**Project design document form**

**(Version 10.1)**

| BASIC INFORMATION | |
|---|---|
| **Title of the project** | CGN Inner Mongolia Huitengliang Phase I Wind Farm Project |
| **Scale of the project** | ☒ Large-scale<br>☐ Small-scale |
| **Version number of the PDD** | 3.1 (updated addressing to renewal of crediting period) |
| **Completion date of the PDD** | 02/01/2019 |
| **Project participants** | CGN Wind Power Co., Ltd. |
| **Host Party** | People's Republic of China |
| **Applied methodologies and standardized baselines** | Methodology: ACM0002 "Grid-connected electricity generation from renewable sources" (Version 19.0) |
| **Sectoral scopes linked to the applied methodologies** | Sectoral scope 1: Energy industries<br>(renewable / non-renewable sources) |
| **Estimated amount of annual average GHG emission reductions** | 106,666 $tCO_2e$ |

# SECTION A. Description of project activity

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

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The CGN Inner Mongolia Huitengliang Phase I Wind Farm Project is located in the Huitengliang area of Xilinguole League, Inner Mongolia Autonomous Region. The project is being developed by CGN Wind Power Co., Ltd. (hereafter as "the developer"). The objective of the project is to generate renewable electricity from wind power and sell the generated power to the North China Power Grid (NCPG).

On the project site, the developer is planning to install 40 wind turbines, each with a capacity of 1.25MW. The total installed capacity of the project activity is 50MW. The expected net annual generation of the project activity is 126,916MWh and the expected volume of emission reductions is 106,666 $tCO_2e$ per year once fully operational.

The project was registered as CDM project on 17/06/2010 with Reference No. 3303. The first crediting period of the project is 17/06/2010-16/06/2017. The second crediting period of the project would be 17/06/2017-16/06/2024. Following the methodology, during the second crediting period, the expected of emission reductions is 106,666 $tCO_2e$ per year and 746,662 $tCO_2e$ totally.

The baseline scenario of the project is the additional power generated by NCPG, and it is the same as the existing scenario prior to start of the implementation of the project. As the NCPG is dominated by the thermal power generation, the proposed project activity will achieve greenhouse gas (GHG) emission reductions by displacing the electricity from NCPG.

The project activity will promote the local and national sustainable development powerfully in the following aspects:

- Reduce greenhouse gas emissions in China compared to a business-as-usual scenario;
- Help to stimulate the growth of the wind power industry in China;
- Create local employment opportunity during the assembly and installation of wind turbines, and for operation of the wind farm;
- Reduce other pollutants resulting from the power generation industry, compared to a business-as-usual approach, such as $SO_2$, $NO_x$ and soot.

## A.2. Location of project activity

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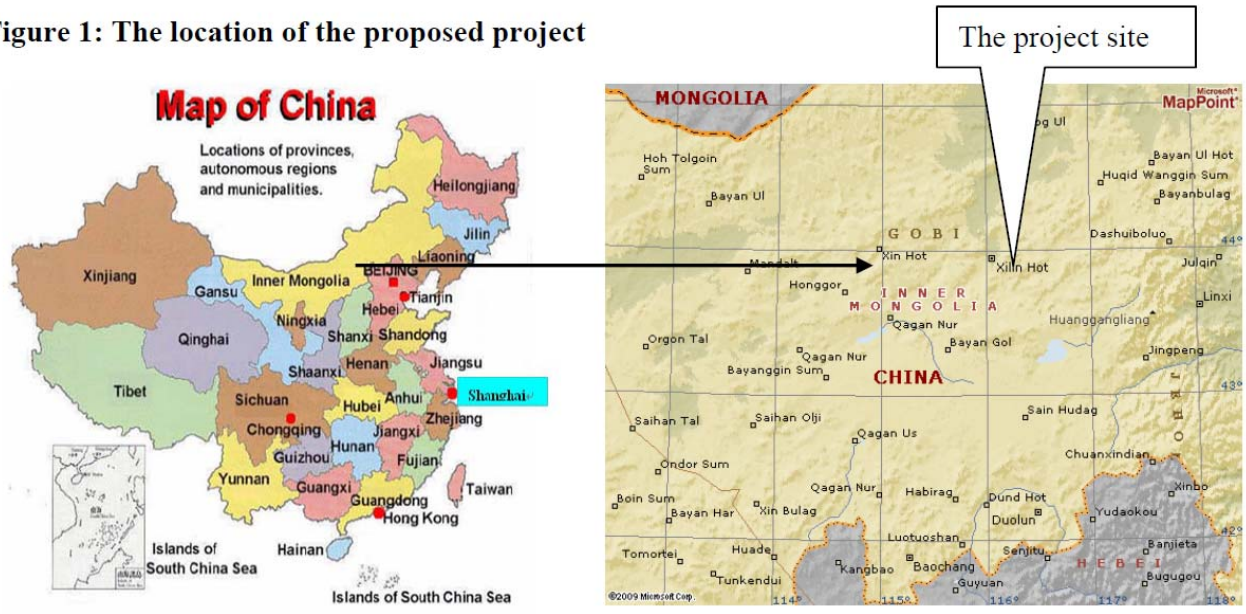
The project activity lies in the Southwest of Xilinhot City. The centre of the project is located at latitude 43°27′57″ North and longitude 115°51′35″ East. The average altitude of the project site is 1360m above sea level.

**Figure 1: The location of the proposed project**




## A.3. Technologies/measures

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The project developer adopts advanced commercial wind-power technology for the construction of this project activity. A total of 40 turbines with a capacity 1.25MW have been installed, the detailed parameters of the turbines are provided in Table 1.

