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

CONTENTS

Annexes

SECTION A. General description of project activity

A.1. Title of the project activity:

Project title: Inner Mongolia Wuhai 30MW Waste Gas Power Generation Project

PDD Version: 03.7

Date: 25/05/2011

A.2. Description of the project activity:

Inner Mongolia Wuhai 30MW Waste Gas Power Generation Project (hereafter referred to as "the Project") is being developed by Inner Mongolia Wuhai Black Cat Carbon Black Co., LTD. The Project is sited at Xilaifeng Industry Park of Wuhai City, Inner Mongolia Autonomous Region, People's Republic of China.

The objective of the Project is to generate electric power utilising the waste gas from three hard carbon black production lines and one soft carbon black line. The total production capacity of 4 carbon black lines is 160,000t/y. The production capacity of each carbon black reactors is 40,000t/y. The construction completion of 1# and 2# carbon black lines were respectively in 16, Jun 2009 and 16 May 2009. 3# and 4# carbon black lines were completed in 20 Nov 2009 and 18 May 2010. In the absence of the Project, the electricity for carbon black lines production was imported from NCPG and the waste gas from carbon black manufacturing process was released into the atmosphere after purification treatment (waste gas incineration).

The Project total installed capacity is 2×15MW. The total electricity generation is 240,000MWh. The total electricity supply of the project is 216,000MWh after meeting captive requirement of power generation devices. About 50,407.760MWh electricity from the total electricity supply of the project will be used for 4 carbon black lines production in a year, the remaining will be exported to the NCPG. The Project is expected to reduce emissions of greenhouse gases by an estimated 187,216tCO_2e per year during the fixed crediting period.

The implementation of the Project will help China to fulfil its goals of promoting sustainable development through the following aspects:

1) When the Project completed and put into production, the waste gas from carbon black production will be used and thus substantially alleviate environment pollution of the local. The Project will replace equivalent electricity generated by NCPG. Coal combustion for power generation in the NCPG and elsewhere, accounts for a significant amount of China's air pollution. This project reduces pollutants caused by fossil fuel consumption.

2) The Project will improve the diversity and structure of North China Power Grid; Mitigate conflict between supply and demand of electricity.

3) The Project construction and operation will provide a number of employment opportunities for local people. The Project activity creates full time employment for 47 employees (43 workers and 4 administrative personnel), and will be a certain role in promoting economic development.

In views mentioned above, the Project strongly contributes to the sustainable development.

A.3. Project participants:

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)
Host Country: People's Republic of China	Inner Mongolia Wuhai Black Cat Carbon Black Co., LTD	No
Switzerland	Vitol S.A.	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

People's Republic of China

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

Inner Mongolia Autonomous Region

A.4.1.3. City/Town/Community etc.:

Wuhai City

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

The Project is to be implemented by Inner Mongolia Wuhai Black Cat Carbon Black Co., LTD and located at Hainan District of Wuhai City, which is traffic hub for North China area, Northeast area and Northwest area. The geographical coordinates of the project site are east longitude 106°55'34", and north latitude 39°22'18". Detailed physical location is described in **Fig1.**

