



HANGJIN YIHEWUSU PHASE I 49.5MW WIND POWER PROJECT



Document Prepared by Climate Bridge (Shanghai) Ltd.

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1 PROJECT DETAILS

1.1 Summary Description of the Project

The Hangjin Yihewusu Phase I 49.5MW Wind Power Project (hereafter, “the project”) is to utilize wind resources for electricity generation through the construction of a windfarm with a total capacity of 49.5MW in Hangjin County, Ordos City, in the western part of the Inner Mongolia Autonomous Region in China.

The timeline of the project is as below:

Start date of construction	26-Feb-2009
Start date of operation	28-Dec-2011
Registered as a CDM project (UNFCCC registration reference number of 7221 ¹)	07-Sep-2012
Registered as a VCS project (VCS ID 1128)	29-Sep-2013

Prior to the implementation of the project activity, the same amount of electricity generated by the project was generated by fossil-fuel-dominated grid-connected power plants. This is the scenario that existed prior to the implementation of the project activity and is also the baseline scenario.

The project installed and operated 33 sets wind turbines with the total capacity of 49.5 MW (1.5MW each). The project is expected to deliver 117,784 MWh electricity to North China Power Grid (NCPG). The electricity generated by the project is supplied to the NCPG, displacing part of electricity generated by NCPG which is dominated by fossil fuel-fired power plants. Thus, greenhouse gas (GHG) emission reductions can be achieved. The first crediting period of the VCS project is from 28-Dec-2011 to 27-Dec-2021. This crediting period is the second crediting period from 28-Dec-2021 to 27-Dec-2031. The estimated annual GHG emission reductions are 97,395 t CO_{2e} and the total emission reductions estimated in this crediting period are 973,950 t CO_{2e}

1.2 Sectoral Scope and Project Type

Sectoral scope: 1. Energy (renewable/non-renewable);

Project type: Wind power generation project.

¹ <https://cdm.unfccc.int/Projects/DB/JC1346997827.74/view>

1.3 Project Eligibility

The scope of the VCS Program includes:

- 1) The six Kyoto Protocol greenhouse gases: The emissions reduction of the project comes from one source: CO₂ emissions from the production of the equivalent amount of electricity replaced by the Project that would otherwise have been purchased from the fossil fuel fired power plants of North China Power Grid (NCPG). Thus, the project applicable to this scope.
- 2) Ozone-depleting substances: NA
- 3) Project activities supported by a methodology approved under the VCS Program through the methodology approval process: NA
- 4) Project activities supported by a methodology approved under a VCS approved GHG program, unless explicitly excluded under the terms of Verra approval: The methodology ACM0002 (Version 21.0) of the project utilized is a methodology approved under CDM Program, that is a VCS approved GHG program.
- 5) Jurisdictional REDD+ programs and nested REDD+ projects as set out in the VCS Program document Jurisdictional and Nested REDD+ (JNR) Requirements: NA

The project has been registered as a VCS project on 29-Sep-2013, this is the second crediting period. The project is a wind source electricity generation project and for greenfield power plant, the GHG emission is considered to be 0. Thus, the project is not the one that can reasonably be assumed to have generated GHG emissions primarily for the purpose of their subsequent reduction, removal or destruction.

Meanwhile, the project is not belonged to the projects excluded in Table 1 of VCS Standard 4.3.

Thus, the project is eligible under the scope of VCS program.

1.4 Project Design

The project includes a single location or installation only.

Eligibility Criteria

The project is not a grouped project.

1.5 Project Proponent

Organization name	Inner Mongolia Guodian New Energy Co.,Ltd.
Contact person	Wa Gao
Title	Project Manager

Address	Room 2, Guibin Building, Dianli Community, Jinchuan Development District
Telephone	+86 0471 2653 722
Email	3542346576@qq.com

1.6 Other Entities Involved in the Project

Organization name	Climate Bridge (Shanghai) Ltd.
Role in the project	VCU Buyer
Contact person	Zhiwen Gao
Title	General Manager
Address	Block B, Level 24, Jiangong Mansion, 33 Fushan Road, Pudong New Area, Shanghai, China 200120
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1.7 Ownership

The project proponent of the project is Inner Mongolia Guodian New Energy Co.,Ltd., who has the full ownership of the project. The project proponent has obtained the approval from Inner Mongolia Development and Reform Commission for the construction and operation of the Project. The Environmental Impact Assessment (EIA) of the Project shows that the Project is constructed and operated by the project proponent, and the EIA form has been approved by Environmental Protection Bureau (EPB) of the Inner Mongolia Autonomous Region on 01-Feb-2008.

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, and the business license of the project owner are evidence for legislative right. Both the project approval and the EIA approval are issued by competent authority, and they demonstrate that the project proponent has been granted the project ownership in compliance with relevant laws and regulations in China.

In addition, the equipment purchasing contracts and the construction contract signed between the project proponent and suppliers/contractors demonstrate the ownership of the project proponent over the project.

1.8 Project Start Date

The project started on 28-Dec-2011 (The start date of operation).

1.9 Project Crediting Period

The project is registered under VCS Standard Version 3.3 and is completed validation before 19-Mar-2020, thus it remains eligible to apply the crediting period requirements under VCS Standard Version 3.3. The project crediting period is ten years, twice renewable for a total of 30 years. However, as the project is also registered as a CDM project with a seven year twice renewable project crediting period, it is not eligible for VCU issuance beyond the end of those 21 years. Considering 3*7 years CDM crediting period and 20 years operation time, it is reasonable that the total VCS crediting period was determined from 28-Dec-2011 to 27-Dec-2031, of which the first VCS crediting period is from 28-Dec-2011 to 27-Dec-2021 and this (the second) VCS crediting period is from 28-Dec-2021 to 27-Dec-2031.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	✓
Large project	

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
28-Dec-2021~31-Dec-2021	1,067
01-Jan-2022~31-Dec-2022	97,395
01-Jan-2023~31-Dec-2023	97,395
01-Jan-2024~31-Dec-2024	97,395
01-Jan-2025~31-Dec-2025	97,395
01-Jan-2026~31-Dec-2026	97,395
01-Jan-2027~31-Dec-2027	97,395
01-Jan-2028~31-Dec-2028	97,395
01-Jan-2029~31-Dec-2029	97,395
01-Jan-2030~31-Dec-2030	97,395
01-Jan-2031~27-Dec-2031	96,328
Total estimated ERs	973,950
Total number of crediting years	10

Average annual ERs

97,395

1.11 Description of the Project Activity

The project generates electricity by using renewable wind power and deliver to the NCPG, replacing equivalent electricity generated by fossil fuel fired power plants connected to the NCPG and therefore reducing GHG emissions.

The project involves the installation of 33 wind turbines, each of which with a rated capacity of 1,500kW, providing a total installed capacity of 49.5 MW. The project is expected to deliver 117,784 MWh to the NCPG annually. Each turbine has a box-type transformer that increases the voltage from 690V to 35kV. The 35kV transmission lines are connected to the main on-site transformer, through which the electricity generated by the project is transformed to 220kV, after which it is transmitted to the substation and then to the NCPG. The net electricity supplied by the project activity to the grid is monitored by the electricity meters installed at the onsite and the substation, which records the electricity exported to and imported from the grid. The designed operational lifetime of the wind farm is 20 years. The technical parameter of the wind turbine is shown in the table below.

