CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

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SECTION A. General description of project activity

A.1 Title of the project activity:

>>
Inner Mongolia Keshiketeng County Wutaohai South Wind Farm 49.5 MW Project
Version: 5.0
Date: Jan. 10, 2008

A.2. Description of the project activity:

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Inner Mongolia Keshiketeng County Wutaohai South Wind Farm 49.5 MW Project (hereafter referred as the proposed project) is a grid connected renewable energy project. The objective of the proposed project is to generate electricity using state-of-the-art wind power generation technology and to deliver into the North China Power Grid.

The proposed project is located in Nandian Town Shangtoudi of Keshiketeng County of Inner Mongolia Autonomous Region. Totally 66 wind turbines with a nominal capacity of 750kW will be installed, providing a total capacity of 49.5 MW. With an average annual 130000 MWh supplied to the North China Power Grid, the proposed project is estimated to deliver 139818 tonnes CO_2 emission reduction annually.

The contributions of the proposed project to sustainable development goal are summarized as follows:

- The implementation of the proposed project will reduce GHG emissions and reduce the dependence of fossil fuels.
- The proposed project could be helpful to diversify power mix of the power grid and increase the supply mix of renewable energy in Keshiketeng County of Inner Mongolia Autonomous Region.
- During the construction and operation period the proposed project will provide at least 15 new employee opportunities.
- Wind power development is at beginning stage both in local area and China. The successful implementation of the proposed project will be serving as a demonstration for wider deployment of wind power technology in local and national level.

A.3. Project participants:

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Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
China (host)	Keshiketeng County Huifeng New Energy Co. Ltd.	No
Japan	New Energy and Industrial Technology Development Organization (NEDO)	No

For detailed contact information of the project participants, please refer to Annex 1.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

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China

A.4.1.2. Region/State/Province etc.:

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Inner Mongolia Autonomous Region

A.4.1.3. City/Town/Community etc:

>>
Keshiketeng County Nandian Town

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

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The proposed wind power project is located in the northwest of Chifeng City and south of Wulanbutong develop park Nandian Town. The altitude of the proposed project site is 1500~1960m. The geographical coordinates of the centre of the wind farm is N117° 48′ , E42° 39′ , 90 km^2 area of total wind farm , as shown in Figure 1.

Figure 1 Location of Wutaohai South Wind Farm Project

A.4.2. Category(ies) of project activity:

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This category would fall within sectoral scope 1: Energy industries (renewable -/ non-renewable sources)

A.4.3. Technology to be employed by the project activity:

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The total installed capacity of the proposed project will be 49.5 MW, composed by 66 wind turbines with 750kW per unit. The type of the wind turbines will be asynchronous generator made by Jinfeng Company. The installation height of wind turbines will be 50m. The expected annual net electricity supplied to the grid will be 130000 MWh, at 2626 operation hours.

A new 63MVA220/35kV transformer station will be constructed within the wind farm. The wind power system will be incorporated into the power grid through one circle of 220kV line.

A.4.4 Estimated amount of emission reductions over the chosen crediting period:

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Years	Annual estimation of emission reductions in tonnes of CO_2e
2008 (Apr. 1 – Dec. 31)	104863
2009	139818
2010	139818
2011	139818
2012	139818
2013	139818
2014	139818
2015 (Jan. 1-Mar. 31)	34954
Total estimated reductions of first crediting period (tonnes of CO_2e)	**978725**
Total number of first crediting period	**7**
Annual average over the first crediting period of estimated reductions (tonnes of CO_2e)	**139818**

A.4.5. Public funding of the project activity:

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No Official Development Assistances from Annex I countries is involved in the proposed project.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:

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ACM0002 (Ver 07): Consolidated baseline methodology for grid-connected electricity generation from renewable sources. More information about the methodology can be found on the website: http://cdm.unfccc.int/methodologies/approved .

"Tool for the Demonstration and Assessment of Additionality (Ver 04)". More information about the methodology can be found on the website:

http://cdm.unfccc.int/methodologies/PAmethodologies/AdditionalityTools/Additionality_tool.pdf

"Tool to calculate the emission factor for an electricity system". More information about the methodology can be found on the website:

http://cdm.unfccc.int/methodologies/Tools/EB35_repan12_Tool_grid_emission.pdf

B.2 Justification of the choice of the methodology and why it is applicable to the project activity:

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The proposed project can meet the applicability criteria of the baseline methodology ACM0002 (Ver 07), therefore, the methodology is applicable to the proposed project.

- The proposed project is a grid-connected zero-emission renewable power generation activity from wind source;
- The proposed project is not an activity that involves switching from fossil fuels to renewable energy at the proposed project site;
- The project power grid system of North China Power Grid is clearly identified and information on the characteristics of this grid is publicly available;
- The additionality of the proposed project can be verified using "Tools for the demonstration and assessment of additionality" requested by the baseline methodology ACM0002 (Ver 07).

B.3. Description of the sources and gases included in the project boundary

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	Source	Gas	Included?	Justification / Explanation
Baseline	Fossil fuels fired power plants in North China Power Grid	CO_2	Yes	Major emission sources
		CH_4	No	According to ACM0002 it is excluded for simplification. This is conservative
		N_2O	No	According to ACM0002 it is excluded for simplification. This is conservative
Project Activity	Not applicable – the project is zero-emissions renewable power source	CO_2	No	Excluded. The project activity is a zero-emission project activity
		CH_4	No	Excluded. The project activity is a zero-emission project activity
		N_2O	No	Excluded. The project activity is a zero-emission project activity

The proposed project is within the boundary of Inner Mongolia Autonomous Region. According to the definition of power grid of DNA[1], Inner Mongolia Autonomous Region is included in the North China Power Grid. Thus the project electricity system of the proposed project is defined as the North China Power Grid. The North China Power Grid includes Beijing, Tianjin, Shandong Province, Hebei Province, Shanxi Province and Inner Mongolia Autonomous Region.

[1] http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=1235

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

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To provide the same output or services comparable with the proposed CDM project activity, these alternatives are to include:

Scenario 1: The proposed project not undertaken as a CDM project activity.

Scenario 2: The fossil-fired plant with the same annual electricity supply as the proposed project.

Scenario 3: Other renewable energy project such as small hydro power station with the same annual electricity supply as the proposed project.

Scenario 4: No construction of the proposed project, and the North China Power Grid as the provider for the same electricity supply.

Scenario 1 developing the proposed project not as a CDM project meets China current regulations and laws. But it should be eliminated from the following consideration because the investment analysis in section B.5 will show that the proposed project not undertaken as a CDM project and without CERs income is lack of the attraction for the potential investors.

Scenario 2 is also unrealistic and should be eliminated from the following consideration because the analysis in Step 1b of section B.5 will show that the fossil fired plant with the same annual electricity output as the proposed project does not comply with Chinese legal and regulatory requirements. Scenario 2 will not become the baseline scenario and should be deleted.

At present, compared with other renewable energy technology in China, only small hydro power might have better benefits than wind power. While in the season of Spring and Winter in Keshiketeng County, there will be very short of water. The output of scenario 3 will decrease and cause short of electricity supply. Scenario 3 will not become the baseline scenario and should be deleted.

Scenario 4 meets the requirement of national regulations and laws and has no economic barrier, it can become baseline scenario.

To summarize, the baseline scenario is Scenario 4-No construction of the proposed project, and the North China Power Grid as the provider for the same electricity supply.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality): >>

The following steps are used to demonstrate the additionality of the proposed project according to "Tools for the demonstration and assessment of additionality (Ver 04)" agreed by Executive Board and requested by the baseline methodology (ACM0002 Ver 07).

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

The objective of this step is to identify realistic and credible alternatives to the proposed project that can be the baseline scenario through the following sub-steps:

Sub-step 1a. Define alternatives to the project activity.

