HEBEI GUYUAN COUNTY DONGXINYING 199.5 MW WIND POWER PROJECT

Document Prepared by Beijing Cronus Technology Consultancy Centre.

Project Title	Hebei Guyuan County Dongxinying 199.5 MW Wind Power Project
Version	02
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Project ID	903
Monitoring Period	01/10/2015 to 29/02/2020（1613days）
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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Hebei Guyuan County Dongxinying 199.5MW Wind Power Project (hereafter referred as "the project") is a Greenfield grid-connected wind power project. The project is invested, constructed and operated by Hebei Construction Investment New Energy Co., Ltd.
The project will help reduce greenhouse gas (GHG) emissions generated from the high-growth, coal-dominated power generation in North China Power Grid (hereinafter referred to as NCPG). When the proposed project is operated, the electricity generated by the proposed project will displace part of the electricity from the NCPG, and thus greenhouse gas (GHG) generated by coal-fired power plants could be reduced.

The project is a newly constructed wind farm. The total capacity of the project is 199.5 MW and a total of 133 wind turbines with 1,500kW per-unit capacities were installed. The expected annual electricity supplied to the NCPG is 405,685MWh and the estimated annual GHG emission reductions are 427,936 tCO_2e.

Some important dates for the project are as follows:
The date to start construction: 25/08/2008;
The date of first wind turbine started operation: 25/05/2010;
The date of all wind turbines put into full operation: 06/10/2010;

This monitoring period is from 01/10/2015-29/02/2020 (1613 days). The total net electricity supplied to the grid by the project in this monitoring period are 1,916,408.837MWh and the emission reductions in this monitoring period are 2,021,522tCO_2.

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 New Energy Co., Ltd
Contact person	Zhang Bo

Title	Manager
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1.4 Other Entities Involved in the Project

Organization name	Beijing Cronus Technology Counsultancy Centre
Role in the Project	Project participant
Contact person	Li Qiang
Title	Manager
Address	814-004, No.15, information road, Haidian, Beijing, 100083, China
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1.5 Project Start Date

25/05/2010 (operation date, which means the date that started to generate GHG emission reductions)

1.6 Project Crediting Period

The first crediting period under VCS is from 25/05/2010 to 24/05/2020 (10years, renewable). Therefore, *the total* crediting period under VCS would have been from 25/05/2010 to 24/05/2040 (30 years). However, the project was registered under CDM on 15/09/2011 with registration number of 4853. And *the* total crediting period under CDM is from 15/09/2011 to 14/09/2032(21years).

According to VCS standard, the total crediting period under VCS is from 25/05/2010 to 14/09/2032.

1.7 Project Location

The project site is located in the south of Guyuan County, Zhangjiakou City of Hebei Province. It is about 20 km from Guyuan County. The exact geographical coordinates of the project are 115.2997° ~ 115.7508°E, 41.3169° ~ 41.5661°N. Figure 1 shows the location of the project:

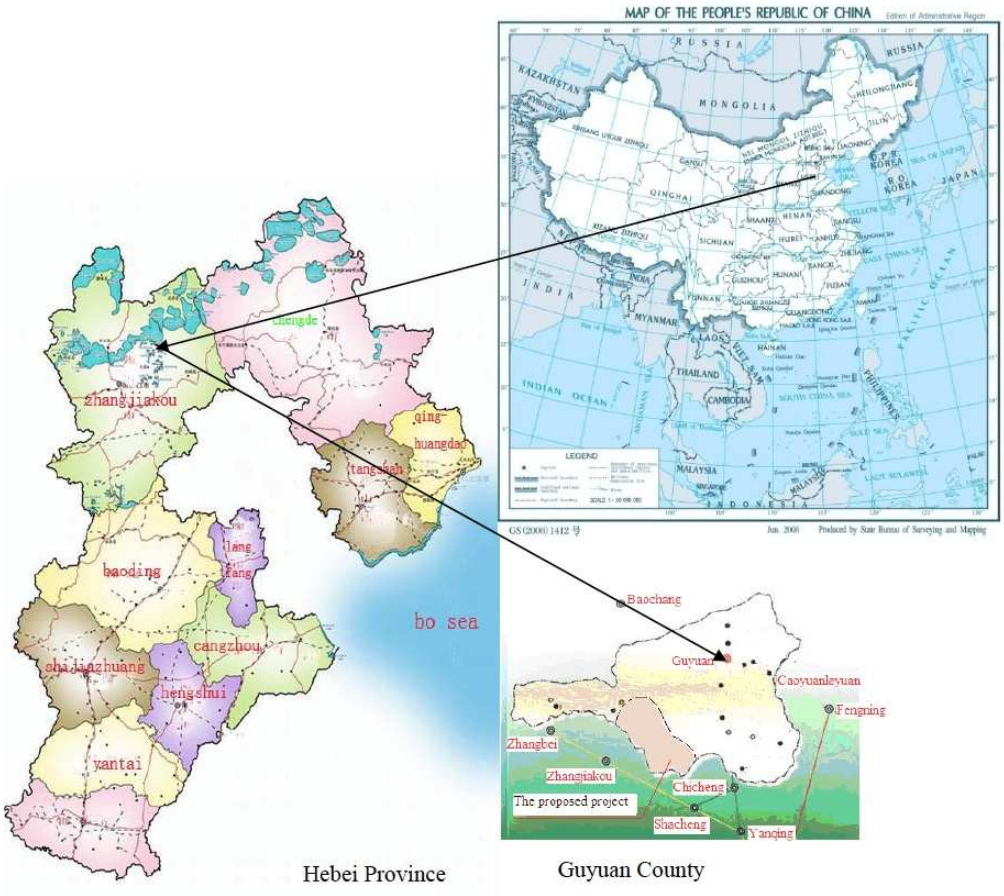

Figure 1. The location of the project

1.8 Title and Reference of Methodology

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);

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

1.9 Participation under other GHG Programs

The Project has been registered as a CDM project on 15/09/2011 with registration number of 4853. It has been issued four times under CDM mechanism, covering monitoring period from 15/09/2011 to 30/09/2015.