**Table 1 The technical specifications of the installed wind turbines**

| Item | Parameters | Manufacturer |
|---|---|---|
| Type | SEC-1250 | Shanghai Electric Wind Co.,Ltd |
| Quantity (sets) | 40 | |
| Rated capacity (kW) | 1250 | |
| Hub height (m) | 68 | |
| Rotor diameter (m) | 64 | |
| Sweep-wind area (m2) | 3217 | |
| Cut-in speed (m/s) | 2.8 | |
| Rated wind speed (m/s) | 12.3 | |
| Cut-out speed (m/s) | 23 | |
| Rated voltage of generator (V) | 690 | |
| Lifetime (years) | 20 | |

The project scenario is the installation of 40 wind turbines with an aggregate capacity of 50MW. The baseline scenario of the project is the additional power generated by NCPG, and it is the same as the existing scenario prior to start of the implementation of the project. The supplied power is expected to be 126,916MWh per year, with an average load factor of about 29%[1]. The project is expected to be operated for 20 years. As the NCPG is dominated by the thermal power generation, the project activity will achieve greenhouse gas (GHG) emission reductions by displacing the electricity from NCPG.

A 220kV transformer station has been built at the project site. The power generation from the project is sent to the grid by 220kV transmission line. The net electricity supplied by the project to the grid is monitored through the main meter installed in Huitengliang substation. If the proposed project has to share the same transformer, substation or transmission line with some other wind

[1] The plant load factor is determined by a third party, Inner Mongolia electrical power investigate and designing institute, which has good experience for similar projects in China, also the plant load factor in FSR of the project has been approved by Chinese government.

farms, appropriate additional meters will be installed at the project site so that the electricity generation can be monitored for each wind farm separately so as to calculate the share of this wind farm of the net supply to the grid. The backup meter has been installed at on-site substation. The main meter and backup meter are bidirectional. Please find the details in Section B.7.3.

The project adopts the turbines manufactured domestically, then there's no 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) |
|---|---|---|
| People's Republic of China (host Party) | CGN Wind Power Co., Ltd. | No |

### A.5. Public funding of project activity

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No public funding from any of the UNFCCC Annex I country governments has been secured for the project.

### A.6. History of project activity

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The project was registered as CDM project on 17/06/2010, the Reference No. is 3303. The PDD is renewal of crediting period. Therefore, it can be confirmed that:

(a) The proposed CDM project activity is not included as a component project activity (CPA) in a registered CDM programme of activities (PoA);
(b) The proposed CDM project activity is not a project activity that has been deregistered.

And confirm that:

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

### A.7. Debundling

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The 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 methodology applied in the project is the approved baseline and monitoring methodology ACM0002 (version 19.0) - "Grid-connected electricity generation from renewable sources".

Approved methodology ACM0002 prescribes the use of the latest version of the "Tool for the demonstration and assessment of additionality (version 7.0.0)" and the "Tool to calculate the emission factor for an electricity system" (version 7.0).

### 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:

| Applicability | Conclusion |
|---|---|

| | |
|---|---|
| This methodology is applicable to grid-connected renewable energy power generation project activities that:<br>(a) Install a Greenfield power plant;<br>(b) Involve a capacity addition to (an) existing plant(s);<br>(c) Involve a retrofit of (an) existing operating plants/units;<br>(d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or<br>(e) Involve a replacement of (an) existing plant(s)/unit(s). | The proposed project is the installation of a Greenfield power plant. |
| The methodology is applicable under the following conditions:<br>(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;<br>(b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects) the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity. | a) The proposed project is the installation of a wind power plant.<br>b) Not applicable. The proposed project is a Greenfield plant and does not represent a capacity addition, retrofits, rehabilitations or replacement. |
| In case of hydro power plants, one of the following conditions shall apply:<br>(a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or<br>(b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density, calculated using equation (3), is greater than 4 W/m2; or<br>(c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m2; or<br>(d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m2, all of the following conditions shall apply:<br>(i) The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m2;<br>(ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity;<br>(iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/$m^2$ shall be:<br>a. Lower than or equal to 15 MW; and<br>b. Less than 10 per cent of the total installed capacity of integrated hydro power project. | Not applicable. The proposed project is the installation of a wind power plant. |
| In the case of integrated hydro power projects, project proponent shall:<br>(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<br>(b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore, this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity. | Not applicable. The proposed project is the installation of a wind power plant. |
| The methodology is not applicable to the following:<br>(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;<br>(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.<br>b) Not applicable. The proposed project is a wind |

| | |
|---|---|
| | power plant. |
| In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance". | Not applicable. The proposed project is the installation of a wind power plant and not a retrofits, rehabilitations or replacement or capacity additions. |
| **Applicability conditions of "Tool to calculate the emission factor for an electricity system", - Version 07.0** | |
| This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects). | This condition is applicable. OM, BM and CM are estimated using the tool under section B.6.3 for calculating baseline emissions. |
| Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, two sub-options under the step 2 of the tool are available to the project participants, i.e. option IIa and option IIb. If option IIa is chosen, the conditions specified in " Appendix 2: be met. Namely, the total capacity of off-grid Procedures related to off-grid power generation" should power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity 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 locats in China, a non-Annex I country. Therefore, this criterion is not applicable for the project activity. |
| Under this tool, the value applied to the $CO_2$ emission factor of biofuels is zero. | The proposed project is a grid connected wind power project/ unit and does not involve emission from biofuels. Therefore, this criterion is not applicable. |

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

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

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***Emission sources and gases***

