Project design document form
(Version 11.0)

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

BASIC INFORMATION	
Title of the project activity	Hebei Shangyi Dongshan Wind Farm Project
Scale of the project activity	☒ Large-scale ☐ Small-scale
Version number of the PDD	05 (updated addressing to renewal of crediting period)
Completion date of the PDD	20/08/2019
Project participants	CGN (Shangyi) Wind Power Co., Ltd. Statkraft Markets GmbH
Host Party	People's Republic of China
Applied methodologies and standardized baselines	ACM0002 "Grid-connected electricity generation from renewable sources" (Version 19.0)
Sectoral scopes	Scope 01: Energy industries (renewable sources)
Estimated amount of annual average GHG emission reductions	94,634 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The purpose of Hebei Shangyi Dongshan Wind Farm Project (hereinafter referred to as the project) is to utilize wind resources for electricity generation through the construction of a wind farm with a total capacity of 49.5MW and a 220kV substation in Shangyi County, Hebei Province, P. R. China. The project is invested and developed by CGN (Shangyi) Wind Power Co., Ltd. The electricity generated from the project are sold to North China Power Grid (NCPG).

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

a) Prior to the start of implementation of the project activity, there is no power generation unit at the site of the project, and the electricity was supplied by NCPG which was dominated by fossil fuel-fired power plants.
b) The project scenario is the implementation of the project, the installation and operation of 33 sets of wind turbines with a total capacity of 49.5 MW which will supply an average annual generation of 112,600MWh to NCPG and replace the same amount of electricity generated by fossil fuel-fired power plants connected to NCPG. According to ACM0002 applied, the project is a renewable electricity generating activity.
c) The baseline scenario of the proposed project is the electricity supply of equal amount as the project from NCPG. The baseline scenario of the project is the same against the scenario prior to the start of the implementation of the project activity.

The project is planned to install and operate 33 sets wind turbines with capacity of 1.5 MW each, which amount to a total capacity of 49.5MW. The estimated annual net electricity generation supplied to the grid is 112,600 MWh and the annual full-load operation time amount to 2,275 h per year. The project commenced construction on 10/2010. The first wind turbine put into operation on 25/12/2011 and all the wind turbines put into operation on 18/01/2012.

The project was registered as CDM project on 08/11/2011 with Reference No. 5293. The first crediting period of the project is 08/11/2011-07/11/2018. The second crediting period of the project would be 08/11/2018-07/11/2025. During the second crediting period, it is expected that the project as a renewable energy source will generate emission reductions of 94,634 tCO_2e per year and totally 662,438 tCO_2e by avoiding CO_2 emissions from the same amount of electricity generation from North China Power Grid, which is mainly composed of traditional thermal power plants.

The project makes contribution to the sustainable development as follows:

1. GHG emission reduction
The project will help reduce the greenhouse gas GHG emissions versus the high-growth, coal-dominated business-as-usual scenario in the NCPG by reducing the electricity generation from the fossil-fuel fired power plants, particularly the emission of SO_x、 NO_x and dust.

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

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

A.2. Location of project activity

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The project is in Shangyi County, Hebei Province, P. R. China. The project has geographical coordinates with east longitude from 114.2632° to 114.2999° and north latitude from 41.2683° to 41.3047°. The figure A1 and A2 shows the geographical location of the proposed project.

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

Figure A2. The project on the map of Shangyi County, Hebei Province, P.R.China

A.3. Technologies/measures

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The project is to utilize wind resources for electricity generation in Shangyi County, Hebei Province, P. R. China. The project is a grid-connected renewable energy to electricity project. The project will achieve obvious greenhouse gas (GHG) emission reductions through the displacement of mainly fossil-fuel dominated grid connected power generation in NCPG.

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

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

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

The project involves the installation of 33 sets of wind turbines with 1.5 MW capacity each, which amounts to a total installed capacity of 49.5MW.The expected effective operating hours amount to 2,275 per year and the plant load factor is 25.97%, which was determined by a third party, Beijing Grand Trend International Economic and Technical Consulting Co., Ltd., who is the conductor of FSR and is also a professional wind power engineering designing entity. It is consistent with the requirement of EB48, Annex 11 “Guidelines for the Reporting and Validation of Plant Load Factors”. The estimated net annual power supplied to the grid is 112,600 MWh.

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

Parameter		**Data**[1]
Model		GW82/1500kW
Quantity		33
Height of hub		70m
Wind turbine	Diameter	82m
	Number of blades	3
	Rated wind speed	11m/s
	Cut-in wind speed	3m/s
	Cut-off wind speed	22m/s
Generator	Rated power	1500kW
	Rated voltage	690V
	Life time	20years

According to the wind turbine layout, each turbine will be equipped with one transformer. The wind power to be generated will be delivered to the 220kV substation by the 35kV transmission lines on the project site. And then connected to the 500 kV Shangyi substation, then transmitted to NCPG finally. But due to the 500kV Grid Substation is still under construction, therefore, the project will connect to a 220kV Grid Substation temporarily. Once the 500kV Grid Substation established, the project will connect to the 500kV Grid Substation and then transmitted to the North China Power Grid.

