



Verified Carbon Standard

YUXIAN BAIYANTUO 49.3 MW WIND POWER PROJECT

Document Prepared by Beijing Ruifang Technology 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	5
1.8	Title and Reference of Methodology	6
1.9	Participation under other GHG Programs	6
1.10	Other Forms of Credit	6
1.11	Sustainable Development	7
2	SAFEGUARDS	7
2.3	AFOLU-Specific Safeguards	10
3	IMPLEMENTATION STATUS	10
3.1	Implementation Status of the Project Activity	10
3.2	Deviations	11
3.3	Grouped Projects	11
4	DATA AND PARAMETERS	12
4.1	Data and Parameters Available at Validation	12
4.2	Data and Parameters Monitored	16
4.3	Monitoring Plan	17
5	QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS	19
5.1	Baseline Emissions	19
5.2	Project Emissions	20
5.3	Leakage	20
5.4	Net GHG Emission Reductions and Removals	20
	APPENDIX: < MONTHLY BASELINE EMISSIONS>	22

1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Yuxian Baiyantuo 49.3 MW Wind Power Project (hereinafter referred to as the project) is developed by Hebei Construction Investment Yuzhou Wind Energy Co., Ltd. It is located at the southwest of Yuxian County, Hebei Province, P. R. China.

The project install 58 sets of wind turbine, each of which has a rated installed capacity of 850 kW, providing a total installed capacity of 49.3 MW. The electricity generated by the project is supplied to North China Grid (NCPG) and the annual output of the project is estimated to be 104,713.2 MWh.

North China Grid is dominated by thermal power plants. In the absence of the Project, equivalent amount of annual power output to the Project will be generated and supplied by NCPG. This is the same with the baseline scenario of the Project. The estimated annual GHG emission reductions in the first crediting period are 99,501 tCO₂e/yr, and are 86,587 tCO₂e/yr during the second crediting period.

The project began to construct on 10/05/2010 and was put into commercial operation on 16/12/2010 (i.e. the project starts date).

The first crediting period is from 16/12/2010 to 15/12/2020 while the second crediting period is from 16/12/2020 to 15/12/2030. This monitoring period is from 01/06/2018-30/11/2021 (1279 days), in which the period from 01/06/2018 to 15/12/2020 (929 days, hereinafter referred as “P1”) belongs to the first crediting period, and the period from 16/12/2020 to 30/11/2021(350 days, hereinafter referred as “P2”) belongs to the second crediting period. The emission reductions in P1 is 271,703 tCO₂, the emission reductions in P2 is 88,509 tCO₂. Hence, the emission reductions in this monitoring period is 360,212 tCO₂.

1.2 Sectoral Scope and Project Type

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

Project type: wind power project.

This project is not grouped project.

1.3 Project Proponent

Organization name	Hebei Construction Investment Yuzhou Wind Energy Co., Ltd
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Title	Manager
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1.4 Other Entities Involved in the Project

Organization name	Beijing Ruifang Technology Co., Ltd.
Role in the Project	Consultancy
Contact person	Teng Haipeng
Title	Manager
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1.5 Project Start Date

16/12/2010 (operation date, which means the date that started to generate GHG emission reductions)

1.6 Project Crediting Period

As per the renewed VCS PD, the first crediting period is from 16/12/2010 to 15/12/2020 while the second crediting period is from 16/12/2020 to 15/12/2030.

This monitoring period is from 01/06/2018-30/11/2021 (1279 days), in which the period from 01/06/2018 to 15/12/2020 (929 days, hereinafter referred as “P1”) belongs to the first crediting period, and the period from 16/12/2020 to 30/11/2021(350 days, hereinafter referred as “P2”) belongs to the second crediting period.

1.7 Project Location

The Project is located in Yu County, Zhangjiakou City, Hebei Province, P.R.China. The center of the Project has geographical coordinates with east longitude of 114°33'06” and north latitude of 39°40'32”. Figure 1 shows the location of Hebei Province. Figure 2 shows the location of Zhangjiakou City. Figure 3 shows the location of the Project.

