Project design document form

(Version 10.1)

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

BASIC INFORMATION	
Title of the project activity	Inner Mongolia Wulanchabu Hongji Wind Farm Project
Scale of the project activity	☒ Large-scale ☐ Small-scale
Version number of the PDD	2.0
Completion date of the PDD	02/01/2019
Project participants	CGNPC (Wulanchabu) Wind Power Co., Ltd.
Host Party	P.R. China
Applied methodologies and standardized baselines	Methodology: ACM0002 “Grid-connected electricity generation from renewable sources” (Version 19.0)
Sectoral scopes linked to the applied methodologies	Sectoral scope 1: Energy industries (renewable / non-renewable sources)
Estimated amount of annual average GHG emission reductions	610,488tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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Inner Mongolia Wulanchabu Hongji Wind Farm Project (the proposed project) is located in Wulanchabu City, Inner Mongolia Autonomous Region. The proposed project activity is developed by CGNPC (Wulanchabu) Wind Power Co., Ltd. (the project developer). The proposed project activity is to install and operate 315 wind turbines, with a total installed capacity of 296.5 MW and the average lifetime of the equipment based on the manufacturer's specifications is 20 years. Once fully operational, the proposed project activity is expected to deliver on average approximately 726,383 MWh of electricity per year to North China Power Grid (NCPG). The purpose of the proposed project activity is the generation of electricity from wind and the supply of this electricity to NCPG.

The baseline scenario, which is the same as the scenario existing prior to the implementation of the proposed project activity, is the generation of electricity by grid-connected power plants.

As the Grid is dominated by fossil fuel-fired power generation, the establishment of the Project Activity is leading to greenhouse gas (GHG) emission reductions. The Project Activity was registered on 04/03/2011 (Ref.4150) and the first crediting period is 04/03/2011 – 03/03/2018. Following the methodology, the emission reductions of the second crediting period (04/03/2018-03/03/2025) are estimated to be on average 610,488 tonnes of CO_2 equivalent (tCO_2e) per year, and 4,273,416 tCO_2e over the chosen crediting period.

The net generation to be monitored will be measured continuously and recorded monthly. It will suffice for the purpose of billing and emission reductions, as long as the error in the meters is within the allowable limits. The main meter used for billing (at the entrance of the grid substation) will also be the primary meter used for emission reduction calculations.

• Meter 2, the main meter, is installed at the entrance of 500kV Qixiaying Substation, as shown in the flow diagram, Figure 2.

• Meter 1, the backup meter, is installed at the exit of 220kV Hongji Substation, as shown in the flow diagram, Figure 2.

Sustainable development

The proposed project activity will help the local government to promote economic development and to improve the air quality. The project will assist China in stimulating and accelerating the commercialisation of grid-connected wind power technologies and markets which are an important objective of the Chinese government. The project will therefore help reduce GHG emissions versus the high-growth, coal-dominated business-as-usual scenario. The project will improve air quality and local livelihoods, promote sustainable renewable energy industry development.

The proposed project activity will contribute to sustainable development in the following ways:

• It will promote local economic development by creating local employment opportunities during both the construction and operational phase of the proposed project activity.
• It will generate electricity from renewable sources.
• It will promote technology development, through the use of advanced technology.
• It will reduce GHG emissions in China compared to the baseline/business-as-usual scenario.
• It will reduce the emissions of other pollutants associated with the operation of fossil fuel-fired thermal power plant, including SO_2 and soot, as well as reducing thermal pollution from cooling water in the baseline/business-as-usual scenario.

A.2. Location of project activity

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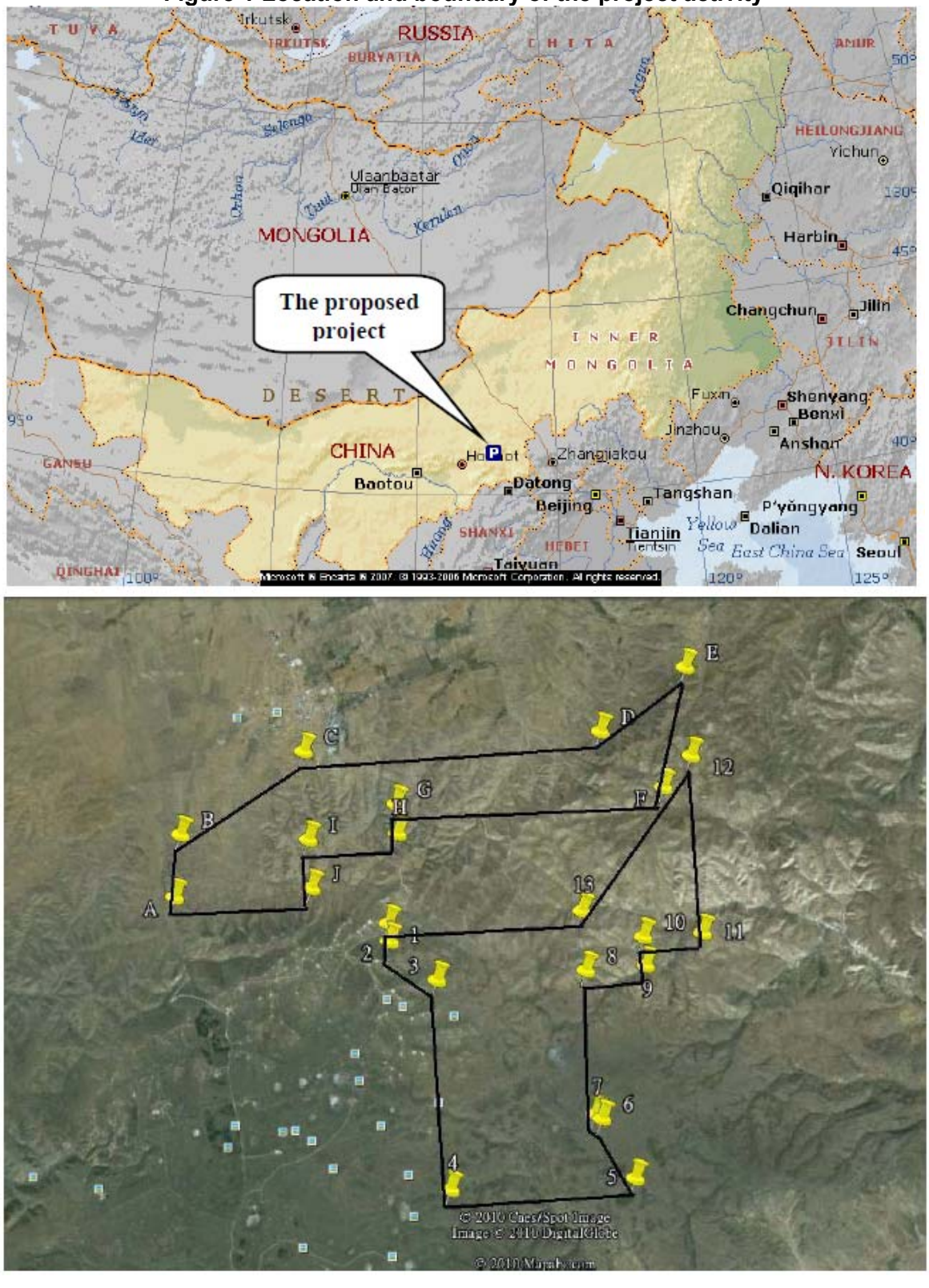
The Project is sited within Wulanchabu City in the Inner Mongolia Autonomous Region, China. The Project has geographical coordinates with east longitude of 112º34'00.28"~112°46'41.26" and north latitude of 41º06'58.80"~41°16'06.67".