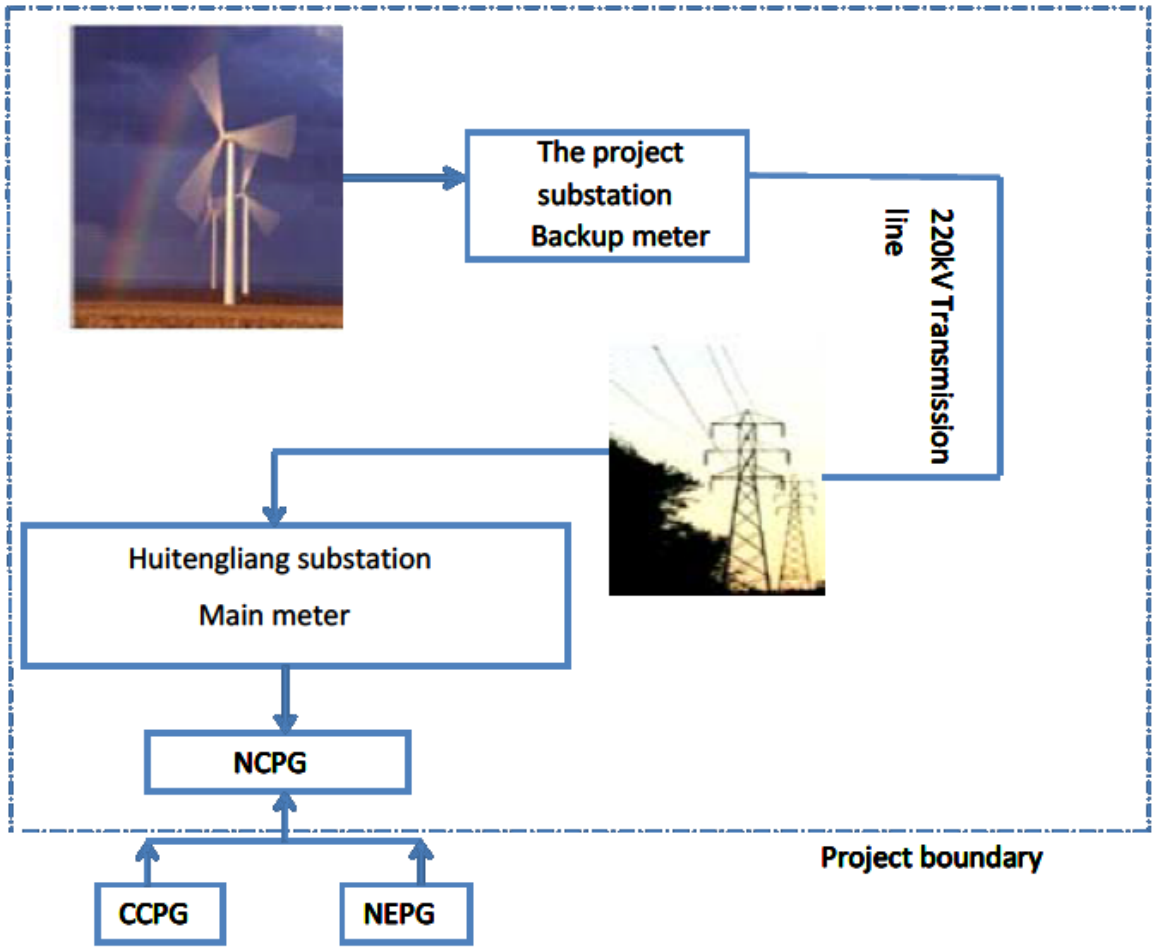
Following the methodology, only $CO_2$ emissions from electricity generation by fossil fuel fired power plant that is displaced due to the project activity are taken into account for determining the baseline emissions. According to the methodology, project emissions from geothermal, solar thermal and hydro power plants need to be taken into account; there are no project emissions for a wind power plant, thus $PE_y = 0$.

| Source | | GHG | Included? | Justification/Explanation |
|---|---|---|---|---|
| Baseline | $CO_2$ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. | $CO_2$ | Yes | Main emission source. |
| | | $CH_4$ | No | Minor emission source. |
| | | $N_2O$ | No | Minor emission source. |
| Project activity | For dry or flash steam geothermal power plants, emissions of $CH_4$ and $CO_2$ from non-condensable gases contained in geothermal steam | $CO_2$ | No | Not applicable to wind power plants. |
| | | $CH_4$ | No | |
| | | $N_2O$ | No | |
| | For binary geothermal power plants, fugitive emissions of $CH_4$ and $CO_2$ from non-condensable gases contained in geothermal steam | $CO_2$ | No | Not applicable to wind power plants. |
| | | $CH_4$ | No | |
| | | $N_2O$ | No | |
| | For binary geothermal power plants, fugitive emissions of hydrocarbons such as n-butane and isopentane (working fluid) contained in the heat exchangers | Low GWP hydrocarbon/refrigerant | No | Not applicable to wind power plants. |
| | $CO_2$ emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants | $CO_2$ | No | Not applicable to wind power plants. |
| | | $CH_4$ | No | |
| | | $N_2O$ | No | |
| | For hydro power plants, emissions of $CH_4$ from the reservoir | $CO_2$ | No | Not applicable to wind power plants. |
| | | $CH_4$ | No | |
| | | $N_2O$ | No | |

**Spatial boundary:**

The spatial extent of the project boundary includes the project site and all power plants connected to NCPG. NCPG is an electricity system which is defined by the spatial extent of the power plants that can be dispatched without significant transmission constraints. The project boundary is shown in the figure below:

**Figure 2 Flow diagram of the project boundary**




Using the boundary definitions of the Chinese DNA[2], NCPG consists of Shandong, Beijing, Tianjin, Hebei, Shanxi and Inner Mongolia provincial power grids. The electricity transmission between different provinces in NCPG is very large and it is reasonable for the project to regard NCPG as the project boundary.

The connected electricity system is the Northeast Power Grid (NEPG), consisting of three provincial grids: Jilin, Liaoning and Heilongjiang, and Central China Power Grid (CCPG), consisting of six provincial grids: Jiangxi, Henan, Hubei, Hunan, Chongqing and Sichuan.

**B.4. Establishment and description of baseline scenario**

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The project 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 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 2.0), the methodological tool "*Assessment of the validity of the original/current baseline and update of the baseline at the*

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

*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 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 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 more than 90% of total electricity generation in NCPG; and this percentage has not been changed significantly in recent 5 years. Therefore, market characteristics do not have impact on the baseline emissions.

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

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

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

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

***Step 1.3: Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested***

This sub-step should only be applied if the baseline scenario identified at the validation of the project activity was the continuation of use of the current equipment(s) without any investment and, the projects proponents or third party (or parties) would undertake an investment later due, for example, to the end of the technical lifetime of the equipment(s) before the end of the crediting period or the availability of a new technology.

