



**Verified Carbon
Standard**

HEBEI GUYUAN COUNTY DONGXINYING 199.5 MW WIND POWER PROJECT

Document Prepared by Demeter Venture UK Limited

Project Title	Hebei Guyuan County Dongxinying 199.5 MW Wind Power Project
Version	23 .0
Date of Issue	1510/0605 /2021
Prepared By	Demeter Venture UK Limited
Contact	Address: Haidian District, Beijing, 100082, P.R.China Email: asd9818@163.com

CONTENTS

- 1 PROJECT DETAILS..... 4**
 - 1.1 Summary Description of the project 4
 - 1.2 Sectoral Scope and Project Type 4
 - 1.3 Project Eligibility 4
 - 1.4 Project Design ~~45~~
 - 1.5 Project Proponent 5
 - 1.6 Other Entities Involved in the project..... 5
 - 1.7 Ownership..... ~~56~~
 - 1.8 Project Start Date 6
 - 1.9 Project Crediting Period 6
 - 1.10 Project Scale and Estimated GHG Emission Reductions or Removals 6
 - 1.11 Description of the project Activity..... 7
 - 1.12 Project Location 8
 - 1.13 Conditions Prior to Project Initiation 9
 - 1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks 9
 - 1.15 Participation under Other GHG Programs 10
 - 1.16 Other Forms of Credit..... 10
 - 1.17 Additional Information Relevant to the project 11

- 2 SAFEGUARDS ~~11~~2**
 - 2.1 No Net Harm ~~11~~2
 - 2.2 Local Stakeholder Consultation 12
 - 2.3 Environmental Impact 14
 - 2.4 Public Comments ~~16~~17
 - 2.5 AFOLU-Specific Safeguards ~~16~~17

3	APPLICATION OF METHODOLOGY.....	<u>1617</u>
3.1	Title and Reference of Methodology	17
3.2	Applicability of Methodology	17
3.3	Project Boundary	21
3.4	Baseline Scenario	22
3.5	Additionality	24
3.6	Methodology Deviations	24
4	QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS	<u>2425</u>
4.1	Baseline Emissions	25
4.2	Project Emissions	32
4.3	Leakage.....	<u>3233</u>
4.4	Net GHG Emission Reductions and Removals.....	33
5	MONITORING	<u>34</u>
5.1	Data and Parameters Available at Validation	34
5.2	Data and Parameters Monitored.....	<u>3536</u>
5.3	Monitoring Plan.....	38

1 PROJECT DETAILS

1.1 Summary Description of the project

Hebei Guyuan County Dongxingying 199.5 MW Wind Power Project (hereinafter referred to as the project) is developed by Hebei Construction Investment New Energy Co., Ltd. It is located at the south of Guyuan County, Hebei Province, P.R.China. The project involves the installation of 133 sets of wind turbine, each of which has a rated installed capacity of 1,500 kW, providing a total installed capacity of 199.5 MW. The annual output of the project is estimated to be 405,685 MWh and the electricity will be exported to the North China Power Grid (NCPG).

The scenario existing prior to the start of the implementation of the project is: the same electricity output by the project activity would have otherwise been generated by the operation of NCPG connected power plants and by the addition of new generation sources. That is the same as the baseline scenario.

When the project is operated, the electricity generated will displace part of the electricity from fossil fuel-fired plants connected to the NCPG, and thus greenhouse gas (GHG) generated by coal-fired power plants could be reduced. The estimated annual GHG emission reductions in the first crediting period are 427,936 tCO₂e/yr, and are 335,460 tCO₂e/yr during the second crediting period.

The construction of the project began on 25/08/2008. The project started commissioning on 25/05/2010 and had a full operation on 06/10/2010. The first crediting period is from 25/05/2010 to 24/05/2020 (10years, renewable). The project operated normally in the first crediting period. The project is applying for the crediting period renewal and the second crediting period is expected from 25/05/2020 to 24/05/2030 (10years).

1.2 Sectoral Scope and Project Type

The project falls in the sectoral scope 1: energy industries (renewable-/non-renewable sources).

Project type: Renewable (wind) power project

The project is not a grouped project.

1.3 Project Eligibility

The project is a wind power project, which reduces CO₂ by replacing electricity from fossil fuel power plants. This complies with the scope of VCS program.

1.4 Project Design

This project is a single project. It is not designed to include multiple project activity instances, or as a grouped project.

The project involves the installation of 133 turbines, each of which have a capacity of 1.5 MW, with a total capacity of 199.5 MW.

Eligibility Criteria

N/A as this is not a grouped project.

1.5 Project Proponent

Organization name	Hebei Construction Investment New Energy Co., Ltd.
Contact person	Zhang Bo
Title	Project manager
Address	No.9 Yuhua Western Road, Yuyuan Plaza, Shijiazhuang City, Hebei Province, 050000
Telephone	+86-0311-85278915
Email	zhangbo93339@126.com

1.6 Other Entities Involved in the project

Organization name	Demeter Venture UK Limited
Role in the project	Project participant
Contact person	Susan Lu
Title	Manager
Address	Haidian District, Beijing, P.R.China
Telephone	+86-10-64828259
Email	asd9818@163.com

1.7 Ownership

The approval of Environmental Impact Assessment (EIA), Feasibility Study Report (FSR), and Letter of Approval for the project as a CDM Project issued by China National Development and Reform Commission, established the project ownership of Hebei Construction Investment New Energy Co., Ltd. The purchasing contract of turbines, and the purchasing power agreement are the evidences for the property and contractual right in the plant, equipment and electricity.

1.8 Project Start Date

25/05/2010. (It is the date when the first turbine was commissioned, which is also the first date that generates GHG emission reductions.)

1.9 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 ~~14/24/0905/2032~~2031.

The project is applying for the second crediting period, which is from 25/05/2020 to 24/05/2030.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	
Large project	✓

Year	Estimated GHG reductions or emission removals (tCO ₂ e)
25/05/2020-31/12/2020 (221days)	203,114
01/01/2021-31/12/2021	335,460
01/01/2022-31/12/2022	335,460
01/01/2023-31/12/2023	335,460

01/01/2024-31/12/2024	335,460
01/01/2025-31/12/2025	335,460
01/01/2026-31/12/2026	335,460
01/01/2027-31/12/2027	335,460
01/01/2028-31/12/2028	335,460
01/01/2029-31/12/2029	335,460
01/01/2030-24/05/2030 (144days)	132,346
Total estimated ERs	3,354,600
Total number of crediting years	10
Average annual ERs	335,460

1.11 Description of the project Activity

The project installed 133 sets of wind turbine, each of which has a rated installed capacity of 1,500kW, providing a total installed capacity of 199.5MW. The estimated electricity delivered to NCPG by the project is 405,685MWh per year and the average annual operating hours is 2,034h with a power load factor of 23.22%.

The wind turbines are produced by Dongfang Steam Turbine Co., Ltd., with models of FD77B. Key technical parameters of main equipments in the project are shown in the following table 1.