To provide the same output or services comparable with the proposed CDM project activity, these alternatives are to include:

Scenario 1: The proposed project not undertaken as a CDM project activity.

Scenario 2: The fossil-fired plant with the same annual electricity supply as the proposed project.

Scenario 3: Other renewable energy project such as small hydro power station with the same annual electricity supply as the proposed project.

Scenario 4: No construction of the proposed project, and the North China Power Grid as the provider for the same electricity supply.

At present, compared with other renewable energy technology in China, only small hydro power might have better benefits than wind power. While in the season of Spring and Winter in Keshiketeng County, there will be very short of water. The output of scenario 3 will decrease and cause short of electricity supply. Scenario 3 will not become the baseline scenario and should be deleted first.

Step1b. Consistency with mandatory laws and regulations:.

The applicable legal and regulatory requirement for the proposed project include laws, central government regulations, local regulations, departmental rules and disciplines related to electricity and environment protection.

The related laws and regulations can be found and downloaded on the website of State Electricity Regulatory Commission (SERC) and National Development and Reform Commission (NDRC): http://www.serc.gov.cn/opencms/export/serc/laws/index.html and http://nyj.ndrc.gov.cn .

Since the fossil fired power plant operation hours are 2-3 times of wind farm operation hours, to provide the same output as the proposed project, the capacity of the above alternative scenario 2 will be less than 50MW. According to the regulation and law in China, it is forbidden to the construction of fossil fired power plant under 135 MW which will be within the connected area[2]. Scenario 2 should be deleted and couldn't become baseline scenario.

Based on the analysis of 1a and 1b, Scenario 1 and 4 both meet national regulations and laws in China and become the realistic and credible alternative scenario of the proposed project.

Step2. Investment analysis.

[2] "Station department on forbiddance construction of the fossil fuel-fired power plant with capacity below 135MW" [2002] No. 6

This step will determine whether the proposed project is the economically or financially less attractive than other alternatives without the revenue from the sale of CERs.

Sub-step 2a. Determine appropriate analysis method.

Three options can be applied for the investment analysis: the simple cost analysis, the investment comparison analysis and the benchmark analysis.

The simple cost analysis is not applicable for the proposed project because the project activity will produce economic benefit (from electricity sale) other than CDM related income. The investment comparison analysis is also not applicable for the proposed project because there are only two selections of construction and not-construction.

To conclude, the benchmark analysis will be used to identify whether the financial indicators (such as IRR or NPV) of the proposed project is better than relevant benchmark value.

Sub-step 2b. Apply investment comparison analysis.

According to the "Measures for Economic Evaluation on Electric Power Technical Reconstruction Project, issued by State Power Corporation", a project will be financially acceptable when the Financial Internal Return Rate (FIRR) is better than the sectoral benchmark FIRR.
The sectoral benchmark FIRR on total investment for power industry is 8%. The FIRR of the proposed project is calculated and compared as follows.

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

The financial indicators of proposed project should show its investment attraction. The main financial indicators are listed in Table 1.

Table 1 Main financial indicators of proposed project

Items	Unit	Amount
Capacity	MW	49.5
Total Investment	Million Yuan	41235
Annually output	MWh/year	130000
Electricity Tariff (excluding VAT)	Yuan/kWh	0.452
Value Added Tax (VAT)	%	8.5
Income tax	%	33
Education tax / value added tax	%	3
City tax / value added tax	%	5
Project operation life time	Year	22

Comparison of financial indicators with and without income from CERs is shown in Table 2.

Table 2 Comparison of financial indicators with and without income from CERs

Items	Without income from CERs	Benchmark	With income from CERs

FIRR	6.59%	8%	8.92%[3]

From Table 2, without income from selling CERs, the FIRR of the proposed project is lower than the benchmark FIRR only 6.59% and the proposed project is financially unacceptable because of its low profitability. While considering such income, the financial acceptance will be changed higher, the FIRR of the proposed project is better than the benchmark then the proposed project is financially acceptable.

Sub-step 2d. Sensitivity analysis.

The objective of this sub step is to show the conclusion regarding the financial attractiveness is robust to reasonable variations of the critical assumptions.

Three factors are considered in following sensitivity analysis:

1) Total investment
2) Annual operation and maintenance cost
3) Electricity tariff

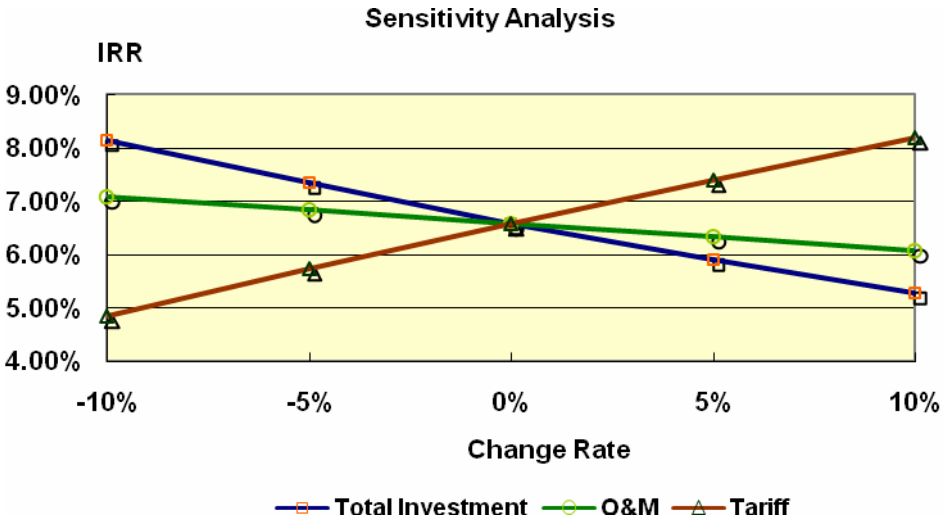

Figure 2 Sensitivity analysis of the proposed project

Assuming the above factors vary in the range of -10% ~ +10%, the FIRR of the proposed project (without income from selling CERs) varies to different extent, as shown in Figure 2.

The changes of total investment and electricity tariff are the most important factors affecting the financial attractiveness of the proposed project. In the case that the total investment decreases by 9%, the FIRR of the proposed project will exceed the benchmark. However, the wind turbines will be imported from domestic company, the price will not be decreased so much recently. There will be no possibility for large

[3] CERs estimated price: US 10 $/tCO$_2$, 1 US $=7.8 yuan

changes in the total investment. Therefore, the proposed project is always lack of financial attractiveness within the reasonable range of total investment.

When the electricity tariff increases by 9%, the FIRR of the proposed project begins to exceed the benchmark. Currently, the wind power tariff will be approved by Power Grid Company and local government according to renewable energy law in China, it will not be changed once confirmation. The financial analysis adopts the electricity tariff 0.452 yuan/kWh which is very high in the local area. It couldn't improve the economic attraction by increasing electricity tariff.

The impact of the annual O&M cost is relatively slight. The FIRR will not exceed the benchmark, if the annual O&M cost increases or decreases by less than 10%. Therefore, the proposed project is always lack of financial attractiveness within the reasonable range of annual O&M cost.

Without CDM CERs income, the financial analysis of the proposed project will be lack of financial attraction and couldn't become the baseline scenario.

Step 4. Common practice analysis

Sub-step 4a. Analyze other activities similar to the proposed project activity:

The existing or under-constructing wind farms with installed capacity above 40 MW in the area of Inner Mongolia Autonomous Region are listed in the following Table 3 (up to Nov. 27, 2007).

