Gold Standard for the Global Goals
Key Project Information & Project Design Document (PDD)

Version 2.0 – October 2018

Gold Standard

KEY PROJECT INFORMATION

Title of Project:	CECIC HKC Danjinghe Wind Farm Project
Brief description of Project:	CECIC HKC Danjinghe Windfarm Project (hereinafter referred to as the proposed project) is located in Zhangbei County, Hebei Province, and is developed by CECIC HKC Wind Power Co. Ltd. Based on the condition of the project site, the proposed project is to install and operate 54 wind turbines of 750kW, 100 wind turbines of 800kW and 53 wind turbines of 1500kW. Therefore, the total installed capacity of proposed windfarm is 200MW. The proposed project is expected to generate approximately 438,550 MWh per year at the full capacity, which will be sold to the North China Power Grid (hereinafter referred to as NCPG).
Expected Implemetation Date: Expected duration of Project:	15/02/2017 15/02/2017-14/02/2022[1]
Project Developer:	Demeter Venture UK Limited (Demeter Venture)
Project Representative:	CECIC HKC Wind Power Co., Ltd.
Project Participants and any communities involved:	Zhangbei County governments, Local resident, NGOs
Version of PDD: Date of Version:	2.1 20/01/2019
Host Country / Location:	P.R. China (host)/ Hebei Province
Certification Pathway (Project Certificatin/Impact Statements & Products	Impact Statements & Products
Activity Requirements applied: (mark GS4GG if none relevant)	GS4GG
Methodologies applied:	Energy Industries (renewable/non-renewable); ACM0002: "Grid-connected electricity generation from renewable sources", Version 19.0
Product Requirements applied:	Gold Standard Verified Emission Reductions (GSVERs)
Regular/Retroactive:	Retroactive
SDG Impacts:	1 –SDG 7 – Affordable And Clean Energy 2 –SDG 8 – Decent Work And Economic Growth 3 –SDG 13 – Climate Action
Estimated amount of SDG Impact Certified	SDG 13 – Climate Action: 395,001 tCO_2e/year

[1] The crediting period of the project is the same as CDM cycle, however OFN assessment would be made once 5 year, therefore credits since 15/02/2022 would be only claimed after the assessment.

SECTION A. Description of project

A.1. Purpose and general description of project

CECIC HKC Danjinghe Windfarm Project (UNFCCC Reference Number: 2170) was registered as a CDM project on 29/12/2008. The first 7 year CDM renewable crediting period started on 29/12/2008 and expired on 28/12/2015. And the project has been renewed, and the second CDM crediting period since from 29/12/2015 to 28/12/2022.

CECIC HKC Danjinghe Windfarm Project (hereinafter referred to as the proposed project) is located in Zhangbei County, Hebei Province, and is developed by CECIC HKC Wind Power Co. Ltd. Based on the condition of the project site, the proposed project is to install and operate 54 wind turbines of 750kW, 100 wind turbines of 800kW and 53 wind turbines of 1500kW. Therefore, the total installed capacity of proposed windfarm is 200MW. The proposed project is expected to generate approximately 438,550 MWh per year at the full capacity, which will be sold to the North China Power Grid (hereinafter referred to as NCPG).

As the NCPG is dominated by fossil fuel-fired power generation, the establishment of the Project Activity will lead to greenhouse gas (GHG) emission reductions. Following the methodology, the emission reductions are estimated to be on average 395,001 tonnes of CO_2 equivalent (tCO_2e) per year. The baseline scenario is the same as the scenario existing prior to the start of the implementation of the project activity: electricity delivered to the NCPG by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources.

The proposed project will therefore help reduce GHG emissions versus the high-growth, coal-dominated business-as-usual scenario. The proposed project promotes local sustainable development through the following aspects:

· reducing CO_2, SO_2 and NO_x emissions;

· creating local employment opportunity during the assembly and installation of wind turbines, and for operation of the proposed project;

· reducing other particulate pollutants resulting from the fossil fuel fired power plants compared with a business-as-usual scenario.

A.2. Eligibility of the project under Gold Standard

The proposed project is a wind farm project which generates and deliveries the electricity to the grid. The project is applying for GS CERs which are transited to GS VERs stream by following the

procedures and required mentioned Gold Standard website. So, the proposed project type is automatically eligible for Gold Standard Certification.

The emission reduction calculations are presented in: Section B.6.4 - Emissions Reductions Calculations' Spreadsheet

The monitoring plans are presented in Section B.7. Monitoring Plan.

A.3. Legal ownership of products generated by the project and legal rights to alter use of resources required to service the project

Demeter Venture Uk Limited (DVUL), which will be leading this project, has been actively involved in the development of national policies on carbon finance. It has supported the creation of international institutions. It is also involved in the continuous development and improvement of carbon finance mechanisms.

DVUL will be responsible for coordinating all aspects related to the Gold Standard Certification, as well as designing and managing all the monitoring activities. Also, by leveraging the carbon finance revenues and the findings from the monitoring surveys, DVUL shall design and implement strategies to come true SDG impacts.

The project no legal rights are violated as part of this project.

A.4. Location of project

A.4.1. Host Country

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People's Republic of China (P. R. China)

A.4.2. Region/State/Province etc.

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Hebei Province

A.4.3. City/Town/Community etc.

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Zhangbei County, Zhangjiakou City

A.4.4. Physical/Geographical location

The CECIC HKC Danjinghe Wind farm is located in the northwest of Zhangbei County, which is in Hebei Province in the People's Republic of China. It is located at longitude from 114°16'56" to 114°25'11" East and latitude from 41°05'00" to 41°12'47" North. The altitude of the site ranges from 1410 m to 1610 m above mean sea level. Figure 1 shows the location of the project.

Figure 1 Map showing the location of the Project

A.5. Technologies and/or measures

The proposed project will have a total installed capacity of 200 MW and the electricity supplied to the grid is expected to be 438,550 MWh annually at full capacity. The electricity generated from

the project will be transmitted to Zhangbei substation of NCPG via a newly built 35kV/220kV transformer.

Based on the condition of the project site, the proposed project is to install and operate 54 wind turbines of 750kW, 100 wind turbines of 800kW and 53 wind turbines of 1500kW.The selected turbines were manufactured by Zhejiang Windey Wind Generating Engineering Co.Ltd. The detailed parameters of selected turbines are provided in Table 1.

Table 1 Key Technology to be employed at the Project Wind Farm

Key Technology Parameter	WD49/750KW	WD54/800KW	WD77/1500KW
Rotor diameter (m)	49	54	77
Swept area (m2)	1886	2290	4656
Number of Paddles	3	3	3
Rated rotor speed (rpm)	15	15	15
Cut-in wind speed (m/s)	3.5	3.5	3.5
Rated wind speed (m/s)	15	15	15
Cut-out wind speed (m/s)	23	25	20
Hub height of the wind turbines (m)	65	65	65
Total Capacity (MW)	40.5	80	79.5
Number of turbines	54	100	53
Rated Voltage	690	690	690
Manufacture	*Zhejiang Windey Wind Generating Engineering Co. Ltd.*		

A.6. Scale of the project

The scale of this project is a large-scale project.

A.7. Funding sources of project

No public funding has been secured for this project.

A.8. Assessment that project complies with 'gender sensitive' requirements

Step 1: Basic Context

1M. Does the project reflect the key issues and requirements of gender-sensitive design and implementation as outlined in the gender policy? Explain how.

Answer: Yes, the multiple, culturally-derived principles of gender equality is a part of the ESG policy of CECIC HKC Wind Power Co., Ltd. From the pre-feasibility study stage to the operation time, from the stakeholder investigation to the employment, fair chance and gender equality to access the source, information and to reflect their opinions as a main consideration is taken by the project owner. Further, even if the customers both including suppliers and power buyer are also investigated by the project owner for gender equality issues.

2M. Does the project align with existing country policies, strategies and best practices? Explain how.

Answer: Yes, the proposed project aligns with Chinese policies and laws which are《Women Rights Guarantee Law of The People's Republic of China》, 《Social Security act》and《 The Law of Labour》. The project owner considers all the aspects of gender equality under Chinese laws, such as equal employment chance and right, rest and payable-holiday right, working protection and insurance, ect.

Step 2: Apply Gold Standard Safeguarding Principles

3M. Does the project address the questions raised in the Gold Standard Safeguarding Principles & Requirements document? Explain how.

Answer: Yes, please see below table.

The questions raised in the Gold Standard safeguarding principles and requirements document.	Assessment	Explanation
Is there a possibility that the Project might reduce or put at risk women's access to or control of resources, entitlements and benefits?	No	The proposed project is located at mountain and rural area, in absent of the project, no specific and special resource is available for women and affect by the construction and operation of the project. And any relevant of the project activity such as work opportunity, supply act is fair and open to any quality people.
Is there a possibility that the Project can adversely affect men and women in marginalised or vulnerable communities (e.g., potential increased burden on women or social isolation of men)?	No	No evidence to show the construction of wind farm project affect men and women in marginalised or vulnerable communities.
Is there a possibility that the Project might not take into account gender roles and the abilities of women or men to participate in the decisions/designs of the project's activities (such as lack of time, child care duties, low literacy or educational levels, or societal discrimination)?	No	During the decision, designs even operation of the project activity, the project developer, employes people base on the principle of open, fair opportunity without the discrimination on men or women.
Does the Project take into account gender roles and the abilities of women or men to benefit from the Project's activities (e.g., Does the project criteria ensure that it includes minority groups or landless	No	The project developer gives the benefit including salary, social welfare and bonus base on the workload and position and without setting any criteria to spcially benefit men or women.

peoples)?		
Does the Project design contribute to an increase in women's workload that adds to their care responsibilities or that prevents them from engaging in other activities?	No	The proposed project does not create any job or have any intention of design to increase the workloard or prevent women from engaging in other activities.
Would the Project potentially reproduce or further deepen discrimination against women based on gender, for instance, regarding their full participation in design and implementation or access to opportunities and benefits?	No	From the statistic and ESG analysis of the construction of the wind farm project, it has no evidence to show that - the Project potentially reproduce or further deepen discrimination against women based on gender, for instance, regarding their full participation in design and implementation or access to opportunities and benefits.
Would the Project potentially limit women's ability to use, develop and protect natural resources, taking into account different roles and priorities of women and men in accessing and managing environmental goods and services?	No	The nature resource of the project is only wind. Whether or not to develop the proposed project, the ability of women to access, use, develop and protect natural resource is not affect or limited.
Is there a likelihood that the proposed Project would expose women and girls to further risks or hazards?	No	There is no likelihood, because the propose project does not change any factor which may expose women and girls to further risks or hazards. Conversely, more gender equality principle and advance knowledges from large cities will bring to the local girl or women that encourages and educates them to protect their right and mitigate the potential risks.