Table 1-1 Technical parameters of the wind turbine²

Unit capacity(kW)	1500
Model	WTG1500A
Quantity of turbine	33
Rotor diameter(m)	82
Cut-in wind speed(m/s)	3
Rated wind speed(m/s)	10.5
Cut-out wind speed(m/s)	25
Rated voltage(V)	690
Operational lifetime	400V

1.12 Project Location

The project is located in Hangjin County, Ordos City, in the western Inner Mongolia of China. The geographical coordinates of the centre of the project area are E107.5411°, N40.0589°.

² Refer to technical agreement on wind turbines

The detail location of the project is shown as below:



Figure 1-1 Location of the Project

1.13 Conditions Prior to Project Initiation

The baseline scenario is the same as the scenario existing prior to the start of implementation of the project activity.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project complies with all Chinese relevant laws and regulations. Mainly include:

1. Renewable Energy Law of the People's Republic of China³;

³ http://www.nea.gov.cn/2017-11/02/c_136722869.htm

2. Catalogue for the Guidance of Industrial Structure Adjustment (2019 version)⁴;
3. National Action plan for carbon peaking goals before 2030⁵ : Actively develop solar thermal power generation, and promote the establishment of a solar thermal integrated renewable energy power generation base with complementary regulation of solar thermal power generation, photovoltaic power generation and wind power. Develop biomass power generation, biomass clean heating and bio natural gas according to local conditions. Explore and deepen the development and utilization of geothermal energy, wave energy, tidal current energy, temperature difference energy and other new marine energy. Further improve the renewable energy electricity consumption guarantee mechanism. By 2030, the total installed capacity of wind power and solar power will reach more than 1.2 billion kilowatts

The project has obtained the project approval and EIA approval from governmental authorities: Inner Mongolia Development and Reform Commission and Inner Mongolia Environmental Protection Bureau. The two approvals well demonstrate that local government permits the construction of the project. Consequently, the project complies with laws, status, and other regulatory frameworks.

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 Clean Development Mechanism (CDM) project in UNFCCC on 07-Sep-2012 (UNFCCC Ref. 7221), with the renewable crediting period of 3*7 years started from 07-Sep-2012. The project issued 189, 860 tCO₂e during the first monitoring period from 07-Sep-2012 to 20-Nov-2014 and 135,902 tCO₂e during the second monitoring period from 21-Nov-2014 to 20-Mar-2016 under CDM program.

Please refer to the following link for details:

<https://cdm.unfccc.int/Projects/DB/JCI1346997827.74/view>

1.15.2 Projects Rejected by Other GHG Programs

The project has not been rejected by any other GHG programs.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

China has a national emissions trading scheme only cover the high-emission industries, such as

⁴ http://www.gov.cn/xinwen/2019-11/06/content_5449193.htm

⁵ http://www.gov.cn/xinwen/2021-10/26/content_5645001.htm

thermal power generation, petrochemical, chemical, building materials, iron and steel, nonferrous, paper, aviation and other key emission industries that emitted at least 26,000 tons of CO₂e/year, not including renewable project⁶.

Also, the project has not been registered as a CCER (Chinese Certified Emission Reductions) project in China, thus it is not eligible for emission reductions transaction under the China's ETS. Therefore, the project does not reduce GHG emissions from activities that are included in an emissions trading program or any other mechanism that includes GHG allowance trading. The net GHG emission reductions generated during this monitoring period have not been used for compliance under such programs or mechanisms.

Furthermore, as a voluntary emission reduction project, the GHG emission reductions and removals generated by the project will not be enforced to be used for compliance in China. The credits in this monitoring period have not been counted and will not be counted under emission trading programs and other binding limits.

1.16.2 Other Forms of Environmental Credit

The project has not sought or received another form of GHG-related environmental credit, including renewable energy certificates. None of the credits will be claimed in the same period.

1.17 Sustainable Development Contributions

The Project utilizes wind source to generate power. By displacing part of the electricity that would have been supplied by the grid, the project achieves significant GHG emission reductions. The project also provides long-term job opportunities to local people.

The Project contributes to sustainable development in the following ways:

- Increase electricity production from renewable sources, which certainly reduces the consumption of fossil fuel in North China Power Grid. Thus, the project achieved SDG 7⁷.
- Reduce greenhouse gas emissions. The project reduces CO₂e by displacing part of the electricity that would have been supplied by the grid, effectively reducing greenhouse gas emissions. Thus, the project achieved SDG 13⁸.
- The project provides job opportunities and increase tax revenue, which has a positive effect on the local economy. Thus, the project achieved SDG 8⁹.

⁶ http://www.mee.gov.cn/xgk/2018/xgk/202103/t20210330_826728.html

⁷ <https://sdgs.un.org/goals/goal7>

⁸ <https://sdgs.un.org/goals/goal13>

⁹ <https://sdgs.un.org/goals/goal8>

The project contributes to achieving Chinese sustainable development priorities is described as below:

SDG	Indicators	Chinese Sustainable Development Progress	Project activity contribution
	SDG 7 Affordable and Clean Energy	By the end of 2015, China had fully solved the problem of providing electricity to all people without electricity, and reached the goal of the Sustainable Development Agenda 15 years ahead of schedule. From 2015 to 2020, the share of non-fossil energy increased from 14.5 % to 19.6%, while the share of raw coal decreased from 72.2 %to 67.6%%.	The project utilizes wind source for power generation and substitute equivalent electricity from thermal power. This contributes to achieve China's stated sustainable development priorities "By 2030, the proportion of non-fossil energy consumption will reach about 25%".
	SDG 8 Decent Work and Economic Growth	China has deeply implemented the innovation-driven development strategy, and small, medium and micro enterprises have developed rapidly. Adhering to the policy of giving priority to employment, the unemployment rate has remained at a low level. By coordinating epidemic prevention and control with economic and social development, China has become the only major economy to achieve positive growth in 2020, and has made positive contributions to global economic recovery.	The project activity provides employment opportunities for local villagers. This contributes to one of China's actions for promoting sustainable developing: "by 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value".

	SDG 13 Climate Action	In 2020, China's energy consumption per unit of GDP was reduced by 24.4% compared with 2012; carbon dioxide emissions per unit of GDP was reduced by 18.8% compared with 2015 and 48.4% compared with 2005, all of which have already fulfilled China's commitment to the international community in 2020 ahead of schedule.	The project utilizes wind source for power generation to avoid CO₂ emissions from the production of the equivalent amount of electricity replaced by the Project that would otherwise have been purchased from the NCPG. This contributes to achieve China's stated sustainable development priorities " China's carbon dioxide emissions would strive to peak by 2030 and strive to achieve carbon neutrality by 2060 ".
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1.18 Additional Information Relevant to the Project

Leakage Management

This is not applicable due to no leakage effects are accounted for under the applied methodology.

Commercially Sensitive Information

There is no commercially sensitive information has been excluded from the public version of the project description.

