



**Verified Carbon
Standard**

INNER MONGOLIA YIHEWUSU PHASE II 49.5 MW WIND POWER PROJECT

Document Prepared by

China Carbon N.V

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1 PROJECT DETAILS

1.1 Summary Description of the Project

The project activity is a wind farm project located at Hangjin County, Ordos City, Inner Mongolia, People's Republic of China which is to use wind resource for electricity generation. The installed capacity of the project activity is 49.5 MW, consisting of 66 sets of wind turbines with unit capacity of 750 kW. The average annual power delivered to the grid by the project is expected to be 101,689 MWh.

The baseline scenario is the same as the scenario existing prior to the start of the implementation of the project activity: electricity delivered to the Grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources. The Project can reduce GHG emissions by replacing the electricity generated by fossil fuel fired power plants North China Power Grid (NCPG). It's estimated that the proposed project could achieve GHG emission reductions of 84,086 tCO₂e annually.

The project start construction start on 15/09/2008, and operation start on 25/06/2009. The project was registered as a CDM project (No. 3490) on 25/11/2010; and was registered as a VCS project (No. 1001).

1.2 Sectoral Scope and Project Type

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

Project type: wind power project.

The project is not a grouped project.

1.3 Project Eligibility

The project met criteria of VCS program and was registered as a VCS project (No. #1001).

1.4 Project Design

The project was designed as a single installation activity, not under a group project.

1.5 Project Proponent

Provide contact information for the project proponent(s). Copy and paste the table as needed.

Organization name	Inner Mongolia Xinjin Wind Power Co., Ltd.
Contact person	Li Qiang
Title	Director
Address	Shengli South Street, Xini Town, Hangjin County, Ordos City, Inner Mongolia, China.
Telephone	+86 134 8882 3841
Email	99824178@qq.com

1.6 Other Entities Involved in the Project

Organization name	China Carbon N.V
Role in the project	Buyer
Contact person	Yiyu Li
Title	Manager
Address	Zuidplein 138, 1077 XV Amsterdam
Telephone	+86 13910966481
Email	liiyu@chinacarbonfund.com

1.7 Ownership

The approval of Environmental Impact Assessment (EIA), Feasibility Study Report (FSR), and the business license of the project owner are evidences for legislative right. Besides, the purchasing contract of turbine generator, and the purchasing power agreement are the evidences for the ownership of the plant, equipment and process generating.

1.8 Project Start Date

15/09/2008 (The project started operation on 25/06/2009.)

1.9 Project Crediting Period

As described in the registered PD, the first crediting period of the Project was '25/06/2009 to 24/06/2019', totally 10 years; the second credit period was set as '24/06/2019 to 24/06/2029' totally 10 years.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	Yes
Large project	

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
25/06/2019~31/12/2019	40,623
2020	84,086
2021	84,086
2022	84,086
2023	84,086
2024	84,086
2025	84,086
2026	84,086
2027	84,086
2028	84,086
01/01/2029-24/06/2029	43,463
Total estimated ERs	840,860
Total number of crediting years	10Years
Average annual ERs	

1.11 Description of the Project Activity

The purpose of the Project is to use well established wind power generation technology for electricity generation and transmission to generate low emissions electricity for the Grid thereby displacing CO₂ emissions from electricity generation from the Grid. The baseline scenario is the same as the scenario existing prior to the start of the implementation of the project activity: electricity delivered to the Grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources.

The proposed project involves the installation of 66 wind turbines each of which with a rated capacity of 750 kW, providing a total capacity of 49.5MW. The expected annual electricity supply to the grid is 101,689 MWh.

According to the turbine layout, each turbine will be equipped with one transformer. The wind power to be generated will be delivered to the Yihewusu Phase I substation by 35kV transmission lines. The power in the 220kV Yihewusu Phase I substation will be transmitted to the Kubuqi 220kV substation. Then the electricity generated will first be transmitted to the Inner Mongolia Power Grid and then to the North China Power Grid.

The main technical parameters of the proposed project are shown in Table A.1

Table A.1 The main technical parameters of the proposed project

	Value	Source
Forecast installed capacity (MW)	49.5	Feasibility Study* 14-1
Forecast annual operating time (hour)	2,054.3	Feasibility Study 14-1
Forecast annual electricity supplied to the grid (MWh)	101,689	Feasibility Study 14-2
Forecast load factor (%)	23.5	Calculated

*The Feasibility Study was performed by the Inner Mongolia Institute of Electricity Power Survey and Design that did the FS in June 2008, and approved by the Development & Reform Committee of Inner Mongolia Autonomous Region on 3rd July 2008.

