



**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>	Zhangjiakou Chabei 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>	Version 2.1 (updated addressing to renewal of crediting period)
<b>Completion date of the PDD</b>	11/01/2019
<b>Project participants</b>	CGN (Chabei) Wind Power Co., Ltd.
<b>Host Party</b>	People's Republic of 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>	179,633 tCO <sub>2</sub> e

## SECTION A. Description of project activity

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

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Zhangjiakou Chabei Wind Farm Project (the proposed project activity) is located in Chabei District, Zhangjiakou City, Hebei Province, China. The proposed project activity is developed by CGN (Chabei) Wind Power Co., Ltd. The proposed project activity is to install and operate 67 wind turbines with a capacity of 1,500kW each; the total installed capacity will be 100.5MW. The expected annual equivalent full load operating hour is 2,127h with Plant Load Factor (PLF) of 24.3%. Once fully operational, the proposed project activity is expected to deliver on 213,735MWh of electricity per year to the 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 the NCPG.

The project scenario is the installation of 100.5MW of renewable energy power generation capacity, and the supply to NCPG of 213,735MWh of electricity generated from renewable energy.

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 proposed project Activity was registered on 27/05/2011 (Ref.4844) and the first crediting period is 27/05/2011 –26/05/2018. Following the methodology (ACM0002,19.0), the emission reductions of the second crediting period (27/05/2018-26/05/2025) are estimated to be on average 179,633 tonnes of CO<sub>2</sub> equivalent (tCO<sub>2</sub>e) per year, and 1,257,431 tCO<sub>2</sub>e over the chosen crediting period.

The development of the proposed project activity is following the developing objective of the Chinese energy industry, and it will contribute to the sustainable development in the energy sector, especially for the electricity industry such as following:

- reducing greenhouse gas emissions compared to business-as-usual scenario;
- helping to stimulate the growth of the wind power industry in China;
- reducing the emission of other pollutants resulting from the power generation industry in China, compared to business-as-usual scenario;
- creating local employment opportunities during the project construction and operation period.