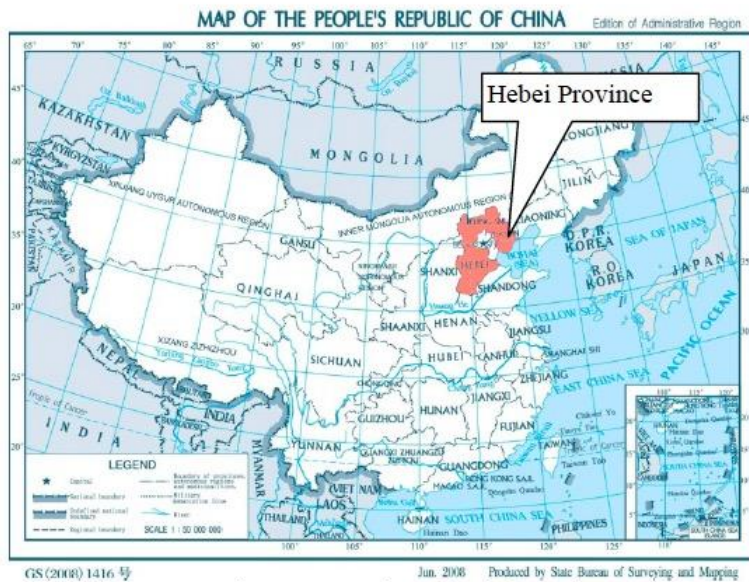


Figure 1. Location of Hebei Province

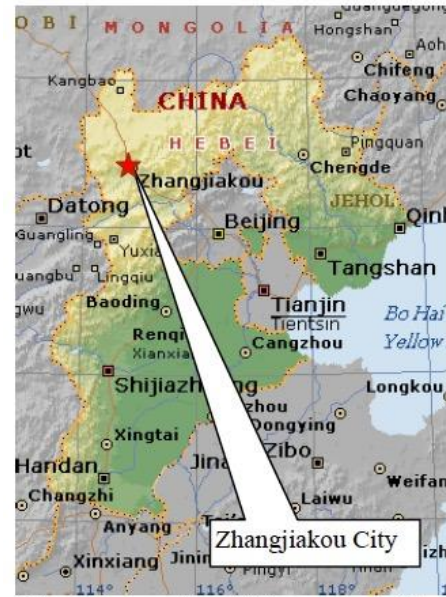


Figure 2. Location of Zhangjiakou City



Figure 3. Location of the Project

1.8 Title and Reference of Methodology

For P1, the project applies the approved consolidated baseline and monitoring methodology ACM0002

“Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (Version 12.1.0).

The methodology also refers to the following tools:

Tool to calculate the emission factor for an electricity system (Version 02.1.0);

Tool for the demonstration and assessment of additionality (Version 05.2);

For P2, the approved methodology applied in the project activity is ACM0002 – Consolidated methodology for grid-connected electricity generation from renewable sources” (version 20.0)¹.

Related tools are:

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

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

-Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period (version 03.0.1)

1.9 Participation under other GHG Programs

The Project has been registered as a CDM project on 01/06/2011 with registration number of 4817. It has been issued one time under CDM mechanism, with monitoring period from 01/06/2011 to 24/06/2012.

The credits in this monitoring period (01/06/2018-30/11/2021) has not been counted and will not be counted under other kind of GHG program

1.10 Other Forms of Credit

The project has been registered as a CDM project on 01/06/2011, the first crediting period is from 01/06/2011 to 31/05/2018(7years, renewable). It has been issued one time under CDM mechanism, with monitoring period from 01/06/2011 to 24/06/2012.

The Project has not created another form of environmental credit, and the Project will not create other environmental credit in the future.

The Project has not created another form of environmental credit, and the Project will not create other environmental credit in the future.

¹ <https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG>

1.11 Sustainable Development

The project makes contribution to the sustainable development as follows:

1. GHG emission reduction

The project will help reduce the greenhouse gas GHG emissions versus the high-growth, coal-dominated business-as-usual scenario in the NCPG by reducing the electricity generation from the fossil-fuel fired power plants.

Thus, the project achieved **SDG 13 Climate Action**².

- Reduction of fossil fuel use and provide clean energy

The Project Activity will reduce reliance on imported fossil fuels, which will contribute to increasing China's energy security, and will also improve local air quality as it reduces the emissions of SO₂, and NO_x associated with fossil fuel use.

Thus, the project achieved **SDG 7 Affordable and Clean Energy**³.

3. Employment opportunities

The conducting of the project will create employment opportunities during the construction phase and operational period.

4. Economic Improvement

The construction of the wind farm will promote local economy by contributing to local government with more tax revenues through selling power generation.

Thus, the project achieved **SDG 8 Decent Work and Economic Growth**⁴.

2 SAFEGUARDS

2.1 No Net Harm

The EIA Form was approved by Environmental Protection Bureau of Hebei Province on 31/03/2009 (Document No. JHB [2009]47). According to the EIA Form, environmental impacts possibly caused by the Project and treatment measures adopted by the Project Owner are analyzed as follows:

Waste water

² <https://sdgs.un.org/goals/goal13>

³ <https://sdgs.un.org/goals/goal7>

⁴ <https://sdgs.un.org/goals/goal8>

Waste water produced during the construction period and the operation period of the Project is mainly domestic waste water of workers. A small quantity of the waste water produced during the construction period will be absorbed by the earth or evaporated, without contaminating the surface ground. The domestic waste water produced during the operation period will be collected and treated in waste water treatment facilities. Then, all the water satisfying safety standards will be reused for the greening and ecological restoration of the wind farm area, without being discharged outside. Thus, the domestic waste water will not have any impact on the surroundings.

Dust and exhaust gas

There is no discharge of exhaust gas during the operation period of the Project. During the construction period of the Project, the generation of dust is mainly due to excavation, piling, backfilling and transportation of earth, land flattening, road expansion and transportation, loading and unloading and piling of construction materials. Exhaust gas could also be generated from the operation of oil fueled machines and vehicle running. However, by means of watering and covering the material piling areas and limiting the speed of vehicles, the air pollutant emission of the Project will meet the requirement of Integrated Emission Standard of Air Pollutants (GB16297-1996), so the Project will not have any impact on the surroundings.