The project does not involve any technology transfer.

A.4. Parties and project participants

Parties involved	**Project participants**	**Indicate if the Party involved wishes to be considered as project participant (Yes/No)**

[1] The values of the parameters are based on the technological specification of the wind turbines.

People's Republic of China (host)	CGN (Shangyi) Wind Power Co., Ltd.	No
Germany	Statkraft Markets GmbH	No

A.5. Public funding of project activity

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There is no public funding from Parties included in Annex I is involved in this project.

A.6. History of project activity

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The project was registered as CDM project on 08/11/2011, the Reference No. is 5293. The registered PDD was revised and approved by CDM EB on 08/08/2019. This PDD is renewal of crediting period.

The project activity owner has confirmed that:

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

And confirm that:

A. The CDM project activity was not a CAP that has been exclude from a registered CDM PoA;
B. The project is not a registered CDM project activity or a CAP 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 CDM project activity.

A.7. Debundling

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N.A.

SECTION B. Application of methodologies and standardized baselines

B.1. References to methodologies and standardized baselines

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The approved methodology applied in the project activity is ACM0002 (version 19.0) – "Grid-connected electricity generation from renewable sources". Reference:

http://cdm.unfccc.int/methodologies/DB/VJI9AX539D9MLOPXN2AY9UR1N4IYGD

"Tool for the Demonstration and Assessment of Additionality (version 7.0.0)". Reference:

http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

"Tool to calculate the emission factor for an electricity system (version 7.0)". Reference:

http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf

"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)". Reference:

https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf

B.2. Applicability of methodologies and standardized baselines

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

1) **This methodology is applicable to grid-connected renewable energy power generation project activities that:**
   - **(a) Install a Greenfield power plant;**
   - **(b) Involve a capacity addition to (an) existing plant(s);**
   - **(c) Involve a retrofit of (an) existing operating plants/units;**
   - **(d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or**
   - **(e) Involve a replacement of (an) existing plant(s)/unit(s).**

The project activity is the installation of a Greenfield power plant.

2) **The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;**

The project activity is the installation of a new wind power plant.

3) **In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects) the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity;**

The project doesn't belong to these types, so it doesn't need to consider this applicability condition.

4) **In case of hydro power plants, one of the following conditions shall apply:**
   - **(a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or**
   - **(b) The project activity is implemented in existing single or multiple reservoirs, where the volume of reservoir(s) is increased and the power density, calculated using equation (3), is greater than 4 W/m^2; or**
   - **(c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m^2; or**
   - **(d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m^2, all of the following conditions shall apply:**
     - **(i) The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m^2;**
     - **(ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity;**
     - **(iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m^2 shall be:**
       - **a. Lower than or equal to 15 MW; and**
       - **b. Less than 10 per cent of the total installed capacity of integrated hydro power project.**

The Project is not a hydro power plant, so it doesn't need to consider this applicability condition.

5) **In the case of integrated hydro power projects, project proponent shall:**

(a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or

(b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore, this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.

The Project is not a hydro power plant, so it doesn't need to consider this applicability condition.

6) The methodology is not applicable to:

(a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;

(b) Biomass fired power plants/units.

The Project is a new grid-connected wind power plant, therefore: The Project doesn't involve switching from fossil fuels to renewable energy sources at the site of the project activity; The Project isn't a biomass fired power plant. So, it doesn't need to consider this applicability condition.

7) In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".

The Project is not a case of retrofit, replacement or capacity addition, so it doesn't need to consider this applicability condition.

In addition, the applicability conditions of "Tool to calculate the emission factor for an electricity system (Version 07.0)" are also considered, which are listed as followed:

1) 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.

2) 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 project is grid connected, this condition is applicable, and the emission factor has been calculated accordingly.

3) In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.

The project locates in China, a non-Annex I country. Therefore, this criterion is not applicable for the project activity.

4) Under this tool, the value applied to the CO2 emission factor of biofuels is zero.

The 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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The sources and gases included in the project boundary are described in Table as below:

Source		GHG	Included?	Justification/Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel-fired power plants that is displaced due to the project	CO_2	Yea	Main emission source.
		CH_4	No	Minor emission source.
		N_2O	No	Minor emission source.
Project activity	The wind power plant	CO_2	No	According to ACM0002, the proposed project generates electricity by renewable energy, thus No GHG emissions emitted.
		CH_4	No	According to ACM0002, the proposed project generates electricity by renewable energy, thus No GHG emissions emitted.
		N_2O	No	According to ACM0002, the proposed project generates electricity by renewable energy, thus No GHG emissions emitted.