### A.2. Location of project activity

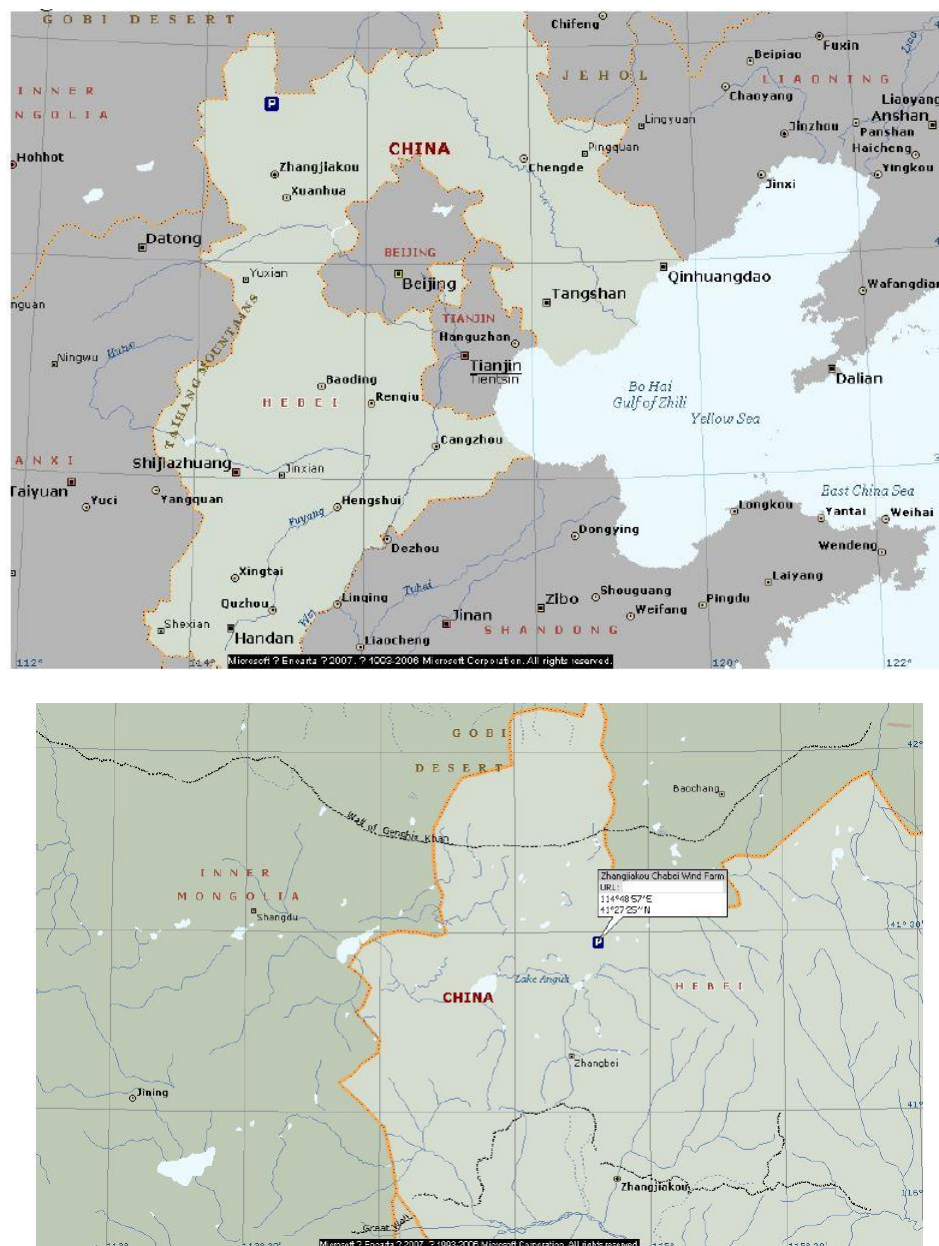
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The Project is located in Chabei District, Zhangjiakou City, Hebei Province, People's Republic of China. The Project has geographical coordinates with east longitude of 114.8158°(Centre)and north latitude of 41.4569°(centre). Altitude of 1420m~1450m above sea level.

The coordinates of the project boundary corners are summarized below.

Corner No.	Longitude	Latitude
1	114.8642°	41.5186°
2	114.8731°	41.5181°
3	114.8764°	41.4922°
4	114.7978°	41.4008°
5	114.7886°	41.4300°
6	114.7475°	41.4367°
7	114.8017°	41.4736°

Figure 1 Map showing the location of the Project



### A.3. Technologies/measures

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The purpose of the Proposed Project Activity is the generation of electricity from wind and the supply of this electricity to the Grid. The project scenario is the installation of 67 wind turbines with a capacity of 1,500 kW each. The equipment is manufactured in China by Xinjiang Goldwind Science & Technology Co., Ltd. There is no direct technology transfer related to the project activity since all the technology employed is from domestic manufacturers. The technology specifications applied is shown in Table 1.

**Table 1. Technology specifications**

Item	Specification	Data Source
Manufacturer	Xinjiang Goldwind Science & Technology Co., Ltd.	Manufacturer's Specifications
Model	77/1500kW	
Power Rating	1,500kW	
Rotor Diameter	77m	
Hub height (Centre)	65m	
Cut-in Wind speed	3m/s	
Rating Wind Speed	12m/s	
Cut-out Wind Speed	25m/s	
Designed life	20years	
Load Factor	24.3%	
		FSR

The Project commenced construction in 09/08/2010. The first wind turbine was put into commercial operation in 25/03/2011 and the last wind turbine was put into commercial operation in 05/2011.

Each turbine will have a transformer from 690V to 35kV, and are connected with the newly-constructed 220kV substation on the wind farm. The onsite substation is connected to the grid substation via 220kV transmission line. All the electricity generated by the wind farm will be transferred to the NCPG via the grid substation.