Step 3: Conduct Stakeholder Consultation:

4M. Does the project apply the Gold Standard Stakeholder Consultation & Engagement Procedure Requirements? Explain how.

Answer: Yes, the proposed project fully applied the Gold Standard Stakeholder Consultation & Engagement procedure. All the processes during consolation indcluding Prepare, Hold A Consultation Meeting, Document, Incorporate Feedback, and Feedback fulfil with the requirements and are considered for the different gender roles and relationships. These local stakeholder consultation processes reach a wide range of community representatives in ways that ensure equal and effective participation of women and men

in consultation, and that gender issues are fully factored into comprehensive social and environmental impact assessment.

SECTION B. Application of selected approved Gold Standard methodology

B.1. Reference of approved methodology

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1. The approved large-scale consolidated methodology ACM0002: "Grid-connected electricity generation from renewable sources" (Version 19.0);

2. The approved "Tool to calculate the emission factor for an electricity system" (Version 07.0).

Further information pertaining to the methodology can be obtained at:
http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

B.2. Applicability of methodology

Baseline and Project Scenario - Emissions Calculations - (see Section B.6.4)

The Methodology ACM0002 (Version 19.0) is chosen and applicable to the project due to the following reasons:

No.	Applicability	Explain
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 belongs to grid-connected renewable energy power generation project activities that (a) install 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 is the installation of a new grid connected 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 is the installation of a new grid connected wind power plant. So, this applicability condition does not need to be considered.
4	In case of hydro power plants, one of the following conditions must 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	The Project is not a hydro power plant, so this applicability condition does not need to be considered.

	single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density calculated using equation (3), is greater than 4 W/m^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.	
5	In the case of integrated hydro power projects, project proponent shall: 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 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 project, so this applicability condition does not need to be considered.
6	The methodology is not applicable to the following: (e) 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; (f) Biomass fired power plants/units.	The Project is a newly built of wind power plant, therefore: (e)The Project does not involve switching from fossil fuels to renewable energy sources at the site of the project activity; (f) The Project is not a biomass fired power plant.
7	In the case of retrofits, replacements, or capacity additions, this methodology is only applicable if the	The Project is the installation of a new grid connected wind

	most plausible baseline scenario, as a result of the identification of baseline scenario, is the continuation of the current situation, i.e. 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.	power plant. So this applicability condition does not need to be considered.

The applicability criteria stated in methodology ACM0002 (Version 19.0) are met on the basis of the reasons above.

For standardized baseline, it's not applicable.

B.3. Project boundary

For the purpose of GHG mitigation/sequestration following table shall be completed

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	CO_2 emissions from electricity generation in fossil fuel fired power plants connected into the NWPG 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 scenario	Project emission	CO_2	No	The project is a wind power project. Project emissions should not be considered according to ACM0002.
		CH_4	No	
		N_2O	No	

B.4. Establishment and description of baseline scenario

As the project activity is the installation of a Greenfield power plant, according to the methodology ACM0002 (Version 19.0), the baseline scenario is the following:

Electricity delivered to the grid by the Project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the Combined Margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

The project displaces electricity generated in NCPG and therefore NCPG is chosen as the baseline scenario boundary. As per the last version of the registered PDD, the baseline of the proposed project is to be demonstrated in accordance with "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" (EB66, version 03.0.1) as follows:

The baseline scenario is same as the registered PDD, that is, prior to the start of the implementation of the project activity: the electricity delivered to the NCPG by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources.

In context with step 1.4, the emission factor has been updated as per the latest available data. Details are given in section B.6.

B.5. Demonstration of additionality

The proposed project is deemed additional because of it is a registered CDM project. Specify the methodology or activity requirement or product requirement that establish deemed additionality for the proposed project (including the version number and the specific paragraph, if applicable).	According to Gold Standard CDM FAQ published on the Gold Standard website (https://www.goldstandard.org/project-developers/develop-project) , the registered CDM project is deemed additionality.
Describe how the proposed project meets the criteria for deemed additionality.	Gold Standard relies on CDM governance to verify additionality and does not check the additionality of CDM-registered projects.

B.6. Sustainable Development Goals (SDG) outcomes

B.6.1. Relevant targets for each of the three SDGs

The relevant SDG target for each of **three** SDGs addressed by the project is specified in the following table.

SDG addressed by the project	SDG targets addressed by the project	Introduction
SDG7- Affordable And Clean Energy	1) By 2030, ensure universal access to affordable, reliable and modern energy services, 2) By 2030, increase substantially the share of renewable energy in the global energy mix. 3) By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology. 4) By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support.	Through the installation and operation of the proposed project, more skilled workers are trained, and the lower operation cost will be enhanced in wind farm sectors, then it encourages more wind farm projects to install and operate. With more wind farm projects operation, it will bring the low price and affordable clean energy and increases substantially the share of renewable energy in the global energy mix as well as promotes investment in energy infrastructure and clean energy technology
SDG 8 – Decent Work And Economic Growth	1) Sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries.	1) Sustain per capita economic growth is not only supported by the renewable grid power generation but also by reinvesting local

	2) Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment.	infrastructure projects through the revenue of the VAT, VAT plus, and income tax from the proposed project. With the improvement local infrastructure, such as, road construction, local people have more opportunities to access more decent jobs. 2) The project entity abides by the Chinese law and regulations concerning work safety and health when signed employment contracts and redoubles their efforts to ensure work safety by setting up and improving the responsibility system such as providing safety training to project staff for work safety and health and improving the conditions for it to guarantee work safety and health.
SDG13- Climate Action	Take urgent action to combat climate change and its impacts.	The proposed project is estimated to generate 395,001t CO_2 annually

B.6.2. Explanation of methodological choices/approaches for estimating the SDG outcome

Emission reduction for the Project activity is calculated based on ACM0002 (Version 19.0), and the Tool to calculate the emission factor for electricity system (Version 07.0).

This section includes the following parts:

·Calculate the project GHG emissions;

·Calculate the baseline GHG emissions;

·Calculate the project leakage;

·Calculate the emission reductions.

I. Calculate the project GHG emissions

The project activity is a windpower project, no fossil fuel will be consumed according to the methodology ACM0002, the project emission should not be considered, that is $PE_y = 0$ tCO_2e.

II. Calculate baseline GHG emissions

1. Calculate the baseline emission factor

As per the methodology ACM0002 Version 19.0, Tool to calculate the emission factor for an electricity system version 07.0 is applied to calculate the baseline emission factor.

According to the methodological tool, the baseline emission factor is calculated in the following six steps:

STEP 1. Identify the relevant electricity systems

The electricity generated by the project will be supplied to the NCPG. In the absence of the project activity, both the existing power plants and the power plants to be built in the foreseeable future within the NCPG would supply electricity comparable to that supplied by the project. As per 2015 baseline emission factors for regional power grids in China published by China DNA on 06/06/2016, the NCPG includes the provincial grid spatial extent of the Beijing Power Grid, the Tianjin Power Grid, the Hebei Power Grid, the Shanxi Power Grid, the Shandong Power Grid, and the Inner Mongolia Power Grid.

The NCPG has imported electricity from the Northeast Power Grid (NEPG) and Northwest Power Grid (NWPG). As per the methodological tool, referred to 2015 baseline emission factors for regional power grids in China, option (b), the simple Operating Margin emission factor of the electricity exporting grid, determined as described in Step 4 (a) was selected to calculate the CO_2 emission factor for net electricity imports from the NEPG and the NWPG by the NCPG.

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.

The Option I was selected for the project.

STEP 3. Select a method to determine the Operating Margin (OM)

The Tool to calculate the emission factor for an electricity system Version 07.0 offers four options for the calculation of the Operating Margin emission factor(s) ($EF_{grid,OM,y}$). Low-cost/must run resources constitute less than 50% of total amount of grid generating output from 2012 to 2014 in the NCPG. In line with 2015 baseline emission factors for regional power grids in China issued by China DNA, Method (a) Simple OM was thus selected.

According to the methodological tool, the following options were selected:

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.

STEP 4. Calculate the Operating Margin emission factor according to the selected method

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 power plants serving the North China Power Grid, not including low-cost/must-run power/units. The Tool to calculate the emission factor for an electricity system version 07.0 offers two options for the calculating of the Simple OM.

Based on data of net electricity generation and CO_2 emission factor of each power plant/unit (Option A), or

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).

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). Option A should be preferred and must be used if fuel consumption data is available for each power plant/unit. As the fuel consumption data for each power plant/unit is not available in China,

Option A is not applicable. Total net electricity generation of all power plants serving the North China Power Grid and the fuel types and total fuel consumption of the North China Power Grid are available from China electric power yearbook and China energy statistical yearbook, and the following conditions can be satisfied:

(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.

