



**Verified Carbon
Standard**

GUYUAN WUHUAPING 49.5 MW WIND POWER PROJECT

Document Prepared by Demeter Venture Uk Limited

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Monitoring Period	30/09/2019 to 30/11/2021 (793 days)
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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Guyuan Wuhuaping 49.5 MW Wind Power Project (hereinafter referred to as the Project) is located within Pingdingbu Town, Guyuan County, Zhangjiakou City, Hebei Province, P.R. China. It is invested, constructed and operated by Construction Investment Yanshan (Guyuan) Wind Energy Co., Ltd.

The total installed capacity of the Project is 49.5 MW equipped with 33 sets of wind turbines with a unit installed capacity of 1,500 kW. Electricity generated by the Project is delivered to North China Power Grid. The Project as a renewable energy source generates emission reductions by avoiding CO₂ emissions from the same amount of electricity generation from NCPG, which is mainly composed of traditional fossil fuel power plants.

The estimated electricity delivered to North China Power Grid by the Project is 117,322.7152MWh per year. The estimated annual GHG emission reductions in the first crediting period are 123,757 tCO₂e/yr, and are 98,603 tCO₂e/yr during the second crediting period.

The project started commissioning on 30/10/2009 and had a full operation on 10/12/2009.

The first crediting period is from 30/09/2009 to 29/10/2019 while the second crediting period is from 30/10/2019 to 29/10/2029. This monitoring period is from 30/09/2019 to 30/11/2021 (793 days), in which the period from 30/09/2019 to 29/10/2019 (30 days, hereinafter referred as “P1”) belongs to the first crediting period, and the period from 30/10/2019 to 30/11/2021 (763 days, hereinafter referred as “P2”) belongs to the second crediting period. The emission reductions in P1 is 10,997 tCO₂, while the emission reductions in P2 is 220,755 tCO₂. Hence, the emission reductions in this monitoring period is 231,752 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	Construction Investment Yanshan (Guyuan) Wind Energy Co., Ltd.
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Contact person	Zhang Ling
Title	Manager
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1.4 Other Entities Involved in the Project

Organization name	Demeter Venture Uk Limited
Role in the Project	Project participant
Contact person	Teng Haipeng
Title	Manager
Address	Chase Business Centre-CHD, 39 – 41 Chase Side, London N14 5BP, United Kingdom
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1.5 Project Start Date

30/10/2009 (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 under VCS is from 30/10/2009 to 29/10/2019, while the second crediting period is from 30/10/2019 to 29/10/2029.

The total crediting period under VCS is from 30/10/2009 to 02/07/2031, considering 3*7 years CDM crediting period.

This monitoring period is from 30/09/2019 to 30/11/2021 (793 days), in which the period from 30/09/2019 to 29/10/2019 (30 days) belongs to the first crediting period, and the period from 30/10/2019 to 30/11/2021 (763 days) belongs to the second crediting period.

1.7 Project Location

The Project is located within Pingdingbu Town, Guyuan County, Zhangjiakou City, Hebei Province, P.R.China. The center of the Project has geographical coordinates with east longitude of $115^{\circ}45'08''$ and north latitude of $41^{\circ}36'36''$. The area of the wind farm is about 55 km².

Figure 1 shows the location of Hebei Province. Figure 2 shows the location of Zhangjiakou City. Figure 3 shows the location of the Project.

