Project design document form
(Version 11.0)

Complete this form in accordance with the instructions attached at the end of this form.

BASIC INFORMATION	
Title of the project activity	Inner Mongolia North Long Yuan 100 MW Huitengxile Wind Farm
Scale of the project activity	☒ Large-scale ☐ Small-scale
Version number of the PDD	5.0
Completion date of the PDD	03/09/2020
Project participants	Inner Mongolia North Long Yuan Wind Power Company
Host Party	People's Republic of China
Applied methodologies and standardized baselines	Methodology: ACM0002 "Grid-connected electricity generation from renewable sources" (Version 20.0) Standardized baselines: N/A
Sectoral scopes	Sectoral scope 1: Energy industries (renewable / non-renewable sources)
Estimated amount of annual average GHG emission reductions	231,919tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The Inner Mongolia North Long Yuan 100 MW Huitengxile Wind Farm developed by Inner Mongolia North Long Yuan Wind Power Company (hereinafter referred to as the Project) is located within Chaha'er Youyi Zhongqi County, Wulanchabu City, Inner Mongolia Autonomous Region, P.R.China. It is invested, constructed and operated by Inner Mongolia North Long Yuan Wind Power Company (hereinafter is referred to as "the Project Owner").

The total installed capacity of the Project is 100 MW equipped with 80 sets of wind turbines with a unit capacity of 1,250 kW. The height of the hub is 74.5 m. The electricity delivered to North China Grid by the Project is 275,946.5MWh[1] per year with a plant load factor of 0.315 (calculated as 275,946.5 MWh/ (100 MW*8,760 h) =0.315). Electricity generated by the Project is delivered to North China Grid via the North Long Yuan Huitengxile Wind Farm 220 kV Step-up Substation.

The Project's baseline scenario, which is the same with the existing scenario prior to implementation of the Project, involves electricity being generated by fossil fuel power plants connected to the North China Power Grid ("**NCPG**").

In view of this, therefore the Project is responsible for reduction of CO_2 emissions through the displacement of fossil fuel-dominated electricity generation by the power plants connected to the grid electricity system.

The construction of the Project was started on 01/10/2006. The commission date of the first turbine was 10/12/2010. The commission date of all turbines was 30/12/2011. The Project was registered on 20/09/2011 (Ref. 5029) and the first crediting period is from 20/09/2011 to 19/09/2018. Following the methodology, the emission reductions of the second crediting period (20/09/2018 to 19/09/2025) are estimated to be on average 231,919tCO_2e equivalent (tCO_2e) per year, and 1,623,433tCO_2e over the chosen (second) crediting period.

The Project not only supplies renewable electricity to the grid, but also contributes to sustainable development of the local community, the host country and the world by means of:

- reducing greenhouse gas emissions compared to a business-as-usual scenario;
- diversifying power sources and mitigating the demand and supply contradiction;
- helping to stimulate the growth of the wind power industry and encourage and promote the technology progress and commercial popularization of grid-connected renewable power generation projects in China;
- reducing the emission of other pollutants resulting from the power generation industry in China, compared to a business-as-usual scenario;
- creating 25 employment opportunities for local community during the operation period of the Project and creating several employment opportunities for local community during the construction period of the Project.

A.2. Location of project activity

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The host country is the People's Republic of China. The Project is located within Chaha'er Youyi Zhongqi County, Wulanchabu City, Inner Mongolia Autonomous Region, P.R.China. The centre of

[1] The total amount of theoretical electricity generation of the Project is 290,470 MWh per year, which is updated based on Bidding Assessment Document. The rate of auxiliary electricity consumption and losses due to transmission and distribution is defined as 5% according to the FSR. Therefore, the estimated electricity delivered to North China Grid by the Project is 275,946.5 MWh per year (calculated as 290,470*(1-5%) =275,946.5).

the Project has geographical coordinates with east longitude of 112°37′24″ and north latitude of 41°08′35″.

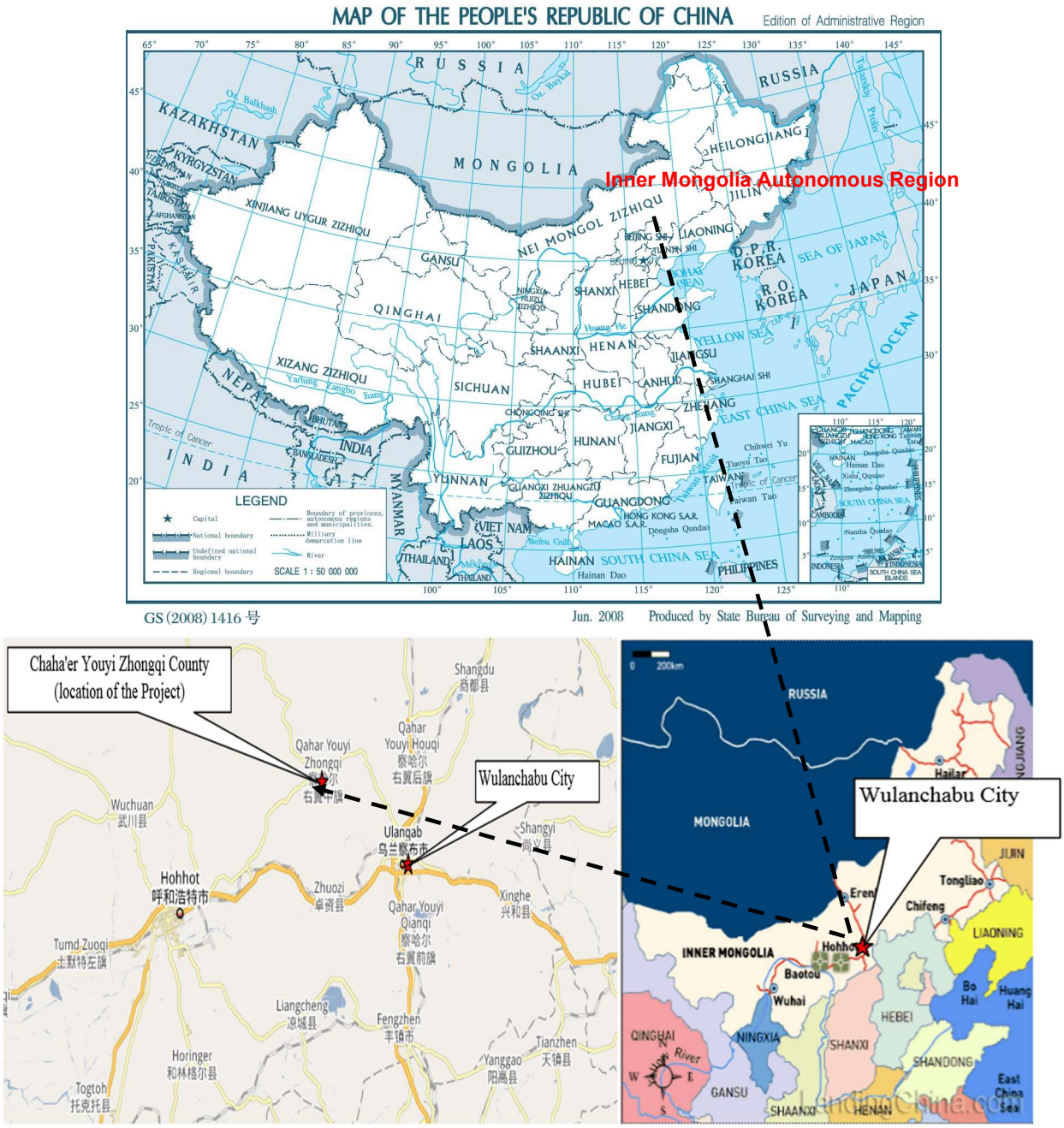

Figure 1: Physical location of the project site

A.3. Technologies/measures

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In the absence of the Project, equivalent amount of annual power output to the Project would be generated and supplied by North China Grid which the Project is connected to. This is the same with the baseline scenario of the Project. It is expected that the Project as a renewable energy source generates emission reductions by avoiding CO_2 emissions from the same amount of electricity generation from North China Grid, which is mainly composed of traditional thermal power plants.