Noise

Noises generated during the construction period of the Project stem from activities such as excavation and backfilling of earth for the foundation of wind turbines, piling, casting of the foundation platform, installation of the power generation equipments and construction of the multipurpose building and the substation. After attenuation, the noises will meet the requirement of Noise Limits for Construction Site (GB12523-90). The noises during the operation period will be reduced through regular maintenance and timely conservation on equipments such as turbines and transformers. As a result, the noises in the plant area and the noises at sensitive sites will meet the requirement of Category I of Emission Standard for Industrial Enterprises Noise at Boundary (GB12348-2008).

Solid waste

The solid waste produced during the construction period is mainly spoil, construction waste, domestic waste etc. The spoil will be immediately transported to dump sites. The construction waste and the domestic waste will be transported to the waste disposal site of Yu County by the environmental sanitation administrative department for sanitary landfill. During the operation period of the Project, the domestic waste will be collected and periodically transported to the waste disposal site of Yu County by the environmental sanitation administrative department for sanitary landfill. By taking the measures above, the solid waste produced in the Project will not have any impact on the surroundings.

Ecological impact

Damage to the vegetation caused by permanent land occupation of the Project will be compensated correspondingly. And the damage to vegetation will be recovered in another place with the same area and quality. By taking measures of vegetation recovery and compensation, the Project will have no impact on local ecological environment. Moreover, the main migration route of birds does not go through the region of the Project, so the wind power generation facilities will not impact the migrating birds.

In summary, by means of measures of pollution avoidance and control as well as ecological recovery, the Project will not impact the environment.

Therefore, the project does not bring negative environmental and socio-economic impacts.

2.2 Local Stakeholder Consultation

Stakeholders of the Project are identified as local residents possibly impacted by the Project. In November 2009, a survey was conducted on the stakeholders of the Project, through distributing and collecting responses to a questionnaire.

The questionnaire is distributed to the local residents near the Project Site. They are of different ages and occupations, coming from different towns and villages. For the total 50 questionnaires distributed to the stakeholders, 50 returned with a response rate of 100%.

The questionnaires mainly focus on the following issues:

- What's the extent of the stakeholders' knowledge about the Project?
- What's the attitude of the stakeholders on the construction of the Project?
- Where will the necessities of construction of the Project be shown from the view of stakeholders?
- What positive impacts will be introduced by the implementation of the Project from the view of stakeholders?
- What negative impacts will be introduced by the implementation of the Project from the view of stakeholders?

According to the 50 questionnaires received:

- 47 respondents (94%) have a certain or very good understanding of the Project and 3 respondents (6%) haven't heard of the Project.
- 49 respondents (98%) support the construction of the Project and 1 respondent (2%) keeps a neutral attitude.
- For the necessities of construction of the Project, 30 respondents (60%) think that the construction of the Project could possibly increase the electricity supplied to the grid, 26 respondents (52%) think that the construction of the Project could possibly improve local employments opportunities, 31 responds (62%) think that the construction of the Project could possibly increase local revenues and 2 respondents(4%) think that the construction of the Project could possibly promote local environmental protection.
- For the positive impacts possibly caused by the implementation of the Project, 12 respondents (24%) think that the implementation of the Project could possibly enhance the available electricity supply to local residents. 10 respondents (20%) think that the implementation of the Project could possibly improve the income of local residents. 27 respondents (54%) think that the implementation of the Project could possibly increase employment opportunities for local residents. 23 respondents (46%) think that the implementation of the Project could possibly improve local living standards. None of the respondents put forward any other positive impact possibly caused by the implementation of the Project.

For the negative impacts possibly caused by the implementation of the Project, 26 respondents (52%) think that the implementation of the Project could possibly cause land occupation. 10 respondents (20%) think that the implementation of the Project could possibly result in noise. 5 respondents (10%) think that the implementation of the Project could possibly have a negative impact on birds' survival environment. 6 respondents (12%) think that the implementation of the Project could possibly destroy local ecological environment. None of the respondents put forward other negative impact caused by the implementation of the Project.

From the results of questionnaire statistics, all the stakeholders understand and support the construction of the Project.

For the issues of noise, birds' survival environment and local ecological environment considered by the respondents, corresponding prevention and control measures have been analyzed in Section D.1 of the PDD. For the issue of land occupation considered by the respondents, the Project will not result in the issue of land occupation since the land required by the Project is mainly grassland and the Project Owner has paid for compensation on land occupation, as described in the FSR.

Thus, there is no necessity to modify the Project in the aspect of design, construction and operation. The Project Owner will think much of the public comments and strictly implement the pollution prevention measures stated in the EIA Form.

For continuous communication with local stakeholders, the project owner public its office telephone to local people and put a grievance book in the office of the company. Anyone who have comments on the project could write on the book or leave message by phone. And after these years' operation, no negative comments were received from local people.