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

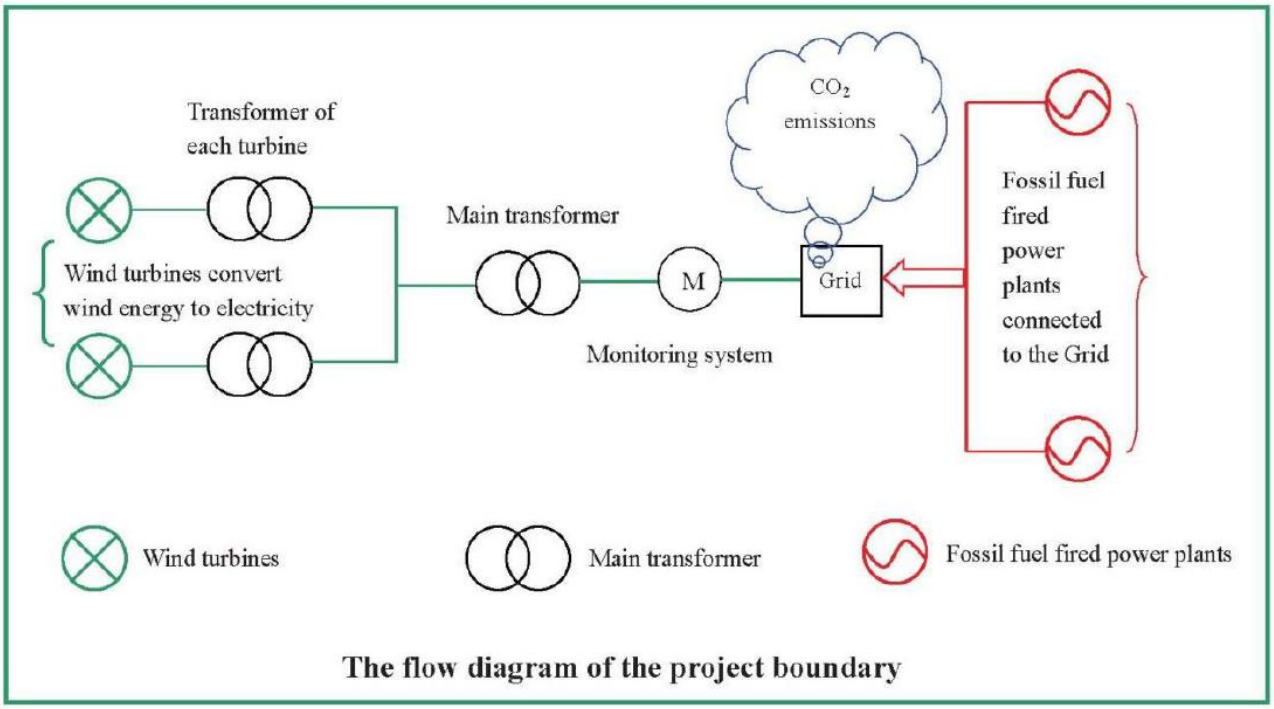
The NCPG is the project electricity system, which is defined by the spatial extent of the power plants that can be dispatched without significant transmission constraints. In determining this project electricity system, such causes below are considered.

According to the “Tool to calculate the emission factor for an electricity system” (version 7.0), the boundary definitions published by the Chinese DNA[2] is used, the NCPG consists of Beijing,

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

Tianjin, Hebei, Shanxi, Shandong and Inner Mongolia Power Grids. Therefore, the project regards the North China Power Grid as the project boundary.

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



The flow diagram of the project boundary

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 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:

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

2. Baseline emissions

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

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

Where:

BE_y = The baseline emissions in year y (tCO_2/yr)

$EG_{PJ,y}$ = The quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)

$EF_{grid,CM,y}$ = The combined margin CO_2 emission factor for grid connected power generation in year *y* calculated (tCO_2/MWh)

Calculation of $EG_{PJ,y}$

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

(a) Greenfield renewable energy power plants

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

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

Where:

$EG_{PJ,y}$ = The quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)

$EG_{facility,y}$ = The quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh/yr)

Calculation of $EF_{grid,CM,y}$

In line with the methodology, the baseline emission factor is calculated as a combined margin ($EF_{grid,CM,y}$), consisting of the combination of operating margin ($EF_{grid,OM,y}$) and build margin ($EF_{grid,BM,y}$) factors according to the following steps defined in "*Tool to calculate the emission factor for an electricity system*" .

Details of the calculations and data follow the published data from the Chinese DNA[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 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.

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

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.

- 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.

[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.

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

The date of the publication of the most recent official data for the calculation of the emission factor prior to the start of validation was 20/12/2018.

Power plants registered as CDM project activities should be included in the sample group that is used to calculate the operating margin if the criteria for including the power source in the sample group apply.

- Details of the calculations and data follow the published data from the Chinese DNA, which uses official national statistics. This data does not exclude CDM projects.

Step 4. Calculate the operating margin emission factor according to the selected method

The Simple OM method (Option a) was chosen in Step 3 above.

(a) Simple OM

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating sources serving the system, not including low-cost/must-run power plants/units.

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

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

Option B can only be used if:

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

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

(a) The necessary data for Option A is not available, as indicated in the calculations of the DNA; and
(b) Only nuclear and renewable power generation are considered as low-cost/must-run power sources, and the quantity of electricity supplied to the grid by these sources is known; and
(c) Option I is chosen in Step 2.