So, the Project uses Option B for calculating the simple OM emission factor as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_i (FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y})}{EG_y} \quad (1)$$

Where

$EF_{grid,OMsimple,y}$ Simple Operating Margin CO2 emission factor in year y (tCO2/MWh);

$FC_{i,y}$ Amount of fossil fuel type i consumed in the NCPG in year y (mass or volume unit);

$NCV_{i,y}$ Net calorific value (energy content) of fossil fuel type i in year y (GJ/mass or volume unit);

$EF_{CO2,i,y}$ CO2 emission factor of fossil fuel type i in year y (tCO2/GJ);

EG_y Net electricity generated and delivered to the grid by all power sources serving the North China Power Grid, not including low-cost/must-run power plants/units, in year y (MWh);

i All fossil fuel types combusted in power sources in the North China Power Grid in year y;

Because the project activity is a new built wind power project, the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex-ante option).

$$EG_y = GEN_y \times (1 - AER_y) \quad (2)$$

Where:

GEN_y electricity generated by all power sources serving the North China Power Grid, not including low-cost/must-run power plants/units, in year y (MWh);

AER_y the average auxiliary electricity consumption rate(%) of all power sources serving the North China Power Grid, not including low-cost/must-run power plants/units, in year y.

The data on electricity generation and auxiliary electricity consumption rate for calculating the operating margin emission factor ($EF_{grid,OM,y}$) are obtained from China Electric Power Yearbook 2011/2012/2013. The data on different fuel consumptions for power generation and the net calorific values of the fuels are obtained from China Energy Statistical Yearbook 2011/2012/2013. The emission factors of the fuels employed are obtained from Table 1.3 and Table 1.4 on page 1.21-1.24 of Volume 2 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories. The lower values of the 95% confidence intervals in Table 1.4 are used for the emission factors of the fuels employed.

According to 2015 baseline emission factors for regional power grids in China, the Simple Operating Margin CO2 emission factor ($EF_{grid,OMsimple,y}$) of the NCPG is 1.0416 tCO_2/MWh (see Appendix 4 for details).

STEP 5. Identify the Build Margin Emission Factor

In terms of vintage of data, project participants chose Option 1:

Option 1: For the first crediting period, calculate the Build Margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. 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. For the third crediting period, the Build Margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Capacity additions from retrofits of power plants should not be included in the calculation of the build margin emission factor.

The sample group of power units m used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above:

(a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5-units}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-}units}$, in MWh);

(b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total} , in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\%}$) and determine their annual electricity generation ($AEG_{SET \geq 20\%}$, in MWh);

(c) From $SET_{5-units}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample});

Identify the date when the power units in SET_{sample} started to supply electricity to the grid. If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin. Ignore steps (d), (e) and (f).

However, under the current circumstances in China, the power plants consider the Build Margin data as important business data and will not have them published. Therefore, it is difficult to obtain the data of five power plants that have been put into operation most recently or the newly built power plant capacity additions in the electricity system that comprise 20% of the system generation.

In allusion to the situation, the CDM EB accepts the following deviation in the application of the methodology

1) Use of capacity additions during the last 1~3 years for estimating the Build Margin emission factor for grid electricity.

2) Use of weights estimated using installed capacity in place of annual electricity generation, being approximately conservative.

And it is suggested to use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy.

The Build Margin emissions factor is the generation-weighted average emission factor (tCO2/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_{m} EG_{m,y} \times EF_{EL,m,y}}{\sum_{m} EG_{m,y}} \quad (3)$$

Where

$EF_{grid,BM,y}$ Build Margin CO2 emission factor in year y (tCO2/MWh);

$EG_{m,y}$ Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh);

$EF_{EL,m,y}$ CO2 emission factor of power unit m in year y (tCO2/MWh);

m Power units included in the Build Margin;

y Most recent historical year for which power generation data is available.

As per the methodology deviation, China DNA published the BM calculation method as follow:

Because current statistics data cannot separate the installed capacity of coal, oil and gas fueled power generation, the method adopted for BM calculation is as follow:

Firstly make use of the latest energy balance data to calculate all sorts of emission scale in total emission from coal, oil and gas fuelled power generation; then based on the emission factor under the business best technology, calculated the fuelled power emission factor of the grid; last multiply the fuelled power emission factor and fuelled power proportion of the total power, it's the BM of the grid.

Detailed step and formula as follow:

Sub-step 1. Calculation of the share of CO2 emissions from solid, liquid and gaseous fuels

$$\lambda_{Coal,y} = \frac{\sum_{i \in COAL, j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (4)$$

$$\lambda_{Oil,y} = \frac{\sum_{i \in OIL, j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (5)$$

$$\lambda_{Gas,y} = \frac{\sum_{i \in GAS, j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (6)$$

Where

$F_{i,j,y}$ The consumption of fuel i in province j in year y (unit of mass or volume);

$NCV_{i,y}$ Net calorific value (energy content) of fuel i in year y (GJ/mass or volume unit, gas fuel/ GJ/m3);

$EF_{CO_2,i,j,y}$ CO2 emission factor of fossil fuel type i in year y (tCO2/GJ).

Coal, Oil and Gas is the foot-index for solid fuels, liquid fuels and gas fuels.

Sub-step 2. Calculation of the emission factor of thermal power

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} \quad (7)$$

$EF_{Coal,Adv,y}$, $EF_{Oil,Adv,y}$ and $EF_{Gas,Adv,y}$ are emission factors of the best efficiency commercial available coal-fired, oil-fired and gas-fired generation technologies.

Sub-step 3. Calculation of the BM in the Grid

$$EF_{grid,BM,y} = \frac{\Delta CAP_{Thermal}}{\Delta CAP_{Total}} \times EF_{Thermal,y} = \frac{CAP_{Thermal,y} - CAP_{Thermal,y-N}}{CAP_{Total,y} - CAP_{Total,y-N}} \times EF_{Thermal,y} \quad (8)$$

$CAP_{Total,y}$ Is the total installed capacity in the North China Power Grid in year y, $CAP_{Thermal,y}$ is the total installed capacity of thermal power in the North China Power Grid in year y. N is the shortest vintage that the added installed capacity nearest to 20% of total installed capacity in the North China Power Grid.

The data on installed capacity for calculating the build margin emission factor ($EF_{grid,BM,y}$) are obtained from China Electric Power Yearbook 2012-2013. The data on different fuel consumptions for power generation and the net calorific values of the fuels are obtained from China Energy Statistical Yearbook 2014. The emission factors of the fuels employed are obtained from Table 1.3 and Table 1.4 on page 1.21-1.24 of Chapter 1, Volume 2 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories. The lower values of the 95% confidence intervals in Table 1.4 are used for the emission factors of the fuels employed.

Based on 2015 baseline emission factors for regional power grids in China published by China DNA, the Build Margin Emission Factor ($EF_{grid,BM,y}$) of the North China Power Grid could be obtained to be 0.4780 tCO2/MWh.

STEP 6. Calculate the Combined Margin emissions factor

The Combined Margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times W_{OM} + EF_{grid,BM,y} \times W_{BM} \quad (9)$$

Where

$EF_{grid,CM,y}$ Combined Margin CO2 emission factor in year y (tCO2/MWh);

W_{OM} Weighting of Operating Margin emissions factor (%);

W_{BM} Weighting of Build Margin emissions factor (%).

2. Calculate baseline GHG emissions

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. ACM0002 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 to be calculated as follows:

$$BEy = EGy \times EF_{grid,CM,y} \quad (10)$$

Where

BE_y Baseline emission in year y (tCO_2);

EG_y The net electricity supplied to the grid by the Project in year y. (MWh); the net generation is calculated as exports (EG_{export}) minus imports (EG_{import}).

III. Calculate Leakage GHG emissions

As per the methodology ACM0002 (Version 19.0), no leakage needs to be considered in the Project.

IV. Calculate the emission reductions

The emission reduction (ER_y) during a given year y is calculated as follows:

$$ERy=BEy-PEy \quad (11)$$

$$ERy=BEy= EGy \times EF_{grid,CM,y} =(EGexport - EGimport) \times EF_{grid,CM,y}$$

B.6.3. Data and parameters fixed ex ante for monitoring contribution to each of the three SDGs

Relevant SDG Indicator	SDG-13,
Data / Parameter	$FC_{i,y}$
Unit	Mass or volume unit
Description	Amount of fossil fuel type i consumed in the NCPG in year y.
Source of data	China energy statistical yearbooks, 2012-2014
Value(s) applied	See Appendix 4
Choice of data or Measurement methods and procedures	The data obtained from the official publication China energy statistical yearbook, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system version 07.0
Purpose of data	Calculation of baseline emissions
Additional comment	-

Relevant SDG Indicator	SDG-13,
Data / Parameter	$NCV_{i,y}$
Unit	GJ/mass or volume unit
Description	Net calorific value (energy content) of fuel type i in year y.