Assess whether the remaining technical lifetime of the equipment that would have continued to be used in the absence of the project, as determined in the renewal CDM-PDD, 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 renewal CDM-PDD, the baseline scenario is that the electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources 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 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:

$PE_y = 0$ (1)

## 2. Baseline emissions

According to the methodology, the baseline emissions include only $CO_2$ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are calculated as follows:

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

Where:

| | | |
|---|---|---|
| $BE_y$ | = | The baseline emissions in year *y* ($tCO_2$/yr) |
| $EG_{PJ,y}$ | = | The quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr) |
| $EF_{grid,CM,y}$ | = | The combined margin $CO_2$ emission factor for grid connected power generation in year *y* calculated ($tCO_2$/MWh) |

***Calculation of $EG_{PJ,y}$***

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

(a) Greenfield renewable energy power plants

As the Project Activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, the following applies:

$EG_{PJ,y} = EG_{facility,y}$ (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[3], 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

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

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

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

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

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

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

- There are no recent or likely future additions to transmission capacity that would enable significant increases in imported electricity; the data in the enclosed EF calculation spreadsheet shows that imports are relatively small and have not changed significantly in the period covered. Therefore, the transmission capacity is not considered a build margin source.

For the purpose of determining the operating margin emission factor, use one of the following options to determine the $CO_2$ emission factor(s) for net electricity imports from a connected electricity system:

(a) 0 $tCO_2$/MWh; or
(b) The simple operating margin emission rate of the exporting grid, determined as described in Step 4 section 6.4.1 of the Tool, if the conditions for this method, as described in Step 3 of the Tool, apply to the exporting grid; or
(c) The simple adjusted operating margin emission rate of the exporting grid, determined as described in Step 4 section 6.4.2 of the Tool; or
(d) The weighted average operating margin (OM) emission rate of the exporting grid, determined as described in Step 4 section 6.4.4 of the Tool.

- Following the calculations of the DNA, the simple operating margin option (b) is used to calculate the $CO_2$ emission factors for net electricity imports ($EF_{grid,import,y}$).

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

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

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

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

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

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

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

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

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

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

(a) Simple OM; or
(b) Simple Adjusted OM; or
(c) Dispatch data analysis OM; or
(d) Average OM

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

(a) Low-cost/must-run resources[4] constitute less than 50% of total grid generation (excluding electricity generated by off-grid power plants) in: 1) average of the five most recent years, and the average of the five most recent years shall be determined by using one of the approaches described below; or 2) based on long-term averages for hydroelectricity production.

(i) Approach 1

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

(ii) Approach 2

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

Where:

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

(b) The average amount of load (MW) supplied by low-cost/must-run resources in a grid in the most recent three years is less than the average of the lowest annual system loads (LASL) in the grid of the same three years.

[4] 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.

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

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

Option A: Based on the net electricity generation and a $CO_2$ emission factor of each power unit; or
Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Option B can only be used if:

(a) The necessary data for Option A is not available; and
(b) Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and
(c) Off-grid power plants are not included in the calculation (i.e. if Option I has been chosen in Step 2).

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

(a) The necessary data for Option A is not available, as indicated in the calculations of the DNA; and
(b) Only nuclear and renewable power generation are considered as low-cost/must-run power sources, and the quantity of electricity supplied to the grid by these sources is known; and

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

(c) Option I is chosen in Step 2.

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

The simple OM emission factor is calculated based on the net electricity supplied to the grid by all power plants serving the system, not including low-cost/must-run power plants/units, and based on the fuel type(s) and total fuel consumption of the project electricity system, as follows:

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

Where:

| | | |
|---|---|---|
| $EF_{grid,OMsimple,y}$ | = | The simple operating margin $CO_2$ emission factor in year *y* ($tCO_2$/MWh) |
| $FC_{i,y}$ | = | The amount of fuel type *i* consumed in the project electricity system in year *y* (mass or volume unit) |
| $NCV_{i,y}$ | = | The net calorific value (energy content) of fuel type *i* in year *y* (GJ/mass or volume unit) |
| $EF_{CO2,i,y}$ | = | The $CO_2$ emission factor of fuel type *i* in year *y* ($tCO_2$/GJ) |
| $EG_y$ | = | The net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year *y* (MWh) |
| *i* | = | All fuel types combusted in power sources in the project electricity system in year *y* |
| *y* | = | The relevant year as per the data vintage chosen in Step 3 |

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

Based on the data available, the three-year average operating margin emission factor is calculated as a full-generation-weighted average of the emission factors. Details of the calculations and data follow the published data from the Chinese DNA[6], which uses official national statistics.

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

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

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

*Option 1: For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE.*

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

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

Where:

| | | |
|---|---|---|
| $EF_{grid,BM,y}$ | = | The build margin $CO_2$ emission factor in year *y* ($tCO_2$/MWh) |
| $EG_{m,y}$ | = | The net quantity of electricity generated and delivered to the grid by power unit m in year *y* (MWh) |
| $EF_{EL,m,y}$ | = | The $CO_2$ emission factor of power unit m in year *y* ($tCO_2$/MWh) |

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

$m$ = 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[7] to calculate the build margin emission factor. The deviation is applied as follows:

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

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

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

Where:
$EF_{grid,BM,y}$ = The build margin $CO_2$ emission factor in year $y$ ($tCO_2/MWh$)
$CAP_{m,y}$ = The added generation capacity by plant type m in year $y$ (MW)
$EF_{EL,m,y}$ = The $CO_2$ emission factor of plant type m in year $y$ ($tCO_2/MWh$)
$Share_{CAP,m,y}$ = The share of added generation capacity by plant type m in year $y$ (%)
$m$ = The plant type included in the build margin (thermal, hydro, nuclear, other)
$y$ = The most recent historical year for which data is available

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

The $CO_2$ emission factor of thermal power plants is weighted on the basis of the emissions from each of the fuel types in the latest year for which data is available, and using the average net energy conversion efficiency of the best technologies commercially available (advanced) power plants in China for each fuel type.

