



**Project design document form  
(Version 10.1)**

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

**BASIC INFORMATION**

<b>Title of the project activity</b>	Inner Mongolia Shangdu Changshengliang Wind Farm Project
<b>Scale of the project activity</b>	<input checked="checked" type="checkbox"/> Large-scale <input type="checkbox"/> Small-scale
<b>Version number of the PDD</b>	05
<b>Completion date of the PDD</b>	02/01/2019
<b>Project participants</b>	Beijing Beineng Chuangye Wind Power Technology Co., Ltd.
<b>Host Party</b>	P.R. China
<b>Applied methodologies and standardized baselines</b>	Methodology: ACM0002 "Grid-connected electricity generation from renewable sources" (Version 19.0)
<b>Sectoral scopes linked to the applied methodologies</b>	Sectoral scope 1: Energy industries (renewable / non-renewable sources)
<b>Estimated amount of annual average GHG emission reductions</b>	86,230tCO <sub>2</sub> e

## SECTION A. Description of project activity

### A.1. Purpose and general description of project activity

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The purpose of Inner Mongolia Shangdu Changshengliang Wind Farm Project (hereinafter referred to as the proposed project) is to utilize wind resources for electricity generation through the construction of a wind farm with a total capacity of 49.5MW and an 220kV substation in Shangdu County, Inner Mongolia Autonomous Region, P. R. China. The proposed project is invested and developed by Beijing Beineng Chuangye Wind Power Technology Co., Ltd.. The electricity generated from the project will be sold to North China Power Grid (NCPG).

The purpose of the proposed project is to generate renewable power and deliver it to North China Power Grid. For the proposed project,

- (a) Prior to the start of implementation of the project activity, there is no power generation unit at the site of the proposed project, and the electricity was supplied by the North China Power Grid which was dominated by fossil fuel-fired power plants.
- (b) The project scenario is the implementation of the proposed project, the installation and operation of 33 sets of wind turbines with a total capacity of 49.5 MW which will supply an average annual generation of 102,600MWh to North China Power Grid and replace the same amount of electricity generated by fossil fuel-fired power plants connected to North China Power Grid. According to ACM0002 applied, the proposed project is a renewable electricity generating activity. The average lifetime of the equipment based on the manufacturer's specifications is 20 years, the expected effective operating hours amount to 2,073 per year and the plant load factor is 23.66%.
- (c) The baseline scenario of the proposed project is the electricity supply of equal amount as the proposed project from the North China Power Grid. The baseline scenario of the proposed project is the same against the scenario prior to the start of the implementation of the project activity.

The proposed project is planned to install and operate 33 sets wind turbines with capacity of 1.5 MW each, which amount to a total capacity of 49.5MW. The proposed project will achieve greenhouse gas (GHG) emission reductions through the displacement of mainly fossil-fuel dominated grid connected power generation. The estimated annual net electricity generation supplied to the grid is 102,600 MWh and the annual full-load operation time amount to 2,073 h per year.

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 08/11/2011 (Ref.5311) and the first crediting period is 08/11/2011 – 07/11/2018. Following the methodology, the emission reductions of the second crediting period (08/11/2018-07/11/2025) are estimated to be on average 86,230 tonnes of CO<sub>2</sub> equivalent (tCO<sub>2</sub>e) per year, and 603,610 tCO<sub>2</sub>e over the chosen crediting period.

The proposed project will set up a main transformer in a 220 kV substation at the project site. The wind power generated will be switched through a 220 kV substation at the project site, and then connected to the Shangdu Qitai 220 kV substation, then transmitted to the North China Power Grid finally. The billing meters (hereafter referred as the main meter M1 and the backup meter M2) will be installed at the Shangdu Qitai 220 kV substation. The to-grid and from-grid electricity will be cross-checked with the electricity receipts.

The proposed project makes contribution to the sustainable development as follows:

#### 1. GHG emission reduction

The project will help reduce the greenhouse gas GHG emissions versus the high-growth, coal-dominated business-as-usual scenario in the NCPG by reducing the electricity generation from the fossil-fuel fired power plants, particularly the emission of SO<sub>x</sub>, NO<sub>x</sub> and dust.

**2. Employment opportunities**

The conducting of the proposed project will create employment opportunities during the construction phase and operational period.

**3. Economic Improvement**

The construction of the wind farm will promote local economy by contributing to local government with more tax revenues through selling power generation.

