.151	23.800	25.151	12,264.58 0					
1/11/2017- 30/11/2017	11,748.73 2	11,756.15 0	11,748.732	26.348	25.550	26.348	11,722.38 4					
1/12/2017- 31/12/2017	9,870.883	9,877.700	9,870.883	35.332	32.900	35.332	9,835.551					
Total in 2017	136,101.2 10	136,175.9 00	136,101.21 0	362.23 7	344.400	362.237	135,738.9 73	1.0755	145987	0	0	145,987
1/01/2018- 31/01/2018	8,911.141	8,920.450	8,911.141	37.585	36.750	37.585	8,873.556					
1/02/2018- 28/02/2018	6,807.676	6,812.750	6,807.676	43.461	42.000	43.461	6,764.215					
1/03/2018- 31/03/2018	12,706.67 0	12,712.35 0	12,706.670	41.527	39.550	41.527	12,665.14 3					
1/04/2018- 30/04/2018	13,692.50 6	13,698.65 0	13,692.506	24.148	23.450	24.148	13,668.35 8					
1/05/2018- 31/05/2018	14,215.23 0	14,224.00 0	14,215.230	17.407	16.450	17.407	14,197.82 3					
1/06/2018- 30/06/2018	11,730.81 7	11,735.85 0	11,730.817	24.498	22.750	24.498	11,706.31 9					

1/07/2018- 31/07/2018	11,873.31 9	11,875.85 0	11,873.319	16.742	16.100	16.742	11,856.57 7					
1/08/2018- 31/08/2018	11,122.61 0	11,130.00 0	11,122.610	41.720	41.300	41.720	11,080.89 0					
1/09/2018- 30/09/2018	12,086.14 6	12,090.40 0	12,086.146	26.150	23.450	26.150	12,059.99 6					
1/10/2018- 31/10/2018	11,850.35 6	11,852.05 0	11,850.356	26.038	23.800	26.038	11,824.31 8					
1/11/2018- 30/11/2018	12,209.23 3	12,211.85 0	12,209.233	25.813	25.550	25.813	12,183.42 0					
1/12/2018- 31/12/2018	10,423.50 5	10,425.10 0	10,423.505	34.434	32.900	34.434	10,389.07 1					
Total in 2018	137,629.2 09	137,689.3 00	137,629.20 9	359.52 3	344.050	359.523	137,269.6 86	1.0755	147633	0	0	147,633
1/01/2019- 31/01/2019	8,992.818	9,000.950	8,992.818	37.555	35.700	37.555	8,955.263					
1/02/2019- 28/02/2019	8,767.803	8,774.850	8,767.803	41.799	41.300	41.799	8,726.004					
1/03/2019- 31/03/2019	11,120.19 0	11,127.90 0	11,120.190	38.813	38.500	38.813	11,081.37 7					
1/04/2019- 30/04/2019	13,617.00 1	13,623.05 0	13,617.001	23.667	23.100	23.667	13,593.33 4					
1/05/2019- 31/05/2019	13,950.24 4	13,953.80 0	13,950.244	17.497	16.450	17.497	13,932.74 7					
1/06/2019- 30/06/2019	11,832.87 2	11,841.90 0	11,832.872	25.679	22.750	25.679	11,807.19 3					
1/07/2019- 31/07/2019	10,879.60 5	10,883.95 0	10,879.605	18.127	15.750	18.127	10,861.47 8					
Total in 2019	79,160.53 3	79,206.40 0	79,160.533	203.13 7	193.550	203.137	78,957.39 6	1.0755	84918	0	0	84,918
Total in this monitoring period		757,109.8 50			1,898.7 50		754,755.3 49	1.0755	811737	0	0	811,737