Table 1. Key technical parameters of main equipments in the project

Turbine type	FD77B
Rated Power (kW)	1500
Cut-in Wind Speed (m/s)	3.0
Rotor Diameter (m)	77
Rated Wind Speed (m/s)	12
Tower Height (m)	61.5
Rated Voltage (V)	690
Generator Type	double-fed asynchronous motor

Each turbine will have a 0.69/35 kV transformer. The electricity output will be transmitted by 35 kV transmission lines to 35kV/220 kV main transformer, and then to NCPG via Xiaochang Substation by 220 kV transmission lines. According to the Feasibility Study Report and the Environmental Impact Assessment Report of the project, the technology employed by the project has been used in China widely and is environmentally safe.

The simplified flow diagram and the meters that will be installed within the project activity are shown in the following figure 1:

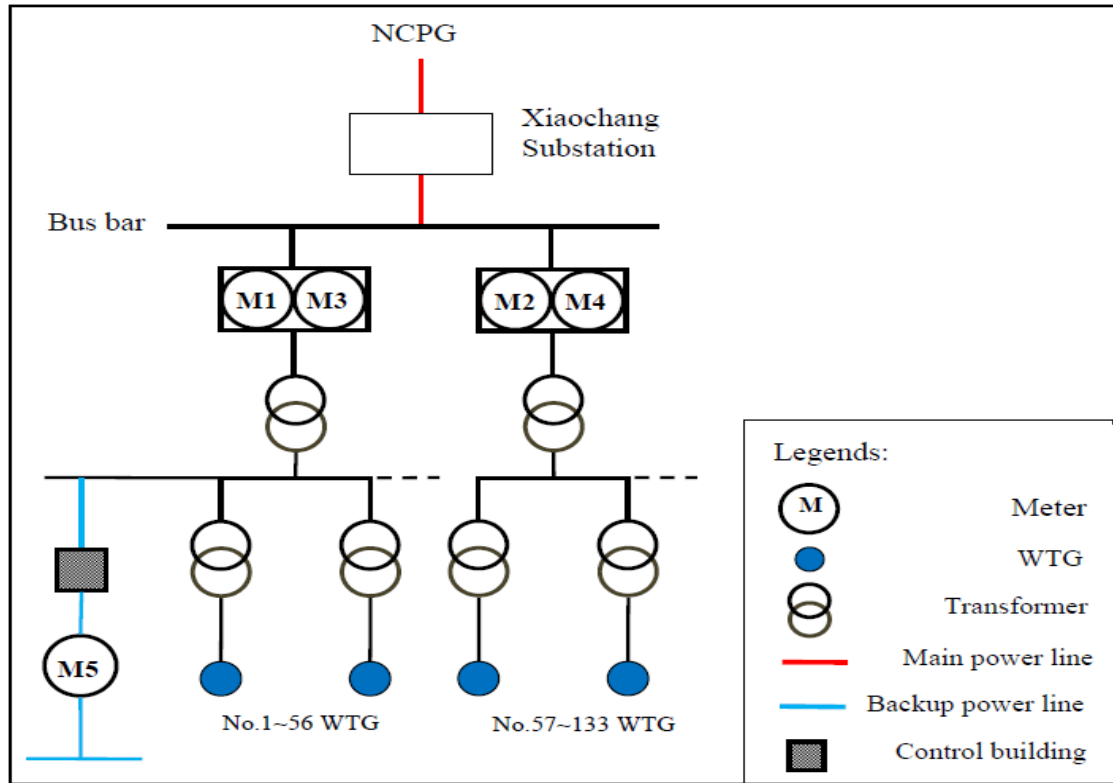


Figure 1. The technology flow diagram of the project

1.12 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°17'59"-115°45'03"E, 41°19'01"-41°33'58"N. The figure 2 shows the geographical location of the project.

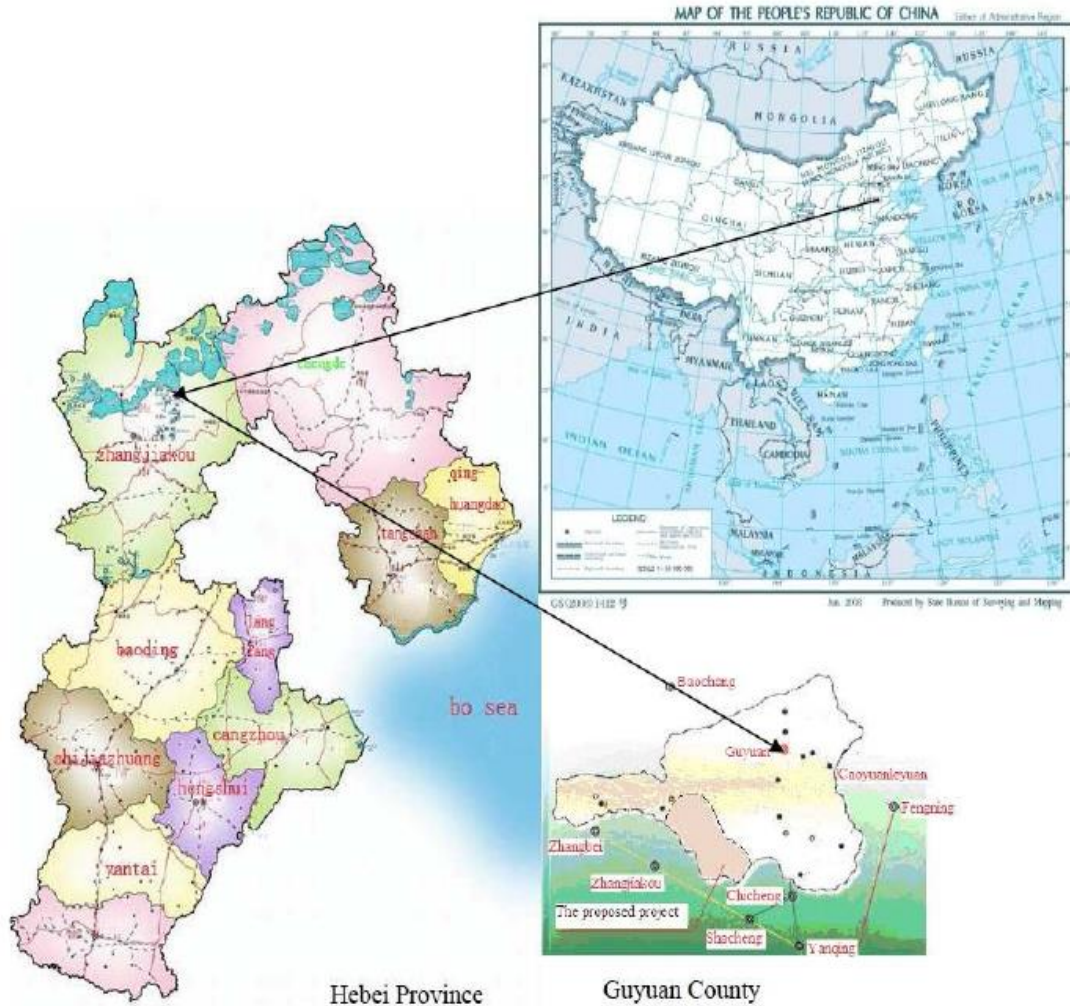


Figure2. The location of the project

1.13 Conditions Prior to Project Initiation

Electricity delivered to the grid (NCPG) by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources. It is the same as the baseline scenario.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project is in the field of renewable energy. The Environmental Impact Assessment (EIA) report was approved by Environment Protection Bureau of Hebei Province on 19/11/2007, and the Feasibility Study Report of the project was approved by National Development and Reform Committee on 04/06/2008. The project has received the Notification Form from China DNA on 02/10/2008. These approvals demonstrate that the project meets the requirement

of national laws and regulations, including Renewable Energy Law of the People's Republic of China and Environmental Protection Regulation for Wind Power Project, etc.