Table 3 Wind farms with installed capacity above 40 MW in Inner Mongolia Autonomous Region

	Wind farm	Installed Capacity（MW）	Emission reductions (tons CO2)	Remark
1	Dongdianmaolin wind power project	50		Electricity preferential project
2	Inner Mongolia Huitengliang 49.5MW Wind Power Project	49.5	110296	Registration
3	Dongshan wind power project	49.3	125557	Registration
4	Bayanzhuoer Chuanjingsumu 49.3MW wind power project	49.3	112641	Applying for CDM project
5	Sunjiaying 50.25MW wind power project	50.25	130990	Applying for CDM project
6	Wudaogou 50.25MW wind power project	50.25	136173	Applying for CDM project
7	XiMengABaGa 49.5 MW wind power project	49.5	139170	Approved by NDRC
8	HangJinQiYiHeWuSu wind power project		113414	Approved by NDRC

9	WengNiuTeWuGou second phase wind power project		131081	Approved by NDRC
10	SiZiWangQiBaYin wind power project		124052	Approved by NDRC
11	ChiFeng Gaofeng 50MW wind power project	50	130375	Approved by NDRC
12	Chifeng Sunjiaying wind power project		130990	Approved by NDRC
13	BaYanNaoEr Chuanjingsumu 2-phase wind power project		121551	Approved by NDRC
14	Baotou Bayin wind power project		475471	Approved by NDRC
15	TuGuRiGe wind power project		128408	Approved by NDRC
16	NaRenBaoLiGe wind power project		124521	Approved by NDRC
17	Zhongguanghe Huitengliang 300MW wind power project	300	690464.5	Approved by NDRC
18	Guohua Huitengliang west wind power project		124440	Approved by NDRC
19	Dali fourth phase wind power project	49.5	135916	Approved by NDRC
20	Dali fifth phase wind power project	49.5	121377	Approved by NDRC
21	Bayinaobao wind power project	49.5	121757	Approved by NDRC
22	Dongshan second phase wind power project	50	136657	Approved by NDRC
23	Maoniuhai wind power project		121040	Approved by NDRC
24	Huadian Inner Mongolia Huitengxile 100.25MW Wind Farm Project	100.25	263800	Registration
25	Inner Mongolia Huitengxile Jingneng 100MW Wind Power Project	100	261397	Registration
26	Guohua Inner Mongolia Huitengliang Wind Farm Project	48.75	127071	Registration

Source: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1592.pdf, http://cdm.unfccc.int/Projects/projsearch.html

Sub-step 4b. Discuss any similar options that are occurring:

The existing wind farm projects do not call into question the claim that the proposed project activity is financially unattractive as discussed in Step 2. While Dongdianmaolin wind power project enjoys a very favourable electricity tariff (e.g. 0.813 yuan/kWh). the tariff of renewable power is regulated by the regulating entities (NDRC) based on the standard power tariff plus a subside price of 0.25yuan/kWh, such high tariff is impossible for wind farm developers[4]. There is essentially difference of investment and policy environment for the proposed project.

However, up to now, the other wind power projects listed in the above table are all facing the same financial barriers and applied for CDM projects, these projects were approved by NDRC and some have finished registration and became CDM project.

To conclude the existence of these projects in Table 3 does not contradict the claim that the proposed project activity is financially unattractive.

As described above, the proposed project activity passed all criteria of "Tool for the demonstration and assessment of additionality". In conclusion, the proposed project is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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The calculation of the GHG emission reductions by the proposed project is followed the baseline methodology ACM0002 (Ver 07) and "Tool to calculate the emission factor for an electricity system".

Step 1: Identify the relevant electric power system

This project is located in Inner Mongolia Autonomous Region. According to the delineation of grid boundaries as provided by DNA in china (http://cdm.ccchina.gov.cn/web/index.asp, Dec. 15, 2006), the project electricity system of the proposed project is defined as the North China Power Grid. It includes Beijing, Tianjin, Hebei Province, Shandong Province, Shanxi Province and Inner Mongolia Autonomous Region.

Step 2: Select an operating margin (OM) method

According to The Methodology, four alternatives could be used to calculate the OM:

a) Simple OM
b) Simple adjusted OM, or
c) Dispatch Data Analysis OM, or
d) Average OM.

[4] http://www.gov.cn/ziliao/flfg/2005-06/21/content_8275.htm

For this Project, the simple Operating Margin emission factor was chosen based on the following two reasons:

1. In China, the State Grid Corporation runs the interregional dispatch system and each regional grid corporation run the intraregional dispatch system. The dispatch information is regarded as business secrets and not available to the public.
2. For the most recent 5 years (2001-2005), the low-cost/must run resources constitute less than 50% of total: 0.85%, 0.89%, 0.86%, 0.76% and 0.75% for 2001, 2002, 2003, 2004 and 2005. (detailed data s are shown in Annex 3).

As a result, the simple OM method can be used.

Step 3: Calculation the Operating Margin emission factor ($EF_{OM,y}$) according to simple OM

The baseline emission factors OM and BM are both from the Announcement of Determine China Regional Power Grid Baseline Emission Factors, published by China National Development and Reform Commission.

The Simple OM emission factor is calculated as the generation-weighted average emissions per unit net electricity generation (tCO_2/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants. It is determined by option A, based on data on fuel consumption and net electricity generation of each power plant/unit. The simple OM emission factor is calculated as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_{i,j} F_{i,j,y} \times NCV_i \times EF_{CO_2,i}}{\sum_j GEN_{j,y}} \quad (1)$$

Where:

$F_{i,j,y}$ is the amount of fuel *i* consumed (ton for solid and liquid fuel, m^3 for gas fuel) by relevant power sources *j* in years *y*;

j refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants, and including imports to the grid;

NCV_i is the net calorific value per ton or m^3 of a fuel *i* (TJ/ ton for solid and liquid fuel, m^3 for gas fuel);

$EF_{CO_2,i}$ is the CO_2 emission factor per TJ of fuel type *i* (tCO_2/TJ).

$GEN_{j,y}$ is the electricity (MWh) delivered to the grid by source *j*. In the China Electric Power Year Book and other data resources, only generation data is available. The generation from source *j* can be translated into electricity delivered to the grid by source *j* by the following formulation:

$$GEN_{j,y} = G_{j,y} \times (1 - e_{j,y}) \quad (2)$$

Where:

$G_{j,y}$ is the amount of generation (in MWh) by source *j* in year *y*;

$e_{j,y}$ is the rate of plant self consumption of source *j* in year *y*.

The simple OM emission factor can be calculated using either of the two following data vintages for years(s) y : (1) (*ex-ante*) A 3-year average based on the most recent statistics available at the time of PDD submission, or (2) The year in which project generation occurs, if $EF_{OM,y}$ is updated based on ex post monitoring.

The Simple OM emission factor of this proposed project is calculated as electricity-to-the-grid weighted average in the North China Power Grid during the most recent 3-year (2003-2005), and will be fixed in the first crediting period. The baseline emission factors OM is from the Announcement of Determine China Regional Power Grid Baseline Emission Factors, published by China National Development and Reform Commission The Operation Margin emission factor ($EF_{grid,OMSimple,y}$) of which the proposed project will serve is 1.1208 tCO_2/MWh.

Step 4: Identify the cohort of power units to be included in the build margin

This PDD choose Option 1 provided by the methodology ACM0002 (Ver 07) to calculate $EF_{BM,y}$ ex-ante. There is no requirement on ex-post monitoring and updating.
To chose one of the following options which generates more electricity to form the sample group m:
(1) The five most recent commissioned power plants;
(2) The power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

According to ACM0002 (Ver 07), it is difficult to get abundant data of electricity generation of incremental power plants and fuel consumption results during North China Power Grid. For the data availability, CDM EB guideline is adopted during calculation. First calculate the proportion of incremental installed capacity and electricity generation technology, secondly calculate the weights of new installed capacity of all electricity generation technology, finally calculate emission factors based on maximum energy efficiency level of new technology commercially

Currently, it is difficult to divide kinds of electricity generation technology of coal, oil and gas on the base of statistic data available, this project adopts following method:

First, based on the energy balance which has been published recently, calculate the emission weights of total CO_2 emissions which corresponds solid, liquid and gas fuels for electricity generation;

Secondly, based on the emission factors of maximum energy efficiency level of new technology commercially, calculate thermal power emission factors making use of emission weights;

Finally, BM can be calculated by thermal power emission factors time weights of thermal power of 20% installed capacity incremental.