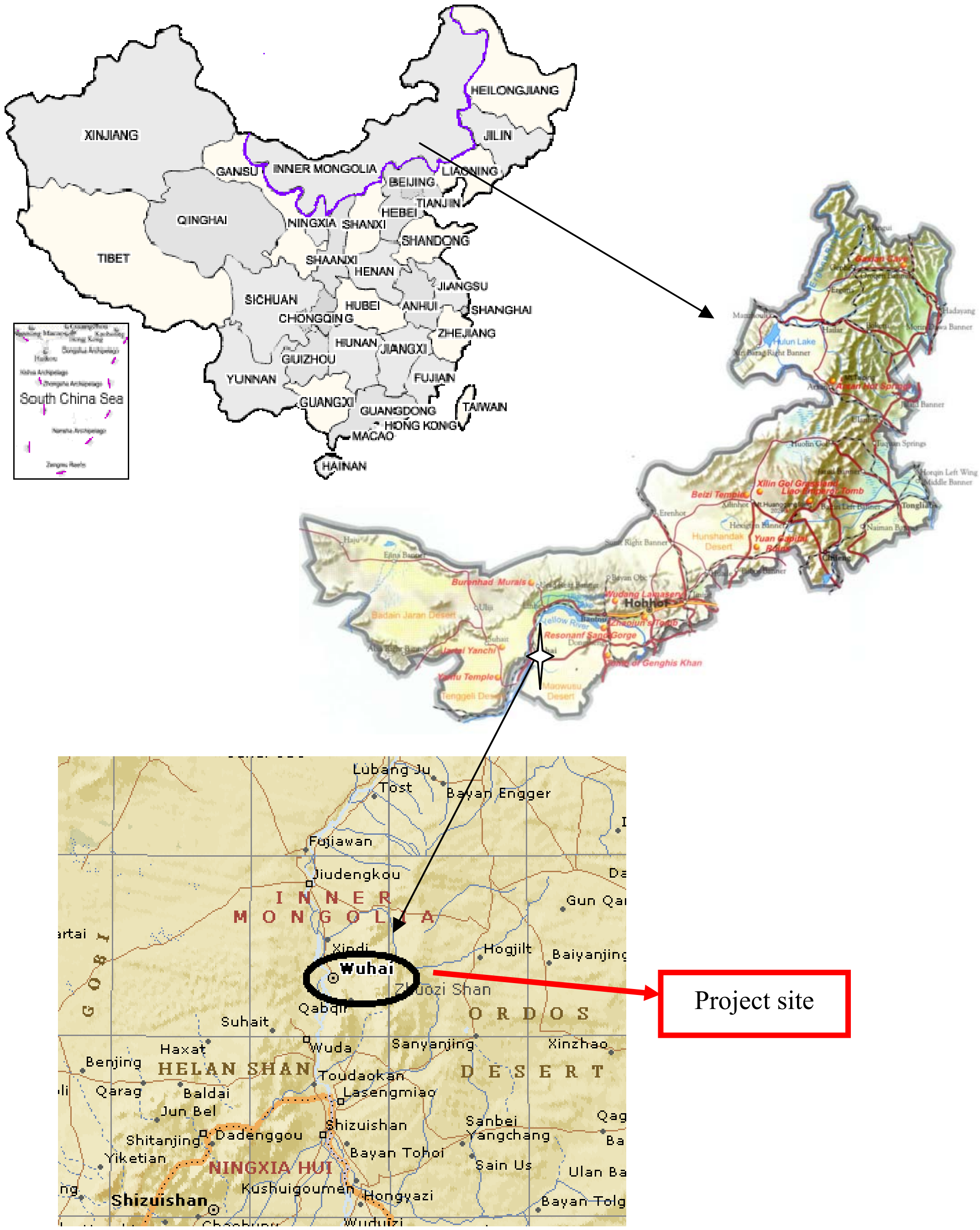

Fig.1. Location of the Project

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

The Project falls within the following sectoral scopes:
Sectoral scope 1: Energy Industries
Sectoral scope 4: Manufacturing industries

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

The technology of carbon black waste gas recovery is as follows. Waste gas with a flow rate of around 160,000Nm^3/h at a temperature of 220℃ with calorific value of about 650 Kcal/Nm^3 is produced by 4 of carbon black production lines. 20% of waste gas will be used in the carbon black production process for drying carbon black before and after the project implementation. The remaining 80% of waste gas was released into atmosphere before the project implementation, while after the project implementation, it will be collected through newly built collection pipes and fed into boilers and burned there, and the released thermal energy evaporates soft water into steam, which is used to drive turbine blades to rotate. Accordingly, electricity is produced by the generators. The waste gas recovery system diagram as follows.

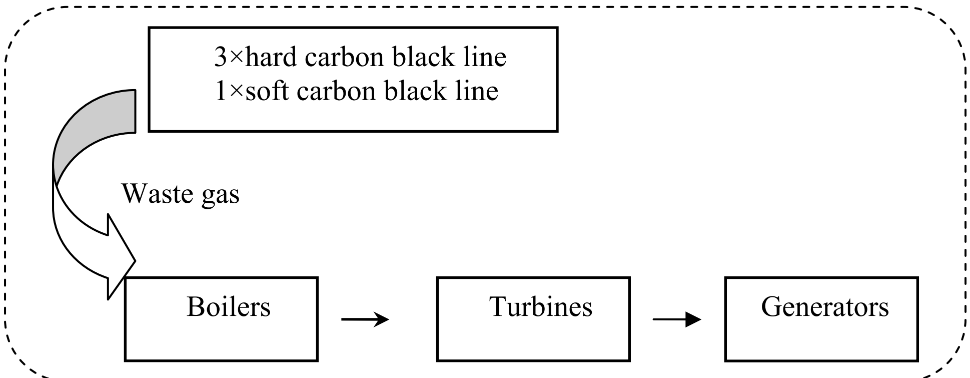

Fig.2. Diagram of Waste Gas Recovery System

The major facilities which will be employed in the project activity are shown in the following table.

Table A.4-3 main equipment parameters

Boiler	
Model	NG-75/5.3 /485-Q
Quantity	2
Superheat stream flow	75t/h
Rated steam temperature	485℃
Rated steam pressure	5.3MPa
Feed water temperature	150℃
Thermal efficiency	83%

Turbine	
Model	N15-4.9(0.9)
Quantity	2
Power	15MW
Rated inlet airflow	63t/h
Rated speed	3000r/min
Steam temperature	470℃
Rated inlet airflow pressure	4.9Mpa

Generator	
Model	QF-J15-2
Quantity	2
Active power	15MW
Rated voltage	10.5kV
Power factor	0.8
Rated speed	3000r/m

All the main equipments employed are domestically manufactured. The Project owner will train staffs and hire the experienced personnel in handling and operating this kind of equipment before project commissioning.

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

The emission reductions due to the Project will have 10 years fixed crediting period, estimated to be started from date of 01/06/2011 after the Project successfully registered as the CDM project at the EB, and the total emission reductions generated by the Project is 1,872,160tCO_2e.

Table A.4-4 The estimation of the emission reductions in the fixed crediting period

Year	**The estimation of annual emission reductions (tCO2e)**
01/06/2011-31/12/2011	109,209
01/01/2012-31/12/2012	187,216
01/01/2013-31/12/2013	187,216
01/01/2014-31/12/2014	187,216
01/01/2015-31/12/2015	187,216
01/01/2016-31/12/2016	187,216
01/01/2017-31/12/2017	187,216
01/01/2018-31/12/2018	187,216
01/01/2019-31/12/2019	187,216
01/01/2020-31/12/2020	187,216
01/01/2021-31/05/2021	78,007
The estimation of total emission reductions in the crediting period	1,872,160
Total number of crediting years	10
The estimation of annual average emission reductions in the crediting period	187,216

A.4.5. Public funding of the project activity:

No existing Official Development Assistance (ODA) from Annex I countries is involved in the 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:

Title: ACM0012 “Consolidated baseline methodology for GHG emission reductions for waste gas or waste heat or waste pressure based energy system” (version 03.2)
“Tools for the Demonstration and Assessment of Additionality” (version 05.2) as well as the latest version of the “Tool to calculate the emission factor for an electricity system” (version 02) according toACM0012 are adopted.