This project is also in line with current laws and regulations, such as Safe Production Law of the People's Republic of China, Regulation on the Quality Management of Construction Projects, etc.

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

The project has been registered as a CDM project in UNFCCC on 15/09/2011 (UNFCCC Ref. 4853), for which a renewable crediting period of 3×7 years will be used under the CDM GHG Program. The first 7-year renewable crediting period under CDM is from 15/09/2011 to 14/09/2018.

1.15.2 Projects Rejected by Other GHG Programs

The project has not been rejected by other GHG programs.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The project has been registered as a CDM project in UNFCCC on 15/09/2011 (UNFCCC Ref. 4853), for which a renewable crediting period of 3×7 years will be used under the CDM GHG Program. The first 7-year renewable crediting period under CDM is from 15/09/2011 to 14/09/2018.

The credits from 15/09/2011 to 30/09/2015 have been issued under CDM mechanism.

The project has not been counted or used under GS project or under any other voluntary carbon crediting scheme. In the future, the emission reductions that apply for issuance under VCS will not be issued under CDM or GS project or under any other voluntary carbon crediting scheme. The project does not involved in ETS or other binding limits.

1.16.2 Other Forms of Environmental Credit

The project has been registered as a CDM project in UNFCCC on 15/09/2011 (UNFCCC Ref. 4853), for which a renewable crediting period of 3×7 years will be used under the CDM GHG Program. The first 7-year renewable crediting period under CDM is from 15/09/2011 to 14/09/2018.

The credits from 15/09/2011 to 30/09/2015 have been issued under CDM mechanism.

The project does not apply for other forms of environmental credit.

1.17 Additional Information Relevant to the project

Leakage Management

N/A.

Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description.

Sustainable Development

The 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 project activity will achieve obvious GHG emission reductions by avoiding CO₂ emissions.

2. Pollutants emission reduction through replacing fossil fuel combustion

The 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 project has obvious environmental benefit.

3. Employment opportunities

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

Further Information

There's not any further information.

2 SAFEGUARDS

2.1 No Net Harm

The project does not bring negative environmental and socio-economic impacts.

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.

All page questionnaire were designed to be easily filled in the following sections:

1) Project introduction

2) Respondent's basic information and education level

3) Questions on:

What level do you know about the 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
Impacts of the project to local environment;	The interference on TV and others
	Positive effect
	Negative effect
Impacts of the project to local economic development ?	No effect
	Beneficial
	Adverse
Whether to support the construction of the project?	No change
	Support
	Nonsupport

4) Space for the respondents' signature and date.

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 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?

Summary of the comments received

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

Education level of the respondents: college and above (24.69%); junior college (44.44%); senior high school (25.93%), junior high school and others (4.94%);

Age of the respondents: 20 ~ 30(30.86%); 30 ~ 40 (39.51%); 40 ~ 50 (20.99%); others (8.64%);

Status of the respondents: resident (35.8%), government representative (25.9%), worker (24.7%), unknown (13.6%).

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.

Consideration of comments received

The survey shows that the project has strong local support amongst the people. All the interviewees support the construction of the project.

The fields of environmental protection which the public concerned mainly include noise, air pollution and construction waste water, use of land, soil and water conservation, impact on the surrounding ecoenvironment, the impact on traffic, the interference on TV and others. The EIA approved by the Environment Protection Bureau of Hebei Province shows that the noise levels would be within China national standards and no interference is expected. The developer will take some measures to reduce the dust during the construction such as watering and covering. Construction waste and waste water will be disposed of properly according to the EIA. Impact on the ecological environment and the traffic impact are very little and will be disposed of properly according to the EIA. Most of the lands for the wind farm are for temporary use, and the developer will carry out the compensation for land requisition according to state regulations. The interference on television and other receivers would be reduced the national standard. The soil and water conservation program has got the approval by the Water Resources Department of Hebei Province. The project owner will put the measures listed in the EIA into effect during construction and operation, so as to achieve environmental benefits, social benefits and economic benefits.

The villagers and local government agree with the project and to date there has been not necessary to modify the project design according to the comments received.

In order for on-going communicate with local stakeholders, the project owner put a grievance notebook in the company office. Anyone can put their comments on the book. Since this project has been operated for several years, all local stakeholders know the telephone of the office. When people has comments on the project, he or she can call the project owner directly and leave message.

2.3 Environmental Impact

The Environmental Impact Assessment of the project was completed by Hebei Institute of Geographical Sciences, and approved by the Environment Protection Bureau of Hebei Province on 19/11/2007(degree number:[2007]342). 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 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 neighbourhood 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 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, including: 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 project during operation phase will only be sewage. The sewage processed by the biological septic tank will be discharged into the collecting pond. The 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.

2.4 Public Comments

No public comments were received during the public comment period.

2.5 AFOLU-Specific Safeguards

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

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

The approved methodology applied in the project activity is ACM0002 - “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)

3.2 Applicability of Methodology

The criteria and assessment of ACM0002 (version 20.0) are in the following table.

Criteria	Assessment
This methodology is applicable to grid-connected renewable energy power generation project activities that: <ul style="list-style-type: none"> (a) Install a Greenfield power plant; (b) Involve a capacity addition to (an) existing plant(s); (c) Involve a retrofit of (an) existing operating plants/units; (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s)/unit(s). 	The project is the installation of a wind power project. Therefore, a) is applicable.
The methodology is applicable under the following conditions: <ul style="list-style-type: none"> a) the project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit; b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects) the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity. 	The project activity includes a wind power plant. Therefore, a) is applicable.
In case of hydro power plants, one of the following conditions shall apply:	Not applicable. the project is a wind

¹ <https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQCOPWPGWWDN8ED5PG>

<p>(a) the project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or</p> <p>(b) the project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density, calculated using equation (7), is greater than 4 W/m²; or</p> <p>(c) the project activity results in new single or multiple reservoirs and the power density, calculated using equation (7), is greater than 4 W/m²; or</p> <p>(d) the project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (7), is lower than or equal to 4 W/m², all of the following conditions shall apply:</p> <p>(i) The power density calculated using the total installed capacity of the integrated project, as per equation (8), is greater than 4 W/m²;</p> <p>(ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity;</p> <p>(iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m² shall be:</p> <p>a. Lower than or equal to 15 MW; and</p> <p>b. Less than 10 per cent of the total installed capacity of integrated hydro power project.</p>	<p>power project, not hydro power plant.</p>
<p>In the case of integrated hydro power projects, project proponent shall:</p> <p>(a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or</p> <p>(b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore, this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum of five years prior to the implementation of the CDM project activity.</p>	<p>Not applicable. the project is a wind power project, not an integrated hydro power project.</p>
<p>The methodology is not applicable to:</p> <p>a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;</p> <p>b) Biomass fired power plants/units</p>	<p>The project activity does not involve switching from fossil fuel to renewable energy sources at the site of the project activity.</p> <p>the project is not a biomass fired power plant/unit.</p>
<p>In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result</p>	<p>Not applicable. the project is not retrofit,</p>

of the identification of baseline scenario, is “the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance”.	rehabilitation, replacement, or capacity addition project.
--	--

The criteria and assessment of “Tool to calculate the emission factor for an electricity system (version 07.0)” are in the following table.

