Project design document form for CDM project activities

(Version 08.0)

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	Daan Laifu Wind Farm Phase IV Project
Version number of the PDD	5.0
Completion date of the PDD	08/08/2017
Project participant(s)	Daan CGN Wind Power CO., Ltd.
Host Party	People’s Republic of China
Applied methodology(ies) and, where applicable, applied standardized baseline(s)	ACM0002 (Version 13.0.0)
Sectoral scope(s) linked to the applied methodology(ies)	Energy industries (renewable - / non-renewable sources)
Estimated amount of annual average GHG emission reductions	101,370 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The Daan Laifu Wind Farm Phase IV Project (hereafter referred as the project) is located at Anguang town, Daan County, Baicheng City, Jilin Province, P.R.China. It is built and operated by Daan CGN Wind Power CO., Ltd.. The project aims to generate electricity using wind resources and to sell generated electricity to the Northeast China Power Grid (NECPG). Four wind farm projects were planned in this region. These four projects were independently developed by the same project owner. So far, Phase I-III projects have stated commissioning already and the project activity (Phase IV) is under construction. Phase I project has already been registered as CDM project[1], phase II and phase III are requesting for registration[2].

Prior to the implementation of the project, local electricity demand is satisfied by Jilin Power Grid, which is an integrated part of NECPG that is dominated by thermal power. The project will install 24wind turbine generators with a rated capacity of 2,000kW and 1 wind turbine generator with rated capacity of 1,500kW, totaling up an installation of 49.5MW. The annual full-load operation time for the project is 2,125.3hours. The plant load factor of the project is 24.26%[3]. The estimated annual in-grid electricity output of the project is 105,202MWh by using the wind power generation technology. The total emission reductions in the first crediting period are 709,590tCO_2e. The baseline scenario to the project activity is the same as the scenario existing prior to the start of implementation of the project.

The project aims to utilize clean and renewable wind sources to generate electricity and substitute equivalent amount of electricity generated by fossil – fuel fired power plants that connected to NECPG, thus achieving CO_2 emission reduction. As a wind farm, no emission sources and GHGs is involved in the project activity. The expected annual reduction of GHG emissions is 101,370tCO_2e.

The project will not only supply renewable electricity to the grid, but also contribute to sustainable development of the local community and the host country by means of:

Reducing the emission of air pollutants like SO_2 and soot resulting from the power generation industry in China, compared with a business-as-usual scenario;

Mitigating the pressure of local power supply and promoting local economic development during both construction and operation periods of the project;

Creating new employment opportunities and helping to improve the livelihood of local residents;

A.2. Location of project activity

A.2.1. Host Party

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People's Republic of China

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[1] http://cdm.unfccc.int/Projects/DB/LRQA%20Ltd1332426071.19/view

[2] Daan Laifu Wind Farm Phase II Project:
(http://cdm.unfccc.int/Projects/Validation/DB/IOUJ4NZVZTCB0EQS8OVL1UE43BPMYH/view.html)

Daan Laifu Wind Farm Phase III Project:
(http://cdm.unfccc.int/Projects/Validation/DB/JE0YMD1Z6RPNBI6MJECK2S0FD7503X/view.html)

[3] PLF=2125.3/8760*100%=24.26%

A.2.2. Region/State/Province etc.

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Jilin Province

A.2.3. City/Town/Community etc.

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Anguang town, Daan County, Baicheng City

A.2.4. Physical/Geographical location

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The project is located in the Anguang town, Daan County, Baicheng City, Jilin province, P.R.China. The geographical coordinates of the centre of the project are longitude 123.3732°~123.4235°East and latitude 45.3702°~45.3936°North. Figure 1 shows the exact location of the project.

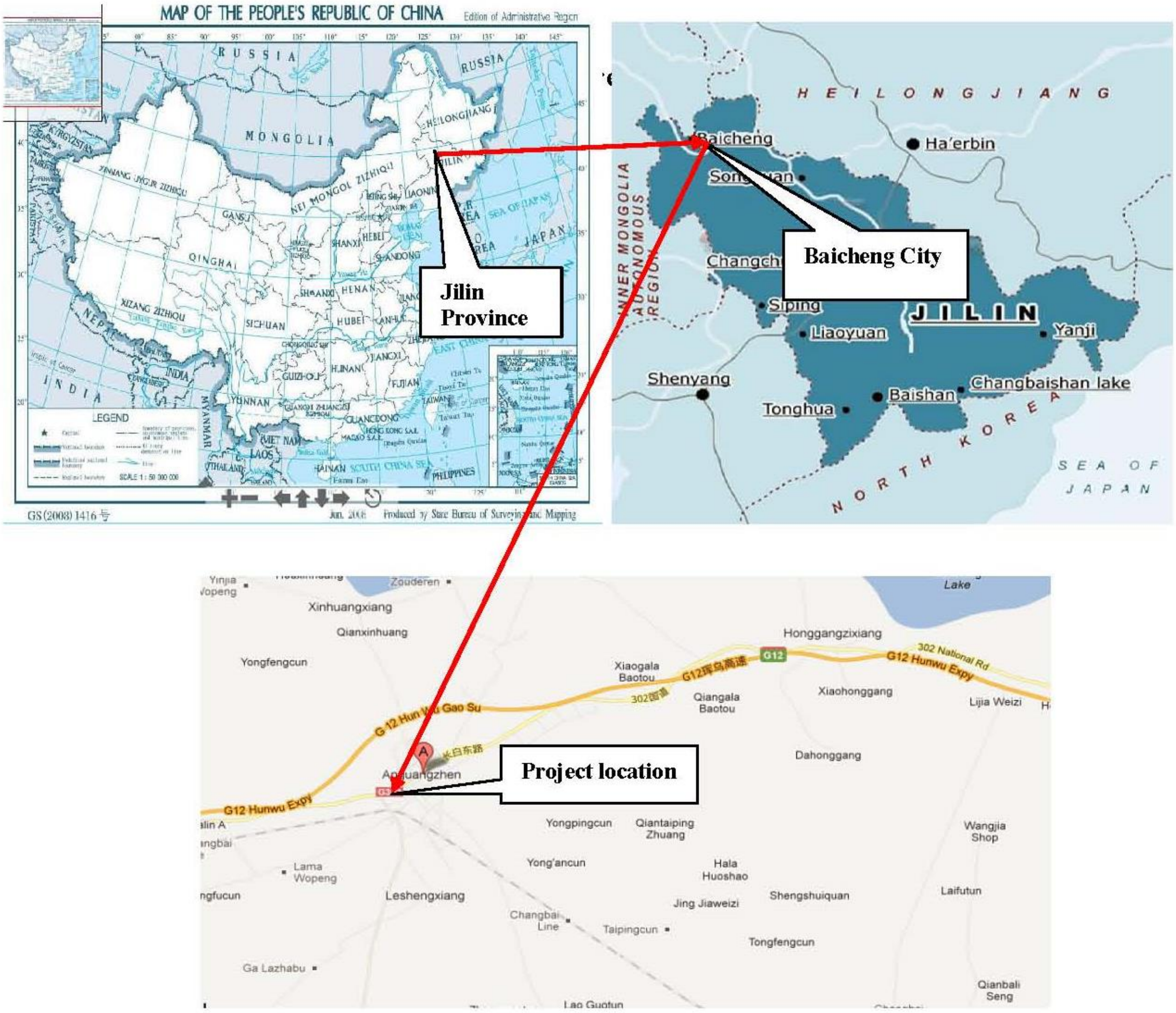

Figure 1. Location of the Project

A.3. Technologies and/or measures

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The project is to utilize wind source to generate electricity and deliver it to NECPG. According to the methodology ACM0002 (Version 13.0.0), no emission sources and green house gases (GHGs) will be involved in the project activity since it is the installation of a new grid-connected renewable energy project. For the project,

1. The scenario existing prior to the start of the implementation of the project activity is NECPG providing the same electricity service as the project;

2. The project scenario is the implementation of the project, the installation and operation of 25 sets of turbines with a total capacity of 49.5MW which will supply an average annual generation of 105,202MWh to NECPG and replace the same amount of electricity generated by fossil fuel fired power plants connected to NECPG.

3. The baseline scenario is the same as the scenario existing prior to the start of implementation of the project activity. The details of the baseline scenario analysis are clearly presented in section B.5.

Technology to be employed

The project will install 24wind turbine generators with a rated capacity of 2,000kW and 1 wind turbine generator with rated capacity of 1,500kW, totaling up an installation of 49.5MW. The electricity generated by the project is delivered to NECPG. It is expected to generate approximately 105,202MWh of net electricity output per year. The plant load factor of the project is 24.26%. The net electricity supplied to the grid can be monitored by power meters installed in the project site. The details of the location and the functions of the power meters can be found in section B.7.2.

The main technical parameters of the wind turbine generators are shown in Table 1 below.

Table 1: The main technical parameters of the wind turbine generators

N0	Item	Value
Basic Parameter	Model 1	G8X-2.0MW
	Nominal capacity	2MW
	Number	24
	Diameter	90m
	Height of the hub centre	78m
	Cut in speed	3m/s
	Cut out speed	25m/s
	Manufacturer	GAMESA WIND (TIAN JIN) CO., LTD
	Model 2	GW82/1500
	Nominal capacity	1500kW
	Number	1
	Diameter	82m
	Height of the hub centre	70m
	Cut in speed	3m/s
	Cut out speed	25m/s
	Manufacturer	Beijing Goldwind Science and Creation Wind power equipment Co., Ltd
	Annual power output	2125.3h
	PLF	24.26%
	Life time	20years

The electricity generated is first delivered to grid substation and then into a Jilin power grid, which is part of NECPG. The project employs domestically-made equipments and no technology transfer is involved. The technology adopted in the project activity is widely used and has been proved to have no significant negative influence on environment.

The metering equipments will be installed in accordance with “Technical administrative code of electric energy metering (DL/T448－2000)”. The meters will be installed in the project site to measure the electricity supply to the grid by the Project. The accuracy of electricity meter will be no lower than 0.5s according to the national Calibration standard (DL/T 448-2000).

A.4. Parties and project participants

Party involved (host) indicates host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (host)	Daan CGN Wind Power CO., Ltd.	No

A.5. Public funding of project activity

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There is no public funding from Parties included in Annex I available for the project.

SECTION B. Application of selected approved baseline and monitoring methodology and standardized baseline

B.1. Reference of methodology and standardized baseline

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The methodologies and tools applied to the project include:

- the approved consolidated baseline methodology ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (Version 13.0.0);
- the methodological tool “Demonstration and assessment of additionality” (Version 06.0.0);
- the “Tool to calculate the emission factor for an electricity system” (Version 2.2.1);

For more information regarding these methodologies and tools, please refer to:

http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

B.2. Applicability of methodology and standardized baseline

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The project is a new grid-connected wind farm installed at the site where no renewable power plant or fossil fuel power plant was operated prior to the implementation of the project activity (greenfield plant) Therefore the Project applies the methodology ACM0002 approved by CDM EB to determine the project baseline and calculate emission reductions achieved by wind power generation.

The project meets all applicable requirements of the methodology ACM0002 as follows:

1) The project is a grid-connected renewable power generation project activity that installs a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant);
2) The project is the installation of wind power plant;
3) The project involves no capacity additions, retrofits or replacements;
4) The project is not a hydro power plant. So the power density is not applicable.
5) The project does not involve switching from fossil fuels to renewable energy at the site of the project activity;
6) The project is not a biomass fired power plant.