Table A.2 Main Technical Parameters of the wind turbines

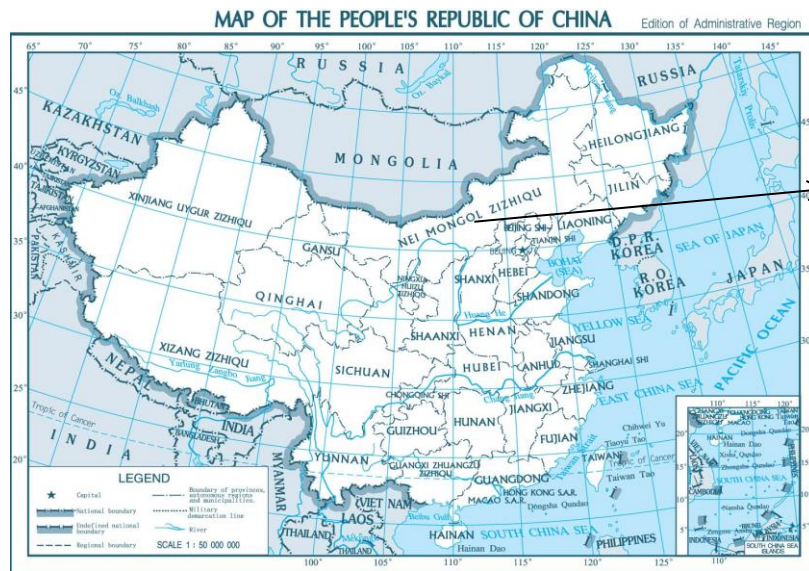
Wind Turbines Technical Parameters	
Parameter	Value
Type	Jinfeng S50/750
No. of Vane	3

Rated Power(kW)	750
Rotor Diameter(m)	50
Cut-in speed (m/s)	3.5
Cut-in speed (m/s)	25
Rated speeds (m/s)	14-15
Hub height (m)	60
Manufacturer	Xinjiang Goldwind Science & Technology Co., Ltd.

The Project will use recognized state-of-the-art technology in electricity generation and transmission. Essential equipment used in the Project is domestically produced, and the Project Developer is experienced in handling and operating this kind of equipment.

1.12 Project Location

The project was located in Ordos city, Inner Mongolia, in the People's Republic of China. The exact location of the Project is defined using geographic coordinates obtained with a Global Positioning System (GPS) receiver: E 107°31'42" Longitude, N 40°07'02" Latitude. These geographic coordinates are for the center of the wind farm.





1.13 Conditions Prior to Project Initiation

The Project is to utilize wind power source to generate electricity and deliver it to NCPG. According to the methodology ACM0002 (Version 20.0), no emission sources and green house gases (GHGs) will be involved in the project activity since it is the installation of a new grid-connected renewable energy project. For the Project, the scenario existing prior to the start of the implementation of the project activity is NCPG providing the same electricity service as the Project.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

The approval of Environmental Impact Assessment (EIA), Feasibility Study Report (FSR), and the business license of the project owner are evidences for legislative right, which also proves that the project compliances with all and any relevant local, regional and national laws, statutes and regulatory frameworks.

1.15 Participation under Other GHG Programs

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

The proposed project was registered as a CDM project activity on 25/11/2010, (Registration number: #3490), and the first crediting period is from 25/11/2010 to 24/11/2017. CERs for the first monitoring period of 21/01/2013-20/12/2015 were issued on 12/10/2016.

The Project has been registered as a VCS project with registration number #1001. VCU from the monitoring period 21/12/2015 to 24/06/2019 were issued on 23/01/2020.

The project has not been or seeking to registered under any other GHG programs.

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

The project has not applied any other forms of credits.