According to the meteorological data of the anemometer tower setup within the Project Site, there is abundant wind resource at the Project Site. The annual average wind speed is 9.2 m/s at 74.5 m height with stable prevailing wind direction. Thus, it is suitable to build grid-connected wind power generation projects at the Project Site.

The total installed capacity of the Project is 100 MW equipped with 80 sets of wind turbines with a unit capacity of 1,250 kW. The estimated electricity delivered to North China Grid by the Project is 275,946.5 MWh per year and the average annual operating hours is 2,759 h with a plant load factor of 0.315. Electricity generated by the Project is delivered to North China Grid via the North Long Yuan Huitengxile Wind Farm 220 kV Step-up Substation.

Table 1 Key technical parameters of main equipment in the Project

	Equipment	Quantity	Type	Technical parameters
Main mechanical and electrical equipment	Turbine	80 sets	S64	Rated power: 1,250 kW Quantity of blades: 3 Height of the hub: 74.5 m

The Project employs turbines manufactured by Suzlon Energy (Tianjin) Co., Ltd., but the Project involves no technology transfer from abroad. According to Turbines Purchase Agreement, no single part of equipment is imported from other countries, and there is no technology know-how or expertise (consulting firm or service) involved in the construction, installation and operation phases.

Electricity delivered to North China Grid by the Project is monitored with meters installed at the North Long Yuan Huitengxile Wind Farm 220 kV Step-up Substation. The measurement precision of the meters employed by the Project is at least 0.5s.

A.4. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (host Party)	Inner Mongolia North Long Yuan Wind Power Company	No

A.5. Public funding of project activity

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The Project does not receive any public funding from Parties included in Annex I countries.

A.6. History of project activity

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The project was registered as CDM project on 20/09/2011 and the reference no. is 5029. The PDD is renewal of crediting period. Therefore, it can be confirmed that:

(a) The proposed CDM project activity is neither registered as a CDM project activity nor included as a component project activity (CPA) in a registered CDM programme of activities (PoA);
(b) The proposed CDM project activity is not a project activity that has been deregistered.

And confirm that:

(a) The proposed CDM project activity was not a CPA that has been excluded from a registered CDM PoA;
(b) The proposed project is not a registered CDM project activity or a CPA under a registered CDM PoA whose crediting period has or has not expired (hereinafter referred to as former project) exists in the same geographical location as the proposed CDM project activity.

A.7. Debundling

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Not applicable.

SECTION B. Application of methodologies and standardized baselines

B.1. References to methodologies and standardized baselines

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The approved baseline and monitoring methodology applied to the project activity is: ACM0002 "Grid-connected electricity generation from renewable sources" (Version 20.0)

The project activity also refers to:
1. Methodological Tool: "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).
2. Methodological Tool: "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (Version 03.0)
3. "Tool to calculate the emission factor for an electricity system" (Version 07.0).

More information on the methodology and tools listed above is available at the following website: http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

B.2. Applicability of methodologies and standardized baselines

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The approved methodology ACM0002 (version 20.0) is applicable to the project activity and the project meets the applicability of the applied methodology, because:

Clauses	Requirements of the 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 NCPG-connected renewable power generation project.	Applicable
2	The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;	The project activity involves the installation of the wind power plant.	Applicable
3	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.	Not applicable, the project is a newly built wind power project.	N/A
4	In case of hydro power plants, one of the following conditions must apply: (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, where the volume of the	Not applicable, the Project is not a hydro power plant, so this applicability condition does not need to be considered.	N/A

	reservoir(s) is increased and the power density calculated using equation (3), is greater than 4 W/m^2; or (c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), 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 (3), 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 (4), 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: Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or 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 five years prior to implementation of CDM project activity.	Not applicable, the Project is not a hydro power plant, so this applicability condition does not need to be considered.	N/A
6	The methodology is not applicable to: 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/units.	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, rehabilitations, 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, that is to use the power generation equipment that was already in use prior to the	Not applicable, the project is a newly built wind power project.	N/A

	implementation of the project activity and undertaking business as usual maintenance".		

In addition, the project meets the applicability conditions of the applied tools applied in the PDD as follows:

Tool/Criteria	Applicability	Conclusion
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 type of crediting period (renewable or fixed) for the project activity is renewal crediting period, and the Project requests for renewal of the second crediting period.	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 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).	The Project is the installation of a wind power plant supplying electricity to the Grid.	Applicable
Tool to calculate the emission factor for an electricity system/ In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	The Project's electricity system is located at a non-Annex I country.	Applicable
Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation. If emissions are calculated for electricity consumption, the tool is only applicable if one out of the following three scenarios applies to the sources of electricity consumption: (a) Scenario A: Electricity consumption from the grid. (b) Scenario B: Electricity consumption from (an) off-grid fossil fuel fired captive power plant(s). or (c) Scenario C: Electricity consumption from the grid and (a) fossil fuel fired captive power plant(s).	The electricity consumption of the project is purchased from the grid.	Applicable
Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation. This tool can be referred to in methodologies to provide procedures to monitor amount of electricity generated in the project scenario, only if one out of the following three project scenarios applies to the recipient of the electricity generated: (a) Scenario I: Electricity is supplied to the grid; (b) Scenario II: Electricity is supplied to consumers/electricity consuming facilities; or (c) Scenario III: Electricity is supplied to the grid and consumers/electricity consuming facilities.	The electricity generated by the project is supplied to the grid.	Applicable
Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation. This tool is not applicable in cases where captive renewable power generation technologies are installed to provide electricity in the project activity, in the baseline scenario or to sources of leakage. The tool only accounts for CO_2 emissions.	There are no captive renewable power generation technologies installed to provide electricity in the project activity, in the baseline scenario or to sources of leakage.	Applicable

B.3. Project boundary, sources and greenhouse gases (GHGs)

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The ACM0002 (version 20.0) states that: "The spatial extent of the project boundary includes the project power plant/unit and all power plants/units connected physically to the electricity system that the CDM project power plant is connected to."

The electricity generated by the Project is supplied to the NCPG. Thus, according to the Tool to calculate the emission factor for an electricity system (version 07.0), the electricity system of the Project is defined as the NCPG which can be dispatched without significant transmission constraints. The Project boundary therefore includes all power plants physically connected to the NCPG and the Project power plant itself.

The Chinese Designated National Authority (**"DNA"**) is Ministry of Ecology and Environment (**"MEE"**). The 2017 Baseline Emission Factors for Regional Power Grids in China published by the DNA[2] stated that the NCPG is a regional grid in China that includes Beijing City, Tianjin City, Hebei Province, Shanxi Province, Shandong Province and Inner Mongolia Autonomous Region.

The Table 2 below provides an overview of inclusion or exclusion of GHG within the Project boundary. The Figure 2 overleaf then shows the Project boundary's flow diagram.

Table 2 Overview of Project Boundary Inclusion or Exclusion of Emission Sources

	The Source	GHG	Included?	Justification/Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the Project	CO_2	Included	Main emission source
		CH_4	Excluded	Minor emission source
		N_2O	Excluded	Minor emission source
Project activity	The Project	CO_2	Excluded	Zero-emissions grid-connected electricity generation from wind energy
		CH_4	Excluded	Zero-emissions grid-connected electricity generation from wind energy
		N_2O	Excluded	Zero-emissions grid-connected electricity generation from wind energy

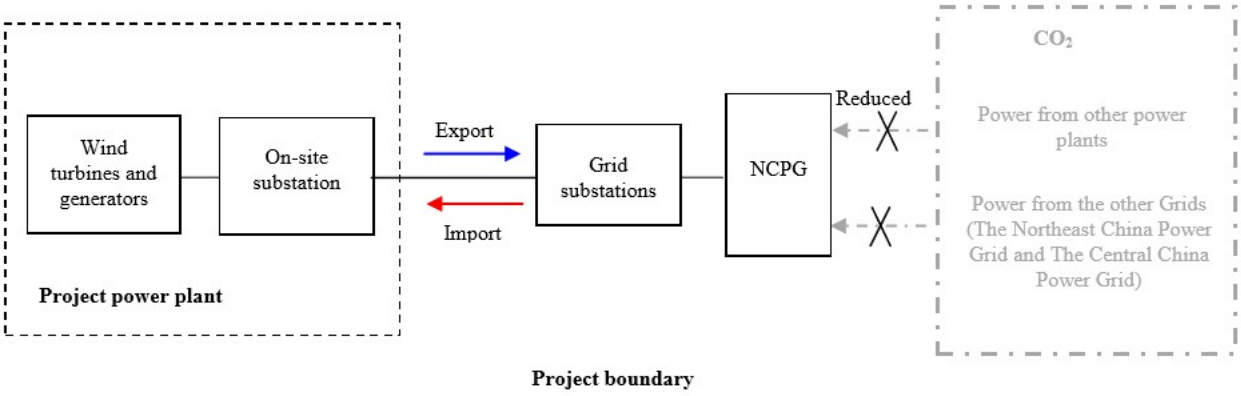

Figure 2: A simplified flow diagram in the project boundary

B.4. Establishment and description of baseline scenario

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According to ACM0002 (version 20.0), If the project activity is the installation of a Greenfield power plant, the baseline scenario is 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 "TOOL07: Tool to calculate the emission factor for an electricity system".