The credits in this monitoring period (01/10/2015- 29/02/2020) 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 15/09/2011 with registration number of 4853. It has been issued four times under CDM mechanism, covering monitoring period from 15/09/2011 to 30/09/2015.

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

1.11 Sustainable Development

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

1. GHG emission reduction

The proposed project activity will achieve obvious GHG emission reductions by avoiding CO_2 emissions.

2. Pollutants emission reduction through replacing fossil fuel combustion

The proposed project is to replace electricity generated by grid-connected coal-fired power plants in the NCPG, and 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 benefit.

3. Employment opportunities

The conducting of the proposed project will create certain job opportunities for local people during operation and achieve the economic growth in the region. Furthermore, the proposed project plans to utilize domestic made state-of-the-art wind turbines to promote the wind turbine manufacturing industries.

2 SAFEGUARDS

2.1 No Net Harm

The Environmental Impact Assessment of the proposed project was completed by Hebei Institute of Geographical Sciences and approved by the Environment Protection Bureau of Hebei Province on 19/11/2007. Main contents of the Environmental Impact Assessment are summarized as follows:

Ecological impact

Construction Phase

1) Impact on Foliage

The area of the buildings stated above will be all the shrub-grassland. There will be some impacts on the local vegetation during the construction period. The main impact will be eradication of local sward and the stack of earth on the lawn. But after the construction period, new trees and grass will be planted again on the site. The vegetation condition of the earth surface will recover very soon.

2) Impact on other animals

No big mammal has been found in the local area. There are only small mammals just like hare and mice.

The small animals disturbed by the construction (like the snail, the angleworm, the ant) will migrate the similar habitat conditions nearby due to their strong ability of migration. So, the species diversity and population size in the area will not be obviously influenced by the proposed project during the construction phase.

3) Impact on the residents

The main air pollution sources during the construction period include dust from excavation, blasting and transportation. Some measures will be taken to reduce impact of dust, such as watering, covering and so on. In addition, the construction area is open and wide, which aids the diffusion of pollutants. Therefore, the construction will not cause much negative impact on the local air environment.

Noise will be generated by machine equipment during construction. Measures will be taken to reduce the environmental impacts of noise: choosing low-noise machines and technologies, arranging reasonable construction time, and enhancing construction management. In addition, the nearest residential area is far away from the wind farm, the neighbor hood residents will not be influenced by the noise.

So the dust and the noise generated by construction activities will have less impact on local residents.

Operation Phase

1) Impact on the local biogeocenose

There is no waste gas, waste water and solid waste in the process of wind energy. Thus, the project will not obviously affect the local biogeocenose.

2) Visual Impact

The wind turbines installed in the grassland will enhance the visual value of the grassland and

demonstrate the harmonious relation between human and nature. So, the proposed project has little impact on the local scene.

3) Impact on the animals

No big mammal has been found in the local area. There are only small mammals just like hare and mice.

They may migrate back to the former sites after the completion of the project. Therefore, the project will have less impact on other propagation during the operation phase.

Environmental Impact

Construction phase

For the dust emission generated during the construction period, treatment measures shall be taken. The measures include spraying water and enhancing construction management to avoid any influence on the ambient environment. Furthermore, the construction period is short and the local atmosphere capacity is large which aids the dust diffusion, the construction will have little influence on the local atmosphere.

The main solid waste generated from the site will be construction waste as well as the household waste from the personnel at the site. The solid waste will be carried to the landfill nearby. And both domestic sewage and the sewage from the worksite will be treated up to the standards before being discharged. So, the waste and waste water generated by construction activities will have less impact on local residents.

Operation Phase

The operating noise level of the 1500kW turbine ranges from 96dB to 104dB. Since the wind farm is far away from the village, the noise levels will be controlled and naturally attenuated by ambient conditions within the standards set as Standard of Environmental Noise of Urban Area.

The waste water from the proposed project during operation phase will only be sewage. The sewage processed by the biological septic tank will be discharged into the collecting pond. The processed sewage will be utilized to irrigate plant in the project site without discharge. Therefore, the sewage from the project during the operation phase will have less impact on the environment.

The solid waste will be mainly composed of the household garbage generated from the workers in the 220kV booster station. The solid waste will be carried termly to the landfill nearby. Therefore, impact of solid waste on the environment is considered to be insignificant.

Conclusion

The project does not have any major adverse impacts on the environment during its construction and operation phase. Therefore, this project does not do harm to local environment.

2.2 Local Stakeholder Consultation

The project owner invited the comments of local stakeholders by issuing questionnaires. Hebei Construction Investment New Energy Co., Ltd carried out the survey on the local villagers and residents, the governmental officials and so on from January 2008. The survey was conducted through distributing and collecting responses to a questionnaire which was designed by project owner.

The questions include:

What level do you know about the proposed project?	Know very well
	Know a little
	Never heard
Do you know about the Clean Development Mechanism?	know
	Don not know
Do you think which impact on the environment may be caused by the project?	Noise caused by construction
	Waste water caused by construction
	Noise caused by turbine operation
	Impact of dust on air quality
	Use of land
	Soil and water conservation
	Construction waste
	Impact on traffic
	Impact on the surrounding eco-environment
	The interference on TV and others
Impacts of the project to local environment	Positive effect
	Negative effect
	No effect
Impacts of the project to local economic development?	Beneficial
	Adverse
	No change
Whether to support the construction of the project?	Support
	Non support

Questionnaires have been distributed according to the principle of both representation and randomness in order to reflect the public opinions and comments in a fair and real manner.