More information about the methodology and the tool can be found on the website:
http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html.

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

The consolidated methodology is for the following types of project activities:
Type-1: All the waste energy in identified WECM stream/s that will be utilized in the project activity is, or would be flared or released to atmosphere in the absence of the project activity at the existing or new facility. The waste energy is an energy source for:

- Cogeneration; or
- Generation of electricity; or
- Direct use as process heat source; or
- For generation of heat in element process (e.g. steam, hot water, hot oil, hot air); or
- For generation of mechanical energy.

Type-2: An existing industrial facility, where the project activity is implemented, that captures and utilizes a portion of the waste gas stream(s) considered in the project activity.

All the waste energy that will be utilized in the project activity would be directly released to atmosphere in the absence of the project activity at the existing facility. The recovery of waste gas from carbon black lines is purely to generate electricity. Therefore, **Type-1** is applicable to the Project activity. **Table B.1** below shows how the Project activity meets the requirement of the Methodology:

Table B.2-1: Reason for the applicability to Project activity

No.	Applicability Conditions as per ACM0012	Situation of this Project Activity
1	If project activity is use of waste pressure to generate electricity, electricity generated using waste gas pressure should be measurable.	The project activity does not use waste pressure to generate electricity.
2	Energy generated in the project activity may be used within the industrial facility or exported outside the industrial facility;	The electricity generated from the project activity is exported to grid after meeting its captive requirement.

3	The electricity generated in the project activity may be exported to the grid;	The electricity generated in the project activity will be exported to NCPG after meeting captive use.
4	Energy in the project activity can be generated by the owner of the industrial facility producing the waste gas/heat or by a third party (e.g. ESCO) within the industrial facility.	All the waste gas is from carbon black production lines in the industrial facility, and it is used to generate electricity in the project activity.
5	Regulations do not constrain the industrial facility generating waste gas from using the fossil fuels being used prior to the implementation of the project activity.	There is no such regulation which constrains the industrial facility generating waste gas from using the fossil fuels being used prior to the implementation of the project activity.
6	The methodology covers both new and existing facilities. For existing facilities, the methodology applies to existing capacity. If capacity expansion is planned, the added capacity must be treated as a new facility.	The project utilizes the waste gas produced by existing facilities for power generation, and there is no capacity expansion.
7	The emission reductions are claimed by the generator of energy using waste energy.	The emission reductions will be exclusively claimed by the Project owner.
8	In case where the energy is exported to other facilities, an official agreement exists between owners of the project energy generation plant with the recipient plant(s) that the emission reductions would not be claimed by recipient plant(s) for using a zero-emission energy source.	A portion of power energy will be exported to NCPG, but emission reductions will be exclusively claimed by the Project owner.
9	For those facilities and recipients, included in the project boundary, which prior to implementation of the project activity (current situation) generated energy on-site (sources of energy in the baseline), the credits can be claimed for minimum of the following time periods: ○The remaining lifetime of equipments currently being used; and ○Credit period.	The remaining lifetime of equipments currently being used is expected to be 20 years, longer than the credit period. Therefore, the credits will be claimed in credit period, which lasts 10 years.
10	Waste energy that is released under abnormal operation (for example, emergencies, shut down) of the plant shall not be accounted for.	Any waste gas is released under abnormal operation of the plant will not be accounted for.

Demonstration of use of waste energy in absence of CDM project activity

For Type -1 project: It shall be demonstrated that the waste energy utilized in the project activity was flared was flared or released into the atmosphere (or wasted in case of project activity recovering waste pressure) in the absence of the project activity at the existing facility[1] by either

[1] Facilities where the commercial production had began at the time when the Project Activity is submitted for validation.

one of the following ways:

1) By **direct measurements** of the energy content and amount of the waste energy produced for at least *three years* prior to the start of the project activity;

2) Providing an **energy balance** of the relevant sections of the plant to prove that the waste energy was not a source of energy before the implementation of the project activity. For the energy balance applicable process parameters are required. The energy balance must demonstrate that the waste energy was not used and also provide conservative estimations of the energy content and amount of waste energy released;

3) **Energy bills** (electricity, fossil fuel) to demonstrate that all the energy required for the process (e.g. based on specific energy consumption specified by the manufacturer) has been procured commercially. Project participants are required to demonstrate through the financial documents (e.g. balance sheets, profit and loss statement) that no energy was generated by waste energy and sold to other facilities and/or the grid. The bills and financial statements should be audited by competent authorities;

4) **Process plant** manufacturer's original design specifications and layout diagrams from the facility could be used as an estimate of the quantity and energy content of the waste energy produced for the rated plant capacity/per unit of product produced;

5) On site checks conducted by the DOE prior to project implementation can confirm that no equipment for waste energy recovery and utilisation, on the WECM stream recovered under the project activity, had been installed prior to the implementation of the CDM project activity.

As a Type-1 project activity, the method 4 process plant is used for demonstration of use of waste energy in absence of the project. The material process balance diagram of hard and soft carbon black production is showed that the waste gas utilized in the project activity was released into the atmosphere in the absence of the project activity. The document is provided and confirmed by DOE validation.

Based on the above analysis, it can therefore be concluded that the Project activity meets all the applicability conditions required by methodology ACM0012.

