



SHANDONG WENDENG ZHANGJIACHAN WIND FARM PROJECT

Document Prepared by CGN Carbon Asset Management (Beijing) Co.,
Ltd.

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CONTENTS

1	PROJECT DETAILS.....	3
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.....	4
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	Participation under other GHG Programs.....	6
1.10	Other Forms of Credit.....	6
1.11	Sustainable Development.....	6
2	SAFEGUARDS.....	7
2.1	No Net Harm.....	7
2.2	Local Stakeholder Consultation.....	9
2.3	AFOLU-Specific Safeguards.....	11
3	IMPLEMENTATION STATUS.....	11
3.1	Implementation Status of the Project Activity.....	11
3.2	Deviations.....	12
3.3	Grouped Projects.....	13
4	DATA AND PARAMETERS.....	13
4.1	Data and Parameters Available at Validation	13
4.2	Data and Parameters Monitored.....	13
4.3	Monitoring Plan.....	17
5	QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS.....	20
5.1	Baseline Emissions	20
5.2	Project Emissions.....	25
5.3	Leakage.....	25
5.4	Net GHG Emission Reductions and Removals.....	25

1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Shandong Wendeng Zhangjiachan Wind Farm Project (hereinafter referred to as the proposed project) is to utilize wind resources for electricity generation through the construction of a wind farm with a total capacity of 49.3MW in Wendeng City, Shandong Province, P. R. China. The electricity generated from the project will be sold to North China Power Grid (NCPG). The proposed project will achieve obvious greenhouse gas (GHG) emission reductions through the displacement of electricity delivered by NCPG which is a fossil-fuel dominated grid.

The proposed project is located in Wendeng City, Shandong Province, P. R. China. The proposed project involves the installation of 58 wind turbines with capacity of 850 kW each, which amount to a total installed capacity of 49.3MW. The proposed project is constructed and operated by Wendeng Zhangjiachan Wind Power Co., Ltd.. The estimated annual net electricity generation and average annual emission reductions of the proposed project are 90,997MWh and 84,709 tCO₂e, respectively.

The project started construction on 26/02/2010. The first batch of generating units started commercial operation on 26/02/2011. The expected operation period of the Project is 20 years as stated in the registered VCS PD Version 01 dated 20/11/2013 and registered CDM PDD Version 2 dated 02/12/2011. The first renewable crediting period of the project updated from 26/02/2011- 29/02/2012 to 26/02/2011-25/02/2021.

The project has been registered as VCS project with Ref. VCS1188 and VCUs of 63,369tCO₂e have been issued for the monitoring period from 26/02/2011- 29/02/2012. The project also has been registered as CDM project with Ref. 5655.

The total emission reductions achieved in this monitoring period (01/03/2012-31/12/2015) were 335,659 tCO₂e.

1.2 Sectoral Scope and Project Type

Sectroal Scope 1: Energy Industry (renewable/non-renewable sources)

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

The project is not a grouped project.

1.3 Project Proponent

Organization name	Wendeng Zhangjiachan Wind Power Co., Ltd.
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Contact person	Shi Lei
Title	CDM office director
Address	Area 12 of Advanced Business Park, No. 188 west of South 4th Ring Road, No.2 Building, Beijing, The People's Republic of China
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1.4 Other Entities Involved in the Project

There are no other entities involved.

1.5 Project Start Date

26/02/2011(commissioning start date)

1.6 Project Crediting Period

In the registered PD, the crediting period is described as from 26/02/2011 to 29/02/2012. A deviation is requested for the crediting period. The project is registered under VCS Standard Version 3.4 and completed validation before 19/03/2020. thus, it remains eligible to apply the crediting period requirements under VCS Standard Version 3.4 which shall be a maximum of ten years and may be renewed at most twice, so the first renewable crediting period of the project should be updated from 26/02/2011 to 29/02/2012 to 26/02/2011 to 25/02/2021.

Therefore, 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 and furthermore, the project has the lifetime of 20 years, it is not eligible for VCU issuance beyond 25/02/2031.

The project monitoring period is from 01/03/2012 to 31/12/2015 and the total monitoring period is 1,401 days.

1.7 Project Location

The proposed project is located at Wendeng City, Shandong Province, P. R. China. The geographical coordinates of the proposed project is from 122.051944 E to 122.155278 E, and from 37.093611 N to 37.181667 N. The central geographical coordinate of the proposed project is 122.103611 E, 37.137639 N. Figures A1 and A2 show the geographical location of the proposed project.

Figure A1. The location of the proposed project in the map of P. R. China



The approved methodology applied in the proposed project activity is ACM0002 (version 12.2.0) – “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”.

5

“Tool to calculate the emission factor for an electricity system (version 02.2.1)” is also applied in the proposed project.

Reference: <http://cdm.unfccc.int/methodologies/PAmethodologies/approved>

1.9 Participation under other GHG Programs

The project has been registered as a CDM project on 17/01/2012 with Ref No.5655, for which a renewable crediting period of 3*7 years will be used under the CDM GHG Program. The first crediting period is from 01/03/2012 to 28/02/2019 and the second crediting period is from 01/03/2019 to 28/02/2026. Therefore, CO₂ emission reductions generated by the project during the CDM crediting period will be verified as unique CERs, but not VCUs to avoid double counting. The project has been registered as VCS project with Ref. VCS1188 and VCUs of 63,369tCO₂e have been issued for the monitoring period from 26/02/2011- 29/02/2012.

1.10 Other Forms of Credit

Emission Trading Programs and Other Binding Limits

The project has been registered as VCS project with Ref. VCS1188 and VCUs of 63,369tCO₂e have been issued for the monitoring period from 26/02/2011- 29/02/2012.

The GHG emission reductions generated by the project from 01/03/2012 to 31/12/2015 will not be used for compliance with emission trading programs or to meet binding limits on GHG emissions.