The annual net supplied power of the proposed project activity to the grid is monitored by the main meter at the onsite substation of the wind farm project, recording the quantity of annual electricity exported to the grid ( $EG_{\text{export},y}$ ) and the quantity of annual electricity imported to the grid ( $EG_{\text{import},y}$ ). Annual net generation is calculated as  $EG_{\text{export},y}$  minus  $EG_{\text{import},y}$ . The backup meter is installed at the onsite substation. The accuracy of the main meter and backup meter is 0.2S. The main meter monitor the flow continuously and are reported monthly. The main meter is read by the qualified operating staff of the wind farm. A monthly report of the net on-grid electricity from the main meter installed at the onsite substation is established on the basis of the data.

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 is considered the baseline scenario.

#### A.4. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (host)	CGN (Chabei) 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 27/05/2011 the reference no. is 4844. 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 a registered CDM project activity whose crediting period has or has expired (hereinafter referred to as former project) exists in the same geographical location as the proposed CDM project activity.

It demonstrates that the proposed CDM project activity meets all conditions for registration in accordance with the applicable provisions in the project standard relating to registration of a project activity that is in the same geographical location as a former project.

#### **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 methodology refers to the following tools

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. “Combined tool to identify the baseline scenario and demonstrate additionality(version 07.0)”  
<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-02-v7.0.pdf>
3. “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion(version 03.0)”  
<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v3.pdf>
4. “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation(version 03.0)”  
<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v3.0.pdf>
5. “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>
6. “Tool to determine the remaining lifetime of equipment (Version 01)”  
<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-10-v1.pdf>
7. “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 applicability in approved methodology ACM0002 (version 19.0) related to wind farm project are as below:

<b>Applicability</b>	<b>Conclusion</b>
<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 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;</li> <li>(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.</li> </ul>	<ul style="list-style-type: none"> <li>a) The proposed project is the installation of a wind power plant.</li> <li>b) Not applicable. The proposed project is a Greenfield plant and does not represent a capacity addition, retrofits, rehabilitations or replacement.</li> </ul>
<p>In case of hydro power plants, one of the following conditions shall apply:</p> <ul style="list-style-type: none"> <li>(a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or</li> <li>(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</li> <li>(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</li> <li>(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: <ul style="list-style-type: none"> <li>(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>;</li> <li>(ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity;</li> <li>(iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m<sup>2</sup> shall be: <ul style="list-style-type: none"> <li>a. Lower than or equal to 15 MW; and</li> <li>b. Less than 10 per cent of the total installed capacity of integrated hydro power project.</li> </ul> </li> </ul> </li> </ul>	<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> <ul style="list-style-type: none"> <li>(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</li> </ul>	<p>Not applicable. The proposed project is the installation of a wind power plant.</p>

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.	
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.
<b>Applicability conditions of "Tool to calculate the emission factor for an electricity system", - Version 07.0</b>	
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 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.	Since the proposed project is grid connected, this condition is applicable and the emission factor has been calculated accordingly.
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 <sub>2</sub> emission factor of	The proposed project is a

biofuels is zero.	grid connected wind power project/ unit and does not involve emission from biofuels. Therefore, this criterion is not applicable.
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Therefore, the methodology ACM0002 (version 19.0) is applicable to the project activity.

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

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According to ACM0002 (Version 19.0), the spatial extent of the project boundary includes the project power plant/unit and all power plants/units connected physically to the electricity system that the CDM project power plant is connected to. The power generated by the project activity is finally connected to NCPG. The areas covered by NCPG include Beijing city, Tianjin city, Hebei province, Shanxi province, Shandong province, and the Inner Mongolia Autonomous Region.