Criteria	Assessment
This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	Applicable. the project generates electricity to national grid. This tool is used to calculate the OM, BM and CM.
Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, two sub-options under the step 2 of the tool are available to the project participants, i.e. option IIa and option IIb. If option IIa is chosen, the conditions specified in “Appendix 1: Procedures related to off-grid power generation” should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	Since the project activity is grid connected, this condition is applicable and the emission factor has been calculated accordingly.
In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	Not applicable. the project is not located in annex I country.
Under this tool, the value applied to the CO ₂ emission factor of biofuels is zero.	Not applicable. the project is a wind power project and does not involve emissions from biofuels.

Applicability conditions of “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (version 03.0)” are in the following table.

Criteria	Assessment
If emissions are calculated for electricity consumption, the tool is only applicable if one out of the following three scenarios applies to the sources of electricity consumption:	Applicable. The electricity consumption lies to Scenario A: Electricity consumption from

<p>(a) Scenario A: Electricity consumption from the grid. The electricity is purchased from the grid only, and either no captive power plant(s) is/are installed at the site of electricity consumption or, if any captive power plant exists on site, it is either not operating or it is not physically able to provide electricity to the electricity consumer;</p> <p>(b) Scenario B: Electricity consumption from (an) off-grid fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants are installed at the site of the electricity consumer and supply the consumer with electricity. The captive power plant(s) is/are not connected to the electricity grid; or</p> <p>(c) Scenario C: Electricity consumption from the grid and (a) fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants operate at the site of the electricity consumer. The captive power plant(s) can provide electricity to the electricity consumer. The captive power plant(s) is/are also connected to the electricity grid. Hence, the electricity consumer can be provided with electricity from the captive power plant(s) and the grid.</p>	<p>the grid. The electricity is purchased from the grid only, and no captive power plant is installed at the site of electricity consumption.</p>
<p>This tool can be referred to in methodologies to provide procedures to monitor amount of electricity generated in the project scenario, only if one out of the following three project scenarios applies to the recipient of the electricity generated:</p> <p>(a) Scenario I: Electricity is supplied to the grid;</p> <p>(b) Scenario II: Electricity is supplied to consumers/electricity consuming facilities; or</p> <p>(c) Scenario III: Electricity is supplied to the grid and consumers/electricity consuming facilities.</p>	<p>Applicable. The project scenario lies to Scenario I: Electricity is supplied to the grid.</p>
<p>This tool is not applicable in cases where captive renewable power generation technologies are installed to provide electricity in the project activity, in the baseline scenario or to sources of leakage. The tool only accounts for CO₂ emissions.</p>	<p>There is no captive renewable power generation technologies installed to provide electricity in the project activity, in the baseline scenario or to sources of leakage.</p>

Applicability conditions of “Assessment of the validity of the original/current baseline and update the baseline at the renewal of the crediting period” (version 03.0.1) are in the following table.

Criteria	Assessment
This tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period	Applicable. The baseline in this PD is at the renewal of the crediting period. The baseline is assessed by the procedure of this tool.

The applicability criteria stated in methodology ACM0002 (Version 20.0) and the tools are met on the basis of the reasons above.

For standardized baseline, it's not applicable.

3.3 Project Boundary

According to the methodology ACM0002, the spatial extent of the project boundary includes the project power plant/unit and all power plants/units connected physically to the electricity system that the CDM project power plant is connected to.

According to 2019 Baseline Emission Factors for Regional Power Grids in China issued by the Ministry of Ecology and Environment of China (China MEE), NCPG consists of Beijing Power Grid, Tianjin Power Grid, Hebei Power Grid, Shanxi Power Grid, Shandong Power Grid and Inner Mongolia Power Grid.

The GHG emission sources included in or excluded from the project boundary are as follows:

Table 3. GHG emission sources of the project

Source	Gas	Included?	Justification/Explanation
Baseline	CO ₂	Included	Main emission source.
	CH ₄	Excluded	Excluded for simplification. This is conservative
	N ₂ O	Excluded	Excluded for simplification. This is conservative
Project	CO ₂	Excluded	According to ACM0002 (Version 20.0), project emission is excluded as a wind power project.
	CH ₄	Excluded	
	N ₂ O	Excluded	

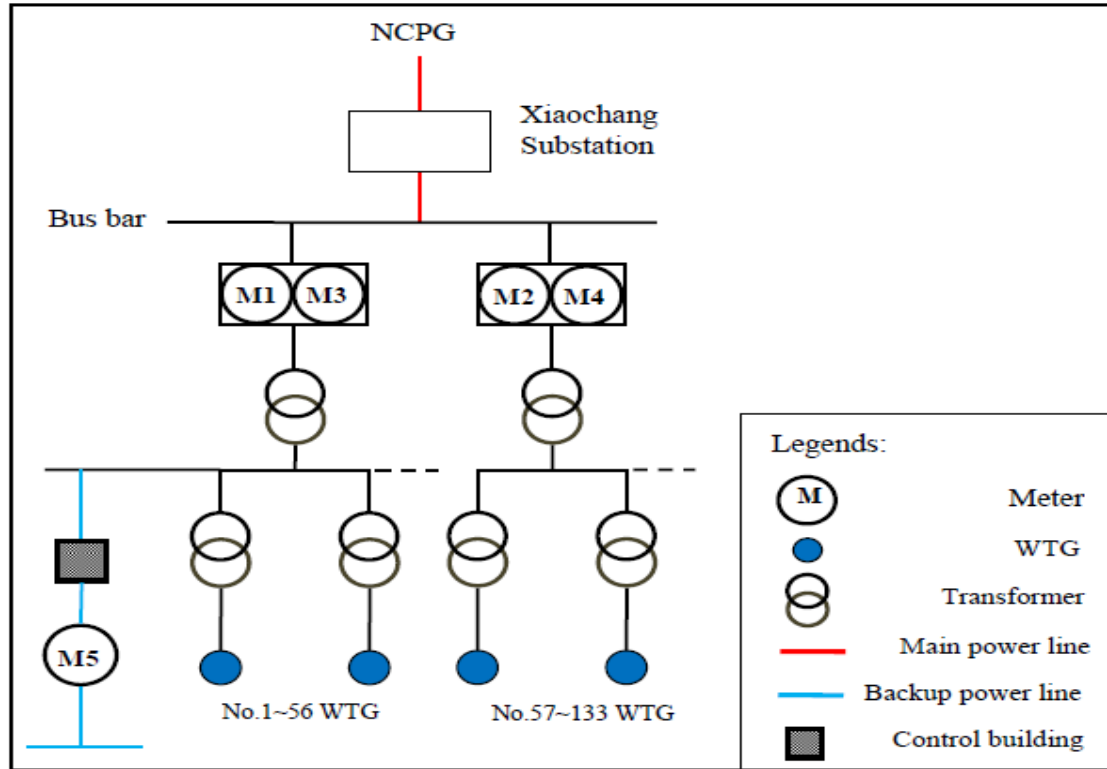


Figure 3. Flow diagram of the project boundary

3.4 Baseline Scenario

The baseline scenario of the project is electricity delivered to NCPG by the project that would otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid. According to the methodology ACM0002 (version 20.0), the baseline emissions are the electricity produced by the project multiplied by the emission factor of NCPG.