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

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

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

Where:

$EF_{grid,OMsimple,y}$ = The simple operating margin CO_2 emission factor in year *y* (tCO_2/MWh)
$FC_{i,y}$ = The amount of fuel type *i* consumed in the project electricity system in year *y* (mass or volume unit)
$NCV_{i,y}$ = The net calorific value (energy content) of fuel type *i* in year *y* (GJ/mass or volume unit)

$EF_{CO2,i,y}$ = The CO_2 emission factor of fuel type *i* in year *y* (tCO_2/GJ)
EG_y = The net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year *y* (MWh)
i = All fuel types combusted in power sources in the project electricity system in year *y*
y = The relevant year as per the data vintage chosen in Step 3

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

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

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

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

- 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)
$\eta_{m,y}$	=	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	-

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	-

Data/Parameter	$EF_{CO2,i,y}$
Data unit	tCO_2e/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	-

Data/Parameter	EG_y
Data unit	MW
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 fatore 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	-

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

>>

Based on the Feasible Study Report, the net power generation of this project will be 112,600 MWh annually. The emission reduction ER_y by the project activity in a given year *y* is calculated as follows:

$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} = 94,634\ tCO_2e$
$ER_y = BE_y - PE_y = 94,634 - 0 = 94,634\ tCO_2e$

The project activity is expected to achieve 662,438 tCO_2e of net emission reductions during the first 7-year crediting period.

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

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
08/11/2018-07/11/2019	94,634	0	0	94,634
08/11/2019-07/11/2020	94,634	0	0	94,634
08/11/2020-07/11/2021	94,634	0	0	94,634
08/11/2021-07/11/2022	94,634	0	0	94,634
08/11/2022-07/11/2023	94,634	0	0	94,634
08/11/2023-07/11/2024	94,634	0	0	94,634
08/11/2024-07/11/2025	94,634	0	0	94,634
Total	662,438	0	0	662,438
Total number of crediting years	7			
Annual average over the crediting period	94,634	0	0	94,634

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data/Parameter	$EG_{export,y}$
Data unit	MWh
Description	Electricity supplied by the project and Hebei Shangyi CGN Dongshan Wind Power Project to the grid in year *y*.
Source of data	Electricity meter readings of the Main meter M1 or the backup meter M2, which are installed at the high volt side of 220kV project site substation.
Value(s) applied	112,600
Measurement methods and procedures	The results from the main meter will be recorded monthly. Back-up meter will be installed at the Grid substation for cross-check. The accuracy of the meters is 0.2s. Data will be archived for 2 years following the end of the last crediting period.
Monitoring frequency	Continuously measurement and monthly recording
QA/QC procedures	The metering equipment at the project site will be calibrated by a qualified Meter Calibration Organization once a year according to the management standard. Power supplied to the grid will be double checked according to electricity sales receipts. The accuracy of the metering equipment is 0.2s.
Purpose of data	Baseline emission calculation
Additional comment	-

Data/Parameter	$EG_{import,y}$
Data unit	MWh
Description	Electricity imported from the grid by the project and Hebei Shangyi CGN Dongshan Wind Power Project during year *y*.
Source of data	Electricity meter readings of the Main meter M1 or the backup meter M2, which are installed at the high volt side of 220kV project site Substation.
Value(s) applied	0
Measurement methods and procedures	The results from the main meter will be recorded monthly. Back-up meter will be installed at the Grid substation for cross-check. The accuracy of the meters is 0.2s. Data will be archived for 2 years following the end of the crediting period.
Monitoring frequency	Continuously measurement and monthly recording

QA/QC procedures	The metering equipment at the project site will be calibrated by a qualified Meter Calibration Organization in accordance once a year according to the management standard. Power imported from the grid will be double checked according to electricity sales receipts. The accuracy of the metering equipment is 0.2s.
Purpose of data	Baseline emission calculation
Additional comment	-

Data/Parameter	$EG_{import\ spare,y}$
Data unit	MWh
Description	Electricity imported from the emergency line during year *y*
Source of data	Electricity meter readings of M3, which is installed at the spare 10kV agriculture line
Value(s) applied	0
Measurement methods and procedures	The results from the electricity meter M3 will be recorded monthly. The accuracy of the meters is 0.5s. Data will be archived for 2 years following the end of the crediting period.
Monitoring frequency	Continuously measurement and monthly recording
QA/QC procedures	The metering equipment at the project site will be calibrated by a qualified Meter Calibration Organization according to the management standard. Power imported from the grid will be double checked according to electricity sales receipts. The accuracy of the metering equipment is 0.5s.
Purpose of data	Baseline emission calculation
Additional comment	-