B.3. Project boundary

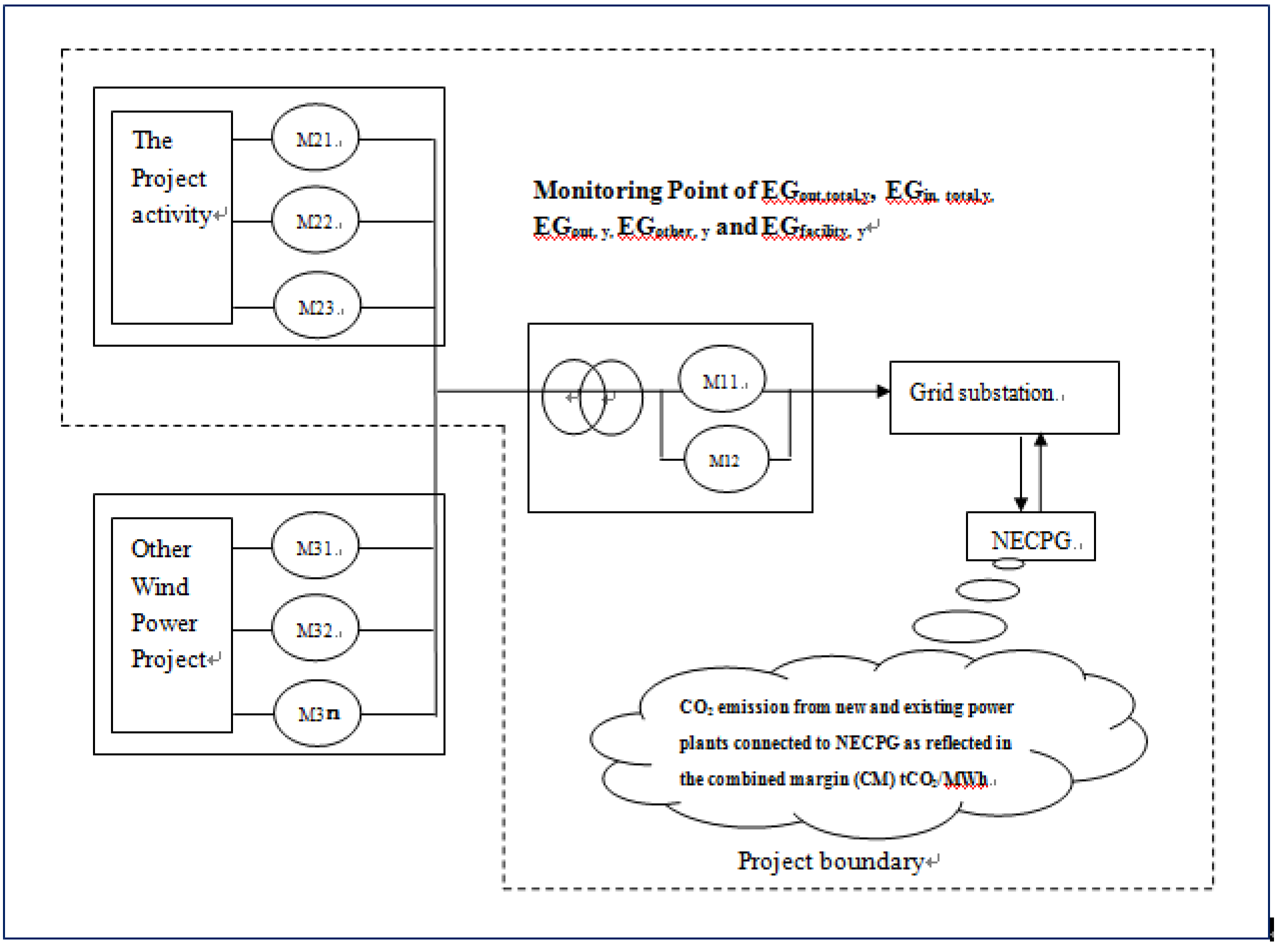
The spatial extent of the project boundary is the Project and all power plants connected physically to the electricity system that the project power plant is connected to.

The electricity generated by the project will be supplied to NECPG, replacing part of electricity generation in fossil fuel fired power plants in the grid. So, NECPG is the electricity system. According to the description of grid boundary as provided by the Chinese DNA[4], NECPG is composed of Heilongjiang, Liaoning and Jilin power grids. The emission sources and gases included in the project boundary are listed in the table below.

[4] *2011 Baseline Emission Factors for Regional Power Grid In China*
issued by NDRC on Oct 20, 2011 available at http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2708.pdf

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.	CO_2	Included	Main emission source.
		CH_4	Excluded	Minor emission source. It is conservative to be excluded.
		N_2O	Excluded	Minor emission source. It is conservative to be excluded.
Project scenario	Emission of the project activity.	CO_2	Excluded	The project activity is the installation of a new grid-connected wind power electricity plant. The project emission is zero according to ACM0002 (Version 13.0.0).
		CH_4	Excluded	The project activity is the installation of a new grid-connected wind power electricity plant. The project emission is zero according to ACM0002 (Version 13.0.0).
		N_2O	Excluded	The project activity is the installation of a new grid-connected wind power electricity plant. The project emission is zero according to ACM0002 (Version 13.0.0).

The flow diagram of the project boundary is shown in figure 2 as below. The details for the monitoring can be found in the section B.7.2.



*Other wind power projects are CGN Jilin Daan Laifu Wind Farm Phase I Project, Daan Laifu Wind Farm Phase II Project and Daan Laifu Wind Farm Phase III Project.

Figure 2: The project boundary of the project activity

B.4. Establishment and description of baseline scenario

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If the project activity is the installation of a new grid-connected renewable power plant/unit, according to ACM0002 (Ver.13.0.0) 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" Version 2.2.1.

The Project is the installation of a new grid-connected wind power plant that connects with and delivers electricity to NECPG. According to Tool to Calculate the Emission Factor for an Electricity System, the delineation of grid boundaries of the Project is NECPG. According to the methodology ACM0002, the baseline scenario of the Project is "the provision of an equivalent amount of annual power output by NECPG which the Project is connected to".

Information and data used to determine the baseline scenario and baseline values are listed in Table 2 below:

Table 2 Information and data used to determine the baseline scenario and baseline values

Description	Value	Unit	Source
Operating Margin Emissions Factor	1.0852	tCO2/MWh	Calculated in Appendix 4
Building Margin Emissions Factor	0.5987	tCO2/MWh	Calculated in Appendix 4
Baseline Emission Factor	0.963575	tCO2/MWh	Calculated in Appendix 4

B.5. Demonstration of additionality

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The additionality of the project is demonstrated and assessed by the approved "Tool for the Demonstration and Assessment of Additionality" (Version 06.0.0). Following steps include:

Step1. Identification of alternatives to the project activity consistent with current laws and regulations

According to para 4 of Tool for the Demonstration and Assessment of Additionality (Version 06.0.0), Project activities that apply this tool in context of approved consolidated methodology ACM0002 Ver.13.0.0, only need to identify that there is at least one credible and feasible alternative that would be more attractive than the proposed project activity.

Two alternatives are identified as follows:

1) The project undertaken without being registered as a CDM project activity;
2) Provision of an equivalent amount of annual electricity generation by NECPG.

Sub-step 1b. Consistency with mandatory laws and regulations:

Alternative 1) and 2) both comply with China current law and regulations, but doesn't belong to mandatory scope.

Step 2. Investment analysis

The purpose of this step is to determine whether the project activity is economically or financially less attractive than other alternatives without additional funding that may be derived from the CDM project activities. The investment analysis was conducted in the following steps:

Sub-step 2a. Determine appropriate analysis method

The three investment analysis methods stated in the Tools for the demonstration and assessment of additionality (Version 06.0.0) are simple cost analysis (option I), investment comparison analysis (option II) and benchmark analysis (option III).

The project will earn revenues not only from the CERs but also from electricity sales, so the simple cost analysis method is not appropriate. Investment comparative analysis is only applicable to the case that alternative baseline scenario is similar to the projects, so investment comparison analysis (Option II) is not appropriate to the Project. Benchmark analysis (Option III) will be employed by the Project as the baseline scenario of the Project is the provision of electricity by the grid.

Sub-step 2b. Apply benchmark analysis (option III)

With reference to “Interim Rules on Economic Assessment of Electric Engineering Retrofit Projects” issued by State Power Corporation of China, the benchmark of total investment after tax for China wind power industry is 8%.

Based on the above-mentioned benchmark, calculation and comparison of financial indicators for the project are carried out in sub-step 2c.

Sub-step 2c. Calculation and comparison of financial indicators

(1) Basic parameters for calculation of financial indicators

The basic parameters for calculation of the financial indicators in the Feasibility Study Report of the project are listed in Table 3 below.

Table 3 The financial indicators for the project

Indicators	Unit	Value	Source
Installed capacity	MW	49.5	FSR
Annual electricity output	MWh	105,202	FSR
Electricity Tariff (including VAT)	RMB/MWh	580	FSR
Total static investment	Million RMB	508.65	FSR
Average annual O&M cost	Million RMB	11.82	FSR
Long-term loan interest rate	%	6.60	FSR
Income tax	%	25[5]	FSR
VAT	%	17[6][7]	FSR
City maintenance & construction tax	%	5[8]	FSR
Education addition tax	%	5[9]	FSR
Residual rate	%	5	FSR

[5] Law of Enterprise Income Tax of the People’s Republic of China, Order No. 63 of the President of the People's Republic of China

[6] According to the national VAT tax regulation (Cai Shui [2008] No.170), the input VAT of equipment purchasing will be deducted from the output VAT of electricity sales in the following operation years.

[7] According to the national VAT tax regulation (Cai Shui [2008] No.156), 50% of the output VAT of wind power revenue will be returned.

[8] Interim regulations of City Maintenance and Construction Surtax, Guofa[1985]19

[9] The state council’s decision on revising <Interim regulations of EducationTax> Guowuyuanlin No.448.Available at : http://www.gov.cn/zwgk/2005-09/27/content_70440.htm

Depreciation period	Year	20	FSR
Project lifetime (including 1 year of construction)	Year	21[10]	FSR
Expected annual emission reduction	tCO_2e/year	101,370	Calculation based on FSR
CERs price	EURO/tCO_2e	9.5[11]	Estimated

(2) Comparison of the IRR for the project and the financial indicators benchmark

Based on the benchmark analysis (option III), if the financial indicators of the project (e.g. IRR) are lower than the benchmark, the project is not considered to be financially attractive.
Table 4 shows the IRR of the total investment after tax with and without CDM revenues respectively. As presented in the table, the IRR of the total investment after tax is 6.15% in absence of CDM revenues, which is lower than the benchmark of 8%. Therefore, the project is financially unattractive to the investor.

Table 4 Financial indicators of the project

	IRR (Total investment after tax, benchmark rate=8%)
Without CDM revenue	6.15%
With CDM revenue	8.38%

Sub-step 2d. Sensitivity analysis (option III)

The purpose of the sensitivity analysis is to assess the impact of uncertainties in the input values of the financial model on the calculated IRR. According to "Guidelines on the Assessment of Investment Analysis" (version 05), only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation. As a general point of departure variations in the sensitivity analysis should at least cover a range of +10% and -10%.

Total static investment accounts for more than 20% of the total investment, and moreover the project revenue is decided by the annual O&M cost, tariff and annual power output. Therefore, these four financial parameters including: total static investment, annual O&M cost, tariff and Annual power output were identified as the main variable factors for sensitive analysis of financial attractiveness. The sensitive analysis will be conducted with the fluctuation of the four parameters with the range from -10% to +10%.

As for the project, the following parameters will be identified as the variable factors to conduct the sensitive analysis of financial attractiveness:

1) Total Static investment
2) Annual O & M Costs
3) Tariff
4) Annual power output

We give the priority to the impact of the total static investment, annual O&M costs, tariff and Annual power output on IRR of total investment after tax. Providing that these four indicators fluctuate between -10% and 10%, the influence of them on IRR is summarized in Table 5.