For the second crediting period, the continued validity of the original baseline should be assessed.

According to the Methodological Tool “Assessment of the validity of the original/current baseline and update the baseline at the renewal of the crediting period” (version 03.0.1), the stepwise procedure as follows should be adopted to assess the continued validity of the baseline and to update the baseline:

Step 1: Assess the validity of the current baseline for the next crediting period

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

There are no new national and/or sectoral policies that could affect the baseline scenario during the renewal of the crediting period. Although national policies favour the development of renewable energy sources, total renewable resources based power generation accounts for less than 50% of total generation of the NCPG in the latest 5 years respectively. Hence in the absence of the project activity electricity would still have been generated in the existing fossil fuel power plants or by the addition of new fossil fuel power plants connected to the NCPG.

Step 1.2: Assess the impact of circumstances

Firstly, the baseline scenario identified at the validation of the project activity was the continuation of the current practice without any investment;

Secondly, the mainly investment environment or market characteristics especially the feed-in tariff, the policy in terms of market access permit have no significant change which would impacts the current baseline. The current practice for the baseline emissions is still the GHG emitted by NCPG: the equivalent electricity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources within the NCPG;

Step 1.3: Assess whether the continuation of the use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which the renewal is requested

The current baseline scenario is the continuation of the current practice. In the absence of the project, the electricity would have been supplied by NCPG, and it will not request an investment by the project proponent or third party. So, this step is not applicable.

Step 1.4: Assessment of the validity of the data and parameters

Since there are some parameters, which were determined at the start of the first crediting period and not monitored during the first crediting period, are not valid anymore, therefore, the current baseline emissions needs to be updated for the second crediting period according to this tool.

Before the time of requesting renewal of the crediting period, the China DNA has issued the latest Notice “2019 Baseline Emission Factors for Regional Power Grids in China” on 29/12/2020², so the emission factor of NCPG is updated for the second crediting period according to this Notice.

In summary, the emission factor of NCPG and all values have been updated to the latest data for the second crediting period according to this Notice.

² http://www.mee.gov.cn/ywgz/ydqhbh/wsqtz/202012/t20201229_815386.shtml

Application of Steps 1.1, 1.2, 1.3 and 1.4 confirmed that the current baseline is valid for the second crediting period, but data and parameters need to be updated. Therefore step 2 is used.

Step 2: Update the current baseline and the data and parameters

Step 2.1: Update the current baseline

The baseline emissions for the second crediting period have been updated, without reassessing the baseline scenario, based on the latest approved version of the methodology ACM0002. More details for the updated baseline emissions for the second crediting period can be seen in section 4.

Step 2.2: Update the data and parameters

As mentioned in step 1.4 above, all parameters regarding the grid emission factor calculation have been updated for this second crediting period. More details can be seen in section 4.

3.5 Additionality

According to VCS standard 4.1, a full reassessment of additionality is not required.

The validity of the original baseline scenario is demonstrated in Section 3.4, and it was concluded that the current baseline is still valid for the next crediting period. Only EF related parameters should be updated for the second crediting period.

Project has no change compared with the original status. Therefore, the project description is the same as in the first crediting period.

The demonstration of regulatory surplus is provided below.

The project activity is in compliance with current laws and regulations in China, such as Renewable Energy Law of the People's Republic of China and Environmental Protection Regulation for Wind Power Project, etc. The law and regulations are described in section 1.14. There is no other regulatory requirement for the implementation of a wind power technology.

3.6 Methodology Deviations

There are no methodology deviations for this project.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

According to the methodology, the baseline emissions include only CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are calculated as follows:

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

(1)

where

BE_y Baseline emissions in year y (t CO₂/yr)

$EG_{PJ,y}$ Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)

$EF_{grid,CM,y}$ Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of “Tool to calculate the emission factor for an electricity system” (tCO₂/MWh)

Calculation of $EG_{PJ,y}$

As the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, the following applies:

$$EG_{PJ,y} = EG_{facility,y}$$

(2)

Where:

$EG_{PJ,y}$ Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)

$EG_{facility,y}$ Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)

Calculation of $EF_{grid,CM,y}$

The baseline emission factor (EF_y) is calculated as a combined margin ($EF_{grid,CM,y}$), consisting of the combination of operating margin ($EF_{grid,OM,y}$) and build margin ($EF_{grid,BM,y}$) factors according to the following seven steps defined in the “Tool to calculate the emission factor for an electricity system”.

Data for the calculations are based on official public data on 2019 China Regional Power Grid Baseline Emission Factors³.

³ http://www.mee.gov.cn/ywgz/ydqhbh/wsqtz/202012/t20201229_815386.shtml

Step 1. Identify the relevant electricity systems

For determining the electricity emission factors, identify the relevant project electricity system.

China DNA has published a delineation of the project electricity system and connected electricity systems, therefore these delineations are used in accordance with the Tool:

- the project electricity system is the North China Power Grid (NCPG), consisting of six provincial grids: Beijing, Tianjin, Hebei, Shanxi, Shandong and Inner Mongolia.

For the purpose of this tool, the reference system is the project electricity system. Hence electricity transfers from a connected electricity system to the project electricity system are defined as electricity imports, and electricity transfers from the project electricity system to connected electricity systems are defined as electricity exports.

For the purpose of determining the build margin emission factor, the spatial extent is limited to the project electricity system, except where recent or likely future additions to the transmission capacity enable significant increases in imported electricity. In such cases, the transmission capacity may be considered a build margin source.

There are no recent or likely future additions to transmission capacity that would enable significant increases in imported electricity; the data that imports are relatively small and have not changed significantly in the period covered. Therefore, the transmission capacity is not considered a build margin source.

For the purpose of determining the operating margin emission factor, use one of the following options to determine the CO₂ emission factor(s) for net electricity imports from a connected electricity system:

- (a) 0 tCO₂/MWh; or
- (b) The weighted average operating margin (OM) emission rate of the exporting grid, determined as described in Step 4 (d) below; or
- (c) The simple operating margin emission rate of the exporting grid, determined as described in Step 4 (a), if the conditions for this method, as described in Step 3 below, apply to the exporting grid; or
- (d) The simple adjusted operating margin emission rate of the exporting grid, determined as described in Step 4 (b) below.

Following the calculations of China DNA, the simple operating margin option (b) is used to calculate the CO₂ emission factors for net electricity imports ($EF_{grid,import,y}$).

For imports from connected electricity systems located in Annex-I country(ies), the emission factor is 0 tonnes CO₂ per MWh.

There are no imports from Annex-I country (ies).