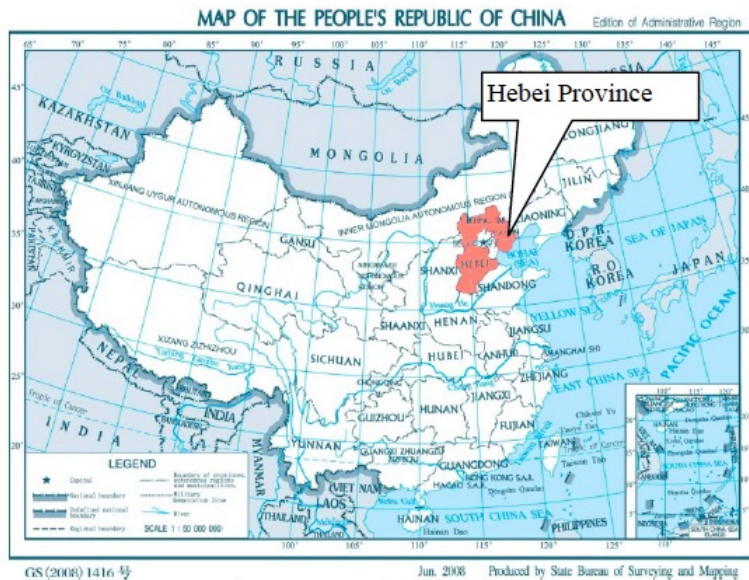


Figure 1. Location of Hebei Province

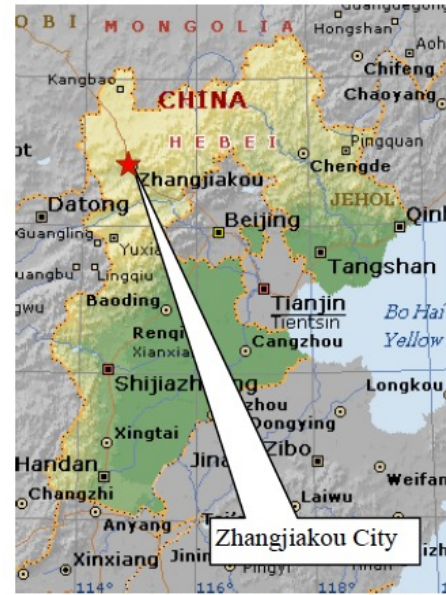


Figure 2. Location of Zhangjiakou City

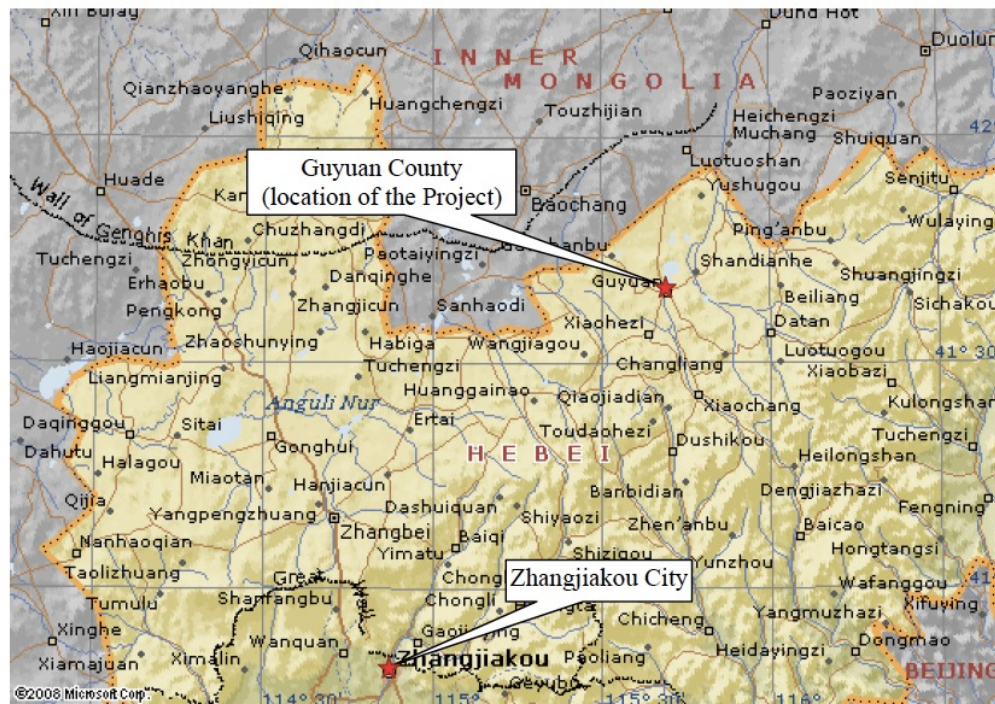


Figure 3. Location of the Project

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 and monitoring methodology.” (Version 10).

The methodology also refers to the following tools:

Tool to calculate the emission factor for an electricity system (Version 02);

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)

-Tool for the demonstration and assessment of additionality (version 07.0.0)

-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 03/07/2010 with registration number of 3356. It has been issued three times under CDM mechanism, covering monitoring period from 03/07/2010 to 30/07/2011, 31/07/2011 to 29/06/2012, and 01/01/2013 to 30/09/2015. And CERs were waiting issuance request for the period from 30/06/2012 - 31/12/2012 under CDM scheme.