2.3 AFOLU-Specific Safeguards

This project is not an AFOLU project. Therefore, this section is not applicable.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The total installed capacity of the Project is 49.3 MW equipped with 58 sets of wind turbines with a unit installed capacity of 850 kW. The estimated net electricity supplied to North China Grid by the Project is 104,713.2 MWh per year and the plant load factor is 0.2424. Electricity generated by the Project is supplied to North China Grid via a 110 kV transmission line. The technical parameters of the project are shown in table 1.

Table 1. Main technical parameters of key equipment in the Project

Equipment	Quantity	Type	Technical parameters	Data sources
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Turbine	35 sets	G52-850 kW (Low Temperature)	Rated power: 850 kW Quantity of blades: 3 Rotor diameter: 52 m Rotor speed: 14.6~30.8 r/min Lifetime: 20 years	Technical Specification and nameplate
	23 sets	G58-850 kW (Low Temperature)	Rated power: 850 kW Quantity of blades: 3 Rotor speed: 14.6~30.8 r/min Rotor diameter: 58 m Lifetime: 20 yrs	

The Project started construction on 10/05/2010 and commissioning on 16/12/2010. During this monitoring period, the monitoring system of the Project was implemented in line with the monitoring plan.

The wind farm had a good running, no equipment is overhauled or replaced in this monitoring period.

No events or emergency occurred during the monitoring period, which may impact the emission reductions and monitoring.

3.2 Deviations

3.2.1 Methodology Deviations

There is no methodology deviation in this monitoring period.

3.2.2 Project Description Deviations

The project was registered under VCS version 3. In the Verification Report of initial VCS monitoring period, it was mentioned that the project started operation since 16/12/2010. As per UNFCCC website, it was confirmed that the project activity was registered as CDM project activity on 01/06/2011. Therefore, the VCS crediting period was determined as 16/12/2010 to 31/05/2011. As per VCS scheme under which the project was registered, the project crediting period is allowable for 10 years and could be renewed twice. Therefore, the total VCS crediting period was determined from 16/12/2010 to 15/12/2030 (considering the 20-year lifetime of the project activity and 21 years CDM crediting period), of which the first crediting period is from 16/12/2010 to 15/12/2020, while the second crediting period is from 16/12/2020 to 15/12/2030. The same has been described in the renewed VCS PD.

3.3 Grouped Projects

Not applicable as this is not a grouped project.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

For monitoring period belongs to the first crediting period:

Data / Parameter	$CAP_{j,y}$
Data unit	MW
Description	The total installed capacity of province j in year y
Source of data	China Electric Power Yearbook, 2006-2008
Value applied	Annex 3 of approved CDM PDD
Justification of choice of data or description of measurement methods and procedures applied	The data obtained from China Electric Power Yearbook issued by authorized entity in China are reliable
Purpose of Data	Calculation of baseline emissions
Comments	/

Data / Parameter	$GEN_{j,y}$
Data unit	MWh
Description	Total power generation of province j of North China Grid in year y
Source of data	China Electric Power Yearbook, 2006-2008
Value applied	Annex 3 of approved CDM PDD
Justification of choice of data or description of measurement methods and procedures applied	The data obtained from China Electric Power Yearbook issued by authorized entity in China are reliable
Purpose of Data	Calculation of baseline emissions
Comments	/

Data / Parameter	$r_{j,y}$
Data unit	/
Description	Auxiliary electricity consumption rate of province j of North China Grid in year y
Source of data	China Electric Power Yearbook, 2006-2008
Value applied	Annex 3 of approved CDM PDD
Justification of choice of data or description of measurement methods	The data obtained from China Electric Power Yearbook issued by authorized entity in China are reliable

and procedures applied	
Purpose of Data	Calculation of baseline emissions
Comments	/

Data / Parameter	$F_{i,j,y}$
Data unit	t or m ³
Description	Consumption of fuel i of province j of North China Grid in year y
Source of data	China Electric Power Yearbook, 2006-2008
Value applied	Annex 3 of approved CDM PDD
Justification of choice of data or description of measurement methods and procedures applied	The data obtained from China Electric Power Yearbook issued by authorized entity in China are reliable
Purpose of Data	Calculation of baseline emissions
Comments	/

Data / Parameter	$NCV_{i,y}$
Data unit	TJ per mass or volume unit of fuel i in year y
Description	Net calorific value of fuel i
Source of data	China Energy Statistical Yearbook 2008
Value applied	Annex 3 of approved CDM PDD
Justification of choice of data or description of measurement methods and procedures applied	The data obtained from China Energy Statistical Yearbook issued by authorized entity in China are reliable
Purpose of Data	Calculation of baseline emissions
Comments	/

Data / Parameter	$EF_{CO_2,i,y}$
Data unit	tC/TJ
Description	CO ₂ emission factor per unit of energy of the fuel i in year y
Source of data	2006 IPCC Guideline for National Greenhouse Gas Inventories
Value applied	Annex 3 of approved CDM PDD
Justification of choice of data or description of measurement methods and procedures applied	IPCC default value