Further Information

There is no additional relevant legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and/or temporal information that may have a bearing on the eligibility of the project, the net GHG emission reductions or removals, or the quantification of the project's net GHG emission reductions or removals.

2 SAFEGUARDS

2.1 No Net Harm

The Environmental Impact Assessment (EIA) Report for the project has been approved by Inner Mongolia Environmental Protection Bureau on 01-Feb-2008, with approval No. "Neihuanbao

[2008] No.25". Every aspect of environmental impact has been considered in the EIA report with corresponding measures during project development. The environmental impacts, treatment, and effects arising from the Project during operation have been analyzed in section 2.3 of this report below. And no net harm has been detected.

Meanwhile, the implementation of the project improves local socio-economic development and contribute to sustainable development as described in section 1.17 of this report above.

In conclusion, the project has no negative impacts on the local environment and socio-economy. No net harm to the local environment and social community has been detected for the project.

2.2 Local Stakeholder Consultation

LSC prior to the Project activity:

Between 17-Aug-2011 and 19-Aug-2011, the staff from the Inner Mongolia Guodian New Energy Co., Ltd. carried out a survey among local villagers and residents living in the project area. The questionnaires used for assessing the project's impacts on the local environment, as well as on the region's social and economic development were sent out to local villagers and residents. 50 questionnaires were distributed, and 46 questionnaires had been returned. The response rate is 92%. The respondents are representative in terms of age, occupation and education, so their attitude towards the impacts of the project can therefore be seen as a comprehensive reflection of the attitudes of the residents possibly affected by the project. The results of the survey are presented in the table 2-1 below.

Table 2-1 Summary of Questionnaires

Item	Response		
	Yes	No	No comments
1. Do you agree with the development of the project?	89.13%	0	10.87%
2. What do you think the project's impact on the local job market will be?	Positive	No impact	Negative
	54.35%	45.65%	0
3. What do you think the project's impact on the local economy will be?	Positive	No Impact	Negative
	82.61%	17.39%	0
4. What do you think the project's impact on the local people's way of living, studying and working will be?	Positive	No Impact	Negative
	50%	50%	0
5. Will the project have a negative impact on the environment, such as noise, water or electromagnetism?	No	Air pollution	
	95.65%	4.35%	

6. What do you think the project's impact on the ecosystem?	Positive	No Impact	Negative
	26.09%	73.91%	0%
7. Will the project have a negative impact on your studying and work?	Yes	No	Not Sure
	0	95.65%	4.35%
8. What will be the general impact of the project's construction and operation?	Positive	No impact	Negative
	97.83%	2.17%	0

In summary, the local people support and agree with the construction of the project. They believe that the project will have a positive impact on the local economic development and their living conditions, without having negative impacts on the environment and the ecosystem.

LSC during the Project implementation stage:

Communications with local stakeholders are being carried out at periodic intervals. Key implementation schedules or changes of the project will be communicated to the local authority, who will inform the neighbourhood committee and the residents, the comments and suggestions from residents will be collected by the local authority meanwhile. And the local government agencies and competent authorities will conduct spot checks on the implementation of the project from time to time, and give suggestions on the involved rectification problems. There are no negative comments received for the project. In line with VCS requirements all the processes have been implemented to receive comments from local stakeholders as well as communicate with them at periodic intervals.

2.3 Environmental Impact

According to the Classification of Environmental Management for Construction Projects¹⁰, the project owner submitted the Environmental Impact Assessment Registration Form to the Environmental Protection Bureau (EPB) of the Inner Mongolia Autonomous Region, which was approved on 01-Feb-2008¹¹. A summary of the main findings of the EIA is provided as follows:

Waste water

Construction period: The wastewater of the proposed project mainly consists of domestic wastewater from the staff's everyday activities and the operation of the employee canteen. Recycled domestic wastewater will be used for landscaping and spraying for the purpose of dust control.

¹⁰ Issued by the Ministry of Environmental Protection, and has become effective on 1 October 2008.

¹¹ Refer to "Neihuanbiao [2008] No. 25"

Operation period: Wastewater generated at the site during the operation period primarily includes domestic wastewater. After its treatment through oxygenation, sedimentation, and disinfection, the wastewater will meet the Class I requirements of the Integrated Wastewater Discharge Standard, following which it will be used for landscaping and spraying.

Noise pollution

Construction period: Noise during the construction period mainly comes from the operation of construction machinery and transportation vehicles. The major measures to be taken for noise control include applying low-noise machinery and technology, pre-planning the construction, maintaining the construction machinery regularly, slowing down speed, and forbidding the use of auto horns while vehicles pass through the residential area. There is no environmentally sensitive area within 500 m of any one of the wind turbines, and thus the requirements of the applicable standards will be met.

Operation period: The operation of wind turbines consists of the major source of noise during the operational period. Based on the data provided by the manufacturer of the wind turbines, the noise of the wind turbines applied by the proposed project meets the relevant standards. As the proposed site is located far from residential areas, the noise impact of the proposed project on the surrounding area is negligible.

Air pollution

Construction period: The air pollution during the construction period is mainly due to the dust emitted by the construction activity. The major measures for dust control include sprinkling water at the construction site and along the roads used for transportation, and covering the temporary excavation sites.

Operation period: The operation of the wind farm will not impact the air quality.

Solid waste

Construction period: Construction waste and excavated materials are regarded as being a significant source of waste, in addition to domestic solid waste. The excavation sites will be backfilled so as to minimize waste excavation. The excavated materials will be placed at the designated site and then treated by engineering and biological measures. Domestic solid waste will be collected and treated by the local sanitary department.

Operation period: Domestic solid waste generated by the staff's activities during the operation period of the proposed project will be collected and treated by the designated sanitary department.

Ecological environment

Construction period: The ecological impacts of the proposed project during the construction period mainly include the loss of vegetation and landform disturbance. In addition, the installation of the wind turbines, box transforms, and other facilities will disturb the original

habitats of birds and other animals. Measures are to be taken in order to minimize the potential ecological impacts during the construction period, including:

- Reinforcing the construction management and minimizing the construction scope;
- Vehicles using designated routes only;
- Planting seeds after the completion of the construction in order to recover lost vegetation;
- Covering different sites, including the collection sites of materials, excavated soil, earthworks, etc.

Operation period: The ecological impacts of the proposed project during the operation period mainly include the impacts of staff activities and the running of wind turbines on wild animals at the proposed site. Measures to be taken in order to minimize the potential ecological impacts during the operation period include: recovering vegetation, disposing domestic solid waste properly, and restoring the original ecological conditions, and increasing the environmental awareness of employees.

In conclusion, as a clean renewable energy project, the project will not have significant negative impacts on the local environment during its construction or operation.

2.4 Public Comments

In order to get the comments and suggestions from local stakeholders, the project owner visited local residents and coherent organizations for stakeholder consultation in August 2011. 50 questionnaires were sent to the stakeholders by the project developer. The survey showed that the proposed project receives strong support from local people, which is closely linked to the fact that the majority of local residents have some understandings with wind power projects. The local people support and agree with the construction of the project. They believe that the project has a positive impact on the local economic development and their living conditions, without having negative impacts on the environment and the ecosystem.

And during the public comment period from 17-Aug-2011 to 19-Aug-2011 under CDM program, there is no comments received.