**A.2. Location of project activity**

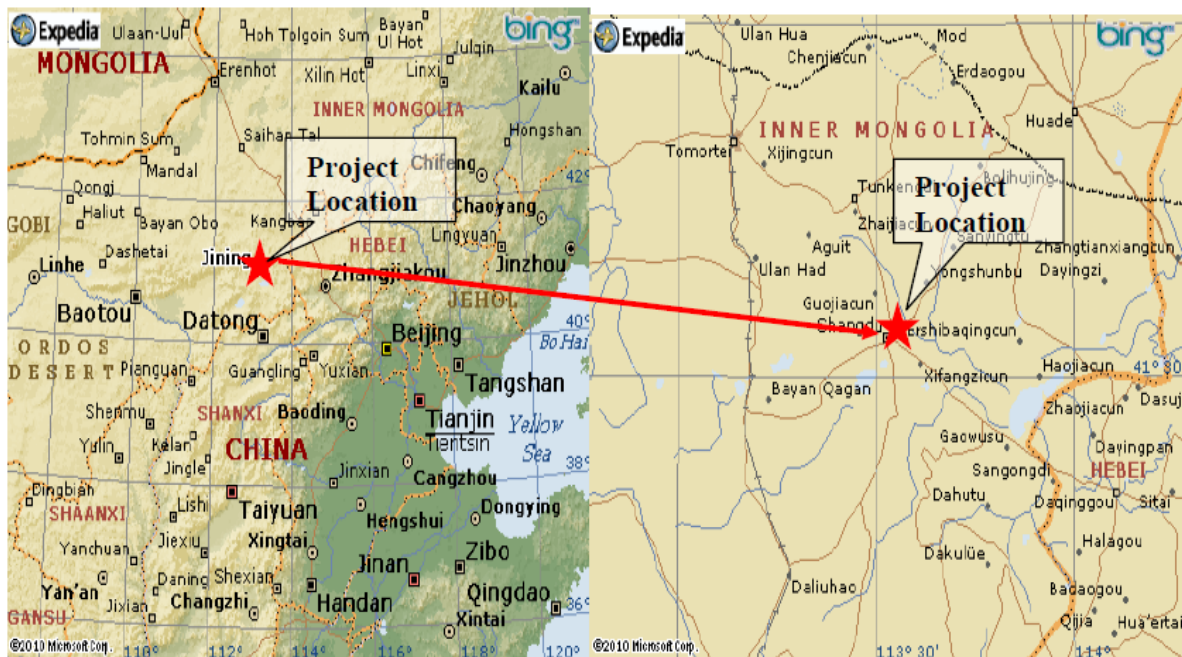
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The proposed project is in Shangdu County, Inner Mongolia Autonomous Region, P. R. China. The project has geographical coordinates with east longitude from 113.5395° to 113.6219° and north latitude from 41.4459° to 41.4831°. The figure A1 and A2 shows the geographical location of the proposed project.

Figure A1. The proposed project on the map of P. R. China



Figure A2. The proposed project on the map of Shangdu County, Inner Mongolia Autonomous Region, P. R. China



### A.3. Technologies/measures

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The proposed project is to utilize wind resources for electricity generation in Shangdu County, Inner Mongolia Autonomous Region, P. R. China. The proposed project is a grid-connected renewable energy to electricity project. The proposed project will achieve obvious greenhouse gas (GHG) emission reductions through the displacement of mainly fossil-fuel dominated grid connected power generation in North China Power Grid.

Prior to the start of implementation of the project activity, there is no power generation unit at the site of the proposed project. The scenario is North China Power Grid providing the same electricity service as the proposed project. North China Power Grid is dominated by the fossil-fuel fired power plants.

The project scenario is the implementation of the proposed project and replaces the same amount of electricity generated by North China Power Grid, which is dominated by the fossil-fuel fired power plants.

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

The proposed project involves the installation of 33 sets of wind turbines with 1.5 MW capacity each, which amounts to a total installed capacity of 49.5MW. The expected effective operating hours amount to 2,073 per year and the plant load factor is 23.66%, which was determined by a third party, Inner Mongonlia Water Power Survey and Design Institute, who is the conductor of FSR and is also a professional wind power engineering designing entity. It is consistent with the requirement of EB48, Annex 11 "Guidelines for the Reporting and Validation of Plant Load Factors". The estimated net annual power supplied to the grid is 102,600 MWh.

The main technical specifications of the wind turbine are provided in the following table.

Parameter		Data
Model		Gold wind 82/1500kW
Quantity		33
Hub height		70 m
Wind Turbine	Rotor diameter	82 m
	Number of blades	3
	Rating wind speed	11 m/s
	Cut-in wind speed	3 m/s
	Cut-out wind speed	22 m/s
Generator	Rated Power	1500 kW
	Rated voltage	690 V
	Lifetime	20 years

The proposed project will set up a main transformer in a 220 kV substation at the project site. The wind power generated will be switched through a 220 kV substation at the project site, and then connected to the Shangdu Qitai 220 kV substation, then transmitted to the North China Power Grid finally.

The proposed project does not involve any technology transfer.

#### 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)	Beijing Beineng Chuangye Wind Power Technology 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 08/11/2011, the reference no. is 5311. The motoring plan has been revised and approved on 27/12/2012. The PDD is renewal of crediting period. Therefore, it can be confirmed that:

- (a) The proposed CDM project activity is 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 proposed project is a grid-connected renewable power generation project activity that installs a new power plant at a site where no renewable power was operated prior to the implementation of the project activity (Greenfield plant). It meets all applicability conditions of methodology ACM0002 (version 19.0) which is listed as follows:

Applicability	Conclusion
<p>This methodology is applicable to grid-connected renewable energy power generation project activities that:</p> <ul style="list-style-type: none"> <li>(a) Install a Greenfield power plant;</li> <li>(b) Involve a capacity addition to (an) existing plant(s);</li> <li>(c) Involve a retrofit of (an) existing operating plants/units;</li> <li>(d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or</li> <li>(e) Involve a replacement of (an) existing plant(s)/unit(s).</li> </ul>	<p>The proposed project is the installation of a Greenfield power plant;</p>
<p>The methodology is applicable under the following conditions:</p> <ul style="list-style-type: none"> <li>(a) The project activity may include renewable energy power</li> </ul>	<p>a) The proposed project is the installation of a wind</p>