Source of data	China energy statistical yearbooks, 2012-2014
Value(s) applied	See Appendix 4
Choice of data or Measurement methods and procedures	The data obtained from the official publication China energy statistical yearbook, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system version 07.0.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Relevant SDG Indicator	SDG-13,
Data / Parameter	$EF_{CO2,i,y}$
Unit	tCO2/GJ
Description	CO2 emission factor of fuel type i in year y.
Source of data	2006 IPCC guidelines on national GHG inventories, Volume 2 Energy, Chapter 1, table1.3-table 1.4
Value(s) applied	See Appendix 4
Choice of data or Measurement methods and procedures	Regional or national average default values are unavailable, so IPCC default values at the lower limit of the uncertainty at a 95% confidence interval are used, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system version 07.0.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Relevant SDG Indicator	SDG-13,
Data / Parameter	GEN_y
Unit	MWh
Description	Electricity generated by all power sources serving North China Power Grid in year y.
Source of data	China electric power yearbooks, v
Value(s) applied	See Appendix 4
Choice of data or Measurement methods and procedures	Regional or national average default values are unavailable, so IPCC default values at the lower limit of the uncertainty at a 95% confidence interval are used, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system version 07.0.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Relevant SDG Indicator	SDG-13,
Data / Parameter	AER_y
Unit	%
Description	Auxiliary electricity consumption rate of all power sources serving North China Power Grid.
Source of data	China electric power yearbooks, 2012-2014

Value(s) applied	See Appendix 4
Choice of data or Measurement methods and procedures	Regional or national average default values are unavailable, so IPCC default values at the lower limit of the uncertainty at a 95% confidence interval are used, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system version 07.0.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Relevant SDG Indicator	SDG-13,
Data / Parameter	$F_{i,j,y}$
Unit	mass or volume unit
Description	Consumption of fuel i in province j in year y.
Source of data	China electric power yearbooks, 2012-2014
Value(s) applied	See Appendix 4
Choice of data or Measurement methods and procedures	The data obtained from the official publication China energy statistical yearbook, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system version 07.0.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Relevant SDG Indicator	SDG-13,
Data / Parameter	$EF_{Coal,Adv,y}$
Unit	tCO2/MWh
Description	Emission factor of the best efficiency, commercially available coal-fired generation technology.
Source of data	2015 baseline emission factors for regional power grids in China published by China DNA
Value(s) applied	0.7483
Choice of data or Measurement methods and procedures	The data obtained from the China DNA, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system version 07.0.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Relevant SDG Indicator	SDG-13,
Data / Parameter	$EF_{Oil,Adv,y}$
Unit	tCO2/MWh
Description	Emission factor of the best efficiency, commercially available oil-fired generation technology.
Source of data	2015 baseline emission factors for regional power grids in China published by China DNA
Value(s) applied	0.5138

Choice of data or Measurement methods and procedures	The data obtained from the China DNA, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system version 07.0.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Relevant SDG Indicator	SDG-13,
Data / Parameter	$EF_{Gas,Adv,y}$
Unit	tCO2/MWh
Description	Emission factor of the best efficiency, commercially available gas-fired generation technology.
Source of data	2015 baseline emission factors for regional power grids in China published by China DNA
Value(s) applied	0.3695
Choice of data or Measurement methods and procedures	The data obtained from the China DNA, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system version 07.0
Purpose of data	Calculation of baseline emissions
Additional comment	-

Relevant SDG Indicator	SDG-13,
Data / Parameter	$CAP_{Total,y}$
Unit	MW
Description	Total installed capacity in North China Power Grid in year y
Source of data	China electric power yearbooks, 2012-2014
Value(s) applied	See Appendix 4
Choice of data or Measurement methods and procedures	The data obtained from the China DNA, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system version 07.0
Purpose of data	Calculation of baseline emissions
Additional comment	-

Relevant SDG Indicator	SDG-13,
Data / Parameter	$CAP_{Thermal,y}$
Unit	MW
Description	Total installed capacity of thermal power in North China Power Grid in year y
Source of data	China electric power yearbooks, 2012-2014
Value(s) applied	See Appendix 4
Choice of data or Measurement methods and procedures	The data obtained from the China DNA, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system version 07.0
Purpose of data	Calculation of baseline emissions
Additional comment	-

B.6.4. Ex ante estimation of outcomes linked to each of the three SDGs

I. Calculate the project GHG emissions

The project is a wind power project, and the project emissions should not be considered as per the methodology ACM0002, $PE_y = 0$ tCO_2e.

II. Calculate the baseline GHG emissions

1. Calculate the baseline emission factor

According to the methodological tool, W_{OM} and W_{BM} are by default 0.75 and 0.25 respectively in the second crediting period. Therefore, the combined baseline emission factor:

$$EF_{grid,CM,y} = 1.0416 \times 0.75 + 0.4780 \times 0.25 = 0.9007\ tCO_2/MWh$$

2. Calculate baseline GHG emissions

According to the FSR of the project, the annual net feed-in electricity is estimated to be 438,550MWh, so the annual baseline emission of the project is

$$BE_y = 438{,}550MWh \times 0.9007\ tCO2/MWh = 395{,}001tCO_2$$

III. Estimate project leakage emissions:

As per the methodology ACM0002 (Version 19.0), no leakage needs to be considered in the Project.

IV. Estimate emission reductions

As per formula in section B.6.1, $ER_y = 395{,}001 - 0 - 0 = 395{,}001\ tCO_2$, and the annual emission reductions of the project are 395,001tCO_2e.

B.6.5. Summary of ex ante estimates of each SDG outcome

SDG 8- The decrement work is about 40 people and SDG7- the clean energy is to generate 438,500MWh annually. The outcome of SDG13 is as the following table.

Year	Baseline estimate	Project estimate	Net benefit
15/02/2017-14/02/2018	395,001	0	395,001
15/02/2018-14/02/2019	395,001	0	395,001
15/02/2019-14/02/2020	395,001	0	395,001
15/02/2020-14/02/2021	395,001	0	395,001
15/02/2021-14/02/2022	395,001	0	395,001
Total	1,975,005		1,975,005
Total number of crediting years	5		

Annual average over the crediting period	395,001	0	395,001

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Stakeholders' feedback/ grievance monitoring

Relevant SDG Indicator	SDG 8-Decent work and economic growth
Data / Parameter	$N_{employment}$
Unit	/
Description	The decent work provided by the project activity
Source of data	The payment of staff
Value(s) applied	40
Measurement methods and procedures	On site check and finance data
Monitoring frequency	Annually
QA/QC procedures	The employment contracts can be used to cross check the decent work position.
Purpose of data	To monitor outcome of SDG 8
Additional comment	-

Relevant SDG Indicator	SDG8-Decent work and economic growth
Data / Parameter	Local county GDP indictor
Unit	%
Description	The revenue from the proposed project, VAT, VAT plus and income tax to show the local county economic growth
Source of data	Local county statistics
Value(s) applied	to be determined
Measurement methods and procedures	Check from local government public data
Monitoring frequency	Annually
QA/QC procedures	Using government pubic data and company finance data
Purpose of data	To monitor outcome of SDG 8
Additional comment	-

Relevant SDG Indicator	SDG 7- Affordable And Clean Energy, SDG 13 –Climate change
Data / Parameter	$EG_{facilityy}$
Unit	MWh
Description	The net electricity supplied to the grid by the project
Source of data	Meter
Value(s) applied	To be determined

Measurement methods and procedures	Both the electricity delivered to the grid by the proposed project and the power delivered from the grid will be monitored continuously through the two-way metering equipment at the onsite substation. Net electricity supplied to the grid (EG) is calculated as exports minus imports. The results from the main meter will be recorded and supplied by the grid company to the developer monthly.
Monitoring frequency	N/A
QA/QC procedures	Monthly net generation data will be approved and signed off by the CDM Manager before it is accepted and stored. The metering data will be double checked by receipt of sales or commercial data. Back-up meters will also be installed at the on-site substation and can be used for cross checking. The metering equipments will be calibrated and checked according to the appropriate industry standards (Chinese electric industry regulation-DL/T448) so that the metering equipment shall have sufficient accuracy of 0.5s.
Purpose of data	Calculation of baseline emissions /
Additional comment	N/A

B.7.2. Sampling plan

Not applicable.

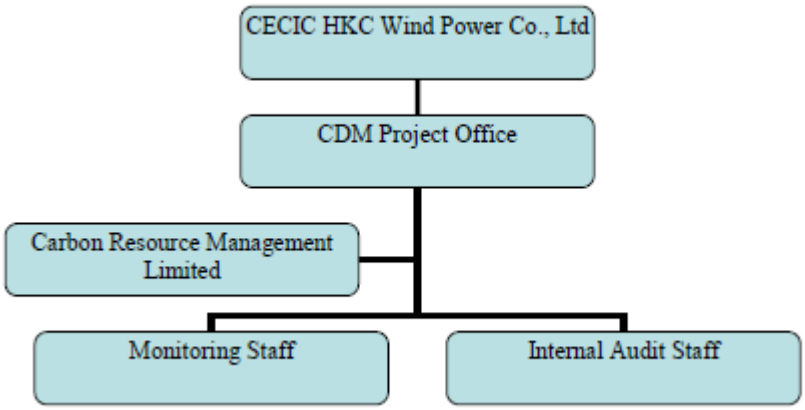
B.7.3. Other elements of monitoring plan

Overall responsibility for monitoring and carrying out the monitoring following this monitoring plan lies with CECIC HKC Wind Power Co., Ltd.

The project Manager of CECIC HKC Wind Power Co., Ltd is responsible for the monitoring and reporting of the wind farm.

The output from this project is monitored and recorded using two meters. One is main meter installed at the onsite substation, the other is back up meter also installed at the on-site substation. The meter readings are used for both project purposes and sales of the electricity generated to the grid company.

The operating and management structure is illustrated as follows:



1. Introduction

The CECIC HKC Danjinghe Wind Farm Project adopts the Revision to the approved consolidated monitoring methodology ACM0002 "Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources" to determine the emission reductions from the net electricity generation from the wind farm.

2. Responsibility

Overall responsibility for monitoring and carrying out the monitoring following this monitoring plan lies with CECIC HKC Wind Power Co., Ltd.