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

Where:
$EF_{thermal,y}$ = The $CO_2$ emission factor of the best technologies commercially available thermal power plants in year $y$ ($tCO_2/MWh$)
$EF_{m,Adv,y}$ = The $CO_2$ emission factor of the best technologies commercially available power plants using fuel type m in year $y$ ($tCO_2/MWh$)
$\lambda_{m,y}$ = The share of emissions of fuel type m in year $y$ (%)
$m$ = The fuel type of thermal plant (coal/solid, oil/liquid, gas)
$y$ = The most recent historical year for which data is available

Using the equation of option A2 from guidance in Step 4 section 6.4.1 of the Tool, the $CO_2$ emission factor of advanced power plants using fuel type m can be calculated as follows:

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

Where:
$EF_{m,Adv,y}$ = The $CO_2$ emission factor of the best technology commercially available power plants using fuel m in year $y$ ($tCO_2/MWh$)
$EF_{CO2,m,y}$ = The average $CO_2$ emission factor of fuel type m in year $y$ ($tCO_2/GJ$)

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

$\eta_{m,y}$ = The average net energy conversion efficiency of the best technologies commercially available power plants using fuel type m in year *y* (%)
*m* = The fuel type of thermal plant (coal/solid, oil/liquid, gas)
*y* = The relevant year as per the data vintage chosen

The build margin emission factor is calculated using this methodology in the enclosed EF calculation spreadsheet:

$EF_{grid,BM,y}$ = 0.4578 $tCO_2$/MWh

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

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

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

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

(a) Weighted average CM

The combined margin emissions factor is calculated as follows:

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

Where:
$EF_{grid,OM,y}$ = The operating margin $CO_2$ emission factor in year *y* ($tCO_2$/MWh)
$w_{OM}$ = The weighting of operating margin emissions factor (%)
$EF_{grid,BM,y}$ = The build margin $CO_2$ emission factor in year *y* ($tCO_2$/MWh)
$w_{BM}$ = The weighting of build margin emissions factor (%)

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

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

| | **$CO_2$ emission factor ($tCO_2$/MWh)** | **Weighting (%)** |
|---|---|---|
| Operating margin (see step 4) | 0.9680 | 75% |
| Build margin (see step 5) | 0.4578 | 25% |
| Combined margin | 0.84045 | - |

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

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

**3. Leakage**

No leakage emissions are considered in the methodology. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such

as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, and transport). These emissions sources are neglected.

### 4. Emission reductions

Emission reductions are calculated as follows:

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

Where:

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

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

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

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

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

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

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

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

| Data/Parameter | $w_{OM}$ |
|---|---|
| Data unit | % |
| Description | Weighting of operating margin emissions factor |
| Source of data | "Tool to calculate the emission factor for an electricity system" (Version 07.0) |
| Value(s) applied | 75 |
| Choice of data or measurement methods and procedures | Follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0) |
| Purpose of data | Calculation of baseline emissions |
| Additional comment | N/A |

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

| Data/Parameter | $EF_{grid,OMsimple,y}$ |
|---|---|
| Data unit | $tCO_2/MWh$ |
| Description | Simple operating margin $CO_2$ emission factor in year *y* |
| Source of data | Calculated follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0) |
| Value(s) applied | 0.9680 |
| Choice of data or measurement methods and procedures | Calculated follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0) |
| Purpose of data | Calculation of baseline emissions |
| Additional comment | N/A |

| Data/Parameter | $EF_{grid,BM,y}$ |
|---|---|
| Data unit | $tCO_2/MWh$ |
| Description | Build margin $CO_2$ emission factor in year *y* |
| Source of data | Calculated follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0) |
| Value(s) applied | 0.4578 |
| Choice of data or measurement methods and procedures | Calculated follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0) |
| Purpose of data | Calculation of baseline emissions |
| Additional comment | N/A |

| Data/Parameter | $EF_{grid,CM,y}$ |
|---|---|
| Data unit | $tCO_2/MWh$ |
| Description | Combined margin $CO_2$ emission factor in year *y* |
| Source of data | Calculated follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0) |
| Value(s) applied | 0.84045 |
| Choice of data or measurement methods and procedures | Calculated follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0) |
| Purpose of data | Calculation of baseline emissions |
| Additional comment | N/A |

### B.6.3. Ex ante calculation of emission reductions

>>

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

$ER_y = BE_y – PE_y$

Using the formulae presented in Section B.6.1., the baseline emissions are calculated from the net electricity supplied by the project 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:

$BE_y = EG_{facility,y} \times EF_{grid,CM,y}$ = 126,916 MWh/yr × 0.84045 $tCO_2$/MWh = 106,666 $tCO_{2e}$/yr

$ER_y = BE_y – PE_y$ = 106,666 $tCO_{2e}$/yr – 0 $tCO_{2e}$/yr = 106,666 $tCO_{2e}$/yr

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

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

| Year | Baseline emissions (t $CO_2$e) | Project emissions (t $CO_2$e) | Leakage (t $CO_2$e) | Emission reductions (t $CO_2$e) |
|---|---|---|---|---|
| 17/06/2017-16/06/2018 | 106,666 | 0 | - | 106,666 |
| 17/06/2018-16/06/2019 | 106,666 | 0 | - | 106,666 |
| 17/06/2019-16/06/2020 | 106,666 | 0 | - | 106,666 |
| 17/06/2020-16/06/2021 | 106,666 | 0 | - | 106,666 |
| 17/06/2021-16/06/2022 | 106,666 | 0 | - | 106,666 |
| 17/06/2022-16/06/2023 | 106,666 | 0 | - | 106,666 |
| 17/06/2023-16/06/2024 | 106,666 | 0 | - | 106,666 |
| **Total** | 746,662 | 0 | - | 746,662 |
| **Total number of crediting years** | 7 | | | |
| **Annual average over the crediting period** | 106,666 | 0 | - | 106,666 |