Step 5: Calculation the Build Margin emission factor ($EF_{gird,BM,y}$)

The detailed calculation as following:

Substep 1. calculate the emission weights of total CO_2 emissions which corresponds solid, liquid and gas fuels for electricity generation

$$\lambda_{Coal} = \frac{\sum_{i \in COAL, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (3)$$

$$\lambda_{Oil} = \frac{\sum_{i \in OIL, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (4)$$

$$\lambda_{Gas} = \frac{\sum_{i \in GAS, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (5)$$

Where:

$F_{i,j,y}$: is the amount of fuel *i* (ton for solid and liquid fuel, m^3 for gas fuel) consumed by plant i in year *y*;

$COEF_{i,j,y}$: the CO_2 emission coefficient (tCO_2/ ton for solid and liquid fuel, m^3 for gas fuel) of fuel *i*, taking into account the carbon content of the fuels used by plant and the percent oxidation of the fuel in year *y*;

COAL, OIL and GAS are the foot label of solid, liquid and gas fuel.

Substep 2: calculate thermal power emission factors

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} \quad (6)$$

Where:

$EF_{Coal,Adv}$, $EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ are emission factors of maximum energy efficiency level of new technology commercially coal, oil and gas.

Substep 3: calculate BM

$$EF_{grid,BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} \quad (7)$$

Where:

CAP_{Total} : total installed capacity increment;

$CAP_{Thermal}$: total thermal power of installed capacity increment.

The baseline emission factors BM is from the Announcement of Determine China Regional Power Grid Baseline Emission Factors, published by China National Development and Reform Commission The Operation Margin emission factor ($EF_{grid,BM,y}$) of which the proposed project will serve is 0.9397 tCO_2/MWh.

Step 6: Calculation the combined margin emission factor ($EF_{grid,CM,y}$)

According to the baseline methodology (ACM0002), the baseline emission factor EF_y is calculated as the weighted average of the Operating Margin emission factor ($EF_{grid,OMSimple,y}$) and the Build Margin emission factor ($EF_{grid,BM,y}$),

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

where the weights ω_{OM} and ω_{BM} are 0.75 and 0.25 by the default.

The baseline emission factor is: $EF_{grid,CM,y} = 0.75 \times EF_{grid,OMSimple,y} + 0.25 \times EF_{grid,BM,y}$ = 1.0755 tCO_2/MWh.

B.6.2. Data and parameters that are available at validation:

Data / Parameter:	$G_{j,y}$
Data unit:	MWh
Description:	The electricity generated by *j* in year *y* (Beijing, Tianjin, Hebei, Shandong, Shanxi, Inner Mongolia 2003-2005)
Source of data used:	China Electric Power Yearbook 2004-2006
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied:	Official statistical data
Any comment:	-

Data / Parameter:	$GEN_{import,y}$
Data unit:	MWh
Description:	Electricity imported to North China Power Grid in year *y* (2003-2005)
Source of data used:	China Electric Power Yearbook 2004-2006

Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied:	Official statistical data
Any comment:	-

Data / Parameter:	$F_{i,j,y}$
Data unit:	10 kton /$10^8 m^3$
Description:	Fuel *i* consumed by *j* in year *y* (Beijing, Tianjin, Hebei, Shandong, Shanxi, Inner Mongolia, 2003-2005)
Source of data used:	China Energy Statistical Yearbook 2004-2006
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied:	Official statistical data
Any comment:	-

Data / Parameter:	NCV_i
Data unit:	TJ per mass or volume unit
Description:	Net calorific value per mass or volume unit of fuel *i*
Source of data used:	China Energy Statistical Yearbook 2004-2006
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied:	National specific data
Any comment:	-

Data / Parameter:	$EF_{CO_2,i}$
Data unit:	t-C/TJ
Description:	Emission factor per energy unit of fuel *i*
Source of data used:	IPCC Guidelines for National Greenhouse Gas Inventories: Workbook, Revised 2006
Value applied:	See Annex 3

Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default data
Any comment:	-

Data / Parameter:	$EF_{coal,Adv}$
Data unit:	%
Description:	Supply efficiency of coal-fired power plant (commercial best practice)
Source of data used:	China DNA：China's Regional Grid Baseline Emission Factors Renewed (August 9, 2007) Annex 2
Value applied:	35.82%
Justification of the choice of data or description of measurement methods and procedures actually applied:	National specific data
Any comment:	-

Data / Parameter:	$EF_{oil/gas,Adv}$
Data unit:	%
Description:	Supply efficiency of oil-fired/gas turbine power plant (commercial best practice)
Source of data used:	China DNA：China's Regional Grid Baseline Emission Factors Renewed (August 9, 2007) Annex 3
Value applied:	47.67 %
Justification of the choice of data or description of measurement methods and procedures actually applied:	National specific data
Any comment:	-

Data / Parameter:	$CAP_{y,j}$
Data unit:	MW
Description:	Installed capacity of *j* in year *y* (Beijing, Tianjin, Hebei, Shandong, Shanxi, Inner Mongolia, 2001-2005)
Source of data used:	China Electric Power Yearbook 2001-2006

Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied:	Official statistical data
Any comment:	-

B.6.3 Ex-ante calculation of emission reductions:

>>

According to the baseline methodology ACM0002 (Ver 07), the GHG emission of the proposed project within the project boundary is zero, i.e. $PE_y = 0$.

According to the baseline methodology ACM0002 (Ver 07), the leakage of the proposed project is not considered, i.e. $L_y = 0$.

Therefore, the proposed project activity emissions are zero, i.e. $E.1 + E.2 = PE_y + L_y = 0$.

According to the descriptions and formulas in section B.6.1, the combined baseline emission factor of the North China China Power Grid is: $EF_{grid,CM,y}$ **=1.0755 tCO$_2$/MWh.**

According to the Feasibility Study Report of the proposed project, the estimated annual net electricity generation delivered to the power grid will be: $EG_{net,y}$ **=130000 MWh.**

The annual emission of baseline scenario is: $BE_y = EG_{net,y} \times EF_{grid,CM,y}$ **= 139818 tCO$_2$.**

The annual emission reductions of the proposed project during the first crediting period are estimated to be: $ER_y = BE_y - PE_y = BE_y$ **= 139818 tCO$_2$.**

B.6.4 Summary of the ex-ante estimation of emission reductions:

>>

Year	Estimation of Project activity Emission (tonnes of CO2e)	Estimation of baseline emission (tonnes of CO2 e)	Estimation of leakage (tonnes of CO2e)	Estimation of Emission reductions (tonnes of CO2 e)
2008 (Apr. 1-Dec. 31)	0	104863	0	104863
2009	0	139818	0	139818
2010	0	139818	0	139818
2011	0	139818	0	139818
2012	0	139818	0	139818
2013	0	139818	0	139818
2014	0	139818	0	139818

2015 (Jan. 1-Mar. 31)	0	34954	0	34954
Total (t CO2e)	**0**	**978726**	**0**	**978726**

B.7 Application of the monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Electricity supplied by proposed project in year *y*
Source of data to be used:	Measured by meters
Value of data applied for the purpose of calculating expected emission reductions in section B.5	It is estimated that 132490MWh of electricity will be supplied by proposed project
Description of measurement methods and procedures to be applied:	The readings of electricity meter will be hourly measured and monthly recorded. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
QA/QC procedures to be applied:	The electricity output from each turbine will be monitored. The project site engineering is responsible for recording this set of data. Electricity sales invoices will also be obtained for double check.
Any comment:	Electricity supplied by the project activity to the grid. Double check by receipt of sales.