Figure 1 shows the location and boundary of the project site.

Figure 1 Location and boundary of the project activity



As showed in Figure 1, the geographic range of proposed project includes South Area and North Area. As per Certificate on the Geo-coordinates of the Project Boundary Corners issued by the FSR design institute, the geo-coordinates values are summarized below.

South Area	Latitude	Longitude	North Area	Latitude	Longitude
1	41°11′54.18″N	112°39′03.82″E	A	41°12′42.17″N	112°34′00.28″E
2	41°11′34.73″N	112°39′03.34″E	B	41°13′50.05″N	112°34′14.78″E
3	41°10′48.44″N	112°40′06.53″E	C	41°15′10.11″N	112°37′21.38″E
4	41°07′01.63″N	112°40′00.78″E	D	41°15′03.84″N	112°44′30.71″E
5	41°06′56.80″N	112°44′26.09″E	E	41°16′06.67″N	112°46′41.26″E
6	41°08′04.28″N	112°43′45.90″E	F	41°13′57.73″N	112°45′54.83″E
7	41°08′09.76″N	112°43′36.87″E	G	41°14′03.47″N	112°39′28.55″E
8	41°10′45.28″N	112°43′40.95″E	H	41°13′31.07″N	112°39′27.73″E
9	41°10′45.28″N	112°45′07.59″E	I	41°13′32.91″N	112°37′18.98″E
10	41°11′16.39″N	112°45′07.59″E	J	41°12′39.44″N	112°37′17.66″E
11	41°11′15.07″N	112°46′33.36″E			
12	41°14′29.47″N	112°46′38.63″E			
13	41°11′50.08″N	112°43′42.66″E			

A.3. Technologies/measures

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The project scenario is the installation of 290 wind turbines with a capacity of 850 kW and 25 wind turbines with a capacity of 2,000 kW. The equipment is manufactured in China by Vestas Wind Technology (China) Co., Ltd.. There is no technology transferred from Annex I Parties involved in the proposed project. The technology specifications applied is shown in Table 1.

Table 1 Technology specifications

Manufacturer	**Vestas Wind Technology (China) Co., Ltd.**	
Model	V52-850kW	V80-2.0MW
Quantity	290 units	25 units
Power Rating	850 kW	2,000 kW
Rated voltage	690 V	690 V
Rotor diameter	52 m	80 m
Hub height	65 m	67 m
Cut-in wind speed	4 m/s	4 m/s
Rating wind speed	18 m/s	19 m/s
Cut-out wind speed	25 m/s	25 m/s
Lifetime	20 years	20 years

Every turbine will have a transformer from 690 V to 35 kV. All turbines are connected to 220 kV Hongji Substation. Hongji Substation is connected via a 220 kV transmission line to 500 kV Qixiaying Substation, through which the power generated is transferred to NCPG.

The proposed project activity is estimated to supply on average approximately 726,383 MWh of renewable electricity per year to NCPG once fully operational. The expected load factor of 28.0% is determined by an independent qualified design institute in the Supplementary Feasibility Study Report (SFSR) using detailed onsite information and long-term local wind data, in accordance with EB guidance on plant load factors (EB48 Annex 11).

The generation and consumption of the proposed project activity is monitored continuously through an electronic control and monitoring system in the onsite office. For the purpose of invoicing for generation and consumption, electricity meters in 500 kV Qixiaying Substation are used. The data from 500 kV Qixiaying Substation is used for the calculation of emission reductions, and records for sold electricity are used for cross-referencing.

Prior to the implementation of the project activity, the electricity was generated by grid-connected power plants. Without the implementation of the project, this scenario would have continued and this is considered as the baseline scenario.

As NCPG is dominated by thermal power generation, the establishment of the proposed project activity will lead to greenhouse gas (GHG) emission reductions, estimated following the baseline methodology below.

A.4. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
P.R. China (host Party)	CGNPC (Wulanchabu) Wind Power Co., Ltd.	No

A.5. Public funding of project activity

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The Project Activity has not received public funding from Parties included in Annex I.

A.6. History of project activity

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The project was registered as CDM project on 04/03/2011, the reference no. is 4150. The PDD is renewal of crediting period. Therefore, it can be confirmed that:

(a) The proposed CDM project activity is not 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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The proposed project is a large-scale project, therefore, not applicable.