Table 5 Sensitivity analysis of the project (without the CDM revenue)

	-10.00%	-5.00%	0.00%	5.00%	10.00%	Critical value

[10] 1year for construction and 20 years for operation

[11] The Euro exchange rate to RMB is 8.3899. It is published by The People's Bank of China on Mar 2, 2012 when the board minute about CDM was made. Available at: http://www.pbc.gov.cn/publish/zhengcehuobisi/637/2012/20120302092455743213855/20120302092455743213855_.html

Total static investment	7.40%	6.78%	6.15%	5.54%	4.96%	-14.20%
O&M costs	6.39%	6.27%	6.15%	6.02%	5.90%	-82.50%
Tariff	4.73%	5.47%	6.15%	6.79%	7.35%	15.50%
Annual power output	4.73%	5.47%	6.15%	6.79%	7.35%	15.50%

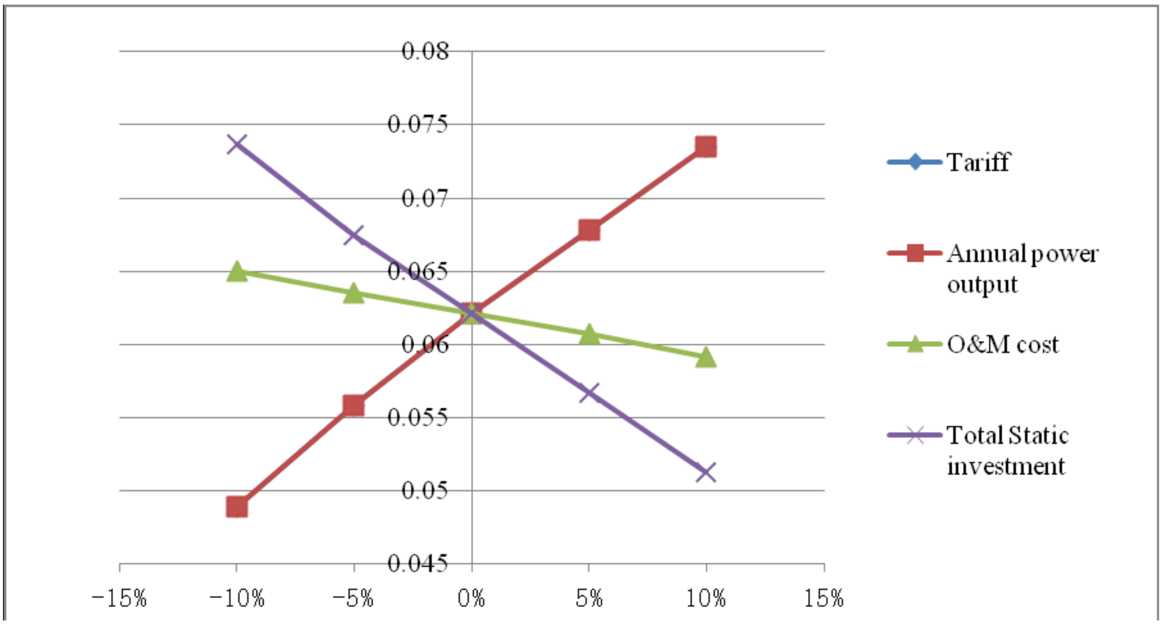

Figure 3 Sensitivity of IRR to different financial indicators of the project

As shown in Table 5 and Figure 3, the project IRR varies to different extents, when the above four financial indicators fluctuate within the range from -10% to +10%. In comparison, the total static Investment has the most significant impact on the IRR, followed by the tariff, Annual power output and Annual O&M Costs as is shown in table 5.

When total static investment decreases by 14.2%, the IRR reaches the benchmark. As evaluated in the FSR, the static investment of the proposed project is mainly composed by the equipment costs (wind turbine, tower of wind turbine, main transformer and relevant equipments), construction engineering, land for construction use costs, production preparation costs and several other costs. However, the total cost of the wind turbines purchase contracts, construction contract, road construction contract, tower purchase contract, the installation contract, the switchgear cupboard purchase contract and the 35KV transmission lines and transformer installation contract reaches 472,410,697RMB, up to 92.88% of the total static investment. So it is impossible that the static investment is 14.2% lower than estimated in the FSR and PDD. Therefore, it was not feasible that the investment costs would decrease to reach the benchmark.

When the tariff increases by 15.50%, the IRR of the project reaches the benchmark.

The tariff 0.58RMB/kWh used in the investment analysis and PDD is derived from the FSR, which was approved by the Jilin Development and Reform Commission on Feb 16, 2012.

In addition, the tariff for the project should be 0.58RMB/kWh according to <The Notice on the Policy of perfecting the feed-in tariff issued by NDRC> Fagaijiage[2009]1906# issued by National Development and Reform Commission on July 20, 2009.

Furthermore, the highest applicable wind farm tariff in Jilin applied by EB is 0.63RMB/kWh[12], which is higher than the tariff used in the investment analysis for this project. The IRR for the project is

[12] Information note on the highest tariffs applied by the executive board in its decisions on registration of projects in the people's republic of china http://cdm.unfccc.int/Reference/Notes/reg_note07.pdf

7.18%, much lower than the benchmark 8%, when the highest tariff used in the investment analysis.

Based on these facts, an increase of electricity tariff by 15.50% over the complete lifetime of the project activity is unlikely to occur.

If the annual power output increase by 15.50%, the IRR reaches the benchmark. However, the expected annual power output of the project indicated in the Feasibility Study report was calculated based on 30-year historical wind data measured by Daan Meteorological Station and one year wind data measured by local wind measure towers , which first using professional software WAsP to select the rich wind source area, then using software WindFarmer to optimize the location of each turbine for maximize power generation according to the related standards "Wind energy resource measurement and technical assessment requirements" Fagainengyuan [2003] No.140313[13] and "Wind Resources Evaluation Method of Wind Farms" (GB/T 18710-2002) issued by General Administration of Quality Supervision, Inspection, and Quarantine of PRC. Therefore, it is impossible that the annual power output would consistently increased by 15.50% over the complete lifetime of the project activity. Therefore, it is assumed that the operational hours are credible and appropriate.

The Annual power output represents the achievable annual generation output of a power plant. According to EB 48 Annex 11 guidance, the plant load factor shall be defined ex-ante in the CDM-PDD according to one of the following options:

(a) The plant load factor provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval;
(b) The plant load factor determined by a third party contracted by the project participants (e.g. an engineering company);

The value of 2,125.3 Annual power output used in the investment analysis is sourced from the FSR which have been issued by the Jilin Electric Power Survey & Design Institute contracted with the project owner. Jilin Electric Power Survey & Design Institute is a qualified independent entity with the highest qualification Grade A of consulting engineering project accredited by the National Development and Reform Commission in 2007. The feasibility study was approved by the Jilin Development and Reform Committee on Feb 16, 2012. The CDM board decision and the approval of the FSR are based on this data. The plant load factor of the project is calculated as below:

PLF=Annual power output/8760=2,125.3 /8760=24.26%. Therefore, the plant load factor can meet the requirement of Annex 11 of EB 48th meeting.

Annual O&M Costs is the least sensitive among the 4 parameters. When it is decreased by 82.50%, the IRR of the project can reach 8%. According to the Feasibility Study Report, the annual O&M costs of the project activity include wage and welfare, maintenance cost, material cost, insurance cost and miscellaneous cost[14]. Official Data available[15] issued by Jilin Bureau of Statistic

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[13] "Wind energy resource measurement and technical assessment requirements" issued by National Development and Reform Committee on Sep 20th, 2003 http://www.windchn.com/webinfo/wfview000064696.html

[14] With reference to Economical assessment and parameters for construction project, 3rd edition which is issued by China Planning Press in 2006, the miscellaneous cost is the costs which are additional to the depreciation, amortization, maintenance, insurance ,material, welfare and financial costs, including administration costs, travelling expenses, costs of labour-union, staff training expense, cost of board meetings, occupation & health safety costs, business entertainment expense, pollution discharge expenses, technical development expense, land use tax, house tax, vehicle and vessel tax, stamp duty etc. More details can be found in page 97 of With reference to Economical assessment and parameters for construction project, 3rd edition.

demonstrate Jilin is revealing an increase of CPI , PPI, the Purchase Price Indices of Raw Material, Fuel and Power and the average salary. In addition, the equipment wearing will also contribute to the increase in the maintenance cost. Furthermore, the O&M per total static investment ratio of all wind farm projects in Jilin which have been registered is in the range of 1.15%~4.35%. The annual operating cost of this project is 2.50% of the static investment which is within a reasonable range for the wind farms. Thus, it can be concluded that the estimated annual O&M cost is reasonable. Summing up all the facts, a decrease of O & M costs up to 82.50% is impossible. The project is always lack of financial attractiveness within the reasonable range of annual O&M cost.

To conclude, under the reasonable variations in the critical assumptions and the realistic change tendencies of these factors, the conclusion on the financial additionality is robust.

Therefore, the alternative 1" The Project undertaken without being registered as a CDM project activity" is not a possible baseline scenario. It is excluded.

Before the construction of the project started, considering the financial unattractiveness of the project without CDM revenue, Daan CGN Wind Power CO., Ltd. began to seek for CDM support. Table 6 outlines the key events in the project development, which indicates that the benefits from CDM have been taken into account in the early stage of the project development.

Prior CDM consideration

Before the construction of the project started, considering the financial unattractiveness of the project without CDM revenue, the project owner began to seek for CDM support. Table 6 outlines the key events in the project development, which indicates that the benefits from CDM have been taken into account in the early stage of the project.

Table 6 The key events in the project development

Date	Key events
03/2011	The Feasibility Study Report (FSR) was complied
03/2011	The Environmental Impact Assessment (EIA) report was complied
08/04/2011	The EIA approval was obtained
16/02/2012	The FSR approval was obtained
02/03/2012	Board decision to develop the project as a CDM project
05/03/2012	The construction contract was signed
09/03/2012	The road construction contract was signed
20/03/2012	The 48MW wind turbines purchase contract was signed
20/04/2012	The 1.5MW wind turbines purchase contract was signed
28/04/2012	The tower purchase contract was signed
07/05/2012	The installation contract was signed
11/05/2012	The switchgear cupboard purchase contract was signed
16/05/2012	The 35kV transmission lines and transformer installation contract was signed
07/08/2012	The prior consideration of CDM form was received by EB and NDRC. The project starting date is 05/03/2012. The prior consideration form of CDM was received by EB and NDRC on 07/08/2012, less than 6 months, which fulfils the requirement of the project standard. In addition, the CDM was considered in the FSR. The board meeting decided to develop the project as a CDM project was held on 02/03/2012 before the project started. Therefore, the CDM was fully considered in the project development.

Step 3: Barrier analysis

Barrier analysis is not employed for the project activity.

[15] Summary of report on economic and social development in Jilin Province From Jilin Province Bureau of Statistic http://tjj.jl.gov.cn/tjgb/ndgb/

Step 4: Common practice analysis

According to the methodological tool “Demonstration and assessment of additionality” (Version 06.0.0), the following steps are needed for common practice analysis:

Step 4.1: Calculate applicable output range as +/-50% of the design output or capacity of the proposed project activity.

The installed capacity of the project is 49.5 MW. Therefore, the wind power generation projects with the installed capacity between 24.75~74.25MW are considered as having the similar scale with the proposed project.

Step 4.2: In the applicable geographical area, identify all plants that deliver the same output or capacity, within the applicable output range calculated in Step 1, as the proposed project activity and have started commercial operation before the start date of the project. Note their number N_{all}. Registered CDM project activities and projects activities undergoing validation shall not be included in this step;

China covers an extremely large area, where the investment circumstance, policies and regulations and natural sources of each province are different. The general environment of wind projects in China such as investment climate, tariff policy and wind resource differs for each province. For example, the electricity tariff for different province is much different under the control of National Development and Reform Commission[16] and price index of industrial products differs for each province[17]. Also, the difference of wind resources in different area is relatively large[18]. Therefore, common practice analysis is limited to the provincial level. As the project is located in Jilin province, the selected geographical area for the project is Jilin province.

The starting date of the project is 05/03/2012.

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Therefore, power plants within the installed capacity of 24.75~74.25MW in Jilin province and starting commercial operation before 05/03/2012, which are not registered as CDM project and are not undergoing validation, are counted to N_{all}.