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

The definition of project boundary states that the project boundary shall encompass all anthropogenic emissions by sources of greenhouse gases (GHG) under the control of the project participants that are significant and reasonably attributable to the CDM project activity. For the purpose of determining GHG emissions of the project activity, project boundary shall include:

1. The industrial facility where waste energy is generated, including the part of the industrial facility where the waste gas was utilized for generation of captive electricity prior to implementation of the project activity);

2. The facility where process heat in the element process/steam/electricity/mechanical energy is generated (generator of process heat/steam/electricity/mechanical energy). Equipment

providing auxiliary heat to the waste energy recovery process shall be included within the project boundary; and

3. The facility (ies) where process heat in the element process/steam/electricity/mechanical energy is used (the recipient plant(s)) and/or grid where electricity is exported, if applicable.

Spatial extent of the grid is as defined in the "Tool to calculate the emission factor for an electricity system" The spatial extent of the project boundary includes the project site and all power plants connected physically to the electricity system that the CDM project power plant is connected to."

In terms of the proposed project, the project boundary comprises carbon black production lines, the waste gas recovery boilers, the steam turbines, the generators, auxiliary power consumer units and all power plants connected to North China Power Grid[2], which consists of Beijing, Tianjin, Hebei Province, Shanxi Province, Shandong Province and Inner Mongolia Autonomous Area.

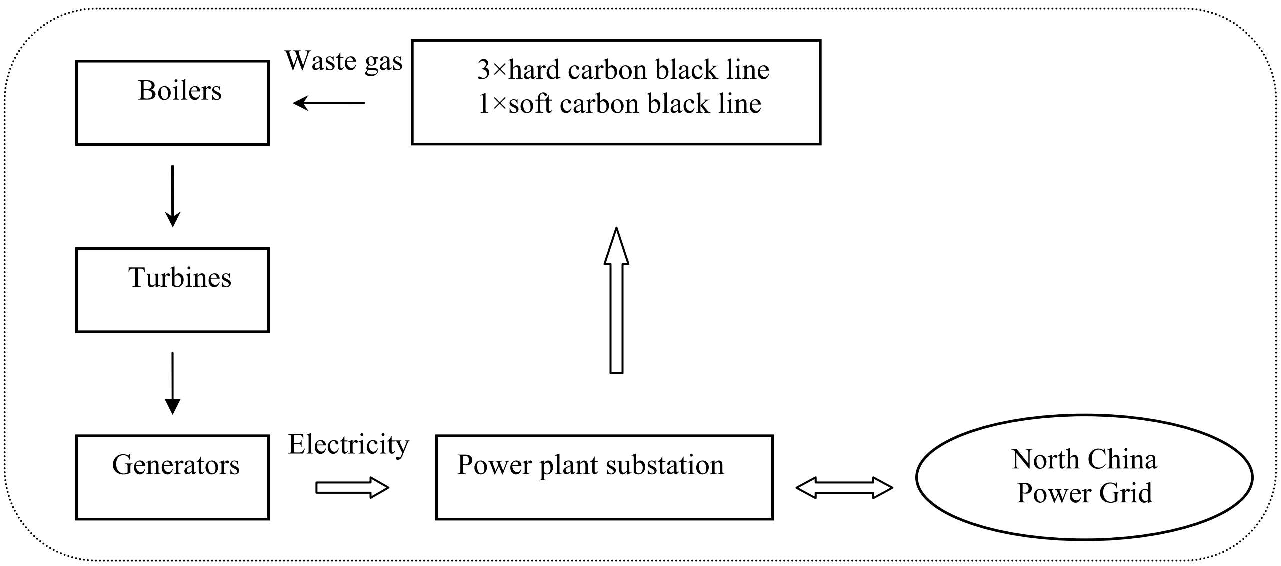

Fig.3. Project Boundary

All released waste gas can be used for power generation. The Project will not require any supplemental fossil fuel consumption. At certain times, such as when shutting down and starting up for maintenance purposes, electricity supplied by the grid may be required; however, imports from the grid to the equipment installed under the project activity are not included in CER calculations, in line with the methodology.

The sources and gases included or excluded within the Project boundary is tabulated below:

Table B.3-1 The sources and gases included or excluded within the Project boundary

[2] China NDRC (02/07/2009), 2009 Baseline Emission Factors for Regional Power Grids in China. Source: http://qhs.ndrc.gov.cn/qjfzjz/t20090703_289357.htm

	Source	Gas	Included ?	Justification / Explanation
Baseline	electricity generation, grid or captive source	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification
		N_2O	Excluded	Excluded for simplification
	Fossil fuel consumption in boiler for thermal energy	CO_2	Excluded	The project isn't involved with the generation of thermal energy
		CH_4	Excluded	Excluded for simplification
		N_2O	Excluded	Excluded for simplification
	Fossil fuel consumption in cogeneration plant	CO_2	Excluded	No cogeneration plants exist.
		CH_4	Excluded	Excluded for simplification
		N_2O	Excluded	Excluded for simplification
	Baseline emissions from generation of steam used in the flaring process, if any	CO_2	Excluded	No generated steam is used in the flaring process.
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification
Project Activity	Supplemental fossil fuel consumption at the project plant	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification
	Supplemental electricity consumption	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification
		N_2O	Excluded	Excluded for simplification
	Electricity import to replace captive electricity, which was generated using waste gas in absence of project activity	CO_2	Excluded	Electricity need in the baseline is supplied by the North China Power Grid.
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.
	Project emissions from cleaning of gas	CO_2	Excluded	Waste gas cleaning is not involved.
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification

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

The project activity involves export of power from the waste gas based power plant. The methodology is applied in the context of the project activity by following 4 step procedures for the determining the baseline as following:

The baseline candidates should be considered for the following facilities:

1. *For the industrial facility where the waste energy is generated:* carbon black lines at Inner Mongolia Wuhai Black Cat Carbon Black Co., LTD.
2. *For the facility where the energy is produced:* facilities and equipments used in the project activity such as boilers, turbines, generators, etc.
3. *For the facility where the energy is consumed:* the electricity will be used on site for captive use and the remaining will be exported to the North China Power Grid.