[2] http://qhs.mee.gov.cn/kzwsqtpf/201812/P020181220579925103092.pdf

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" (version 07.0).

The selected methodology prescribes the baseline scenario; thus, no further analysis is required. The combined margin is calculated in Section B.6 below.

Table 3 The emission factor of NCPG[3]

	$EF_{grid,OM,y}$ (tCO_2/MWh)	$EF_{grid,BM,y}$ (tCO_2/MWh)	$EF_{grid,CM,y}$ (tCO_2/MWh)
North China Power Grid	0.9680	0.4578	**0.84045**

According to the ACM0002 (version 20.0) and Project Standard (version 02.0), the methodological tool "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) is adopted to assess the continued validity of the baseline and to update the baseline. 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.

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

If the current baseline complies with all relevant mandatory national and/or sectoral policies which have come into effect after the submission of the project activity for validation or the submission of the previous request for renewal of the crediting period and are applicable at the time of requesting renewal of the crediting period, go to Step 1.2.

- There are no new national and/or sectoral policies that could affect the baseline scenario at the time of requesting renewal of the crediting period. The current baseline complies with all relevant mandatory national and/or sectoral policies. Hence in the absence of the project activity the electricity would still have 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".

Step 1.2: Assess the impact of circumstances

Assess the impact of circumstances existing at the time of requesting renewal of the crediting period on the current baseline emissions, without reassessing the baseline scenario.

In the situation where the baseline scenario identified at the validation of the project activity was the continuation of the current practice without any investment, an assessment of the changes in market characteristics is required for the renewal of the crediting period.

- The baseline scenario identified at the validation of the project activity was the continuation of the current practice without any investment. Baseline emissions are primarily derived from the fossil fuel power plants in the NCPG. The total generation produced by fossil fuel power plants accounts for 90% of total electricity generation in NCPG; and this percentage has not been changed significantly in recent 5 years. Therefore, market characteristics do not have impact on the baseline emissions.

[3] *2017 Baseline Emission Factors for Regional Power Grids in China* published by Chinese DNA on 20/12/2018.

- Evaluate whether the conditions used to determine the baseline emissions in the previous crediting period are still valid. Assess the availability of new fuels or raw materials and the impact of electricity or fuel prices in the identification of the current practice for the baseline emissions.

- The conditions used to determine the baseline emissions in the previous crediting period are still valid. The availability of new fuels or raw materials or the level of fuel prices has no impact on the identification of the current practice for the baseline emissions. Presently the NCPG is dominated by the fossil fuel power plants. The availability of new fuels or raw materials or the level of fuel prices has no impact on the baseline emissions.

If the new circumstances make a continued validity of the current baseline not plausible, then the current baseline needs to be updated for the subsequent crediting period.

As there are no new circumstances that make a continued validity of the current baseline not plausible, the current baseline does not need to be updated for the second crediting period.

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

This sub-step should only be applied if the baseline scenario identified at the validation of the project activity was 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.

Assess whether the remaining technical lifetime of the equipment that would have continued to be used in the absence of the project activity, as determined in the CDM-PDD or CDM-PDD-REN, exceeds the crediting period for which renewal is requested.

Take into consideration the market penetration of different technologies. Evaluate the penetration rate of different technologies that are available in the market and evaluate how they could affect the baseline.

- As determined in the CDM-PDD and CDM-PDD-REN, 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 in NCPG, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”. The projects proponents or third party (or parties) would not undertake an investment later due. The combined margin calculation automatically takes account of any issues regarding remaining technical lifetime or market penetration.

If the baseline scenario of the project activity is the continuation of use of the current equipment(s) without any investment and the projects proponents or third party(ies) will undertake an investment later, but before the end of a crediting period, then the current baseline needs to be updated for that crediting period or the crediting of emission reductions should be limited to the period before the baseline equipment would cease its operation.

Therefore, the current baseline does not need to be updated for the second crediting period.

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

Assess whether data and parameters that were only determined at the start of the crediting period and not monitored during the crediting period are still valid or whether they should be updated. 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 CDM project activity.

If any of the data and parameters that were only determined at the start of the crediting period and not monitored during the crediting period are not valid anymore, the current baseline needs to be updated for the subsequent crediting period.

In accordance with the methodology, the grid emission factor and all the values in its calculation are updated in section B.6.

If the application of Steps 1.1, 1.2, 1.3 and 1.4 confirmed that the current baseline as well as data and parameters are still valid for the subsequent crediting period, then this baseline, data and parameters can be used for the renewed crediting period. Otherwise, proceed to Step 2.

The original baseline scenario needs to be updated to incorporate the latest grid emission factor in accordance with the methodology.

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

This step is only applicable if any of the Steps 1.1, 1.2, 1.3 and/or 1.4 showed that the current baseline needs to be updated.

Step 2.1: Update the current baseline

Update the current baseline emissions for the subsequent crediting period, without reassessing the baseline scenario, based on the latest approved version of the methodology applicable to the project activity. The procedure should be applied in the context of the sectoral policies and circumstances that are applicable at the time of request for renewal of the crediting period.

As shown in step 1.1 above, in accordance with the procedures for renewal of the crediting period of a registered CDM project activity, the original baseline, as updated, remains valid taking new relevant national and/or sectoral policies and circumstances into account.

Step 2.2: Update the data and parameters

If the application of Step 1.4 showed that the data and/or parameter(s) that were only determined at the start of the crediting period and not monitored during the crediting period are not valid anymore, project participants should update all applicable data and parameters, following the guidance in Step 1.4.

As discussed above in step 1.4, the grid emission factor and all the values in its calculation are updated in section B.6.

Conclusion regarding the assessment of the validity of the original baseline scenario

In accordance with the procedures for renewal of the crediting period of a registered CDM project activity, the original baseline, as updated in accordance with step 2.2 in section B.6, remains valid taking new relevant national and/or sectoral policies and circumstances into account.

B.5. Demonstration of additionality

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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 CDM project standard for project activities Version 02.0, the project participants are not required to reassess the additionality of the project activity and update the section relating to additionality.

B.6. Estimation of emission reductions

B.6.1. Explanation of methodological choices

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Baseline emissions

Baseline emissions include only CO_2 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 to be calculated as follows:

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

Where:

BE_y	= Baseline emission in year y (tCO_2e)
$EG_{PJ,y}$	= Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)
$EF_{grid,CM,y}$	= Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO_2e/MWh)

Since the Project is the installation of a new grid-connected renewable power plant, then $EG_{PJ,y}$ is calculated using the following formula:

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

Where:

$EG_{facility,y}$	= Net electricity generation supplied by the Project to the grid in year y (MWh)
$EG_{PJtoGRID,y}$	= Electricity delivered by the Project to the grid in year y (MWh)
$EG_{GRIDtoPJ,y}$	= Electricity imported by the Project from the grid in year y (MWh)

The "Tool to calculate the emission factor for an electricity system" (version 07.0) determines the CO_2 emission factor for the displacement of electricity generated by power plants in an electricity system, by calculating the "combined margin" emission factor (CM) of the electricity system. The CM is the result of a weighted average of two emission factors pertaining to the electricity system: the "operating margin" (OM) and the "build margin" (BM). The operating margin is the emission factor that refers to the group of existing power plants whose current electricity generation would be affected by the CDM project activity. The build margin is the emission factor that refers to the group of power plants whose construction and future operation would be affected by the CDM project activity.