Data/Parameter	$EG_{project,y}$
Data unit	MWh
Description	Electricity supplied to the grid measured by meters installed at 35kv transmission lines of the project.
Source of data	Sum of electricity meter readings of M4, M5 and M6, which are installed on the 35kv transmission lines of the project.
Value(s) applied	0
Measurement methods and procedures	The results from the electricity meter M4, M5 and M6 will be recorded monthly. The accuracy of the meters is 0.2s. Data will be archived for 2 years following the end of the crediting period.
Monitoring frequency	Continuously measurement and monthly recording
QA/QC procedures	The metering equipment at the project site will be calibrated by a qualified Meter Calibration Organization according to the management standard. The accuracy of the metering equipment is 0.2s.
Purpose of data	Baseline emission calculation
Additional comment	-

Data/Parameter	$EG_{other,y}$
Data unit	MWh
Description	Electricity supplied to the grid measured by meters installed at 35kv transmission lines of Hebei Shangyi CGN Dongshan Wind Power Project.
Source of data	Sum of electricity meter readings of M7, M8 and M9, which are installed on the 35kv transmission lines of Hebei Shangyi CGN Dongshan Wind Power Project.
Value(s) applied	0
Measurement methods and procedures	The results from the electricity meter M7, M8 and M9 will be recorded monthly. The accuracy of the meters is 0.2s. Data will be archived for 2 years following the end of the crediting period.
Monitoring frequency	Continuously measurement and monthly recording

QA/QC procedures	The metering equipment at the project site will be calibrated by a qualified Meter Calibration Organization according to the management standard. The accuracy of the metering equipment is 0.2s.
Purpose of data	Baseline emission calculation
Additional comment	-

Data/Parameter	$EG_{facility,y}$
Data unit	MWh
Description	Quantity of net electricity generation supplied to the Grid by the project activity in year y.
Source of data	Electricity meter readings of the Main meter M1 or the backup meter M2 installed at the high volt side of 220kV project site Substation, the meter readings of M4, M5 and M6 installed at the 35kv transmission lines of the project, the meter readings of M7, M8 and M9 installed at the 35kv transmission lines of Hebei Shangyi CGN Dongshan Wind Power Project, and the meter readings of M3 installed at the spare 10kV agriculture line.
Value(s) applied	In this PDD, the net electricity delivered to the Grid 112,600 MWh is applied.
Measurement methods and procedures	$EG_{facilityy} = EG_{export,y} \times \frac{EG_{projecty}}{EG_{projecty} + EG_{othery}} - EG_{importy} - EG_{importsparey}$
Monitoring frequency	Continuously measurement and monthly recording
QA/QC procedures	The metering equipment at the project site will be calibrated by a qualified Meter Calibration Organization according to the management standard. Power imported from the grid will be double checked according to electricity sales receipts. The accuracy of the meter M3 is 0.5s, the accuracy of the meter M1, M2, M4, M5, M6, M7, M8, M9 are 0.2s.
Purpose of data	Baseline emission calculation
Additional comment	-

B.7.2. Sampling plan

>>
N.A

B.7.3. Other elements of monitoring plan

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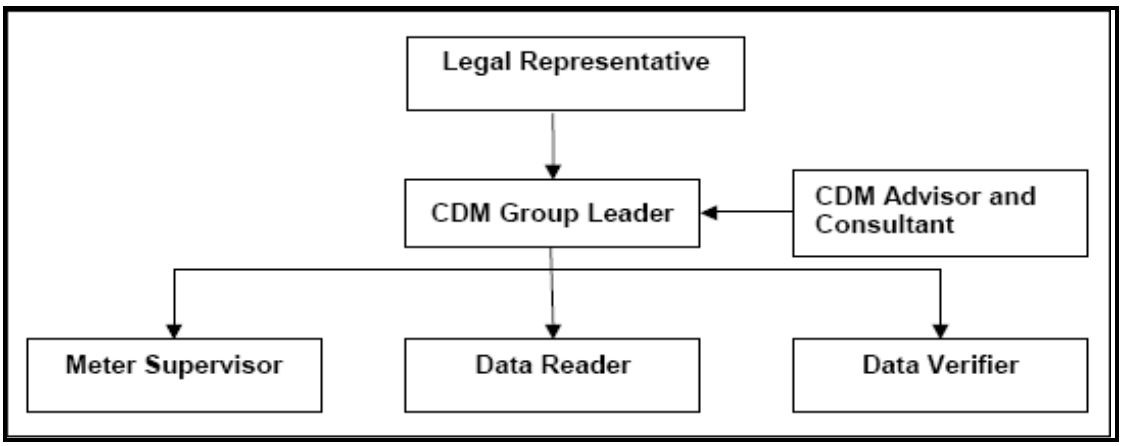
The project adopts the approved consolidated monitoring methodology ACM0002 “Grid-connected electricity generation from renewable sources” (Version 19.0) to determine the emission reductions from the net electricity generation from the wind farm. This plan describes in more detail the process.

1. Monitoring Object

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

2. Management Structure

The Project owner was responsible for the monitoring related work, including the relevant data collection, monitoring and verification. A CDM working panel was established internally and to be assisted by an external CDM consulting company. The operational and organizational structure for the monitoring process is showed as in the Figure below.