Data / Parameter:	PC_y
Data unit:	MWh
Description:	Electricity consumed by proposed project in year *y*
Source of data to be used:	Measured by meters
Value of data applied for the purpose of calculating expected emission reductions in section B.5	It is estimated that 2490MWh consumed by proposed project
Description of measurement methods and procedures to be applied:	The readings of electricity meter will be hourly measured and monthly recorded. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
QA/QC procedures to be applied:	To conduct a crosscheck between the meter readings and electricity invoice.
Any comment:	-

B.7.2 Description of the monitoring plan:

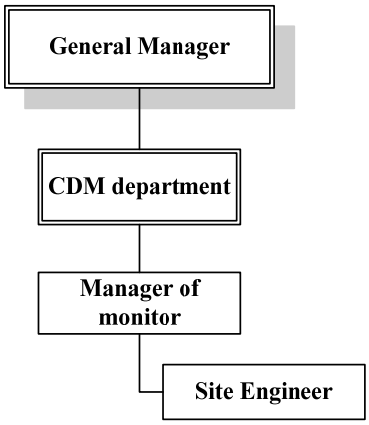
>>
This monitoring plan will assure the completeness, consistency, clear and accurate of monitor and calculation of emission reductions of project activity during the crediting period. There will be a special person of host responsible for this action and Power Grid Company implement together with project owner.

1 Data monitored

For the emission factor of baseline is based on *ex-ante* calculation, the main data monitored will be electricity supplied to the grid by this project.

2 Monitor Mechanism

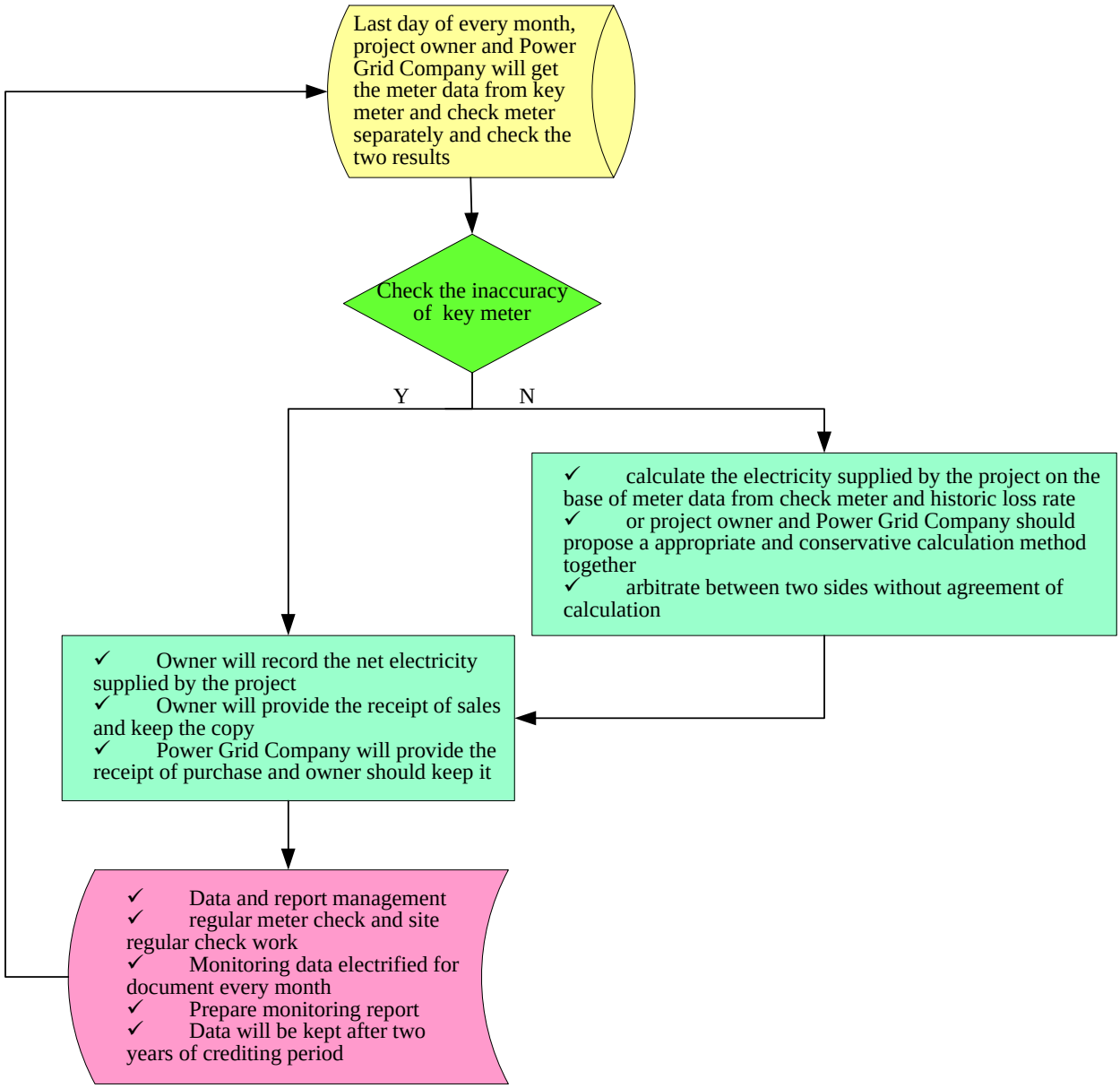
A manager of monitor and check who will be nominated by project owner is responsible for supervising and checking data and whole data record process. Meanwhile, a site engineer will work together with the manager and will collect data (such like electric meter data, keep receipt of sales), calculate emission reduction and prepare the monitor report.



3 Monitor Device and Installation

Two meters will be installed in this project. One will be in the end of output in the electric substation (check meter) to measure the station output. The other will be installed in the input end of Power Grid to measure the net electricity supplied by this project (key meter). The electricity supplied by the project will adopt the data of key meter. When key meter has errors, the data of check meter will be adopted. Before project operation, the electricity calculation device should be checked by project owner and Power Grid Company according to the regulations.

4 Monitoring plan



5 Meter Adjustment

Project owner will be responsible for the daily operation monitor work of check meter and Power Grid Company will be responsible the daily operation monitor work of key meter. They should both guarantee the meters in good condition and good seal. It is confirmed that verification should get real meter record and check report.

For ensuring the meter accuracy, yearly meter check and site yearly check work should be implemented according to the national power industry regulations, standards. Meter should be sealed after check. Project owner and Power Gird Company should implement jointly. It is forbidden to open and modify meter when the other side are not in site.

The project site engineering is responsible for recording this set of data. Electricity sales invoices will also be obtained for double check.

B.8 Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies)

>>

The baseline study of the proposed project was completed on 10 January, 2008.

Dr Alun GU, Institute of Nuclear and New Energy Technology, Tsinghua University.

Address: Room C501, Energy Science Building, Tsinghua University, 100084, Beijing, China

Telphone: +8610-62794098

Email: gal@tsinghua.edu.cn

(Not the project participants listed in Annex 1)

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>

26/02/2007

C.1.2. Expected operational lifetime of the project activity:

>>

22 years

C.2 Choice of the crediting period and related information:

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the first crediting period:

>>

01/04/2008

C.2.1.2. Length of the first crediting period:

>>

7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>

Not applicable.

C.2.2.2. Length:

>>

Not applicable.

SECTION D. Environmental impacts

>>

D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

>>

The environmental impacts analysis comes from the Environmental Impacts Assessment Report of the proposed project.