All credits from 01/03/2012 to 31/12/2015 will be claimed under VCS program as VCUs for the project to avoid double counting.

Other Forms of Environmental Credit

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

1.11 Sustainable Development

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

1. GHG emission reduction

The proposed project activity will achieve obvious GHG emission reductions by avoiding CO₂ emissions, as grid-connected fossil fuel-fired power dominates in the NCPG.

2. Pollutants emission reduction through replacing fossil fuel combustion

The proposed project utilizes wind energy for generating electricity which would have been generated through alternate fuels (fossil fuel) based power plants, contributing to reduction in

specific emissions including GHG emissions. Thus reduce fossil fuel consumption and avoid pollutants emission, such as sulfur dioxide and dust, brought by fossil fuel combustion. Therefore, the proposed project has obvious environmental benefits.

3. Employment opportunities

The implementation of the proposed project will offer job opportunities for local people during both the construction and operational period. The proposed project leads to alleviation of poverty by establishing direct and indirect employment benefits. Such benefits will, for example, be accrued out during maintenance operations of the project activity or as generation of permanent labor in the form of security services, cleaning services. The infrastructure in and around the project area will also improve due to project activities. This includes development of road network and improvements of electricity quality, frequency and availability.

4. Economic development

The proposed project leads to an investment of about 518 million to a developing region which otherwise would not have happened in the absence of project activity. The generated electricity is fed into the NCPG, thereby improving the grid frequency and availability of electricity to the local stakeholders. This attracts new opportunities for industries and economic activities to be setup in the area thereby resulting in greater local employment, ultimately leading to overall development. Otherwise the region can achieve economic growth and booming of local tourism through the construction and operation of the project. Furthermore, the project will contribute to local government with more tax revenues (about 4.0 million per year).

2 SAFEGUARDS

2.1 No Net Harm

The environmental impact assessment for this project was carried out by Shandong Academy of Environmental Science in April, 2008 and approved by Shandong Environmental Protection Bureau on 24/06/2008. A summary of the report is illustrated as below:

Ambient air

The impact on ambient air quality of the proposed project is mainly from dust during construction stage. The excavation work is the primary emission source, however, it is a ground source and the particle size is quite large so that dust will deposit quickly on the ground. Immediately replant the areas where construction has completed, and by sprinkling water frequently and timely clearing can reduce the dust pollution. When the project is in operational period, there will be no air pollutions. In conclusion, the proposed project will not pose any threat on the quality of ambient air.

Impact from noise

There is some noise during the operation of wind turbines. The equipments and techniques with lower noise will be chosen to apply. Improvement on construction process and strengthening of equipment maintenance is emphasized. Noise Limits in Construction site (GB12523-90) and Emission standard for industrial enterprise noise at boundary (GB12348-2008) Level II noise standard would be fulfilled during the construction and operational period. Besides, some noise control measures on the noise source control and sensitive object protection would be taken to mitigate the noise at the maximum limit. Consequently, the noise of operation has little impact to the surrounding environment. Hence, the noise will not impact the work and daily life of local residents.

Electromagnetic impact

The operation of the wind farm will generate electromagnetic pollution, whereas the pollution is slight.

Some measures on the prevention and control of electromagnetic influence, for example, strengthen the training on the electromagnetic knowledge for the workers and organise and manage the work time, will be taken to reduce the electromagnetic impact during the operation phase. In addition, the wind turbines are very far from local residents and village. Therefore, the electronic magnetic pollution to the surrounding environment is insignificant.

Impact from Solid waste

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

Impact from Wastewater Wastewater is mainly domestic wastewater. Wastewater quantity is fairly small and treatment methods will be applied for on-site primary treatment, and then the wastewater will be treated together with the local wastewater. Small-scale septic tanks should be built on the site, through which the discharging wastewater can reach the Water quality standard for urban miscellaneous water consumption (GB/T18920-2002). Therefore, the impact of wastewater is limited and mitigated.

No migrating birds have been found in the project field. Therefore, the project is not located on the passage of migrating birds, and the project construction will not influence the migration of birds.

2.2 Local Stakeholder Consultation

Local stakeholders Consultation during the project preparation stage:

Notification of Shandong Wendeng Zhangjiachan Wind Power Project to invite comments on the construction of the proposed project on 19/11/2009. Stakeholder Consultation Meeting of the project was held at Wendeng Detai Hotel on 21/11/2009 to guarantee the successful implementation of proposed project with the interest of stakeholder being taken into account. The project owner also distributed public participation questionnaires at the project location Zhangjiachan Town to collect advice and opinions on the proposed project from local stakeholders.

48 out of 50 copies of questionnaires were collected. Among the interviewees, there were 27 farmers, 14 workers, and 7 government officials; 36 of them had junior high school education or below while 12 had high school level education. The questions in the questionnaire were mainly as follows:

- a) How do you think of the local environmental quality in general?
- b) Is there any electromagnetic radiation disturbance when you watch TV?
- c) Do you think the construction of the project will have any negative effect on you and your family?
- d) Will the project promote the local economy?
- e) How do you think the project will affect the acoustic environment (noise) quality?
- f) What is your most concerned environmental issue during the construction and operation of the project?
- g) Do you favour the construction of the project?
- h) Do you have any advice about the selection of environmental protection measures?
- i) Do you have any other suggestions to the proposed project?

The summary of survey is listed as the following:

- 88% of the interviewee think good of the general local environmental quality, 12% of them think it average;
- 90% of them think there is no electromagnetic radiation disturbance when they watch TV, 8% are not sure about it and 2% of them think there is;
- 96% of them think the construction of the project will have no negative effect on them and their family while 4% of them think it will;
- 96% of them think the project will promote the local economy while 4% are not sure;

- 77% of them think the project will not affect the acoustic environment (noise) quality, 4% think it will and 19% are not sure;
- 29% of them consider electromagnetic disturbance their most concerned environmental issue during the construction and operation of the project, 64% are most concerned about noise effect and 7% are most concerned about wastewater discharge;
- 94% of them support the construction of the project and 6% are not sure.