The credits in this monitoring period (30/09/2019- 30/11/2021) has not been counted and will not be counted under other kind of GHG programs.

1.10 Other Forms of Credit

The project has been registered as a CDM project on 03/07/2010, and the first crediting period is from 03/07/2010 to 02/07/2017 (7years, renewable). It has been issued three times under CDM mechanism, covering monitoring period from 03/07/2010 to 30/07/2011, 31/07/2011 to 29/06/2012, and 01/01/2013 to 30/09/2015. And CERs were waiting issuance request for the period from 30/06/2012 - 31/12/2012 under CDM scheme.

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.

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 Environmental Impact Statement Form was completed by Hebei Provincial Institute of Geographic Sciences and approved by Environmental Protection Bureau of Hebei Province on 15/05/2008. According to the Environmental Impact Statement 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 construction period and operation period of the Project is mainly domestic waste water of workers. A little 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 operation period will be treated in waste water treatment facilities. Then, the overflow water in the upper layer of the facilities will be introduced into reservoir for the greening of the wind farm area, without being discharged outside. Thus, the domestic waste water has little 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 meet the requirement of Noise Limits for Construction Site (GB12523-90). The noises under abnormal working conditions 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 meet the requirement of Category I of Standard of Noise at Boundary of Industrial Enterprises (GB12348-90) and Category I of Standard of Environmental Noise of Urban Area (GB3096-93).

Solid waste

The solid waste produced during the construction period is mainly the discarded earth, the construction waste, the domestic waste and etc. The discarded earth will be immediately transported to dump sites. The construction waste and the domestic waste will be transported to the waste disposal site of Guyuan County by the environmental sanitation administrative department for sanitary landfill. During the operation period of the Project, domestic waste (about 3.65 t/a) will be collected and periodically transported to the waste disposal site of Guyuan 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 negative impacts on the surroundings.

Ecological impact

Damage to the vegetation caused by permanent land occupation of the Project will be compensated accordingly, in other words, vegetation with equal area and quality to the damaged will be recovered in another place. By taking measures of vegetation recovery and compensation,

the Project will have no impact on local ecological environment. The 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. And the project indeed does no harm to local environment during these years.

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 affected by the Project. In December 2008, 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 60 questionnaires distributed to the stakeholders, 60 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?
- 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 60 questionnaires received:

- 58 respondents (97%) have a certain or very good understanding of the Project and 2 respondents (3%) haven't heard of the Project.
- 58 respondents (97%) support the implementation of the Project and 2 respondents (3%) keep a neutral attitude.
- 40 respondents (67%) think that the implementation of the Project could possibly enhance the electricity consumption of local residents. 18 respondents (30%) think that the implementation of the Project could possibly improve the income of local residents. 33 respondents (55%) think that the implementation of the Project could possibly increase employment opportunities for local residents. None of the respondents put forward any other positive impact possibly caused by the implementation of the Project.
- 22 respondents (37%) think that the implementation of the Project could possibly result in noise. 16 respondents (27%) think that the implementation of the Project could possibly cause land occupation.

None of the respondents put forward any other negative impact possibly caused by the implementation of the Project.

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

The issue of noise considered by the respondents and corresponding prevention and control measures have been analyzed in the PDD. The Project Owner will take measures to ensure that there will be no noise pollution to the local environment. For the issue of land occupation considered by the respondents, the Project has no relation to 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 Environmental Impact Statement Form.

For on-going communications with local stakeholders, the project owner public its office telephone to local people by bulletins and put a grievance book in the company's office. Anyone who have comments on the project could write on the book or leave message by phone. Besides, since the project has been operated for years, local people is familiar with the project and remember the phone number of the company. No negative comments were received from local people during this monitoring period.

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 project installed 33 sets of wind turbines with a unit capacity of 1,500 kW and total capacity of 49.5MW. Electricity generated by the Project is delivered to NCPG via a 110 kV transmission line.