<p>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;</p> <p>(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.</p>	<p>power plant.</p> <p>b) Not applicable. The proposed project is a Greenfield plant and does not represent a capacity addition, retrofits, rehabilitations or replacement.</p>
<p>In case of hydro power plants, one of the following conditions shall apply:</p> <p>(a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or</p> <p>(b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density, calculated using equation (3), is greater than 4 W/m<sup>2</sup>; or</p> <p>(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<sup>2</sup>; or</p> <p>(d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m<sup>2</sup>, all of the following conditions shall apply:</p> <p>(i) The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m<sup>2</sup>;</p> <p>(ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity;</p> <p>(iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m<sup>2</sup> shall be:</p> <p>a. Lower than or equal to 15 MW; and</p> <p>b. Less than 10 per cent of the total installed capacity of integrated hydro power project.</p>	<p>Not applicable. The proposed project is the installation of a wind power plant.</p>
<p>In the case of integrated hydro power projects, project proponent shall:</p> <p>(a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or</p> <p>(b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore, this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.</p>	<p>Not applicable. The proposed project is the installation of a wind power plant.</p>
<p>The methodology is not applicable to the following:</p> <p>(a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in</p>	<p>a) Not applicable. The proposed project does not involve switching from fossil</p>



<p>this case the baseline may be the continued use of fossil fuels at the site;</p> <p>(b) Biomass fired power plants/units.</p>	<p>fuels to renewable energy at the site of the proposed project.</p> <p>b) Not applicable. The proposed project is a wind power plant.</p>
<p>In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result 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".</p>	<p>Not applicable. The proposed project is the installation of a wind power plant and not a retrofits, rehabilitations or replacement or capacity additions.</p>
<p><b>Applicability conditions of "Tool to calculate the emission factor for an electricity system", - Version 07.0</b></p>	
<p>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).</p>	<p>This condition is applicable. OM, BM and CM are estimated using the tool under section B.6.3 for calculating baseline emissions.</p>
<p>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 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.</p>	<p>Since the proposed project is grid connected, this condition is applicable and the emission factor has been calculated accordingly.</p>
<p>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.</p>	<p>The proposed project is located in China, a non-Annex I country. Therefore, this criterion is not applicable for the project activity.</p>
<p>Under this tool, the value applied to the CO<sub>2</sub> emission factor of biofuels is zero.</p>	<p>The proposed project is a grid connected wind power project/ unit and does not involve emission from biofuels. Therefore, this criterion is not applicable.</p>

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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Source		Gas	Included	Justification/explanation
Baseline	CO <sub>2</sub> emissions from electricity generation in fossil fuel-fired power plants that is displaced due to the project activity.	CO <sub>2</sub>	Yes	Main emission source
		CH <sub>4</sub>	No	Minor emission source
		N <sub>2</sub> O	No	Minor emission source
Project activity	The wind power plant	CO <sub>2</sub>	No	According to ACM0002, the proposed project generates electricity by renewable energy, thus No GHG emissions emitted.
		CH <sub>4</sub>		
		N <sub>2</sub> O		

The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the proposed CDM project power plant is connected to, i.e. North China Power Grid. The project site includes the power plant, turbines themselves and auxiliary electric equipments that are used to support the turbines operation. The proposed project is connected to the North China Power Grid. Therefore, the North China Power Grid including all power plants connected is selected as the project boundary.

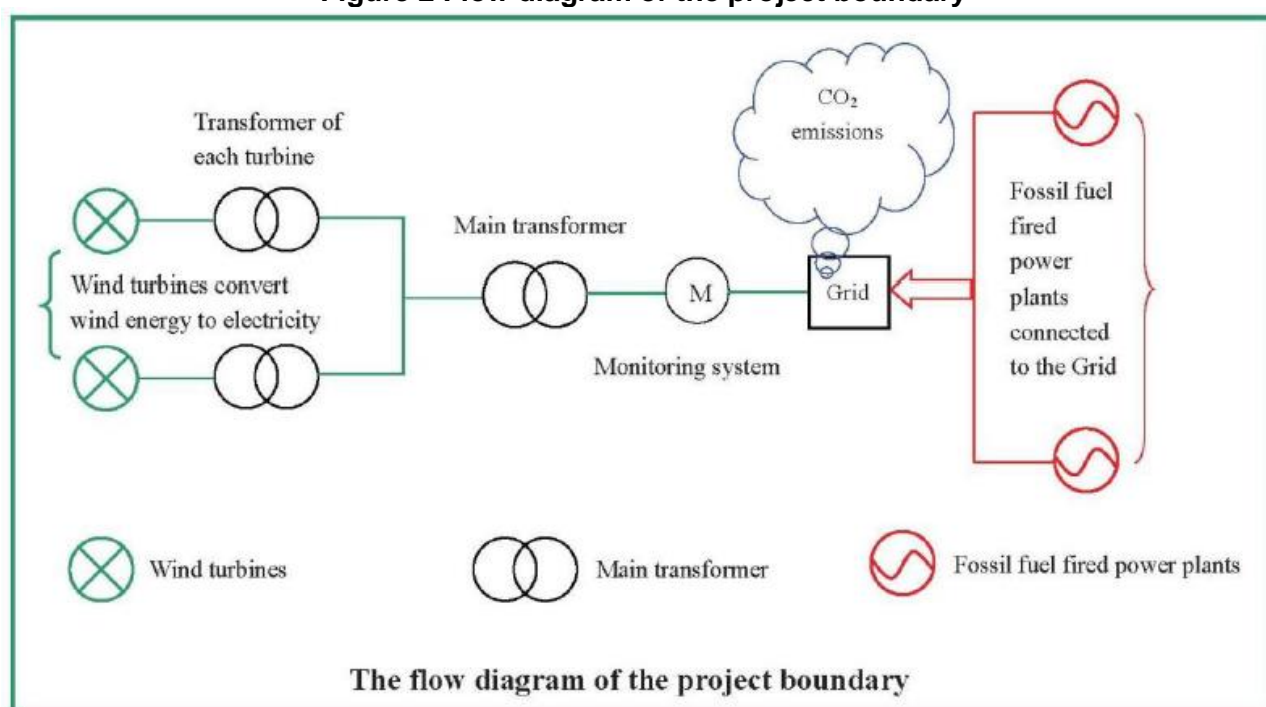
The NCPG is the project electricity system, which is defined by the spatial extent of the power plants that can be dispatched without significant transmission constraints. In determining this project electricity system, such causes below are taken into account.