$N_{all} = N_{all,wind} + N_{all,other}$

Where:

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[16] <The Notice on the Policy of perfecting the feed-in tariff issued by NDRC> Fagaijiage[2009]1906# issued by National Development and Reform Commission on July 20, 2009 available at: http://www.sdpc.gov.cn/zcfb/zcfbtz/2009tz/t20090727_292827.htm

[17] Data is from National Bureau of Statistics of China.
http://www.stats.gov.cn/tjgb/ndtjgb/dfndtjgb/t20100322_402641738.htm
http://www.stats.gov.cn/tjgb/ndtjgb/dfndtjgb/t20100325_402641740.htm
http://www.stats.gov.cn/tjgb/ndtjgb/dfndtjgb/t20100408_402641876.htm
http://www.stats.gov.cn/tjgb/ndtjgb/dfndtjgb/t20100412_402641746.htm
http://www.stats.gov.cn/tjgb/ndtjgb/dfndtjgb/t20100301_402625749.htm
http://www.stats.gov.cn/tjgb/ndtjgb/dfndtjgb/t20100506_402656910.htm
http://www.stats.gov.cn/tjgb/ndtjgb/dfndtjgb/t20100402_402641744.htm
http://www.stats.gov.cn/tjgb/ndtjgb/dfndtjgb/t20100309_402629777.htm
http://www.stats.gov.cn/tjgb/ndtjgb/dfndtjgb/t20100401_402641743.htm
http://www.stats.gov.cn/tjgb/ndtjgb/dfndtjgb/t20100330_402641741.htm
http://www.stats.gov.cn/tjgb/ndtjgb/dfndtjgb/t20100224_402641739.htm
http://www.stats.gov.cn/tjgb/ndtjgb/dfndtjgb/t20100225_402625747.htm
http://www.stats.gov.cn/tjgb/ndtjgb/dfndtjgb/t20100302_402625748.htm
http://www.stats.gov.cn/tjgb/ndtjgb/dfndtjgb/t20100226_402625746.htm

[18] Distribution map of wind energy density in China available at
http://www.windchn.com/webinfo/wfview000050187.html

N_{all} is all plants within the applicable output range and applicable geographical area, which started the commercial operation before the starting date of the Proposed Project Activity;

$N_{all,wind}$: Number of all wind projects within the applicable output range and applicable geographical area, starting commercial operation before the starting date of the Proposed Project Activity.

$N_{all,other:}$ Number of all other projects (except wind farm project) within the applicable output range and applicable geographical area, starting commercial operation before the starting date of the proposed project activity.

According to UNFCCC[19], NDRC website[20], the Statistic of installed capacity of China's Wind Farms of 2007, 2008, 2009, 2010 and 2011[21] and the Jilin Province Bureau[22] which are the most publicly available authoritative statistics of wind power projects in China, there is no wind farm that comply with the requirements of N_{al}l in the selected region. Therefore, $N_{all,wind} = 0$.

$N_{all} = N_{all,other}$

Step 4.3: Within plants identified in Step 2, identify those that apply technologies different that the technology applied in the proposed project activity. Note their number N_{diff}.

The different technology indicated in paragraph 9 of the addtionality tool Ver 6.0.0 includes: (a) Energy source/fuel; (b) Feed stock; Obviously, the hydro, biomass and other technologies is different with wind farm technology on the Energy source/fuel and Feed stock, therefore

$N_{diff} = N_{all,other} = N_{all}$

Step 4.4: Calculate factor $F=1-N_{diff}/N_{all}$ representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity.

N_{diff} is equal to N_{all}, so $N_{all} - N_{diff} = 0$.

$N_{all} - N_{diff} =0<3$

Thus, the Project is considered as not a common practice.

Based on the above analysis, it is demonstrated that the project is additional.

In addition, according to the above investment analysis, the project IRR is 6.15% without CDM revenues, lower than the benchmark (8%). But the project IRR can reach 8.38% if considering the IRR revenues. Therefore, it is concluded that the project is not a common practice in Jilin province. It is additional.

The project activity is not a baseline scenario. The Alternative 2 "Provision of an equivalent amount of annual electricity generation by NECPG." is the only realistic and credible choice for the baseline scenario.

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[19] http://cdm.unfccc.int/Projects/projsearch.html

[20] http://cdm.ccchina.gov.cn/web/

[21] Source: Statistic of installed capacity of China's Wind Farms in 2007, 2008, 2009, 2010 and 2011, issued by Chinese Wind Energy Association

[22] http://wjj.jl.gov.cn/zyynyjg/

B.6. Emission reductions

B.6.1. Explanation of methodological choices

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The emission reductions of the project will be calculated through the following steps in accordance to ACM0002 (Version 13.0.0):

- First, calculate the baseline emissions;
- Second, calculate the project emissions;
- Third, calculate the project leakage;
- Last, calculate the emission reductions.

I. Baseline emissions (BE_y)

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

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \tag{1}$$

Where:

BE_y is baseline emission in year y (tCO_2/yr).
$EG_{PJ,y}$ is Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr).
$EF_{grid,CM,y}$ is combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the *Tool to calculate the emission factor for an electricity system* (tCO_2e/MWh).

Calculation of $EG_{PJ,y}$

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

$$EG_{PJ,y} = EG_{facility,y} \tag{2}$$

Where:

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

$EG_{facility,y}$ is the quantity of net electricity generation supplied by the Project to the grid in year y (MWh/yr)

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

The combined margin CO_2 emission factor for grid connected power generation is calculated according to "Tool to calculate the emission factor for an electricity system" (Version 02.2.1) as follows:

Step 1 Identify the relevant electricity systems

In accordance with Tool to Calculate the Emission Factor for an Electricity System (version 02.2.1), the relevant electricity system of the Project is identified according to the delineation of the project

electricity system and connected electricity systems published by China's DNA. Electricity generated by the Project will be delivered to Jilin power grid. According to 2011 Baseline Emission Factors for Regional Power Grids in China issued by China's DNA which provides the delineation of relevant electricity systems, Jilin Power Grid is an integral part of NECPG and NECPG is the relevant electricity system of the project. NECPG is composed of Jilin, Liaoning and Heilongjiang power grids.

According to 2011 Baseline Emission Factors for Regional Power Grids in China issued by China's DNA[23] on Oct 20, 2011, NECPG didn't import any electricity from other regional power grid but supply power to North China Power grid from 2007~2009. Electricity exports should not be subtracted from electricity generation data used for calculating and monitoring the electricity emission factors. Therefore, only NECPG is identified as the relevant electricity system of the project.

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

According to the "Tool to calculate the emission factor for an electricity system" (Version 02.2.1), 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.

Option I is chosen to calculate the operating margin and build margin emission factor.

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

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

a) Simple OM, or
b) Simple adjusted OM, or
c) Dispatch data analysis OM, or
d) Average OM.

As per Tool to Calculate the Emission Factor for an Electricity System (version 02.2.1), referring to 2011 Baseline Emission Factors for Regional Power Grids in China, the method (a) simple OM is employed for calculation of the operating margin emission factor ($EF_{grid,OM,y}$) of the Project. As per Tool to Calculate the Emission Factor for an Electricity System, the method (a) simple OM only can be used when lowcost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

From 2005 to 2009, the low-cost/must-run electricity generation in NECPG account for 15.54%, 15.57%, 14.95%, 15.94% and 17.70% respectively[24], which are far less than 50% of the total output of grid power generation. Therefore, method a) simple OM is applicable to the project.

Installed capacity (MW)	2005	2006	2007	2008	2009
Hydro power (A)	5971.4	6126	6170	6260	6300
Total installed capacity of lower/must-run electricity generation (C=A+B)	6244.7	6678	7273	8499	10720
Total installed capacity in NECPG (D)	40178.8	42894	48653	53319	60560

[23] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2720.pdf

[24] China Electric Power Yearbook from 2006 to 2010

Ratio between C and D	15.54%	15.57%	14.95%	15.94%	17.70%

For the simple OM, the emission factor can be calculated using either of the two following data vintages:

- *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 emission 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 PDD to the DOE for validation. For off-grid power plants, use a single calendar year within the 5 most recent calendar years prior to the time of submission of the PDD for validation.
- *Ex post* option: If the *ex post* option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emission factor to be updated annually during monitoring. If the data required to calculate the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year y-1 may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year y-2 may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.

For the project, only grid power plants are included in the calculation. And the *Ex ante* option is adopted by the project to determine the emission factor. Therefore, the emission factor is determined once at the validation stage and no monitoring and recalculation of the emission factor during the crediting period is required.

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 system, not including low-cost / must-run power plants / units. It may be calculated:

- Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit[25]; or
- Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Option B can only be used if:

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

Since the data on the net electricity generation and CO_2 emission factor of each power unit in NECPG are not available, Option A is not applicable to the Project.

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

The simple OM emission factor is calculated as follows:

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[25] Power units should be considered if some of the power units at the site of the power plant are low-cost/must-run units and some are not. Power plants can be considered if all power units at the site of the power plant belong to the group of low cost/must-run units or if all power units at the site of the power plant do not belong to the group of low-cost/must-run units.

$$EF_{grid,OMsimple,y} = \frac{\sum_i \left(FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}\right)}{EG_y} \quad (3)$$

Where:

$EF_{grid,\ OMsimple,\ y}$	=	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$FC_{i,y}$	=	Amount of fossil fuel type i consumed by power plant / unit m 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)
$EF_{CO2,i,y}$	=	CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ)
i	=	All fossil fuel types combusted in power sources in the project electricity system in year y
y	=	The relevant year as per the data vintage chosen in Step 3

With reference to the *2011 Baseline Emission Factors for Regional Power Grids in China*[26], the simple OM emission factor for NECPG is 1.0852 tCO_2e/MWh (refer Annex 4 for details).

Step 5 Calculate the build margin (BM) emission factor

According to Tool to Calculate the Emission Factor for an Electricity System (version 02.2.1), project participants shall choose between one of the following two options to calculate the build margin emission factor ($EF_{grid,BM,y}$).

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 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.

Option 2. For the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the Project or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emission factor shall be calculated ex ante, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

Option 1 is adopted by the project.

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 ($SET_{5\text{-}units}$) and determine their annual electricity generation ($AEG_{STE\text{-}5\text{-}units}$, 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

[26] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2708.pdf

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).

Otherwise:

d) Exclude from sample SET the power units which started to supply electricity to the grid more than 10 years ago. Include in that set the power units registered as CDM project activity, starting with power units that started to supply electricity to the grid most recently, until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) to the extent is possible. Determine for the resulting set ($SET_{sample-CDM}$) the annual electricity generation ($AEG_{SET-sample-CDM}$, in MWh);

If the annual electricity generation of that set is comprises at least 20% of the annual electricity generation of the project electricity system (i.e. $AEG_{SET-sample-CDM} \geq 0.2 \times AEG_{total}$), then use the sample group $SET_{sample-CDM}$ to calculate the build margin. Ignore steps (e) and (f).

Otherwise:

e) Include in the sample group $SET_{sample-CDM}$ the power units that started to supply electricity to the grid more than 10 years ago until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation);

f) The sample group of power units m used to calculate the build margin is the resulting set ($SET_{sample-CDM->10yrs}$).

It is suggested the set of power units that comprises the larger annual generation should be used. Considering data availability, CDM EB accepts the following deviation in application of methodology[27]:

1) Use of capacity additions during the last several 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.

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.

Therefore for the Project: First, calculate the share of different power generation technology in recent capacity additions. Second, calculate the weight for capacity additions of each power generation technology. And finally calculate the emission factor using the efficiency level of the best technology commercially available in China.

Sub-step 5.1 Calculate the proportion of CO_2 emission caused by solid, liquid and gas fuels in the total emission respectively:

27 Http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ.

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

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

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

Where:

$F_{i,y,y}$	=	the amount of fuel i (in a mass or volume unit) consumed by province j in year(s) y
$NCV_{i,y}$	=	the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit)
$EF_{CO2,i,j,y}$	=	the weighted average CO_2 emission factor of fuel type i year y (tCO_2/GJ)

Coal, Oil and Gas are footnote group for solid fuels, liquid fuels and gas fuels.

Sub-step 5.2 Calculate the emission factor of thermal power generation

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

Where:

$EF_{Coal,Adv,y}$, $EF_{Oil,Adv,y}$ and $EF_{Gas,Adv,y}$ are emission factor proxies of efficiency level of the best coalfired,oil based and gas-based power generation technology commercially available in China.

Sub-step 5.3 Calculate BM of the grid

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

Where:

$CAP_{Total,y}$	=	the total amount of incremental installed capacity;
$CAP_{Thermal,y}$	=	the increased installed capacity of thermal power generation.

The data on different fuel consumptions for power generation and the net caloric values of the fuels are obtained from the China Energy Statistical Yearbook 2010. The emission factors and oxidation factors if the fuels adopted are obtained from Table 1-4 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook. With reference to the Notification on Determining Baseline Emission Factor of China's Grid, the weighted average fuel consumption for power generation of 20 sets of 600MW subcritical coal-fired power generators built in 2009 (311.5 gce/kWh) and the 200 MW oil/gas based combined cycle power generators (237.4 gce/kWh) are taken as the efficiency level of the best technology commercially available in China.