The wind power generation process of the project is showed in Figure 4

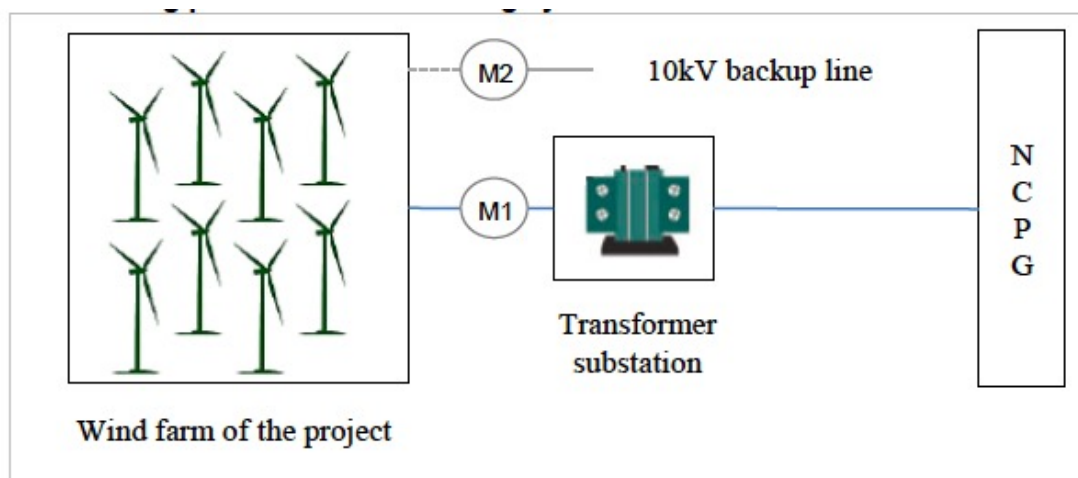


Figure 4. Flow chart of the project

The technical parameters of the installed wind turbines are shown in the table below

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

	Equipment	Quantity	Type	Technical parameters
Main mechanical and electrical equipments	Turbine	33 sets	GE1.5 sle	Rated power: 1,500kW Quantity of blades:3 Height of the hub: 80m Power factor of generator: ± 0.95 Lifetime: 20 years Estimated operating hours: 2368h
Step-up substation	Main transformer	1 set	SZ11-50000/10	Capacity: 50 MVA Rated voltage: 110/35 kV

The Project started construction on 10/05/2009 and commissioning on 30/10/2009. During this monitoring period, the monitoring system of the Project was implemented in line with the monitoring plan.

The wind farm operated normally. No equipment is overhauled or replaced in this monitoring period. No emergencies which may impact the methodology application and monitoring occurred during the monitoring period.

3.2 Deviations

2.3.1 Methodology Deviations

There is no methodology deviation in this monitoring period.

2.3.2 Project Description Deviations

The project was registered under VCS scheme in 2011. In the Verification Report of initial VCS monitoring period, it was mentioned that the project started operation since 30/10/2009. As per UNFCCC website, it was confirmed that the project activity was registered as CDM project activity on 03/07/2010. Therefore, the VCS crediting period was determined as 30/10/2009 to 02/07/2010. 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 30/10/2009 to 02/07/2031 (considering 3*7 years CDM crediting period), of which the first VCS crediting period is from 30/10/2009 to 29/10/2019 and the second VCS crediting period is from 30/10/2019 to 29/10/2029. The same has been described in the renewed VCS PD and approved by VERRA.

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 2005-2007
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, 2005-2007
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, 2005-2007
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	$F_{i,j,y}$
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 Energy Statistical Yearbook, 2005-2007
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	$NCV_{i,y}$
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 2007
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	CO2 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 2006 (taken as efficiency level of the best technology commercially available in China)
Source of data	China's Regional Grid Baseline Emission Factors (Published on 30/12/2008)
Value applied	329.94
Justification of choice of data or description of	The data obtained from China's Regional Grid Baseline Emission Factors are reliable.

measurement methods and procedures applied	
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	China's Regional Grid Baseline Emission Factors (Published on 30/12/2008)
Value applied	252
Justification of choice of data or description of measurement methods and procedures applied	The data obtained from China's Regional Grid Baseline Emission Factors 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	"2017 Baseline Emission Factors for Regional Power Grids in China" issued by China DNA ⁵
Value applied	0.9680
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	/

⁵ <http://www.mee.gov.cn/ywgz/ymqhbh/wsqtkz/201812/P020181220579925103092.pdf>

Data / Parameter	EF _{grid,BM,y}
Data unit	tCO ₂ /MWh
Description	Build margin CO ₂ emission factor in year y
Source of data	“2017 Baseline Emission Factors for Regional Power Grids in China” issued by China DNA ⁶
Value applied	0.4578
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 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	/