The main environmental impacts of the project construction lie on:

- ✧ The waste water and solid living waste released during the construction period will be little and have no impact on environment after treatment.
- ✧ The impacts on the sound environment and air quality are short-term during the construction period. After the completion of the construction, the impacts will disappear naturally.
- ✧ The dust during construction will have little impacts. Since the site of the proposed project is far enough, there will be no obvious impacts on local environment.
- ✧ The occupation of ground will destroy some surface vegetation during the construction period, but the vegetation destroyed by temporary ground occupation will be recovered after the completion of the construction. The impacts on local ecology system will then be minimized.

The main environmental impacts of the project operation lie on:

- ✧ There will be no air pollutant emissions during the operation period of the proposed project.
- ✧ There will be a little amount of living waste water released during the operation period of the proposed project, which will be treated in the leakage proof cesspool and then be taken down of the hill by truck. Therefore, the waste water will have little impact on the surface water.
- ✧ The noise source during the operation period of the proposed project will be mainly from the running of the wind power unit. After freely dissemination of 250m, it will be reduced about 45.0dB(A), which will not have impacts out 250m. The height of the wind power turbine is 80 km and doesn't have impacts on mitigating of birds.

In conclusion, being as a typical type of clean renewable energy, the proposed project has no significant impacts on local environment and will greatly contribute to achievement of sustainable development objective and promote local environmental protection.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

>>

The Environmental Impacts Assessment Report of the proposed project has been approved by the Environmental Protection Administration of Inner Mongolia Autonomous Region, referred as "Nei Environment Construction [2004] No.505".

Not applicable, since the construction and operation of the proposed project have no significant environmental impacts.

SECTION E. Stakeholders' comments

>>

E.1. Brief description how comments by local stakeholders have been invited and compiled:

>>

The project owner adopts three kinds of public methods for requiring suggestions and advices of people of all circle.

- The project owner had put the project information in the website of Inner Mongolia Autonomous Regions Development and Reform Commission, and declared time and venue of stakeholder meeting, provided the contact information. (http://www.nmgfgw.gov.cn/html/2006-11-13/20061113154829.htm)
- The project owner had made project announcement in the local TV station.
- On November, 15th, 2006, under the support of the Keshiketeng County, the project owner successfully held a stakeholder meeting in Keshiketeng County Jingpeng Town. Totally 8 stakeholder representatives participated the meeting, respectively from the Government of Keshiketeng County, the Development and Reform Bureau of Keshiketeng County, the Environmental Protection Bureau of Keshiketeng County, the Wind Power Office of Huifeng New Energy Co. Ltd., the representatives of Dayuan Village.

The key topics lie on:

- The impacts on local production and living life of project construction and operation
- The benefits on local economic development of project construction and operation
- The impacts on local environment of project construction and operation
- Any advice and suggestions of project construction and operation

E.2. Summary of the comments received:

>>

Every stakeholder representative expressed the comments for the proposed project. No opposite comment was received. The summary of the comments is as follows:

Comments from the local government: The proposed project has been approved by the Development and Reform Commission of Inner Mongolia Autonomous Region and Environmental Protection Administration of Inner Mongolia Autonomous Region, which shows that the construction and operation of the proposed project will have little impacts on the local environment. There is fair good of wind energy in the proposed site. Both the county and town municipal governments highly support the proposed project, and expect the increase of local financial incoming and new employment opportunity through the implementation of the proposed project. The construction of the proposed project will contribute to promoting the total capacity of power grid, increasing end voltage and improving the system power quantity.

Comments from villager representatives: The proposed project site is degraded grassland. There are no residents and croplands in the area 1 km around the proposed project. Therefore, there is no issue on noise disturbance and residents movement. The villagers are satisfied with the compensation for field occupation. Since the field occupied are relative small, the villagers expressed that it will have little impacts on their future income.

E.3. Report on how due account was taken of any comments received:

>>

Since there is no negative comment received, it’s no need to make adjustment on design, construction and operation of the proposed project.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Keshiketeng County Huifeng New Energy Co. Ltd.
Street/P.O.Box:	East of Gangtie street, Hongshan district
Building:	Fourth floor of Liaohe Engineering Bureau
City:	Chifeng City
State/Region:	Inner Mongolia Autonomous Region
Postfix/ZIP:	024000
Country:	China
Telephone:	0476-8372998
FAX:	0476-8370208
E-Mail:	Fanguofeng2348@sina.com
URL:	-
Represented by:	HONG Yongsheng
Title:	-
Salutation:	-
Last Name:	HONG
Middle Name:	-
First Name:	Yongsheng
Department:	-
Mobile:	13304769166
Direct FAX:	0476-8370208
Direct tel:	0476-8372998
Personal E-Mail:	Fanguofeng2348@sina.com

Organization:	New Energy and Industrial Technology Development Organization (NEDO)
Street/P.O.Box:	1310 Omiya-cho, Saiwai-ku
Building:	MUZA Kawasaki Central Tower, 18F
City:	Kawasaki City
State/Region:	Kanagawa
Postfix/ZIP:	212-8554
Country:	Japan
Telephone:	-
FAX:	-
E-Mail:	-
URL:	http://www.nedo.go.jp/
Represented by:	-
Title:	Director General
Salutation:	Mr.
Last Name:	Nakashima
Middle Name:	-
First Name:	Hidefumi
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Mobile:	-
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Personal E-Mail:	nakashimahdf@nedo.go.jp

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No Official Development Assistances from Annex I countries is involved in the proposed project.

Annex 3

BASELINE INFORMATION

Table A3-1 Electricity Generation Share of North China Power Grid in 2001-2005

Year		Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total	Thermal share	Other share
	Unit	TWh	TWh	TWh	TWh	TWh	TWh	TWh	%	%
2001	Total electricity generation	17.67	22.18	93.19	71.1	46.55	110.44	**361.13**		
	Thermal	17.39	22.17	92.87	69.42	45.82	110.40	**358.07**	99.15	**0.85**
2002	Total electricity generation	18.35	27.28	101.42	84.13	52.19	124.18	**407.55**		
	Thermal	17.89	27.26	100.97	82.26	51.38	124.16	**403.92**	99.11	**0.89**
2003	Total electricity generation	19.29	32.2	108.8	95.85	65.95	139.57	**461.66**		
	Thermal	18.61	32.19	108.26	93.96	65.11	139.55	**457.68**	99.14	**0.86**
2004	Total electricity generation	18.93	33.95	125.54	106.96	81.46	163.98	**530.82**		
	Thermal	18.58	33.95	125.00	104.93	80.43	163.92	**526.81**	99.24	**0.76**
2005	Total electricity generation	21.48	37	134.68	130.94	93.68	190	**607.78**		
	Thermal	20.88	36.99	134.35	128.78	92.35	189.88	**603.23**	99.25	**0.75**

Source: China Electric Yearbook 2002-2006

Electricity generation, installed capacity and rate of electric plant consumption are all from China Electrical Power Yearbook 2000-2006 for OM and BM calculation. The fuel consumptions and low thermal value are from China Energy Statistic Yearbook 2004-2006. Fuel potential emission factors and carbon oxidation rate are from 2006 IPCC Guidelines for National Greenhouse Gas Inventories" Volume 2 Energy Chapter 1.21-1.24, Table 1.3 and Table 1.4.

Fuel	Low thermal value	Emission factor tc/TJ
Raw coal	20908 kJ/kg	25.80
Clean coal	26344 kJ/kg	25.80
Other washed coal[5]	8363 kJ/kg	25.80
Coke	28435 kJ/kg	29.50

[5] According to the China Energy Statistics Yearbook 2005 P365, the low thermal value of coal slurry is higher than middling, this calculation is conservative.