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

Source		Gas	Included	Justification/explanation
Baseline	Power supplied by NCPG	CO <sub>2</sub>	Yes	Following ACM0002
		CH <sub>4</sub>	No	Conservative/according to ACM0002
		N <sub>2</sub> O	No	Conservative/according to ACM0002
Project activity	The proposed project	CO <sub>2</sub>	No	According to ACM0002, the project emission for wind power plant is zero.
		CH <sub>4</sub>	No	
		N <sub>2</sub> O	No	

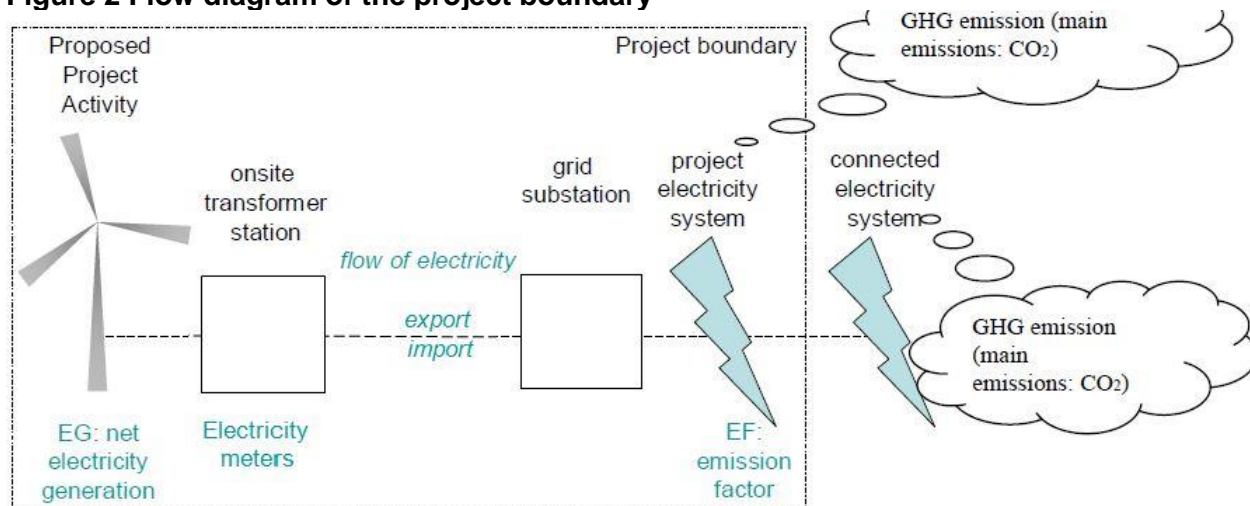
A connected electricity system is defined as an electricity system that is connected by transmission lines to the project electricity system. Power plants within the connected electricity system can be dispatched without significant transmission constraints but transmission to the project electricity system has significant transmission constraint.

As the DNA of China has published a delineation of the project electricity system and connected electricity systems<sup>1</sup>, these delineations are used. According to the delineation of grid boundaries as provided by the DNA of China, NCPG includes Beijing, Tianjin, Shanxi, Hebei, Shandong, and Inner Mongolia. NCPG is the project electricity system, as the power plants that are connected to NCPG can be dispatched without significant transmission constraints.

In line with the *Guidelines for Completing the Project Design Document (CDM-PDD)* and ACM0002(version 19.0), 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).

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



**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 01.0), 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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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>2</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

<sup>2</sup> <http://qhs.mee.gov.cn/kzwsqtpf/>

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.
- 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:

- (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<sup>3</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.

(i) Approach 1

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

(ii) Approach 2

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

Where:

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

- (b) The average amount of load (MW) supplied by low-cost/must-run resources in a grid in the most recent three years is less than the average of the lowest annual system loads (LASL) in the grid of the same three years.
- The approach 1 is chosen for calculation and low-cost/must-run resources constitute less than 50% of total grid generation in average of the five most recent years<sup>4</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 20/12/2018.

<sup>3</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.