The vast majority of public opinions received were supportive. Some of local residents were concerned with temporary land occupation and construction waste and some of them showed concern about wastewater during construction period. As discussed in the EIA report, these issues are well illuminated and specific instructions were given to mitigate the potential impacts of these issues. In addition, the proposed project site is designed to be far enough away from the residential area. Wastewater during the construction and operation phase will be removed periodically. The environmental impacts can be avoided, controlled or mitigated via thorough implementation of the mitigation measures. Therefore, the proposed project can be carried out as planned.

Local stakeholder Consultation during the project implementation stage:

The project owner has set out the mechanism for on-going communication with local stakeholders and the communications with local stakeholders are being carried out at periodic intervals.

Firstly, stakeholders were informed of the status and progress of the project through the bulletin board on the village committee, and their comments can be recorded in the village committee's complaint book. This information is fed back to the project proponent by the contact person for a timely response.

Secondly, stakeholders can communicate and give feedback directly to the project proponent at any time through the published phone number of contact person.

Finally, the contract person of project owner also meet local villagers to collect their comments and suggestions yearly.

During this monitoring period, the project carried out the communication with local stakeholders in line with the mechanism. Village committee's complaint book were quarterly checked by the contact person, and the contact person visited the villages in Aug 2012, Sep 2013, Aug 2014, Sep 2015 to communicate with stakeholders. Meanwhile, the local authority has also conducted spot checks on the implementation of the project yearly. There are no negative comments received for the project during this monitoring period. In line with VCS requirements all the processed have been implemented to receive comments from local stakeholders as well as communicate with them.

2.3 AFOLU-Specific Safeguards

The project is not AFOLU project.

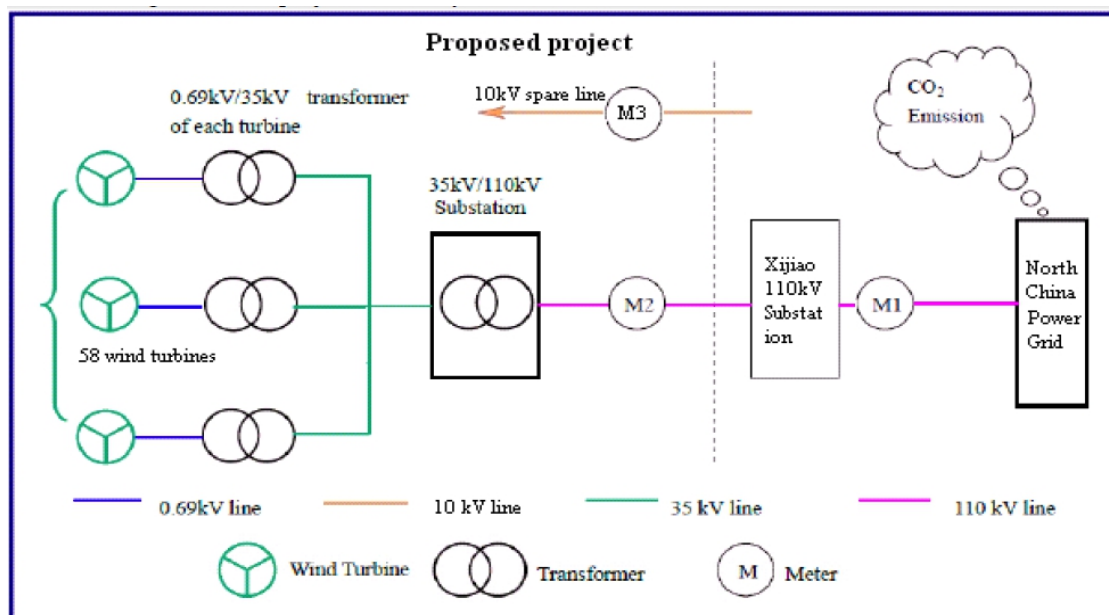
3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project employed standard wind power generation technology. It installed 58 wind turbines with capacity of 850kW each adding up to a total installed capacity of 49.3 MW. The main specifications of the turbine/generator are listed as below Table:

Wind Turbine (G58-850kW)		
Item	Unit	Index
Rated capacity	kW	850
Number of blades	-	3
Rotor diameter	m	58
Cut-in speed	m/s	3.0
Rated wind speed	m/s	16
Cut-off speed	m/s	23
Height of hub	m	65
Rated voltage	V	690

The technology diagram of the Project is as follows:



The project started construction on 26/02/2010. The first batch of generating units started commercial operation on 26/02/2011. The expected operation period of the Project is 20 years as stated in the registered CDM PDD Version 2 dated 02/12/2011.

The electricity generated from the Project is delivered to Shandong Power Grid, an integral part of the North China Power Grid (NCPG). During this monitoring period, there was no significant malfunction or any emergency occurred for the Project during this monitoring period. No events occurred during this monitoring period which may impact the applicability of the methodology.

3.2 Deviations

2.3.1 Methodology Deviations

There is no methodology deviations applied during this monitoring period.

2.3.2 Project Description Deviations

In the registered PD, the crediting period is described as from 26/02/2011 to 29/02/2012. A deviation is requested for the crediting period in the registered PD. The project is registered under VCS Standard Version 3.4 and completed validation before 19/03/2020. Thus, it remains eligible to apply the crediting period requirements under VCS Standard Version 3.4 which shall be a maximum of ten years and may be renewed at most twice, so the first renewable crediting period of the project should be updated from 26/02/2011 to 29/02/2012 to 26/02/2011 to 25/02/2021.