SECTION B. Application of selected methodologies and standardized baselines

B.1. Reference to methodologies and standardized baselines

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The approved large-scale consolidated methodology applied in the project is ACM0002 “Grid-connected electricity generation from renewable sources” (Version 19.0, EB100, 2018). For more information regarding the methodology please refer to
http://cdm.unfccc.int/methodologies/DB/VJI9AX539D9MLOPXN2AY9UR1N4IYGD

The project activity also refers to:

1. "Tool for the demonstration and assessment of additionality (version 07.0.0)".
   http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf
2. "Tool to calculate the emission factor for an electricity system" (Version 07.0).
   http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf
3. 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).
   http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf

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 is applicable to the proposed project activity, because:

Applicability	Conclusion
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 proposed project is the installation of a Greenfield power plant;
The methodology is applicable under the following conditions: (a) The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit; (b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects) the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.	a) The proposed project is the installation of a wind power plant. b) Not applicable. The proposed project is a Greenfield plant and does not represent a capacity addition, retrofits, rehabilitations or replacement.
In case of hydro power plants, one of the following conditions shall 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 reservoir(s) is increased and the power density, calculated using equation (3), is greater than 4 W/m2; 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/m2; 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/m2, 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/m2; (ii) Water flow between reservoirs is not used by any other	Not applicable. The proposed project is the installation of a wind power plant.

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.	
In the case of integrated hydro power projects, project proponent shall: (a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or (b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore, this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.	Not applicable. The proposed project is the installation of a wind power plant.
The methodology is not applicable to the following: (a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; (b) Biomass fired power plants/units.	a) Not applicable. The proposed project does not involve switching from fossil fuels to renewable energy at the site of the proposed project. b) Not applicable. The proposed project is a wind power plant.
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 implementation of the project activity and undertaking business as usual maintenance".	Not applicable. The proposed project is the installation of a wind power plant and not a retrofits, rehabilitations or replacement or capacity additions.
Applicability conditions of "Tool to calculate the emission factor for an electricity system", - Version 07.0	
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).	This condition is applicable. OM, BM and CM are estimated using the tool under section B.6.3 for calculating baseline emissions.
Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, two sub-options under the step 2 of the tool are available to the project participants, i.e. option IIa and option IIb. If option IIa is chosen, the conditions specified in"Appendix 2: be met. Namely, the total capacity of off-grid Procedures related to off-grid power generation" should power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity	Since the proposed project is grid connected, this condition is applicable and the emission factor has been calculated accordingly.

generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	
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 proposed project is located in China, a non-Annex I country. Therefore, this criterion is not applicable for the project activity.
Under this tool, the value applied to the CO_2 emission factor of biofuels is zero.	The proposed project is a grid connected wind power project/ unit and does not involve emission from biofuels. Therefore, this criterion is not applicable.

Therefore, the project is in accordance with the applicability of methodology ACM0002 (Version 19.0).

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

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Spatial boundary

The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to.

The project electricity system is defined by 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.

As the DNA of China has published a delineation of the project electricity system and connected electricity systems, these delineations are used. According to the delineation of grid boundaries as provided by the DNA of China, NCPG includes Beijing, Tianjin, Hebei, Shanxi, Inner Mongolia and Shandong. NCPG is the project electricity system, as the power plants that are connected to NCPG can be dispatched without significant transmission constrains. The connected electricity system is Northeast Power Grid (NEPG), consisting of three provincial grids: Jilin, Liaoning and Heilongjiang, and Central China Power Grid (CCPG), consisting of six provincial grids: Jiangxi, Henan, Hubei, Hunan, Chongqing and Sichuan.

Emission sources and gases

The greenhouse gases and emission sources included in or excluded from the project boundary are shown in the table below.

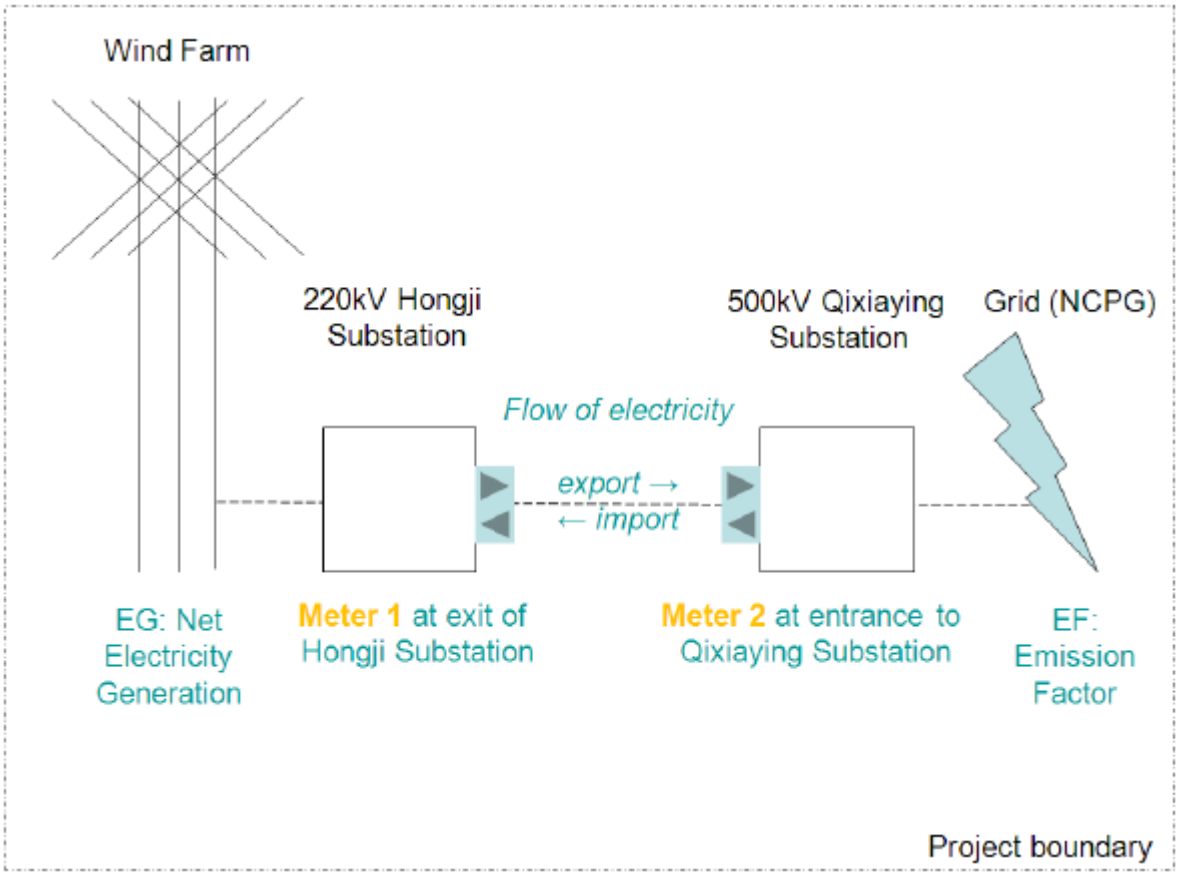
Following the methodology, only CO_2 emissions from electricity generation by fossil fuel fired power plant that is displaced due to the project activity are taken into account for determining the baseline emissions. According to the methodology, project emissions from geothermal, solar thermal and hydro power plants need to be taken into account; there are no project emissions for a wind power plant.