3. Installation of meters

The net electricity generation of the CECIC HKC Danjinghe Wind Farm will be monitored through the main metering equipment installed at the onsite substation, recording exports to the grid (supply) and imports from the grid (consumption). Net generation supplied is calculated as exports minus imports. A backup meter in CECIC HKC Danjinghe Wind Farm will also be installed at the on-site substation. The accuracy of the meters is at least 0.5s. The electricity meters monitor the flow continuously and are reported monthly.

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

4. Monitored data

The net electricity supplied to the grid (EG) will be monitored and recorded following the procedures below. Data variables to be monitored are presented in Section B of the PDD.

The net supplied power monitored by these meters will suffice for the purpose of billing and emission reductions, as long as the error in the meters is within the agreed limits.

5. Calibration and Maintenance

The metering equipment will be calibrated and checked by qualified third party for accuracy according to industry standards (Chinese electric industry regulation-DL/T448) so that the metering equipment shall have sufficient accuracy of 0.5s.

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

All the meters installed shall be tested by the NCPG within 10 days after: the detection of a difference larger than the allowable error in the readings of both meters; the repair of all or part of meter caused by the failure of one or more parts to operate in accordance with the specifications.

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

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

6. Quality control

Monthly net on-grid supplied electricity for the purpose of emission reduction calculations will be cross-checked against sales receipts and approved and signed off by the project Manager before it is accepted and stored.

This internal audit will also identify potential improvements to procedures to improve monitoring and reporting in future years. If such improvements are proposed these will be reported to the DOE and only operationalised after approval from the DOE.

7. Data management system

Physical document such as paper-based maps, diagrams and environmental assessments will be collated in a central place, together with this monitoring plan. In order to facilitate auditors'

reference of relevant literature relating to the CECIC HKC Danjinghe Wind Farm project, the project material and monitoring results will be indexed. All paper-based information will be stored by the technology department of CECIC HKC Danjinghe Wind Farm and all the material will have a copy for backup. And all data including calibration records is kept until 2 years after the end of the total crediting period of the project.

8. Reporting

· Zhangjiakou Electric Power Company reads main meter and reports the result to NCPG Company monthly.

· Zhangjiakou Electric Power Company supplies reading to CECIC HKC Danjinghe Wind Farm monthly.

· CECIC HKC Danjinghe Wind Farm records readings from the backup meter monthly and other relevant separated meters if needed.

· CECIC HKC Danjinghe Wind Farm carries out an internal audit and reports the meter readings to the DOE before the verification.

CECIC HKC Wind Power Co., Ltd will facilitate the verification through providing the DOE with all required necessary information at any stage.

SECTION C. Duration and crediting period

C.1. Duration of project

C.1.1. Start date of project

11/05/2007 (the date of construction contract signed)

C.1.2. Expected operational lifetime of project

25years

C.2. Crediting period of project

C.2.1. Start date of crediting period

15/02/2017

C.2.2. Total length of crediting period

The crediting period: 5 years 0 month

SECTION D. Safeguarding principles assessment

D.1. Analysis of social, economic and environmental impacts

Safeguarding principles	Assessment questions	Assessment of relevance to the project (Yes/potentially/no)	Justification	Mitigation measure (if required)
1 Human Rights	a. Shall the Project Developer and the Project not respect internationally proclaimed human rights and be complicit in violence or human rights abuses of any kind as defined in the Universal Declaration of Human Rights	a. No	a. From the project design to the project operation, the employment of temporary workers and long-term staff, the project developer fulfils the proclaim human rights. In order to avoid the violations of a state's human right obligations and the core international human rights treaties and fulfil the GS 'requirement, 30 Articles of the Universal Declaration of Human Rights were seriously considered and provided for stakeholder consultation and positive feedback were collected.	a. not required
1.Human rights	b. Shall the Project discriminate with regards to participation and inclusion?	b. No	The participation and inclusion of the project including the bid of the design, EPC and the operation maintenance as well as the employment process is fair and open ways. Every item of the above process does not obey any item of the universal declaration of human rights and has no any discrimination.	b. not required.
2. Gender Equality and Women 's Rights	Is there a possibility that the Project might reduce or put at risk women's access to or control of resources, entitlements and	No	The proposed project is located at mountain and rural area, in absent of the project, no specific and special resource is available for women and affect by the	Not Required

	benefits?		construction and operation of the project. And any relevant of the project activity such as work opportinuty, supply ect is fair and open to any quality people.	
	Is there a possibility that the Project can adversely affect men and women in marginalised or vulnerable communities	No	No evidence to show the construction of wind farm project affect men and women in marginalised or vulnerable communities.	Not Required
	Is there a possibility that the Project might not take into account gender roles and the abilities of women or men to participate in the decisions/designs of the project's activities (such as lack of time, child care duties, low literacy or educational levels, or societal discrimination)?	No	During the decision, designs even operation of the project activity, the project developer –employs people base on the principle of open, fair opportunity without the discrimination on men or women.	Not Required
	Does the Project take into account gender roles and the abilities of women or men to benefit from the Project's activities (e.g., Does the project criteria ensure that it includes minority groups or landless peoples)?	No	The project developer gives the benefit including salary, social welfare and bonus base on the workload and position and without setting any criteria to specially benefit men or women.	Not Required
2. Gender Equality and Women 's Rights	Does the Project design contribute to an increase in women's workload that adds to their care responsibilities or that prevents them from engaging in other activities?	No	The proposed project does not create any job or have any intention of design to increase the workload or prevent women from engaging in other activities.	Not Required

2. Gender Equality and Women 's Rights	Would the Project potentially reproduce or further deepen discrimination against women based on gender, for instance, regarding their full participation in design and implementation or access to opportunities and benefits?	No	From the statistic and ESG analysis of the construction of the wind farm project, it has no evidence to show that -the Project potentially reproduce or further deepen discrimination against women based on gender, for instance, regarding their full participation in design and implementation or access to opportunities and benefits.	Not Required
2. Gender Equality and Women 's Rights	Would the Project potentially reproduce or further deepen discrimination against women based on gender, for instance, regarding their full participation in design and implementation or access to opportunities and benefits?	No	From the statistic and ESG analysis of the construction of the wind farm project, it has no evidence to show that -the Project potentially reproduce or further deepen discrimination against women based on gender, for instance, regarding their full participation in design and implementation or access to opportunities and benefits.	Not Required
2. Gender Equality and Women 's Rights	Is there a likelihood that the proposed Project would expose women and girls to further risks or hazards?	No	There is no likelihood, because the propose project does not change any factor which may expose women and girls to further risks or hazards. Conversely, more gender equality principle and advance knowledges from large cities will bring to the local girl or women that encourages and educate them to protect their right and mitigate the potential risks.	Not Required
3. Community Health, Safety and working Conditions	Shall the Project adversely affect the health of the workers and the community or not avoid community exposure to increased health risks	No	As per the labor contract template provided by the Project owner, the project will strictly comply with Labor Law of the People's Republic of China. The project will recruit professional staff	

			responsible for construction, operation and maintenance of the Project. The labor contract which protects the interest of the labor will be signed between the Project and the staff. Under the protection of Labor Law, it not involved. and is not complicit in any form of forced or compulsory labor. The Project unit shall abide by this Law and other laws and regulations concerning work safety and health, redouble their efforts to ensure work safety by setting up and improving the responsibility system such as providing safety training to project staff for work safety and health and improving the conditions for it to guarantee work safety and health. Thus, the Project is not complicit in exposing workers to unsafe or unhealthy work environments. As per the EIA Form and its approval for the Project, the Project is a new wind power project, will not engage in any agriculture-related production activities, could not bring alien species that will endanger and will not produce dangerous chemical substances on the environment, waste generated during the construction and operation process of the Project will be safely disposed. The project does not use any genetical modified organisms and does	

			not involve large mono-culture plantations. As a wind project, the project does not produce hazardous waste. China has ratified all conventions relevant to this Project and has its own credible legislation in place enforcing the principle. China actively enforces the Principle of precautionary approach, in EIA form and EIA approval, the precautionary approach were discussed and directly required in the EIA approval. And the Environment, safety and health management manual, Environment protection, Duties Manual for environmental protection, and rewards and punishments for environmental protection, were issued by the project owner. The project is located in remote mountainous area. The precautionary approach in the Environment, safety and health management manual were adopted during transmission line construction and road construction, the impact was minimized. The blasting was operated by trained staff and the safety protection precautionary approach was adopted; the strict environment and ecosystem management were implemented. During the construction period, no any accidents occurred due to the strict implementation of Environment, safety and health management. So, the	

			Project will not raise any threat of harm to human health or the environment.	
4. Cultural Heritage, Indigenous Peoples, Displacement and Resettlement	Does the Project Area include sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture (e.g., knowledge, innovations, or practices)	No	As per the EIA Form and its approval for the Project by Hebei EPA, most of land occupied by the project here does not include, sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture.	Not required.
	Does the Project require or cause the physical or economic relocation of peoples (temporary or permanent, full or partial)?	No	The project does not involve resettlement according to EIA report. The land occupied by the project was local government, not private land. The land expropriation contracts were provided, the land expropriation was compensated based on relevant regulations and agreed by local forest bureau. and government. So, the proposed project does not cause any physical or economic relocation.	Not required.
	Does the Project require any change to land tenure arrangements and/or other rights? For Projects involving land-use tenure, are there any uncertainties with regards land tenure, access rights, usage rights or land ownership?	No	The land occupied by the project was local government, not private land. The land expropriation contracts were provided, the land expropriation was compensated based on relevant regulations and agreed by local forest bureau.	Not required
	Are indigenous peoples present in or within the area of influence of the Project and/or is the	No	The land occupied by the project was local government, not private land. The project does not refer any indigenous	Not required.