Electricity exports should not be subtracted from electricity generation data used for calculating and monitoring the electricity emission factors.

Electricity exports from the project electricity system to the connected electricity system are not subtracted from electricity generation data used for calculating and monitoring the electricity emission factors.

Step 2. Choose whether to include off-grid power plants in the project electricity system (optional)

Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.

Option II: Both grid power plants and off-grid power plants are included in the calculation.

Following the calculations of the DNA and the availability of statistical data availability, Option I is chosen.

Step 3. Select a method to determine the operating margin (OM)

According to the tool, the calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:

- (a) Simple OM; or
- (b) Simple Adjusted OM; or
- (c) Dispatch data analysis OM; or
- (d) Average OM

According to the Tool, the simple OM method (option a) can only be used if low-cost / must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

This criterion is met and therefore the project participants chose to use the simple OM method (option a).

The Simple OM emissions factor can be calculated using either ex-ante or ex-post data vintages. The project participants have chosen to use the ex-ante option, and $EF_{grid,OM,y}$ is fixed for the duration of the second crediting period.

Ex ante option: If the ex-ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation.

Step 4. Calculate the operating margin emission factor according to the selected method

(a) Simple OM

The Simple Operating Margin emission factor $EF_{grid,OM,y}$ is defined as the generation-weighted average emissions per unit net electricity generation (tCO₂/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants. Two options can be selected to calculate the simple OM:

Option A: Based on the net electricity generation and a CO₂ emission factor of each power unit;
or

Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Option B can only be used if:

- (a) The necessary data for Option A is not available; and
- (b) Only nuclear and renewable power generation are considered as low-cost / must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and
- (c) Off-grid power plants are not included in the calculation (i.e. if Option I has been chosen in Step 2).

The criteria for Option B are met, as (a) the necessary data for Option A is not available as indicated in the calculations of the DNA, (b) only nuclear and renewable power generation are considered as low-cost / must-run power sources and the quantity of electricity supplied to the grid by these sources is known, and (c) Option I is chosen in Step 2.

Option B – Calculation based on total fuel consumption and electricity generation of the system

According to the Tool, where Option B is used, the simple OM emission factor is calculated based on the net electricity supplied to the grid by all power plants serving the system, not including low-cost / must-run power plants / units, and total fuel consumption of the project electricity system, as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO_2,i,y}}{EG_y} \quad (3)$$

Where:

- $EF_{grid,OMsimple,y}$ Simple operating margin CO₂ emission factor in year y (tCO₂/MWh)
- $FC_{i,y}$ The amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)

NCV _{i,y}	Net calorific value (energy content) of fossil fuel type i in year y (GJ/mass or volume unit)
EF _{CO₂,i,y}	CO ₂ emission factor of fossil fuel type i in year y (tCO ₂ /GJ)
EG _y	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year y (MWh)
i	All fossil fuel types combusted in power sources in the project electricity system in year y
y	The relevant year as per the data vintage chosen in Step 3

On the basis of the data available, the three-year average operating margin emission factor is calculated by the DNA as a full-generation-weighted average of the emission factors.

$$EF_{grid,OMsimpe,y} = 0.9419 tCO_2/MWh$$

Step 5. Calculate the build margin (BM) emission factor

In terms of vintage of data, the project participants chose Option 1, the ex-ante option (as for the OM calculation), and $EF_{grid,BM,y}$ is fixed for the duration of the second crediting period:

Option 1: ex-ante. For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

The latest statistical data available (from the China Power Yearbook) is used by the DNA to determine the most recent year from which the added generation capacity is equal to or just exceeds 20% of the latest statistic. The added generation capacity is the sample group of power units m used to calculate the build margin.

The sample group of power units m used to calculate the build margin consists of the set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently. This option is chosen as it comprises larger annual generation than the five units built most recently.

The build margin emissions factor is the generation-weighted average emission factor (tCO₂/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (4)$$

Where:

$EF_{grid,BM,y}$	Build margin CO ₂ emission factor in year y(t CO ₂ /MWh)
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	CO ₂ emission factor of power unit m in year y (tCO ₂ /MWh)
m	Power units included in the build margin
y	The most recent historical year for which power generation data is available

The CO₂ emission factor of each power unit m ($EF_{EL,m,y}$) should be determined as per the guidance in step 4 (a) for the simple OM, using options A1, A2 or A3, using for y the most recent historical year for which power generation data is available, and using for m the power units included in the build margin.

Due to the limited availability of data on individual power units, the build margin emission factor and the CO₂ emission factor of thermal power units as follows.

The added generation capacity is taken instead of generation in formula (4) above, as with the determination of the group of plant included in the build margin. Therefore, the calculation of $EF_{grid,BM,y}$ is as follows:

$$EF_{grid,BM,y} = \frac{\sum_m (CAP_{m,y} \times EF_{EL,m,y})}{\sum_m CAP_{m,y}} = \sum_m Share_{CAP,m,y} \times EF_{EL,m,y} \quad (5)$$

Where:

$EF_{grid,BM,y}$	Build margin CO ₂ emission factor in year y(t CO ₂ /MWh)
$CAP_{m,y}$	Added generation capacity by plant type m in year y (MW)
$EF_{EL,m,y}$	CO ₂ emission factor of plant type m in year y (tCO ₂ /MWh)
$Share_{CAP,m,y}$	Share of added generation capacity by plant type m in year y (%)
m	Plant type included in the build margin (thermal, hydro, nuclear, other)
y	The most recent historical year for which electricity generation data is available

The CO₂ emission factor of plant types other than thermal power plants is taken as zero.

The CO₂ emission factor of thermal power plants is the weighted average emission factor of the best thermal power plant technologies commercially available in China. The CO₂ emission factor of advanced (best commercially available) power plants using fuel type i can be calculated as follows:

$$EF_{m,Adv,y} = \frac{EF_{CO_2,m,y} \times 3.6}{\eta_{m,y}} \quad (6)$$

Where:

$EF_{m,Adv,y}$	CO ₂ emission factor of advanced power plants using fuel m in year y (tCO ₂ /MWh)
$EF_{CO_2,m,y}$	Average CO ₂ emission factor of fuel type m in year y (tCO ₂ /GJ)
$\eta_{m,y}$	Average net energy conversion efficiency of advanced power plants using fuel type m in year y (%)
m	Fuel type of thermal plant (coal/solid, oil/liquid, gas)
y	The relevant year as per the data vintage chosen

The weighted average CO₂ emission factor of thermal power plants is weighted on the basis of the emissions from each of these fuel types in the latest year for which data is available, and using the average net energy conversion efficiency for each fuel type of the best technologies commercially available in China.

$$EF_{thermal,y} = \sum_m (EF_{m,Adv,y} \times \lambda_{m,y}) \quad (7)$$

Where:

$EF_{thermal,y}$	Weighted average CO ₂ emission factor of thermal power plants in year y (tCO ₂ /MWh)
$EF_{m,Adv,y}$	CO ₂ emission factor of advanced power plants using fuel type m in year y (tCO ₂ /MWh)
$\lambda_{m,y}$	Share of emissions of fuel type m in year y (%)
m	Fuel type of thermal plant (coal/solid, oil/liquid, gas)
y	The relevant year as per the data vintage chosen

The build margin emission factor is calculated by the DNA using this methodology:

$$EF_{grid,BM,y} = 0.4819 \text{ tCO}_2/\text{MWh}.$$

Step 6. Calculation of the combined margin emission factor

The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is based on one of the following methods:

- (a) Weighted average CM; or
- (b) Simplified CM.