According to the “Tool to calculate the emission factor for an electricity system” (version 07.0), the boundary definitions published by the Chinese DNA is used, the NCPG consists of Beijing, Tianjin, Hebei, Shanxi, Shandong and Inner Mongolia Power Grids. Therefore, the proposed project regards the North China Power Grid as the project boundary.

In April 2002, China implemented the policy of “separate power plants from grids and compete in price for grid connection”. The power sector reform started in 2002, and the six big power grids structured from then. Hence the grid data from Year 2006, 2007 and 2008 of the North China Power Grid applied in the PDD, which is after the power sector reform in China.

The flow diagram of the project boundary is illustrated as follow:

**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 in 2011; 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<sub>2</sub> 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 <sub>2</sub> /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 <sub>2</sub> emission factor for grid connected power generation in year $y$ calculated (tCO <sub>2</sub> /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<sup>1</sup>, 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<sub>2</sub> emission factor(s) for net electricity imports from a connected electricity system:

- (a) 0 tCO<sub>2</sub>/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.

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<sup>1</sup> <http://qhs.mee.gov.cn/kzwsqtpf/>

- Following the calculations of the DNA, the simple operating margin option (b) is used to calculate the CO<sub>2</sub> emission factors for net electricity imports ( $EF_{grid,import,y}$ ).

For imports from connected electricity systems located in Annex-I country(ies), the emission factor is 0 tonnes CO<sub>2</sub> 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:

- Simple OM; or
- Simple Adjusted OM; or
- Dispatch data analysis OM; or
- Average OM

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

- Low-cost/must-run resources<sup>2</sup> 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.

- Approach 1

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

<sup>2</sup> 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

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

Where:

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

- (b) The average amount of load (MW) supplied by low-cost/must-run resources in a grid in the most recent three years is less than the average of the lowest annual system loads (LASL) in the grid of the same three years.
- The approach 1 is chosen for calculation and low-cost/must-run resources constitute less than 50% of total grid generation in average of the five most recent years<sup>3</sup>. 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 06/06/2016.

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<sub>2</sub> emissions per unit net electricity generation (tCO<sub>2</sub>/MWh) of all generating sources serving the system, not including low-cost/must-run power plants/units.

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

Option A: Based on the net electricity generation and a CO<sub>2</sub> emission factor of each power unit;

<sup>3</sup> <http://qhs.mee.gov.cn/kzwsqtpf/>

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 <sub>2</sub> emission factor in year y (tCO <sub>2</sub> /MWh)
$FC_{i,y}$	=	The amount of fuel type <i>i</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>i</i> in year y (GJ/mass or volume unit)
$EF_{CO2,i,y}$	=	The CO <sub>2</sub> emission factor of fuel type <i>i</i> in year y (tCO <sub>2</sub> /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>i</i>	=	All fuel types combusted in power sources in the project electricity system in year y
<i>y</i>	=	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<sup>4</sup>, which uses official national statistics.

$$EF_{grid,OMsimple,y} = 0.9680 \text{ tCO}_2/\text{MWh}$$

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

<sup>4</sup> <http://qhs.mee.gov.cn/kzwsqtpf/>

In terms of vintage of data, the project participants chose Option 1, ex-ante, and  $EF_{grid,BM,y}$  is fixed for the duration of the 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<sub>2</sub>/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 <sub>2</sub> emission factor in year $y$ (tCO <sub>2</sub> /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 <sub>2</sub> emission factor of power unit $m$ in year $y$ (tCO <sub>2</sub> /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<sup>5</sup> 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<sub>2</sub> emission factor of thermal power plants using each fuel type.

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

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

Where:

$EF_{grid,BM,y}$	=	The build margin CO <sub>2</sub> emission factor in year $y$ (tCO <sub>2</sub> /MWh)
$CAP_{m,y}$	=	The added generation capacity by plant type $m$ in year $y$ (MW)
$EF_{EL,m,y}$	=	The CO <sub>2</sub> emission factor of plant type $m$ in year $y$ (tCO <sub>2</sub> /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<sub>2</sub> emission factor of all plant types other than thermal power plants is taken as zero.

The CO<sub>2</sub> 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.

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

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

Where:

$EF_{thermal,y}$	=	The CO <sub>2</sub> emission factor of the best technologies commercially available thermal power plants in year $y$ (tCO <sub>2</sub> /MWh)
$EF_{m,Adv,y}$	=	The CO <sub>2</sub> emission factor of the best technologies commercially available power plants using fuel type $m$ in year $y$ (tCO <sub>2</sub> /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<sub>2</sub> 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 <sub>2</sub> emission factor of the best technology commercially available power plants using fuel $m$ in year $y$ (tCO <sub>2</sub> /MWh)
$EF_{CO2,m,y}$	=	The average CO <sub>2</sub> emission factor of fuel type $m$ in year $y$ (tCO <sub>2</sub> /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:

$$EF_{grid,BM,y} = 0.4578 \text{ tCO}_2/\text{MWh}$$

### **Step 6. Calculate the combined margin emission factor**

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

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

Option (a) is the preferred option. Option (b) 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 <sub>2</sub> emission factor in year $y$ (tCO <sub>2</sub> /MWh)
$w_{OM}$	=	The weighting of operating margin emissions factor (%)
$EF_{grid,BM,y}$	=	The build margin CO <sub>2</sub> emission factor in year $y$ (tCO <sub>2</sub> /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 <sub>2</sub> emission factor (tCO <sub>2</sub> /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<sub>2</sub> 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<sub>2</sub>e/yr)  
 $BE_y$  = The baseline emissions in year  $y$  (tCO<sub>2</sub>/yr)  
 $PE_y$  = The project emissions in year  $y$  (tCO<sub>2</sub>e/yr)