	Project located on land/territory claimed by indigenous peoples?		people's right, land or territory.	
5. Corruption	Does not recognise Projects that engage in, contribute to or reinforce corruption of any kind?	No	The Project strictly implements the bidding system, project supervision system and project completion acceptance supervision system. All the Project financials will be available for the project beneficiaries and legal authorities to ensure that the Project does not involve and is not complicit in corruption. Also, the project owner has issued the company's anti-corruption rules, which indicates that the employees are strictly prohibited to be involved or complicit in any kinds of corruption.	
6.Economics Impact	Shall the Project Developer not ensure that there is no forced labour and that all employment is in compliance with national labour and occupational health and safety laws, with obligations under international law, and consistency with the principles and standards embodied in the International Labour Organization (ILO) fundamental conventions? Where these are contradictory and a breach of one or other cannot be avoided, then guidance	No	As per the labor contract template provided by the Project owner, the Project will strictly comply with Law of the People's Republic of China on Work Safety, the Project unit shall abide by this Law and other laws and regulations concerning work safety and health, redouble their efforts to ensure work safety by setting up and improving the responsibility system such as providing safety training to project staff for work safety and health and improving the conditions for it to guarantee work safety and health. Thus, the Project is not complicit in exposing workers to unsafe or unhealthy work	Not Required

	shall be sought from Gold Standard.		environments. An organisation of the project had been built to help individual people protect his or her rights as well as a paper working agreement was signed with each one to fix his or her duties and tasks, working hours, insurance and other rights in Chinese labour law. No child labour is employment in the project. And all the staff will be trained and test before starting their work.	
	Shall the Project Developer not demonstrate the financial sustainability of the Projects implemented, also including those that will occur beyond the Project Certification period? Shall the Projects not consider economic impacts and not demonstrate a consideration of potential risks to the local economy and how these have been taken into account in Project design, implementation, operation and after the Project, Shall particular focus not be given to vulnerable and marginalised social groups in targeted communities and these	No	As per the feasibility study report, the project developer considered and gave a analysis for the financial sustainability of the Projects implemented for the whole project life (25years) which is beyond the project certification period. During the feasibility study stage and preliminary design stage, the project demonstrated the potential risks to local economy is zero and confirmed the construction and operation of the project activity would benefit local economics and not affect vulnerable and marginalised social groups.	Not Required

	benefits are socially-inclusive and sustainable.			
Environmental &Ecological Safeguading Principles Assessment				
1. 1. Climate and Energy	Will the Project increase greenhouse gas emissions over the Baseline Scenario?	No.	The project activity generates electricity by renewable resources and creates emission reductions comparing to the baseline scenario.	Not Required.
	Will the Project use energy from a local grid or power supply (i.e., not connected to a national or regional grid) or fuel resource (such as wood, biomass) that provides for other local users?	No.	The project activity provides clean, sustainable and afford energy to the grid.	Not Required.
	Could the Project directly or indirectly cause additional erosion and/or water body instability or disrupt the natural pattern of erosion?	No	Base on the analysis and assessment of EIA report and approval from government. The project does not cause additional erosion and/or water body instability or disrupt the natural pattern of erosion.	Not Required.
Environment, Ecology and Lan use	Does the Project involve the use of land and soil for production of crops or other products?	No	According to FSR and Land Use approval, the project land is grass land and forest and after construction, the land should be recovered by the grass or trees.	Not Required.
	Could the Project be negatively impacted by the use of genetically modified organisms or GMOs (e.g., contamination, collection and/or harvesting, commercial development	No	As per the EIA Form and its approval for the Project, the project does not use any genetical modified organisms, and does not involve large mono-culture plantations	Not Required.
	Could the Project potentially result in the	No	As a wind project, the project does not produce hazardous	Not Required.

	release of pollutants to the environment		waste.	
	Will the Project involve animal husbandry?	No	According to EIA report, husbandry was not affected. During the contraction period, the temporary safety measures for cow have been made and applied.	Not Required.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from stakeholders

Step 1- Prepare

1) A Stakeholder Consolation Plan was made in the early of July 2018, which includes the information as below:
   a) the purpose of consultation
   b) the process
   c) Who are your stakeholders
   d) and category the stakeholders
   e) anyone missing test
   f) The ways of invitation the stakeholders
2) To check the plan is line with the requirement of The Golden standard
3) Prepare Key Project Information
4) According to the reply to email and phone, prepare physical meeting. give each stakeholder category code.

Step 2 Hold a consolation meeting

The minute of consolation meeting is as the table below.

Stakeholder Consultation Minutes			
Agenda	Process & Content	Feedback or Comments from Stakeholder	Conclusion and Reponses or the applied measures to feedback
Opening of the meeting	The purpose. process and working ways of the meeting are introduced to stakeholder. Introduce each other between the investigator, Project Developer, and the stakeholders	A question raised by stakeholder was what the meaning of the stakeholder meeting was.	The reply to this question was that the project under applying for GS VER streams should have at least three Positive SDG impacts and was assessed as per the gender equity and safeguarding principle requirements. The comments or feedback from stakeholder consultation is key part of this assessment.

Explanation of the project	The paper document of "key I project information" in Chinese was sent and explained by detail to the stakeholders.	Key information was clear and no question on it.	In order to make sure the stakeholders to fully understand the detail information, some stakeholders especially for local residents were paid more attention. And the local residents especially for women were told separately that they can give their idea or complaints freely.
Discussion of continuous input /grievance mechanism	The complaint procedures and protocols were exlantated to the stakeholders and the contact information were also record by the stakeholders.	The stakeholder said no complaint or comment during the meeting, they wanted to know if they had, what time or how to give the feedback to the investigator or goldern standard.	The contact information including the phone, emails address and GS website was given to the stakeholders. The stakeholders were told their feedback was very important and the second-round consultation would be hold soon.
Sustainable Development Exercise	explain the expected project SDG impacts in blind a way. Potential risk was discussed and consensus on risk mitigation measures and positive SDG impacts were reached.	Besides SDG 7, SDG 8 and SDG 13 impacts, the stakeholders suggested the proposed project also have positive impact on SDG 1- No Poverty, SDG2- NO Hunger and SDG5- Gender Equality.	A consensus was reached as that the most positive and criteria fulfilled SDG impacts are SDG 7, SDG 8 and SDG 13, the project also had a positive impact on SDG 1, SDG2 and SDG5.
Discussion on monitoring SDG Impacts	Raised and explained the monitoring plan fo SDG impacts, and exchanged the ideas and way how to appropriately monitor the outcomes of SDG and feedbacks collection from the stakeholders.	No comments were raised by stakeholders.	Stakeholders believed the monitoring plan and monitor methodologies is good enough to measure the DGS impacts.
Closure of the	Invited stakeholders to	No feedback from	Told them another

meeting	complete the evaluation form and told them the meeting minutes would be sent to them by emails and the contact address can be received feedback, complaints and comments at any time.	stakeholders	stakeholders meeting would be held.

Step 3- Document

The consultation meeting minutes was recorded as above table, and the documents such as Investigator questionnaires, meeting pictures, any comments or feedbacks from the stakeholders were record and kept.

Step -4 Incorporate Feedback

Stakeholder comment	**Was comment taken into account (Yes/ No)?**	**Explanation (Why? How?)**
The meaning of the stakeholder meeting	Yes	The project under applying for GS VER streams should have at least three Positive SDG impacts and was assessed as per the gender equity and safeguarding principle requirements. The comments or feedback from stakeholder consultation is key part of this assessment.
Besides SDG 7, SDG 8 and SDG 13 impacts, the stakeholders suggested the proposed project also have positive impact on SDG 1- No Poverty, SDG2- NO Hunger and SDG5- Gender Equality.	Yes	A consensus was reached as that the most positive and criteria fulfilled SDG impacts are SDG 7, SDG 8 and SDG 13, the project also had a positive impact on SDG 1, SDG2 and SDG5.
The possible solid waste during the	Yes	The solid waste during the operation period mainly from domestic garbage, which will be

construction of the project.		collected by the project owner and regularly removed by local sanitation departments.
The possible waste water discharge during the construction of the project.	Yes	The industrial wastewater will be reused for cleaning tires and watering the construction site after oil separation and sedimentation, while the sanitary wastewater will be reused for watering green and the ground after collection and treatment.

Step 5- Feedback

The contact information was sent to all the stakeholders. And further comments or feedback can be sent directly. The mails was sent the environmental experts including the persons from European Investment Bank and Chinese carbon company on 22 December 2018. The mails mainly focused on the social and environmental impacts of the project to ask the experts's views and comments.According to replied, they believe the wind farm project will help reduce GHGs emissions and other air pollutants and create local employment opportunities for the local people.
The second-round stakeholders consultation including physical meeting was hold on 20 November 2018. All the stakeholders investigated gave the positive feedback as the first physical meeting.
And the results of the two stakeholder meetings, the Project has strong local support amongst the local people. All the interviewees support the construction of the project. The main issues seem to be noise, air pollution and waste water. The developer is committed to all measures to keep a pleasant environment for local people, and if any problem occurs to finding the best way to solve it in conjunction with the stakeholders.
If there are any further comment or feedback which will be documented and monitored as required before the end of the project life.