The "Tool to calculate the emission factor for an electricity system" (version 07.0) provides procedures to determine the following parameters:

Parameter	SI Unit	Description
$EF_{CM.grid,y}$	t CO_2/WMh	Combined margin CO_2 emission factor for the Project electricity system in year y

$EF_{BM,grid,y}$	t CO_2/WMh	Build margin CO_2 emission factor for the Project electricity system in year y
$EF_{OM,grid,y}$	t CO_2/WMh	Operating margin CO_2 emission factor for the Project electricity system in year y

The following steps are applied to calculate the emission factor for an electricity system:

STEP 1: Identify the relevant electricity systems
STEP 2: Choose whether to include off-grid power plants in the Project electricity system (optional)
STEP 3: Select a method to determine the operating margin (OM)
STEP 4: Calculate the operating margin emission factor according to the selected method
STEP 5: Calculate the build margin (BM) emission factor
STEP 6: Calculate the combined margin (CM) emissions factor

Step 1: Identify the relevant electricity systems

According to instructions from China's DNA[4], the NCPG consists of Shandong Province, Beijing City, Tianjin City, Hebei Province, Shanxi Province and Inner Mongolia Autonomous Region. The NCPG has imported electricity from Northeast Power Grid (NEPG) and Central China Power Grid (CCPG). The electricity transfers from the NEPG and the CCPG to the NCPG are therefore taken into account when calculating the grid emission factor.

The NCPG has imported electricity from Northeast Power Grid (NEPG) and Central China Power Grid (CCPG), so NEPG and CCPG are the connected electricity system. For the purpose of determining the operating margin emission factor, use one of the following options to determine the CO_2 emission factor(s) for net electricity imports from a connected electricity system:

(a) 0 t CO_2/MWh; or

(b) The simple operating margin emission rate of the exporting grid, determined as described in Step 4 section 6.4.1, if the conditions for this method, as described in Step 3 below, apply to the exporting grid; or

(c) The simple adjusted operating margin emission rate of the exporting grid, determined as described in Step 4 section 6.4.2 below; or

(d) The weighted average operating margin (OM) emission rate of the exporting grid, determined as described in Step 4 section 6.4.4 below.

The Project chooses option(b) to determine the CO_2 emission factor for net electricity imports from CCPG and NEPG, as the same method is chosen to the project electricity system.

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.

For the Project, the Option I is selected to calculate emission factor of the NCPG.

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

The calculation of operating margin emission factor ($EF_{grid,OM,y}$) can be based on one of four options listed as follows:

Option (a) Simple OM, or

Option (b) Simple adjusted OM, or

[4] 2017 Baseline Emission Factors for Regional Power Grids in China: http://qhs.mee.gov.cn/kzwsqtpf/201812/P020181220579925103092.pdf

Option (c) Dispatch data analysis OM, or

Option (d) Average OM.

Detailed information to carry out a dispatch data analysis is not publicly available; therefore, method (b) and method (c) is not suitable for the project.

According to ACM0002, the Simple OM method is applicable to the project if the low-cost resources constitute less than 50% of total grid generation on average in the five most recent years or based on long-term averages for hydroelectric production.

The share of low-cost/must-run generation in North China Power Grid is less than 50% of total grid generation in average of the five most recent years. The Simple OM method, therefore, is selected to calculate the Operating Margin emission factor of the project.

The Simple OM can be calculated using either of the two following data vintages for years(s) y:

- **Ex-ante option:** If the *ex-ante* option is chosen, the emission factor is determined once at the validation stage. Thus, no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation. For off-grid power plants, use a single calendar year within the five most recent calendar years prior to the time of submission of the CDM-PDD for validation;
- **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 emission factor to be updated annually during monitoring. If the data required to calculate 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 the 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.

This PDD uses **Ex-ante Option** for $EF_{grid,simple\ OM,\ y}$ calculation to be in accordance with the baseline emissions factor calculation for regional power grids published by China DNA.

Step 4: Calculate the operation margin emission factor according to the selected method

The simple OM emission factor is calculated as the generation-weighted average CO_2 emission per unit net electricity generation (tCO_2e/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units.

The simple OM may be calculated:

Option A: Based on the net electricity generation and a CO_2 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.

As the data required by option A is not available in China, and the 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 in china, and off-grid power plants are not included in the calculation. Therefore, Option B is used for calculating project OM as follows:

$$EF_{grid,\,OMsimple,\,y} = \frac{\sum FC_{i,\,y} \times NCV_{i,\,y} \times EF_{CO2,\,i,\,y}}{EG_y} \qquad (3)$$

Where:

$EF_{grid, OMsimple, y}$	=	Simple operating margin CO_2 emission factor in year *y* (tCO_2/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 fossil fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{co2,i,y}$	=	CO_2 emission factor of fuel type *i* in year *y* (tCO_2/GJ)
EG_y	=	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year *y* (MWh)
i	=	All fuel types combusted in power sources in the project electricity system in year *y*
y	=	The relevant year as per the data vintage chose in Step 3

If available, $NCV_{i,y}$ and $EF_{CO2,i,y}$ 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 2016. With regard to the fuel types where $NCV_{i,y}$ fluctuate in a certain range, the floor values of the fluctuation range are used for conservatism. $EF_{CO2,i,y}$ of fossil fuel comes from IPCC 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 (2014~2016, published annually) and China Energy Statistical Yearbook (2014~2016). Based on these data, the Simple OM Emission Factor ($EF_{grid,OMsimple,y}$) of the North China Power Grid is calculated as 0.9680 tCO_2e/MWh (see appendix 4 for details).

For the project, the renewable crediting period, i.e. 7*3 years, is adopted.

Step 5 Calculate the build margin emission factor (BM)

In terms of vintages 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 second crediting period should be used. 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 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 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 PDD 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 PDD 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 ($SET_{5\text{-units}}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-}units}$, 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 ($AEG_{SET\text{-}\geq 20 \text{ per cent}}$, in MWh);

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

Otherwise:

(d) Exclude from SET_{sample} the power units which started to supply electricity to the grid more than10 years ago. Include in that set the power units registered as CDM project activity, starting with power units that started to supply electricity to the grid most recently, until the electricity generation of the new set comprises 20 per cent of the annual electricity generation of the project electricity system (if 20 per cent falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) to the extent is possible. Determine for the resulting set ($SET_{sample\text{-}CDM}$) the annual electricity generation ($AEG_{SET\text{-}sample\text{-}CDM}$, in MWh);

If the annual electricity generation of that set is comprising at least 20 per cent of the annual electricity generation of the project electricity system (i.e. $AEG_{SET\text{-}sample\text{-}CDM} \geq 0.2 \times AEG_{total}$), then use the sample group $SET_{sample\text{-}CDM}$ to calculate the build margin. Ignore steps (e) and (f).

(e) Include in the sample group $SET_{sample\text{-}CDM}$ the power units that started to supply electricity to the grid more than 10 years ago until the electricity generation of the new set comprises 20 per cent of the annual electricity generation of the project electricity system (if 20 per cent falls on part of the generation of a unit, the generation of that unit is fully included in the calculation);

(f) The sample group of power units m used to calculate the build margin is the resulting set ($SET_{sample\text{-}CDM\text{->}10yrs}$).

However, in China, it is very difficult to obtain the data of the five existing power plants built most recently or the power plants capacity additions in the electricity system that comprise 20 per cent of the system generation (in MWh) and that were built most recently, since no data of plant specific generation and fossil fuel consumption is currently available in China. As none of the above options can be selected, the following deviations are adopted to calculate the BM[5]:

First, to calculate the newly added installed capacity and the contribution component of other various power generation technologies, then calculate of the weight of newly added installed capacity of each power generation technology, and finally, to calculate BM emission factor using the commercially optimal efficiency level of each power generation technology.