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

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;  
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:

- The necessary data for Option A is not available; and
- 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
- 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:

- The necessary data for Option A is not available, as indicated in the calculations of the DNA; and
- 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
- 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:

$$EF_{grid,OMsimple,y} = \sum_i (FC_{i,y} \times NCV_{i,y} \times EF_{CO_2,i,y}) / EG_y \quad (4)$$

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)           |
| $EF_{CO_2,i,y}$        | = | 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)
$i$	= 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<sup>5</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**

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 ( $\text{tCO}_2/\text{MWh}$ ) 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 $y$ ( $\text{tCO}_2/\text{MWh}$ )
$EG_{m,y}$	=	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 $y$ ( $\text{tCO}_2/\text{MWh}$ )
$m$	=	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>6</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.

<sup>5</sup> <http://qhs.mee.gov.cn/kzwsqtpf/>

<sup>6</sup> M-DEV0004, DNV (07/10/2005), see <http://cdm.unfccc.int/Projects/deviations/87512>.

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

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

Where:

$EF_{grid,BM,y}$	=	The build margin CO <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.

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

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

#### (a) Weighted average CM

The combined margin emissions factor is calculated as follows:

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

Where:

$EF_{grid,OM,y}$	=	The operating margin CO <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	$FC_{i,y}$
Data unit	Mass or volume
Description	The amount of fossil fuel <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	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	$\eta_{\text{fuel-type},y}$
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	$\text{Share}_{\text{CAP},m,y}$
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	$W_{\text{OM}}$
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	$W_{\text{BM}}$
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 <sub>grid,OMsimple,y</sub>
Data unit	tCO <sub>2</sub> /MWh
Description	Simple operating 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	0.9680
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:

$$BE_y = EG_{facility,y} \times EF_{grid,CM,y} = 213,735 \text{ MWh/yr} \times 0.84045 \text{ tCO}_2/\text{MWh} = 179,633 \text{ tCO}_{2e}/\text{yr}$$

$$ER_y = BE_y - PE_y = 179,633 \text{ tCO}_{2e}/\text{yr} - 0 \text{ tCO}_{2e}/\text{yr} = 179,633 \text{ tCO}_{2e}/\text{yr}.$$

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)
27/05/2018-26/05/2019	179,633	0	0	179,633
27/05/2019-26/05/2020	179,633	0	0	179,633
27/05/2020-26/05/2021	179,633	0	0	179,633
27/05/2021-26/05/2022	179,633	0	0	179,633
27/05/2022-26/05/2023	179,633	0	0	179,633
27/05/2023-26/05/2024	179,633	0	0	179,633
27/05/2024-26/05/2025	179,633	0	0	179,633
Total	1,257,431			
Total number of crediting years	7			
Annual average over the crediting period	1,257,431	0	-	1,257,431

### B.7. Monitoring plan

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

Data/Parameter	<i>EG<sub>facility,y</sub></i>
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Electricity meter (s), monitoring supply to the grid and imports from the grid
Value(s) applied	213,735 MWh/year when fully operating
Measurement methods and procedures	Net electricity generated by the proposed project activity will be monitored continuously through the main metering equipment installed at the project activity site, recording exports to the grid ( <i>EG<sub>export,y</sub></i> ) and imports from the grid ( <i>EG<sub>import,y</sub></i> ). Net generation is calculated as exports minus imports. $EG_{facility,y} = EG_{export,y} - EG_{import,y}$
Monitoring frequency	Consciously measured and monthly recorded.
QA/QC procedures	The metering equipment is calibrated and checked annually for accuracy by the qualified third party in accordance with relevant industry standards. The error resulting of the meters will not exceed 0.5%. Monthly net generation data will be approved and signed off by CDM manager before it is accepted and stored.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	<i>EG<sub>export,y</sub></i>
Data unit	MWh
Description	Quantity of annual electricity exported to the grid by the proposed project
Source of data	Monitored from bidirectional electricity meter (s)
Value(s) applied	213,735 MWh when fully operating

Measurement methods and procedures	The electricity supplied by the proposed project activity will be monitored continuously through the main metering equipment installed at the project activity site. The results from the main meter will be recorded monthly. The error resulting of the meters will not exceed 0.5%.
Monitoring frequency	Consciously measured and monthly report.
QA/QC procedures	The metering equipment is calibrated annually for accuracy by a qualified third party in accordance with industry standard. Monthly generation data will be approved and signed off by CDM manager before it is accepted and stored. The supply of electricity to the grid is cross-checked against records for sold electricity.
Purpose of data	Calculation of baseline emissions
Additional comment	Additional generating capacity not part of this proposed project activity may be connected to the same transmission line of the power grid company. The share of this wind farm of the electricity supply to the grid will be accounted for proportionally to generation of the proposed project activity and any additional capacity in this case.