Data / Parameter	W _{BM}
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)

⁶ <http://www.mee.gov.cn/ywgz/xdqhbh/wsqtz/201812/P020181220579925103092.pdf>

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_{PJ,y} (for the first crediting period) EG _{facility,y} (for the second crediting period)
Data unit	MWh
Description	The quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the Project in year y (for the first crediting period) Quantity of net electricity generation supplied by the project plant to the grid in year y (for the second crediting period)
Source of data	Measured by electricity meter
Description of measurement methods and procedures to be applied	Continuously measured by one bi-directional meter installed on the at the Project Site. It is calculated with electricity delivered by the Project to the grid (EG _{PJtoGRID,y}), electricity imported by the Project from the grid via the main transmission line (EG _{GRIDtoPJ,y}), and electricity imported by the Project from the grid via the 10 kV backup line (EG _{10KVtoPJ,y}) $EG_{PJ,y} / EG_{facility,y} = EG_{PJtoGRID,y} - EG_{GRIDtoPJ,y} - EG_{10KVtoPJ,y}$
Frequency of monitoring/recording	Continuously measured and monthly recording
Value monitored	273,089.401
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. The electricity records are crosschecked with electricity receipts.

Purpose of the data	Calculation of baseline emissions
Calculation method	$EG_{PJ,y} / EG_{fality,y} = EG_{PJtoGRID,y} - EG_{GRIDtoPJ,y} - EG_{10KVtoPJ,y}$
Comments	/

Data / Parameter	$EG_{PJtoGRID,y}$														
Data unit	MWh														
Description	The electricity delivered by the Project to the grid in year y														
Source of data	Measured by electricity meter														
Description of measurement methods and procedures to be applied	It is continuously measured by the bi-directional meter and monthly recorded. The meter is installed on the main transmission line of the Project. The meter readings are crosschecked with the electricity receipts. The conservative value is used for ER calculation. At 24:00 of the last day of each month, the meter reading were read and recorded by the project owner and grid company.														
Frequency of monitoring/recording	Continuously measured and monthly recorded														
Value monitored	273,369.870														
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. The electricity records are 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="3">DSSD685</td><td rowspan="3">09070111440073</td><td rowspan="3">0.2S</td><td>25/03/1919</td><td>24/03/2020</td></tr><tr><td>25/03/2020</td><td>24/03/2021</td></tr><tr><td>25/03/2021</td><td>24/03/2022</td></tr></table>	Type	Serial No.	Accuracy	Calibration Date	Valid date	DSSD685	09070111440073	0.2S	25/03/1919	24/03/2020	25/03/2020	24/03/2021	25/03/2021	24/03/2022
Type	Serial No.	Accuracy	Calibration Date	Valid date											
DSSD685	09070111440073	0.2S	25/03/1919	24/03/2020											
			25/03/2020	24/03/2021											
			25/03/2021	24/03/2022											
Purpose of the data	Calculation of baseline emissions														
Calculation method	/														
Comments	/														

Data / Parameter	EG _{GRIDtoPJ,y}				
Data unit	MWh				
Description	The electricity imported by the project from the grid via the main transmission line in year y				
Source of data	Measured by electricity meter				
Description of measurement methods and procedures to be applied	It is continuously measured by the bi-directional meter and monthly recorded. The meter is installed on the main transmission line of the Project. The meter readings are crosschecked with the electricity receipts. The conservative value is used for ER calculation. At 24:00 of the last day of each month, the meter reading were read and recorded by the project owner and grid company.				
Frequency of monitoring/recording	Continuously measured and monthly recorded				
Value monitored	280.469				
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. The electricity records are crosschecked with electricity receipts. The main information is shown below:				
	Type	Serial No.	Accuracy	Calibration Date	Valid date
	DSSD685	09070111440073	0.2S	25/03/2019	24/03/2020
				25/03/2020	24/03/2021
				25/03/2021	24/03/2022
Purpose of the data	Calculation of baseline emissions				
Calculation method	/				
Comments	/				

Data / Parameter	EG_{10kVtoPJ,y}
Data unit	MWh
Description	The electricity imported by the Project from the grid via the 10 kV backup line in year y