2.5 AFOLU-Specific Safeguards

The project is not an AFOLU project.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Following approved baseline & monitoring methodology is applied:

ACM0002 “Grid-connected electricity generation from renewable sources” (Version 21.0);

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

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)

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

For more information regarding the methodology please refer to:

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

3.2 Applicability of Methodology

The project satisfies all the applicability criteria of the methodology ACM0002 (Version 21.0), of which the detailed description is listed in Table 3-1 below:

Table 3-1 Applicability of ACM0002

Para No.	Requirements as per ACM0002	Scenario of the project	Conclusion
1	This methodology is applicable to grid-connected renewable energy power generation project activities that: (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 a greenfield grid-connected renewable power generation project.	Applicable
2	In case the project activity involves the integration of a BESS, the methodology is applicable to grid-connected renewable energy power generation project activities that: (a) Integrate BESS with a Greenfield power plant; (b) Integrate a BESS together with implementing a capacity addition to (an) existing solar photovoltaic ¹ or wind power plant(s)/unit(s);	The project activity is grid connected renewable power generation from wind and a newly built wind power project. The project does not involve the integration of a BESS.	Not involved

	(c) Integrate a BESS to (an) existing solar photovoltaic or wind power plant(s)/unit(s) without implementing any other changes to the existing plant(s); (d) Integrate a BESS together with implementing a retrofit of (an) existing solar photovoltaic or wind power plant(s)/unit(s).		
3	The methodology is applicable under the following conditions: (a) 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; (c) In case of Greenfield project activities applicable under paragraph 5 (a) above, the project participants shall demonstrate that the BESS was an integral part of the design of the renewable energy project activity (e.g.	The project activity is grid connected renewable power generation from wind and a newly built wind power project. The project does not involve capacity additions, retrofits, rehabilitations or replacements, and the integration of a BESS. The project belongs to condition (a).	Applicable

	by referring to feasibility studies or investment decision documents); (d) The BESS should be charged with electricity generated from the associated renewable energy power plant(s). Only during exigencies 2 may the BESS be charged with electricity from the grid or a fossil fuel electricity generator. In such cases, the corresponding GHG emissions shall be accounted for as project emissions following the requirements under section 5.4.4 below. The charging using the grid or using fossil fuel electricity generator should not amount to more than 2 per cent of the electricity generated by the project renewable energy plant during a monitoring period. During the time periods (e.g. week(s), months(s)) when the BESS consumes more than 2 per cent of the electricity for charging, the project participant shall not be entitled to issuance of the certified emission reductions for the concerned periods of the monitoring period.		
4	In case of hydro power plants, one of the following conditions shall apply¹²: (a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or (b) The project activity is implemented in existing single or multiple reservoirs,	The project is not a hydro power plant, so this applicability condition does not need to be considered.	Not involved

¹² Project participants wishing to undertake a hydroelectric project activity that results in a new reservoir or an increase in the volume of an existing reservoir, in particular where reservoirs have no significant vegetative biomass in the catchments area, may request a revision to the approved consolidated methodology.

	where the volume of the reservoir(s) is increased and the power density, calculated using equation (7), is greater than $4W/m^2$, or (c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (7), is greater than $4 W/m^2$; or (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 $4 W/m^2$, all of the following conditions shall apply. (i) The power density calculated using the total installed capacity of the integrated project, as per equation (8), is greater than $4 W/m^2$; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity. (iii) Installed capacity of the power plant(s) with power density lower than or equal to $4 W/m^2$ shall be a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project		
5	In the case of integrated hydro power projects, project proponent shall: (a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation	The project is not a hydro power plant, so this applicability condition does not need to be considered	Not involved

	capacity of the integrated hydro power project; or (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.		
6	The methodology is not applicable to the following: (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; (b) Biomass fired power plants;	The project does not involve switching from fossil-fuels to renewable energy sources at the site of the project activity and also the project is not a biomass-fired power project.	Applicable
7	In the case of retrofits, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is “the continuation of the current situation, i.e. to use the power generation equipment that was already in use prior to the implementation of the project	The project activity is a new wind power plant. Also, no replacement, modification and retrofit measures are implemented here. Hence, this criterion is also not relevant to the project activity.	Not involved

	activity and undertaking business as usual maintenance”.		
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In addition, the project meets the applicability conditions of the applied tools applied in the PD as follows:

Table 3-2 Applicability of applied tools

Tool	Criteria	Applicability	Conclusion
Tool of Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period	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, as required by paragraph 49 (a) of the modalities and procedures of the clean development mechanism. The tool consists of two steps. The first step provides an approach to evaluate whether the current baseline is still valid for the next crediting period. The second step provides an approach to update the baseline in case that the current baseline is not valid anymore for the next crediting period.	The validity of the current baseline is assessed by the project using the following sub-steps: Step 1: Assess the validity of the current baseline for the next crediting period. Step 2: Update the current baseline and the data and parameters.	Applicable
Tool to calculate the emission factor for an electricity system	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	The Project is the installation of a wind power plant supplying electricity to the Grid.	Applicable

	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).		
	In the case of CDM projects, the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	The project electricity system is located in a non-Annex I country.	Applicable
	Under this tool, the value applied to the CO ₂ emission factor of biofuels is zero	Not applicable. The project does not involve this situation.	Not involved

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 project power plant is connected to.

In the project case, the electricity for the project is from NCPG and electricity generated by the wind power plant would have been generated by power generation sources connected to NCPG. Therefore, the project boundary includes the whole wind power plant system and all grid-connected power plants in NCPG.

According to authoritative documents provided by China DNA¹³, NCPG covers Beijing City, Tianjin City, Hebei Province, Shanxi Province, Shandong Province, and Inner Mongolia Autonomous Region. The project boundary is shown in Figure 3-1 below.

¹³ <http://www.mee.gov.cn/ywgz/ycqhbh/wsqtz/202012/W020201229610353340851.pdf>

In accordance with “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), the validity of the current baseline is assessed using the following sub-steps:

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.

The project activity is a renewable wind power project that supplies electricity to displace electricity from NCPG. As the project displaces electricity generated in NCPG, combined margin (CM) is used to determine baseline emission factor. NCPG is still dominated by the thermal power plants¹⁴, hence, the current baseline “Electricity delivered to the NCPG by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources” still complies with all relevant mandatory national and sectoral policies which have come into effect after the submission of the project activity for validation and are applicable at the time of requesting renewal of the crediting period, go to step 1.2.

Step 1.2: Assess the impact of circumstances.

The plant still has the same technical characteristics and energy sources, and its energy production has been sold to NCPG. These circumstances continue during the second crediting period and therefore, do not have an impact on the current baseline emissions. Hence the current baseline does not need to be updated. Go to step 1.3.

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

The project activity consists of the implementation of wind power plant where no electricity was generated prior to its implementation. In the absence of the project activity, the project owner would not have constructed the plant and electricity would have been generated by other power plants connected to the grid.

In this sense, this sub-step is not applicable since the identified baseline scenario at the validation of the project activity did not correspond to the continuation of use of the current equipment(s) without any investment and, the projects proponents or third party (or parties) would undertake an investment later due, for example, to the end of the technical lifetime of the equipment(s) before the end of the crediting period or the availability of a new technology.