3.3 Grouped Projects

The project is not a grouped project.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO ₂ / MWh
Description	Combined margin emission factor for grid connected power generation in year y
Source of data	Registered CDM PDD with Ref No.5655
Value applied	0.9309
Justification of choice of data or description of measurement methods and procedures applied	Refer to the registered CDM PDD with Ref No.5655
Purpose of Data	Calculation of baseline emissions
Comments	The data is calculated ex-ante according to the applied tool.

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{Facility,y}$
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project to the Grid in year y.
Source of data	Calculation by $EG_{output,y}$, $EG_{import,y}$ and $EG_{im-spare,y}$
Description of measurement methods and procedures to be applied	Calculated based on the measurement results of $EG_{output,y}$, $EG_{import,y}$ and $EG_{im-spare,y}$ $EG_{output,y}$ and $EG_{import,y}$ will be monitored by the main meter M1 and backup meter M2 at the at the connection points between the proposed project and the Grid (M1 installed at Xijiao 110kV substation; M2 installed at on-site 110kV substation). The meter readings will be cross checked with ETNs or statements issued by grid company. $EG_{im-spare,y}$ will be measured by meter M3, and cross-checked based on the ETNs or statements issued by the local power distributor. The project operator is responsible for recording.

Frequency of monitoring/recording	Continuously measurement and monthly recording										
Value monitored	<table border="1"> <tr> <td>01/03/2012-31/12/2012</td><td>83,006.263</td></tr> <tr> <td>01/01/2013-31/12/2013</td><td>101,875.867</td></tr> <tr> <td>01/01/2014-31/12/2014</td><td>87,715.007</td></tr> <tr> <td>01/01/2015-31/12/2015</td><td>87,979.605</td></tr> <tr> <td>Total</td><td>360,576.742</td></tr> </table>	01/03/2012-31/12/2012	83,006.263	01/01/2013-31/12/2013	101,875.867	01/01/2014-31/12/2014	87,715.007	01/01/2015-31/12/2015	87,979.605	Total	360,576.742
01/03/2012-31/12/2012	83,006.263										
01/01/2013-31/12/2013	101,875.867										
01/01/2014-31/12/2014	87,715.007										
01/01/2015-31/12/2015	87,979.605										
Total	360,576.742										
Monitoring equipment	Please refer to the monitoring equipment information in the table of parameters $EG_{output,y}$, $EG_{import,y}$ and $EG_{im-spare,y}$. Please refer to the monitoring equipment information in the table of parameters.										
QA/QC procedures to be applied	The accuracy of M1-M2 is not lower than 0.5s and the accuracy of M3 is 2.0, The accuracy of electricity meter is satisfied to the requests of monitoring plan. The meters would be calibrated according to the appropriate national standard. The calibration frequency is once a year. Data will be archived for 2 years following the end of the last crediting period										
Purpose of the data	Baseline Emission calculation										
Calculation method	The net electricity supplied to the Grid by the proposed project will be calculated through electricity supplied by the project to the grid ($EG_{output,y}$) minus electricity purchased from the Grid ($EG_{import,y}$) and electricity purchased from the 10 kV spare line ($EG_{im-spare,y}$).										
Comments	-										

Data / Parameter	$EG_{output,y}$
Data unit	MWh
Description	Electricity supplied to the grid by the Project in year y.
Source of data	Electricity meter reading (M1 as main meter, M2 as backup meter)
Description of measurement methods and procedures to be applied	$EG_{output,y}$ will be monitored by the main meter M1 and backup meter M2 at the at the connection points between the proposed project and the Grid (M1 installed at Xijiao 110kV substation; M2 installed at on-site 110kV substation). The meter readings will be cross-checked with ETNs or statements issued by grid company. The project operator is responsible for recording.

Frequency of monitoring/recording	Continuously measurement and monthly recording										
Value monitored	<table border="1"> <tr> <td>01/03/2012-31/12/2012</td><td>83,280.450</td></tr> <tr> <td>01/01/2013-31/12/2013</td><td>102,240.050</td></tr> <tr> <td>01/01/2014-31/12/2014</td><td>88,141.900</td></tr> <tr> <td>01/01/2015-31/12/2015</td><td>88,460.900</td></tr> <tr> <td>Total</td><td>362,123.300</td></tr> </table>	01/03/2012-31/12/2012	83,280.450	01/01/2013-31/12/2013	102,240.050	01/01/2014-31/12/2014	88,141.900	01/01/2015-31/12/2015	88,460.900	Total	362,123.300
01/03/2012-31/12/2012	83,280.450										
01/01/2013-31/12/2013	102,240.050										
01/01/2014-31/12/2014	88,141.900										
01/01/2015-31/12/2015	88,460.900										
Total	362,123.300										
Monitoring equipment	Electricity meter reading (M1 as main meter, M2 as backup meter).Please refer to the monitoring equipment information in the table of parameters.										
QA/QC procedures to be applied	The accuracy of M1-M2 is not lower than 0.5s; The accuracy of electricity meter is satisfied to the requests of monitoring plan. The meters would be calibrated once a year according to the appropriate national standard. Data will be archived for 2 years following the end of the last crediting period										
Purpose of the data	Baseline Emission calculation										
Calculation method	-										
Comments	-										

Data / Parameter	$EG_{import,y}$
Data unit	MWh
Description	Electricity delivered to the project by the grid in year y.
Source of data	Electricity meter reading (M1 as main meter, M2 as backup meter)
Description of measurement methods and procedures to be applied	$EG_{import,y}$ will be monitored by the main meter M1 and backup meter M2 at the at the connection points between the proposed project and the Grid (M1 installed at Xijiao 110kV substation; M2 installed at on-site 110kV substation). The meter readings will be cross-checked with ETNs or statements issued by grid company. The project operator is responsible for recording.
Frequency of monitoring/recording	Continuously measurement and monthly recording
Value monitored	