The weighted average CM method (option a) should be used as the preferred option.

The simplified CM method (option b) can only be used if:

- the project activity is located in a Least Developed Country (LDC) or in a country with less than 10 registered projects at the starting date of validation; and
- The data requirements for the application of step 5 above cannot be met.

Option a is the preferred option. Option b cannot be used as the project activity does not take place in an LDC or in a country with less than 10 registered CDM projects. Therefore, option a is chosen.

Weighted average CM

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = w_{OM} \times EF_{grid,OM,y} + w_{BM} \times EF_{grid,BM,y}$$

$$EF_{grid,CM,y} = \omega_{OM} \times EF_{grid,OM,y} + \omega_{BM} \times EF_{grid,BM,y} \quad (8)$$

Where:

$EF_{grid,BM,y}$	Build margin CO ₂ emission factor in year y (tCO ₂ /MWh)
$EF_{grid,OM,y}$	Operating margin CO ₂ emission factor in year y (tCO ₂ /MWh)
w_{OM}	Weighting of operating margin emissions factor (%)
w_{BM}	Weighting of build margin emissions factor (%).

The default weights are used, i.e. for the wind farm projects in the first crediting period and the subsequent crediting periods, $w_{OM} = 0.75$ and $w_{BM} = 0.25$.

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
Operating Margin Emissions Factor ($EF_{grid,OM,y}$)	0.9419	0.75
Build Margin Emissions Factor ($EF_{grid, BM,y}$)	0.4819	0.25
Baseline Emissions Factor ($EF_{grid,CM,y}$)	0.8269	

Thus,

$$BE_y = EG_{facility,y} \times EF_{grid,CM,y} = 405,685 \text{ MWh} \times 0.8269 \text{ tCO}_2/\text{MWh} = 335,460 \text{ tCO}_2$$

4.2 Project Emissions

According to the methodology, for most renewable energy project activities, $PE_y = 0$. However, the methodology prescribes project emission calculations for geothermal, solar thermal and hydro power plant. the project is a wind power project, therefore, there are no project emissions according to the methodology:

$$PE_y = 0$$

4.3 Leakage

According to the methodology, no leakage is considered for the project activity.

4.4 Net GHG Emission Reductions and Removals

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad (9)$$

Where:

ER_y Emission reductions in year y (t CO₂e/yr)

BE_y Baseline emissions in year y (t CO₂/yr)

PE_y Project emissions in year y (t CO₂e/yr)

Thus,

$$ER_y = BE_y - PE_y = 335,460 \text{ tCO}_2\text{e} - 0 \text{ tCO}_2\text{e} = 335,460 \text{ tCO}_2\text{e}$$

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
25/05/2020-31/12/2020 (221days)	203,114	0	0	203,114
01/01/2021-31/12/2021	335,460	0	0	335,460
01/01/2022-31/12/2022	335,460	0	0	335,460
01/01/2023-31/12/2023	335,460	0	0	335,460
01/01/2024-31/12/2024	335,460	0	0	335,460
01/01/2025-31/12/2025	335,460	0	0	335,460
01/01/2026-31/12/2026	335,460	0	0	335,460
01/01/2027-31/12/2027	335,460	0	0	335,460
01/01/2028-31/12/2028	335,460	0	0	335,460
01/01/2029-31/12/2029	335,460	0	0	335,460
01/01/2030-24/05/2030 (144days)	132,346	0	0	132,346

Total	3,354,600	0	0	3,354,600
-------	-----------	---	---	-----------

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,OM,y}$
Data unit	tCO ₂ /MWh
Description	Simple 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 ⁴
Value applied	0.9419
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	$EF_{grid,BM,y}$
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 ⁵
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

⁴ <http://www.mee.gov.cn/ywgz/ydqhbh/wsqtz/202012/W020201229610353816665.pdf>

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

Comments	/
Data / Parameter	WOM
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	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	/

5.2 Data and Parameters Monitored

Data / Parameter	$EG_{\text{facility},y}$
Data unit	MWh/yr

Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y.
Source of data	Calculation
Description of measurement methods and procedures to be applied	Measurement will be performed continuously with electricity meters, and it will be recorded monthly. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
Frequency of monitoring/recording	Measured continuously and recorded monthly.
Value applied	405,685 MWh per year at full capacity.
Monitoring equipment	The electricity is monitored by electricity meters with national standards.
QA/QC procedures to be applied	Meters will be examined, tested and calibrated regularly according to the manufacturer's standards. Monitoring data are counter-checked by receipt of electricity sales.
Purpose of data	Calculation of baseline emissions
Calculation method	$EG_{\text{facility},y} = EG_{\text{export},y} - EG_{\text{import},y} - EG_{\text{backupline},y}$ EG _{export,y} : Quantity of electricity exported to the grid by the project through the main power line. EG _{import,y} : Quantity of electricity imported from the grid by the project through the main power line. EG _{backupline,y} : Quantity of electricity delivered to the project through the backup line.
Comments	/
Data / Parameter	EG _{export,y}
Data unit	MWh/yr
Description	Quantity of electricity exported to the grid by the project through the main power line.
Source of data	Project activity site with electricity meter (M1 and M2, or the backup meter M3 and M4).
Description of measurement methods and procedures to be applied	Measurement will be performed continuously with electricity meters, and it will be recorded monthly. $EG_{\text{export},y} = EG_{\text{export},y,1} + EG_{\text{export},y,2}$ Here, EG _{export,y} refers to annual electricity exported to the grid and equals to sum of EG _{export,y,1} and EG _{export,y,2} . EG _{export,y,1} and EG _{export,y,2} refer to annual electricity exported to the grid by the two groups of wind turbine generators respectively. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.

Frequency of monitoring/recording	Measured continuously and recorded monthly.
Value applied	405,685 MWh per year at full capacity.
Monitoring equipment	The electricity is monitored by electricity meters M1(M3) and M2(M4) with national standards.
QA/QC procedures to be applied	Meters will be examined, tested and calibrated regularly according to the manufacturer's standards. Monitoring data are counter-checked by receipt of electricity sales.
Purpose of data	Calculation of baseline emissions
Calculation method	/
Comments	/

Data / Parameter	$EG_{import,y}$
Data unit	MWh/yr
Description	Quantity of electricity imported from the grid by the project through the main power line.
Source of data	Project activity site with electricity meter (M1 and M2, or the backup meter M3 and M4).
Description of measurement methods and procedures to be applied	<p>Measurement will be performed continuously with electricity meters, and it will be recorded monthly.</p> $EG_{import,y} = EG_{import,y,1} + EG_{import,y,2}$ <p>Here,</p> <p>$EG_{import,y}$ refers to annual electricity imported from the grid and equals to sum of $EG_{import,y,1}$ and $EG_{import,y,2}$.</p> <p>$EG_{import,y,1}$ and $EG_{import,y,2}$ refer to annual electricity imported from the grid by the two groups of wind turbine generators respectively.</p> <p>Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.</p>
Frequency of monitoring/recording	Measured continuously and recorded monthly.
Value applied	0 MWh per year at full capacity.
Monitoring equipment	The electricity is monitored by electricity meters M1(M3) and M2(M4) with national standards.
QA/QC procedures to be applied	Meters will be examined, tested and calibrated regularly according to the manufacturer's standards. Monitoring data are counter-checked by receipt of electricity sales.
Purpose of data	Calculation of baseline emissions
Calculation method	/
Comments	/