Source of data	Measured by electricity meter				
Description of measurement methods and procedures to be applied	It is continuously measured by the meter installed on the 10kV backup line and monthly recorded. The meter readings are crosschecked with electricity receipts. The conservative value is used for ER calculation. At 24:00 of the last day of each month, the meter reading were read and recorded by the project owner and grid company.				
Frequency of monitoring/recording	Continuously measured and monthly recorded				
Value monitored	0				
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. The electricity records are crosschecked with electricity receipts. The main information is shown below:				
	Type	Serial No.	Accuracy	Calibration Date	Valid date
	DSSD132	20242018	1.0	15/02/2019	14/02/2020
				15/02/2020	14/02/2021
				15/02/2021	14/02/2022
Purpose of the data	Calculation of baseline emissions				
Calculation method	/				
Comments	/				

4.3 Monitoring Plan

1. Monitoring data

The electricity delivered by the Project to the grid in year y ($EG_{PJtoGRID,y}$), the electricity imported from the grid to the Project via the main transmission in year y ($EG_{GRIDtoPJ,y}$), and the electricity imported from the grid to the Project via the backup line in year y ($EG_{10kVtoPJ,y}$) will be monitored.

2. Monitoring System Organization Chart

The monitoring system is shown in Figure 5.

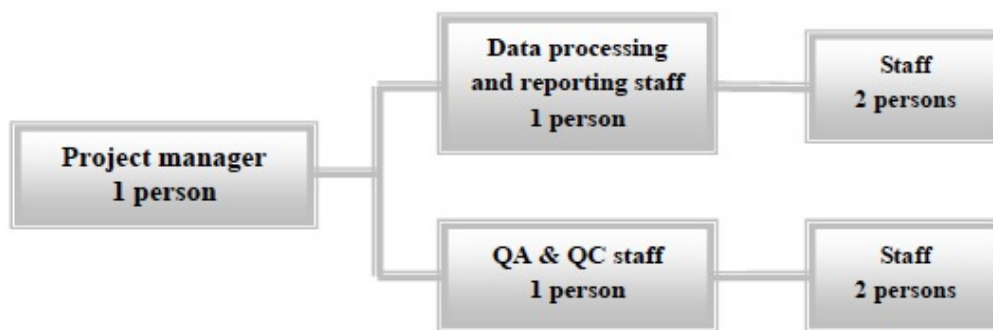


Figure 5. Monitoring structure

The Project Manager is responsible for implementation and supervision of the monitoring activity and liaison in this 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

A bidirectional meter is installed on the main transmission line of the Project. The electricity delivered by the Project to the grid, and electricity imported from the grid to the Project will be measured continuously by bidirectional meter and recorded monthly. A backup meter is installed on the 10kV backup line to monitor the imported electricity from grid through the backup line. No electricity was imported from the backup line during this monitoring period.

Electricity receipts are prepared the grid company and confirmed by the project owner. electricity receipts is used for crosscheck of the electricity records. If difference exists between the monitored data and the data on receipts, the conservative values will be used to calculate 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, including readings from meter(s) connected into the computer central control system, will be regularly copied and archived via optical discs and hard disk and kept for at least 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.

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 actual accuracy of the meter on main transmission line is 0.2S. The accuracy of meter on backup line is 1.0.

6. Procedure of emergency handling

If the 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 determined by the Project Owner and the power grid company. A conservative estimation 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

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

Where:

BE_y is the baseline emissions (tCO₂e)

$EG_{PJ,y}$ is the quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y (MWh) (for the 1st crediting period);

$EG_{facility,y}$ is Quantity of net electricity generation supplied by the project plant to the grid in year y (MWh) (for the 2nd crediting period);

$EF_{grid,CM,y}$ is the CO₂ emission factor of the NCPG, which is fixed in the first crediting period and the 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 1.05485 tCO₂e/MWh.

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 ($EF_{grid,OM\ simple,y}$)	0.9680	0.75
Build Margin Emissions Factor ($EF_{grid, BM,y}$)	0.4578	0.25
Baseline Emissions Factor ($EF_{grid,CM,y}$)	0.84045	

The yearly electricity volume and baseline emissions are listed in following table 2.