<b>Data/Parameter</b>	<b><i>EG<sub>import,y</sub></i></b>
Data unit	MWh
Description	Quantity of annual electricity imported from the grid by the proposed project
Source of data	Monitored from bidirectional electricity meter (s)
Value(s) applied	0
Measurement methods and procedures	The electricity imported to the proposed project activity will be monitored continuously through the main metering equipment installed at the project activity site. The results from the main meter will be recorded monthly. The error resulting of the meters will not exceed 0.5%.
Monitoring frequency	Consciously measured and monthly recorded.
QA/QC procedures	The metering equipment is calibrated annually for accuracy by a qualified third party in accordance with industry standard. Monthly data of electricity imports will be approved and signed off by CDM manager before it is accepted and stored. The electricity import from the grid is cross-checked against records for sold electricity.
Purpose of data	Calculation of baseline emissions
Additional comment	Additional generating capacity not part of this proposed project activity may be connected to the same transmission line of the power grid company. The share of this wind farm of the electricity supply from the grid will be accounted for proportionally to generation of the proposed project activity and any additional capacity in this case.

### 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

>>

#### 1.Introduction

The proposed Project adopts the approved consolidated monitoring methodology ACM0002 "Grid-connected electricity generation from renewable sources (version 19.0) to determine the emission reductions from the net electricity generation from the wind farm.

#### 2. Responsibility



Overall responsibility for monitoring and carrying out the monitoring following this monitoring plan lies with CGN (Chabei) Wind Power Co., Ltd.

### 3. Training

The CDM project management office will assign and train the dedicated people carrying out the monitoring work. The CDM project manager will complete the monitoring personnel training before the registration, further training work will be completed with the preliminary verification.

### 4. Installation of meter

The annual net supplied power of the proposed project activity to the grid is monitored by the main meter at the onsite substation of the wind farm project, recording the quantity of annual electricity exported to the grid ( $EG_{\text{export},y}$ ) and the quantity of annual electricity imported to the grid ( $EG_{\text{import},y}$ ). Annual net generation is calculated as  $EG_{\text{export},y}$  minus  $EG_{\text{import},y}$ . The backup meter is installed at the onsite substation. The accuracy of the main meter and backup meter is 0.2S. The main meter monitor the flow continuously and are reported monthly. The main meter is read by the qualified operating staff of the wind farm. A monthly report of the net on-grid electricity from the main meter installed at the onsite substation is established on the basis of the data.

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 ( $EG_{\text{project}}$ ) will be calculated as follows:

$$EG_{\text{project}} = EG_{\text{total}} * E_{\text{project}} / (E_{\text{project}} + E_{\text{others}})$$

$EG_{\text{total}}$  is the total net electricity supplied to the grid based on the data metered by the main meter;

$E_{\text{project}}$  is the electricity generation from the project activity metered by the separate meters;

$E_{\text{others}}$  is the electricity generation from other projects metered by the other separate meters.

### 5. Calibration

The metering equipment will be calibrated and checked for accuracy in accordance with industry standards. The error resulting of the meters will not exceed 0.5%. The net generation output registered by the meter alone will suffice for the purpose of billing and emission reduction verification as long as the error in the meter is within the agreed limits.

The metering equipment shall be jointly inspected and sealed on behalf of the parties concerned and shall not be interfered with by either party except in the presence of the other party or its accredited representatives.

Calibration is carried out by the qualified entity with the records being supplied to CGN (Chabei) Wind Power Co., Ltd., and these records will be maintained by CGN (Chabei) Wind Power Co., Ltd.