Moreover, the applied ACM0002 methodology obviously defines that for new wind power plants, as it is the case, the baseline scenario is:

¹⁴ source: 2019 Baseline Emission Factors for Power Grids in China
<https://www.mee.gov.cn/ywgz/ycqhbh/wsqtz/202012/W020201229610353340851.pdf>

“The baseline scenario is that the electricity delivered to the grid 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 into the grid”.

The baseline scenario defined by the methodology corresponds to the scenario identified in the first crediting period of the project activity. Considering the definition above, independently of the penetration rate of different technologies, it is concluded that the baseline scenario remains valid and applicable for the second crediting period. Go to step 1.4.

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

According to the methodological tool “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of a crediting period”, updates should be undertaken in the following cases:

- Where IPCC default values are used, the values should be updated if any new default values have been adopted and published by the IPCC, for example, in guidelines for national GHG inventories, IPCC assessment report or special reports by the IPCC.
- Where emission factors, values or emission benchmarks are used and determined only once for the crediting period, they should be updated, except if the emission factors, values, or emission benchmarks are based on the historical situation at the site of the project activity prior to the implementation of the project and cannot be updated because the historical situation does not exist anymore as a result of the project activity.

According to the “Tool to calculate the emission factor for an electricity system (version 07.0)”, 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 wind and solar power generation project activities, $\omega_{OM} = 0.75$ and $\omega_{BM} = 0.25$ (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods; And the values used for the calculation of $EF_{grid,OMsimple,y}$, $EF_{grid,BM,y}$ and $EF_{grid,CM,y}$ are updated in this (second) crediting period in this PD.

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

Step 2.1: Update the current baseline

As per the analysis in step 1 above, the current baseline does not need to be updated.

Step 2.2: Update the data and parameters

The updated baseline emission factors for the project ($EF_{grid,OMsimple,y}$, $EF_{grid,BM,y}$ and $EF_{grid,CM,y}$) are calculated in line with the “Tool to calculate the emission factor for an electricity system (version 07.0)”, the data of $EF_{grid,OMsimple,y}$ is calculated as 0.9419 tCO₂e/MWh, the data of $EF_{grid,BM,y}$ is calculated as 0.4819 tCO₂e/MWh and the data of $EF_{grid,CM,y}$ is calculated as 0.8269 tCO₂e/MWh, refer to section 4.1 for details.

3.5 Additionality

The project has demonstrated its additionality in the first crediting period and no changes affect the additionality of the project since its registration. As per the VCS Project Standard Version 4.3, section 3.8.9 (1), the project participants are not required to reassess the additionality of the project activity and update the section relating to additionality.

According to the relevant applicable laws and regulations at the time of renewal of crediting period, i.e. Renewable Energy Law of the People's Republic of China which came into effect on 01/01/2006, Agenda for China's 14th Five-Year Plan (2021-2025), there are no new national and/or sectoral policies that could affect the baseline scenario during the renewal of the crediting period. Therefore, no regulatory surplus required comparing with the first validation at time of renewal of crediting period.

3.6 Methodology Deviations

There is no methodology deviation.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

According to ACM0002 (v 21.0) "Grid-connected electricity generation from renewable sources", 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 baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad (1)$$

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 VCS project activity in year y (MWh/yr)

$EF_{grid,CM,y}$ = Combined margin CO₂ emission factor for grid connected power generation in year y (t CO₂/MWh)

And for Greenfield power plant,

$$EG_{PJ,y} = EG_{facility,y} = EG_{net,M\&S,y} - EG_{imp,M\&I,y}$$

Where:

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

$EG_{net, mS, y}$ = Quantity of the electricity delivered to the grid by the project in year y (MWh/yr)

$EG_{imp, m1, y}$ = Quantity of the electricity imported from the grid by the project in year y (MWh/yr)

$EF_{grid, CM, y}$ is calculated using the latest version of “TOOL07: Tool to calculate the emission factor for an electricity system” as below:

According to “Tool to calculate the emission factor for an electricity system” (version 07.0). The following six steps are applied to determine OM, BM, and CM used for calculating the project baseline emissions:

Step 1. Identify the relevant electricity systems

According to the Tool to calculate the emission factor for an electricity system (Version 07.0), project participants may delineate the project electricity system using any of the following options:

Option 1. A delineation of the project electricity system and connected electricity systems published by the DNA or the group of the DNAs of the host country(ies). In case a delineation is provided by a group of DNAs, the same delineation should be used by all the project participants applying the tool in these countries.

Option 2. A delineation of the project electricity system defined by the dispatch area of the dispatch centre responsible for scheduling and dispatching electricity generated by the project activity. Where the dispatch area is controlled by more than one dispatch centre, i.e. layered dispatch area, the higher level area shall be used as a delineation of the project electricity system (e.g. where regional dispatch centres are required to comply with dispatch orders of the national dispatch centre then area controlled by the national dispatch centre shall be used);

Option 3. A delineation of the project electricity system defined by more than one independent dispatch areas, e.g. multi-national power pools.

The Chinese DNA has published a delineation of the project electricity system and connected electricity system, Option 1 is applied for the project. According to the delineations, the North China Power Grid (NCPG) is identified as the relevant electric power system of the project, which includes Beijing City, Tianjin City, Hebei Province, Shanxi Province, Shandong Province, and Inner Mongolia Autonomous Region Power Grids.

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

Based on China's real situation, only grid power plants are included in the calculation.

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

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.

In China, specific data from the grid or each power plant is treated as business confidential and thus not public available. Therefore, method (b) and method (c) are not suitable for the project.

The Simple OM method (a) can only be applied when low-cost/must run resources¹⁵ constitute less than 50% of total grid generation in average of the five most recent years. According to “2019 Baseline Emission Factors for Regional Power Grids in China”¹⁶, for the NCPG the project activity connected to, the low-cost/must-run electric power resources generation accounts for the total grid total are all lower than 50% in recent five years, which satisfied the applicability of the method (a), therefore, the simple OM method is chosen for the calculation of the OM emission factor $EF_{grid,OM,y}$.

As per the latest version of “Tool to calculate the emission factor for an electricity system” (version 07.0), one of the following methods should be chosen to calculate the simple OM emission factor:

- **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 VCS-PD to the DOE for validation, or

¹⁵ Low-cost/must-run resources are defined as power plants with low marginal generation costs or power plants that are dispatched independently of the daily or seasonal load of the grid. They typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If coal is obviously used as must-run, it should also be included in this list, i.e. excluded from the set of plants.

¹⁶ http://www.mee.gov.cn/ywgz/xdqhbh/wsqtz/index_1.shtml

- Ex post option: If the ex-post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required calculating the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year (y-1) may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year (y-2) may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.

Here the ex-ante option is selected, and the $EF_{grid,OM,y}$ is fixed during the second crediting period.

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

Based on the analysis of the step 3, the simple OM method is used to calculate the NCPG OM emission factor in this step. The simple OM emission factor is calculated as the generation-weighted average CO₂ emissions per unit net electricity generation (tCO₂/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/ units.