With reference to the *2011 Baseline Emission Factors for Regional Power Grids in China*[28], the build margin emission factor ($EF_{BM,y}$) of NECPG is 0.5987 tCO_2e/MWh (refer Annex 4 for details).

Step 6 Calculate the combined margin (CM) emissions factor

The combined margin emission 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 CO_2 emission factor in year y (tCO_2e/MWh)
$EF_{grid,OM,y}$	=	Operating margin CO_2 emission factor in year y (tCO_2e/MWh)
$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year y (tCO_2e/MWh)
w_{OM}	=	Weighting of operating margin emissions factor (%)
w_{BM}	=	Weighting of build margin emissions factor (%)

The project activity is to utilize wind power for electricity generation, the following default values should be used for w_{OM} and w_{BM}:

$w_{OM} = 0.75$ and $w_{BM} = 0.25$.

Hence, $EF_{grid,\ CM,\ y} = EF_{grid,\ OM,\ y} \times 0.75 + EF_{grid,\ BM,\ y} \times 0.25$
$= 1.0852 \times 0.75 + 0.5987 \times 0.25$
$= 0.963575$ (tCO_2e/MWh)

II. Project emissions (PE_y)

The project activity is to utilize wind power for electricity generation, according to ACM0002 (Version 13.0.0), the project emissions are zero, i.e.

$PE_y = 0$.

III. Leakage (L_y)

According to ACM0002 (Version 13.0.0), the project needn't consider leakages, i.e.

$L_y = 0$.

IV. Emission reductions (ER_y)

The project activity will generate GHG emission reductions by avoiding CO_2 emissions from electricity generation by fossil fuel power plants. The emission reduction (ER_y) is calculated as follows:

$$ER_y = BE_y - PE_y \quad (10)$$

B.6.2. Data and parameters fixed ex ante

Data / Parameter	NCV_i
Unit	TJ per mass of volume unit of the fuel *i*
Description	The net calorific value (energy content) per mass or volume unit of the fuel *i*

[28] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2720.pdf

Source of data	*China Energy Statistical Yearbook 2010*
Value(s) applied	See Appendix 4 for details
Choice of data or Measurement methods and procedures	The data come from official statistics and is reliable.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	$EF_{CO2,i}$
Unit	tCO_2/TJ
Description	CO_2 emission factor per unit of energy of the fuel *i*
Source of data	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
Value(s) applied	See Appendix 4 for details
Choice of data or Measurement methods and procedures	The data is obtained from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories and is reliable
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	$F_{i,j,y}$
Unit	t or m^3
Description	The fuel I consumed in NECPG
Source of data	*China Electric Power Yearbook 2008-2010*
Value(s) applied	See Appendix 4 for details
Choice of data or Measurement methods and procedures	The data come from official statistics and is reliable.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	$GEN_{i,y}$
Unit	MWh/y
Description	The electricity generated in NECPG
Source of data	*China Electric Power Yearbook 2008-2010*
Value(s) applied	See Appendix 4 for details
Choice of data or Measurement methods and procedures	The data come from official statistics and is reliable.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	η_i
Unit	%
Description	Internal load ratio of power plant in NECPG

Source of data	*China Electric Power Yearbook 2008-2010*
Value(s) applied	See Appendix 4 for details
Choice of data or Measurement methods and procedures	The data come from official statistics and is reliable.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	η_b
Unit	%
Description	The efficiency of best technology
Source of data	*2011 Baseline Emission Factors for Regional Power Grid in China*
Value(s) applied	See Appendix 4 for details
Choice of data or Measurement methods and procedures	The data is obtained from the *2011 Baseline Emission Factors for Regional Power Grid in China* and is reliable EF_{coal_Adv} is 39.45%; EF_{oil_Adv} is 51.77%; EF_{gas_Adv} is 51.77%.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	$CAP_{i,j,y}$
Unit	MW
Description	Installed capacities of power plant category i of province j in years y
Source of data	China Electric Power Yearbook 2008-2010
Value(s) applied	See Appendix 4 for details
Choice of data or Measurement methods and procedures	The data come from official statistics and is reliable.
Purpose of data	Calculation of baseline emissions
Additional comment	-

B.6.3. Ex ante calculation of emission reductions

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I. Baseline emissions (BE_y)

According to the Feasibility Study Report, the net Electricity supplied by the project activity to the grid is estimated to be 105,202 MWh. Combined margin CO_2 emission factor for grid connected power generation ($EF_{grid,CM,y}$) is 0.963575 tCO_2e/MWh and the annual baseline emissions of the project are calculated below:

$$BE_y = EG_{facility,y} \times EFgrid,CM,y$$
$$= 105{,}202\ MWh \times 0.963575\ tCO_2e/MWh$$
$$= 101{,}370\ tCO_2e$$

II. Project emissions (PE_y)

The project activity is to utilize wind power for electricity generation, according to ACM0002 (Version 13. 0.0), the project emissions are zero, i.e.

$PE_y = 0$

III. Leakage (L_y)

According to ACM0002 (Version 13.0.0), the project does not need to consider leakages, i.e.

$L_y = 0$

IV. Emission reductions (ER_y)

The project activity will generate GHG emission reductions by avoiding CO_2 emissions from electricity generation by fossil fuel power plants. The emission reduction (ER_y) is calculated as follows:

$ER_y = BE_y - PE_y = 101{,}370 - 0 = 101{,}370\ tCO_2e$

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

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
30/11/2013~31/12/2013	8,887	0	0	8,887
01/01/2014~31/12/2014	101,370	0	0	101,370
01/01/2015~31/12/2015	101,370	0	0	101,370
01/01/2016~31/12/2016	101,370	0	0	101,370
01/01/2017~31/12/2017	101,370	0	0	101,370
01/01/2018~31/12/2018	101,370	0	0	101,370
01/01/2019~31/12/2019	101,370	0	0	101,370
01/01/2020~29/11/2020	92,483	0	0	92,483
Total	**709,590**	**0**	**0**	**709,590**
Total number of crediting years	**7**			
Annual average over the crediting period	**101,370**	**0**	**0**	**101,370**

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data to be monitored in tables below shall be archived two years after end of crediting period or after last issuance of CERs whichever comes later by means of electronic and paper backup.

Data / Parameter	$EG_{out,total,y}$
Unit	MWh/yr
Description	The total electricity exported to the NECPG by the project activity and other installed wind farm in the year y
Source of data	On-site measurement by bi-directional power meters M_{11} and M_{12}
Value(s) applied	105,202

Measurement methods and procedures	The electricity will be continuously measured by the bi-directional power meter M_{11} and M_{12} and monthly recorded. Data records will be archived two years after end of crediting period or after last issuance of CERs whichever comes later by means of electronic and paper backup. The national Calibration standard DL/T 448-2000 and JJG596-1999 will be applied in the project. The calibration frequency is one time/year. The details of the description can be found in section B.7.2
Monitoring frequency	Measured continuously, recorded monthly
QA/QC procedures	The power meters will be installed in accordance with “Technical administrative code of electric energy metering (DL/T448 - 2000)”. The accuracy and the frequency of the calibration of meter should meet the requirement of DL/T448 - 2000. The procedure for the calibration of the power meters should be in compliance with “Preventive test code for electric power equipment (JJG596-1999)”. Power supplied to the grid and double checked according to electricity sales receipts.
Purpose of data	Calculation of baseline emissions
Additional comment	The accuracy of electricity meter will be no lower than 0.5 according to the national Calibration standard (DL/T 448-2000). Uncertainty level of data is low.

Data / Parameter	$EG_{out,y}$
Unit	MWh/yr
Description	The electricity generated by the project in the year y
Source of data	On-site measurement by power meters M_{21}, M_{22} and M_{23}
Value(s) applied	105,202
Measurement methods and procedures	The electricity will be continuously measured by the power meters M_{21}, M_{22} and M_{23} and monthly recorded. Data records will be archived two years after end of crediting period or after last issuance of CERs whichever comes later by means of electronic and paper backup. The national Calibration standard DL/T 448-2000 and JJG596-1999 will be applied in the project. The calibration frequency is one time/year. The details of the description can be found in section B.7.2.
Monitoring frequency	Measured continuously, recorded monthly
QA/QC procedures	The power meters will be installed in accordance with “Technical administrative code of electric energy metering (DL/T448 - 2000)”. The accuracy and the frequency of the calibration of meter should meet the requirement of DL/T448 - 2000. The procedure for the calibration of the power meters should be in compliance with “Preventive test code for electric power equipment (JJG596-1999)”. Power supplied to the grid and double checked according to electricity sales receipts.
Purpose of data	Calculation of baseline emissions
Additional comment	The accuracy of electricity meter will be no lower than 0.5 according to the national Calibration standard (DL/T 448-2000). Uncertainty level of data is low.

Data / Parameter	$EG_{in,total,y}$
Unit	MWh/yr
Description	The total electricity imported from the grid by the project activity and other installed wind farm in the year y
Source of data	On-site measurement by power meters M_{11} and M_{12}
Value(s) applied	Estimated as 0 will be measured in the crediting period

Measurement methods and procedures	The electricity will be continuously measured by the power meters M_{11} and M_{12} and monthly recorded. Data records will be archived two years after end of crediting period or after last issuance of CERs whichever comes later by means of electronic and paper backup. The national Calibration standard DL/T 448-2000 and JJG596-1999 will be applied in the project. The calibration frequency is one time/year. The details of the description can be found in section B.7.2.
Monitoring frequency	Measured continuously, recorded monthly
QA/QC procedures	The power meters will be installed in accordance with “Technical administrative code of electric energy metering (DL/T448 - 2000)”. The accuracy and the frequency of the calibration of meter should meet the requirement of DL/T448 - 2000. The procedure for the calibration of the power meters should be in compliance with “Preventive test code for electric power equipment (JJG596-1999)”. Power supplied to the grid and double checked according to electricity sales receipts.
Purpose of data	Calculation of baseline emissions
Additional comment	The accuracy of electricity meter will be no lower than 0.5 according to the national Calibration standard (DL/T 448-2000). Uncertainty level of data is low.

Data / Parameter	$EG_{other,y}$
Unit	MWh/yr
Description	The electricity generated by other wind power project in the year y
Source of data	On-site measurement by power meter M_{31}, M_{32}, …, M_{3n}.
Value(s) applied	0
Measurement methods and procedures	The electricity will be continuously measured by the power meter M_{31}, M_{32}, …, M_{3n} and monthly recorded. Data records will be archived two years after end of crediting period or after last issuance of CERs whichever comes later by means of electronic and paper backup. The national Calibration standard DL/T 448-2000 and JJG596-1999 will be applied in the project. The calibration frequency is one time/year.
Monitoring frequency	Measured continuously, recorded monthly
QA/QC procedures	The power meters will be installed in accordance with “Technical administrative code of electric energy metering (DL/T448 - 2000)”. The accuracy and the frequency of the calibration of meter should meet the requirement of DL/T448 - 2000. The procedure for the calibration of the power meters should be in compliance with “Preventive test code for electric power equipment (JJG596-1999)”. Power supplied to the grid and double checked according to electricity sales receipts.
Purpose of data	Calculation of baseline emissions
Additional comment	The accuracy of electricity meter will be no lower than 0.5 according to the national Calibration standard (DL/T 448-2000). Uncertainty level of data is low.

Data / Parameter	$EG_{facility,y}$
Unit	MWh/yr
Description	The net electricity exported to NECPG by the project in the year y
Source of data	It is a calculated value and not monitored directly. It is calculated as $EG_{facility,y} = EG_{out\ total,y} * EG_{out,y} / (EG_{out,y} + EG_{other,y}) - EG_{in,total,y}$
Value(s) applied	105,202

Measurement methods and procedures	The parameter is not monitored directly. It is calculated from on-site monitoring. The electricity data used to calculate $EG_{facility,y}$ will be continuously measured by the power meters and monthly recorded. Data records will be archived two years after end of crediting period or after last issuance of CERs whichever comes later by means of electronic and paper backup. The national Calibration standard DL/T 448-2000 and JJG596-1999 will be applied in the project.
Monitoring frequency	Measured continuously, recorded monthly
QA/QC procedures	The power meters will be installed in accordance with "Technical administrative code of electric energy metering (DL/T448 - 2000)". The accuracy and the frequency of the calibration of meter should meet the requirement of DL/T448 - 2000. The procedure for the calibration of the power meters should be in compliance with "Preventive test code for electric power equipment (JJG596-1999)". Power supplied to the grid and double checked according to electricity sales receipts.
Purpose of data	Calculation of baseline emissions
Additional comment	The accuracy of electricity meter will be no lower than 0.5 according to the national Calibration standard (DL/T 448-2000). Uncertainty level of data is low.