## B.7. Monitoring plan

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

| Data/Parameter | $EG_{export, total}$ |
|---|---|
| Data unit | MWh |
| Description | Total exported electricity to the grid by the project and other projects in period *y* |
| Source of data | Electricity meter |
| Value(s) applied | N/A |
| Measurement methods and procedures | Total exported electricity to the grid will be monitored through main meter at the Huitengliang substation. |
| Monitoring frequency | The electricity meter measure continuously and accumulatively.<br>The data is recorded monthly. |
| QA/QC procedures | The metering equipment will be calibrated and checked yearly by qualified third party for accuracy according to the appropriate industry standards. The accuracy of the meter meets the national standard, and the metering equipment shall have sufficient accuracy so that any error resulting from such equipment shall not exceed 0.5%. The export electricity to the grid is checked by receipt. |
| Purpose of data | Calculation of baseline emissions |
| Additional comment | N/A |

| Data/Parameter | $EG_{import, total}$ |
|---|---|
| Data unit | MWh |
| Description | Total imported electricity from the grid by the project and other projects in period *y* |
| Source of data | Electricity meter |
| Value(s) applied | N/A |
| Measurement methods and procedures | Total imported electricity from the grid will be monitored through main meter at the Huitengliang substation. |
| Monitoring frequency | The electricity meter measure continuously and accumulatively.<br>The data is recorded monthly. |
| QA/QC procedures | The metering equipment will be calibrated and checked yearly by qualified third party for accuracy according to the appropriate industry standards. The accuracy of the meter meets the national standard, and the metering equipment shall have sufficient accuracy so that any error resulting from such equipment shall not exceed 0.5%. The import electricity to the grid is checked by receipt. |
| Purpose of data | Calculation of baseline emissions |
| Additional comment | N/A |

| Data/Parameter | $EG_{project}$ |
|---|---|
| Data unit | MWh |
| Description | The electricity generation from the project activity metered by separate meter |
| Source of data | Electricity meter |
| Value(s) applied | N/A |
| Measurement methods and procedures | Separate meter monitoring the generation from the project activity at the project site |
| Monitoring frequency | The electricity meter measure continuously and accumulatively.<br>The data is recorded monthly. |
| QA/QC procedures | The metering equipment will be calibrated and checked yearly by qualified third party for accuracy according to the appropriate industry standards. The accuracy of the meter meets the national standard, and the metering equipment shall have sufficient accuracy so that any error resulting from such equipment shall not exceed 0.5%. The electricity generation from the project activity can be cross-checked by the confirmation letter of generation from the grid. |
| Purpose of data | Calculation of baseline emissions |
| Additional comment | N/A |

| Data/Parameter | $EG_{others}$ |
|---|---|
| Data unit | MWh |
| Description | The electricity generation from other projects metered by separate meters |
| Source of data | Electricity meter |
| Value(s) applied | N/A |
| Measurement methods and procedures | Separate meters monitoring the generation from other projects |
| Monitoring frequency | The electricity meter measure continuously and accumulatively.<br>The data is recorded monthly. |
| QA/QC procedures | The metering equipment will be calibrated and checked yearly by qualified third party for accuracy according to the appropriate industry standards. The accuracy of the meter meets the national standard, and the metering equipment shall have sufficient accuracy so that any error resulting from such equipment shall not exceed 0.5%. The electricity generation from other projects can be cross-checked by the confirmation letters of generation from the grid. |
| Purpose of data | Calculation of baseline emissions |
| Additional comment | N/A |

| Data/Parameter | $EG_y$ |
|---|---|
| Data unit | MWh |
| Description | The net electricity supplied to the grid by the proposed project in period *y* |
| Source of data | Calculated as export of electricity ($EG_{export,y}$) minus import of electricity ($EG_{import,y}$). |
| Value(s) applied | 126,916 (once fully operational) |
| Measurement methods and procedures | $EG_y = EG_{export,y} - EG_{import,y}$ |
| Monitoring frequency | |
| QA/QC procedures | |
| Purpose of data | Calculation of baseline emissions |
| Additional comment | N/A |

### B.7.2. Sampling plan

>>
Not applicable.

### B.7.3. Other elements of monitoring plan

>>
An overall monitoring plan is made for the project activity. The project participants have compiled a monitoring and management manual, i.e. "The Monitoring and Management Manual for CGN Inner Mongolia Huitengliang Phase I Wind Farm Project". The aim of the monitoring plan is to make sure that the net electricity generation delivered to the grid is monitored completely, consistently, reliably and precisely. The details are summarized as follows:

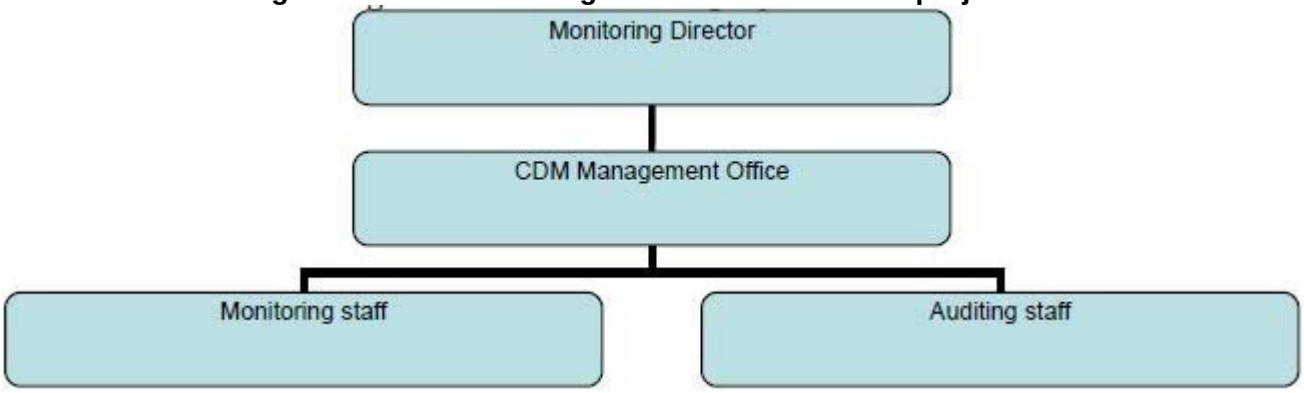
**1. Monitoring subject**

The main data monitored is the net electricity generation delivered to the grid by the project.

**2. Monitoring management structure**

In order to obtain reliable monitoring data, the project developer will establish a monitoring management framework prior to the starting of the crediting period. Clear responsibilities will be assigned to all staff involved in the CDM project. A monitoring director will be appointed who has the overall responsibilities for the monitoring of the project, other staff will be responsible for the data recording, data collecting, data archiving and emission reductions calculation. The detailed structure is as follows:

**Figure 3 The CDM management structure of the project**




**3. Monitoring apparatus and installation**

The quantity of annual electricity delivered to the grid by the proposed project ($EG_{export,y}$) and the electricity purchased from the grid by the proposed project ($EG_{import,y}$) will be monitored through the

bidirectional main meter in the Huitengliang substation. Any error resulting from the meter shall not exceed 0.5%.