Furthermore, a CDM manual was designed as a guideline for the project owner for management of the Project and monitoring of the data during the operation period. Details on the authority and responsibility for monitoring, measurement and reporting, the procedures for the training of monitoring personnel, the procedures for day-to-day records handling, the procedures for internal audits, the procedures for corrective actions and so on are provided in the CDM manual for the Project owner.

3. Monitoring Equipments

The project and Hebei Shangyi CGN Dongshan Wind Power Project use the same gate meter installed at the high volt side of 220kV project site Substation (Main meter M1 and backup meter M2). The meters use to monitor the total quantity of electricity supplied to the grid and imported from the grid by the project and the Hebei Shangyi CGN Dongshan Wind Power Project. The accuracy of all the meters are 0.2s.

Besides, the 33 sets of wind turbines of the project are divided into 3 groups, and each group is connected with a 35kV transmission line and installed with one meter at the input side of 220kV project substation. The meters of M4, M5 and M6 are used to monitor the electricity generated by the project. The accuracy of all the meters are 0.2s.

Similar situation occurs in Hebei Shangyi CGN Dongshan Wind Power Project, the meters of M7, M8 and M9 are used to monitor the electricity generated by Hebei Shangyi CGN Dongshan Wind Power Project. The accuracy of all the meters are 0.2s.

An emergency line is used for supplying electricity in emergent case that the projects fail to generate power. A meter (M3) was installed to measure the electricity imported by the project via this line. But the emergency line was only used on the construction period and after putting into operation, the emergency line has been out of service. The accuracy of the meter M3 is 0.5s.

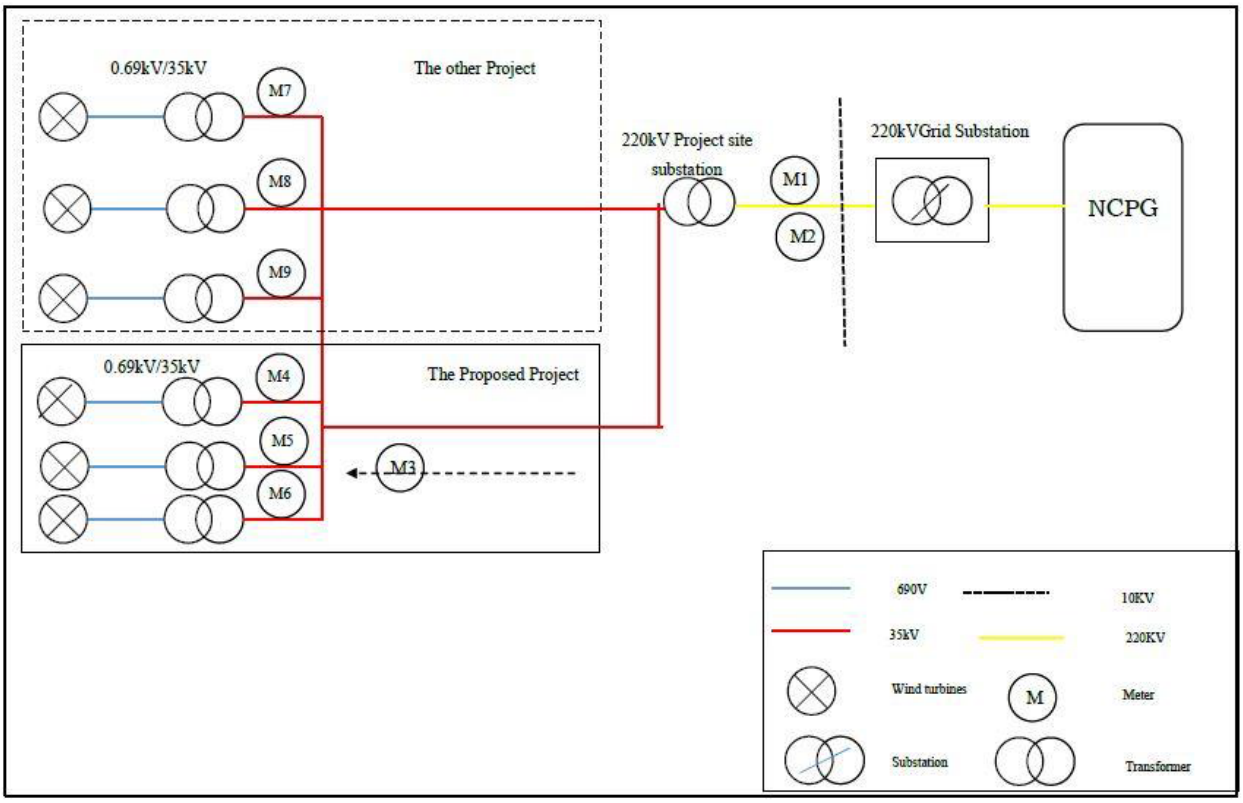
The net electricity supplied to the grid by the proposed project is calculated as followed:

$$EG_{facility,y} = EG_{export,y} \times \frac{EG_{project,y}}{EG_{project,y} + EG_{other,y}} - EG_{import,y} - EG_{import,spare,y}$$