The investigated stakeholders include the individuals from the construction site and the nearby Guyuan County. The stakeholders also include the group from the government and association. The investigation has taken full account into the public advice of different ages, education levels and occupations.

In addition, public comments were invited by a poster on 12/02/2008 in all the villages within a radius of five-kilometre from the proposed project, which include Dongxinying Village, Lianhuatan Village, Taiping Village. Besides the content mentioned above, the following question was added in the Notice.

- What other comments and suggestions do the respondents have for the company regarding the Project?
- What impacts on your life may be caused by the project?

81 valid responses from 82 questionnaires were collected and the following is a summary of the survey：

Comments from the questionnaires show that 100% of the investigated stakeholders agree with the project construction, and none of them objects.

18.52% of the investigated stakeholders know something about the project while 75.31% of the investigated stakeholders know very well about the project and the others never heard it; 90.12% of them know about CDM; 87.65% of them don't think it impacting their livelihoods environment while 2.47% of them think it takes little impact of the local environment and the others think it has no impact; The fields of environmental protection the public concerned mainly include noise of the construction(6.17%) , waste water caused by construction (7.41%), noise of the operation (17.28%), construction waste (17.28%), impact of dust on air quality (1.23%), use of land (55.56%), soil and water conservation(12.35%), impact on traffic(4.94%); impact on the surrounding eco-environment (8.64%), the interference on TV and others(4.94%); 98.77% of them think it will promote the local economy. And the stakeholders are all supportive of this project.

No comments of the villagers who had seen the Notice have been received from 12/02/2008 to 12/03/2008.

In conclusion, the stakeholders are all supportive of this project.

In addition to the physical stakeholder consultations, 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 project is a Greenfield grid-connected wind power project. The total installed capacity of the project is 199.5MW equipped with 133 sets of wind turbines with a unit installed capacity of 1.5MW.

Construction of the project was started on 25/08/2008. The date of first wind turbine started operation was 25/05/2010. And the date of all wind turbine started full operation was 06/10/2010.

The project applies WTG-box transformer unit to boost voltage of the generated electricity from 690V to 35kV. Then the electricity will be transmitted to the main transformers via 35kV collection lines. After boosted its voltage to 220kV by the main transformers, the electricity will be transmitted to Xiaochang Substation and exported to NCPG.

Major technical parameters of the key equipments employed by the project are illustrated in the following table.

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

Parameter	Unit	Value
Type of turbine	/	FD77B
Tybe of generator	/	double-fed asynchromous motor
Nominal output	kW	1500
Rotor Diameter	m	77
Hub height	m	61.5
Rated Voltage	V	690
Cut-in wind speed	m/s	3.0
Nominal wind speed	m/s	12

During this monitoring period (01/10/2015-29/02/2020), the project 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

There is no deviation in this monitoring period.

3.3 Grouped Projects

Not applicable because this is not a grouped project.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	$FC_{i,m,y}$
Data unit	Mass or volume unit
Description	The amount of fuel i (in a mass or volume unit) consumed by relevant power sources m in year(s) y
Source of data	China Energy Statistical Yearbook (2005-2007)
Value applied	Annex 3 of registered PD
Justification of choice of data or description of measurement methods and procedures applied	Official statistical data
Purpose of Data	Calculation of baseline emissions
Comments	/

Data / Parameter	$NCV_{i,y}$
Data unit	GJ/mass or volume unit of a fuel
Description	The net calorific value (energy content) per mass or volume unit of a fuel i
Source of data	China Energy Statistical Yearbook 2005-2007
Value applied	Annex 3 of registered PD

Justification of choice of data or description of measurement methods and procedures applied	China Energy Statistical Yearbook 2005-2007
Purpose of Data	Calculation of baseline emissions
Comments	/

Data / Parameter	$EF_{i,m,y}$
Data unit	tCO_2/GJ
Description	The CO_2 emission factor per unit of energy of the fuel i.
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied	Annex 3 of registered PD
Justification of choice of data or description of measurement methods and procedures applied	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Purpose of Data	Calculation of baseline emissions
Comments	NCV values used for the OM/BM calculation are based on IPCC default value which is at the lower limit of the uncertainty at a 95% confidence interval, so it is conservative.

Data / Parameter	$EG_{grid,j,y}$
Data unit	MWh
Description	Net electricity generated and delivered to the grid by province j in year y
Source of data	China Power Yearbook 2005-2007
Value applied	Annex 3 of registered PD
Justification of choice of data or description of measurement methods and procedures applied	Official statistical data
Purpose of Data	Calculation of baseline emissions
Comments	/

Data / Parameter	$GENE_{best,coal}$
Data unit	/

Description	Best electricity supply efficiency for coal fired plant
Source of data	Notification on Determining Baseline Emission Factor of China's Grid
Value applied	37.28%
Justification of choice of data or description of measurement methods and procedures applied	Official statistical data
Purpose of Data	Calculation of baseline emissions
Comments	/

Data / Parameter	$GENE_{best,oil,gas}$
Data unit	/
Description	Efficiency level of the best technology commercially available in China for gas-fired and oil-fired power generators
Source of data	Notification on Determining Baseline Emission Factor of China's Grid
Value applied	48.81%
Justification of choice of data or description of measurement methods and procedures applied	Official statistical data
Purpose of Data	Calculation of baseline emissions
Comments	/