	01/03/2012-31/12/2012	267.300
	01/01/2013-31/12/2013	363.770
	01/01/2014-31/12/2014	426.800
	01/01/2015-31/12/2015	476.300
	Total	1,534.170
Monitoring equipment	Please refer to the monitoring equipment information in the table of parameters.	
QA/QC procedures to be applied	The accuracy of M1-M2 is not lower than 0.5s, The accuracy of electricity meter is satisfied to the requests of monitoring plan. The meters would be calibrated once a year according to the appropriate national standard. Data will be archived for 2 years following the end of the last crediting period	
Purpose of the data	Baseline Emission calculation	
Calculation method	-	
Comments	-	

Data / Parameter	EG _{im-spare,y}							
Data unit	MWh							
Description	Electricity purchased from the grid through a 10 kV spare line in the year y							
Source of data	Electricity meter reading (M3)							
Description of measurement methods and procedures to be applied	The local power distributor will measure the EG _{im-spare,y} by metering instrument (M3) owned, operated and installed at the project site. Only the local power distributor is accessible to the meter. Sales receipts will be issued accordingly in an approach which is agreed by both the local power distributor and the project owner.							
Frequency of monitoring/recording	Continuously measurement and monthly recording							
Value monitored	<table><tr><td>01/03/2012-31/12/2012</td><td>6.887</td></tr><tr><td>01/01/2013-31/12/2013</td><td>0.413</td></tr><tr><td>01/01/2014-31/12/2014</td><td>0.093</td></tr></table>		01/03/2012-31/12/2012	6.887	01/01/2013-31/12/2013	0.413	01/01/2014-31/12/2014	0.093
01/03/2012-31/12/2012	6.887							
01/01/2013-31/12/2013	0.413							
01/01/2014-31/12/2014	0.093							

	01/01/2015-31/12/2015	4.995
	Total	12.388
Monitoring equipment	Please refer to the monitoring equipment information in the table of parameters.	
QA/QC procedures to be applied	The accuracy of M3 is not lower than 2.0; The accuracy of electricity meter is satisfied to the requests of monitoring plan. The meter would be calibrated once a year according to the appropriate national standard. Data will be archived for 2 years following the end of the last crediting period.	
Purpose of the data	Baseline Emission calculation	
Calculation method	-	
Comments	-	

The monitoring equipment information

Meter	Main meter M1	Backup meter M2	M3
Serial No.	370110001005067	1007036777000001	WY4D98135
Accuracy	0.5s	0.2s	2.0
Date of Calibration	26/02/2012 26/02/2013 26/02/2014 26/02/2015	27/02/2012 27/02/2013 27/02/2014 27/02/2015	27/02/2012 27/02/2013 27/02/2014 27/02/2015
Validity	The meters had been calibrated once a year according to the appropriate national standard.		

4.3 Monitoring Plan

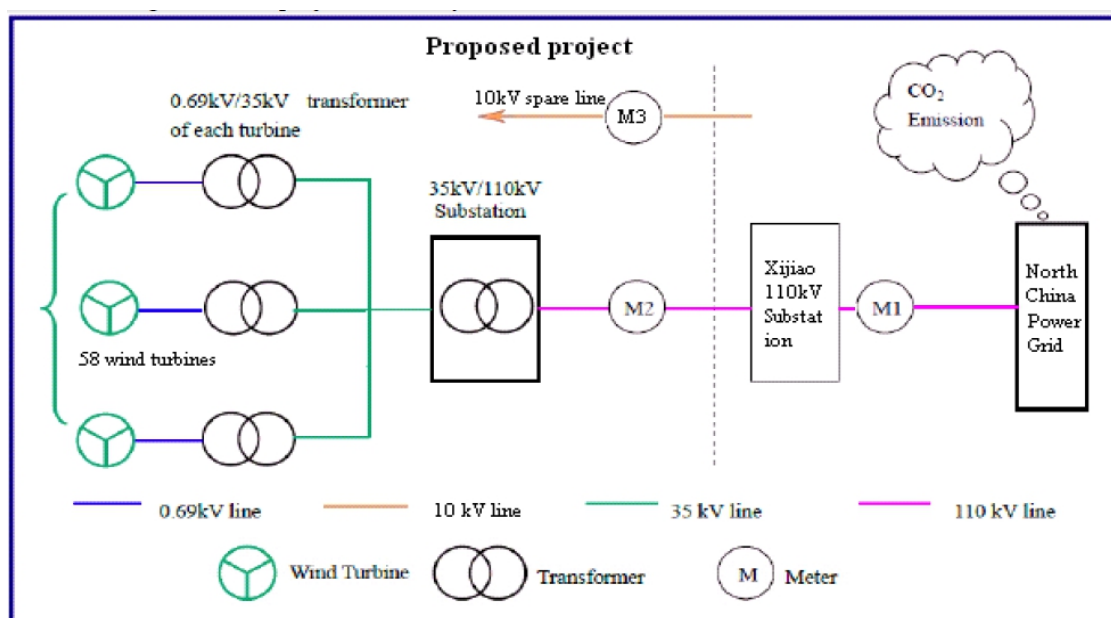
The bi-directional electricity meter (M1) is installed on the substation to measure directly and continuously the electricity supplied to the grid by the project activity and the electricity purchased from the grid to the project site. The supplied and purchased electricity is double checked with the sales receipts.

The back-up meter (M2) is installed in the 110kV substation in the wind farm. The sales receipts of the electricity supplied to the grid by this proposed project and the electricity purchased from the grid are issued based on the power purchase agreement (PPA) signed between the project entity and the power grid company and the readings from the main meter

(M1). The reading of meter (M2) is carried out by the project owner just for cross check against reading of M1, taken the line loss into consideration. The accuracy of M1 and M2 is no lower than 0.5s, and the calibration frequency of M1 and M2 is once a year in line with the national standards.

A 10kV spare line is used for supplied electricity to the proposed project when the main power line fails to supply power. A meter (hereafter referred as meter M3) is installed to measure the electricity imported via this line. This meter is owned, maintained and monitored by the local power distributor. The accuracy of the meter is not lower than 2.0, and the calibration frequency of the meter M3 is once a year in line with the national standards.