The simple OM may be calculated by one of the following two options:

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.

For the project activity, the required data for the exercise of Option A is not available and those of Option B can be obtained from official sources, and off-grid power plants are not included in the calculation, therefore, Option B is chosen to calculate the operating margin emission factor:

For Option B, 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 based on the fuel type(s) and total fuel consumption of the project electricity system, as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_i (FC_{i,y} \times NCV_{i,y} \times EFCO2_{i,y})}{EG_y} \quad (2)$$

Where:

$EF_{grid,OMsimple,y}$ = Simple operating margin CO₂ emission factor in year y (tCO₂ /MWh)

$FC_{i,y}$ = Amount of 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 fuel type i in year (GJ / mass or volume unit)

$EFCO2_{i,y}$ = CO₂ emission factor of fuel type i in year y (tCO₂ /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 fuel types combusted in power sources in the project electricity system in year y
- y = The three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation.

If available, $NCV_{i,y}$ and $EF_{CO_2,i,y}$ from the fuel supplier of the power plants in invoices may be used; or, regional or national average default values may be used. In this PDD, $NCV_{i,y}$ of different fuels are obtained from China Energy Statistical Yearbook. Emission factors ($EF_{CO_2,i,y}$) of each type of fossil fuel come from IPCC 2006 default values.

The Simple OM Emission Factor ($EF_{grid,OMsimple,y}$) of the project is calculated on the basis of the fuel consumption data for electricity generation of the North China Power Grid, not including those of low-operating cost and must-run power plants, such as wind power, hydropower and nuclear etc. These data are obtained from the China Electric Power Yearbook (published annually) and China Energy Statistical Yearbook. Based on these data, the Simple OM Emission Factor ($EF_{grid,OMsimple,y}$) of the North China Power Grid is calculated as 0.9419 tCO₂/MWh. Details of the calculations can be found on the published data from the Chinese DNA¹⁷, which uses official national statistics.

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

In terms of vintage of data, project participants can choose between one of the following two options:

Option 1: 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.

Option 2: For the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin

¹⁷“2019 Baseline Emission Factors for Regional Power Grids in China”,
http://www.mee.gov.cn/ywgz/ycqhbh/wsqtz/index_1.shtml

emissions factor shall be calculated ex ante, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

The PD chooses Option 1, which requires the project participant to calculate the Build Margin Emission Factor $EF_{grid,BM,y}$, ex-ante based on the most recent information available on units already built for sample group m at the time of PD submission.

The sample group of power units m used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above:

(a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5-units}$) and determine their annual electricity generation ($AEG_{SET-5-units}$, in MWh).

(b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total} , in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20 per cent of AEG_{total} (if 20 per cent falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20 \text{ per cent}}$) and determine their annual electricity generation ($AEG_{SET \geq 20 \text{ per cent}}$, in MWh);

(c) From $SET_{5-units}$ and $SET_{\geq 20 \text{ per cent}}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample});

Identify the date when the power units in SET_{sample} started to supply electricity to the grid. If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin. Ignore steps (d), (e) and (f).

Under the current circumstances in China, the power plants consider the Build Margin data as important business data and will not have them published. Therefore, it is difficult to obtain the data of five power plants that have been put into operation most recently or the newly installed power plant capacity additions in the electricity system that comprise 20% of the system generation.

According to the instructions of China DNA, for the determination of the set of samples, a sample merging processing in some degree has been adopted due to that the power generation data, energy consumption data or thermal efficiency data of each plant cannot be consulted in the public statistical data. In this calculation, the newly-installed power units in the past years are classified by year, province and power generation technology, and the same type of newly-installed power units in the same province and in the same year are bundled as a "newly-installed power units".

The power generation of each "newly-installed power units" in the most recent year y is estimated based on its installed capacity and the number of power generation utilization hours in year y. The formula is as follows:

$$EG_{m,y} = CAP_m \times H_{m,y} \quad (3)$$

Where:

$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
CAP_m	Installed capacity of electricity generated and delivered to the grid by power unit m in year y (MW)
$H_{m,y}$	The number of power utilization hours (h) of electricity generated and delivered to the grid by power unit m in year y . And it selects the average utilization hours of similar units in the province in which it is located in year y ;
y	Most recent year for which data is available.
m	The sample group of power units.

The power unit m is selected from the "newly-installed power plants" in the most recent year y (For the calculation of the grid BM in 2019, the y is equal to 2017) to the "newly-installed power plants" in the earlier year, until the cumulative power generation reaches 20% of the total power generation in the year y ($y=2017$).

Since the newly-installed power units of the same type (k) in the same province (A) and the same year (t) are bundled into the "newly-installed power units", the CAP_m is equal to the statistical data of recent installed capacity of a given unit type(k) in a given year(t) in a given province (A).

$$CAP_m = CAP_m|_{m=(A,t,k)} = CAP_{A,t,k} \quad (4)$$

Where:

CAP_m	Installed capacity of electricity generated and delivered to the grid by power unit m in year y (MW), and m is equivalent to an established combination of (A , t , k);
$CAP_{A,t,k}$	Capacity of newly-installed power units of a given province (A), given year (t), and given unit type (k) (MW)
A	It is the various provincial regions covered by the regional power grid
t	It is the sampling year of the "newly-installed power units".
k	For the calculation of the grid BM in 2019, t is equal to 2017, 2016, until the units that comprise at least 20 percent of the system generation in 2017.
k	It is the power generation technology classification of "newly-installed power units", which is divided into: hydro-power, coal-thermal power, gas-thermal power,

oil-thermal power, Waste-thermal power plant, other thermal power¹⁸, nuclear power, wind power, solar power, and others¹⁹.

As per tool, the CO₂ emission factor of each power unit m ($EF_{EL,m,y}$) should be determined as per the tool in Step 4 section 6.4.1 for the simple OM, using Options A1, A2 or A3, using for y the most recent historical year for which electricity generation data is available, and using from the power units included in the build margin.

Because current statistics data cannot separate each power plant, for a power unit m , only data on electricity generation and the fuel types used is available. So, the option A2 is selected, the emission factor should be determined based on the CO₂ emission factor of the fuel type used and the efficiency of the power unit, as follows:

$$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} \times 3.6}{\eta_{m,y}} \quad (5)$$

Where:

$EF_{EL,m,y}$	CO ₂ emission factor of power unit m in year y (tCO ₂ /MWh)
$EF_{CO2,m,i,y}$	Average CO ₂ emission factor of fuel type i used in power unit m in year y (tCO ₂ /GJ)
$\eta_{m,y}$	Average net energy conversion efficiency of power unit m in year y (ratio)
3.6	Conversion coefficient of thermal work equivalent of electricity (GJ/MWh)

According to formula (5), the unit electricity emission factor of the hydro-power, nuclear power, wind power, solar power, other thermal power²⁰, and others power generation technology²¹ in the “newly-installed power units” samples are is zero. The emission factor per unit of electricity for power generation from coal, gas, oil and electricity waste power is calculated based on formula (5). Since the average net energy conversion efficiency of each sample ($\eta_{m,y}$) cannot be obtained, the power supply thermal efficiency of the best commercialized technology of coal, gas, oil and waste power ($\eta_{Best,m,y}$) is better than $\eta_{m,y}$. It is conservative to use $\eta_{Best,m,y}$ for the calculation of $EF_{EL,m,y}$.