E.2. Summary of comments received

See the table in the Step of Section E. 1

E.3. Report on consideration of comments received

Appendix 1. The positive feedbacks from stakeholder consultation were received and there is no nagative on the comments. Contact information of project participants

Organization name	CECIC HKC Wind Power Co., Ltd.
Street/P.O. Box	Xiaoshuiquan village west, Danjinghe Town,Zhangbei County
Building	
City	Zhangjiakou
State/Region	Hebei Province
Postcode	074676
Country	P.R. China
Telephone	+86+10 62248705
Fax	+86 10 62248700
E-mail	lvxin@cecwpc.cn
Website	
Contact person	Lvxin
Title	
Salutation	Ms
Last name	Lv
Middle name	
First name	Xin
Department	
Mobile	
Direct fax	+86+10 62248705
Direct tel.	+86 10 62248700
Personal e-mail	lvxin@cecwpc.cn

Organization name	DEMETER VENTURE UK LIMITED
Street/P.O. Box	St John Street
Building	
City	London
State/Region	London
Postcode	145-157
Country	UK
Telephone	+44-204 437 3867
Fax	+44-204 519 2940
E-mail	cdmcarbon@126.com
Website	
Contact person	
Title	Project manager
Salutation	
Last name	Osbea
Middle name	
First name	Peter
Department	
Mobile	
Direct fax	+44-204 437 3867
Direct tel.	+44-204 519 2940
Personal e-mail	cdmcarbon@126.com

Appendix 2. Summary of post registration design changes

Not applicable

Annex 3 Further background information on ex ante calculation of emission reductions

BASELINE INFORMATION

To determine the simple OM emission factor ($EF_{grid,OMsimple,y}$) and the Build Margin emission factor ($EF_{grid,BM,y}$) of the Project, data recommended in the 2015 baseline emission factors for regional power grids in China for the North China Power Grid are adopted.

The following tables summarise the numerical results from the equations listed in the approved methodological tool-Tool to calculate the emission factor for an electricity system version 07.0 The information provided by the tables includes data, data sources and the underlying calculations. The emission factors of OM and BM are calculated based on the Tool to calculate the emission factor for an electricity system. The information provided by the tables includes data, data sources and the underlying calculations.

Table A1.Thermal Electricity generation of the North China Power Grid

year	2011			2012			2013		
Province	EG	AER	EDG	EG	AER	EDG	EG	AER	EDG
	(MWh)	(%)	(MWh)	(MWh)	(%)	(MWh)	(MWh)	(%)	(MWh)
Beijing	25,800,000	6.00	24,252,000	28,300,000	5.40	26,711,800	32,900,000	5.57	21,067,470
Tianjin	61,200,000	6.40	57,283,200	58,200,000	6.30	54,533,400	59,100,000	6.14	55,471,260
Hebei	215,100,000	6.50	201,118,500	217,800,000	6.40	203,860,800	227,500,000	6.17	213,463,250
Shanxi	229,600,000	8.00	211,232,000	245,400,000	7.60	226,749,600	252,700,000	7.44	233,899,120
Inner Mongolia	288,900,000	7.60	266,943,600	302,900,000	7.40	280,485,400	321,3000,000	7.36	297,652,320
Shandong	312,900,000	6.80	291,622,800	324,100,000	5.70	305,626,300	350,300,000	5.83	329,877,510
Total			963,892,440			1,098,027,300			1,161,430,930

Data source: China electric power yearbook, 2012-2014
EG- Electricity generation, AER- Auxiliary electricity consumption Rate, EDG-Electricity delivered to the grid.

Table A2. Calculation of simple OM emission factor of the North China Power Grid in 2011

Energy	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total fuel	Emission factor	NCV	Emission
									kgCO2/TJ	MJ/t,km3	tCO2
		A	B	C	D	E	F	G=Sum(A:F)	H	I	*J
Coal	kt	6,809.70	28,284.50	100,703.10	103,260.00	189,983.80	137,846.80	566,887.90	87,300	20,908	1,034,722,570
Cleaned coal	kt	-	-	-	119.30	28.40	16.70	164.40	87,300	26,344	378,092
Other washed coal	kt	-	-	858.60	6,424.70	1,850.90	7,248.10	16,382.30	87,300	8,363	11,960,552
briquettes	kt	12.30	-	-	-	-	323.40	335.70	87,300	20,908	612,743
Coke	kt	-	-	-	-	-	-	-	95,700	28,435	0
Coal gangue	kt	-	-	27,936.00	210,112.00	89,655.00	96,013.00	423,716.00	87,300	8,363	30,935,077
Coke oven gas	Mm3	-	152.00	1,847.00	2,201.00	600.00	1,555.00	6,355.00	37,300	16,726	3,964,756
BFG	Mm3	-	1,608.00	29,860.00	3,690.00	6,032.00	15,941.00	57,131.00	219,000	3,763	47,081,486
LDG	Mm3	-	175.00	1,062.00	102.00	-	1,269.00	2,608.00	145,000	7,945	3,004,481
Other gas	Mm3	-	-	-	-	-	53.00	53.00	37,300	5,227	10,333
oil	kt	-	-	-	-	-	-	-	71,100	41,816	0
gasoline	kt	-	-	-	-	-	-	-	67,500	43,070	0
Diesel	kt	0.90	-	19.60	-	5.60	17.60	43.70	72,600	42,652	135,319
Fuel oil	kt	2.50	-	0.80	-	0.20	16.80	20.30	75,500	41,816	64,089
Naphtha	kt	-	-	-	-	-	-	-	72,600	43,906	0
Lubricating Oil	kt	-	-	-	-	-	-	-	72,900	41,398	0
Paraffin	kt	-	-	-	-	-	-	-	72,200	39,934	0
Solvent Oil	kt	-	-	-	-	-	-	-	72,200	42,945	0
Petroleum asphalt	kt	-	-	-	-	-	-	-	69,300	38,931	0
Petroleum coke	kt	58.70	154.20	-	-	-	136.30	349.20	82,900	31,947	924,823
LPG	kt	0.10	-	-	-	-	-	0.10	61,600	50,179	309
Refinery gas	kt	4.10	0.20	20.20	-	-	32.70	57.20	48,200	46,055	126,975
Natural gas	Mm3	157.00	5.70	1.50	58.50	1.20	1.30	225.20	54,300	38,931	4,760,623
Other oil products	kt	8.70	-	23.20	-	-	49.10	81.00	72,200	41,816	244,548
Other coke products	kt	-	-	98.10	-	-	12.90	111.00	95,700	28,435	302,056
Other energy	kt Ce	185.60	142.90	607.00	659.80	126.30	530.00	2,251.60	-	-	0

										subtotal	1,139,228,834

Thermal electricity delivered to the North China Power Grid (MWh)	1,052,452,100
Net electricity import from the Northeast China Power Grid to the North China Power Grid (MWh)	10,045,670
The simple OM emission factor of the Northeast China Power Grid (tCO2/MWh)	1.1546
Net electricity import from the Northwest China Power Grid to the North China Power Grid (MWh)	25,697,020
The simple OM emission factor of the Northwest China Power Grid (tCO2/MWh)	0.9404
Total emission of the North China Power Grid (tCO2)	1,174,992,213
Total electricity delivered to the North China Power Grid (MWh)	1,088,194,790
Simple OM emission factor of the North China Power Grid in 2011 (tCO2/MWh)	1.0798

* J=G×H×I/1,000,000

Data sources: China energy statistical yearbook 2012
2006 IPCC guideline for national greenhouse gas inventories, volume 2 energy

Table A3. Calculation of simple OM emission factor of the North China Power Grid in 2012

Energy	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total fuel	Emission factor	NCV	Emission
									kgCO2/TJ	MJ/t,km3	tCO2
		A	B	C	D	E	F	G=Sum(A:F)	H	I	*J
Coal	kt	6,495.60	27,463.80	95,771.40	108,363.3	202,263.90	132,763.50	573,121.50	87,300	20,908	1,046,100,563
Cleaned coal	kt	-	-	-	162.30	10.60	55.20	228.10	87,300	26,344	524,591
Other washed coal	kt	-	-	890.40	6,946.70	342.00	20,858.50	29,037.60	87,300	8,363	21,200,058
briquettes	kt	14.80	-	-	-	-	310.30	325.10	87,300	20,908	593,395
Coke	kt	-	-	-	-	-	-	-	95,700	28,435	0
Coal gangue	kt	-	-	1,704.40	20,495	6,115.6	5,912.6	34,227.60	87,300	8,363	24,989,225
Coke oven gas	Mm3	-	110.00	1,746.00	2,031.00	614.00	1,694.00	6,195.00	37,300	16,726	3,864,935
BFG	Mm3	-	1,169.00	32,233.00	4,480.00	5,072.00	23,153.00	66,107.00	219,000	3,763	54,478,580
LDG	Mm3	-	233.00	1,811.00	127.00	-	1,709.00	3,880.00	145,000	7,945	4,469,857

Other gas	Mm3	-	-	-	-	-	74.00	74.00	37,300	5,227	14,428
oil	kt	-	81.20	-	-	0.5	-	81.7	71,100	41,816	242,904
gasoline	kt	-	-	-	-	-	0.1	0.1	67,500	43,070	291
Diesel	kt	1.00	-	13.20	-	7.10	20.60	41.90	72,600	42,652	129,745
Fuel oil	kt	1.30	-	0.30	-	0.10	5.00	6.70	75,500	41,816	21,153
Naphtha	kt	-	-	-	-	-	-	-	72,600	43,906	0
Lubricating Oil	kt	-	-	-	-	-	-	-	72,900	41,398	0
Paraffin	kt	-	-	-	-	-	-	-	71,900	43,070	0
Solvent Oil	kt	-	-	-	-	-	-	-	72,200	42,945	0
Petroleum asphalt	kt	-	-	-	-	-	-	-	69,300	38,931	0
Petroleum coke	kt	56.90	174.30	-	-	-	155.70	386.90	82,900	31,947	1,024,668
LPG	kt	-	-	-	-	-	-	-	61,600	50,179	-
Refinery gas	kt	4.80	0.30	6.0	-	-	20.30	31.4	48,200	46,055	69,703
Natural gas	Mm3	2,122	61	27	521	13	13	2,757	54,300	38,931	5,828,169
Other oil products	kt	6.0	-	22.60	-	-	1.00	29.60	72,200	41,816	89,366
Other coke products	kt	-	-	134.30	-	-	33.50	167.80	95,700	28,435	456,622
Other energy	kt Ce	196.70	126.50	1,219.70	855.40	454.90	609.60	3,462.80	-	-	0
										subtotal	1,164,098,254