Data / Parameter	$CAP_{j,y}$
Data unit	MW
Description	Installed capacity in each province of NCPG
Source of data	China Electric Power Yearbook 2005-2007
Value applied	Annex 3 of registered PD
Justification of choice of data or description of measurement methods and procedures applied	Official statistical data
Purpose of Data	Calculation of baseline emissions

Comments	/

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{facility,y}$
Data unit	MWh/yr
Description	Net electricity supplied to the grid by the proposed project in year y.
Source of data	Calculation
Description of measurement methods and procedures to be applied	Calculation by $EG_{export,y}$ - $EG_{import,y}$ - $EG_{backupline,y}$ and cross-check with sale receipts. $EG_{facility,y}=EG_{export,y}-EG_{import,y}-EG_{backupline,y}$ $EG_{export,y}$: Annual electricity exported to the grid by the proposed project $EG_{import,y}$: Annual electricity imported from the grid to the proposed project. $EG_{backupline,y}$: Electricity delivered to the project through the backup line.
Frequency of monitoring/recording	Continuously measurement and monthly recording
Value monitored	1916408.837
Monitoring equipment	The information of the electricity meter is in the following table.
QA/QC procedures to be applied	The electricity meters are calibrated by qualified entity according to national standards. The electricity records are crosschecked with sales receipts. The conservative value is used for calculation.
Purpose of the data	Calculation of baseline emissions
Calculation method	$EG_{facility,y}=EG_{export,y}-EG_{import,y}-EG_{backupline,y}$
Comments	/

Data / Parameter	$EG_{export,y}$
Data unit	MWh
Description	Annual electricity exported to the grid by the proposed project
Source of data	Measured by electricity meter M1(or M3, backup meter) and M2(or M4, backup meter)

<table>
<tr><td>Description of measurement methods and procedures to be applied</td><td>It is continuously measured by the bi-directional meters and monthly recorded by the project owner.

$EG_{export,y} = EG_{export,y,1} + EG_{export,y,2}$

The total value will be crosschecked with sales receipts, and the conservative value will be used for emission reductions.
The accuracy of the meters are 0.2S.</td></tr>
<tr><td>Frequency of monitoring/recording</td><td>Continuously measured and monthly recorded</td></tr>
<tr><td>Value monitored</td><td>1918164.760</td></tr>
<tr><td>Monitoring equipment</td><td>The information of the electricity meter is in the following table.</td></tr>
<tr><td>QA/QC procedures to be applied</td><td>The electricity meters are calibrated by qualified entity according to national standards. The main information is shown below:

<table>
<tr><th>Name</th><th>Type</th><th>Serial No.</th><th>Accuracy</th><th>Calibration Date and valid date</th></tr>
<tr><td rowspan="5">M1</td><td rowspan="5">ACE8000</td><td rowspan="5">37006390</td><td rowspan="5">0.2S</td><td>13/08/2015-12/08/2016</td></tr>
<tr><td>08/08/2016-07/08/2017</td></tr>
<tr><td>01/08/2017-31/07/2018</td></tr>
<tr><td>25/07/2018-24/07/2019</td></tr>
<tr><td>17/07/2019-16/07/2020</td></tr>
<tr><td rowspan="4">M2</td><td rowspan="4">ACE8000</td><td rowspan="4">37002994</td><td rowspan="4">0.2S</td><td>13/08/2015-12/08/2016</td></tr>
<tr><td>08/08/2016-07/08/2017</td></tr>
<tr><td>01/08/2017-31/07/2018</td></tr>
<tr><td>25/07/2018-24/07/2019</td></tr>
</table></td></tr>
</table>

					17/07/2019-16/07/2020
	M3	DSSD331	09080144840023	0.2S	18/10/2015-17/10/2016
					12/10/2016-11/10/2017
					29/09/2017-28/09/2018
					21/09/2018-20/09/2019
					16/09/2019-15/09/2020
	M4	DSSD331	09080144840005	0.2S	18/10/2015-17/10/2016
					12/10/2016-11/10/2017
					29/09/2017-28/09/2018
					21/09/2018-20/09/2019
					16/09/2019-15/09/2020
Purpose of the data	Calculation of baseline emissions				
Calculation method	/				
Comments	/				

Data / Parameter	$EG_{import,y}$
Data unit	MWh
Description	Annual electricity imported from the grid to the proposed project.
Source of data	Measured by electricity meter M1(or M3, backup meter) and M2(or M4, backup meter). $EG_{import,y} = EG_{import,y,1} + EG_{import,y,2}$

<table>
<tr><td>Description of measurement methods and procedures to be applied</td><td>It is continuously measured by the bi-directional meter and monthly recorded by the project owner. The total value will be crosschecked with sales receipts, and the conservative value will be used for emission reductions.</td></tr>
<tr><td>Frequency of monitoring/recording</td><td>Continuously measured and monthly recorded</td></tr>
<tr><td>Value monitored</td><td>1755.923</td></tr>
<tr><td>Monitoring equipment</td><td>The information of the electricity meter is in the following table.</td></tr>
<tr><td>QA/QC procedures to be applied</td><td>The electricity meter is calibrated by qualified entity according to national standards. The main information is shown below:
<table>
<tr><th>Name</th><th>Type</th><th>Serial No.</th><th>Accuracy</th><th>Calibration Date and valid date</th></tr>
<tr><td rowspan="5">M1</td><td rowspan="5">ACE8000</td><td rowspan="5">37006390</td><td rowspan="5">0.2S</td><td>13/08/2015-12/08/2016</td></tr>
<tr><td>08/08/2016-07/08/2017</td></tr>
<tr><td>01/08/2017-31/07/2018</td></tr>
<tr><td>25/07/2018-24/07/2019</td></tr>
<tr><td>17/07/2019-16/07/2020</td></tr>
<tr><td rowspan="5">M2</td><td rowspan="5">ACE8000</td><td rowspan="5">37002994</td><td rowspan="5">0.2S</td><td>13/08/2015-12/08/2016</td></tr>
<tr><td>08/08/2016-07/08/2017</td></tr>
<tr><td>01/08/2017-31/07/2018</td></tr>
<tr><td>25/07/2018-24/07/2019</td></tr>
<tr><td>17/07/2019-16/07/2020</td></tr>
<tr><td rowspan="5">M3</td><td rowspan="5">DSSD331</td><td rowspan="5">09080144 840023</td><td rowspan="5">0.2S</td><td>18/10/2015-17/10/2016</td></tr>
<tr><td>12/10/2016-11/10/2017</td></tr>
<tr><td>29/09/2017-28/09/2018</td></tr>
<tr><td>21/09/2018-20/09/2019</td></tr>
<tr><td>16/09/2019-15/09/2020</td></tr>
</table></td></tr>
</table>