According to the "Tool to calculate the emission factor for an electricity system", the build margin emissions factor ($EF_{grid,BM,y}$) is calculated as the generation-weighted average emission factor (tCO_2e/MWh) of all power units *m* during the most recent year *y* for which power generation data is available. The calculation equation is as follows:

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

Where:

$EF_{grid,BM,y}$	=	Build Margin CO_2 emission factor in year y (CO_2e/MWh)
$EG_{m\,y}$	=	Net quantity of electricity generated and delivered to the grid by power unit m

[5] http://cdm.unfccc.int/UserManagement/FileStorage/6POIAMGYOEDOTKW25TA20EHEKPR4DM

$EF_{EL,m,y}$	=	CO_2 emission factor of power unit m in year y (tCO_2e/MWh)
m	=	Power units included in the build margin
y	=	Most recent historical year for which power generation data is available

Since the generating capacity of coal-fired, oil-fired and gas-fired technologies can't be separated from the existing statistical data, the following measures are taken for the calculation:

First, based on the available data of the latest year, determine the ratio of CO_2 emissions from coal, oil, and gas consumption for power generation to the total CO_2 emission; Second, to calculate the emission factor of the thermal power based on the weight of CO_2 emission from coal, oil, and gas, and the emissions factors using commercial technologies with optimal efficiency. And finally, to multiply the thermal emission factor with the portion of the thermal power comprising 20 per cent of the newly added capacity.

Sub-Step 1: Calculate the proportion of CO_2 emissions from solid, liquid and gaseous fuels corresponding to the total CO_2 emissions.

$$\lambda_{Coal} = \frac{\sum_{i \in COAL, j} F_{i,j,y} \times NCV_{i,y} \times EF_{co_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{co_2,i,j,y}} \quad (5)$$

$$\lambda_{Oil} = \frac{\sum_{i \in OIL, j} F_{i,j,y} \times NCV_{i,y} \times EF_{co_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{co_2,i,j,y}} \quad (6)$$

$$\lambda_{Gas} = \frac{\sum_{i \in GAS, j} F_{i,j,y} \times NCV_{i,y} \times EF_{co_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{co_2,i,j,y}} \quad (7)$$

Where:

$F_{i,j,y}$	=	the amount of fossil fuel *i* (tce) consumed by plants in province *j* in year *y*
$NCV_{i,y}$	=	is the net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO2,i,j,y}$	=	is the CO_2 emission factor of fossil fuel type *i* in province *j* in year *y*

Coal, Oil and Gas represent solid fuel, liquid fuel and gaseous fuel respectively.

Sub-Step 2: Calculate the emission factor of thermal power ($EF_{Thermal}$)

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} \quad (8)$$

$EF_{Coal,Adv}$, $EF_{Oil,Adv}$, $EF_{Gas,Adv}$ are the operating margin emission factors respectively consumed by coal-fired, oil-fired and gas-fired generation technology at the commercially optimal efficiency.

Sub-Step 3: Calculation of BM in the grid.

$$EF_{grid,BM,y} = \frac{CAP_{Thermal,y}}{CAP_{Total,y}} \times EF_{Thermal,y} \quad (9)$$

Where:

$CAP_{thermal,,y}$	=	is the added installed capacity of thermal power generation sources (MW) in year *y*
$CAP_{total,y}$	=	is the total added installed capacity of all kinds of power generation sources (MW) in year *y* which comprises at least 20 per cent of the existing installed capacity

.

Key parameters used to calculate BM emission factor include the low calorific value of each fossil fuel, the oxidation rate, the potential emission factors, and the efficiency of various power generation technologies. The data of low calorific value of each fossil fuel and their oxidation rate comes from China Energy Statistical Yearbook 2016. The potential emission factors are sourced from *"2006 IPCC Guidelines for National Greenhouse Gas Inventories*" Table 1.3 and Table 1.4 of Page 1.21-1.24 in Chapter one, Volume 2 Energy.

According to the latest and available data at the time of this PDD submission, $EF_{grid,BM,y}$ is calculated to be 0.4578 tCO_2e/MWh. Please refer to appendix 4 for the details of calculation.

Step 6: Calculate the combined margin emissions factor

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

(a) Weighted average CM; or

(b) Simplified CM.

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

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

(a) 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
(b) The data requirements for the application of step 5 above cannot be met.

The PDD choose option A.

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times \omega_{OM} + EF_{grid,BM,y} \times \omega_{BM} \quad (10)$$

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh)

$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (tCO_2/MWh)

ω_{OM} = Weighting of operating margin emissions factor (per cent)

ω_{BM} = Weighting of build margin emissions factor (per cent)

As specified in "Tool to calculate the emission factor for an electricity system" (Version 07.0), the wind power project shall use ω_{OM}=0.75 and ω_{BM} =0.25 for the first crediting period, and for the subsequent crediting periods.

For the project, ω_{OM} = 0.75 and ω_{BM} =0.25 are applied for the second crediting period.

$EF_{grid,CM,y}$ = 0.9680×0.75 + 0.4578×0.25 = 0.84045 tCO_2e/MWh

Project Emission calculation:

As per the applied methodology ACM0002, for most renewable energy power generation activities, $PE_y = 0$.

Leakage:

As per the applied methodology ACM0002, no project emissions are considered.

Emission Reductions:

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad (11)$$

Where:

ER_y = Emission reductions in year y (tCO_2e/yr)

BE_y = Baseline emissions in year y (tCO_2e/yr)

PE_y = Project emissions in year y (tCO_2e/yr)

B.6.2. Data and parameters fixed ex ante

Data / Parameter	$EF_{grid,OM,y}$
Date unit	tCO_2e/MWh
Description	Operating margin emission factor for North China Power Grid
Source of data	"2017 Baseline Emission Factors for Regional Power Grids in China" published by Chinese DNA
Value(s) applied	0.9680
Choice of data or Measurement methods and procedures	Calculated as per the latest version of "Tool to calculate the emission factor for an electricity system" (version 07.0) by Chinese DNA
Purpose of data	Calculation of $EF_{grid,CM,y}$
Additional comment	Calculated ex ante and fixed for the second crediting period

Data / Parameter	$EF_{grid,BM,y}$
Date unit	tCO_2e/MWh
Description	Build margin emission factor for North China Power Grid
Source of data	"2017 Baseline Emission Factors for Regional Power Grids in China" published by Chinese DNA
Value(s) applied	0.4578
Choice of data or Measurement methods and procedures	Calculated as per the latest version of "Tool to calculate the emission factor for an electricity system" (version 07.0) by Chinese DNA
Purpose of data	Calculation of $EF_{grid,CM,y}$
Additional comment	Calculated ex ante and fixed for the second crediting period

Data / Parameter	ω_{OM}
Date 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(s) applied	0.75
Choice of data or Measurement methods and procedures	-
Purpose of data	Calculation of $EF_{grid,CM,y}$
Additional comment	Calculated ex ante and fixed for the second crediting period

Data / Parameter	ω_{BM}
Date unit	-
Description	Weighting of build margin emissions factor
Source of data	"Tool to calculate the emission factor for an electricity system" (version 07.0)
Value(s) applied	0.25
Choice of data or Measurement methods and procedures	-
Purpose of data	Calculation of $EF_{grid,CM,y}$

Additional comment	Calculated ex ante and fixed for the second crediting period

Data / Parameter	$EF_{grid,CM,y}$
Date unit	tCO_2e/MWh
Description	Baseline emission factor for North China Power Grid
Source of data	"2017 Baseline Emission Factors for Regional Power Grids in China" published by Chinese DNA
Value(s) applied	0.84045
Choice of data or Measurement methods and procedures	Calculated as per the latest version of "Tool to calculate the emission factor for an electricity system" (version 07.0) by Chinese DNA
Purpose of data	Baseline emission calculation
Additional comment	Calculated ex ante and fixed for the second crediting period

B.6.3. Ex ante calculation of emission reductions

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Baseline emission:

$BE_y = EG_{PJ,y} * EF_{grid,CM,y} = EG_{facility,y} * EF_{grid,CM,y} = (EG_{PJtoGRID,y} – EG_{GRIDtoPJ,y}) * EF_{grid,CM,y}$

$= (275{,}946.5\ MWh^6 - 0\ MWh^4) * 0.84045\ tCO_2e/MWh = 231{,}919\ tCO_2e$

Project Emission:

The project is a Greenfield wind power plant. No fossil fuels are combusted during operation of the project, as per the applied methodology ACM0002, the project emission is zero.