The sources and types of GHG included in the project boundary are listed below.

Source		Gas	Included	Justification/explanation
Baseline	Grid	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project activity	None	CO_2	No	According to ACM0002, the project emission of renewable energy project activity is zero.
		CH_4		
		N_2O		

A flow diagram of the project boundary is presented in Figure 2 below. The flow diagram physically delineates the project boundary, includes the flow of electricity and represents the emissions included (EF: emission factor) and the monitoring variable (EG: net electricity generation).

Figure 2 Flow diagram of the project boundary



B.4. Establishment and description of baseline scenario

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The Project Activity is the installation of a new Greenfield power plant, and is not a capacity addition, retrofit, rehabilitation or replacement of existing grid-connected renewable power plant/unit. Therefore, the baseline scenario is prescribed in the methodology:

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

According to the ACM0002 (version 19.0) 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 3.0.1) 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.

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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Not applicable for the second crediting period.

In accordance with the procedures for renewal of the crediting period of a registered CDM project activity and the applied methodology, it does not require a reassessment of the baseline scenario

or additionality, it is only required to assess whether the original project baseline is still valid or has been updated taking account of new data where applicable.

B.6. Estimation of emission reductions

B.6.1. Explanation of methodological choices

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1. 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, therefore, there are no project emissions according to the methodology:

$$PE_y = 0 \quad (1)$$

2. Baseline emissions

According to the methodology, the 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 calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad (2)$$

Where:

BE_y	=	The baseline emissions in year *y* (tCO_2/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 CO_2 emission factor for grid connected power generation in year *y* calculated (tCO_2/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:

$$EG_{PJ,y} = EG_{facility,y} \quad (3)$$

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 DNA[1], which uses official national statistics.

Step 1. Identify the relevant electricity systems

For determining the electricity emission factors, identify the relevant project electricity system. Similarly, identify any connected electricity system. If a connected electricity system is located partially or totally in Annex-I countries, then the emission factor of that connected electricity system should be considered zero. If the DNA of the host country has published a delineation of the project electricity system and connected electricity systems, these delineations should be used.

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

The project electricity system is the North China Power Grid (NCPG), consisting of the following provincial grids: Beijing, Tianjin, Shanxi, Hebei, Shandong, and Inner Mongolia. There are no imports from connected systems.

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

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

There are no recent or likely future additions to transmission capacity that would enable significant increases in imported electricity; the data 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 CO_2 emission factor(s) for net electricity imports from a connected electricity system:

(a) 0 tCO_2/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
(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 CO_2 emission factors for net electricity imports ($EF_{grid,import,y}$).

[1] http://qhs.mee.gov.cn/kzwsqtpf/

For imports from connected electricity systems located in Annex-I country(ies), the emission factor is 0 tonnes CO_2 per MWh.

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

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

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

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

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

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

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

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 resources[2] 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

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

[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.

(ii) Approach 2

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

Where:

$Share_{LCMR}$	=	The share of the low cost/must run resources (%)
EG_{LCMRy}	=	The electricity generation supplied to the project electricity system by the low cost/must run resources in year *y* (MWh)
$totall_y$	=	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[3]. Therefore, the project participants chose to use the simple OM method (option (a)).

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

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

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 20/12/2018.

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 CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating sources serving the system, not including low-cost/must-run power plants/units.

[3] http://qhs.mee.gov.cn/kzwsqtpf/

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

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 (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 DNA[4], which uses official national statistics.

[4] http://qhs.mee.gov.cn/kzwsqtpf/

$EF_{grid,OMsimple,y}$ = 0.9680 tCO_2/MWh

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

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 second crediting period:

Option 1: 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.

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 deviation[5] 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.

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

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

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 CO_2 emission factor of all plant types other than thermal power plants is taken as zero.

[5] M-DEV0004, DNV (07/10/2005), see http://cdm.unfccc.int/Projects/deviations/87512.

The CO_2 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 CO_2 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:

$EF_{grid,BM,y}$ = 0.4578 tCO_2/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) can not 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 wind 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 second 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 (see step 4)	0.9680	75%
Build margin (see step 5)	0.4578	25%
Combined margin	0.84045	-

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

Baseline emissions (BE_y) now can be calculated as the annual net generation of the Proposed Project Activity (EG_y) multiplied by the combined margin CO_2 emission factor ($EF_{grid,CM,y}$).