The metering equipment installed shall be tested by qualified entity after: the detection of a difference larger than the allowable error in the readings of main meter; the repair of all or part of meter caused by the failure of one or more parts to operate in accordance with the specifications.

If any errors are 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.

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 within acceptable limits of accuracy or operation is performed improperly CGN

(Chabei) Wind Power Co., Ltd. and the Power Grid Company shall jointly prepare a reasonable and conservative estimate of the correct reading, and provide sufficient evidence that this estimation is reasonable and conservative when DOE undertakes verification; and (c) if the Power Grid Company and CGN (Chabei) Wind Power Co., Ltd. fail to agree then the matter will be referred for arbitration according to agreed procedures.

## **6. Monitored data**

Grid-connected electricity generated by the proposed project will be monitored through the main metering equipment. Every month CGN (Chabei) Wind Power Co., Ltd. will obtain the on-grid electricity generation from the substation.

## **7. Quality control**

Monthly net generation data will be approved and signed off by CDM manager before it is accepted and stored. This audit will check compliance with operational procedures in this monitoring plan. This internal audit will also identify potential improvements to procedures to improve monitoring and reporting in future years.

## **8. Data management system**

Physical documents such as paper-based maps, diagrams and environmental assessments 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, the project material and monitoring results will be indexed. All paper-based information will be stored by the technology department of CGN (Chabei) Wind Power Co., Ltd. and all the material will have a copy for backup. And all data including calibration records is kept until 2 years after the end of the total crediting period of the CDM project.

## **9. Reporting and verification**

- CGN (Chabei) Wind Power Co., Ltd. records readings from the main meter monthly.
- CGN (Chabei) Wind Power Co., Ltd. carries out an internal audit on the readings and calculations.
- CGN (Chabei) Wind Power Co., Ltd., after the internal audit, reports the readings, grid data and calculations to the DOE for verification.

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

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

>>

28/07/2010

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 earliest date of the proposed project activity is the signing date of Turbines Purchase Contract (28/07/2010), which is the starting date of a CDM project activity.

### **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**

>>

27/05/2018 (2<sup>nd</sup> crediting period)

### **C.3.3. Duration of crediting period**

>>

7y-0m

## **SECTION D. Environmental impacts**

### **D.1. Analysis of environmental impacts**

>>

Environmental Impact Assessment (EIA) for the proposed project has been completed by Beijing National Water Conservancy & Electric Power Engineering Co., Ltd. and approved by Hebei Province Environmental Protection Bureau.

#### **The analysis of the environment impact in the construction period**

- The air pollution from the proposed project is mainly due to the dust emitted from the construction activity. The major measures for dust control include spreading water regularly on the construction site, covering the construction materials, minimizing the temporary land occupation, etc.
- Construction machinery and construction activity will generate noise. The low-noise equipment will be applied and be maintained regularly; the driving time and routine will be controlled; the
- construction plan and area involved will be well organized. Therefore, the impact of construction noise to the local region is minimal.
- The waste water during construction period is mainly from construction workers, and this small quantity of waste water will cause no impact on the local water environment.
- The solid waste in the construction period is mainly from building waste, construction waste and household garbage. The household garbage waste will be collected and then moved to the local landfill plant; the building waste will be collected by construction party; the construction soil will be refilled. Therefore, the solid waste will not have the impact on the environment.
- The necessary measures will be undertaken in order to minimize the impact to the environment, by means of reducing the land occupation, protecting the plants, surface soil conservation, recovering the ground, and compensation for the land occupation.

#### **The analysis of the environment impact in operation period**

- The operation of wind farm will cause some noise. The equipment will be maintained regularly. The distance between turbines and sensitive site will satisfy the protection requirement. Therefore, the noise does not influence the residential districts nearest to the site.
- The waste water during operation period is mainly from operation staff, and this small quantity of waste water during construction, which is used to water the plants after treatment, will cause no impact on the local water environment.
- The solid waste in the operational period is mainly from the household garbage. The household garbage waste will be collected and then moved to the local landfill plant. Therefore, the solid waste will not have the impact on the environment.
- In order to avoid the light and shadow influence to the local residents, the local government promise not to approve the residence buildings.