The simplified wiring diagram is showed as below:



$EG_{output,y}$ (the electricity supplied to the grid by the project activity) and $EG_{import,y}$ (the electricity delivered to the project activity by the grid via the main power line) is measured by both main bidirectional meter M1 and bidirectional back up meter M2 in accordance with national regulations. During this monitoring period (01/03/2013 to 31/12/2015), the 24:00 on the last but five of every month in 2012 is determined as the settlement time for power supplied to the grid and the 24:00 on the last day of every month from 2013. The grid company issues the monthly Electricity Transaction Notes (ETNs) based on the readings of M1 to the project entity. The measurement results of $EG_{output,y}$ measured with main meter M1 and backup meter M2 and electricity supply values on ETNs are cross-checked against each other. The measurement results of M1 and the monthly ETNs are considered as a basis for emission reductions calculation. Measurement records and also ETNs are archived for a period of two years after the crediting period to which the records pertain.

$EG_{im-spare,y}$ (the electricity delivered to the project activity by the grid via the back-up power line) is measured by standard metering instrument M3 installed on the 10kv back-up power line in

accordance with national regulations. During this monitoring period (01/03/2013 to 31/12/2015), the 24:00 on the last but six of every month in 2012 is determined as the settlement time for power supplied to the grid and the 24:00 on the last day of every month from 2013. The grid company issues ETNs (or statement issued by the grid company) according to the readings of M3 for power delivered to the project activity every month. The measurement results of M3 and electricity value on ETNs (or statement issued by the grid company) are cross-checked against each other and those values were considered as a basis for emission reductions calculation. Measurement records and also the ETNs are archived for a period of 2 years after the crediting period to which the records pertain.

Monitoring organizational structure, roles and responsibilities

The project owner will use this document as guideline in monitoring of the project emission reduction performance and will adhere to the guidelines set out in this monitoring plan to ensure that the monitoring is credible, transparent and conservative.

The responsibilities of the project staff are as follows:

General Manager: To be responsible for supervising the whole monitoring procedure.

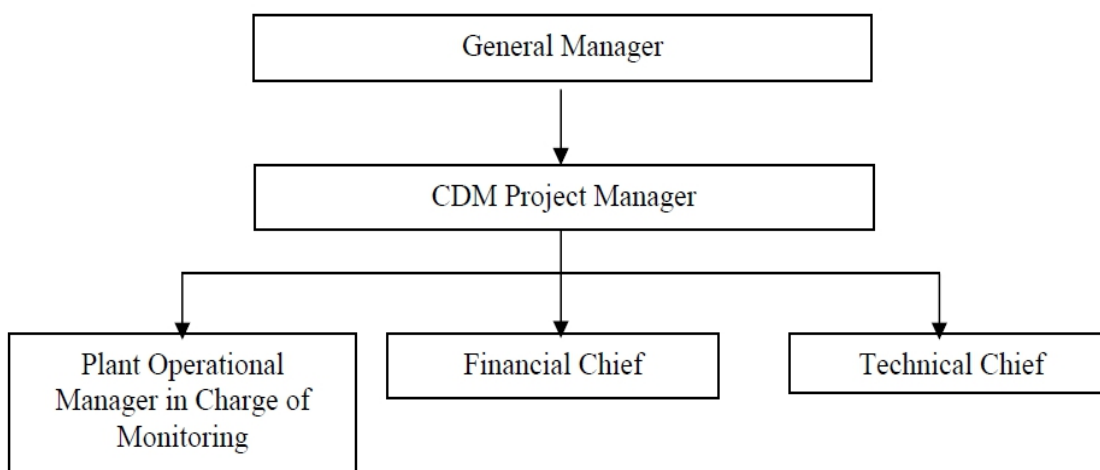
CDM Project Manager: To be responsible for data management and compiling monitoring report.

Operational and monitoring manager: To be responsible for collecting data and do internal audit.

Financial chief: To be responsible for collection of sales receipts.

Technical chief: To be responsible for preparing operational reports of the project activity, recording the daily operation of the wind farm, including operating periods, equipment defects, etc.

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



Data Management System

To keep safely the record of the data collected during monitoring, this project will set up a complete data management system. The project will perfect the whole monitoring procedure by developing the CDM manual, tracking information from the primary source to the end-data calculations in paper document format. It is the responsibility of the proposed project owner to provide additional necessary data and information for validation and verification requirements of respective DOE. Physical documentation such as paper-based maps, diagrams and environmental assessment will be collated in a central place, together with this monitoring plan. All paper-based information will be stored by the proposed project owner and kept at least one copy.

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

All the data will be kept for two years following the end of the last crediting period.

Quality Assurance and Quality Control

The workers are trained to be competent and the metering equipments are calibrated and sealed as per the industry practices at regular intervals, with the purpose to provide credible, accurate, transparent and conservative monitoring data and ensure the real, measurable, long-term GHG emission reduction from this project.

Monthly metering data of the supplied and purchased electricity by the proposed project will be approved and signed off by the Manager before it is accepted and stored. This audit will check compliance with monitoring procedures in this monitoring plan. This internal audit will also identify potential improvements to procedures to improve monitoring and reporting in future years. The monitoring officers will also attend a training session organized by the CDM consultant. The purpose of training is to assure those staffs are competent to conduct the monitoring plan, thus to make the monitored data accurate.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

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

$$BE_y = EG_{Facility,y} \times EF_{grid,CM,y}$$

Where:

BE_y = Baseline emissions in year y (tCO₂/yr)

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

$EF_{grid,CM,y}$ = Combined margin emission factor for grid connected power generation in year y (tCO₂/MWh).

$$EG_{facility,y} = EG_{output,y} - EG_{import,y} - EG_{im-spare,y}$$

Where:

- $EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (in MWh);
- $EG_{output,y}$ = Electricity supplied to the grid by the project activity (in MWh);
- $EG_{import,y}$ = Electricity delivered to the project activity by the grid via the main power line (in MWh);
- $EG_{im-spare,y}$ = Electricity delivered to the project activity by the grid via the back-up power line (in MWh).