B.7.2. Sampling plan

>>

No data or parameters are determined by using sampling method, so this section is not relevant to the Project.

B.7.3. Other elements of monitoring plan

>>

Monitoring plan is a division and schedule of a series of monitoring tasks. Monitoring tasks must be implemented according to the monitoring plan in order to ensure that the real, measurable and long-term GHG emission reductions for the project is monitored and reported.

1. The requirement of monitoring plan

- The monitoring plan provides the requirements and instructions for establishing and maintaining the appropriate monitoring systems for electricity generated by the project.
- Quality control of the measurements.
- Procedures for the periodic calculation of GHG emission reductions.
- Assigning monitoring responsibilities to personnel.
- Data storage and filing system.
- Preparing for the requirements of an independent, third party auditor/verifier.

This plan should be perfected according to actual conditions and requirements of DOE in order to ensure that the monitoring is credible, transparent and conservative.

2. Operational and organizational structure for monitoring

The monitoring of the emission reductions will be carried out according to the scheme shown in the figure 4 below.

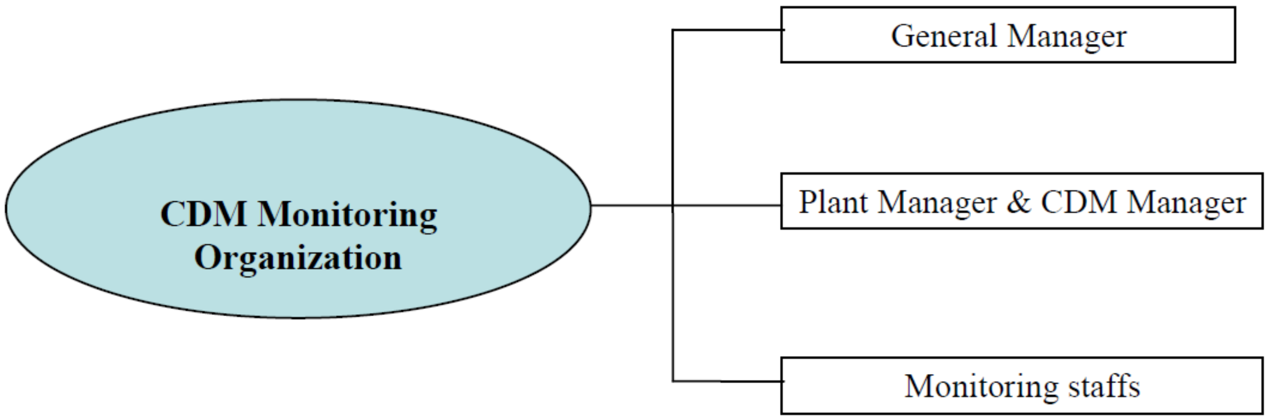


Figure 4 CDM monitoring organization

(1) Responsibility of the General Manager:

The general manager will hold the overall responsibility for the monitoring process. All the affairs related to CDM project monitoring is managed by general manager. The general manager has the overall responsibility of checking data for its completeness and correctness.

(2) Responsibility of the Plant Manager & CDM Manager:

The responsibilities of CDM manager include regular production management, internal audit, checking the operation reports, according to practical situation to ensure the accuracy of the data.

(3) Responsibility of the Monitoring staffs:

The monitoring personnel will record and archive monitoring data, calculate the emission reduction, make the daily operation and maintenance and help with the calibration of the meters.

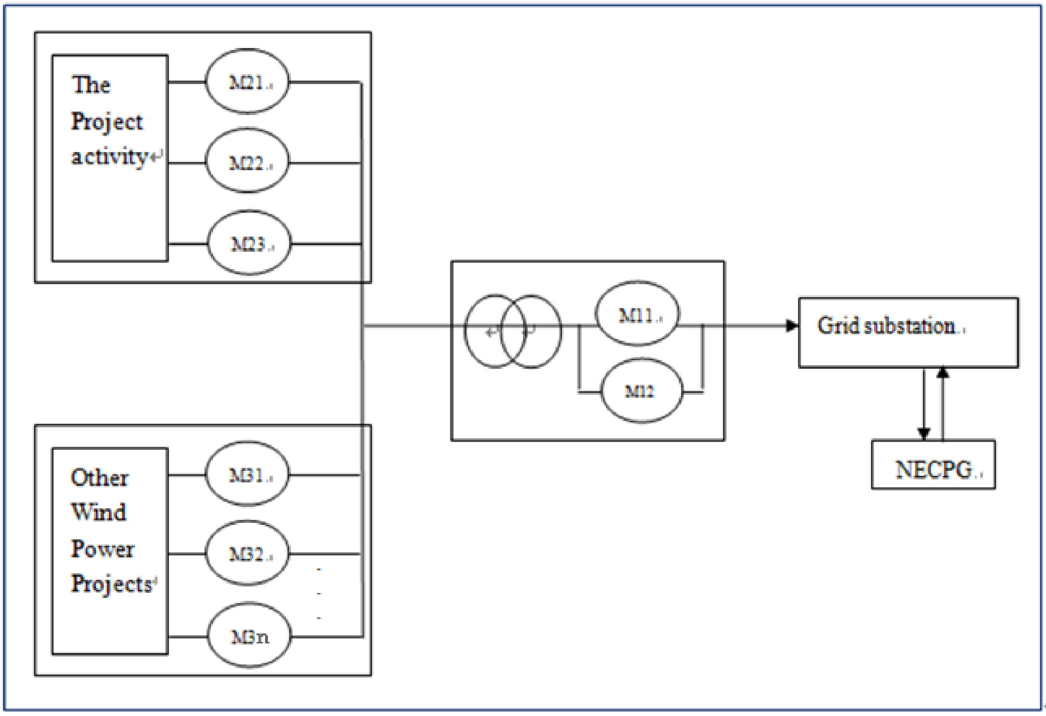
3. Monitoring data

The data and parameters to be monitored for the CDM project activity are listed in Section B.7.1. of this PDD:

- $EG_{out,total,y}$ the total electricity exported to the NECPG by the project activity and other installed wind farm in the year y;
- $EG_{out,y}$ the electricity generated by the project in the year y ;
- $EG_{in,total,y}$ The total electricity imported from the grid by the project activity and other installed wind farm in the year y
- $EG_{other,y}$ the electricity generated by other wind power project in the year;
- $EG_{facility,y}$ the net electricity exported to NECPG by the project in the year y
  $EG_{facility,y}$ is is a calculated value and not monitored directly. It is calculated as
  $EG_{facility,y} = EG_{out\ total,y} * EG_{out,y} / (EG_{out,y} + EG_{other,y}) - EG_{in,total,y}$

The location of each power meters is shown in Figure 5.

The grid company confirms the data with the project owner monthly at the balance day. The net electricity supply will be double checked with the sale and purchase receipts.



** Other wind power projects are CGN Jilin Daan Laifu Wind Farm Phase I Project, Daan Laifu Wind Farm Phase II Project and Daan Laifu Wind Farm Phase III Project.

Figure 5 Sketch for the location of the meters

4. Quality Assurance and Quality Control

(1) For measurement equipments — Calibration of meters

Power meters M_{11}, M_{12}, M_{21}, M_{22}, M_{23}, M_{31}, M_{32}, …, M_{3n} will be installed by the project owner together with the technicians of local power-grid company. An agreement should be signed between the project owner of the project and the power grid company that defines the metering arrangements and the required quality control procedures to ensure accuracy. The project owner should prepare backup procedures to deal with any errors occurred on the power meters. The accuracy of electricity meter should meet the national requirement[29] and calibration will be implemented by an independent qualified third party at least once per year in order to ensure accuracy. Besides, the calibration record should be provided to the project owner.

(2) For emergency situation — Backup meters and conservative method

When main gateway meter is calibrated or in malfunction, or some previous data monitored by the main meter is so inaccurate that beyond the allowable error range, the electricity generated by the project shall be determined by a corresponding backup gateway meter unless a test reveals it is inaccurate.

If the backup gateway meter operates beyond the acceptable accuracy limit or functions improperly, a new calibrated meter should replace it. The starting time should be recorded carefully. The project owner will prepare an estimate of the correct reading acceptable by DOE.

When malfunction or errors take place, the grid-connected electricity generated by the project shall be jointly determined by the project owner and the power grid company according to the error-handling procedures; otherwise, conservative and reasonable methods will implemented to evaluate the exported or import electricity. The average value of data recorded in the latest month

[29] DL/T448-2000

recorded data will be used for emission reduction calculation. The malfunction period should be recorded carefully.

(3) For monitoring process — Computer execution with human supervision

The data, $EG_{out,total,y}$, $EG_{out,total,y}$, $EG_{out,y}$ and $EG_{other,y}$ will be continuously monitored by the power meters shown in the Figure 5. The monitoring process should be supervised by persons in case that the meters and the computer function normally. The emergency response will be initiated once any abnormal circumstance happens.

(4) For human resource management — Training plan

To ensure the steady progress of the monitoring task and the accuracy of the monitoring data, the monitoring officers should attend a series of training lectures by the CERs purchaser. The training plan should include:

- Background of CDM
- Contents of monitoring plan (including monitoring procedures)
- Practical requirements for monitoring (including metering, calibration)
- Audit procedures / project performance review / corrective actions
- Worksheet (excel) containing monitoring data and calculations
- Monitoring report template
- Practical training exercise

The contents and procedure of quality assurance and quality control will be ceaselessly perfected in the crediting period.

5. Data management system

All data of the metering devices, relevant documentation and the results of calibration, in electronic and written form, will be collated in a central place by the project owner. The net quantity of electricity supplied to the facility by the project will be used in the calculation of emission reduction. Data records will be archived two years after end of crediting period or after last issuance of CERs.

B.8. Date of completion of application of methodology and standardized baseline and contact information of responsible persons/ entities

>>
Date of completion: 08/08/2017

Daan CGN Wind Power CO., Ltd. is the project participant of the Project and the responsible entity for completing the CDM-PDD. Mr. Shi Lei is the authorised signatory of the organization and the responsible person for completing the CDM-PDD. The brief contact information is as follows:

Organization name: Daan CGN Wind Power CO., Ltd.
Adress: No.2 Building, Area 12, No.188 west of South 4th ring road, Fengtai District, Beijing City, P. R. China
Contact person: Shi Lei
Salutation: Mr.
Direct TEL: +86-10-63705765
Direct FAX: +86-10-63705875
E-Mail: cgnwind@163.com

Please refer to Appendix 1 for the detailed contact information.

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

>>
05/03/2012
The signature date of the construction contract

C.1.2. Expected operational lifetime of project activity

>>
20y-0m

C.2. Crediting period of project activity

C.2.1. Type of crediting period

>>
Renewable crediting period. This is the first period.

C.2.2. Start date of crediting period

>>
30/11/2013.

C.2.3. Length of crediting period

>>
7y-0m

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>

The Environmental Impact Assessment (EIA) for the project was completed and subsequently approved by the Jilin Environmental Protection Department on Apr 8th, 2011[30]. Conclusions of the EIA report are provided in Section D.2 below.

D.2. Environmental impact assessment

>>

Summary of Environmental Impact Assessment

Summary of the environmental impacts:

Air

The main air pollutant during the construction period is dust, which originates from mixing concrete, transport of materials and earthwork construction. To mitigate the impacts of the dust, the Project will adopt several measures including stopping the construction work under strong wind, sprinkling of water, decreasing the speed of transport vehicles and covering materials during transportation.

Noise

During the construction period, the noise mainly comes from heavy vehicles such as bulldozers and excavators. The project site is far from the village. The impact caused by the noise to residents is insignificant. The noise will further be decreased by selecting low-noise equipment and maintaining them in good condition.