Purpose of Data	Calculation of baseline emissions
Comments	/

Data / Parameter	$FC_{adv,coal}$
Data unit	gCe/kWh
Description	Weighted average of the fuel consumption for power generation of top 30 sets of 600 MW coal fired power generation units built in 2007 (taken as efficiency level of the best technology commercially available in China)
Source of data	Announcement to Publish 2009 Baseline Emission Factors for Regional Power Grids in China
Value applied	322.5
Justification of choice of data or description of measurement methods and procedures applied	The data obtained from Announcement to Publish 2009 Baseline Emission Factors for Regional Power Grids in China made publicly available by China's DNA are reliable.
Purpose of Data	Calculation of baseline emissions
Comments	/

Data / Parameter	$FC_{adv,oil/gas}$
Data unit	gCe/kWh
Description	Weighted average of the fuel consumption for power generation of 200 MW oil/gas fired combined cycle power generation units (taken as efficiency level of the best technology commercially available in China)
Source of data	Announcement to Publish 2009 Baseline Emission Factors for Regional Power Grids in China
Value applied	246
Justification of choice of data or description of measurement methods and procedures applied	The data obtained from Announcement to Publish 2009 Baseline Emission Factors for Regional Power Grids in China made publicly available by China's DNA are reliable.
Purpose of Data	Calculation of baseline emissions
Comments	/

For monitoring period belongs to the second crediting period:

Data / Parameter	$EF_{grid,OM,y}$
Data unit	tCO ₂ /MWh
Description	Operating margin CO ₂ emission factor in year y

Source of data	“2019 Baseline Emission Factors for Regional Power Grids in China” issued by China DNA ⁵
Value applied	0.9419
Justification of choice of data or description of measurement methods and procedures applied	Official public data from Chia DNA
Purpose of Data	Calculation of baseline emissions
Comments	/

Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO ₂ /MWh
Description	Build margin CO ₂ emission factor in year y
Source of data	“2019 Baseline Emission Factors for Regional Power Grids in China” issued by China DNA ⁶
Value applied	0.4819
Justification of choice of data or description of measurement methods and procedures applied	Official public data from MEE
Purpose of Data	Calculation of baseline emissions
Comments	/

Data / Parameter	w_{OM}
Data unit	%
Description	Weighting of operating margin emissions factor
Source of data	“Tool to calculate the emission factor for an electricity system” (Version 07.0)
Value applied	75
Justification of choice of data or description of	Based on the requirements of “Tool to calculate the emission factor for an electricity system” (Version 07.0)

⁵ <http://www.mee.gov.cn/ywgz/ymqhbh/wsqtz/202012/W020201229610353816665.pdf>
⁶ <http://www.mee.gov.cn/ywgz/ymqhbh/wsqtz/202012/W020201229610354442145.pdf>

measurement methods and procedures applied	
Purpose of Data	Calculation of baseline emissions
Comments	/
Data / Parameter	WBM
Data unit	%
Description	Weighting of build margin emissions factor
Source of data	"Tool to calculate the emission factor for an electricity system" (Version 07.0)
Value applied	25
Justification of choice of data or description of measurement methods and procedures applied	Based on the requirements of "Tool to calculate the emission factor for an electricity system" (Version 07.0)
Purpose of Data	Calculation of baseline emissions
Comments	/

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{\text{facility},y}$
Data unit	MWh
Description	Quantity of net electricity generation supplied by the Project to the grid in year y
Source of data	Measured by electricity meter, calculated by Electricity supplied to the Grid minus Electricity imported from the grid.
Description of measurement methods and procedures to be applied	Continuously measured by one bi-directional meter installed on the 35 kV transmission line at the Project Site and monthly recorded. The readings at 24:00 of the meter were read and recording by operator on duty of the project owner once a day. Cut-off time of the project is at 24:00 on the end of each month. The electricity receipts issued by the grid company for power supplied to the grid and imported from the grid serve as a cross-check.
Frequency of monitoring/recording	Continuously measurement and monthly recording
Value monitored	392998.170

Monitoring equipment	The information of the electricity meter is in the following table.																
QA/QC procedures to be applied	The electricity meter is calibrated by qualified entity according to national standards (DLT448-2016). The meter is calibrated once a year. The electricity record is crosschecked with electricity receipts. The main information is shown below: <table><tr><th>Type</th><th>Serial No.</th><th>Accuracy</th><th>Calibration Date</th><th>Valid date</th></tr><tr><td rowspan="4">ZFD402C</td><td rowspan="4">94316769</td><td rowspan="4">0.2S</td><td>22/12/2017</td><td>21/12/2018</td></tr><tr><td>22/12/2018</td><td>21/12/2019</td></tr><tr><td>22/12/2019</td><td>21/12/2020</td></tr><tr><td>22/12/2020</td><td>21/12/2021</td></tr></table>	Type	Serial No.	Accuracy	Calibration Date	Valid date	ZFD402C	94316769	0.2S	22/12/2017	21/12/2018	22/12/2018	21/12/2019	22/12/2019	21/12/2020	22/12/2020	21/12/2021
Type	Serial No.	Accuracy	Calibration Date	Valid date													
ZFD402C	94316769	0.2S	22/12/2017	21/12/2018													
			22/12/2018	21/12/2019													
			22/12/2019	21/12/2020													
			22/12/2020	21/12/2021													
Purpose of the data	Calculation of baseline emissions																
Calculation method	$EG_{\text{facility},y}$ = Electricity supplied to the Grid - Electricity imported from the grid																
Comments	/																