	M4	DSSD331	09080144840005	0.2S	18/10/2015-17/10/2016
					12/10/2016-11/10/2017
					29/09/2017-28/09/2018
					21/09/2018-20/09/2019
					16/09/2019-15/09/2020
Purpose of the data	Calculation of baseline emissions				
Calculation method	/				
Comments	/				

Data / Parameter	$EG_{backupline,y}$
Data unit	MWh
Description	Electricity delivered to the proposed project through the backup line
Source of data	Measured by electricity meter (M5)
Description of measurement methods and procedures to be applied	This parameter is continuously measured and monthly recorded by the project owner. The value will be crosschecked with sales receipts, and the conservative value will be used for emission reductions. The accuracy of M5 is 0.5S
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 main information is shown below:

	Type	Serial No.	Accuracy	Calibration Date and valid date
M5	DSSD22	B24T0P812403001807	0.5S	13/08/2015-12/08/2016
				08/08/2016-07/08/2017

					01/08/2017-31/07/2018
					25/07/2018-24/07/2019
					17/07/2019-16/07/2020
Purpose of the data	Calculation of baseline emissions				
Calculation method	/				
Comments	/				

4.3 Monitoring Plan

1. Monitoring data

The net electricity ($EG_{facility,y}$) supplied to the grid by the project will not be measured directly. It is the difference of the following parameters.

1） $EG_{export,y}$ is the electricity exported to the grid by the project through the main power line;

2） $EG_{import,y}$ is the electricity imported from the grid by the project through the main power line;

3） $EG_{backupline,y}$ is the electricity delivered to the project through the backup line.

2. Project Integrate Management

This monitoring plan has been implemented by Hebei Construction Investment New Energy Co., Ltd., the project owner. The project manager is responsible for the implementation and monitoring of the monitoring activity. There are two departments organized for data report, quality control. There is a manager responsible for data report and quality control department. The manager will take charge of the employment administration, as well as the operation implementation and monitoring; staffs will carry on the concrete assignment based on the guide of their manager

3. Metering System

The electricity generated by the project will be transmitted to on-site transformers which increase the voltage to 220 kV, and then delivered to Xiaochang Substation by 220kV transmission line. The simplified electrical grid connection diagram is shown in the following figure 2:

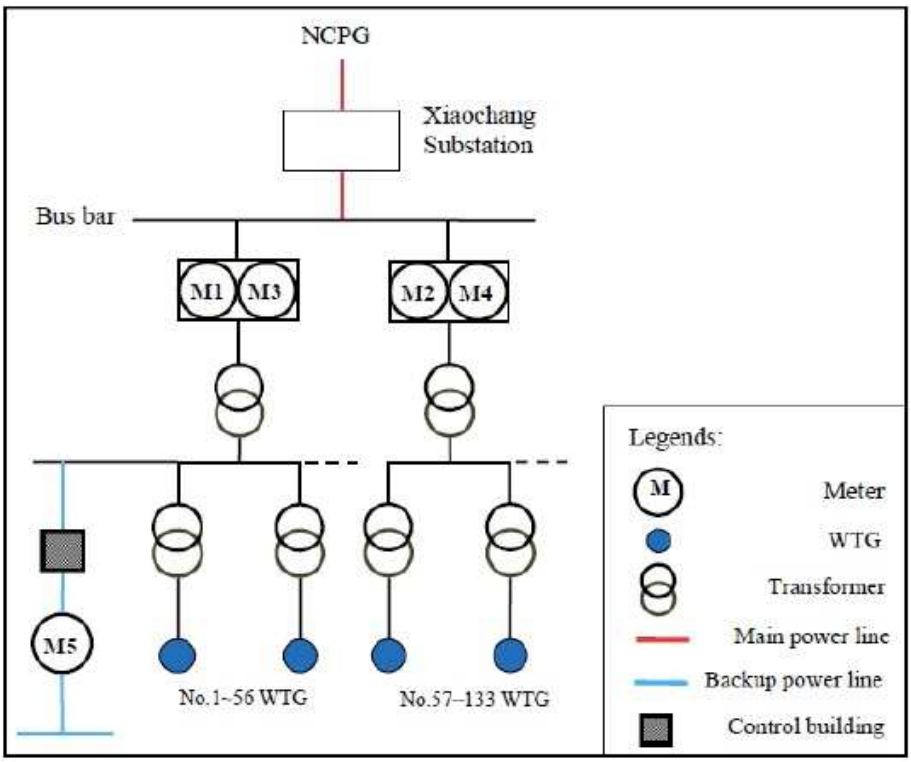

Figure 4. Simplified electrical grid connection diagram

The power line supplying electric power to the grid can also deliver power from the grid to the wind farm.