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:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (6)$$

¹⁸ refers to waste heat and pressure, straw, bagasse, forest wood power generation.

¹⁹ refers to power generation such as geothermal energy and ocean energy.

²⁰ Other thermal power mainly refers to waste heat and pressure, straw, bagasse and forest power generation.

²¹ Others power generation technology mainly refers to geothermal energy, ocean energy and other power generation.

Where

$EF_{grid,BM,y}$	Build Margin CO ₂ emission factor in year y (tCO ₂ /MWh)
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y
$EF_{EL,m,y}$	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 year for which data is available

Outcome of STEP5:

The Build Margin Emission Factor ($EF_{grid,BM,y}$) of the NCPG could be obtained to be 0.4819 tCO₂/MWh

Step 6. Calculate the combined margin (CM) emission factor

As per the “tool to calculate the emission factor for an electricity system”, the combined margin emission factor ($EF_{grid,CM,y}$) is calculated 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: (i) a Least Developed Country (LDC); or in (ii) a country with less than 10 registered CDM projects at the starting date of validation; or (iii) a Small Island Developing States (SIDS); and

The data requirements for the application of step 5 above cannot be met.

The PD choose option A.

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = \omega_{OM} \times EF_{grid,OMsimple,y} + \omega_{BM} \times EF_{grid,BM,y} \quad (7)$$

Where,

$EF_{grid,BM,y}$	= Build margin CO ₂ emission factor in year y (tCO ₂ /MWh)
$EF_{grid,OMsimple,y}$	= Operating margin CO ₂ emission factor in year y (tCO ₂ /MWh)
ω_{OM}	= Weighting of operating margin emissions factor (per cent)
ω_{BM}	= Weighting of build margin emissions factor (per cent)

The combined margin emissions factor $EF_{grid,CM,y}$ should be calculated as the weighted average of the Operating Margin emission factor ($EF_{grid,OM,y}$) and the Build Margin emission factor ($EF_{grid,BM,y}$), where for wind and solar power generation project activities: $w_{OM} = 0.75$ and $w_{BM} = 0.25$ (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods.

For the project, the weight w_{OM} and w_{BM} are 0.75, 0.25 respectively by default for the fixed crediting period. Thus, $EF_{grid,CM,y} = 0.9419 \text{ tCO}_2/\text{MWh} * 0.75 + 0.4819 \text{ tCO}_2/\text{MWh} * 0.25 = 0.8269 \text{ (tCO}_2/\text{MWh)}$

According to feasibility study report of the project, the annual electricity supplied to the grid is 117,784 MWh. Thus, the estimated annual baseline emission is calculated as below:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} = 117,784 \text{ MWh} * 0.8269 \text{ tCO}_2/\text{MWh} = 97,395 \text{ tCO}_2$$

Thus, during this crediting period, the annual estimated emission reductions are 97,395 tCO_{2e} and the total estimated emission reductions are 973,950 tCO_{2e}.

4.2 Project Emissions

As a wind power generation project, according to ACM0002, the project emissions $PE_y = 0$.

4.3 Leakage

No leakage effects are accounted for under this methodology.

4.4 Net GHG Emission Reductions and Removals

According to the section 4.1,4.2 and 4.3, the annual emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

The estimated emission reductions can be obtained as below:

Year	Estimated baseline emissions or removals (tCO _{2e})	Estimated project emissions or removals (tCO _{2e})	Estimated leakage emissions (tCO _{2e})	Estimated net GHG emission reductions or removals (tCO _{2e})
28-Dec-2021~31-Dec-2021	1,067	0	0	1,067
01-Jan-2022~31-Dec-2022	97,395	0	0	97,395
01-Jan-2023~31-Dec-2023	97,395	0	0	97,395
01-Jan-2024~31-Dec-2024	97,395	0	0	97,395

01-Jan-2025~31-Dec-2025	97,395	0	0	97,395
01-Jan-2026~31-Dec-2026	97,395	0	0	97,395
01-Jan-2027~31-Dec-2027	97,395	0	0	97,395
01-Jan-2028~31-Dec-2028	97,395	0	0	97,395
01-Jan-2029~31-Dec-2029	97,395	0	0	97,395
01-Jan-2030~31-Dec-2030	97,395	0	0	97,395
01-Jan-2031~27-Dec-2031	96,328	0	0	96,328
Total	973,950	0	0	973,950

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,CM,y}$
Data unit	t CO ₂ /MWh
Description	Combined margin CO ₂ emission factor for grid connected power generation in year y
Source of data	2019 Baseline Emission Factors for Regional Power Grids
Value applied:	0.8269
Justification of choice of data or description of measurement methods and procedures applied	$EF_{grid,CM,y}$ is calculated based on $EF_{grid,OM,Simple,y}$ and $EF_{grid,BM,y}$ as per the latest version of “Tool to calculate the emission factor for an electricity system” (version 07.0).
Purpose of Data	Calculation of baseline emissions and project emissions
Comments	According to section 4.1, the ex-ante option is selected to calculate $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ and fixed in the second crediting period, thus the $EF_{grid,CM,y}$ is calculated and fixed during the second crediting period. $EF_{grid,CM,y} = \omega_{OM} \times EF_{grid,OM,y} + \omega_{BM} \times EF_{grid,BM,y}$ In this crediting period:

$$EF_{grid,CM,y} = 0.75 * 0.9419 \text{ tCO}_2/\text{MWh} + 0.25 * 0.4819 \text{ tCO}_2/\text{MWh} = 0.8269 \text{ (tCO}_2/\text{MWh)}$$

5.2 Data and Parameters Monitored

Data / Parameter	$EG_{facility,y}$
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Monitoring electricity meter
Description of measurement methods and procedures to be applied	Calculated based on the electricity delivered to the grid by the project ($EG_{net, mS, y}$) and the electricity imported from the grid by the project ($EG_{imp, m1, y}$)
Frequency of monitoring/recording	Continuous measurement, monthly recording
Value monitored	117,784MWh applied ex-ante according to FSR and will be monitored ex-post.
Monitoring equipment	Electricity meters (M_s , M_s' , M_i)
QA/QC procedures to be applied	The accuracy of meters M_s , M_s' and M_i is no less than 0.5s. The meters are calibrated annually by the independent qualified party. Data measured by meters will be cross checked by records for sold and purchased electricity.
Purpose of the data	Calculations of baseline emission
Calculation method	$EG_{facility,y} = EG_{net,m_s,y} - EG_{imp,m_1,y}$ $EG_{facility, y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr) $EG_{net, mS, y}$ = The net electricity delivered to the grid measured by meter M_s (M_s') (MWh/yr), which is calculated via the amount of electricity supplied to the grid minus the amount of electricity imported from the grid that measured by meter M_s (M_s') $EG_{imp, m1, y}$ = The electricity imported from the grid through meter M_i (MWh/yr)

Comments

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5.3 Monitoring Plan

1. Operation and management structure of monitoring

In order to obtain reliable monitoring data, the project developer establishes a monitoring management structure. Clear responsibilities are assigned to all staff involved in the VCS project. A VCS manager are appointed who has the overall responsibilities of monitoring the project. The measurement of the electricity exports and imports are carried out by the monitoring officers. In addition, the project developer designates internal verifiers who are responsible for the internal verification of the measurement, the collection of electricity records, and the calculation of the emission reductions.