- 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 environment. In addition, the wild animals will be protected and the farmers will be taken care of.

## 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

>>

Environmental impacts are not considered significant. Hebei Province Environmental Protection Bureau has approved the EIA (29 December 2007).

## SECTION E. Local stakeholder consultation

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

>>

In June 2010, the staff from the Developer carried out a survey of the local villagers and residents near the area. Questionnaires were sent to 50 stakeholders and the survey had a 100% response rate. As the project area is rural, far away from urban areas, and sparsely populated, the number of stakeholders is representative for a large area. 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

>>

#### Stakeholders surveyed

Item	Content	Vote	Proportion
Gender	Male	35	70%
	Female	15	30%
Education	Elementary school	10	20%
	Junior high school	20	40%
	Senior high school	16	32%
	University or above	6	8%

#### Response

1. Will the project affect your environment of living, studying and working?	Yes	No	Not Sure
	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	100%	0%
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. Will the project help to reduce GHG emissions, comparing to conventional thermal power plant?	Yes	No	Not Sure
	98%	0	2%

5. Do you think the proposed project will have a positive impact on local economic development?	Yes	No	Unclear
	100%	0	0
6. Do you agree with the development of the Project?	Yes	No	No Concern
	100%	0	0

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**

>>

The local stakeholders are all supportive of the proposed project activity, and up to date there has been no need to modify the project design according to the comments received.

The project developer 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**

>>

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>	CGN (Chabei) Wind Power Co., Ltd.
<b>Country</b>	China
<b>Address</b>	No.188,West of South 4 <sup>th</sup> Ring Road
<b>Telephone</b>	+86 10 6370 5651
<b>Fax</b>	+86 10 6370 5875
<b>E-mail</b>	<a href="mailto:Wangzisong@hotmail.com">Wangzisong@hotmail.com</a>
<b>Website</b>	/
<b>Contact person</b>	Niu Zhiping

## 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

There are no post-registration changes of the proposed project activity

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## Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
10.1	28 June 2017	Revision to make editorial improvement.
10.0	7 June 2017	Revision to: <ul style="list-style-type: none"> <li>• Improve consistency with the “CDM project standard for project activities” and with the PoA-DD and CPA-DD forms;</li> <li>• Make editorial improvement.</li> </ul>
09.0	24 May 2017	Revision to: <ul style="list-style-type: none"> <li>• Ensure consistency with the “CDM project standard for project activities” (CDM-EB93-A04-STAN) (version 01.0);</li> <li>• Incorporate the “Project design document form for small-scale CDM project activities” (CDM-SSC-PDD-FORM);</li> <li>• Make editorial improvement.</li> </ul>
08.0	22 July 2016	EB 90, Annex 1 Revision to include provisions related to automatically additional project activities.
07.0	15 April 2016	Revision to ensure consistency with the “Standard: Applicability of sectoral scopes” (CDM-EB88-A04-STAN) (version 01.0).
06.0	9 March 2015	Revision to: <ul style="list-style-type: none"> <li>• Include provisions related to statement on erroneous inclusion of a CPA;</li> <li>• Include provisions related to delayed submission of a monitoring plan;</li> <li>• Provisions related to local stakeholder consultation;</li> <li>• Provisions related to the Host Party;</li> <li>• Make editorial improvement.</li> </ul>
05.0	25 June 2014	Revision to: <ul style="list-style-type: none"> <li>• Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0));</li> <li>• Include provisions related to standardized baselines;</li> <li>• Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1;</li> <li>• Change the reference number from F-CDM-PDD to CDM-PDD-FORM;</li> <li>• Make editorial improvement.</li> </ul>
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b

<i>Version</i>	<i>Date</i>	<i>Description</i>
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Registration Keywords: project activities, project design document		