#### B.6.2. Data and parameters fixed ex ante

Data/Parameter	FC <sub>i,y</sub>
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>i</i> consumed in the project/connected electricity system in year <i>y</i>
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	$EF_{CO_2,i,y}$
Data unit	tCO <sub>2</sub> /GJ
Description	CO <sub>2</sub> emission factor of fossil fuel type <i>i</i> in year <i>y</i>
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 <i>y</i>
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	$\eta_{fuel-type,y}$
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 <sub>CAP,m,y</sub>
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 <sub>OM</sub>
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 <sub>BM</sub>
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 <sub>grid,OMsimple,y</sub>
Data unit	tCO <sub>2</sub> /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 <sub>grid,BM,y</sub>
Data unit	tCO <sub>2</sub> /MWh
Description	Build margin CO <sub>2</sub> 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 <sub>grid,CM,y</sub>
Data unit	tCO <sub>2</sub> /MWh
Description	Combined margin CO <sub>2</sub> 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:

$$BE_y = EG_{facility,y} \times EF_{grid,CM,y} = 102,600\text{MWh/yr} \times 0.84045 \text{ tCO}_2/\text{MWh} = 86,230 \text{ tCO}_{2e}/\text{yr}$$

$$ER_y = BE_y - PE_y = 86,230 \text{ tCO}_{2e}/\text{yr} - 0 \text{ tCO}_{2e}/\text{yr} = 86,230 \text{ tCO}_{2e}/\text{yr}$$

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 <sub>2</sub> e)	Project emissions (t CO <sub>2</sub> e)	Leakage (t CO <sub>2</sub> e)	Emission reductions (t CO <sub>2</sub> e)
08/11/2018-07/11/2019	86,230	0	0	86,230
08/11/2019-07/11/2020	86,230	0	0	86,230
08/11/2020-07/11/2021	86,230	0	0	86,230
08/11/2021-07/11/2022	86,230	0	0	86,230
08/11/2022-07/11/2023	86,230	0	0	86,230

08/11/2023-07/11/2024	86,230	0	0	86,230
08/11/2024-07/11/2025	86,230	0	0	86,230
<b>Total</b>	603,610	0	0	603,610
<b>Total number of crediting years</b>	7			
<b>Annual average over the crediting period</b>	86,230	0	0	86,230

## B.7. Monitoring plan

### B.7.1. Data and parameters to be monitored

<b>Data/Parameter</b>	$EG_{export,y}$
Data unit	MWh
Description	Electricity supplied by the project activity to the grid in year y.
Source of data	Project activity site
Value(s) applied	102,600
Measurement methods and procedures	Continuously measurement and monthly recording The data will be continuously measured and monthly recorded. Data will be archived for 2 years following the end of the last crediting period.
Monitoring frequency	Continuously measurement and monthly recording
QA/QC procedures	The metering equipments at the 220kV Shangdu Qitai Substation will be calibrated once a year according to the management standard. Power supplied to the grid will be double checked according to electricity sales receipts.
Purpose of data	Calculation of baseline emissions
Additional comment	-

<b>Data/Parameter</b>	$EG_{import,y}$
Data unit	MWh
Description	Electricity imported from the grid by the proposed project during year y
Source of data	Project activity site
Value(s) applied	0
Measurement methods and procedures	Continuously measurement and monthly recording The data will be continuously measured and monthly recorded. Data will be archived for 2 years following the end of the crediting period.
Monitoring frequency	Continuously measurement and monthly recording
QA/QC procedures	The metering equipments at the 220kV Shangdu Qitai Substation will be calibrated once a year according to the management standard. Power imported from the grid will be double checked according to electricity sales receipts.
Purpose of data	Calculation of baseline emissions
Additional comment	-

<b>Data/Parameter</b>	$EG_{facility,y}$
Data unit	MWh/yr
Description	Quantity of net electricity generation supplied to the Grid by the project activity in year y.
Source of data	Measurement based on $EG_{export,y}$ minus $EG_{import,y}$
Value(s) applied	In this PDD, the net electricity delivered to the Grid 102,600 MWh is applied.
Measurement methods and procedures	The net electricity supplied to the Grid by the proposed project will be calculated through electricity supplied by the project to the grid ( $EG_{export,y}$ ) minus electricity purchased from the Grid ( $EG_{import,y}$ ).

Monitoring frequency	Continuously measurement and monthly recording
QA/QC procedures	Power supplied to the grid will be checked by internal verification procedure and electricity sales receipts.
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 proposed project adopts the approved consolidated monitoring methodology ACM0002 “Consolidated baseline monitoring methodology for grid-connected electricity generation from renewable sources” (version 19.0) to determine the emission reductions from the net electricity generation from the wind farm. This plan describes in more detail the process.