4.3 Monitoring Plan

1. Monitoring data

The ex-ante determined baseline emission factor will be adopted. The quantity of net electricity generation supplied by the Project ($EG_{\text{facility},y}$) will be monitored. It is monitored by one bi-directional meter installed at the project site. The electricity volume is monitored continuously and recorded monthly. The difference between the electricity exported to grid and the electricity imported from the grid is the net electricity supply.

2. Monitoring System Organization Chart

The monitoring system is shown in Figure 4.

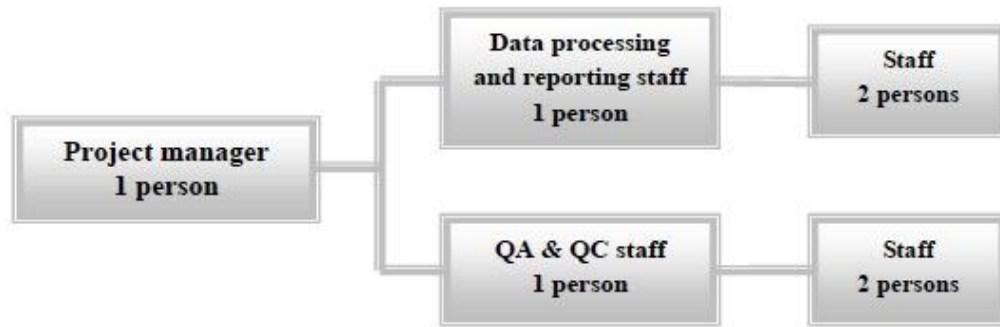


Figure 4. Monitoring structure

The Project Manager is responsible for implementation and supervision of the monitoring activity and liaison in this CDM project. The data processing and reporting personnel are responsible for managing, processing and submitting data. The QA & QC personnel are responsible for calibration of meter and supervision of the whole process quality.

3. Installation of Meter

The quantity of net electricity generation supplied by the Project ($EG_{\text{facility},y}$) is measured continuously by one bi-directional meter installed on the 35 kV transmission line at the Project Site and monthly recorded by the staff.

If there exists difference between the monitored data and the data on electricity sales receipt(s), the conservative values will be used to estimate emission reductions.

4. Data Management System

Particular staff will be appointed by the Project Owner to take the overall responsibility for monitoring data recording and keeping all the data collected as part of monitoring archived electronically.

Electronic data and documents will be regularly copied and archived and kept at least for two years after the end of the last crediting period.

Written data and documents will be copied and archived and kept for at least two years after the end of the last crediting period or two years after the last issuance, whichever is later.

5. Quality Assurance and Quality Control Procedure

Particular QC staff will be appointed by the Project Owner to take the overall responsibility of calibrating monitoring equipment, managing and processing the monitored data.

The meter of the Project will be calibrated by qualified entity according to national standard. The precision of the meter employed by the Project will be 0.2s.

6. Procedure of emergency handling

In case the main meter is out of order, it shall be inspected, repaired, or replaced immediately by the professional staff and quantity of net electricity generation supplied by

the Project to the grid shall be jointly determined by the Project Owner and the power grid company. A conservative and reasonable estimate of the readings shall be determined and conservative values shall be used to estimate emission reductions.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

According to ACM0002, the baseline emission during this verification period is calculated as

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

Where:

BE_y is the baseline emissions (tCO₂e)

$EG_{\text{facility},y}$ is Quantity of net electricity generation supplied by the project to the grid in year y (MWh)

$EF_{\text{grid},CM,y}$ is the CO₂ emission factor of the grid which is fixed in the first and second crediting period (tCO₂e/MWh)

On the basis of these weights for the first crediting period, the combined margin emission factor is calculated, and are fixed ex-ante for the duration of the **first crediting period** as follows:

	CO ₂ emission factor (tCO ₂ /MWh)	Weighting
Simple operating Margin Emissions Factor ($EF_{\text{grid},OM \text{ simple},y}$)	1.0069	0.75
Build Margin Emissions Factor ($EF_{\text{grid}, BM,y}$)	0.7802	0.25
Baseline Emissions Factor ($EF_{\text{grid},CM,y}$)	0.950225	

On the basis of these weights for the second crediting period, the combined margin emission factor is calculated, and are fixed ex-ante for the duration of the **second crediting period** as follows:

	CO ₂ emission factor (tCO ₂ /MWh)	Weighting
Simple operating Margin Emissions Factor ($EF_{\text{grid},OM \text{ simple},y}$)	0.9419	0.75
Build Margin Emissions Factor ($EF_{\text{grid}, BM,y}$)	0.4819	0.25

Baseline Emissions Factor ($EF_{grid,CM,y}$)	0.8269
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The yearly electricity volume and baseline emissions are listed in following table 2.