Leakage:

As per the applied methodology ACM0002, no leakage emissions are considered.

Emission Reduction:

$ER_y = BE_y – PE_y = BE_y – 0 = BE_y = 231{,}919\ tCO_2e$

B.6.4. Summary of ex ante estimates of emission reductions

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
20/09/2018-19/09/2019	231,919	0	0	231,919
20/09/2019-19/09/2020	231,919	0	0	231,919
20/09/2020-19/09/2021	231,919	0	0	231,919
20/09/2021-19/09/2022	231,919	0	0	231,919
20/09/2022-19/09/2023	231,919	0	0	231,919
20/09/2023-19/09/2024	231,919	0	0	231,919
20/09/2024-19/09/2025	231,919	0	0	231,919
Total	1,623,433	0	0	1,623,433
Total number of crediting years	7			
Annual average over the crediting period	231,919	0	0	231,919

[6] As stated in section B.7.1, this value is from FSR only used for ex ante estimation.

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data/Parameter	$EG_{PJtoGRID,y}$
Data unit	MWh
Description	Electricity delivered by the Project to the grid in year y
Source of data	The data used in the PDD are calculated with the electricity generation estimated in Bidding Assessment Document (290.47 GWh) and the rate of auxiliary electricity consumption in the FSR (5%). Actual data will be obtained through on-site measurement.
Value(s) applied	275,946.5
Measurement methods and procedures	Continuously measured by bi-directional meters (one main meter, and one backup meter) installed at the North Long Yuan Huitengxile Wind Farm 220 kV Step-up Substation and monthly recorded. The accuracy of the meters is 0.2S. The Power Grid Company and the project owner will be responsible for reading and recording the meter readings.
Monitoring frequency	Continuous measurement and monthly recording
QA/QC procedures	The meters will be calibrated once a year according to the relevant national rules, such as Verification Regulation of Electrical Energy Meters with Electronics (JJG 596-2012). Receipt(s) is used for crosscheck.
Purpose of data	Baseline emission calculation
Additional comment	-

Data/Parameter	$EG_{GRIDtoPJ,y}$
Data unit	MWh
Description	Electricity imported by the Project from the grid in year y
Source of data	Assumed as zero in the PDD. Actual data will be obtained through on-site measurement.
Value(s) applied	0
Measurement methods and procedures	Continuously measured by bi-directional meters (one main meter, and one backup meter) installed at the North Long Yuan Huitengxile Wind Farm 220 kV Step-up Substation and monthly recorded. The accuracy of the meters is 0.2S. The Power Grid Company and the project owner will be responsible for reading and recording the meter readings.
Monitoring frequency	Continuous measurement and monthly recording
QA/QC procedures	The meters will be calibrated once a year according to the relevant national rules, such as Verification Regulation of Electrical Energy Meters with Electronics (JJG 596-2012). Receipt(s) is used for crosscheck.
Purpose of data	Baseline emission calculation
Additional comment	-

Data/Parameter	$EG_{facility,y}$
Data unit	MWh
Description	Net electricity generation supplied by the Project to the grid in year y
Source of data	The data used in the PDD are calculated with the electricity generation estimated in Bidding Assessment Document (290.47GWh) and the rate of auxiliary electricity consumption in the FSR (5%). Actual data will be obtained through on-site measurement.
Value(s) applied	275,946.5

Measurement methods and procedures	This parameter is determined through calculating the difference between the electricity supplied to and drawn from the grid (NCPG) by the Project, which are measured continuously and recorded at least monthly, as follows: $EG_{facility,y} = EG_{PJtoGRID,y} - EG_{GRIDtoPJ,y}$ Where, $EG_{PJtoGRID,y}$ Electricity delivered by the Project to the grid in year y (MWh) $EG_{GRIDtoPJ,y}$ Electricity imported by the Project from the grid in year y (MWh)
Monitoring frequency	Continuously measured by bi-directional meters (one main meter, and one backup meter) installed at the North Long Yuan Huitengxile Wind Farm 220 kV Step-up Substation and monthly recorded.
QA/QC procedures	N/A
Purpose of data	Baseline emission calculation
Additional comment	N/A

B.7.2. Sampling plan

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Not applicable.

B.7.3. Other elements of monitoring plan

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1. Monitored Data

The ex-ante determined baseline emission factor is adopted. The electricity delivered by the Project to the grid ($EG_{PJtoGRID,\ y}$) and the electricity imported by the Project from the grid ($EG_{GRIDtoPJ,y}$) is monitored.

2. Monitoring System Organization Chart

The monitoring system is shown in Figure 3 and implemented by the Project Owner.

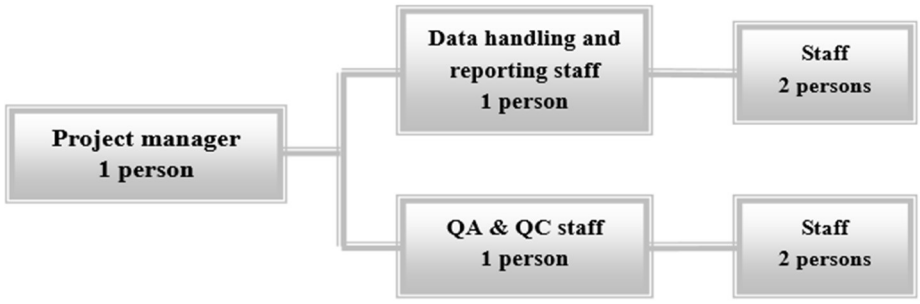

Figure 3: The monitoring system

The Project Manager is responsible for implementation and supervision of the monitoring activity and liaison in this CDM project. The data handling and reporting personnel are responsible for managing, processing and submitting data. The QA & QC personnel are responsible for calibration of meters and supervision of the whole process quality.

3. Installation of Meters

The net electricity generation supplied by the Project to the grid is measured continuously by a main meter installed at the North Long Yuan Huitengxile Wind Farm 220 kV Step-up Substation and recorded monthly. A backup meter is also installed at the North Long Yuan Huitengxile Wind Farm 220 kV Step-up Substation at the same place with the identical type and scale as the main meter. Both of these meters are bi-directional meters. Once there is a malfunction of the main meter, data recorded on the backup meter will be used.