Where:
$EG_{facility,y}$= Net electricity supplied by the project in the year y.
$EG_{export,y}$= Total electricity supplied to the grid by the project and the other project in the year y.
$EG_{import,y}$= Total electricity imported from the grid by the project and the other project in the year y.
$EG_{project,y}$= Electricity measured by meters installed at the 35kV transmission lines of the project
$EG_{other,y}$= Electricity measured by meters installed at the 35kV transmission lines of Hebei Shangyi CGN Dongshan Wind Power Project
$EG_{import\ spare,y}$= Electricity imported from the emergency line in the year y

The project and Hebei Shangyi CGN Dongshan Wind Power Project will set up a main transformer in a 220 kV substation at the project site. The wind power generated will be switched through a 220kV substation at the project site, and then connected to the new-built 500kV Grid Substation, then transmitted to the North China Power Grid finally. But due to the 500kV Grid Substation is still under construction, therefore, the project will connect to the 220kV Grid Substation temporarily. Once the 500kV Grid Substation established, the project will connect to the 500kV Grid Substation and then transmitted to the North China Power Grid.

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



4. Monitoring procedure

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

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

5. Quality Assurance and Quality Control

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

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

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

Emergency Procedure:

In case metering equipment is damaged and no reliable readings can be recorded the project, entity will estimate net supply by the project activity according to the following procedure:

In case metering equipment is damaged: The project entity and the grid company will jointly calculate a conservative estimate of power supplied to the grid. A statement will be prepared indicating

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

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

6. Data Management System

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

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

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

7. Monitoring Report

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

SECTION C. Start date, crediting period type and duration

C.1. Start date of project activity

>>
20/08/2010 (on which the Construction Contract of Administration Building, 35KV Distribution Room and Outdoor Affiliated Facilities was signed, which is considered as the earliest date of the project)

C.2. Expected operational lifetime of project activity

>>
20 years operational lifetime + 1 year construction period

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

>>
08/11/2018

C.3.3. Duration of crediting period

>>
7 years and 0 month

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>
The environmental impact assessment report for this project was carried out by Hebei Academy of Geography Science in December 2008. The results of the EIA were positive and approved by Hebei Provincial Environmental Protection Bureau on 30th December 2008. A summary of conclusion of the report is illustrated as below:

Ambient air

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

Impact from noise

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

Electromagnetic impact

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

Impact from Solid waste

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

Impact from Wastewater

There is mainly domestic wastewater with fairly small quantities in construction stage, and primary treatment methods will be first applied, small-scale septic tanks should be built on the site, through

which the wastewater can finally reuse after treatment. Therefore, the impact of wastewater is limited and mitigated.

Impact on ecological environment

The proposed project will both permanently and temporarily occupy some land (mostly farmland), the temporarily occupied land will be ecologically restored for original use. Such restoration measures will include land re-surfacing, re-vegetation, and etc. As for the permanently occupied land, ecological compensation measures will be applied to the adjacent area to offset the impact on ecosystem.

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

D.2. Environmental impact assessment

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

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

>>
In July 2010, staff from the project owner carried out a survey of the local residents around the project location. The staff introduced the background of the proposed project and then sent out 50 copies of questionnaire in a random way, 50 pieces of reply were received. Among the interviewees, 36 of them have educational level of middle school, 13 of high school, 1 of collage; 31 of them are farmers, 2 of them are workers, 17 are officers.

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

The questions regarding the proposed project were mainly as follows:

How do you think the general condition of the local environmental quality?
Do you currently experience electromagnetic interference when watching TV at home?
Are there any negative impacts of the proposed project on the everyday life of local residents?
Is the proposed project going to help improve the living and/or working environment?
How the proposed project impacts the acoustic environment (noise) quality?
Which is the environmental topic that concerns you the most during the construction and operation of the proposed project?
Do you support the proposed project?

E.2. Summary of comments received

>>

The summary of questionnaire survey is listed as the following:

- 48 (96%) of them think the local environmental quality is very well, 2(4%) of them think it is general;
- All (100%) of them currently do not experience electromagnetic interference when watching TV at home;
- All (100%) of them think there will not be any negative impacts on their everyday life, and the remainder is unsure;
- 46 (92%) of them think the proposed project will help improve their living and/or working environment, and the remainder is unsure;
- 48 (96%) of them are unsure whether the proposed project will make noise, one(2%) of them thinks that it is beneficial, and the remainder thinks it is not beneficial;
- Regarding the construction and operation of the propose project, 12 (24%) of them are most concerned with electromagnetic interference, 31 (62%) of them are most concerned with the noise level, and 7 (14%) of them are most concerned with wastewater from the project;
- All (100%) of them support the implementation of the proposed project.