Table 2. Baseline emissions

Period	Electricity supplied to the grid (MWh)	Electricity imported from the grid (MWh)	$EG_{facility,y}$ (MWh)	$EF_{grid,CM,y}$ (tCO ₂ /yr)	Baseline Emissions (tCO ₂ e)
01/06/2018-31/12/2018 (P1)	63042.171	101.640	62940.531	0.950225	59,803
01/01/2019-31/12/2019 (P1)	116119.507	159.000	115960.507	0.950225	110,181
01/01/2020-15/12/2020 (P1) ⁷	107189.891	137.930	107051.961	0.950225	101,719
16/12/2020-31/12/2020 (P2)	5110.058	3.720	5,106.338	0.8269	4,222
01/01/2021-30/11/2021 (P2)	102072.263	133.430	101938.833	0.8269	84,287
Total in this monitoring period	393533.890	535.720	392998.170		360,212

The monthly data are shown in appendix 1.

5.2 Project Emissions

According to the ACM0002, the emission of wind power project activity is zero, i.e. $PE_y=0$.

5.3 Leakage

According to ACM0002, the leakage of wind power project is not needed to be considered.

5.4 Net GHG Emission Reductions and Removals

In according with the registered PD

$$ER_y = BE_y - PE_y$$

Year	Baseline emissions or removals	Project emissions or removals	Leakage emissions	Net GHG emission reductions or
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⁷ According to Electric Quantity Confirmation issued by the Grid Company, Electricity supplied to the grid and Electricity imported from the grid is 4,903.220 MWh and 2.000MWh during 01/12/2020 to 15/12/2020, and Electricity supplied to the grid and Electricity imported from the grid is 5,110.058 MWh and 3.720MWh during 16/12/2020 to 31/12/2020.

	(tCO ₂ e)	(tCO ₂ e)	(tCO ₂ e)	removals (tCO ₂ e)
01/06/2018-31/12/2018	59,803	0	0	59,803
01/01/2019-31/12/2019	110,181	0	0	110,181
01/01/2020-31/12/2020	105,941	0	0	105,941
01/01/2021-30/11/2021	84,287	0	0	84,287
Total	360,212	0	0	360,212

The estimated annual GHG emission reductions in the first crediting period are 99,501 tCO₂e/yr, and are 86,587 tCO₂e/yr during the second crediting period. This monitoring period is from 01/06/2018 - 30/11/2021 (1279 days, 929 days in the first crediting period, and 350 days in the second crediting period).

The emission reductions claimed are 360,212 tCO₂e in this monitoring period (i.e. 1279 days). Compared with expected emission reductions 336,279 tCO₂e (calculated as 99,501/365*929+86,587/365*350) in the approved CDM PDD and renewed VCS PD, the reported emission reductions in this monitoring period are 7.12% larger than the expected, which is considered to be in the reasonable variation range.

This will not impact the additionally of the project activity as the sensitivity analysis of the project activity shows that the IRR will not exceeds benchmark until an 27.4% increase in Grid-connected electricity. The main reason for the electricity generation increase is that the wind flow in this monitoring period are larger than the designing value in the FSR, the management skills of the plant improves gradually and the wind power accommodation capacity of the grid is increasing.