1.16.2 Other Forms of Environmental Credit

The project has not applied any other forms of environmental credits

1.17 Additional Information Relevant to the Project

Leakage Management Not applicable

Commercially Sensitive Information

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

Sustainable Development

The Project will contribute to sustainable development of the Host Country. Specifically, the Project:

- Increases employment opportunities in the area where it is located - approximately 15 people will be permanently employed for Project operation, and Project construction secures jobs in the construction sector. The Project therefore contributes to poverty alleviation;
- Enhances the local investment environment, and therefore improves the local economy;
- Diversifies the sources of electricity generation. This is important for meeting growing energy demands, and transitioning away from coal-supplied electricity generation;
- Makes use of renewable wind power resources;

Further Information

N/A

2 SAFEGUARDS

2.1 No Net Harm

According to Clauses 13 and 19 of the Environmental Evaluation Law of the Host Country, the Project entity must analyze the environmental impacts of project activities in the Host Country before utilizing natural resources and beginning Project construction. The Project Developer therefore commissioned a third party, the Inner Mongolia Institute of Electricity Power Survey and Design, to conduct the required Environmental Impact Assessment (EIA) in 2008, and the EIA report was approved by the Inner Mongolia Environmental Protection Bureau on 07/05/2008.

There is no transboundary impact related to the Project, and there is no requisite resettlement or relocation of population, buildings, or public services. Therefore, social and environmental influences are considered partial, short-term, and reversible.

Where impacts of the project were identified, mitigation measures were suggested and defined. The EIA highlights the following with regards to the Project, as shown in the following discussion.

Noise: The noise pollution mainly comes from the manual drills and cement mixers during the construction period, and aerodynamic interaction between the wind and turbine blades during operation. The noise levels will be naturally attenuated by ambient conditions, and will remain within the 'Standards of Environmental noise of urban areas' (GB3096-93). It is stated in the EIA that the project location is far away from the nearest resident area. Therefore, the noise of the turbines will not affect the local residents.

Solid Waste: Most of the waste produced during the construction shall be landfilled or disposed of in an appropriate solid waste disposal site. The household waste will be collected and sent to the local waste treatment station or refuse dump.

Electromagnetic impact: The operation of the wind farm will generate electromagnetic energy, however, the amount produced will be very small. Furthermore, the site of the Project is far from any residential area. Therefore, there is no significant electromagnetic impact to be expected.

Wastewater and sewage: The total amount of wastewater and sewage from the operation of the project will be very small. The wastewater and sewage from the construction and operational periods will be treated and reused for plant irrigation, which indicates no impact on the surrounding environment.

Dust and Air Quality: The air impact during the construction period mainly comes from airborne dust produced by excavating, by land transportation vehicles, and some exhaust discharge from using and moving construction machinery. Regarding this problem, the project owner will use enclosed or semi-enclosed transportation the

construction controls, advocating ‘civilized construction’, and regularly spaying and cleaning the branch roads, material dump sites and other construction work surfaces.

Ecological impact: The proposed wind farm is located in an area of natural grassland. During the construction period, some vegetation will be affected, but this will be restored within a short period. The installation height of the turbines is lower than 100m, so there is not expected to be any significant effect on birds’ migration. In conclusion, the construction work of this proposed project is not expected to affect the local ecological environment.

Given the environment of the project location, there is very little wildlife at the site, and no protected species has been detected. Therefore, there is no significant impact by the Project on the local ecology.

With mitigation controls planned as part of the Project construction and EIA process, and the contribution made by the project to sustainable development for the local and national area, the Project is expected to have an overall positive impact on the local and global environments. Mitigation measures will ensure that there are no significant residual impacts associated with the Project.

2.2 Local Stakeholder Consultation

Local Stakeholder Consultation during the project preparation stage:

The stakeholder consultation for the Project activity took place during May 2009. The consultation invited local stakeholders to submit comments on the Project activity by filling in a questionnaire sent out by the Project Developer. The Project Developer put the notice at the gate of the Hangjin county government office. The notice included a technical description of the Project as well as a brief explanation of how the project activity mitigates climate change through the Clean Development Mechanism of the Kyoto Protocol, and brings other sustainable development benefits. The questionnaires were sent out around the project site. The questions asked were as follows:

- What impacts do you think the CDM Project activity will have on the local environment?
- What impacts do you think the CDM Project activity will have on employment in the local area?
- What impacts do you think the CDM Project activity will have on your livelihood? • What impacts do you think the CDM Project activity will have on social welfare in the local area?
- What would be the overall effects of the construction and operation of the CDM Project?
- What is your attitude towards the construction of the CDM Project?

31 questionnaires were sent to the stakeholders by the Project Developer. The stakeholders are all local residents including governmental officials (2 people), local

residents (26 people) and related employees (3 people). A full list of stakeholders consulted is available from the Project Developer.

Local Stakeholder Consultation during the project implementation stage:

There is a Notebook provided near the notice board of the local village. All the local stakeholders can write their comments, suggestions, or complains in the Notebook anytime during the lifetime of the project. The project owner will check the book every month. 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

The environment impact assessment(EIA) for the Project was approved by the Inner Mongolia Environmental Protection Bureau on 7th May, 2008.