Data / Parameter	$EG_{\text{backupline},y}$
Data unit	MWh/yr
Description	Quantity of electricity delivered to the project through the backup line.
Source of data	Project activity site with electricity meter (M5).
Description of measurement methods and procedures to be applied	Measurement will be performed continuously with electricity meters, and it will be recorded monthly. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
Frequency of monitoring/recording	Measured continuously and recorded monthly.
Value applied	0 MWh per year at full capacity.
Monitoring equipment	The electricity is monitored by electricity meter M5 with national standards.
QA/QC procedures to be applied	Meters will be examined, tested and calibrated regularly according to the manufacturer's standards. Monitoring data are counter-checked by receipt of electricity sales.
Purpose of data	Calculation of baseline emissions
Calculation method	/
Comments	/

5.3 Monitoring Plan

The project owner, Hebei Construction Investment New Energy Co., Ltd., is the user of this monitoring plan and will be responsible for this monitoring plan. The project owner must maintain credible, transparent, and adequate data estimation, measurement, collection, and tracking systems to maintain the information required for an audit of an emission reduction project.

These records and monitoring systems are needed to allow the DOE to verify project performance as part of the verification and certification process.

Emission reductions will be achieved through displacing part of the electricity from the NCPG due to the power generated by the project. The net grid-connected output is therefore defined as the key data to monitor.

The monitoring plan is established according to the request of approved baseline and monitoring methodology ACM0002 (version 20.0).

1. Monitoring subject

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

- 1) $EG_{\text{export},y}$ is the quantity of electricity exported to the grid by the project through the main power line;
- 2) $EG_{\text{import},y}$ is the quantity of electricity imported from the grid by the project through the main power line;
- 3) $EG_{\text{backupline},y}$ is the quantity of electricity delivered to the project through the backup line.

2. Project Integrate Management

This monitoring plan will be 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 220kV, and then delivered to Xiaochang Substation by 220kV transmission line. The simplified electrical grid connection diagram is shown in the following figure 4:

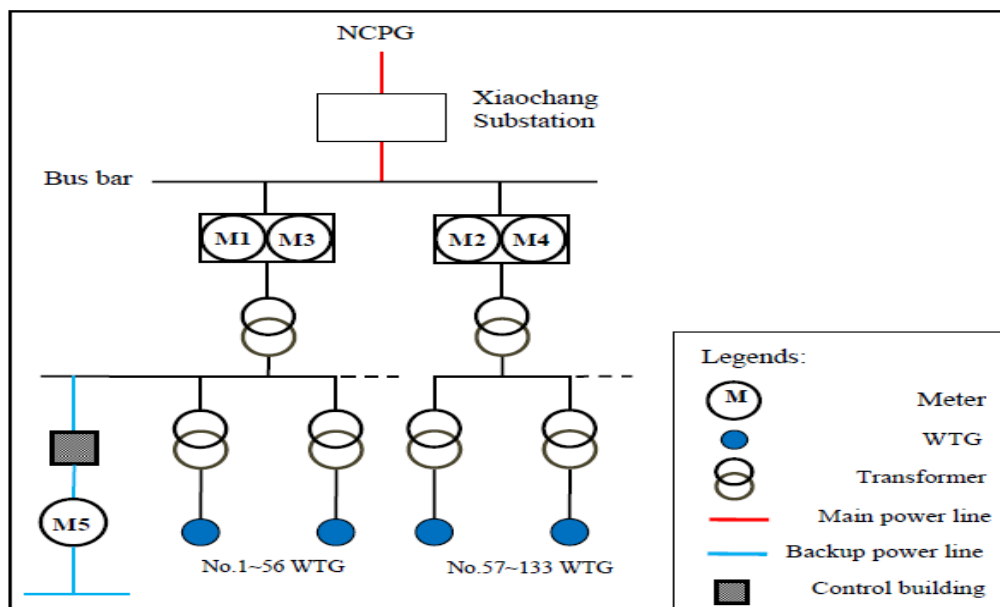


Figure 4. Simplified electrical grid connection diagram

The power line supplying electric power to the grid can also deliver power from the grid to the wind farm. The metering equipment runs in two directions and will record two readings, i.e. electricity exported to the grid ($EG_{\text{export},y}$) and electricity imported from the grid ($EG_{\text{import},y}$). 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 ($EG_{\text{export},y,1}$) and electricity imported from the grid by Group 1 WTGs ($EG_{\text{import},y,1}$). M2 plays the same role as M1, that is, measuring electricity exported by Group 2 WTGs ($EG_{\text{export},y,2}$) and electricity imported from the grid by Group 2 WTGs ($EG_{\text{import},y,2}$). $EG_{\text{export},y,1}$ plus $EG_{\text{export},y,2}$ makes total electricity exported to the grid by the project ($EG_{\text{export},y}$). Similarly, $EG_{\text{import},y,1}$ plus $EG_{\text{import},y,2}$ make total electricity imported from the grid by the project ($EG_{\text{import},y}$).

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 1 WTGs 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.

In case of emergencies and when the wind farm does not produce enough power for auxiliary power use, the project will use the power through the backup line. Power delivered to the project through a backup power line ($EG_{\text{backupline},y}$) is metered by instruments at M5 in Figure 4 which is operated by the grid company.

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

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

Where:

$EG_{\text{facility},y}$ is the calculated quantity of net electricity generation supplied by the project plant/unit to the grid in year y;

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

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

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

4. Quality Assurance and Quality Control

The metering equipments will be properly calibrated and checked annually by an independent third party according to relevant national standard, e.g. the DL/T448—2016 or other national

standard, to ensure its accuracy. The accuracy of metering equipments M1, M2, M3 and M4 which have been installed are 0.2s. The accuracy of metering equipment (M5) is 0.5s.

The relative recording files will be supplied to the project owner. These recording files will be preserved by the project owner and provide to DOE in Verification.

The relevant training will be implemented by the project owner and the equipment manufacturer before operation of the project.

5. Information collection and management

It is the responsibility for the project owner to provide necessary information and data for validation and verification. The measurement of the whole production data is controlled and stored by the project owner.

All physical documents including the readings in electronic and manual form of the Meters, billing receipts will be stored by the project owner and kept one copy in order to facilitate the verification of DOE.

The monthly records of power supplied to the grid and received from the grid, relevant accounting documents and billing receipts and the results of calibration shall be collected in a central place 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 in case of damaged metering equipment

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 among others metering values of power supplied to and received from the grid, copies of electricity receipts, a report on calibration and a calculation of emission reductions.

All the data shall be kept until two years after the end of the first crediting period.