APPENDIX: < MONTHLY AND YEARLY ELECTRICITY >

Monitoring period			Electricity supplied to the grid			Electricity imported from the grid			EG _{facility,y} (MWh)
Year	From	To	Data from monthly meter reading records (MWh)	Data on the electricity receipts (MWh)	Data for ER calculation (MWh)	Data from monthly meter reading records (MWh)	Data on the electricity receipts (MWh)	Data for ER calculation (MWh)	
			D	E	F=Min(D,E)	J	K	L=Max(J,K)	M=F-L
2018	01/06/2018	30/06/2018	7,289.157	7,289.157	7289.157	12.190	12.190	12.190	7276.967
	01/07/2018	31/07/2018	8,907.623	8,907.623	8907.623	6.680	6.680	6.680	8900.943
	01/08/2018	31/08/2018	7,329.176	7,329.176	7329.176	10.250	10.250	10.250	7318.926
	01/09/2018	30/09/2018	7,548.030	7,548.030	7548.030	11.730	11.730	11.730	7536.300
	01/10/2018	31/10/2018	8,827.190	8,827.190	8827.190	18.790	18.790	18.790	8808.400
	01/11/2018	30/11/2018	11,902.730	11,902.730	11902.730	25.160	25.160	25.160	11877.570
	01/12/2018	31/12/2018	11,238.265	11,238.265	11238.265	16.840	16.840	16.840	11221.425
	Total in 2018 (P1)		63042.171	63042.171	63042.171	101.640	101.640	101.640	62940.531
2019	01/01/2019	31/01/2019	10,288.760	10,288.760	10288.760	10.290	10.290	10.290	10278.470
	01/02/2019	28/02/2019	9,965.370	9,965.370	9965.370	15.620	15.620	15.620	9949.750
	01/03/2019	31/03/2019	9,980.642	9,980.642	9980.642	11.830	11.830	11.830	9968.812
	01/04/2019	30/04/2019	8,650.830	8,650.830	8650.830	9.840	9.840	9.840	8640.990
	01/05/2019	31/05/2019	7,745.290	7,745.290	7745.290	16.790	16.790	16.790	7728.500
	01/06/2019	30/06/2019	8,890.165	8,890.165	8890.165	18.210	18.210	18.210	8871.955
	01/07/2019	31/07/2019	7,137.192	7,137.192	7137.192	7.860	7.860	7.860	7129.332
	01/08/2019	31/08/2019	8,943.763	8,943.763	8943.763	10.150	10.150	10.150	8933.613
	01/09/2019	30/09/2019	9,903.127	9,903.127	9903.127	13.210	13.210	13.210	9889.917
	01/10/2019	31/10/2019	10,327.880	10,327.880	10327.880	16.990	16.990	16.990	10310.890
	01/11/2019	30/11/2019	11,903.764	11,903.764	11903.764	17.840	17.840	17.840	11885.924
	01/12/2019	31/12/2019	12,382.724	12,382.724	12382.724	10.370	10.370	10.370	12372.354

	Total in 2019 (P1)		116119.507	116119.507	116119.507	159.000	159.000	159.000	115960.507
2020	01/01/2020	31/01/2020	11,027.923	11,027.923	11027.923	16.330	16.330	16.330	11011.593
	01/02/2020	28/02/2020	10,283.675	10,283.675	10283.675	13.260	13.260	13.260	10270.415
	01/03/2020	31/03/2020	9,023.870	9,023.870	9023.870	8.740	8.740	8.740	9015.130
	01/04/2020	30/04/2020	8,893.160	8,893.160	8893.160	9.950	9.950	9.950	8883.210
	01/05/2020	31/05/2020	8,043.190	8,043.190	8043.190	10.230	10.230	10.230	8032.960
	01/06/2020	30/06/2020	8,675.180	8,675.180	8675.180	20.710	20.710	20.710	8654.470
	01/07/2020	31/07/2020	7,693.720	7,693.720	7693.720	18.040	18.040	18.040	7675.680
	01/08/2020	31/08/2020	9,908.790	9,908.790	9908.790	8.750	8.750	8.750	9900.040
	01/09/2020	30/09/2020	9,823.463	9,823.463	9823.463	9.380	9.380	9.380	9814.083
	01/10/2020	31/10/2020	8,593.240	8,593.240	8593.240	10.330	10.330	10.330	8582.910
	01/11/2020	30/11/2020	10,320.460	10,320.460	10320.460	10.210	10.210	10.210	10310.250
	01/12/2020	15/12/2020	4,903.220	4,903.220	4903.220	2.000	2.000	2.000	4901.220
	Total in 2020 (P1)		107189.891	107189.891	107189.891	137.930	137.930	137.930	107051.961
	16/12/2020	31/12/2020	5,110.058	5,110.058	5110.058	3.720	3.720	3.720	5106.338
Total in 2020 (P2)		5110.058	5110.058	5110.058	3.720	3.720	3.720	5106.338	
2021	01/01/2021	31/01/2021	11,924.278	11,924.278	11924.278	8.940	8.940	8.940	11915.338
	01/02/2021	28/02/2021	10,437.884	10,437.884	10437.884	10.250	10.250	10.250	10427.634
	01/03/2021	31/03/2021	8,213.163	8,213.163	8213.163	13.830	13.830	13.830	8199.333
	01/04/2021	30/04/2021	7,058.740	7,058.740	7058.740	18.640	18.640	18.640	7040.100
	01/05/2021	31/05/2021	7,790.160	7,790.160	7790.160	8.870	8.870	8.870	7781.290
	01/06/2021	30/06/2021	8,034.650	8,034.650	8034.650	12.350	12.350	12.350	8022.300
	01/07/2021	31/07/2021	8,043.190	8,043.190	8043.190	10.920	10.920	10.920	8032.270
	01/08/2021	31/08/2021	9,247.185	9,247.185	9247.185	18.220	18.220	18.220	9228.965
	01/09/2021	30/09/2021	9,036.250	9,036.250	9036.250	9.040	9.040	9.040	9027.210
	01/10/2021	31/10/2021	10,392.175	10,392.175	10392.175	10.530	10.530	10.530	10381.645
	01/11/2021	30/11/2021	11,894.588	11,894.588	11894.588	11.840	11.840	11.840	11882.748
	Total in 2021 (P2)		102072.263	102072.263	102072.263	133.430	133.430	133.430	101938.833
Total in this monitoring period			393533.890	393533.890	393533.890	535.720	535.720	535.720	392998.170