Crude oil	41816 kJ/kg	20.00
Gasoline	43070 kJ/kg	18.90
Kerosene	43070 kJ/kg	19.60
Diesel	42652 kJ/kg	20.20
Fuel oil	41816 kJ/kg	21.10
Other petroleum[6]	38369 kJ/kg	20.00
Natural gas	38931 kJ/m^3	15.30
Coke oven gas[7]	16726 kJ/m^3	12.10
Other gas[8]	5227 kJ/m^3	12.10
LPG	50179 kJ/kg	17.20
Refinery gas	46055 kJ/kg	18.20

This calculation process considers the most efficiency technology of coal fired power generation as 600MW domestic sub-critical unit and net coal consumption rate is 343.33gce/kWh, which is equivalent to 35.82% of net electricity efficiency. The most efficiency technology of gas turbine power plant (including gas and oil) is considered as 200MW combined cycle (such like GE 9E unit), the net coal consumption rate (value calculation) is 258gce/kWh, which is equivalent to 47.67% of net electricity efficiency.

	Parameter	Net electricity efficiency	Emission factor (tc/TJ)	Emission factor (tCO_2/MWh)
		A	B	C=3.6/A/1000*B*44/12
Coal-fires power plant	$EF_{Coal,Adv}$	35.82%	25.8	0.9508
Gas-fired power plant	$EF_{Gas,Adv}$	47.67%	15.3	0.4237
Oil-fires power plant	$EF_{Oil,Adv}$	47.67%	21.1	0.5843

[6] Because China Energy Statistics Yearbook will not provide other petroleum products low thermal value, this calculation adopts low thermal value of 38369kJ/kg based on the calculation between energy balance physical quality and standard quality, which is equivalent to 1.3108tce/t.

[7] According to China Energy Statistics Yearbook 2005 P365, this calculation adopts the lowest value of 16726-17981 kJ/m^3

[8] According to China Energy Statistics Yearbook 2005 P365, this calculation adopts the lowest value.

Table A3-2 OM emission factor calculation of North China Power Grid in 2003

Fuel	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	subtotal	Carbon coefficient	NCV	CO2 Emissions
									(TC/TJ)	(TJ/unit)	(tCO2)
								A	B	C	D = A*B*C*44/12
Raw coal	10^4 Tons	714.73	1052.74	5482.64	4528.5	3949.32	6808	**22535.94**	25.8	20908	445737636.11
Clean coal	10^4 Tons						9.41	**9.41**	25.8	26344	234510.60
Other washed coal	10^4 Tons	6.31		67.28	208.21		450.9	**732.7**	25.8	8363	5796681.31
Coke	10^4 Tons					2.8		**2.8**	25.8	28435	75318.63
Coke oven gas	10^8 m^3	0.24	1.71		0.9	0.21	0.02	**3.08**	12.1	16726	228559.67
Other gas	10^8 m^3	16.92		10.63		10.32	1.56	**39.43**	12.1	5227	914399.71
Crude oil	10^4 Tons						29.68	**29.68**	20	41816	910139.18
Gasoline	10^4 Tons						0.01	**0.01**	18.9	43070	298.48
Diesel	10^4 Tons	0.29	1.35	4		2.91	5.4	**13.95**	20.2	42652	440693.26
Fuel oil	10^4 Tons	13.95	0.02	1.11		0.65	10.07	**25.8**	21.1	41816	834672.45
LPG	10^4 Tons							**0**	17.2	50179	0.00
Refinery gas	10^4 Tons			0.27			0.83	**1.1**	18.2	46055	33807.44
Natural gas	10^8 m^3		0.5				1.08	**1.58**	15.3	38931	345076.60
Other petroleum products	10^4 Tons							**0**	20	38369	0.00
Other coking products	10^4 Tons							**0**	25.8	28435	0.00
Other energy	10^4 Tce	9.83					39.21	**49.04**	0	0	0.00
SubTotal											455551793.43

Source: China Energy Statistics Yearbook 2004

MWh	Yr 2003
Net import from Northeast China Power Grid to North China Power Grid	4,244,380

The average emission factor of Northeast China Power Grid C=A/B	1.13656
Total emissions（tCO2）A	174,151,899
Total delivered electricity MWh B	153,227,363

North China Power Grid Thermal Electricity generation in 2003

	Electricity generation (10^8kWh)	**Electricity generation (MWh)**	**rate of electric plant consumption (%)**	**Delivered electricity (MWh)**
Beijing	186.08	18608000	7.52	17208678.4
Tianjin	321.91	32191000	6.79	30005231.1
Hebei	1082.61	108261000	6.5	101224035
Shanxi	939.62	93962000	7.69	86736322.2
Inner Mongolia	651.06	65106000	7.66	60118880.4
Total				425364906

China Electrical Power Yearbook 2004

	Yr 2003
Total delivered electricity (MWh)	**429,609,286**
Total emissions（tCO_2）	**460,375,781**

Table A3-3 OM emission factor calculation of North China Power Grid in 2004

Fuel	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	subtotal	Carbon coefficient	NCV	CO2 Emissions
									(TC/TJ)	(TJ/unit)	(tCO2)
								A	B	C	D = A*B*C*44/12
Raw coal	10^4 Tons	823.09	1410	6299.8	5213.2	4932.2	8550	**27228.29**	25.8	20908	538547476.6
Clean coal	10^4 Tons						40	**40**	25.8	26344	996856.96
Other washed coal	10^4 Tons	6.48		101.04	354.17		284.22	**745.91**	25.8	8363	5901190.882
Coke	10^4 Tons					0.22		**0.22**	25.8	28435	5917.8922
Coke oven gas	10^8 m^3	0.55		0.54	5.32	0.4	8.73	**15.54**	12.1	16726	1153187.451
Other gas	10^8 m^3	17.74		24.25	8.2	16.47	1.41	**68.07**	12.1	5227	1578574.385
Crude oil	10^4 Tons							**0**	20	41816	0
Diesel	10^4 Tons	0.39	0.84	4.66				**5.89**	20.2	42652	186070.4874
Fuel oil	10^4 Tons	14.66		0.16				**14.82**	21.1	41816	479451.3838
LPG	10^4 Tons							**0**	17.2	50179	0
Refinery gas	10^4 Tons		0.55	1.42				**1.97**	18.2	46055	60546.05223
Natural gas	10^8 m^3		0.37		0.19			**0.56**	15.3	38931	122305.6296
Other petroleum products	10^4 Tons							**0**	20	38369	0
Other coking products	10^4 Tons							**0**	25.8	28435	0
Other energy	10^4 Tce	9.41		34.64	109.73	4.48		**158.26**	0	0	0
Total											549031577.7

Source: China Energy Statistics Yearbook 2005

MWh	Yr 2004
Net import from Northeast China Power Grid to North China Power Grid	4,514,550

The average emission factor of Northeast China Power Grid C=A/B	1.17411
Total emissions（tCO2）A	199,754,431
Total delivered electricity MWh B	170,132,885

North China Power Grid Thermal Electricity generation in 2004

	Electricity generation (10^8kWh)	Electricity generation （MWh)	rate of electric plant consumption （%）	Delivered electricity （MWh)
Beijing	185.79	18579000	7.94	17,103,827
Tianjin	339.52	33952000	6.35	31,796,048
Hebei	1249.7	124970000	6.5	116,846,950
Shanxi	1049.26	104926000	7.7	96,846,698
Inner Mongolia	804.27	80427000	7.17	74,660,384
Total				489,173,110

China Electrical Power Yearbook 2005

	Yr 2004
Total delivered electricity (MWh)	**493,687,660**
Total emissions（tCO_2）	**554,332,148**