Thermal electricity delivered to the North China Power Grid (MWh)	1,098,027,300
Net electricity import from the Northeast China Power Grid to the North China Power Grid (MWh)	10,926,140
The simple OM emission factor of the Northeast China Power Grid (tCO_2/MWh)	1.1225
Net electricity import from the Northwest China Power Grid to the North China Power Grid (MWh)	27,079,710
The simple OM emission factor of the Northwest China Power Grid (tCO_2/MWh)	0.9546
Total emission of the North China Power Grid (tCO_2)	1,202,212,118
Total electricity delivered to the North China Power Grid (MWh)	1,088,194,790
Simple OM emission factor of the North China Power Grid in 2012 (tCO_2/MWh)	1.0583

* J=G×H×I/1,000,000

Data sources: China energy statistical yearbook 2013

2006 IPCC guideline for national greenhouse gas inventories, volume 2 energy

Table A4. Calculation of simple OM emission factor of the North China Power Grid in 2013

Energy	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total fuel	Emission factor	NCV	Emission
									kgCO2/TJ	MJ/t,km3	tCO2
		A	B	C	D	E	F	G=Sum(A:F)	H	I	*J
Coal	kt	631.97	2702.33	9515.31	11554.8	18419.87	13744.01	56568.29	87,300	20,908	1,032,523,122
Cleaned coal	kt				13.96	1.24	0.66	15.68	87,300	26,344	364,753
Other washed coal	kt			100.35	702.9	17.83	639.52	1460.6	87,300	8,363	10,663,693
briquettes	kt	0.93				0.65	33.09	34.67	87,300	20,908	632.821
Coke	kt			168.19	1020.91	642.69	519.62	2351.41	95,700	28,435	17,167,407
Coal gangue	kt							0	87,300	8,363	0
Coke oven gas	Mm3		1.4	19.72	18.49	6.24	18	63.85	37,300	16,726	3,983,473
BFG	Mm3		14.89	500.17	48.2	49.85	242.78	855.89	219,000	3,763	70,533,638
LDG	Mm3		2.4	22.47	1.34		19.3	45.51	145,000	7,945	5,242,866
Other gas	Mm3						1.02	1.02	37,300	5,227	19,887
oil	kt						3.47	3.47	71,100	41,816	94,427
gasoline	kt		7.9			0.01		7.91	67,500	43,070	235,174
Diesel	kt	0.2		1.49		0.73	1.84	0.01	72,600	42,652	291
Fuel oil	kt			0.03		0.05	1.42	0	75,500	41,816	0
Naphtha	kt							0	72,600	43,906	0
Lubricating Oil	kt							0	72,900	41,398	0
Paraffin	kt							0	71,900	43,070	0
Solvent Oil	kt							0	72,200	42,945	0
Petroleum asphalt	kt							0	69,300	38,931	0
Petroleum coke	kt	3.69	16.51	1.29			7.3	28.79	82,900	31,947	762,476
LPG	kt		0.02					0.02	61,600	50,179	618
Refinery gas	kt	0.19		0.84			1.95	2.98	48,200	46,055	66,152
Natural gas	Mm3	29.46	0.51	0.65	6.24	0.25	0.11	2.54	54,300	38,931	
Other oil products	kt								48,200	46,055	
Other coke products	kt	0.73		1.7				37.22	54,300	38,931	76,686

Other energy	kt Ce	16.47	10.96	83.72	85.23	8.89	248.04	453.31	72,200	41,816	7,868,134

Thermal electricity delivered to the North China Power Grid (MWh)	1,161,430,930
Net electricity import from the Northeast China Power Grid to the North China Power Grid (MWh)	17,930,720
The simple OM emission factor of the Northeast China Power Grid (tCO2/MWh)	1.1102
Net electricity import from the Northwest China Power Grid to the North China Power Grid (MWh)	25,644,730
The simple OM emission factor of the Northwest China Power Grid (tCO2/MWh)	0.9424
Total emission of the North China Power Grid (tCO2)	1,194,206,002
Total electricity delivered to the North China Power Grid (MWh)	1,204,706,380
Simple OM emission factor of the North China Power Grid in 2010 (tCO2/MWh)	0.9913

* J=G×H×I/1,000,000
Data sources: China energy statistical yearbook 2014
2006 IPCC guideline for national greenhouse gas inventories, volume 2 energy

Calculated with the data provided in Table A1~Table A4, the OM emission factor of the North China Power Grid is calculated as 1.0416 tCO2/MWh.

The section Baseline emissions factor detailed the calculation of BM emission factor of North China Power Grid, as per 2015 baseline emission factors for regional power grids in China published by China DNA on June 06, 2016 details as follows:
Sub-step 1: Calculation of the share of CO2 emissions from solid, liquid and gaseous fuels.

Calculated with the data provided in Table A4 and equations (4), (5) and (6), $\lambda_{Coal,y}$ =92.27%, $\lambda_{Oil,y}$ =0.11%, $\lambda_{Gas,y}$ =7.62%
Sub-step 2: with weight of the proportion calculated in Step1, Calculated the emission factor of thermal power based on the emission factors of the best efficient and commercial generation technologies as follow:

Thermal Power Technologies	variable	Electricity supply efficiency (%)	Emission factor of fuel(kgCO2)	Emission factor(tCO2/MWh)
		A	B	C=3.6/A/1,000,000×B
Coal fired power plants	EFCoal,Adv,y	42%	87,300	0.7483
Oil fired power plants	EFOil,Adv,y	52.90%	75,500	0.5138
Gas fired power plants	EFGas,Adv,y	52.90%	54,300	0.3695

As per equation (7)

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y}$$

=92.27%×0.7483+0.11 %×0.5138+7.62%×0.3695

=0.71916 tCO2e/MWh

Sub-step 3: take the thermal power emission factor calculated in the Step 2 multiplied by the proportion count for 20% of capacity addition of the grid as the Build Margin emission factor ($EF_{grid,BM,y}$)

Table A6. Installed capacity of the North China Power Grid in 2013

Installed capacity	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal power (MW)	6,760	11,120	41,870	52,050	63,860	70,980	246,640
Hydro power (MW)	1,010	10	1,810	2,430	1,080	1,078	7,418
Nuclear power (MW)	0	0	0	0	0	0	0
Wind power and Other (MW)	150	246	8,517	3,195	19,908	5,118	37,134
Total (MW)	7,920	11,376	52,197	57,675	84,848	77,176	291,192

Table A6. Installed capacity of the North China Power Grid in 2012

Installed capacity	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal power (MW)	6,140	11,100	39,990	50,110	60,190	68,180	235,710
Hydro power (MW)	1,020	5	1,790	2,430	1,080	1,077	7,402
Nuclear power (MW)	-	-	-	-	-	-	-
Wind power and Other (MW)	150	232	6,900	2,007	17,140	3,886	30,315
Total (MW)	7,310	11,337	48,680	54,547	78,410	73,143	273,427

Data source: China electric power yearbook 2013.

Table A14. Installed capacity of the North China Power Grid in 2011

Installed capacity	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal power (MW)	5,140	10,830	38,100	46,510	59,550	64,480	224,610
Hydro power (MW)	1,050	10	1,790	2,430	850	1,069	7,199
Nuclear power (MW)	-	-	-	-	-	-	-
Wind power and Other (MW)	150	130	4,617	927	14,657	2,497	22,978
Total (MW)	6,340	10,970	44,507	49,867	75,057	68,046	254,787

Data source: China electric power yearbook 2012.

Table A15. Installed capacity of the North China Power Grid in 2010

Installed capacity	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal power (MW)	5,140	10,910	36,640	42,100	54,020	60,020	208,830
Hydro power (MW)	1,050	10	1,790	1,820	850	1,070	6,590
Nuclear power (MW)	-	-	-	-	-	-	-
Wind power and Other (MW)	110	30	3,720	370	9,730	1399	15,359
Total (MW)	6,300	10,950	42,150	44,290	64,600	62,489	230,779

Data source: China electric power yearbook 2011.

Table A17. Calculation of BM emission factor of the North China Power Grid

	Installed capacity in 2010	Installed capacity in 2011	Installed capacity in 2012	Installed capacity in 2013	Capacity additions from 2010 to 2013	Capacity additions from 2011 to 2013	Capacity additions from 2012 to 2013	Share in total capacity additions
Unit	MW	MW	MW	MW	MW	MW	MW	
	A	B	C	D	E	F	G	G
Thermal power	208,830	224,610	235,710	246,640	43,618	24,919	12,483	66.47%
Hydro power	6,590	7,199	7,402	7,418	228	219	16	0.35%
Nuclear power	0	0	0	0	0	0	0	0.00%
Wind power and	15,359	22,978	30,315	37,134	21,775	14,156	6,819	33.18%

Other								
Total	230,779	254,787	273,427	291,192	65,621	39,294	19,318	100.00%
Share in total installed capacity of 2013					22.54%	13.49%	6.63%	

$EF_{grid,BM,y}$ =0.71916*66.47%=0.4780tCO2/MWh

Table A18. Calculation of CM emission factor

	Value	weight	CM
OM(tCO2/MWh)	1.0416	0.75	0.9007
BM(tCO2/MWh)	0.4780	0.25	