If the proposed project has to share the same transformer, substation or transmission line with some other wind farms, appropriate additional meters will be installed at the project site so that the electricity generation can be monitored for each wind farm separately so as to calculate the share of this wind farm of the net supply to the grid. The backup meter will be installed at on-site substation. The main meter and backup meter are bidirectional.

The net electricity supplied by the project will be calculated as follows:

$EG_{export,\ y} = EG_{export,\ total} * EG_{project} / (EG_{project} + EG_{others})$
$EG_{import,\ y} = EG_{import,\ total}$
$EG_{y} = EG_{export,\ y} - EG_{import,\ y}$

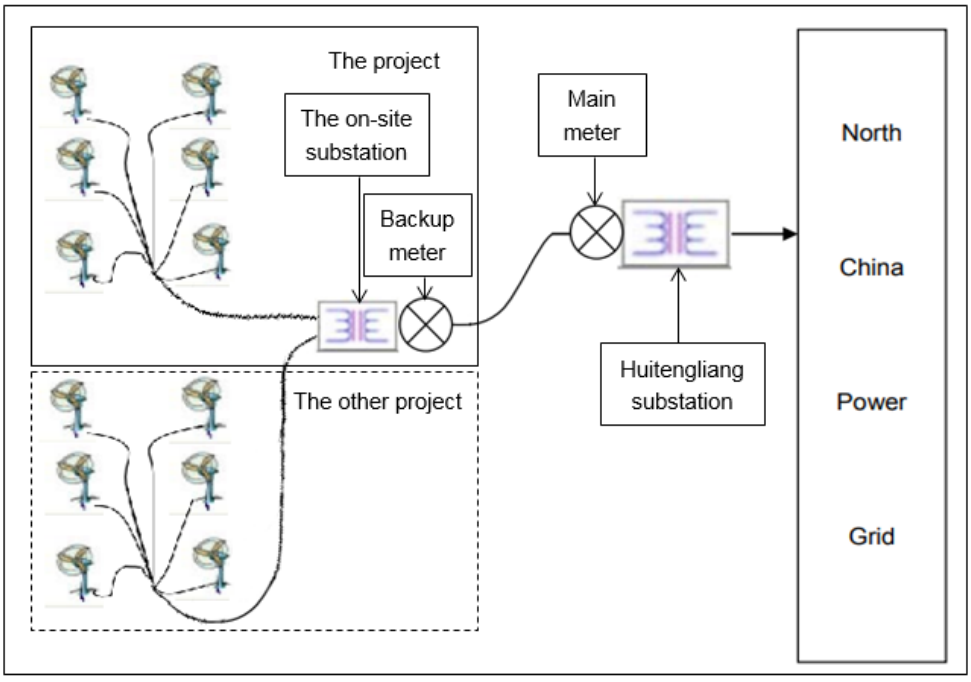
$EG_{export,\ total}$ is total exported electricity to the grid based on the data metered by the main meter at the Huitengliang substation;
$EG_{import,\ total}$ is total imported electricity from the grid based on the data metered by the main meter at the Huitengliang substation;
$EG_{project}$ is the electricity generation of the proposed project based metered by separate meter at the project site;
$EG_{others}$ is the electricity generation of other wind farm projects based metered by other separate meters;
$EG_{y}$ is the net electricity supplied to the grid by the proposed project.

The $EG_{export,\ total}$ and $EG_{import,\ total}$ can be cross checked by sale receipt. The readings of those separate meters can be cross-checked by the confirmation letter of generation from the grid.

**4. Data monitoring**

The quantity of annual electricity delivered to the grid by the proposed project ($EG_{export,y}$) and the electricity purchased from the grid by the proposed project ($EG_{import,y}$) will be monitored. The net electricity generation is calculated as the electricity delivered to the grid minus the electricity purchased from the grid. The diagram of the monitoring system is shown in Figure 4.

**Figure 4 The diagram of the monitoring system**



**5. Quality control**

1) Calibration of meters

The calibration of meters is conducted by a qualified organization in compliance with the national standard and sectional regulations to ensure the accuracy. The main meter and back-up meter will be calibrated in line with the regulation and manufacturers requirements. The meters are sealed after calibration. The calibration records are archived together with other monitoring records. When the main meter or back-up meter have a breakdown, the party finding the breakdown should tell another party and inform the qualified calibration organization to check, calibrate, test and treat the meter so as to recover the normal monitoring state.

2) Emergency treatment

When the main meter or back-up meter have a breakdown, the electricity generation difference will be treated as follows:

(1) When both meters are fine, the main meter will be used;
(2) When one of the two meters has a breakdown, the readings of the other meter will be adopted;
(3) If both the main meter and back-up meter have breakdowns, the net electricity supplied to the grid will be calculated from the readings of other meters and deducting the line losses.

**6. Data management**

All monitoring data and records will be archived in electronic format as well as on paper. The electronic documents will be backed up on compact disc or hard disc. The project developer will also keep copies of sale receipts and prepare a monitoring report at the end of each year, which includes the net electricity generation, the monitoring data summary, the calibration records, and the emission reductions calculation.

And all data including calibration records is kept until 2 years after the end of the total crediting period of the CDM project.

**7. Training program**

The project developer will train all related staff before the start of the crediting period. The training contains CDM knowledge, operational regulations, quality control (QC), data monitoring requirements and data management regulations, etc.

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

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

>>
24/03/2009 (date of the equipment purchase contract)

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

>>
20 y-0m

### C.3. Crediting period of project activity

#### C.3.1. Type of crediting period

>>
A renewable crediting period is chosen. It is the second crediting period.

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

>>
17/06/2017

### C.3.3. Duration of crediting period

>>
7 years 0 month

## SECTION D. Environmental impacts

### D.1. Analysis of environmental impacts

>>
The Environmental Impact Assessment (EIA) for the project activity was completed by Xilinguole League Environment Science Research Institute in October 2006.