Step 1: Define the most plausible baseline scenario for the generation of heat and electricity using the following baseline options and combinations.

For the use of waste gas/heat, the realistic and credible alternatives may include:
W1: WECM is directly vented to atmosphere without incineration or waste heat is release to the atmosphere or waste pressure energy is not utilized.
W2: WECM is released to the atmosphere (for example after incineration) or waste heat is released to the atmosphere or waste pressure energy is not utilized.
W3: Waste gas/heat is sold as an energy source.
W4: Waste gas/heat is used for meeting energy demand.
W5: A portion of the waste gas produced at the facility is captured and used for captive electricity generation, while the rest of the waste gas produced at the facility is vented /flared.
W6: All the waste gas produced at the industrial facility is captured and used for export electricity generation.

Scenario analysis on W1
According to the *Law of the Peoples Republic of China on the Prevention and Control of Atmospheric Pollution (carry into effect on 01/09/2000)*[3], the waste gas should be purified such as incineration or other measures shall be taken before released to the atmosphere. Therefore, the alternative option is not allowed by the Chinese laws and regulations and it cannot be considered as a baseline scenario.

Scenario analysis on W2
The baseline scenario option which is compliance with all legal and regulatory requirements and it is the common practice in China.Thus, it can be regarded as a realistic and credible scenario.

Scenario analysis on W3
The users are forbidden to use waste gas from carbon black production lines[4] directly for the safety reasons according to manufactured gas standard[5]:
- The carbon monoxide concentration of waste gas from carbon black production lines is 10.13% which is higher than the upper limited 10% of manufactured gas standard;
- The lower calorific value of waste gas from carbon black production lines is 2.816MJ/m3 which is lower than its lowest limited 10 MJ/m3 of manufactured gas standard;

Therefore, W3 is not a plausible scenario.

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[3] Law of the Peoples Republic of China on the Prevention and Control of Atmospheric Pollution (01/09/2000). Source: http://www.envir.gov.cn/law/air.htm

[4] The specification of waste gas from carbon black production plant

[5] National standard of manufactured gas

Scenario analysis on W4

Waste gas is used for power generation to meet the energy demand, i.e. by implementing the proposed project but being not undertaken as a CDM project. This scenario is in compliance with legal and regulatory requirements in China. Hence, it can be regarded as a realistic and credible scenario.

Scenario analysis on W5

According to the carbon black production process, there is a small part of waste gas produced will be used for drying carbon black not for electricity generation and there is no existing captive power plant built on the project site. So W5 is not a plausible scenario to the project.

Scenario analysis on W6

It is not a baseline scenario. W6 is all of the waste gas produce is captured and used for export electricity generation. But according to the project, all of the waste gas is captured and used for self-use first and the remaining will be export. Furthermore, the waste gas from carbon black production is released into atmosphere after incineration is a common practice in China, without CDM revenue, the power plant based on carbon black waste gas is financially unattractive[6]. So W6 is not a plausible scenario to the project.

For power generation, the realistic and credible alternatives may include:

P1: Proposed project activity is not undertaken as a CDM project activity.

P2: On site or off site existing/new fossil fuel powered cogeneration plant.

P3: On site or off site existing/new renewable energy based cogeneration plant.

P4: On site or off site existing/ new fossil fuel based existing captive or identified plant.

P5: On site or off site existing/new renewable energy or other waste energy based existing captive or identified plant.

P6: Source Grid-connected power plants

P7: Captive electricity generation using waste energy (if project activity is captive generation using waste energy, this scenario represents captive generation with lower efficiency than the project activity)

P8: Cogeneration from waste energy (if project activity is cogeneration with waste energy, this scenario represents cogeneration with lower efficiency than the project activity)

P9: Existing power generating equipment (used previous to implementation of project activity for captive electricity generation from a captured portion of waste gas) is either decommissioned to build new more efficient and larger capacity plant or modified or expanded (by installing new equipment), and resulting in higher efficiency, to produce and only export electricity generated from waste gas. The electricity generated by existing equipment for captive consumption is now imported from the grid;

P10: Existing power generating equipment (used previous to implementation of project activity or captive electricity generation from a captured portion of waste gas) is either decommissioned to build a new more efficient and larger capacity plant or modified or expanded (by installing new equipment), and resulting in lighter efficiency, to produce electricity from waste gas (already utilized portion plus the portion flared/vented) for own consumption and for export;

P11: Existing power generating equipment is maintained and additional electricity generated by grid connected power plants.

[6] http://cdm.unfccc.int/Projects/DB/emc1278394777.39/view

Scenario analysis on P1

This scenario is in compliance with all applicable legal and a regulatory requirements, belongs to the national supported and encouraged activity, but it does not belong to the enforced activity by the regulations[7].Hence, scenario P1 considered as a baseline scenario.

Scenario analysis on P2

Since there is no on-site or off-site existing fossil fuel fired cogeneration plant, all the electricity demand by the carbon black lines is supplied by NCPG. Therefore, scenario P2 is not credible and realistic, shall be excluded.