#### 1. Monitoring Object

The monitoring is to justify the realistic amount of emission reduction from the CDM project. The monitoring plan will provide credible, accurate, transparent and conservative monitoring data and ensure the real, measurable, long-term GHG emission reduction from this project.

#### 2. Management Structure

Beijing Beineng Chuangye Wind Power Technology Co., Ltd., the owner of the proposed project, will use this document as guideline in monitoring of the project emission reduction performance and will adhere to the guidelines set out in this monitoring plan to ensure that the monitoring is credible, transparent and conservative.

The responsibilities of the project staff are as follow:

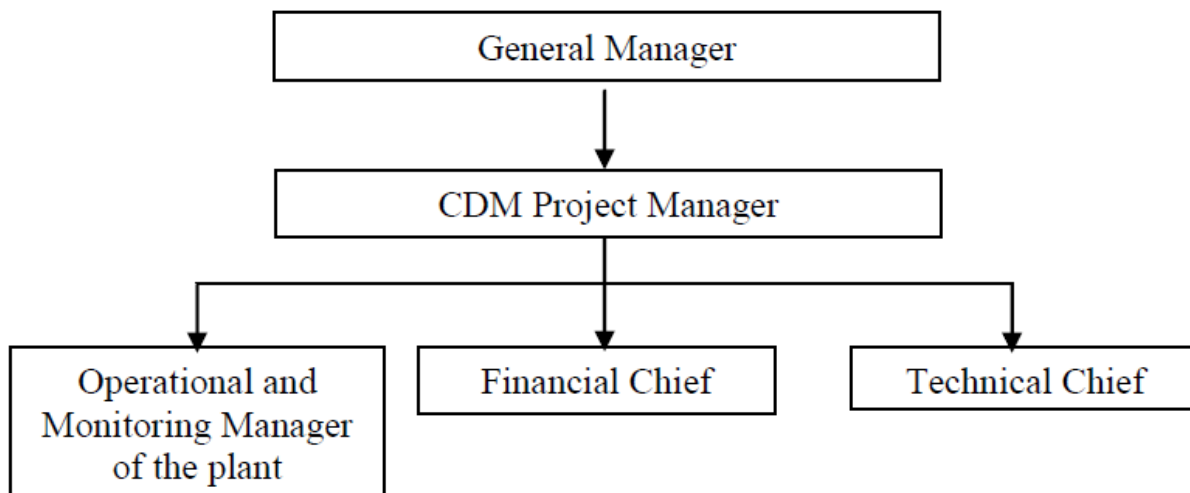
General Manager: To be responsible for supervising the whole monitoring procedure.

CDM Project Manager: To be responsible for data management and compiling monitoring report.

Operational and monitoring manager: To be responsible for collecting data and do internal audit.

Financial chief: To be responsible for collection of sales receipts.

Technical chief: To be responsible for preparing operational reports of the project activity, recording the daily operation of the wind farm, including operating periods, equipment defects, etc.