There is no transboundary impact related to the Project, and there is no requisite resettlement or relocation of population, buildings, or public services. Therefore social and environmental influences are considered partial, short-term, and reversible.

Where impacts of the project were identified, mitigation measures were suggested and defined. The EIA highlights the following with regards to the Project, as shown in the following discussion.

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The noise pollution mainly comes from the manual drills and cement mixers during the construction period, and aerodynamic interaction between the wind and turbine blades during operation. The noise levels will be naturally attenuated by ambient conditions, and will remain within the 'Standards of Environmental noise of urban areas' (GB3096-93). It is stated in the EIA that the project location is far away from the nearest resident area. Therefore, the noise of the turbines will not affect the local residents.

Solid Waste

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The total amount of waste water and sewage from the operation of the project will be very small. The wastewater and sewage from the construction and operational periods will be treated and reused for plant irrigation, which indicates no impact on the surrounding environment.

Dust and Air Quality

The air impact during the construction period mainly comes from airborne dust produced by excavating, by land transportation vehicles, and some exhaust discharge from using and moving construction machinery. Regarding this problem, the project owner will use enclosed or semi-enclosed transportation the construction controls, advocating 'civilized construction', and regularly spraying and cleaning the branch roads, material dump sites and other construction work surfaces.

Ecological impact

The proposed wind farm is located in an area of natural grassland. During the construction period, some vegetation will be affected, but this will be restored within a short period. The installation height of the turbines is lower than 100m, so there is not expected to be any significant effect on birds' migration. In conclusion, the construction work of this proposed project is not expected to affect the local ecological environment.

Given the environment of the project location, there is very little wildlife at the site, and no protected species has been detected. Therefore, there is no significant impact by the Project on the local ecology.

2.4 Public Comments

There was a Notebook provided near the notice board of the local village. All the local stakeholders can write their comments, suggestions, or complains in the Notebook anytime during the lifetime of the project. The project owner will check the book every month. 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.

2.5 AFOLU-Specific Safeguards

The project is not a AFOLU-Specific project

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

The approved large-scale consolidated methodology ACM0002: "Grid-connected electricity generation from renewable sources"(Version 20.0).

“The 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).
Further information pertaining to the methodology can be obtained at:
<http://cdm.unfccc.int/methodologies/PAMethodologies/approved.html>

3.2 Applicability of Methodology

The Methodology ACM0002 (Version 20.0) is chosen and applicable to the project due to the following reasons:

The proposed project is a greenfield grid-connected zero-emission renewable power

generation activity from wind source.

The proposed project is not an activity that involves switching from fossil fuels to renewable energy at the proposed project site.

The proposed project is to be connected to the North China Power Grid (including Beijing City, Tianjin City, Hebei Province, Shanxi Province, Shandong Province and Inner Mongolia Autonomous Region) which is clearly identified and information on the characteristics of this grid is publicly available.

Therefore, the methodology ACM0002 (Version 20.0) is applicable to the proposed project.

3.3 Project Boundary

According to ACM0002 (Version 20.0), the spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the VCS project power plant is connected with.

In “Tool to calculate the emission factor for an electricity system”, the project electricity system is defined as the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity (i.e. the renewable power plant location) and that can be dispatched without significant transmission constraints.

A connected electricity system is defined as an electricity system that is connected by transmission lines to the project electricity system. Power plants within the connected electricity system can be dispatched without significant transmission constraints but transmission to the project electricity system has significant transmission constraint. According to “Tool to calculate the emission factor for an electricity system”, the delineation of project electricity system and connected electricity systems has published by the China’s DNA is used¹ on 29/12/2019.

The proposed project activity is connected to the Inner Mongolia power grid, which is part of the NCPG. Therefore, the spatial extent of the Project boundary also includes

all the power plants physically connected into the NCPG. The Figure following indicates the project boundary.

Source		Gas	Included?	Justification/Explanation
Baseline	Source 1	CO2	Yes	Main emission source.
		CH4	No	Minor emission source.
		N2O	No	Minor emission source.
		Other	No	Minor emission source.
Project	Source 1	CO2	No	The project is a wind power project. Project emissions should not be considered according to ACM0002.
		CH4	No	
		N2O	No	
		Other	No	

3.4 Baseline Scenario

According to ACM0002 (Version 20.0), if the project activity is the installation of a new grid-connected renewable power plant (the proposed project is a newly built wind power project), the baseline scenario is the following: “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, as reflected in the combined margin (CM) calculations described in the Tool to calculate the emission factor for an electricity system.”