During the operation period the main noise source is the wind turbines. The project site is far from the village. The noise causes no significant impacts.

Water

The waste water during the construction phase is mainly sewage. The sewage will be collected and used as organic fertilizer.

Solid Waste

The solid waste mainly comprises household waste and soil excavated during the construction period. Most of the soil will be used for paving roads and the surplus will be backfilled or taken into a designated site. The household waste will be collected and taken to a designated waste collection point. Using these methods the environmental impact of solid waste will be small.

Ecological aspects

There are no large animals, protected birds and rare animal or plant species in the project site, and the site is not on the migration road of birds. Implementation of the Project occupies some land and spoils some vegetation, thus causing soil erosion. However, the construction period only lasts for one year and the impacts will be mitigated by implementing measures of planting trees, grass and other plants. After implementing these measures the vegetation coverage will be higher than before starting to implement the project.

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[30] Jihuanshenbiaozi [2011] No.283

The noise caused by construction vehicles will impact wild animals living in the area, probably causing them to leave the area. However, there are only rats and other small animals living in the area, and no large wild animals are living there. Furthermore, the construction area is rather small and the time limited, and therefore the Project will not wipe out any species or decrease the number of species. Therefore, the ecological impacts are not significant.

Conclusion

Being a typical clean energy project, the Project causes no significant impacts on the environment. The Project will also greatly contribute to the sustainable development of the region.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

>>

A survey was carried out among the local community in May 16th, 2012. The project owner informed local stakeholders in the form of sticking the notification in the villages around the project site. The stakeholders who saw this notification, went to the specific site mentioned in the Notification and filled the questionnaire. The questionnaire was designed and distributed among government organisations, government officials, political consulting commission, labour unions, village committee, villagers and retired workers, etc. 30 questionnaires were send out and they were all returned. The content of the questionnaire is as follows:

Daan Laifu Wind Farm Phase IV Project
Basic information of the project:

<table>
<tr><td colspan="8">Daan Laifu Wind Farm Phase IV Project Stakeholders' Questionnaire</td></tr>
<tr><td colspan="8">Project owner: Daan CGN Wind Power CO., Ltd.
Location: Anguang Town, Daan County, BaiCheng City, Jilin Province, P.R.China.

The project involves the install 24wind turbine generators with a rated capacity of 2,000kW and 1 wind turbine generator with rated capacity of 1,500kW, totaling up an installation of 49.5MW. The generated electricity will be supplied to the Northeast China Power Grid (NECPG). The implementation of the Project could reduce the emission of GHG and air pollutants like SO_2 and soot; mitigate the pressure of local power supply and promote local economic development during both construction and operation periods of the Project.</td></tr>
<tr><td>Name</td><td></td><td>Gender</td><td></td><td>Age</td><td></td><td>Address</td><td></td></tr>
<tr><td>Education</td><td></td><td>Profession</td><td></td><td>Date</td><td colspan="3"></td></tr>
<tr><td>No.</td><td colspan="2">Contents</td><td colspan="5">Comments (Mark “ √ ” in ())</td></tr>
<tr><td>1</td><td colspan="2">Are you familiar with wind power project?</td><td>Yes ( )</td><td>No ( )</td><td colspan="3">Not much ( )</td></tr>
<tr><td>2</td><td colspan="2">Status of local power supply</td><td>Tense ( )</td><td>Easy ( )</td><td colspan="3">Not too bad ( )</td></tr>
<tr><td>3</td><td colspan="2">Should the wind power resources be used?</td><td>Yes ( )</td><td>No ( )</td><td colspan="3">Don't care ( )</td></tr>
<tr><td>4</td><td colspan="2">What is your attitude towards the construction of wind power projects</td><td>For ( )</td><td>Against ( )</td><td colspan="3">Don't care ( )</td></tr>
<tr><td>5</td><td colspan="2">What are the impact of the Project construction to your life quality</td><td>Improve ( )</td><td>Retard ( )</td><td colspan="3">No impact ( )</td></tr>
<tr><td rowspan="2">6</td><td colspan="2" rowspan="2">Are there any negative impact on the current environment</td><td colspan="2">No ( )</td><td colspan="3">Small ( )</td></tr>
<tr><td colspan="5">Big ( ) For example:</td></tr>
<tr><td>7</td><td colspan="2">What are the impact of the Project construction to the local economic development</td><td>Promote ( )</td><td>Retard ( )</td><td colspan="3">No impact ( )</td></tr>
<tr><td colspan="8">Suggestions and requirements to the Project activity:</td></tr>
</table>

E.2. Summary of comments received

>>

In total 30 pieces of the questionnaire were sent out and they were all returned. The information about the respondents is presented in the below table.

Occupation	Farmer	Official	Worker	Other	Not disclosed
Proportion	33%	10%	27%	7%	23%

<table>
<tr><td>Gender</td><td colspan="3">Male</td><td colspan="3">Female</td></tr>
<tr><td>Proportion</td><td colspan="3">73%</td><td colspan="3">27%</td></tr>
<tr><td>Age</td><td colspan="2">⩽25</td><td colspan="2">25-45</td><td colspan="2">⩾46</td></tr>
<tr><td>Proportion</td><td colspan="2">17%</td><td colspan="2">43%</td><td colspan="2">40%</td></tr>
<tr><td>Education</td><td>Elementary or junior high school</td><td colspan="2">Senior high school</td><td colspan="2">University</td><td>Technical secondary school or college</td></tr>
<tr><td>Proportion</td><td>43.3%</td><td colspan="2">10%</td><td colspan="2">3.3%</td><td>43.3%</td></tr>
</table>

The results of the questionnaires are summarized below:

1. 96.7 % or the respondents are familiar with wind power, 6.7 % are not familiar.
2. 50 % of the respondents consider the status of local the power supply tense, 3% good and the rest 47 % consider it satisfactory.
3. 90 % of the respondents think that wind resources should be used and 10 % do not care whether they are used.
4. 90 % of the respondents support the construction of the project and 10 % do not care about its construction.
5. 80 % of the respondents think that construction of the project improves the quality of their lives whereas 20 % think that it has no impact on the quality of their lives.
6. 100 % of the respondents think that the project has no negative impacts on the environment.
7. 100 % of the respondents think that the project will promote the local economy.

In the column for free comments and opinions, all the respondents either supported the project or had no further comments. In conclusion, the construction of the project enjoys strong support from the stakeholders.

E.3. Report on consideration of comments received

>>

The stakeholders have no negative comments on the project.

SECTION F. Approval and authorization

>>

The letters of approval from Parties for the project activity are not yet available at the time of submitting the PDD to the validating DOE.

Appendix 1. Contact information of project participants and responsible persons/ entities

Project participant and/or responsible person/ entity	☒ Project participant ☒ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	Daan Laifu Wind Farm Phase IV Project
Street/P.O. Box	No.2 Building, Area 12, No.188 west of South 4th ring road, Fengtai District
Building	-
City	Beijing
State/Region	Beijing
Postcode	100070
Country	People's Republic of China
Telephone	+86-10-63705765
Fax	+86-10-63705875
E-mail	cgnwind@163.com
Website	-
Contact person	Shi Lei
Title	-
Salutation	Mr.
Last name	Shi
Middle name	-
First name	Lei
Department	-
Mobile	-
Direct fax	+86-10-63705875
Direct tel.	+86-10-63705765
Personal e-mail	cgnwind@163.com

Appendix 2. Affirmation regarding public funding

There is no public funding from Annex I Party available for the project.

Appendix 3. Applicability of methodology and standardized baseline

There is no further information about the applicability of selected methodology.

Appendix 4. Further background information on ex ante calculation of emission reductions

All the tables related to the calculation of baseline emission reduction are presented below:

The calculation of the OM and BM is in full compliance with 2011 Baseline Emission Factors for Regional Power Grids in China[31]

1. Calculation of the simple Operating Margin (OM) Emission Factor

[31] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2708.pdf

Table A1. Operating margin data for the Northeast China Power Grid (2007)

Fuel types	Unit	Liaoning	Jilin	Heilongjiang	Subtotal	Emission factor (tc/TJ)	Oxidation rate (%)	Emission factor ($kgCO_2/TJ$)	Low Caloric Value (MJ/t,km3)	CO_2 Emission (tCO2e) I=D*G*H/100000(t)
		A	B	C	D=A+B+C	E	F	G	H	I=D*G*H/10000 (m3)
Raw coal	10^4t	4869.32	2873.45	3736.11	**11478.88**	25.8	100	87,300	20,908	209,520,369.31
Cleaned coal	10^4t				**0**	25.8	100	87,300	26,344	0.00
Other washed coal	10^4t	747.85	16.52	106.81	**871.18**	25.8	100	87,300	8,363	6,360,397.19
Cellular coal	10^4t				**0**	26.6	100	87,300	20,908	0.00
Coke	10^8m^3	4.99			**4.99**	29.2	100	95,700	28,435	135,789.35
Coke oven gas	10^8m^3	5.53	1.44	1.89	**8.86**	12.1	100	37,300	16,726	552,757.50
Other coal gas	10^4t	68.38	9.06		**77.44**	12.1	100	37,300	5,227	1,509,825.22
Crude oil	10^4t	0.24			**0.24**	20	100	71,100	41,816	7,135.48
Gasoline	10^4t				**0**	18.9	100	67,500	43,070	0.00
Diesel	10^4t	0.96	0.39	0.47	**1.82**	20.2	100	72,600	42,652	56,356.94
Fuel oil	10^4t	8.43	0.45	1.48	**10.36**	21.1	100	75,500	41,816	327,076.39
LPG	10^4t				**0**	17.2	100	61,600	50,179	0.00
Refinery gas	10^8m^3	7.33		1.99	**9.32**	15.7	100	48,200	46,055	206,890.11
Natural gas	10^4t		0.02	2.03	**2.05**	15.3	100	54,300	38,931	433,360.43
Other oil products	10^4t	0.01			**0.01**	20	100	72,200	41,816	301.91
Other coal chemicals	10^4t ce	0.46			**0.46**	25.8	100	95,700	28,435	12,517.66
Other energy		12.41	2.43	51.35	**66.19**	0	0	0	0	0.00
									Total	219,122,778

Data sources: China Energy Statistical Yearbook 2008

Table A2. Fire power generation of Northeast China Power Grid (2007)

Name of the province	Generation (MWh)	Rate of electricity used by factory (%)	Power Supply (MWh)		
Liaoning	106,500,000	7	99,045,000	Total emission amount tCO2	219,122,778
Jilin	43,700,000	7.68	40,343,840	Total power supply MWh	202,542,560
Heilongjiang	68,400,000	7.67	63,153,720	Emission factor in 2006	1.08186
Total			202,542,560		

Data sources: China Electric Power Yearbook 2008

Table A3. Operating margin data for the Northeast China Power Grid (2008)

Fuel types	Unit	Liaoning	Jilin	Heilongjiang	Subtotal	Emission factor (tc/TJ)	Oxidation rate (%)	Emission factor ($kgCO_2/TJ$)	Low Caloric Value (MJ/t,km3)	CO_2 Emission (tCO2e) I=D*G*H/100000(t)
		A	B	C	D=A+B+C	E	F	G	H	I=D*G*H/10000 (m3)
Raw coal	10^4t	4973.05	3289.16	3873.45	**12135.66**	25.8	100	87,300	20,908	221,508,367.11
Cleaned coal	10^4t				**0**	25.8	100	87,300	26,344	0.00
Other washed coal	10^4t	791.96	15.58	112.97	**920.51**	25.8	100	87,300	8,363	6,720,550.54
Cellular coal	10^4t				**0**					
Coke	10^4t	5.77			**5.77**	29.2	100	95,700	28,435	157,014.94
Coke oven gas	10^8m^3	4.12	1.06	5.54	**10.72**	12.1	100	37,300	16,726	668,799.15
Other coal gas	10^8m^3	61.11	7.63		**68.74**	12.1	100	37,300	5,227	1,340,203.85
Crude oil	10^4t	0.37			**0.37**	20	100	71,100	41,816	11,000.54
Gasoline	10^4t	0.02			**0.02**	18.9	100	67,500	43,070	581.45
Diesel	10^4t	0.84	1.07	0.37	**2.28**	20.2	100	72,600	42,652	70,601.00
Fuel oil	10^4t	10.64	1.06	1.29	**12.99**	21.1	100	75,500	41,816	410,108.33
LPG	10^4t				**0**	17.2	100	61,600	50,179	0.00
Refinery gas	10^4t	7.54		3.77	**11.31**	15.7	100	48,200	46,055	251,065.15
Natural gas	10^8m^3		0.39	1.85	**2.24**	15.3	100	54,300	38,931	473,525.54
Other oil products	10^4t				**0**	20	100	72,200	41,816	0.00
Other coal chemicals	10^4t				**0**	25.8	100	95,700	28,435	0.00
Other energy	10^4t ce	16.9	3.04	68.19	**88.13**	0	0	0	0	0.00
									Total	231,611,818