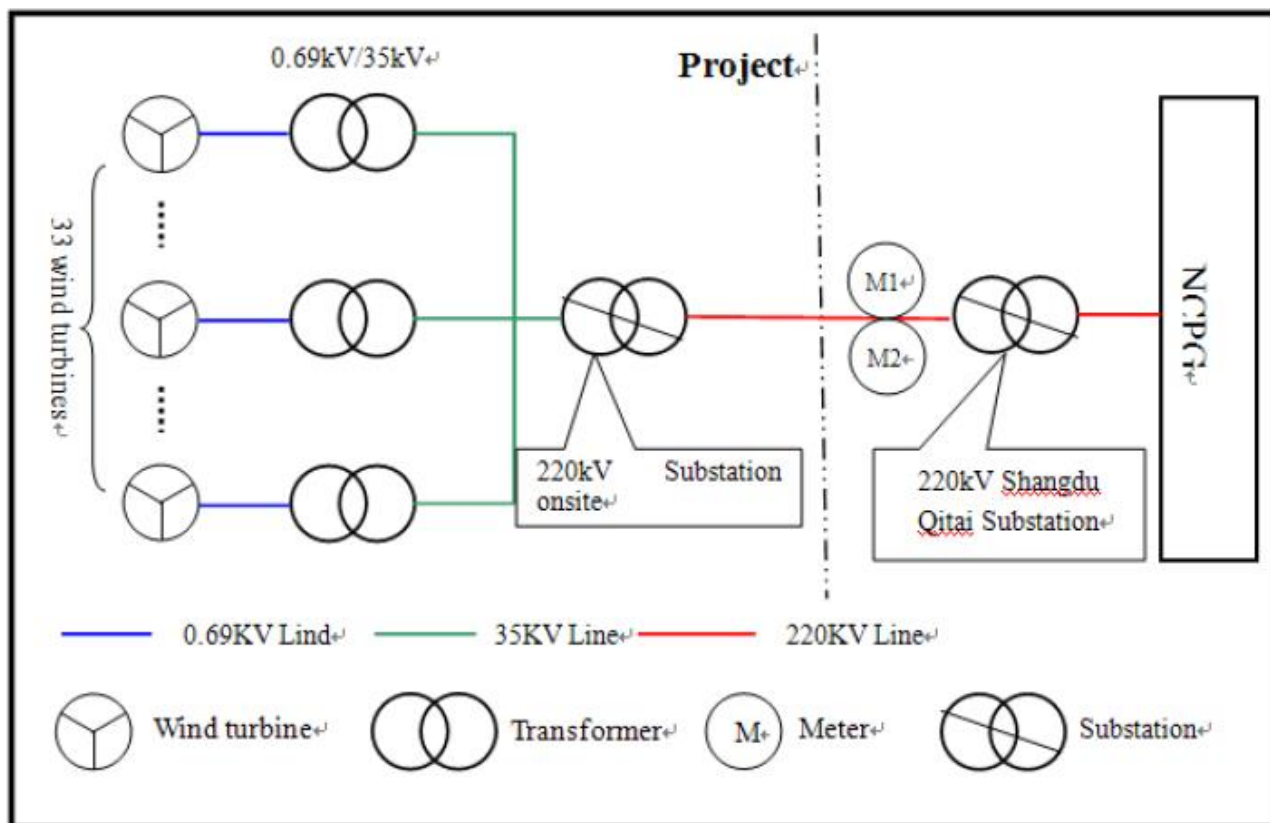


### 3. Monitoring Equipments

Electricity supplied by the proposed project will be monitored through the bi-directional electricity meter. Both electricity supplied to the grid by the project activity and the electricity imported from the grid to the project site will be monitored by the meters. The billing meters (hereafter referred as the main meter M1 and the backup meter M2) will be installed at the Shangdu Qitai 220 kV substation. The to-grid and from-grid electricity will be cross-checked with the electricity receipts. The precision of the meters are 0.2s.

The receipts of the electricity supplied to the grid by this proposed project and the electricity imported from the grid will be issued based on the power purchase agreement (PPA) signed between the project entity and the power grid company and the readings from the billing meter (M1). The net generation is calculated as exports minus imports.

A diagram shows how parameters are monitored is presented as follows:



The metering equipment are calibrated and checked for accuracy so that the metering equipment shall have sufficient accuracy within the agreed limits. The metering equipments are calibrated and checked annually by qualified third party for accuracy. The records will be supplied to the wind farm operator, and maintained by the operator.

If any error is detected, the party owning the meter shall repair, recalibrate or replace the meter giving the other party sufficient notice to allow a representative to attend during any corrective activity.

#### 4. Monitoring procedure

The electricity supplied to the grid and the electricity imported from the grid will base on the meter installed at 220kV Shangdu Qitai Substation. The receipts of the electricity supplied to the power grid by this proposed project and the electricity imported from the power grid will be issued based on the power purchase agreement (PPA) signed between the project entity and the power grid company and the readings from the metering equipment.

The net generation is calculated as exports minus imports. The electricity exchanged between the proposed project and NCPG via the Shangdu Qitai 220 kV substation is cross-checked by the project owner and the grid company, the metered values of electricity exported and imported will confirmed by the two sides.

#### 5. Quality Assurance and Quality Control

The workers are trained to be competent and the metering equipments are calibrated and sealed as per the industry practices at regular intervals, with the purpose to provide credible, accurate, transparent and conservative monitoring data and ensure the real, measurable, long-term GHG emission reduction from this project.

Monthly net on-grid electricity supplied data will be approved and signed off by the Manager before it is accepted and stored. This audit will check compliance with monitoring procedures in this monitoring plan. This internal audit will also identify potential improvements to procedures to

improve monitoring and reporting in future years. The monitoring officers will also attend a training session organized by the CDM consultant. The purpose of training is to assure those staffs are competent to conduct the monitoring plan, thus to make the monitored data accurate.

#### **Emergency Procedure:**

In case metering equipment is damaged and no reliable readings can be recorded the project entity will estimate net supply by the proposed project activity according to the following procedure:  
In case metering equipment is damaged: The project entity and the grid company will jointly calculate a conservative estimate of power supplied to the grid. A statement will be prepared indicating

- ▶ the background to the damage to metering equipment
- ▶ the assumptions used to estimate net supply to the grid for the days for which no record could be recorded
- ▶ the estimation of power supplied to the grid. The statement will be signed by both a representative of the project entity as well as a representative of the grid company.

The project entity will furthermore document all efforts taken to restore normal monitoring procedures.

### **6. Data Management System**

The CDM manual sets out the procedures for tracking information from the primary source to the end-data calculations in paper document format. Physical documentation such as paper-based maps, diagrams and environmental assessment will be collated in a central place, together with this monitoring plan. In order to facilitate auditors' reference of relevant literature relating to the proposed project activity, the project material and monitoring results will be made available.

At the end of each month, the monitoring data will be filed in a spreadsheet and stored electronically, and the paper-based printout should be also archived. Furthermore, the project owner collects the sales receipts for the electricity supplied to the grid as a cross-check, and compiled the monitoring report including the monitoring data and relevant evidence at the end of each crediting year.

All the data will be kept for two years following the end of the last crediting period.

### **7. Monitoring Report**

The monitoring report is prepared by the CDM project manager alone or with designated third party. The project developer and/or the designated third party have to make sure that the format and content of the monitoring report are consistent with the monitoring methodology in the registered PDD.

## **SECTION C. Start date, crediting period type and duration**

### **C.1. Start date of project activity**

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29/07/2010

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 date of the Box Transformer contract.

### **C.2. Expected operational lifetime of project activity**

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20years

**C.3. Crediting period of project activity****C.3.1. Type of crediting period**

&gt;&gt;

Renewable crediting period (second).