3. Leakage

No leakage emissions are considered in the methodology. 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. Emission reductions

Emission reductions are calculated as follows:

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

Where:
ER_y = The emission reductions in year y (tCO_2e/yr)
BE_y = The baseline emissions in year y (tCO_2/yr)
PE_y = The project emissions in year y (tCO_2e/yr)

B.6.2. Data and parameters fixed ex ante

Data/Parameter	**$FC_{i,y}$**
Data unit	Mass or volume
Description	The amount of fossil fuel *i* consumed in the project/connected electricity system in year *y*
Source of data	China Energy Statistical Yearbook
Value(s) applied	Same as used by the DNA for the official emission factor calculations
Choice of data or measurement methods and procedures	Data accepted and used by the DNA for the official emission factor calculations.
Purpose of data	Calculation of baseline emissions
Additional comment	N/A

Data/Parameter	$NCV_{i,y}$
Data unit	GJ/mass or volume unit
Description	Net caloric value of fossil fuel type *i* consumed in the project/connected electricity system in year *y*
Source of data	China Energy Statistical Yearbook
Value(s) applied	Same as used by the DNA for the official emission factor calculations
Choice of data or measurement methods and procedures	National average default values, accepted and used by the DNA for the official emission factor calculations.
Purpose of data	Calculation of baseline emissions
Additional comment	N/A

Data/Parameter	$EF_{CO2,i,y}$
Data unit	tCO_2/GJ
Description	CO_2 emission factor of fossil fuel type i in year y
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied	Same as used by the DNA for the official emission factor calculations
Choice of data or measurement methods and procedures	The IPCC default values at the lower level of 95% confidence interval are accepted and used by the DNA for the official emission factor calculations and are the default value in the tool.
Purpose of data	Calculation of baseline emissions
Additional comment	N/A

Data/Parameter	EG_y
Data unit	MWh
Description	Net electricity generated and delivered in the project electricity system in year *y*
Source of data	China Electric Power Yearbook
Value(s) applied	Same as used by the DNA for the official emission factor calculations
Choice of data or measurement methods and procedures	Data accepted and used by the DNA for the official emission factor calculations.
Purpose of data	Calculation of baseline emissions
Additional comment	N/A

Data/Parameter	$\eta_{fuel\text{-}type,y}$
Data unit	%
Description	Average net energy conversion efficiency of the best technologies commercially available in China using solid, liquid and gas fuels
Source of data	Chinese DNA
Value(s) applied	Same as used by the DNA for the official emission factor calculations
Choice of data or measurement methods and procedures	Data accepted and used by the DNA for the official emission factor calculations.
Purpose of data	Calculation of baseline emissions
Additional comment	N/A

Data/Parameter	$Share_{CAP,m,y}$
Data unit	%
Description	Share of added generation capacity by plant type m in year *y*
Source of data	Chinese DNA
Value(s) applied	Same as used by the DNA for the official emission factor calculations
Choice of data or measurement methods and procedures	Data accepted and used by the DNA for the official emission factor calculations.
Purpose of data	Calculation of baseline emissions
Additional comment	N/A

Data/Parameter	w_{OM}
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(s) applied	75
Choice of data or measurement methods and procedures	Follow the “Tool to calculate the emission factor for an electricity system” (Version 07.0)
Purpose of data	Calculation of baseline emissions
Additional comment	N/A

Data/Parameter	w_{BM}
Data unit	%
Description	Weighting of build margin emissions factor
Source of data	“Tool to calculate the emission factor for an electricity system” (Version 07.0)
Value(s) applied	25
Choice of data or measurement methods and procedures	Follow the “Tool to calculate the emission factor for an electricity system” (Version 07.0,)
Purpose of data	Calculation of baseline emissions
Additional comment	N/A

Data/Parameter	$EF_{grid,OMsimple,y}$
Data unit	tCO_2/MWh
Description	Simple operating margin CO2 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(s) applied	0.9680
Choice of data or measurement methods and procedures	Calculated follow the “Tool to calculate the emission factor for an electricity system” (Version 07.0)
Purpose of data	Calculation of baseline emissions
Additional comment	N/A

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(s) applied	0.4578
Choice of data or measurement methods and procedures	Calculated follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0)
Purpose of data	Calculation of baseline emissions
Additional comment	N/A

Data/Parameter	$EF_{grid,CM,y}$
Data unit	tCO_2/MWh
Description	Combined 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(s) applied	0.84045
Choice of data or measurement methods and procedures	Calculated follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0)
Purpose of data	Calculation of baseline emissions
Additional comment	N/A

B.6.3. Ex ante calculation of emission reductions

>>

In accordance with the methodology, emission reductions are calculated as follows:

$ER_y = BE_y – PE_y$

Using the formulae presented in Section B.6.1., the baseline emissions are calculated from the net electricity supplied by the Project Activity to the grid and the combined margin emission factor of the grid. The annual net generation is estimated based on long-term averages in the Feasibility Study Report; the combined margin emission factor is calculated in section B.6.1. above. The ex-ante calculations of baseline emissions and emission reductions, therefore, are as follows:

$BE_y = EG_{facility,y} \times EF_{grid,CM,y} =$ 726,383MWh/yr × 0.84045 tCO_2/MWh = 610,488 tCO_{2e}/yr

$ER_y = BE_y – PE_y$ =610,488 tCO_{2e}/yr – 0 tCO_{2e}/yr = 610,488 tCO_{2e}/yr

The ex-ante calculations of estimated emission reductions are included in the ER calculation spreadsheet.

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)
04/03/2018-03/03/2019	610,488	0	0	610,488
04/03/2019-03/03/2020	610,488	0	0	610,488
04/03/2020-03/03/2021	610,488	0	0	610,488
04/03/2021-03/03/2022	610,488	0	0	610,488

04/03/2022-03/03/2023	610,488	0	0	610,488
04/03/2023-03/03/2024	610,488	0	0	610,488
04/03/2024-03/03/2025	610,488	0	0	610,488
Total	4,273,416	0	0	4,273,416
Total number of crediting years	7			
Annual average over the crediting period	610,488	0	0	610,488

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

All data collected as part of the monitoring are archived electronically and kept at least for 2 years after the end of the last crediting period. 100% of the data are monitored if not indicated otherwise in the tables below. All measurements are conducted with calibrated measurement equipment according to relevant industry standards.