The project activity is the installation of a new grid-connected renewable power plant/unit, and is not a modification/retrofit of an existing plant/unit, therefore, the baseline scenario is provision of the equivalent amount of electricity generated by NCPG connected power plants and the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”.

3.5 Additionality

According to VCS Standard dated 19/09/2019 (v4.1), a reassessment of additionality is not required when renewing the project crediting period.

3.6 Methodology Deviations

There is no methodology deviation in this monitoring period.

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:*

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

Where:

- BE_y = The baseline emissions in year y (tCO₂/yr)
- $EG_{PJ,y}$ = The 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)
- $EF_{grid,CM,y}$ = The combined margin CO₂ emission factor for grid connected power generation in year y calculated (tCO₂/MWh)

Calculation of $EG_{PJ,y}$

The calculation of $EG_{PJ,y}$ is different for: (a) Greenfield plants, (b) retrofits and replacements; and (c) capacity additions. The Project Activity is a Greenfield plant.

(a) Greenfield renewable energy power plants

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:

$$EG_{PJ,y} = EG_{facility,y} \quad (2)$$

Where:

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

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

In line with the methodology, the baseline emission factor 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 steps defined in “Tool to calculate the emission factor for an electricity system” .

Details of the calculations and data follow the published data from the Chinese DNA¹, which uses official national statistics.

Step 1. Identify the relevant electricity systems

In accordance with the boundary definitions of the China DNA, the spatial extent of the project boundary includes the Project and all power plants connected physically to the NCPG that the Project is connected to. NCPG is defined as the project electricity system, which consists of independent province-level electricity systems including Beijing, Tianjin, Hebei Province, Shanxi Province, Shandong Province and Inner Mongolia Autonomous Region. That can be dispatched without significant transmission constraints. The project electricity system is connected to North China Power Grid (NCPG) and there's electricity export to NCPG. For the purpose of determining the build margin emission factor, the spatial extent is limited to the project electricity system (NCPG).

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 in the enclosed EF calculation spreadsheet shows 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 simple operating margin emission rate of the exporting grid, determined as described in Step 4 section 6.4.1 of the Tool, if the conditions for this method, as described in Step 3 of the Tool, apply to the exporting grid; or

¹ http://www.mee.gov.cn/ywgz/xdqhbh/wsqtzk/202012/t20201229_815386.shtml

- (c) The simple adjusted operating margin emission rate of the exporting grid, determined as described in Step 4 section 6.4.2 of the Tool; or
- (d) The weighted average operating margin (OM) emission rate of the exporting grid, determined as described in Step 4 section 6.4.4 of the Tool.

Following the calculations of the 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.

The Option I is chosen, because only grid power plants would be considered in the project electricity system.

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

The simple OM method (Option a) can only be used if any one of the following requirements is satisfied:

- (a) Low-cost/must-run resources² constitute less than 50% of total grid generation (excluding electricity generated by off-grid power plants) in: 1) average of the five most recent years, and the average of the five most recent years shall be determined by using one of the approaches described below; or 2) based on long-term averages for hydroelectricity production.

- (i) Approach 1

$$Share_{LCMR} = \text{average} \left[\frac{EG_{LCMR_{y-4}}}{total_{y-4}}, \dots, \frac{EG_{LCMR_y}}{total_y} \right]$$

- (ii) Approach 2

$$Share_{LCMR} = \frac{\text{average} (EG_{LCMR_{y-4}}, \dots, EG_{LCMR_y})}{\text{average} (total_{y-4}, \dots, total_y)}$$

Where:

$Share_{LCMR}$	The share of the low cost/must run resources (%)
EG_{LCMR_y}	The electricity generation supplied to the project electricity system by the low cost/must run resources in year y (MWh)
$total_y$	The total electricity generation supplied to the project electricity system in year y (MWh)
y	The most recent year for which data is available

- (b) The average amount of load (MW) supplied by low-cost/must-run resources in a grid in the most recent three years is less than the average of the lowest annual system loads (LASL) in the grid of the same three years.
- The approach 1 is chosen for calculation and low-cost/must-run resources constitute less than 50% of total grid generation in average of the five most recent years. 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 third 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-

² Low-cost/must-run resources are defined as power plants with low marginal generation costs or dispatched independently of the daily or seasonal load of the grid. They include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If a fossil fuel plant is dispatched independently of the daily or seasonal load of the grid and if this can be demonstrated based on the publicly available data, it should be considered as a low-cost/must-run.

weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation.