Scenario analysis on P3

Since there is no on-site or off-site existing renewable energy cogeneration plant, all the electricity demand by the carbon black lines is supplied by NCPG. There is no wind, hydro, biomass, tide or geothermal resources near the project site, and high investment cost for solar development. Thus, scenario P3 is not credible and realistic, shall be excluded.

Scenario analysis on P4

There is no on-site or existing fossil fuel based existing captive or identified plant, all the electricity demand by the carbon black lines is supplied by NCPG. Regarding to build on-site or off-site new fossil fuel based captive plant, it is not allowed according to the inform on strict restriction on new fire power plants with an installed capacity less than 135MW issued by office of China State Council in 2002[8]. Therefore, scenario P4 is not compliance with legal and regulatory requirements and is not credible and realistic, shall be excluded.

Scenario analysis on P5

There is no on-site or existing renewable energy based existing captive or identified plant, all the electricity demand by the carbon black lines is supplied by NCPG. Regarding to building on-site or off-site new renewable energy based on captive plant, it is in compliance with all applicable legal and regulatory requirements, but there is no economical attractive renewable resource of solar, wind, tide, geothermal etc. for supplying the equivalent amount electricity demand of the carbon black lines. In addition, there is no existing captive or identified plant based on other waste energy and using the waste energy for power generation. Therefore, scenario P5 is not realistic and credible, and shall be excluded.

Scenario analysis on P6

Before the implementation of the proposed project, the electricity demand is met by the supply of NCPG. Scenario P6 is an actual situation, and compliance with legal and regulatory requirements. Therefore, it can be considered as a baseline scenario.

Scenario analysis on P7

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[7] China Energy Conservation Law Issued by State Council Office, (28/10/2007).Source: http://www.gov.cn/flfg/2007-10/28/content_788493.htm

[8] Notice on Strictly Prohibiting the Installation of Fuel-fired Generators with the Capacity of 135MW or below Issued by State Council Office, decree no. 2002-6, Source: http://www.gov.cn/gongbao/content/2002/content_61480.htm

There is no existing captive power plant built in the project site. Moreover, according to *Energy Conservation Law of the People's Republic of China*[9] implemented since 01, January 2008, the national government encourages the construction of energy conservation and high efficiency project and entities whose energy conservation management rules are not sound, energy conservation measures are not implemented or energy utilization efficiency is low, the energy conservation administrative department shall carry out on-site investigations, organize energy efficiency detection of energy consuming equipment, order to implement energy audit, put forward written rectification requirements, and order them to make rectification within a time limit. It is also required in *China's second Five-Year National Economic and Social Development Plan*[10], the government encourages the energy conservation, energy efficiency promotion project and also encourages enterprises to improving quality and efficiency of equipment and eliminate the old and low efficiency technologies. Therefore, P7 is not a creditable and plausible scenario to the project.

Scenario analysis on P8
Since the Project is not a cogeneration plant and this scenario need to represent captive generation with lower efficiency than the Project. Hence, scenario P8 is not realistic and credible, and shall be excluded.

Scenario analysis on P9
Since no existing power generating equipment exists in the project site and all the electricity generation is supplied by NCPG, scenario P9 is not realistic and credible, and shall be excluded.

Scenario analysis on P10
Since no existing power generating equipment exists in the project site and all the electricity generation is supplied by NCPG, scenario P10 is not realistic and credible, and shall be excluded.

Scenario analysis on P11
Since no existing power generating equipment exists in the project site and all the electricity generation is supplied by NCPG, scenario P11 is not realistic and credible, and shall be excluded.

The project activity is not a cogeneration project and electricity is the only product, so it is not necessary to consider heat generation. Alternatives from H1 to H9 don't need to be analyzed. Also, as per the FSR, no mechanical energy is produced in the electricity generation process. Therefore, alternatives from M1 to M5 shall be excluded.

In conclusion, W2, W4 , P1 and P6 are realistic and credible scenarios.

Combinations of baseline options and scenarios applicable to the Project.

	P1	P6

[9] The Energy Conservation Law of the People's Republic of China. source: http://www.gov.cn/flfg/2007-10/28/content_788493.htm

[10] China's second Five-Year National Economic and Social Development Plan. Source: http://news.sina.com.cn/c/2011-03-17/055622129864.shtml

W2	**This Combination is not applicable.** Waste gas is released to the atmosphere but it does not use for power generation.	**Combination scenario 1:** It is the actual situation. Waste gas is released to the atmosphere. The power demand of carbon black lines is met by the supply from NCPG.
W4	**Combination scenario 2:** The Project is implemented but not undertaken as a CDM project. This is compliance with the legal and regulatory requirements.	**This Combination is not applicable.** The Project implementation for electricity generation to reduce the emission reduction by replacing the local grid. Other than to purchase the equivalent electricity from grid for black carbon production.

Step 2: Identify the fuel for the baseline choice of energy source taking into account the national and/or sectoral policies as applicable.

According to ACM0012, step 2 is to demonstrate that the identified baseline fuel is available in abundance in the host country and there is no supply constrain.

Combination scenario 1: Waste gas is released to the atmosphere without fuel use. The power demand of carbon black lines is met by the supply from NCPG. The fuel of NCPG for electricity is coal, and there is no supply constrain.

Combination scenario 2: The Project is implemented but not undertaken as a CDM project. This is not need fuel consumption. Therefore, there is no fuel available and supply constrain.

In conclusion, combination scenario 1 and combination scenario 2 are the applicable baseline choice.