Table A3-4 OM emission factor calculation of North China Power Grid in 2005

Fuel	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	subtotal	Carbon coefficient	NCV	CO2 Emissions
									(TC/TJ)	(TJ/unit)	(tCO2)
								A	B	C	D = A*B*C*44/12
Raw coal	10^4 Tons	897.75	1675.2	6726.5	6176.5	6277.23	10405.4	**32158.53**	25.8	20908	636062535.8
Clean coal	10^4 Tons						42.18	**42.18**	25.8	26344	1051185.664
Other washed coal	10^4 Tons	6.57		167.45	373.65		108.69	**656.36**	25.8	8363	5192725.191
Coke	10^4 Tons					0.21	0.11	**0.32**	25.8	28435	8607.8432
Coke oven gas	10^8 m^3	0.64	0.75	0.62	21.08	0.39		**23.48**	12.1	16726	1742396.483
Other gas	10^8 m^3	16.09	7.86	38.83	9.88	18.37		**91.03**	12.1	5227	2111027.27
Crude oil	10^4 Tons					0.73		**0.73**	20	41816	22385.49867
Gasoline	10^4 Tons			0.01				**0.01**	18.9	43070	298.4751
Diesel	10^4 Tons	0.48		3.54		0.12		**4.14**	20.2	42652	130786.3867
Fuel oil	10^4 Tons	12.25		0.23		0.06		**12.54**	21.1	41816	405689.6325
LPG	10^4 Tons							**0**	17.2	50179	0
Refinery gas	10^4 Tons			9.02				**9.02**	18.2	46055	277221.0107
Natural gas	10^8 m^3	0.28	0.08		2.76			**3.12**	15.3	38931	681417.0792
Other petroleum products	10^4 Tons							**0**	20	38369	0
Other coking products	10^4 Tons							**0**	25.8	28435	0
Other energy	10^4 Tce	8.58		32.35	69.31	7.27	118.9	**236.41**	0	0	0
Total											647686276.3

Source: China Energy Statistics Yearbook 2006

MWh	Yr 2005
Net import from Northeast China Power Grid to North China Power Grid	23,423,000

The average emission factor of Northeast China Power Grid C=A/B	1.1578
Total emissions （tCO2）A	207,282,748
Total delivered electricity MWh B	179,031,569

North China Power Grid Thermal Electricity generation in 2005

	Electricity generation (10^8kWh)	**Electricity generation （MWh)**	**rate of electric plant consumption （%）**	**Delivered electricity （MWh)**
Beijing	208.8	20880000	7.73	19,265,976
Tianjin	369.93	36993000	6.63	34,540,364
Hebei	1343.48	134348000	6.57	125,521,336
Shanxi	1287.85	128785000	7.42	119,229,153
Inner Mongolia	923.45	92345000	7.01	85,871,616
Total				560,751,013

China Electrical Power Yearbook 2006

Yr 2005

Total delivered electricity (MWh)	**584,174,013**
Total emissions （tCO_2）	**674,805,425**

The average weighted emission factor of three year：1.1208 tCO_2/MWh

North China Power Grid BM calculation

Step 1. The share of CO_2 emissions in the total emissions from solid, liquid and gas fuels fired for electricity generation

		Beijing	Tian jin	Hebei	Shanxi	Shandong	Inner Mongolia	Total	Thermal value	Emission factor	Emissions
Fuel	Unit	A	B	C	D	E	F	G=A+…+F	H	I	K=G*H*I*44/12/100
Raw coal	10^4 Tons	897.75	1675.2	6762.5	6176.45	10405.4	6277.23	32158.53	20908 kJ/kg	25.80	636,062,536
Clean coal	10^4 Tons	0	0	0	0	42.18	0	42.18	26344 kJ/kg	25.80	1,051,186
Other washed coal	10^4 Tons	6.57	0	167.45	373.65	108.69	0	656.36	8363 kJ/kg	25.80	5,192,725
Coke	10^4 Tons	0	0	0	0	0.11	0.21	0.32	28435 kJ/kg	25.80	8,608
SubTotal											**642,315,055**
Crude oil	10^4 Tons	0	0	0	0	0	0.73	0.73	41816 kJ/kg	20.00	22,385
Gasoline	10^4 Tons	0	0	0.01	0	0	0	0.01	43070 kJ/kg	18.90	298
Kerosene	10^4 Tons	0	0	0	0	0	0	0	43070 kJ/kg	19.60	0
Diesel	10^4 Tons	0.48	0	3.54	0	0	0.12	4.14	42652 kJ/kg	20.20	130,786
Fuel oil	10^4 Tons	12.25	0	0.23	0	0	0.06	12.54	41816 kJ/kg	21.10	405,690
Other petroleum products	10^4 Tons	0	0	0	0	0	0	0	38369 kJ/kg	20.00	0
SubTotal											**559,160**
Natural gas	$10^7 m^3$	2.8	0.8	0	27.6	0	0	31.2	38931 kJ/m^3	15.30	681,417
Coke oven gas	$10^7 m^3$	6.4	7.5	6.2	210.8	0	3.9	234.8	16726 kJ/m3	12.10	1,742,396
Other gas	$10^7 m^3$	160.9	78.6	388.3	98.8	0	183.7	910.3	5227 kJ/m^3	12.10	2,111,027
LPG	10^4 Tons	0	0	0	0	0	0	0	50179 kJ/kg	17.20	0
Refinery gas	10^4 Tons	0	0	9.02	0	0	0	9.02	46055 kJ/kg	18.20	277,221
SubTotal											**4,812,062**
Total											**647,686,276**

Source: China Energy Statistics Yearbook 2006

From above table and formulas (3)-(5) , λ_{Coal} =99.17%， λ_{Oil} =0.08%， λ_{Gas} =0.74%。

Step 2: Emission factor of thermal fired power

$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv}$ =0.9465 (tCO_2/MWh)

Step 3: Power grid BM calculation

North China Power Grid installed capacity in 2005

Installed capacity	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal	MW	3833.5	6149.9	22333.2	22246.8	19173.3	37332	111068.7
Hydro	MW	1025	5	784.5	783	567.9	50.8	3216.2
Nuclear	MW	0	0	0	0	0	0	0
Others	MW	24	24	48	0	208.9	30.6	335.5
Total	MW	4882.5	6178.9	23165.7	23029.8	19950.2	37413.4	114620.5

Source: China electrical power yearbook 2006

North China Power Grid installed capacity in 2004

Installed capacity	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal	MW	3458.5	6008.5	19932.7	17693.3	13641.5	32860.4	93594.9
Hydro	MW	1055.9	5	783.8	787.3	567.9	50.8	3250.7
Nuclear	MW	0	0	0	0	0	0	0
Others	MW	0	0	13.5	0	111.8	12.4	137.7
Total	MW	4514.4	6013.5	20730	18480.5	14321.2	32923.6	96983.2

Source: China electrical power yearbook 2005

North China Power Grid installed capacity in 2003

Installed capacity	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal	MW	3347.5	6008.5	17698.7	15035.8	11421.7	30494.4	84006.6
Hydro	MW	1058.1	5	764.3	795.7	592.1	50.8	3266
Nuclear	MW	0	0	0	0	0	0	0
Others	MW	0	0	13.5	0	76.6	0	90.1
Total	MW	4405.6	6013.5	18476.5	15831.5	12090.4	30545.2	87362.7

Source: China electrical power yearbook 2004

Table A3－5 North China Power Grid BM calculation sheet

	Installed capacity in 2003	Installed capacity in 2004	Installed capacity in 2005	Incremental installed capacity between 2003-2005	Share on incremental installed capacity
	A	B	C	D=C-A	
Thermal（MW）	84006.6	93594.9	111068.7	27062.1	99.28%
Hydro（MW）	3266.0	3250.7	3216.2	-49.8	-0.18%
Nuclear（MW）	0	0	0	0	0%
Wind Power（MW）	90.1	137.5	335.5	245.4	0.90%
Total（MW）	**87362.7**	**96983.1**	**114620.4**	**27257.7**	**100.00%**
Share of installed capacity in 2004	76.22%	84.61%	100%		

$EF_{grid, BM,y}$=0.9465×99.28%=0.9397 tCO_2/MWh.

OM	tCO_2/MWh	1.1208
BM	tCO_2/MWh	0.9397

Annex 4

MONITORING INFORMATION

No other information.