Data/Parameter	$EG_{facility,y}$
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y ($EG_{facility,y} = EG_{export,y} – EG_{import,y}$)
Source of data	Project activity site
Value(s) applied	726,383 MWh/yr once fully operational
Measurement methods and procedures	Continuous measurement and at least monthly recording. The main meter is installed at Qixiaying Substation, and the backup meter is installed at Hongji Substation Any error resulting from the both meters shall not exceed 0.5% of full-scale rating. Designated persons record the readings of the both meters each month. The both meters are bidirectional, which can record the import and export electricity generation.
Monitoring frequency	Continuous measurement and monthly recording
QA/QC procedures	1. The export electricity supply to the grid is checked by receipt. 2. When the main meter fails to work normally, the readings of the back-up meter will be adopted. 3. The data will be kept during the crediting period and two years after. 4. The main meter will be calibrated by a qualified calibration organization in accordance with industry standards and manufacturer's specifications.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	$EG_{export,y}$
Data unit	MWh
Description	Quantity of electricity exported to the grid by the proposed project in year y
Source of data	Project activity site
Value(s) applied	726,383 MWh/yr once fully operational

Measurement methods and procedures	Continuous measurement and at least monthly recording. The main meter is installed at Qixiaying Substation, and the backup meter is installed at Hongji Substation Any error resulting from the both meters shall not exceed 0.5% of full-scale rating. Designated persons record the readings of the both meters each month. The both meters are bidirectional, which can record the import and export electricity generation.
Monitoring frequency	Continuous measurement and monthly recording
QA/QC procedures	1. The export electricity supply to the grid is checked by receipt. 2. When the main meter fails to work normally, the readings of the back-up meter will be adopted. 3. The data will be kept during the crediting period and two years after. 4. The main meter will be calibrated by a qualified calibration organization in accordance with industry standards and manufacturer's specifications.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	$EG_{import,y}$
Data unit	MWh
Description	Quantity of electricity imported from the grid by the proposed project in year y
Source of data	Project activity site
Value(s) applied	0
Measurement methods and procedures	Continuous measurement and at least monthly recording. The main meter is installed at Qixiaying Substation, and the backup meter is installed at Hongji Substation. Any error resulting from the both meters shall not exceed 0.5% of full-scale rating. Designated persons record the readings of the both meters each month. The both meters are bidirectional, which can record the import and export electricity generation.
Monitoring frequency	Continuous measurement and monthly recording
QA/QC procedures	1. The export electricity supply to the grid is checked by receipt. 2. When the main meter fails to work normally, the readings of the back-up meter will be adopted. 3. The data will be kept during the crediting period and two years after. 4. The main meter will be calibrated by a qualified calibration organization in accordance with industry standards and manufacturer's specifications.
Purpose of data	Calculation of baseline emissions
Additional comment	-

B.7.2. Sampling plan

>>

Not applicable. None of the data and parameters monitored in section B.7.1 above are to be determined by a sampling approach.

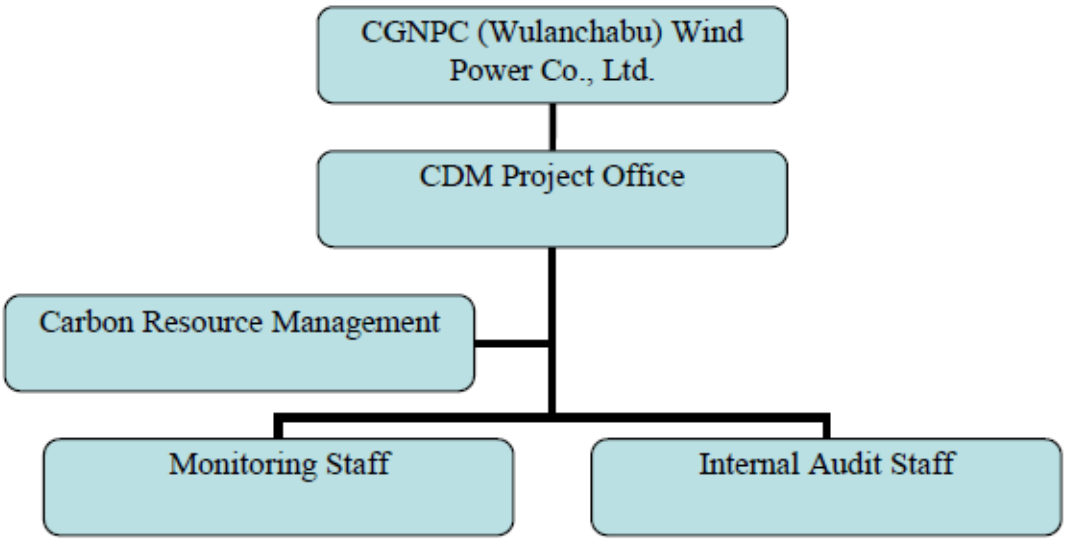
B.7.3. Other elements of monitoring plan

>>

The CDM Manager of the proposed project owned by the project developer is responsible for the monitoring and reporting of the wind farm.

The output from this project is monitored and recorded using two meters. One is main meter; the other is backup meter. The meter readings are used for both CDM purposes and sales of the electricity generated to the grid company.

The CDM operating and management structure is illustrated as follows:



I. Responsibility

The responsibility for monitoring lies with the Developer, who operates the proposed project activity. The company will establish a CDM project management office and assign dedicated people responsible for the monitoring and reporting of the generation and emission reductions of the project activity.

II. Training

Personnel from the CDM Project Management Office will complete training within 3 months of registration of the proposed project activity. New personnel of the CDM PMO will complete training within 3 months of starting work.