Table 1-1: Electricity exchange with the grid via the main power line

Period		Electricity supplied to the grid by the project activity (MWh)			Electricity delivered to the project activity by the grid via the main power line (MWh)		
		Metered by M1	Evidenced by ETNs	Conservative values (EG _{output,y})	Metered by M1	Evidenced by ETNs	Conservative values (EG _{import,y})
		A	B	C=MIN(A, B)	D	E	F=MAX(D, E)
01/03/2012	26/03/2012	9384.65	9384.65	9384.65	20.35	20.35	20.35
27/03/2012	25/04/2012	15438.50	15438.50	15438.50	13.20	13.20	13.20
26/04/2012	26/05/2012	6354.70	6354.70	6354.70	7.70	7.70	7.70
27/05/2012	25/06/2012	11936.10	11936.10	11936.10	15.95	15.95	15.95
26/06/2012	26/07/2012	7656.00	7656.00	7656.00	15.40	15.40	15.40
27/07/2012	26/08/2012	4914.80	4914.80	4914.80	39.05	39.05	39.05
27/08/2012	25/09/2012	5337.20	5337.20	5337.20	42.35	42.35	42.35
26/09/2012	26/10/2012	8859.40	8859.40	8859.40	35.20	35.20	35.20
27/10/2012	25/11/2012	8005.25	8005.25	8005.25	9.90	9.90	9.90
26/11/2012	26/12/2012	3984.75	3984.75	3984.75	57.20	57.20	57.20
27/12/2012	31/12/2012	1409.10	1409.10	1409.10	11.00	11.00	11.00
2012 subtotal				83280.45			267.30

01/01/2013	31/01/2013	7660.95	7660.95	7660.95	38.50	38.50	38.50
01/02/2013	28/02/2013	5423.55	5423.55	5423.55	83.60	83.60	83.60
01/03/2013	31/03/2013	14403.95	14403.95	14403.95	9.90	9.90	9.90
01/04/2013	30/04/2013	15263.60	15263.60	15263.60	18.15	18.15	18.15
01/05/2013	31/05/2013	10027.05	10027.05	10027.05	10.12	10.12	10.12
01/06/2013	30/06/2013	6470.20	6470.20	6470.20	19.80	19.80	19.80
01/07/2013	31/07/2013	6882.15	6882.15	6882.15	32.45	32.45	32.45
01/08/2013	31/08/2013	6415.20	6415.20	6415.20	30.25	30.25	30.25
01/09/2013	30/09/2013	4433.00	4433.00	4433.00	39.60	39.60	39.60
01/10/2013	31/10/2013	8182.90	8182.90	8182.90	25.85	25.85	25.85
01/11/2013	30/11/2013	8219.20	8219.20	8219.20	36.30	36.30	36.30
01/12/2013	31/12/2013	8858.30	8858.30	8858.30	19.25	19.25	19.25
2013 subtotal				102240.05			363.77
01/01/2014	31/01/2014	6833.75	6833.75	6833.75	28.05	28.05	28.05
01/02/2014	28/02/2014	8699.35	8699.35	8699.35	53.90	53.90	53.90
01/03/2014	31/03/2014	11955.90	11955.90	11955.90	27.50	27.50	27.50
01/04/2014	30/04/2014	7565.25	7565.25	7565.25	32.45	32.45	32.45
01/05/2014	31/05/2014	10853.70	10853.70	10853.70	22.00	22.00	22.00
01/06/2014	30/06/2014	4922.50	4922.50	4922.50	37.95	37.95	37.95
01/07/2014	31/07/2014	5151.30	5151.30	5151.30	25.85	25.85	25.85
01/08/2014	31/08/2014	3149.85	3149.85	3149.85	39.05	39.05	39.05
01/09/2014	30/09/2014	3247.20	3247.20	3247.20	70.40	70.40	70.40
01/10/2014	31/10/2014	10615.55	10615.55	10615.55	30.25	30.25	30.25
01/11/2014	30/11/2014	5843.20	5843.20	5843.20	29.15	29.15	29.15
01/12/2014	31/12/2014	9304.35	9304.35	9304.35	30.25	30.25	30.25
2014 subtotal				88141.90			426.80
01/01/2015	31/01/2015	12674.20	12674.20	12674.20	34.65	34.65	34.65
01/02/2015	28/02/2015	6592.30	6592.30	6592.30	38.50	38.50	38.50
01/03/2015	31/03/2015	9722.90	9722.90	9722.90	30.25	30.25	30.25
01/04/2015	30/04/2015	13185.15	13185.15	13185.15	27.50	27.50	27.50
01/05/2015	31/05/2015	8155.95	8155.95	8155.95	18.15	18.15	18.15
01/06/2015	30/06/2015	6535.10	6535.10	6535.10	24.20	24.20	24.20
01/07/2015	31/07/2015	3657.50	3657.50	3657.50	66.00	66.00	66.00
01/08/2015	31/08/2015	2897.40	2897.40	2897.40	55.00	55.00	55.00
01/09/2015	30/09/2015	2492.60	2492.60	2492.60	66.00	66.00	66.00
01/10/2015	31/10/2015	5679.30	5679.30	5679.30	36.85	36.85	36.85
01/11/2015	30/11/2015	9563.40	9563.40	9563.40	29.15	29.15	29.15
01/12/2015	31/12/2015	7305.10	7305.10	7305.10	50.05	50.05	50.05
2015 subtotal				88460.90			476.30
Total		-	-	362,123.300	-	-	1,534.170

Table 1-2: Electricity delivered to the project activity by the grid via the backup power line