The metering equipment run in two directions and will record two readings, i.e. electricity exported to the grid ($EG_{export, y}$) and electricity imported from the grid ($EG_{import, y}$). Net electricity supplied to the grid is calculated as exports minus imports.

M1 is installed at high voltage side of No. 1 main transformer; M2 is installed at the high voltage side of No. 2 main transformer. Both M1 and M2 are bi-directional meters. M1 is used for measurement of electricity exported by Group 1 WTGs ($EG_{export,y,1}$) and electricity imported from the grid by Group 1WTGs($EG_{import,y,1}$). M2 measures electricity exported by Group 2 WTGs ($EG_{export,y,2}$) and electricity imported from the grid by Group 2 WTGs ($EG_{import,y,2}$).

The meter M3 which is of the same type, accuracy and function and serves as the backup meter of M1, can also record electricity of Group 1WTGs bidirectionally and works with M1 simultaneously; the meter M4 also acts as backup meter of M2 and measures electricity of Group 2 WTGs together with M2 simultaneously.

The parameters are continuously measured and monthly recorded, and the cut-off time is 24:00 on the last day of each month.

Net electricity supplied to the grid by the project is calculated on a monthly basis as:

$EG_{facility,y} = EG_{export,y} - EG_{import,y} - EG_{backupline,y}$

Where:

$EG_{facility,y}$ is the calculated power generation from the proposed project;

$EG_{export,y}$ is the electricity exported to the grid through the main power line metered by the instruments at M1 and M2 (or backup meter M3 and M4);

$EG_{import,y}$ is the electricity imported from the grid through the main power line metered by the instruments at M1 and M2 (or backup meter M3 and M4);

$EG_{backupline,y}$ is the electricity delivered to the project through the backup line metered by the instruments at M5.

In case of emergencies and when the wind farm does not produce enough power for auxiliary power use, the project will use the power from grid through the backup line. Power delivered to the project through a backup power line ($EG_{backupline,y}$) is metered by M5 which is operated by the grid company.

4. 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 metering equipment will be properly calibrated and checked annually by an independent third party according to relevant national standard, e.g. the DL/T448 - 2000 or other national standard, to ensure its accuracy. The accuracy of meter M1, M2, M3 and M4 which have been installed are 0.2s. The accuracy of meter M5 is 0.5s.

All the electricity data are recorded by the working staff and then checked by the team manager.

5. Information collection and management

All physical documents including the readings in electronic and manual form will be stored by the project owner. All data collected as part of monitoring will be kept at least for 2 years after the end of the last crediting period by the project owner.

6. Procedure of emergency handling

In case metering equipment is damaged and no reliable readings can be recorded, the project owner will estimate net supply by the project activity according to the following procedure:

a. In case the main meter is damaged only:

By reading the backup meter.

b. In case both the main meter and the backup one are damaged:

The project owner and the grid company will jointly calculate a conservative estimate of power supplied to the grid. A statement will be prepared indicating

- The background to the damage to metering equipment

- The assumptions used to estimate net supply to the grid for the days for which no record could be recorded the estimation of power supplied to the grid.

7. Monitoring Report

The Project owner will annually prepare a monitoring report which will include a summary of metering values of power supplied to and received from the grid, a report on calibration and a calculation of 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

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

Where:

BE_y is the baseline emissions (tCO_2e)

$EG_{facility,y}$ is the net electricity supplied to the grid by the project in year y (MWh);

$EF_{grid,CM,y}$ is the CO_2 emission factor of the NCPG, which is fixed in the first crediting period (tCO_2e/MWh)

$$EG_{facility,y} = EG_{export,y} - EG_{import,y} - EG_{backupline,y}$$

where

$EG_{facility,y}$ is the calculated power generation from the project;

$EG_{export,y}$ is the electricity exported to the grid through the main power line metered by M1 and M2 (or backup meter M3 and M4);

$EG_{import,y}$ is the electricity imported from the grid through the main power line metered by M1 and M2 (or backup meter M3 and M4);

$EG_{backupline,\ y}$ is the electricity delivered to the project through the backup line metered by M5.

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

Table 2. Baseline emissions

Period	Electricity exported to the grid by the projec ($EG_{export,y}$)(MWh)	Electricity imported from the grid to the project ($EG_{import,y}$) (MWh)	Electricity delivered to the project through the backup line($EG_{backupline,y}$) (MWh)	Net electricity supplied to the grid by the project in year y ($EG_{facility,y}$) (MWh)	$EF_{grid,CM,y}$ （tCO_2/yr)	Baseline Emissions (tCO_2e)
01/10/2015 - 31/12/2015	95,687.960	98.064	0.000	95,589.896	1.05485	100,833
01/01/2016 - 31/12/2016	399,346.200	229.425	0.000	399,116.775	1.05485	421,008
01/01/2017 - 31/12/2017	469,233.240	468.600	0.000	468,764.640	1.05485	494,476
01/01/2018 - 31/12/2018	449,398.360	386.994	0.000	449,011.366	1.05485	473,639
01/01/2019 - 31/12/2019	433,730.400	523.370	0.000	433,207.030	1.05485	456,968
01/01/2020 - 29/02/2020	70768.600	49.470	0.000	70719.130	1.05485	74,598
Total in this monitoring period	1918164.760	1755.923	0.000	1916408.837		2,021,522

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. PEy=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

ERy=BEy – PEy

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
01/10/2015-31/12/2015	100,833	0	0	100,833
01/01/2016-31/12/2016	421,008	0	0	421,008
01/01/2017-31/12/2017	494,476	0	0	494,476
01/01/2018-31/12/2018	473,639	0	0	473,639
01/01/2019-31/12/2019	456,968	0	0	456,968
01/01/2020-29/02/2020	74,598	0	0	74,598
Total	2,021,522	0	0	2,021,522

The emission reductions in the registered PD are 427,936tCO_2e/yr. This monitoring period is from 01/10/2015 to 29/02/2020(1613days). The ex-ante estimated ER for this monitoring period are 427936/365*1613=1,891,125tCO_2. And the actual ER for this monitoring period is 2,021,522tCO_2, which increases 6.9% than the ex-ante estimation. This would not influence the project additionality. Based on the registered PD, when the net exported electricity increases 14.4% could the IRR reach benchmark.