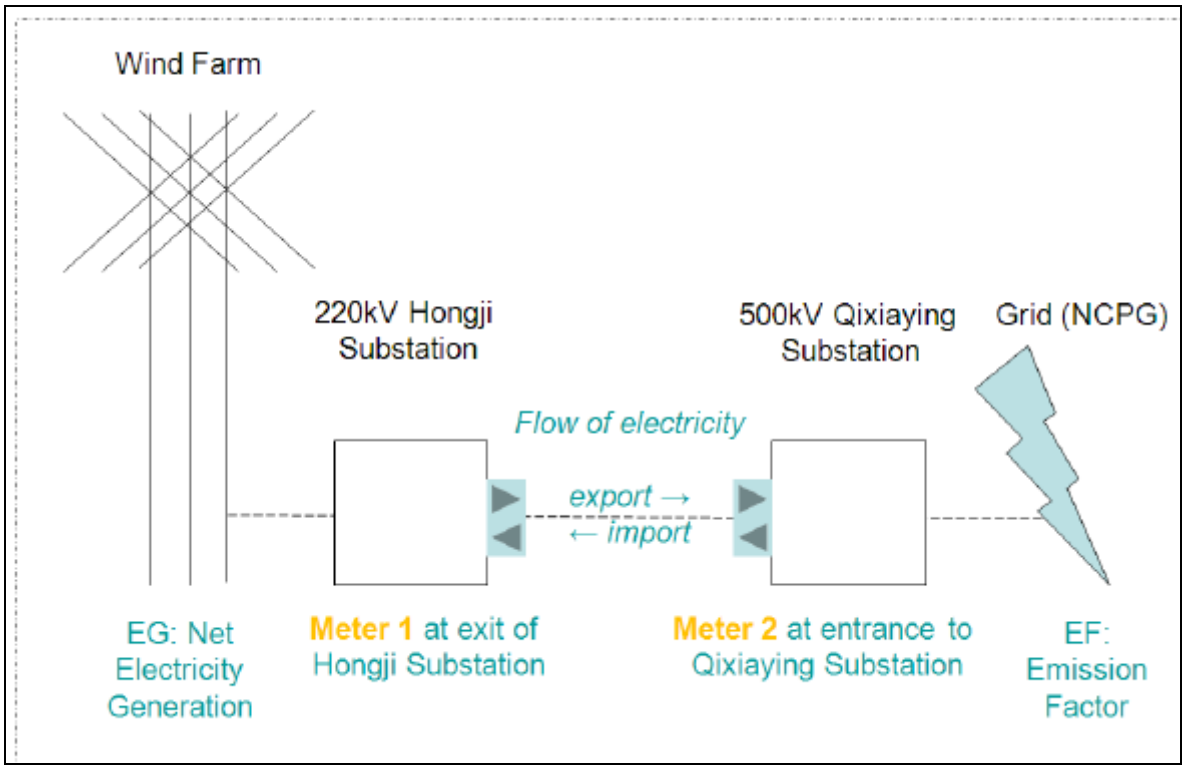
A CDM Manual will be compiled within 3 months of registration of the proposed project activity.

III. Data and parameters to be monitored

The data and parameters to be monitored for the CDM project activity are listed in Section B.7.1. of this PDD:

$EG_{facility,y}$ *(=* $EG_{export,y}$ *-* $EG_{import,y}$*)*: Net electricity supplied by the project activity to the grid, calculated from supply to the grid and imports from the grid using the main meter at the grid substation.

The line diagram showing all relevant monitoring points is as following:



The net generation to be monitored will be measured continuously and recorded monthly. It will suffice for the purpose of billing and emission reductions, as long as the error in the meters is within the allowable limits. The main meter used for billing (at the entrance of the grid substation) will also be the primary meter used for emission reduction calculations. The emission factor is determined ex-ante and fixed for the duration of the crediting period in this PDD.

• Meter 2, the main meter, is installed at the entrance of 500kV Qixiaying Substation, as shown in the flow diagram, Figure 2.
• Meter 1, the backup meter, is installed at the exit of 220kV Hongji Substation, as shown in the flow diagram, Figure 2.

Some parameters are monitored for purposes other than the CDM, in particular for ongoing for operational and maintenance requirements of the project.

If in the future, other wind farms share the same transformer, substation or transmission line with this wind farm, appropriate additional meters will be installed at the project site so that the electricity generation can be monitored for each wind farm (or each turbines) separately so as to calculate the share of this wind farm of the net supply to the grid.

The net electricity supplied by the project activity ($EG_{facility}$) will be calculated as follows:

$$EG_{facility} = EG_{total} * E_{facility} / (E_{facility} + E_{others})$$

Where:
EG_{total}: is the total net electricity supplied to the grid based on the data metered by the main meter;
$E_{facility}$: is the electricity generation from the project activity metered by the separate meters;
E_{others}: is the electricity generation from other projects metered by the other separate meters.

IV. Installation of electricity meters
Both the main meter and back-up meter are installed in accordance with industry standards (Chinese electric industry regulation DL/T448). Any error resulting from the meter shall not exceed 0.5% which is in line with the industry standards.

V. Compilation of the monitored data and dealing with errors

The meter readings from the main and back-up meters as well as the volumes from the sales receipts are compiled and compared.

Should any previous months reading of the main meter be inaccurate by more than the allowable error, or otherwise functioned improperly, the net generation output shall be determined by (a) first, by reading backup meter, unless a test by either party reveals it is inaccurate; (b) if the backup system is not with acceptable limits of accuracy or operation is performed improperly the Developer and grid company shall jointly prepare an reasonable and conservative estimate of the correct reading, and provide sufficient evidence that this estimation is reasonable and conservative for verification by the DOE; and (c) if the grid company and the Developer fail to agree then the matter will be referred for arbitration according to agreed procedures.

VI. Calibration

The metering equipment is annually calibrated and checked for accuracy by a qualified entity in accordance with industry standards (Chinese electric industry regulation DL/T448). Calibration records will be kept by the Developer for verification. The meters will be jointly inspected and sealed on behalf of the parties concerned and not be interfered with by either party except in the presence of the other party or its accredited representatives.

The meters installed shall be tested by qualified entity, under following conditions:
• before the end of the validity of the previous calibration certificate,
• after the detection of a difference larger than the allowable error in the readings of the meters, or
• after the repair of all or part of a meter caused by the failure of one or more parts to operate in accordance with the specifications.

VII. Quality control

The CDM Manager cross-checks meter readings from the main meter received and sales receipts and also compare the data with the meter reading from the back-up meter. The most conservative of the main meter reading and sales receipt is adopted.

The CDM manager also checks the validity of the calibration certificates of the electricity meters. If the identified, such errors will be described and corrected, prior to approval, sign off and storage of the corrected data and error descriptions.

The internal audit will also identify potential improvements or required changes in the monitoring procedure and reporting for the future.

VIII. Reporting

The Monitoring Report will describe the monitoring procedures and the approved and signed off metering data, corrected errors, and the emission reduction calculations.
With the Monitoring Report, the calibration records are presented for verification.

IX. Record keeping

All data collected as part of the monitoring are archived electronically and kept at least for 2 years after the end of the last crediting period by the CDM Project Management Office.