The date of the publication of the most recent official data for the calculation of the emission factor prior to the start of validation was 29/12/2020.

Power plants registered as CDM project activities should be included in the sample group that is used to calculate the operating margin if the criteria for including the power source in the sample group apply.

- Details of the calculations and data follow the published data from the Chinese DNA, which uses official national statistics. This data does not exclude CDM projects.

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

The Simple OM method (Option a) was chosen in Step 3 above.

(a) Simple OM

The simple OM emission factor is calculated as the generation-weighted average CO₂ emissions per unit net electricity generation (tCO₂/MWh) of all generating sources serving the system, not including low-cost/must-run power plants/units.

The simple OM may be calculated by one of the following 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.

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).

Following the calculations of the DNA, Option B is chosen. The criteria for Option B are met:

- (a) The necessary data for Option A is not available, as indicated in the calculations of the DNA; 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) Option I is chosen in Step 2.

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

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:

$$EF_{grid,OMsimple,y} = \sum_i (FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}) / EG_y \quad (4)$$

Where:

$EF_{grid,OMsimple,y}$	The simple operating margin CO ₂ emission factor in year y (tCO ₂ /MWh)
$FC_{i,y}$	The amount of fuel type i consumed in the project electricity system in year y (mass or volume unit)
$NCV_{i,y}$	The net calorific value (energy content) of fuel type i in year y (GJ/mass or volume unit)
$EF_{CO2,i,y}$	The CO ₂ emission factor of fuel type i in year y (tCO ₂ /GJ)
EG_y	The 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 relevant year as per the data vintage chosen in Step 3

For this approach (simple OM) to calculate the operating margin, the subscript m refers to the power plants/units delivering electricity to the grid, not including low-cost/must-run power plants/units, and including electricity imports to the grid. Electricity imports should be treated as one power plant.

Based on the data available, the three-year average operating margin emission factor is calculated as a full-generation-weighted average of the emission factors. Details of the calculations and data follow the published data from the Chinese DNA³, which uses official national statistics.

$$EF_{grid,OMsimple,y} = 0.9419 \text{ tCO}_2/\text{MWh}$$

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

³ <http://qhs.mee.gov.cn/kzwsqtpf/>

In terms of vintage of data, the project participants chose Option 1, ex-ante, and $EF_{grid,BM,y}$ is fixed for the duration of the third crediting period:

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.

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units m during the most recent year y for which electricity generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \sum_m (EG_{m,y} \times EF_{EL,m,y}) / \sum_m EG_{m,y} \quad (5)$$

Where:

$EF_{grid,BM,y}$	The build margin CO_2 emission factor in year y (tCO_2/MWh)
$EG_{m,y}$	The net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	The CO_2 emission factor of power unit m in year y (tCO_2/MWh)
m	The power units included in the build margin
y	The most recent historical year for which electricity generation data is available

Due to the limited availability of data on individual power units, the published grid emission factor calculations from the Chinese DNA uses the approved deviation⁴ to calculate the build margin emission factor. The deviation is applied as follows:

- Generation *capacity* is used in formula (5) above, instead of generation.
- The newly added generation capacity that has been added to the grid most recently, and that comprises 20 percent of total installed capacity in the latest year for which data is available is used as the sample group of power units m to calculate the build margin. This option comprises a larger sample than the five units built most recently.
- The efficiency level of the best technology commercially available in the provincial/regional or national grid of China is used, as a conservative proxy, to determine the CO_2 emission factor of thermal power plants using each fuel type.

⁴ M-DEV0004, DNV (07/10/2005), see <http://cdm.unfccc.int/Projects/deviations/87512>.