Table 2. Baseline emissions

Period	EG _{PJtoGRID,y} (MWh)	EG _{GRIDtoPJ,y} (MWh)	EG _{10KvtoPJ,y} (MWh)	EG _{PJ,y} / EG _{facility,y} (MWh)	EF _{grid,CM,y} (tCO ₂ /yr)	Baseline Emissions (tCO ₂ e)
30/09/2019- 29/10/2019 (P1) ⁷	10435.930	10.730	0	10425.200	1.05485	10,997
30/10/2019- 31/12/2019 (P2) ⁸	23211.680	23.546	0	23188.134	0.84045	19,488
01/01/2020- 31/12/2020 (P2)	122776.440	133.753	0	122642.687	0.84045	103,075
01/01/2021- 30/11/2021 (P2)	116945.820	112.440	0	116833.380	0.84045	98,192
Total in this monitoring period	273369.870	280.469	0	273089.401	/	231,752

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 approved CDM PDD,

$$ER_y = BE_y - PE_y$$

⁷ The EG_{PJtoGRID,y} and EG_{GRIDtoPJ,y} is 7994.570MWh and 38.090MWh during 01/09/2019 to 30/09/2019 based on Monthly Meter Reading records and Electricity receipts.

According to the issued MR (monitoring period from 01/10/2015 to 29/09/2019), the EG_{PJtoGRID,y} and EG_{GRIDtoPJ,y} of 7662.400MWh and 37.640MWh have been confirmed and calculated during 01/09/2019 to 29/09/2019.

Thus, the EG_{PJtoGRID,y} on 30/09/2019 can be calculated as 7994.570MWh-7662.400MWh=332.170, and the EG_{GRIDtoPJ,y} on 30/09/2019 can be calculated as 38.090MWh-37.640MWh=0.450MWh. These data have been confirmed by the grid company.

⁸ The EG_{PJtoGRID,y} and EG_{GRIDtoPJ,y} is 10533.310MWh and 11.166MWh during 01/10/2019 to 31/10/2019 based on Monthly Meter Reading records and Electricity receipts.

According to Electric Quantity Confirmation issued by the Grid Company, the EG_{PJtoGRID,y} and EG_{GRIDtoPJ,y} during 01/10/2019 to 29/10/2019 is 10103.760MWh and 10.280MWh, and the EG_{PJtoGRID,y} and EG_{GRIDtoPJ,y} during 30/10/2019 to 31/10/2019 is 429.550MWh and 0.886MWh. These data have been confirmed by the grid company.

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)
30/09/2019-29/10/2019 (P1)	10,997	0	0	10,997
30/10/2019-31/12/2019 (P2)	19,488	0	0	19,488
01/01/2020-31/12/2020 (P2)	103,075	0	0	103,075
01/01/2021-30/11/2021 (P2)	98,192	0	0	98,192
Total	231,752	0	0	231,752

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)
30/09/2019-31/12/2019	30,485	0	0	30,485
01/01/2020-31/12/2020	103,075	0	0	103,075
01/01/2021-30/11/2021	98,192	0	0	98,192
Total	231,752	0	0	231,752

The estimated annual GHG emission reductions in the first crediting period are 123,757 tCO₂e/yr, and are 98,603 tCO₂e/yr during the second crediting period. This monitoring period is from 30/09/2019 to 30/11/2021 (793 days, 30 days in the first crediting period and 763 days in the second crediting period).

The emission reductions claimed are 231,752 tCO₂e in this monitoring period (i.e. 793 days). Compared with expected emission reductions 216,293 tCO₂e (calculated as 123,757*30d/365d +98,603 *763d/365d) in the approved CDM PDD and renewed VCS PD, the reported emission reductions in this monitoring period are 7.15% larger than the expected. 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. 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 21.13% increase in Grid-connected electricity.