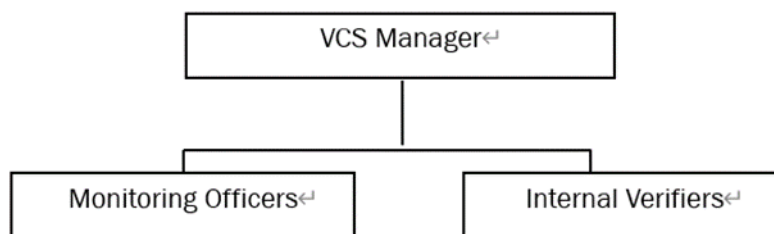


Figure 5-1 Operations and Management Structure of the proposed project

2. Monitoring equipment and installation

The quantity of net Electricity delivered to the grid by the proposed project needs to be monitored.

There are project deviations in the 1st crediting period, which are:

The project was registered as a CDM project by UNFCCC on 07-Sep-2012 (UNFCCC Ref. 7221) and post registration change occurred and the revised CDM PDD was approved by UNFCCC on 17-Apr-2015. According to the revised CDM PDD, the name of the substation where the meter Ms and Ms' actually locate is named Kubuqi Substation, instead of the previous Balagong Substation mentioned in registered CDM PDD.

The location of the meter M_i (unidirectional meter) measured the electricity imported from the 10kV backup power line for emergencies, is located in the on-site substation in the project site in the revised CDM PDD, instead of the Yihewusu Substation that was described in the registered PDD.

The meters are owned by the grid company and this change of location of meter is beyond project proponents' control. These deviations are applicable to the 2nd crediting period.

The electricity generated by the 33 wind turbine generators is transformed to 35kV by the 33 box-type transformers, connected to the on-site main transformer which increases the voltage to 220kV, and then delivered to the nearby Kubuqi substations. All electricity is finally delivered to the Inner Mongolia Grid which belongs to the NCPG.

The metering systems include M_s , M_s' , M_i . M_s and M_s' are installed at the Kubuqi substation, and M_i is installed at the onsite substation at the project site. All the electricity meters except M_i are bi-directional meters which measure the amount of electricity supplied to the grid and the amount of electricity imported from the grid. M_i measures the electricity imported from the 10kV backup power supply grid for emergencies.

M_s is the main meter and M_s' is the backup meter, which will be used when main meter is malfunctioning. The net electricity delivered to the grid measured by M_s (M_s') minus the electricity imported from the grid through M_i is the total net electricity delivered to the grid of the proposed project ($EG_{facility,y} = EG_{net,m_s,y} - EG_{imp,m_i,y}$). The data is used for the ER calculation.

All meters are installed in accordance with the national standard 'Electricity meter installation technical management code' (DL/T448). The accuracy of the meters is no less than 0.5s.

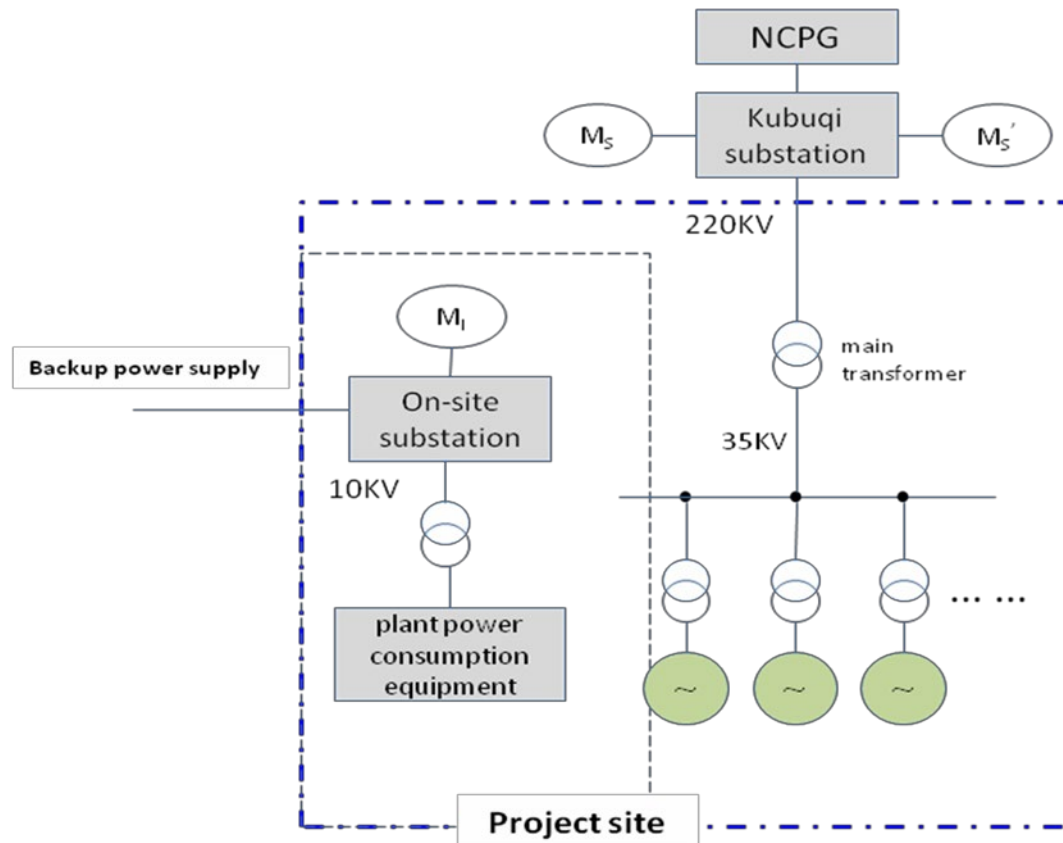


Figure 5-2. Diagram of grid connection

3. Data collection and management

The project owner and the local power grid company read and confirm the meters and record the data on a regular basis. The monitored data will be archived electronically each month.

All written documents, such as diagrams and reports, should be stored and made available to the verifier, so that the reliability of the information can be checked. All data should be archived for 2 years after the end of the last monitoring period.

4. Quality assurance and quality control

The meters should be installed in accordance with the relevant national and industrial regulations. Prior to the project operation, the project owner and the grid company should check the meters according to the relevant national and industrial regulations. The meters should be calibrated annually by an independent qualified calibration entity in accordance with the relevant national and industrial regulations. Data and records are checked prior to being recorded and archived, and possible errors should be identified at this step. In case the main meter operates abnormally, the readings from the backup meter will be adopted. If both the main and back-up meters are out of order, the data monitored within this certain period shall not be counted.

Training on VCS monitoring is provided to the relevant staff in order to guarantee the implementation of the monitoring plan.

5. Monitoring results and verification

The verification of the monitoring results of the project activity is required for each monitoring period. The monitoring results will be compiled in a monitoring report that will serve as a basis for project verification in each crediting year.