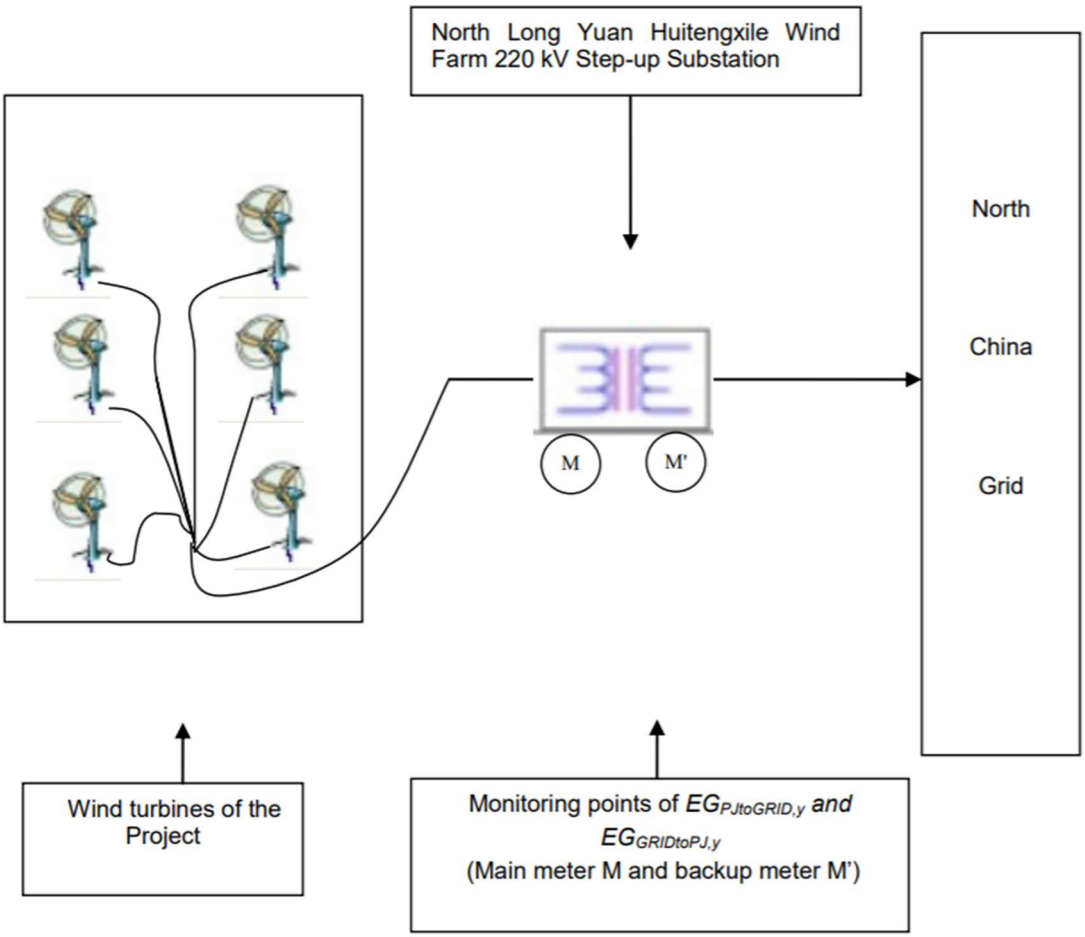

Figure 4: The monitoring point of the Project

4. Precision of Meters

The measurement precision of the meters employed by the Project is at least 0.5s.

5. Calibration of Meters

The meters of the Project is calibrated by qualified third entity(ies) once a year, which is in compliance with the requirement of Verification Regulation of Electrical Energy Meters with Electronics (JJG 596-2012).

6. Data Management System

Particular staff is appointed by the Project Owner to take the overall responsibility for monitoring emission reductions and keeping all the data collected as part of monitoring archived electronically and kept at least for two years after the end of the last crediting period.

Electronic data and documents, including readings from meters connected into the computer central control system, are regularly copied and archived via optical discs and storage tapes, and kept at least for two years after the end of the last crediting period or two years after the last issuance of CERs.

Written data and documents, including receipts for cross-checking of data, are copied and archived with an explanation of the department or company where the original copy is kept, and kept for at least two years after the end of the last crediting period or two years after the last issuance of CERs.

7. Quality Assurance and Quality Control Procedure

The Project Manager is responsible for planning the regular calibration and ensuring that records are retained. Particular QC staff is appointed by the Project Owner to take the overall responsibility of calibrating monitoring equipment, managing and processing the monitored data according to

QA/QC procedure provided in Section B.7.1. If something unusual, the Project Manager should be immediately informed.

Data records are reviewed by QA staff prior to storage and archive in order to identify potential errors as well as for completeness purpose. Periodic internal audits on CDM management are conducted by Project Owner on an annual basis and spot checks can be carried out taking into account the evaluation outcomes of previous internal audit.

When erroneous measurement is detected by operators involved in implementation of the monitoring plan, the erroneous measurement should be reported to the Project Manager instantly. The Project Manager takes the responsibility to handle the erroneous measurement as follows:

If the reason for erroneous measurement is the malfunction of the meters, use the data automatically obtained and saved by the computer system as backup.

If the erroneous measurement is made by employees in charge of recording, use the data automatically obtained and saved by the computer system as backup. At the same time, training courses will be re-arranged for relevant employees to ensure the correct implementation of the monitoring plan, so as to prevent error.

8. Preparation for Verification

Besides the recorded data and the documents for cross-check required in Section B.7.1, other documents are prepared by the Project Owner for verification by the DOE including, but not limited to:

PDD (registration version), including the electronic spreadsheets and supporting documents (assumptions, estimations, measurement, etc);

Documents relevant to quality control and quality assurance;

Report on necessary maintenance and calibration of meters.

SECTION C. Start date, crediting period type and duration

C.1. Start date of project activity

>>
13/02/2007 (Civil Engineering Contract of the Project was signed.)

C.2. Expected operational lifetime of project activity

>>
20 years 0 month

C.3. Crediting period of project activity

C.3.1. Type of crediting period

>>
Renewable crediting period (second).

C.3.2. Start date of crediting period

>>
20/09/2018

C.3.3. Duration of crediting period

>>
7 years 0 month

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>

The Environmental Impact Statement Form was completed by Institute of Power Exploring and Designing, Inner Mongolia in June 2004 and approved by Environmental Protection Bureau of Inner Mongolia Autonomous Region on June 7, 2005. According to the Environmental Impact Statement Form, environmental impacts possibly caused by the Project and treatment measures adopted by the Project Owner are analysed as follows:

Land use

The Project is constructed on the grasslands of Huitengliang stud farm. Neither the land in other villages nor the farmland is occupied during construction of the Project. Currently, the Huitengliang stud farm has a meadow with an area of about 4.3 million m^2. The land to be permanently occupied by the Project is about 2,362 m^2. It accounts for 0.55% of the meadow area and has relatively small impact on animal husbandry production in the stud farm. During the construction period, the land is used for only one to two years. Taking recovery time into consideration, the maximum time of period is three years. The land is returned to Huitengliang stud farm upon completion of the construction. Use of this area is planned to be strictly monitored and enforced during construction to ensure that no random tread or inappropriate occupation of the meadow take place. Therefore, the Project's impact on production activities in the area and living conditions of local villagers is insignificant.

Natural landscape

The wind turbine is erected on the south-east side of the existing wind farm. The local residents believe that many wind turbines standing upright on the grasslands would not destroy the local natural landscape, rather would create beautiful scenery.
In addition, once the first stage of construction is completed, this may become a local tourist attraction. The local community could benefit from tourism revenues that the Project may generate. For this reason, the construction of the Project is perceived to have a positive impact on local scenery.

Noise

The noise level of the wind turbines to be used in the Project is about 90 dB(A). The operators work mainly in the control room, which is quite far from the wind turbines. Therefore, the impact of noise on the health of operators is not significant. For the personnel who works on equipment repair and maintenance, it is believed that the noise generated by the Project doesn't have any significant impact on the health of these personnel since the working time for repair and maintenance is short.

Overall, the Project utilize advanced equipment. It neither produces pollutants such as air, liquid and solid wastes during the construction of the Project, nor produces serious electromagnetic interference and noise pollution that can negatively impact the local environment. Instead, the Project generates clean energy to replace coal fired power plants and thereby greatly reduces air pollution in the surrounding environment, with significant health benefits. The Project is practicable in view of environmental protection and no significant environmental impact is identified.

In spite of the fact that no significant negative environmental impact is found to be associated with the Project, an environment management plan is provided as follows:

Table 3 Environmental management plan during construction of the Project

Stage	Content	Mitigating measures	Unit in charge
Construction	Permanent harm to land during	1. Reduce road occupation during construction following design requirements.	Construction unit The Project Owner

	construction and maintenance of the Project	2. Only the maintenance road was used during maintenance and no other land was occupied. This requirement was enforced according to certain related rules and some road landmarks.	
	Construction noise	1. Machines with “high noise” had a specific approximate value of 85 dB (A). 2. Control the operation time of machines with high noise. The operation time of machines was from 6:00 a.m. to 8:00 p.m.	Construction unit
	Excavation of foundation for wind turbines	Rocks during excavation of the foundation for wind turbines were loosened by standing shot. Because rocks may damage grasslands, they must be moved away from grasslands.	Construction unit
	Wind turbine on-site installation	1. Delimit installation site. 2. Place various machines and equipment in position designated by design requirements; did not place them randomly in order to effectively control land occupation.	Construction unit
	Truck transportation	1. It was required that trucks must run on certain specified roads, and just not anywhere in order to better protect grasslands. This could be enforced together with other measures, such as setting road blocks, signage and supervision. 2. The road was used as maintenance road after construction is completed.	Construction unit The Project Owner
	Spoil produced during construction	Local ESP had approved that 50% of spoil was backfilled into wind turbine foundation and 50% fill in the nearby gully.	Construction unit The Project Owner
Operation	Maintenance road	Make plans on existing roads as far as possible and reduce meadow occupation at a maximum limit.	The Project Owner
	Noise from operation of wind turbines	1. Select equipment with low noise. Specify an approximate value (in dB[A]) for “low noise”. (The approximate value of low noise is not higher than 103dB(A)) 2. Operators work in control room. 3. Keep enough distance from residential areas.	Design unit Construction unit The Project Owner
	Permanent harm to land during maintenance of the Project	During the maintenance of the Project in order to avoid damaging grasslands, it is necessary to make rules to limit where vehicles can go and enforce these rules.	Construction unit The Project Owner
	Power transmission lines	1. Install power transmission lines outside residential areas. 2. Ground distance should meet the requirement of the design criterion. According to Design Specification for 110 kV - 220 kV Power Transmission Lines (DL/P5092) issued in 1999, the design criterion is more than 6 m.	Design unit The Project Owner

Note: The responsibility of the contractors listed above is clarified in tender documents and the final contract.