There are several reasons for the electricity generation. First, wind resource is sufficient these years. Second, the wind turbines and generators are operated and maintained well. Third, renewable electricity is encouraged and the grid has a great number of demand.

APPENDIX: < MONTHLY ELECTRICTY SUPPLY>

	Annual electricity exported to the grid by the proposed project ($EG_{export,y}$)					Electricity imported from the grid to the proposed project (EGimport,y)					
Period	Electricity exported to the grid by meter M1 ($EG_{export,y,1}$) (MWh)	Electricity exported to the grid by meter M2 ($EG_{export,y,2}$) (MWh)	Annual electricity exported to the grid by the poposed project ($EG_{export,y}$) (MWh)	Sales receipts (MWh)	Conservative value for $EG_{export,y}$ (MWh)	Electricity imported electricity from the grid by meter M1 ($EG_{import,y,1}$)	Electricity imported from the grid by mete M2 ($EG_{import,y,2}$)	Annual Electricity from the grid to the proposed proejct ($EG_{import,y}$) (MWh)	Sales receipts (MWh)	Conservative value (MWh)	Net electricity supplied to the grid by theproject in year y ($EG_{facility,y}$) (MWh)
01/10/2015-31/10/2015	12588.840	18117.000	30705.840	30639.840	30639.840	9.240	13.200	22.440	26.540	26.540	30613.300
01/11/2015-30/11/2015	11453.640	17915.040	29368.680	29299.680	29299.680	15.840	21.120	36.960	41.534	41.534	29258.146
01/12/2015-31/12/2015	14662.560	21098.880	35761.440	35748.440	35748.440	10.560	14.520	25.080	29.990	29.990	35718.450
Total in 2015	38705.040	57,130.92	95835.960	95687.960	95687.960	35.640	48.84	84.480	98.064	98.064	95,589.896
01/01/2016-31/01/2016	16221.480	23342.880	39564.360	39551.360	39551.360	1.320	1.320	2.640	4.333	4.333	39547.027
01/02/2016-28/02/2016	10136.280	15205.080	25341.360	25245.360	25245.360	15.840	21.120	36.960	41.269	41.269	25204.091
01/03/2016-31/03/2016	17901.840	25761.120	43662.960	43599.960	43599.960	11.880	18.480	30.360	33.603	33.603	43566.357
01/04/2016-30/04/2016	17971.800	29322.480	47294.280	47283.280	47283.280	6.600	9.240	15.840	17.251	17.251	47266.029
01/05/2016-31/05/2016	14180.760	19582.200	33762.960	33679.960	33679.960	5.280	7.920	13.200	15.736	15.736	33664.224

01/06/2016-30/06/2016	13213.200	18246.360	31459.560	31428.560	31428.560	1.320	2.640	3.960	8.333	8.333	31420.227
01/07/2016-31/07/2016	10958.640	16437.960	27396.600	27325.600	27325.600	9.240	11.880	21.120	21.503	21.503	27304.097
01/08/2016-31/08/2016	6857.400	11187.000	18044.400	17964.400	17964.400	3.960	5.280	9.240	12.999	12.999	17951.401
01/09/2016-30/09/2016	6799.320	9014.280	15813.600	15791.600	15791.600	11.880	17.160	29.040	30.088	30.088	15761.512
01/10/2016-31/10/2016	13342.560	19199.400	32541.960	32523.960	32523.960	10.560	14.520	25.080	30.159	30.159	32493.801
01/11/2016-30/11/2016	17401.560	24723.600	42125.160	42117.160	42117.160	1.320	0.000	1.320	6.505	6.505	42110.655
01/12/2016-31/12/2016	16302.000	26598.000	42900.000	42835.000	42835.000	1.320	2.640	3.960	7.646	7.646	42827.354
Total in 2016	161286.840	238,620.36	399907.200	399346.200	399346.200	80.520	112.20	192.720	229.425	229.425	399,116.775
01/01/2017-31/01/2017	21150.360	31724.880	52875.240	52858.240	52858.240	6.600	9.240	15.840	16.592	16.592	52841.648
01/02/2017-28/02/2017	9790.440	15314.640	25105.080	25095.080	25095.080	11.880	17.160	29.040	31.586	31.586	25063.494
01/03/2017-31/03/2017	13937.880	20057.400	33995.280	33954.280	33954.280	50.160	71.280	121.440	126.275	126.275	33828.005
01/04/2017-30/04/2017	18782.280	25936.680	44718.960	44707.960	44707.960	3.960	5.280	9.240	11.240	11.240	44696.720
01/05/2017-31/05/2017	18923.520	30876.120	49799.640	49747.640	49747.640	15.840	21.120	36.960	37.960	37.960	49709.680
01/06/2017-30/06/2017	8486.280	13846.800	22333.080	22313.080	22313.080	6.600	9.240	15.840	21.459	21.459	22291.621
01/07/2017-31/07/2017	10429.320	17017.440	27446.760	27443.760	27443.760	6.600	10.560	17.160	20.170	20.170	27423.590