SECTION C. Start date, crediting period type and duration

C.1. Start date of project activity

>>
29/07/2009

The starting date of a CDM project activity is the earliest of the date(s) on which the implementation or construction or real action of a project activity begins/has begun. The starting date of the proposed project activity is the signing date of Turbine Purchasing Contract. The first

construction contract was signed on 25 August 2009, with the construction permission issued on the same day.

C.2. Expected operational lifetime of project activity

>>
20y-0m from commissioning

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

>>
04/03/2018 (2nd crediting period)

C.3.3. Duration of crediting period

>>
7y-0m

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>
An Environmental Impact Assessment (EIA) for the proposed project activity has been completed by Wulanchabu City Environmental Scientific Research Institute in November 2005, and was approved by Environmental Protection Bureau of Inner Mongolia Autonomous Region in November 2005.

The main impacts identified in the EIA are summarised below.

Impacts during the construction period

• Noise: Construction machinery and construction activity will generate noise. However, since the nearest sensitive area is 1000m away from the wind farm site, after attenuation the noise will be decrease to 55dB when reaching the distance of 250m, which satisfies the requirement of Noise Standard of Urban Area (GB3096-93). Thus the impact of construction noise to the local region is minimal.

• Waste water: The waste water from construction is mainly from construction workers, and this small quantity of waste water during construction period will have no impact on the local environment.

• Solid waste: The solid waste in the construction period, mainly include the waste soil and household garbage. The waste soil will be backfilled to the wind farm, and the household garbage waste will be collected and then harmlessly disposed. Therefore, the solid waste will not have the impact on the environment.

• Air pollution: The air pollution from the proposed project is mainly dust emitted by the construction activity. Major measures for dust control include spreading water regularly on the construction site, covering the construction materials, minimizing the exposure time of the materials, etc.

• Ecosystem: The proposed project temporarily disturbs some soil and grass cover in construction period. The necessary measures will be undertaken in order to minimize the impact to the environment, by means of stipulating the vehicles' routes and the locations of equipment and

material storage with covering. The occupied land will be restored after construction. Overall, land use impact on the local residents arising from the proposed project is considered to be insignificant.

Impacts during operational period

• Noise: The noise during operational period is from blades of wind power machine rotating. However, since the nearest sensitive area is 1000m away from the wind farm site, after attenuation the noise will be decrease to 31dB when reaching the distance of 1000m, which satisfies the requirement of Noise Standard of Urban Area (GB3096-93). Thus the impact of noise to the local region during operational period is minimal.

• Solid waste: Solid waste will be produced by operation staff during operation period. The household garbage waste will be collected and then harmlessly disposed. Therefore, the solid waste will not have the impact on the environment.

• Waste water: The waste water in operation period is mainly from operation staff, and this small quantity of waste water during construction period will have no impact on the local environment.

• Ecosystem: In the operation period, all the land except the foundations of the wind turbines, could be recovered, therefore no impacts will be caused to the ecosystem.

Conclusion

Wind power is renewable energy and the impacts caused by wind farms on the surrounding ecosystem, water, noise, and atmosphere environment is insignificant.

D.2. Environmental impact assessment

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Environmental impacts are not considered significant. Environmental Protection Bureau of Inner Mongolia Autonomous Region has approved the EIA.

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

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In June 2009, the staff from the project owner carried out a survey of the local villagers and residents near the area. Questionnaires were sent to 36 stakeholders and the survey had a 100% response rate. The result of the survey indicated the support to the project.

The questionnaire was designed to be understandable and easy to fill in for the local stakeholders. The questionnaire included a short summary of the proposed project activity, questions about the responding stakeholder and a number of specific questions and the opportunity for further comments.

E.2. Summary of comments received

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Stakeholders surveyed

Item	Content	Vote	Proportion
Gender	Male	20	56%
	Female	16	44%
Education	Elementary school	6	17%
	Junior high school	17	47%
	Senior high school	8	22%
	University or above	5	14%

Responses

1. Will the project affect your environment of living,	Yes	No	Not Sure

studying and working?	0	100%	0
2. Will construction, operation or decommissioning of the project affect natural resources or ecosystems, such as water, habitats, etc?	Yes	No	Not Sure
	0	97.22%	2.78%
3. Will the project cause noise, vibration or release of electromagnetic radiation that could adversely affect your health?	Yes	No	Not Sure
	0	100%	0
4. Do you think the proposed project will have a positive impact on local economic development?	Yes	No	Not Sure
	100%	0	0
5. Do you agree with the development of the Project?	Yes	No	Not Sure
	100%	0	0
6. What is your opinion or suggestion on the construction and operation of the project?	One of the responders thought the project would promote the local development. One of the responders hoped the project could result in the employment of the local residents. One of the responders hoped the project would not influence the local rainfall, Other 33 responders out of the total 36 have no opinions or suggestions on the construction and operation of the project		

No further comments were given.

Conclusions from the survey

The survey shows that the proposed project has strong support among the local stakeholders. They all believe the proposed project will promote the local economic development and agree the project construction.

E.3. Consideration of comments received

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The local stakeholders are all supportive of the proposed project and to date there has been no need to modify the project design according to the comments received. The project developer said they would employ the local residents during project construction and operation, and they would keep developing the wind farm projects in the local area. In addition, globally there is no evidence, to prove the wind power projects would influence the local rainfall.

The project owner has an overall environment-friendly plan to guarantee that the project has the minimum negative impact on the environment during the project construction and operation.

SECTION F. Approval and authorization

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The letters of approval for the Project Activity are available and had been uploaded with the registration.

Appendix 1. Contact information of project participants

Organization name	CGNPC (Wulanchabu) Wind Power Co., Ltd
Country	People's Republic of China
Address	No.2 Building, Area 12 of Advanced Business Park, No.188, west of South 4th Ring Road, Beijing
Telephone	+86 10-63705651
Fax	+86 10-63705875
E-mail	wangzisong@hotmail.com
Website	-
Contact person	Wang zisong

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

All the details on ex ante calculation of emission reductions are described in B.6.

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

Comments received from local stakeholders during registration validation and the corresponding response has been displayed at the project interface.

Appendix 7. Summary of post-registration changes

NA