APPENDIX: < MONTHLY AND YEARLY ELECTRICITY >

Period	EG _{PJtoGRID,y}			EG _{GRIDtoPJ,y}			EG _{10kVtoPJ,y}	EG _{PJ,y} / EG _{facility,y}
	Data from monthly meter reading records (MWh)	Data from electricity receipts (MWh)	Conservative data for ER calculation (MWh)	Data from monthly meter reading records (MWh)	Data from electricity receipts (MWh)	Conservative value for ER calculation (MWh)	value for ER calculation (MWh)	
	A	B	C=min(A,B)	D	E	F=max(D,E)	G	H=C-F-G
30/09/2019-30/09/2019	332.170	332.170	332.170	0.450	0.450	0.450	0.00	331.720
01/10/2019-29/10/2019	10,103.760	10,103.760	10,103.760	10.280	10.280	10.280	0.00	10093.480
Total in 2019 (P1)	10,435.930	10,435.930	10,435.930	10.730	10.730	10.730	0.000	10,425.200
30/10/2019-31/10/2019	429.550	429.550	429.550	0.886	0.886	0.886	0.00	428.664
01/11/2019-30/11/2019	11,128.640	11,128.640	11,128.640	13.270	13.270	13.270	0.00	11115.370
01/12/2019-31/12/2019	11,653.490	11,653.490	11,653.490	9.390	9.390	9.390	0.00	11644.100
Total in 2019 (P2)	23,211.680	23,211.680	23,211.680	23.546	23.546	23.546	0.000	23,188.134
01/01/2020-31/01/2020	12,023.630	12,023.630	12,023.630	12.510	12.510	12.510	0.00	12011.120
01/02/2020-29/02/2020	11,878.450	11,878.450	11,878.450	10.840	10.840	10.840	0.00	11867.610
01/03/2020-31/03/2020	10,937.180	10,937.180	10,937.180	13.670	13.670	13.670	0.00	10923.510
01/04/2020-30/04/2020	9,891.550	9,891.550	9,891.550	8.293	8.293	8.293	0.00	9883.257
01/05/2020-31/05/2020	9,230.480	9,230.480	9,230.480	6.640	6.640	6.640	0.00	9223.840
01/06/2020-30/06/2020	8,902.340	8,902.340	8,902.340	12.410	12.410	12.410	0.00	8889.930
01/07/2020-31/07/2020	8,410.280	8,410.280	8,410.280	10.920	10.920	10.920	0.00	8399.360
01/08/2020-31/08/2020	8,009.170	8,009.170	8,009.170	14.320	14.320	14.320	0.00	7994.850
01/09/2020-30/09/2020	9,973.250	9,973.250	9,973.250	10.110	10.110	10.110	0.00	9963.140
01/10/2020-31/10/2020	10,032.820	10,032.820	10,032.820	11.380	11.380	11.380	0.00	10021.440
01/11/2020-30/11/2020	11,248.260	11,248.260	11,248.260	8.040	8.040	8.040	0.00	11240.220
01/12/2020-31/12/2020	12,239.030	12,239.030	12,239.030	14.620	14.620	14.620	0.00	12224.410

Total in 2020 (P2)	122,776.440	122,776.440	122,776.440	133.753	133.753	133.753	0/00	122,642.687
01/01/2021-31/01/2021	10,279.350	10,279.350	10,279.350	5.790	5.790	5.790	0.00	10273.560
01/02/2021-28/02/2021	11,728.060	11,728.060	11,728.060	12.880	12.880	12.880	0.00	11715.180
01/03/2021-31/03/2021	10,823.180	10,823.180	10,823.180	10.930	10.930	10.930	0.00	10812.250
01/04/2021-30/04/2021	8,054.370	8,054.370	8,054.370	8.720	8.720	8.720	0.00	8045.650
01/05/2021-31/05/2021	9,329.040	9,329.040	9,329.040	10.690	10.690	10.690	0.00	9318.350
01/06/2021-30/06/2021	9,639.470	9,639.470	9,639.470	12.300	12.300	12.300	0.00	9627.170
01/07/2021-31/07/2021	10,391.380	10,391.380	10,391.380	8.920	8.920	8.920	0.00	10382.460
01/08/2021-31/08/2021	10,201.730	10,201.730	10,201.730	10.220	10.220	10.220	0.00	10191.510
01/09/2021-30/09/2021	11,680.450	11,680.450	11,680.450	12.280	12.280	12.280	0.00	11668.170
01/10/2021-31/10/2021	11,029.330	11,029.330	11,029.330	7.030	7.030	7.030	0.00	11022.300
01/11/2021-30/11/2021	13,789.460	13,789.460	13,789.460	12.680	12.680	12.680	0.00	13776.780
Total in 2021 (P2)	116,945.820	116,945.820	116,945.820	112.440	112.440	112.440	0.000	116,833.380
Total in this monitoring period	273,369.870	273,369.870	273,369.870	280.469	280.469	280.469	0.000	273,089.401