Step 3: step 2 and/or step 3 of the latest approved version of the "Tool for the demonstration and assessment of additionality" shall be used to identify the most plausible baseline scenarios by eliminating non-feasible options.

According to the "*Tool for the Demonstration and Assessment of Additionality"* (Version 5.2), step 3 is used to identify the most plausible baseline scenarios by eliminating non-feasible alternatives. Therefore, further discussion for each alternative in Step 2 is followed.

The combination scenario 1 is the common situation existing in the carbon black plant at present. It doesn't face any prohibitive obstacles. The combination scenario 2 is to implement the proposed project but not to develop it as a CDM project. In this combination, the investment barrier exists (More details in B.5), therefore, it is unfeasible commercially.

Hence, the only baseline option is as follows.

Baseline options		**Description of situation**
Waste gas	Power generation	
W2	P6	Waste gas is released to the atmosphere; the power demand of carbon black lines is met by the supply

		from NCPG.

Step 4: If more than one credible and plausible alternative scenario remain, the alternative with the lowest baseline emissions shall be considered as the most likely baseline scenario

Not applicable since there is only one alternative scenario.

Conclusion:
The baseline scenario of this Project is the combined scenario of W2 and P6: Purchase of equivalent electricity from NCPG and waste gas is released to the atmosphere.

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):

Early consideration of CDM

Since November 2007, the holding company of the project owner signed a letter of commitment with CDM consultancy company and plan to apply for CDM project. Considering the CDM revenue will overcome the investment barriers which the Project faced, the expectation of registering the Project as a CDM project is mentioned in the Feasibility Study Report, which was published in May, 2008. Since the internal rate of return of Project is less than 8% benchmark of power industry, the Board made the decision to apply for CDM to get further financial stimulus on June 03, 2008. The detail of project timeline is in the following table B.5-1.

Table B.5-1 The implementation timeline of the Project

Date	Key events	Reference/Evidence
19/11/2007	The holding company of the project owner signed the letter of commitment with CDM consultancy company.	The signed letter of commitment
05/2008	The feasibility study report of the Project completed.	FSR
05/05/2008	The project owner published the project information in the Wuhai Daily for public investigation.	Wuhai Daily
03/06/2008	The project owner took Board meeting and made decision to CDM development.	Board decision
15/06 /2008	The project owner signed the CDM consultancy agreement with CDM consultancy company.	CDM consultancy agreement
10/07/2008	The project owner held a stakeholder meeting and decided to conduct public investigation by deliver the questionnaires.	Stakeholder meeting minutes and questionnaires.
30/07/2008	The grid connection application of the Project approved by Inner Mongolia Power Corporation.	Approval of grid connection
28/08/2008	The Project started which is the date of the phase 1 main equipment purchase agreement of the Project signed.	Equipment purchase agreement of phase 1.
09/2008	The environment impact assessment report of	EIA report

	the Project completed.	
03/09/2008	The phase 1 construction contract signed.	The construction contract of phase 1.
18/11/2008	The project owner signed ERPA with the buyer.	ERPA
18/12/2008	The EIA report of the Project approved by Environmental Protection Bureau of Inner Mongolia Autonomous Region.	EIA approval
12/01/2009	The project owner informed to NDRC in writing of the commencement of the Project.	NDRC notification
06/03/2009	The Project was approved by Wuhai City DRC.	Wuhai City DRC approval.
05/05/2009	The phase 2 main equipment purchase agreement of the Project signed.	Equipment purchase agreement of phase 2.
07/06/2009	The Project was approved by Inner Mongolia DRC.	Inner Mongolia DRC approval
22/06/2009	The NDRC meeting for the Project examination.	The meeting notice
15/07/2009	China LoA received.	China LoA
21/09/2009	The phase 2 construction contract signed.	The construction contract of phase 2
23/10/2009	Swiss LoA received.	Swiss LoA

Additionality

ACM0012 methodology requires that the additionality of the project activity be demonstrated and assessed using the latest version (Version 05.2) of the "Tool for the demonstration and assessment of additionality" which is available at: http://cdm.unfccc.int/methodologies/PAmethodologies/AdditionalityTools/Additionality_tool.pdf.

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations

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

As demonstrated in B.4, the realistic and credible alternative scenario to the Project is the combined scenario of W2 and P6: Purchase of equivalent electricity from NCPG and waste gas is released to the atmosphere.

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

The alternative doesn't violate any mandatory law or regulation in China, and it is practiced extensively in Chinese industrial plants. In addition, the alternative is not limited by China applicable legal and regulatory requirements and has no prohibitive barriers.

According to the requirements of the *Tool for the demonstration and assessment of additionality*, an investment analysis in step 2 is chosen to demonstrate the additionality.

Step 2: Investment analysis

Sub-step 2a: Determine appropriate analysis method

Three options can be applied to conduct the investment analysis. These are the simple cost analysis (Option I), the investment comparison analysis (Option II) and the benchmark analysis (Option III).

Since this project will generate financial/economic benefits other than CDM-related income, through the sale of generated electricity, Option I (Simple Cost Analysis) is not applicable. The investment comparison analysis (Option II) is only applicable to the case that alternative baseline scenario is similar to the proposed projects. While the baseline scenario of the proposed project is the North China Grid supplies the same amount of electricity rather than a new investment project. Therefore option II is not an appropriate method either, the benchmark analysis (Option III) is more appropriate than investment comparison analysis (Option II) for assessing the financial attractiveness of the project activity.

Sub-step 2b: Option III – Application of benchmark analysis

According to EB 51 Annex 59 '*Previous rulings related to the appropriateness of benchmarks for project activities utilizing waste heat/gas for power generation'*, the project with 75% and above electricity generation for internal use, the project benchmark IRR can choose core business benchmark.