Period		Electricity delivered to the project activity by the grid via the backup power line (MWh)		
		Metered by M3	Evidenced by ETNs	Conservative values (EG _{im-spare,y})
		G	H	I=MAX(G, H)
12/02/2012	12/03/2012	0.389	0.389	0.389
13/03/2012	11/04/2012	1.415	1.415	1.415
12/04/2012	12/05/2012	0.391	0.391	0.391
13/05/2012	11/06/2012	0.577	0.577	0.577
12/06/2012	12/07/2012	0.495	0.495	0.495
13/07/2012	12/08/2012	0.389	0.389	0.389
13/08/2012	11/09/2012	0.389	0.389	0.389
12/09/2012	12/10/2012	1.060	1.060	1.060
13/10/2012	11/11/2012	0.451	0.451	0.451
12/11/2012	12/12/2012	1.331	1.331	1.331
13/12/2012	31/12/2012	0.000	0.000	0.000
2012 subtotal				6.887
01/01/2013	31/01/2013	0.005	0.005	0.005
01/02/2013	28/02/2013	0.008	0.008	0.008
01/03/2013	31/03/2013	0.007	0.007	0.007
01/04/2013	30/04/2013	0.003	0.003	0.003
01/05/2013	31/05/2013	0.004	0.004	0.004
01/06/2013	30/06/2013	0.001	0.001	0.001
01/07/2013	31/07/2013	0.001	0.001	0.001
01/08/2013	31/08/2013	0.386	0.386	0.386
01/09/2013	30/09/2013	0.000	0.000	0.000
01/10/2013	31/10/2013	0.001	0.001	0.001
01/11/2013	30/11/2013	0.001	0.001	0.001
01/12/2013	31/12/2013	0.001	0.001	0.001
2013 subtotal				0.413
01/01/2014	31/01/2014	0.001	0.001	0.001
01/02/2014	28/02/2014	0.040	0.040	0.040
01/03/2014	31/03/2014	0.000	0.000	0.000
01/04/2014	30/04/2014	0.000	0.000	0.000
01/05/2014	31/05/2014	0.053	0.053	0.053
01/06/2014	30/06/2014	0.000	0.000	0.000
01/07/2014	31/07/2014	0.000	0.000	0.000

01/08/2014	31/08/2014	0.000	0.000	0.000
01/09/2014	30/09/2014	0.000	0.000	0.000
01/10/2014	31/10/2014	0.000	0.000	0.000
01/11/2014	30/11/2014	0.000	0.000	0.000
01/12/2014	31/12/2014	0.000	0.000	0.000
2014 subtotal				0.093
01/01/2015	31/01/2015	0.000	0.000	0.000
01/02/2015	28/02/2015	0.883	0.883	0.883
01/03/2015	31/03/2015	0.402	0.402	0.402
01/04/2015	30/04/2015	0.389	0.389	0.389
01/05/2015	31/05/2015	0.389	0.389	0.389
01/06/2015	30/06/2015	0.389	0.389	0.389
01/07/2015	31/07/2015	0.389	0.389	0.389
01/08/2015	31/08/2015	0.389	0.389	0.389
01/09/2015	30/09/2015	0.598	0.598	0.598
01/10/2015	31/10/2015	0.389	0.389	0.389
01/11/2015	30/11/2015	0.389	0.389	0.389
01/12/2015	31/12/2015	0.389	0.389	0.389
2015 subtotal				4.995
Total		-	-	12.388

Table 2: Calculation of net electricity supplied to the grid

Period	Conservative values of the electricity supplied to the grid (MWh)	Conservative values of electricity delivered to the project by the grid via main power line (MWh)	Conservative values of electricity delivered to the project by the grid via backup power line (MWh)	Net electricity supplied to the grid by the project (MWh)
	EG _{output,y}	EG _{import,y}	EG _{im-spare,y}	EG _{facility,y} = EG _{output,y} - EG _{import,y} - EG _{im-spare,y}
01/03/2012-31/12/2012	83,280.450	267.300	6.887	83,006.263
01/01/2013-31/12/2013	102,240.050	363.770	0.413	101,875.867
01/01/2014-31/12/2014	88,141.900	426.800	0.093	87,715.007
01/01/2015-31/12/2015	88,460.900	476.300	4.995	87,979.605
Total	362,123.300	1,534.170	12.388	360,576.742

Table 3: Calculation of baseline emission reductions

Period	Net electricity supplied to the grid by the project (MWh) (EG _{facility,y})	EF _{grid, CM, y} (tCO ₂ e/MWh)	Baseline emissions (tCO ₂ e/MWh) (BE _y)
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01/03/2012-31/12/2012	83,006.263	0.9309	77,270
01/01/2013-31/12/2013	101,875.867	0.9309	94,836
01/01/2014-31/12/2014	87,715.007	0.9309	81,653
01/01/2015-31/12/2015	87,979.605	0.9309	81,900
Total			335,659

5.2 Project Emissions

According to ACM0002 (Version 12.2.0), no project emissions were to be counted by the Project.

Hence, $PE_y = 0 \text{ tCO}_2\text{e}$.

5.3 Leakage

According to the baseline methodology ACM0002 (version 12.2.0), the leakage of the Project is not 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)
Year 2012 (01/03/2012-31/12/2012)	77,270	0	-	77,270
Year 2013	94,836	0	-	94,836
Year 2014	81,653	0	-	81,653
Year 2015	81,900	0	-	81,900
Total	335,659	0	-	335,659

The annual average emission reductions estimated in the registered CDM-PDD is 84,709 tCO₂, so the estimated amount of emission reductions for the corresponding 1,401 days (the duration of this monitoring period) are $1,401/365 \times 84,709 = 325,143 \text{ tCO}_2$, which is little lower (3.23%) than the actual value of 335,659 tCO₂. Due to the wind resources are variable with the seasonal changes, the emission reductions are reasonable in this monitoring period.