Responsibility and measures

Based on Environmental Impact Evaluation Law, the Wulanchabu Research Institute takes the responsibility for the evaluation of the project plans and the environmental impacts which are caused by construction and operation of the Project. Additionally, they develop countermeasures to prevent or reduce any negative environmental impacts, and make tracing measurement.

In summary, by means of measures of pollution avoidance and control as well as ecological recovery, the Project does not impact the environment.

D.2. Environmental impact assessment

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Environmental impacts of the Project are considered not significant by the Project Participants. Environmental impacts of the Project comply with relevant laws and regulations of the host country. Therefore, it is not necessary to provide additional information for the Project in this Section.

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

>>

Stakeholders of the Project are identified as local residents possibly affected by the Project. During the environmental impact evaluation and environmental protection design of the Project in April 2004, a survey was conducted on the stakeholders of the Project, through distributing and collecting responses to a questionnaire.

The questionnaire is distributed to the local residents near the Project Site. They are of different ages and occupations, coming from different towns and villages. 50 questionnaires were sent out to the stakeholders and 38 respondents filled out the questionnaires. According to the 38 questionnaires returned, the basic structure of the respondents is illustrated in Table 4.

Table 4 Structure of the respondents

Structure of educational level		
Educational level	No.	Percentage (%)
Primary school	1	3
Junior middle school	29	76
Senior middle school	6	16
Technical college or university	0	0
Blank	2	5

Structure of age		
Age	No.	Percentage (%)
Below 30	0	0
31~40	12	32
41~50	11	29
51 and above	7	18
Blank	8	21

The questionnaires mainly focus on the following issues:

- Are the stakeholders' current environment of living, working and studying quiet?
- Is there electromagnetic radiation interference when the stakeholders are watching TV at home?
- What's the attitude of the stakeholders on the construction of the Project to them and their family life?
- Is the Project beneficial in terms of improving working and living environment?
- What impacts on noise environment will be introduced by the construction of the Project?
- Do the stakeholders support construction of the Project?

E.2. Summary of comments received

>>

The statistics results can be summarized as follows:

(1) Current living, working and studying environment are quiet; all respondents are satisfied.

(2) 82% of respondents think that there is no electromagnetic radiation interference when they are watching TV at home, 15% think that the impact exists, and 3% are not sure.

(3) 79% of respondents think that the Project has no negative impact on their family life, 18% think that the impact exists, and 3% are not sure.

(4) 79% of respondents think that the Project is beneficial in terms of improving working and living environment, 18% think there will be no improvement, and 3% are not sure.

(5) 39% of respondents think that the construction of the Project has no significant noise impact, 8% think that the impact exists, and 53% are not sure.

(6) 18% of respondents are more concerned about electromagnetic interference, and 82% are more concerned about noise than other impacts mentioned above.

(7) 100% of respondents supported the construction of the Project.

During investigation, most respondents have expressed the view that they think the Project would improve local economic conditions and would contribute toward sustainable development of the economy. All respondents think that the meadow should be protected and the environment should be protected during construction and local residents should be hired to do construction work.

In general, local residents care very much about the Project and are generally supportive of it. They also expressed their opinions on environmental problems that the Project may bring about. They have paid attention to the environmental impacts which may result from the Project and have also

considered certain prevention measures which should be taken during design of the Project if needed.

E.3. Consideration of comments received

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We know from the results of questionnaire statistics that all the stakeholders understand and support the construction of the Project. As a result, the Project does not need to be re-designed.

The issue of noise considered by the respondents and corresponding prevention and control measures have been analysed in Section D.1 of the PDD. The Project Owner will take measures to ensure that there will be no noise pollution to the local environment.

The issue of electromagnetic interference concerned by the respondents and corresponding prevention and control measures have been analysed in Section D.1 of the PDD, the ground distance from the box type transformer substation and 35 kV wind farm switching station to the wind farm control centre meets the requirement of the design criterion. According to Design Specification for 110 kV-220 kV Power Transmission Lines (DL/P5092) issued in 1999. Electromagnetic interference generated by the transformer equipment has insignificant impacts on to the surroundings considering range attenuation and shielding effect of the equipment cover and cover and case.

Based on the suggestions of the local villagers, the Project Owner makes special efforts to hire local villagers to do construction work. Additionally, the Project Owner has agreed to implement the environmental management plan to address some of the residents' concerns regarding environmental impacts occurred during construction of the Project.

SECTION F. Approval and authorization

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The Letter of Approval from China's DNA, National Development and Reform Commission, was issued on 07/11/2006 and has been uploaded with the registration.

Appendix 1. Contact information of project participants

Organization name	Inner Mongolia North Long Yuan Wind Power Company
Country	People's Republic of China
Address	Xi Lin South Road, Power Mansion, Huhhot, Inner Mongolia Autonomous Region
Telephone	+86-471-6221455
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E-mail	qqb_2008@sina.com
Website	-
Contact person	Liu Xiaochun

Appendix 2. Affirmation regarding public funding

Not applicable. There is no public funding from UNFCCC Annex 1 parties for the project.

Appendix 3. Applicability of methodologies and standardized baselines

The applicability of the selected methodology is described in B.2.

Appendix 4. Further background information on ex ante calculation of emission reductions

The baseline information for calculation of OM, BM and CM emission factors of North China Power Grid is shown in the 2017 Baseline Emission Factors for Regional Power Grid in China issued by China's DNA on 20/12/2018 at:
http://qhs.mee.gov.cn/kzwsqtpf/201812/P020181220579925103092.pdf

The CM emission factor $EF_{Grid, CM, y}$=0.75*0.9680+0.25*0.4578=0.84045 (tCO_2/MWh)

The value of parameters above that are not monitored throughout the second crediting period are based on the most recent data source available at the time of submission of the PDD.

Appendix 5. Further background information on monitoring plan

All the details on monitoring plan are described in B.7.

Appendix 6. Summary report of comments received from local stakeholders

All the details on comments received from local stakeholders are described in section E.

Appendix 7. Summary of post-registration changes

Not applicable.

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Document information

Version	*Date*	*Description*
11.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN); • Make editorial improvements.
10.1	28 June 2017	Revision to make editorial improvement.
10.0	7 June 2017	Revision to: • Improve consistency with the "CDM project standard for project activities" and with the PoA-DD and CPA-DD forms; • Make editorial improvement.
09.0	24 May 2017	Revision to: • Ensure consistency with the "CDM project standard for project activities" (CDM-EB93-A04-STAN) (version 01.0); • Incorporate the "Project design document form for small-scale CDM project activities" (CDM-SSC-PDD-FORM); • Make editorial improvement.
08.0	22 July 2016	EB 90, Annex 1 Revision to include provisions related to automatically additional project activities.
07.0	15 April 2016	Revision to ensure consistency with the "Standard: Applicability of sectoral scopes" (CDM-EB88-A04-STAN) (version 01.0).
06.0	9 March 2015	Revision to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Make editorial improvement.
05.0	25 June 2014	Revision to: • Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from F-CDM-PDD to CDM-PDD-FORM; • Make editorial improvement.
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.

Version	*Date*	*Description*
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

Decision Class: Regulatory
Document Type: Form
Business Function: Registration
Keywords: project activities, project design document