Data sources: China Electric Power Yearbook 2009

Table A4. Fire power generation of Northeast China Power Grid (2008)

Name of the Province	Generation (MWh)	Rate of electricity used by factory (%)	Power Supply (MWh)		
Liaoning	108,500,000	7.18	100,709,700	Total emission amount tCO2	231,611,818
Jilin	46,400,000	7.76	42,799,360	Total power supply MWh	209,625,110
Heilongjiang	71,500,000	7.53	66,116,050	Emission factor in 2008	1.104886
Total			209,625,110		

Data sources: China Electric Power Yearbook 2009

Teble A5. Operating margin data for the Northeast China Power Grid (2009)

Fuel types	Unit	Liaoning	Jilin	Heilongjiang	Subtotal	Emission factor	Oxidation rate	Emission factor	Low Caloric Value	CO_2 Emission (tCO2e)
						(tc/TJ)	(%)	($kgCO_2$/TJ)	(MJ/t,km3)	I=D*G*H/100000(t)
		A	B	C	D=A+B+C	E	F	G	H	I=D*G*H/10000 (m3)
Raw coal	10^4t	5297.77	2999.09	3691.92	**11988.78**	25.8	100	87,300	20,908	218,827,413
Cleaned coal	10^4t				**0**	25.8	100	87,300	26,344	0
Other washed coal	10^4t	662.76	19.67	98.77	**781.2**	25.8	100	87,300	8,363	5,703,462
Cellular coal	10^4t			1.18	**1.18**	26.6	100	87,300	20,908	21,538
Coke	10^4t	4.19			**4.19**	29.2	100	95,700	28,435	114,020
Coke oven gas	10^8m^3	4.97	1.77	2.51	**9.25**	12.1	100	37,300	16,726	577,089
Other coal gas	10^8m^3	75.72	13.88	0.11	**89.71**	12.1	100	37,300	5,227	1,749,050
Crude oil	10^4t	0.79			**0.79**	20	100	71,100	41,816	23,488
Gasoline	10^4t				**0**	18.9	100	67,500	43,070	0
Diesel	10^4t	0.44	0.42	0.43	**1.29**	20.2	100	72,600	42,652	39,945
Fuel oil	10^4t	3.32	0.79	1.39	**5.5**	21.1	100	75,500	41,816	173,641
LPG	10^4t				**0**	17.2	100	61,600	50,179	0
Refinery gas	10^4t	7.78		3.21	**10.99**	15.7	100	48,200	46,055	243,962
Natural gas	10^8m^3		1.97	1.86	**3.83**	15.3	100	54,300	38,931	809,644
Other oil products	10^4t	0.44			**0.44**	20	100	72,200	41,816	13,284
Other coal chemicals	10^4t				**0**	25.8	100	95,700	28,435	0
Other energy	10^4t ce	18.24	15.93	107.82	**141.99**	0	0	0	0	0
									Total	228,296,535

Data sources: China Energy Statistical Yearbook 2010

Table A6. Fire power generation of Northeast China Power Grid (2009)

Name of the Province	Generation (MWh)	Rate of electricity used by factory (%)	Power Supply (MWh)		
Liaoning	113,500,000	6.94	105,623,100	Total emission amount tCO2	228,296,535
Jilin	47,300,000	7.89	43,568,030	Total power supply MWh	213,531,870
Heilongjiang	69,400,000	7.29	64,340,740	Emission factor in 2007	1.06915
Total			213,531,870		

Data sources: China Electric Power Yearbook 2010

$EF_{OM,y}$ = 1.0852 tCO_2e/MWh

2. Calculation of Build Margin (BM) Emission Factor

The calculation of the BM for the Project makes use of aggregated data to identify the 20% most recent capacity addition (sample group). This is identified by direct comparison of the total installed capacity on NECPG in the most recent years for which data is available (for the Project, the year 2009). BM is determined by selecting the year since which the new capacity additions are equal to or greater than 20%.

Table A7. Calculating the proportion of solid fuel, liquid fuel and gas fuel in total thermal power emission

Fuel types	Unit	Liaoning	Jilin	Heilongjiang	Total	NCV	Emission factor	Oxidation factor	CO_2 emission (tCO_2e)
						$kj/kg,m^3$	$kgCO_2/TJ$		H=G×D×E×F/100,000 (Mass unit)
		A	B	C	D=A+B+C	E	F	G	H=G×D×E×F/10,000 (Volume unit)
Raw coal	10^4t	5,297.77	2,999.09	3,691.92	11,988.78	20,908	87,300	1.00	218,827,412.89
Cleaned coal	10^4t	0	0	0	0	26,344	87,300	1.00	0.00
Other washed coal	10^4t	662.76	19.67	98.77	781.2	8,363	87,300	1.00	5,703,462.30
Cellular coal	10^4t	0	0	1.18	1.18	20,908	87,300	1.00	21,538.17
Coke	10^4t	4.19	0	0	4.19	28,435	95,700	1.00	114,019.52
Other coke products	10^4t	0	0	0	0	28,435	95,700	1.00	0.00
Total									224,666,433
Crude oil	10^4t	0.79	0	0	0.79	41,816	71,100	1	23,488
Gasoline	10^4t	0	0	0	0	43,070	67,500	1	0
Diesel	10^4t	0.44	0.42	0.43	1.29	42,652	72,600	1	39,945
Fuel oil	10^4t	3.32	0.79	1.39	5.5	41,816	75,500	1	173,641
Other oil products	10^4t	0.44	0	0	0.44	41,816	72,200	1	13,284
Total									250,358

Natural gas	$10^8 m^3$	0	19.7	18.6	38.3	38,931	54,300	1	809,644
Coke oven gas	$10^8 m^3$	49.7	17.7	25.1	92.5	16,726	37,300	1	577,089
Other coal gas	$10^8 m^3$	757.2	138.8	1.1	897.1	5,227	37,300	1	1,749,050
LPG	$10^4 t$	0	0	0	0	50,179	61,600	1	0
Refinery gas	$10^4 t$	7.78	0	3.21	10.99	46,055	48,200	1	243,962
Total									3,379,744
									228,296,535

Data sources: China Energy Statistical Yearbook 2010

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

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

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

Where:

$F_{i,j,y}$ is the amount of fuel i (in a mass or volume unit) consumed by province j in year(s) y;
$NCV_{i,y}$ is Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)
$EF_{CO2,i,j,y}$ is CO_2 emission factor of fossil fuel type i consumed by province j in year y (tCO_2/GJ)
and COAL, OIL and GAS are footnote group for solid fuels, liquid fuels and gas fuels.

According to the data and related calculation formula, λ_{Coal} = 98.41%, λ_{Oil}= 0.11%, λ_{Gas} = 1.48%.

It could be obviously concluded from the calculation results above that the amount of gas-fired and oil-fired power is very small in NECPG, in the Project we could neglect the impacts of gas-fired and oil-fired power and it is conservative.

The best commercially available thermal power plant:

With reference to the *2011 Baseline Emission Factors for Regional Power Grid In China*, the efficiency level of the best commercially available of thermal power is set as 600MW domestic sub-critical generator sets. The weighted average value of coal consumption of power supply of 30 set of 600MW generator sets newly built in 2009 is taken as the estimation of the efficiency level of the best technology commercially available in the calculation result. The coal consumption of power supply of 600MW domestic sub-critical power plant is estimated to be 311.5gce/kWh, which is equivalent to 39.45% of power supply efficiency.

Table A8. Emission factor of coal in NECPG

Technology	Variable	Efficiency of power supply	Emission Factor （kgCO2/TJ）	Oxidation rate	Emission Factor （tCO2/MWh）
		A	B	C	D=3.6/A/1000000*B*C
Coal fired plant	$EF_{Coal,Adv}$	39.45 %	87,300	1	0.7967
Gas fired plant	$EF_{Gas,Adv}$	51.77 %	75,500	1	0.5250
Oil fired plant	$EF_{Oil,Adv}$	51.77 %	54,300	1	0.3776

Data sources:
Electricity supply efficiency: China Energy Statistical Yearbook 2010;
Default carbon content: IPCC Guideline 2006
$OXID_i$: IPCC Guideline 2006

$EF_{thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv}$ = 0.7902 tCO_2/MWh

Table A9. Installed capacity of the Northeast China Power Grid 2009

Installed capacity	Unit	Liaoning	Jilin	Heilongjiang	Total
Fire power	MW	22,560	10,560	16,720	49,840
Hydro power	MW	1,460	3,900	940	6,300
Nuclear power	MW	0	0	0	0
Wind power and other	MW	1,740	1,480	1,200	4,420
Total	MW	25,760	15,940	18,860	60,560

Data sources: China Electric Power Yearbook 2010

Table A10. Installed capacity of the Northeast China Power Grid 2008

Installed capacity	Unit	Liaoning	Jilin	Heilongjiang	Total
Fire power	MW	19,900	8,350	16,570	44,820
Hydro power	MW	1,430	3,890	940	6,260
Nuclear power	MW	0	0	0	0
Wind power and other	MW	859	760	620	2,239
Total	MW	22,189	13,000	18,130	53,319

Data sources: China Electric Power Yearbook 2009

Table A11. Installed capacity of the Northeast China Power Grid 2007

Installed capacity	Unit	Liaoning	Jilin	Heilongjiang	Total
Fire power	MW	19,720	7,580	14,080	41,380
Hydro power	MW	1,410	3,890	870	6,170
Nuclear power	MW	0	0	0	0
Wind power and other	MW	359	514	230	1,103
Total	MW	21,489	11,984	15,180	48,653

Data sources: China Electric Power Yearbook 2008

Table A12. Capacity additions of the Northeast China Power Grid from 2007 to 2009

	Installed capacity in 2007	Installed capacity in 2008	Installed capacity in 2009	New added installed capacity 2007-2009	New added installed capacity 2008-2009	The fraction of newly added installed capacity
	A	B	C			
Thermal power（MW）	41,380	44,820	49,840	10,772	6,646	75.76 %
Hydro power（MW）	6,170	6,260	6,300	130.0	40.0	0.91 %
Nuclear power（MW）	0	0	0	0.0	0.0	0.00 %
Wind power（MW）	1,103	2,239	4,420	3317.0	2181.0	23.33 %
Total（MW）	48653.0	53319.0	60560.0	14219.0	8867.0	100.00 %
The fraction of installed capacity compared with 2009				23.48 %	14.64 %	

Data sources: China Electric Power Yearbook 2008-2010
*Calculated with the consideration of installed, shut-down and pumped storage capacity

Table A13. Calculation of BM in NECPG

A	**B**	**F=A*B**
$EF_{thermal}$ (kg/MWh)	Share of thermal power plants in newly added total capacity	$EF_{BM,y}$ (tCO_2/MWh)
0.7902	75.76%	0.5987

So, $EF_{BM,y}$ = 0.5987 tCO_2e/MWh

Appendix 5. Further background information on monitoring plan

There is no further information about monitoring.

Appendix 6. Summary of post registration changes

Not applicable.

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Document information

Version	Date	Description
08.0	22 July 2016	EB 90, Annex 1 Revision to include provisions related to automatically additional project activities.
07.0	15 April 2016	Revision to ensure consistency with the “Standard: Applicability of sectoral scopes” (CDM-EB88-A04-STAN) (version 01.0).
06.0	9 March 2015	Revisions to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; Editorial improvement.
05.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from *F-CDM-PDD* to *CDM-PDD-FORM;* • Editorial improvement.
04.1	11 April 2012	• Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
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01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

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