The summary of local stakeholders' meeting:

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

E.3. Consideration of comments received

>>

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

SECTION F. Approval and authorization

>>

The letter of approval (LoA) from DNA of Germany was issued on 20/02/2019, which has been provided to the DOE for validation. Reference:
https://cdm.unfccc.int/filestorage/J/O/P/JOP0CA3VRBN1HFUGYEXTD2SW4ZI7LQ/5293_LoA_Germany_addStatkraft.pdf?t=RTh8cHhjbmg4fDCCf1csBW24wFt2CTXQSesJ

The letter of approval (LoA) from DNA of China was issued on 13/06/2011, which has been provided to the DOE for validation. Reference:
https://cdm.unfccc.int/filestorage/1/L/P/1LPH7OAMR0UBC9FZWI65X4KSJQV2NG/HCA%20%28China%29.pdf?t=Sjh8cHhjbm43fDDipVgB7o-xRvp3RdaF1UIt

Appendix 1. Contact information of project participants

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Website	-
Contact person	Shi Lei

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E-mail	sprengers@statkraft.com
Website	-
Contact person	Peter Sprengers

Appendix 2. Affirmation regarding public funding

There is no public funding for Hebei Shangyi DongShan Wind Farm Project.

Appendix 3. Applicability of methodologies and standardized baselines

Please refer to section B in the PDD.

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

Please refer to B.7.2 in the PDD.

Appendix 6. Summary report of comments received from local stakeholders

Please refer to E.2 in the PDD.

Appendix 7. Summary of post-registration changes

There is no post-registration change during the process of the renewal of the crediting period.

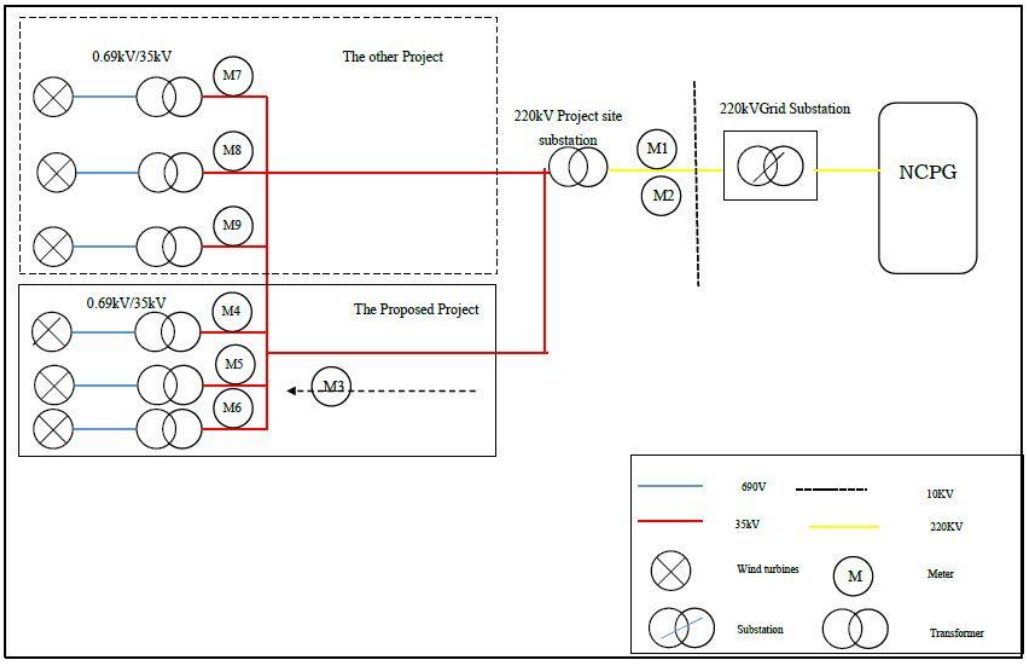
However, there were permanent changes to the registered monitoring plan during the first crediting period. The revised PDD (version 4.0, dated 25/09/2018) was submitted and approved by CDM EB on 08/08/2019. Reference:

https://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1317260688.01/view

The summary of the post-registration changes mentioned above is as followed:

In the registered PDD (version 3.0, dated 08/09/2011), the project installed one bi-directional meter at the high volt side of 220kV project site Substation. Both electricity supplied to the grid by the project activity and the electricity imported from the grid to the project site is monitored by the meters. However, in actual, there is another project, namely, Hebei Shangyi CGN Dongshan Wind Power Project which uses joint meter with the project.

Hence, in the revised PDD (version 4.0, dated 25/09/2018), the sketch for the location of the meters in Section B.7.1 and some relevant description in the registered PDD (version 3.0, dated 08/09/2011) should be permanently changed. The actual sketch for the location of the meters is shown in the following figure. The meters (M4, M5 and M6) installed at the 35kv transmission lines of the project and the meters (M7, M8 and M9) installed at the 35kv transmission lines of the Hebei Shangyi CGN Dongshan Wind Power Project had been added in the revised PDD (version 4.0, dated 25/09/2018).



The monitoring parameters $EG_{project,y}$ and $EG_{other,y}$ have been added into B.7.1 of the revised PDD (version 4.0, dated 25/09/2018). The relevant description of the parameters of $EG_{import,y}$, $EG_{export,y}$ *and* $EG_{facility,y}$, such as the description, the measurement methods and procedures, have been revised in the B.7.1 of the revised PDD (version 4.0, 25/09/2018).

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Document information

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

Version	*Date*	*Description*
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
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

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