**C.3.2. Start date of crediting period**

&gt;&gt;

08/11/2018 (2<sup>nd</sup> crediting period)**C.3.3. Duration of crediting period**

&gt;&gt;

7y

**SECTION D. Environmental impacts****D.1. Analysis of environmental impacts**

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The environmental impact assessment report for this project was approved by Inner Mongolia Autonomous Region Environmental Protection Bureau on 12th December 2006. A summary of conclusion of the report is illustrated as below:

**Ambient air**

The impact on ambient air quality of the proposed project is mainly from dust during construction stage. The excavation work is the primary emission source, however, it is a ground source and the particle size is quite large so that dust will deposit quickly on the ground. Immediately replant the areas where construction has completed, and by sprinkling water frequently and timely clearing can reduce the dust pollution. When the project is in operational period, there will be no air pollutions. In conclusion, the proposed project will not pose any threat on the quality of ambient air.

**Impact from noise**

There is some noise caused by operation of equipments. However, the location arrangement of wind turbines is serious considered to avoid adverse influence to the residents. The noise level is less than 60 dB (A) in accordance with the National Standard. Hence, the noise will not impact the work and daily life of local residents.

**Electromagnetic impact**

The electromagnetic pollution generated from operation of the wind blades has limited effect within about 20m around, whereas no wireless communication facilities exist within, so the electronic magnetic pollution to the surrounding environment is insignificant.

**Impact from Solid waste**

There is mainly some waste of stone, bricks or domestic waste in the construction stage and basically no solid waste in the operational period. Solid waste will be collected and handled properly. Hence, it will not result any environmental impact.

**Impact from Wastewater**

There is mainly domestic wastewater with fairly small quantities in construction stage, and primary treatment methods will be first applied, small-scale septic tanks should be built on the site, through which the wastewater can finally reuse after treatment. Therefore, the impact of wastewater is limited and mitigated.

**Impact on ecological environment**

The proposed project will both permanently and temporarily occupy some land (mostly farmland), the temporarily occupied land will be ecologically restored for original use. Such restoration measures will include land re-surfacing, re-vegetation, and etc. As for the permanently occupied



land, ecological compensation measures will be applied to the adjacent area to offset the impact on ecosystem.

No migrating birds have been found in the project field till now. Therefore, the project is not located on the passage of migrating birds, and the project construction will not influence the migration of birds.

## **D.2. Environmental impact assessment**

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The Project use clean renewable energy to generate electricity whose environmental impact comply with relevant environmental laws and regulations in the host country. The environmental impacts of the proposed project are not considered significant.

## **SECTION E. Local stakeholder consultation**

### **E.1. Modalities for local stakeholder consultation**

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In July 2010, staff from the project owner carried out a survey of the local residents around the project location. The staff introduced the background of the proposed project and then sent out 50 copies of questionnaire in a random way, 49 pieces of reply were received. Among the interviewees, 35 of them have educational level of middle school, 13 of high school, 1 of collage; 30 of them are farmers, 2 of them are workers, 17 are officers.

An invitation notice for stakeholder comments was later issued by the project developer, several representatives of local stakeholders, including governmental officials of local county and local residents, etc attended the meeting on 9th July 2010 to discuss the questionnaires collected and further introduce the project. No negative opinion on construction of the project is heard and environmental considerations expressed by stakeholders are discussed on the meeting.

The questions regarding the proposed project were mainly as follows:

How do you think the general condition of the local environmental quality?		
A Very well	B General	C Unsure
Do you currently experience electromagnetic interference when watching TV at home?		
A Yes	B No	C Unknown
Are there any negative impacts of the proposed project on the everyday life of local residents?		
A Yes	B No	C Unknown
Is the proposed project going to help improve the living and/or working environment?		
A Yes	B No	C Unsure
How the proposed project impact the acoustic environment (noise) quality?		
A Beneficial	B Not beneficial	C Unsure
Which is the environmental topic that concerns you the most during the construction and operation of the proposed project?		
A Electromagnetic interference	B Noise level	C Wastewater
Do you support the proposed project?		
A Yes	B No	C Unsure

### **E.2. Summary of comments received**

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The summary of questionnaire survey is listed as the following:

- 47 (96%) of them think the local environmental quality is very well, 2(4%) of them think it is general;
- All (100%) of them currently do not experience electromagnetic interference when watching TV at home;

- All (100%) of them think there will not be any negative impacts on their everyday life, and the remainder is unsure;
- 45 (92%) of them think the proposed project will help improve their living and/or working environment, and the remainder is unsure;
- 47 (96%) of them are unsure whether the proposed project will make noise, one(2%) of them thinks that it is beneficial, and the remainder thinks it is not beneficial;
- Regarding the construction and operation of the propose project, 11 (23%) of them are most concerned with electromagnetic interference, 31 (63%) of them are most concerned with the noise level, and 7 (14%) of them are most concerned with wastewater from the project;
- 48 (98%) of them support the implementation of the proposed project. and the remainder is unsure.

**The summary of local stakeholders meeting:**

The local community possesses basically positive comments on the effects of the proposed project. The interviewees considered that local social, economic and environmental development would be beneficial from the proposed project. The response was overall supportive to the project implementation.

**E.3. Consideration of comments received**

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During the survey local residents support the propose project as they showed in the questionnaires. Some people express their concerns about the negative impacts of the project, but they don't think it is serious. About the environment impacts of the project, the requirements in the EIA report will be strictly conducted by the project owner and be supervised by the municipal environmental protection bureau. Therefore, the proposed project can be carried out as planned.

**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

<b>Organization name</b>	Beijing Beineng Chuangye Wind Power Technology Co., Ltd.
<b>Country</b>	People's Republic of China
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<b>E-mail</b>	<a href="mailto:cgnwind@163.com">cgnwind@163.com</a>
<b>Website</b>	-
<b>Contact person</b>	Shi Lei

## 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

The project was registered on 08/11/2011. The project revised monitoring plan and was approved by EB on 27/12/2012.