Using this deviation, formula (5) can be re-written as follows:

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

Where:

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

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

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

$$EF_{thermal,y} = \sum_m (EF_{m,Adv,y} \times \lambda_{m,y}) \quad (6)$$

Where:

$EF_{thermal,y}$	The CO ₂ emission factor of the best technologies commercially available thermal power plants in year y (tCO ₂ /MWh)
$EF_{m,Adv,y}$	The CO ₂ emission factor of the best technologies commercially available power plants using fuel type m in year y (tCO ₂ /MWh)
$\lambda_{m,y}$	The share of emissions of fuel type m in year y (%)
m	The fuel type of thermal plant (coal/solid, oil/liquid, gas)
y	The most recent historical year for which data is available

Using the equation of option A2 from guidance in Step 4 section 6.4.1 of the Tool, the CO₂ emission factor of advanced power plants using fuel type m can be calculated as follows:

$$EF_{m,Adv,y} = EF_{CO2,m,y} \times 3.6 / \eta_{m,y} \quad (7)$$

Where:

$EF_{m,Adv,y}$	The CO ₂ emission factor of the best technology commercially available power plants using fuel m in year y (tCO ₂ /MWh)
$EF_{CO2,m,y}$	The average CO ₂ emission factor of fuel type m in year y (tCO ₂ /GJ)
$\eta_{m,y}$	The average net energy conversion efficiency of the best technologies commercially available power plants using fuel type m in year y (%)
m	The 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 using this methodology in the enclosed EF calculation spreadsheet:

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

Step 6. Calculate 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.

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

(a) Weighted average CM

The combined margin emissions factor is calculated as follows:

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

Where:

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

According to the Tool, the default values for w_{OM} and w_{BM} for solar projects in the first crediting period and the subsequent crediting period, which should be used, are: $w_{OM} = 0.75$ and $w_{BM} = 0.25$ (owing to their intermittent and non-dispatchable nature).

Based on these weights for the third crediting period, the combined margin emission factor is calculated, and fixed ex-ante for the duration of the second crediting period (conservatively rounded down to the fourth digit) as given below.

	CO ₂ emission factor (tCO ₂ /MWh)	Weighting (%)
Operating margin	0.9419	75%
Build margin	0.4819	25%
Combined margin	0.8269	-

These parameters will be recalculated at any renewal of the crediting period.

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. As a wind power plant, there are no project emissions according to the methodology:

$$PE_y = 0 \quad (9)$$

4.3 Leakage

No leakage emissions are considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, and transport). These emissions sources are neglected.

4.4 Net GHG Emission Reductions and Removals

According to ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”(Version 20.0), the net GHG emission reductions are calculated as follows:

$$\text{Emission Reductions (ER}_y\text{)} = BE_y - PE_y - LE_y$$

Baseline emissions:

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

According to the feasibility study of the proposed project, the net electricity generated is approximately 101,689MWh i.e. $EG_{\text{facility},y} = 101,689\text{MWh}$;

Based on section B.6.1, the baseline emissions factor ($EF_{\text{grid,CM},y}$) of ECPG is calculated as 0.8269 tCO₂e/MWh.

$$BE_y = EG_{\text{facility},y} * EF_{\text{grid,CM},y} = 101,689 \text{ (MWh)} \times 0.8269 \text{ (tCO}_2\text{e/MWh)} = 84,086 \text{ tCO}_2\text{e}$$

$$\text{Emission Reductions (ER}_y\text{)} = BE_y - PE_y - LE_y = 84,086 \text{ tCO}_2\text{e} - 0 - 0 = 84,086 \text{ tCO}_2\text{e}$$

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)
25/06/2019~31/12/2019	42,849	0	0	42,849
2020	84,086	0	0	84,086
2021	84,086	0	0	84,086
2022	84,086	0	0	84,086

2023	84,086	0	0	84,086
2024	84,086	0	0	84,086
2025	84,086	0	0	84,086
2026	84,086	0	0	84,086
2027	84,086	0	0	84,086
2028	84,086	0	0	84,086
01/01/2029- 24/06/2029	41,237	0	0	41,237
Total	840,860	0	0	840,860

5 MONITORING

5.1 Data and Parameters Available at Validation

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	Follow the “Tool to calculate the emission factor for an electricity system” (Version 07.0)
Purpose of Data	Calculation of baseline emissions
Comments	N/A
Data / Parameter	WBM
Data unit	%

5.2

Description	Weighting of Build margin emissions factor
Source of data	“Tool to calculate the emission factor for an electricity svstem” (Version 07.0)
Data / Parameter	$EF_{grid,OMsimple,y}$
Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO ₂ /MWh
Description	Build margin CO ₂ emission factor in year y
Source of data	Calculated follow the “Tool to calculate the emission factor for an electricity system” (Version 07.0)
Value applied	0.4819
Justification of choice of data or description of measurement methods and procedures applied	Calculated follow the “Tool to calculate the emission factor for an electricity system” (Version 07.0)
Purpose of Data	Calculation of baseline emissions
Comments	N/A

meters Monitored

Data / Parameter	$EG_{facility,y}$
Data unit	MWh
Description	Net electricity supplied by the project activity to the grid in year y
Source of data	Electricity Meter
Description of measurement methods and procedures to be applied	Both the electricity exported to the grid by the proposed project and the power imported from the grid will be monitored continuously through the two-way metering equipment (Key meter) at the onsite substation.
Frequency of monitoring/recording	Calculated from the above measured parameters and recorded on a monthly basis