According to the Environmental Impact Assessment (EIA), the environment impacts of the project are summarised below:

**1. The analysis of the environment impact during the construction period**

The environmental impacts during the construction period are as follows:

Ecological environment. The project temporarily disturbs some grass cover for construction use. The occupied land will be restored after construction. Overall, land use impact on the local residents arising from the project is considered to be insignificant.

Noise. The project will meet the restrictive construction boundary noise values during the construction stage. Therefore, the noise is not considered to negatively impact local residential areas.

Dust. The project construction region is large with good atmospheric diffusion, so the dust has little impact on the environment.

Solid-waste. The main solid-wastes produced during the construction period are construction waste and garbage from the construction workers. Garbage will be collected and will be sent to landfill. The construction wastes will be used for backfilling, foundations and road construction.

Waste water. Waste water will be treated and reused.

**2. The analysis of the environment impact during operation period**

The environment impacts during the construction period are as follows:

Waste water. A small quantity of waste water will be produced by the project management staff during operation. The waste water will be treated and will be used for sprinkling the vegetation.

Noise. The noise from the wind turbines meets “Industry Enterprise Factory Boundary Noise Standard”. The noise of the wind farm is not considered to have a negative impact on local residents during the operational period.

Solid waste. The main solid waste during the operational period is generated by the project management staff. All the waste produced will be collected and sent to landfill.

### D.2. Environmental impact assessment

>>

Environmental impacts are not considered significant. The Environmental Protection Bureau of Inner Mongolia Autonomous Region approved the EIA on 7 Nov 2006.

## SECTION E. Local stakeholder consultation

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

>>

Local stakeholder comments were invited and compiled on the basis of a questionnaire send out to stakeholders in Aug 2008. In total 67 questionnaires were distributed to stakeholders (and were returned to the developer), including local residents, non-governmental organizations and governmental departments.

### E.2. Summary of comments received

>>

The local community supports the proposed project activity, as indicated by the results of the survey, which is summarised below. The survey forms are available from the project owner.

| Question | Answer | Persons | Share |
|---|---|---|---|
| I take part in the stakeholder questionnaires comments collection representing: | Official | 4 | 6% |
| | Local resident and social entities | 60 | 90% |
| | Others | 3 | 4% |
| Do you know CDM? | Excellent | 10 | 15% |
| | A little | 57 | 85% |
| | No | 0 | 0 |
| Do you think whether the project developer adopts the local stakeholders' opinion and suggestion adequately during the design and construction period? | Yes | 66 | 99% |
| | No | 0 | 0 |
| | Unconcern | 1 | 1% |
| Do you think which environment impact will be brought by the project? | Positive impact | 67 | 100% |
| | Negative impact | 0 | 0 |
| | Unknown | 0 | 0 |
| Do you think whether the project developer supply the good, safe, and clean project construction circumstance as well as operation circumstance? | Yes | 67 | 100% |
| | No | 0 | 0 |
| | Unknown | 0 | 0 |
| Do you think whether the project will promote the local economy development? | Yes | 67 | 100% |
| | No | 0 | 0 |
| | Unknown | 0 | 0 |
| Do you think which positive impacts will be brought by the project to your life? | Increase income and improve life | 47 | 70% |
| | Improve environment and reduce GHG emissions | 37 | 55% |
| | Others | 0 | 0 |
| In general, do you think which of impact the construction and operation of the project will have? | Positive impact | 67 | 100% |
| | Negative impact | 0 | 0 |
| | Unknown | 0 | 0 |
| Which is your attitude to the project construction? | Approval | 67 | 100% |
| | Opposing | 0 | 0 |
| | Unconcerned | 0 | 0 |

**Conclusions from the survey**

The survey shows that the proposed project has strong local support among the stakeholders. They all believe that the proposed project will increase the local employment opportunities,

promote the local development in society and in economy greatly. None of the stakeholders are against the project.

### E.3. Consideration of comments received

>>

Local stakeholders responded positive to the project and did not raise issues due account for which needs to be taken.

## SECTION F. Approval and authorization

>>

The host country Letter of Approval (LoA) of the Project has been issued.

# Appendix 1. Contact information of project participants

| | |
|---|---|
| **Organization name** | CGN Wind Power Co., Ltd. |
| **Country** | People's Republic of China |
| **Address** | No.188, West of South 4th ring Road, No.2 Building, Area of Advanced Business Park, Beijing, P. R. China |
| **Telephone** | +86 10 63705651 |
| **Fax** | +86 10 63705793 |
| **E-mail** | larnhart@hotmail.com |
| **Website** | / |
| **Contact person** | Sui Chen |

# 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

Not applicable.

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## Document information

| *Version* | *Date* | *Description* |
|---|---|---|
| 10.1 | 28 June 2017 | Revision to make editorial improvement. |
| 10.0 | 7 June 2017 | Revision to:<br>• Improve consistency with the “CDM project standard for project activities” and with the PoA-DD and CPA-DD forms;<br>• Make editorial improvement. |
| 09.0 | 24 May 2017 | Revision to:<br>• Ensure consistency with the “CDM project standard for project activities” (CDM-EB93-A04-STAN) (version 01.0);<br>• Incorporate the “Project design document form for small-scale CDM project activities” (CDM-SSC-PDD-FORM);<br>• Make editorial improvement. |
| 08.0 | 22 July 2016 | EB 90, Annex 1<br>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:<br>• Include provisions related to statement on erroneous inclusion of a CPA;<br>• Include provisions related to delayed submission of a monitoring plan;<br>• Provisions related to local stakeholder consultation;<br>• Provisions related to the Host Party;<br>• Make editorial improvement. |
| 05.0 | 25 June 2014 | Revision to:<br>• 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));<br>• Include provisions related to standardized baselines;<br>• Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project in B.7.4 and Appendix 1;<br>• Change the reference number from F-CDM-PDD to CDM-PDD-FORM;<br>• Make editorial improvement. |
| 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 |

| *Version* | *Date* | *Description* |
|---|---|---|
| 02.0 | 14 June 2004 | EB 14, Annex 06b |
| 01.0 | 03 August 2002 | EB 05, Paragraph 12<br>Initial adoption. |

Decision Class: Regulatory
Document Type: Form
Business Function: Registration
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