01/08/2017-31/08/2017	9905.280	14253.360	24158.640	24075.640	24075.640	5.280	9.240	14.520	16.726	16.726	24058.914
01/09/2017-30/09/2017	13062.720	16991.040	30053.760	29997.760	29997.760	10.560	15.840	26.400	28.276	28.276	29969.484
01/10/2017-31/10/2017	18831.120	24310.440	43141.560	43081.560	43081.560	13.200	19.800	33.000	36.918	36.918	43044.642
01/11/2017-30/11/2017	20997.240	26877.840	47875.080	47791.080	47791.080	36.960	48.840	85.800	87.759	87.759	47703.321
01/12/2017-31/12/2017	29323.800	38871.360	68195.160	68167.160	68167.160	11.880	17.160	29.040	33.639	33.639	68133.521
Total in 2017	193620.240	276078.000	469698.240	469233.240	469233.240	179.520	254.76	434.280	468.600	468.600	468,764.640
01/01/2018-31/01/2018	11860.200	16378.560	28238.760	28210.760	28210.760	1.320	2.640	3.960	8.000	8.000	28202.760
01/02/2018-28/02/2018	16410.240	26774.880	43185.120	43105.120	43105.120	15.840	25.080	40.920	43.086	43.086	43062.034
01/03/2018-31/03/2018	18230.520	24166.560	42397.080	42322.080	42322.080	7.920	11.880	19.800	24.695	24.695	42297.385
01/04/2018-30/04/2018	23678.160	35517.240	59195.400	59142.400	59142.400	9.240	15.840	25.080	30.452	30.452	59111.948
01/05/2018-31/05/2018	19112.280	28667.760	47780.040	47766.040	47766.040	1.320	2.640	3.960	9.151	9.151	47756.889
01/06/2018-30/06/2018	17754.000	24517.680	42271.680	42256.680	42256.680	10.560	15.840	26.400	29.856	29.856	42226.824
01/07/2018-31/07/2018	13081.200	21343.080	34424.280	34380.280	34380.280	9.240	13.200	22.440	23.321	23.321	34356.959
01/08/2018-31/08/2018	9724.440	12889.800	22614.240	22607.240	22607.240	13.200	19.800	33.000	35.027	35.027	22572.213
01/09/2018-30/09/2018	6920.760	9959.400	16880.160	16818.160	16818.160	18.480	27.720	46.200	51.561	51.561	16766.599
01/10/2018-31/10/2018	13266.000	19900.320	33166.320	33162.320	33162.320	10.560	14.520	25.080	27.149	27.149	33135.171

01/11/2018-30/11/2018	16785.120	24153.360	40938.480	40867.480	40867.480	30.360	42.240	72.600	73.820	73.820	40793.660
01/12/2018-31/12/2018	15919.200	22908.600	38827.800	38759.800	38759.800	11.880	15.840	27.720	30.876	30.876	38728.924
Total in 2018	182742.120	267177.240	449919.360	449398.360	449398.360	139.920	207.24	347.160	386.994	386.994	449,011.366
01/01/2019-31/01/2019	18655.560	24730.200	43385.760	43378.760	43378.760	26.400	39.600	66.000	71.780	71.780	43306.980
01/02/2019-28/02/2019	12903.000	20181.480	33084.480	32996.480	32996.480	5.280	6.600	11.880	15.550	15.550	32980.930
01/03/2019-31/03/2019	16143.600	21399.840	37543.440	37457.440	37457.440	30.360	48.840	79.200	83.570	83.570	37373.870
01/04/2019-30/04/2019	18746.640	26975.520	45722.160	45644.160	45644.160	11.880	15.840	27.720	27.640	27.720	45616.440
01/05/2019-31/05/2019	18147.360	25060.200	43207.560	43157.560	43157.560	22.440	29.040	51.480	56.050	56.050	43101.510
01/06/2019-30/06/2019	12050.280	17340.840	29391.120	29373.120	29373.120	29.040	44.880	73.920	75.090	75.090	29298.030
01/07/2019-31/07/2019	10367.280	16216.200	26583.480	26517.480	26517.480	7.920	11.880	19.800	22.700	22.700	26494.780
01/08/2019-31/08/2019	10645.800	16650.480	27296.280	27294.280	27294.280	13.200	21.120	34.320	39.470	39.470	27254.810
01/09/2019-30/09/2019	11113.080	18132.840	29245.920	29195.920	29195.920	9.240	13.200	22.440	25.950	25.950	29169.970
01/10/2019-31/10/2019	14523.960	21785.280	36309.240	36256.240	36256.240	2.640	3.960	6.600	10.120	10.120	36246.120
01/11/2019-30/11/2019	18144.720	24053.040	42197.760	42177.760	42177.760	14.520	19.800	34.320	36.560	36.560	42141.200
01/12/2019-31/12/2019	16525.080	23781.120	40306.200	40281.200	40281.200	23.760	33.000	56.760	58.810	58.810	40222.390
Total in 2019	177966.360	256,307.04	434273.400	433730.400	433730.400	196.680	287.76	484.440	523.290	523.370	433,207.030

01/01/2020-31/01/2020	15304.080	24970.440	40274.520	40218.520	40218.520	5.280	7.920	13.200	14.380	14.380	40204.140
01/02/2020-29/02/2020	13704.240	16845.840	30550.080	31776.080	30550.080	11.880	18.480	30.360	35.090	35.090	30514.990
Total in 2020	29008.320	41,816.28	70824.600	71994.600	70824.600	17.160	26.40	43.560	49.470	49.470	70719.130
Total in this monitoring period	783,328.92	1,137,129.84	1920458.760	1919390.760	1918220.760	649.440	937.20	1586.640	1755.843	1755.923	1916408.837