Value applied	–
Monitoring equipment	The monitoring meter is the key Meter, and a check meter is installed in case the key meter is malfunctioned. During this monitoring period, the key meter has operated normally.
QA/QC procedures to be applied	Measurement results should be cross-checked by records for sold electricity.
Purpose of data	For the calculation of baseline emission
Calculation method	$EG_{facility,y} = EG_{PJ\ to\ grid,y} - EG_{grid\ to\ PJ,y}$
Comments	-

5.3 Monitoring Plan

The approved monitoring methodology ACM0002 (Version 20.0) is used for developing the monitoring plan. Monitoring tasks must be implemented according to the monitoring plan in order to ensure that the real, measurable and long-term greenhouse gas (GHG) emission reductions for the proposed project is monitored and reported.

Describe the process and schedule followed for monitoring the data and parameters, set out in Section 5.2 (Data and Parameters Monitored) above, during this monitoring period, include details on the following:

The organizational structure, responsibilities and competencies of the personnel that carried out the monitoring activities.

The methods used for generating/measuring, recording, storing, aggregating, collating and reporting the data on monitored parameters.

The procedures used for handling any internal auditing performed and any non-conformities identified.

The implementation of sampling approaches, including target precision levels, sample sizes, sample site locations, stratification, frequency of measurement and QA/QC procedures. Where applicable, demonstrate whether the required confidence level or precision has been met.

Where appropriate, include line diagrams to display the GHG data collection and management system.

This section details the steps taken to monitor the GHG emissions reductions on a regular basis from the Inner Mongolia Yihewusu Phase II 49.5 MW Wind Power Project in the Host Country.

The monitoring set-up for this Project has been developed to ensure that from the start, the Project is well organised in terms of the collection and archiving of complete and reliable data.

1. CDM monitoring Organization

Roles and responsibilities will be defined for relevant staff involved in CDM monitoring, and the prospect of nominating a CDM Manager will be considered. If appointed, the CDM Manager will have the overall responsibility for the monitoring system on this project. All staff involved in the collection of data and records will be coordinated by him.

2. Staff training

Training is conducted on-site to ensure that staffs are capable of performing their designated tasks to high standards. This will include CDM specific training to warrant that they understand the importance of complete and accurate data and records for CDM monitoring.

3. Maintenance and calibration of monitoring equipment

The electricity meter(s) measuring power output to the grid will be calibrated in line with the relevant national standard. The meter(s) measuring electricity supply will maintain accuracy within 0.5%.

4. Data collection and record-keeping arrangements

The meter installed at the high voltage side of the on-site transformer is used to obtain the amount of electricity effectively supplied to the Grid and the amount of imported electricity from the Grid. The electricity generated and consumed by the facility is collected and recorded at 24:00 on the 24th every month, meanwhile the net electricity exported onto the net is calculated automatically by the computer, this method of calculation is accepted by the Inner Mongolia Power (Group) Co., Ltd.

The meter recording value should be cross checked with the ETN issued by Grid Company. The monitoring system is as following:

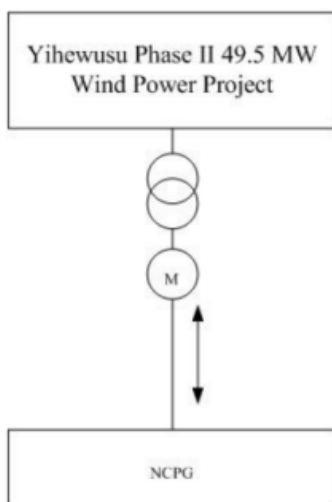


Figure 1. Line diagram

5. Data Quality Control and Quality Assurance

All data collected on-site will be checked internally before being compiled in an electronic format, to ensure that it is complete and of appropriate quality. The responsible company or person will perform a final check of the data, and analyze project performance prior to any verification.

APPENDIX

Use appendices for supporting information. Delete this appendix (title and instructions) where no appendix is required.

N/A