Since the project total electricity generation is 240,000MWh. The total electricity supply of the project is 216,000MWh (by deducting 10% consumption of electricity generation devices), in which the quantity of electricity for carbon black plant using about 50,407.760MWh (accounts about 21% of total electricity generation), the remaining is exported to the grid. Therefore, the Project with electricity generation for internal use is less than 75%, the core business benchmark is not applicable. We have to choose the power industry benchmark.

With reference to *Methodology and Parameter for Project Economic Evaluation (3rd edition)*[11], issued by China National Development and Reform Committee, the financial benchmark of Internal Rate of Return (IRR) for projects in the electric power industry is 8% (pre-tax). In China, this benchmark of IRR is a widely applied and accepted standard for projects in the power industry.

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

The main financial parameters used in the financial analysis are as follows:

Table B.5-2: Main parameters used for financial calculations

Parameters	Value	Source
Total Construction Investment	180 Million CNY	Feasibility Study Report (FSR)
Installed Capacity	30MW	FSR
Annual Net Output	209,520MWh	FSR
Electricity Tariff	0.21CNY/kWh (VAT excluded)	FSR

[11] Notice of Methodology and Parameter for Project Economic Evaluation (3rd edition) issued by National Development and Reform Committee PRC, decree no [2006] 1325.

Value Added Tax	17%	FSR
City construction maintenance tax	7%	FSR
Educational added tax	3%	FSR
Expected CERs price	80 CNY /tCO_2	FSR

Table B.5-3 Financial indicators of the project

	with CDM financing	without CDM financing
IRR	11.8%	5.59%

The financial analysis results are shown in Table B.5-3. As shown in this table, without carbon credits the project's IRR is 5.59%, which is much lower than the benchmark rate of 8%. Otherwise, the project IRR is increase to 11.8% if the CER revenue is considered. Therefore, the results indicate that the project without carbon credits is not financially attractive.

Sub-step 2d: Sensitivity analysis

A sensitivity analysis was conducted by altering the following parameters:

- Total investment

- Annual operational costs (O&M costs)

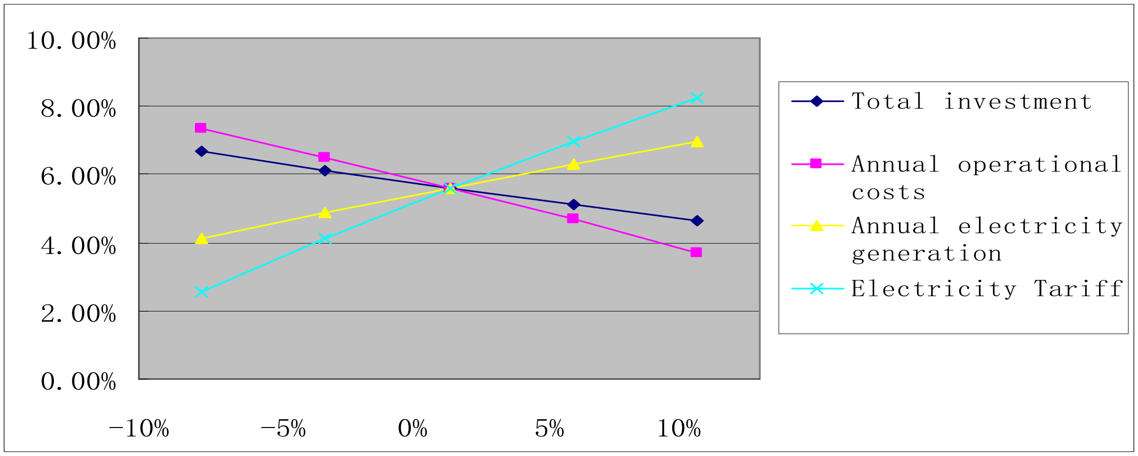
- Annual Electricity generation

- Electricity tariff

The required alteration needed in each parameter in order to reach the benchmark was assessed. Table B.5-4 summarizes the results of the sensitivity analysis.

Table B.5-4 Sensibility analysis of the proposed project

Change rate / Indicators	-10%	-5%	0	5%	10%
Total investment	6.69%	6.12%	5.59%	5.10%	4.63%
O&M costs	7.34%	6.48%	5.59%	4.67%	3.70%
Annual electricity generation	4.10%	4.86%	5.59%	6.30%	6.98%
Electricity tariff	2.56%	4.13%	5.59%	6.96%	8.25%



Significant variations in the key parameters in favor of the project would be needed in order to reach the benchmark. However, these variations of the parameters will not reach the benchmark 8%.

- Total investment: A decrease in investment costs is very unlikely to happen, as it is much more likely that power projects will experience cost increases rather than cost decreases during construction. According to China Statistic data 2008[12&13], the total investment in fixed assets of the whole country from year 2006 to year 2007 appeared a rising trend and increased by 24.8%. In addition, the price indices for investment in fixed assets by region showed that the indices increased from year 2006 to year 2007 in Inner Mongolia. These data mentioned would have influence the total investment and even show an increasing trend. Therefore, it is impossible to reach the benchmark by decreasing total investment.

- O&M costs: A decrease in O&M costs is very unlikely to happen. According to the physical circumstances, the operational costs are in upward trend especially for materials and labour cost. As to the same reason like the total investment and the salary indices in of Inner Mongolia Statistic data 2008[14], these demonstrated that the O&M costs would continuous growth. Therefore, decreasing in O&M costs is unrealistic and that consequently the IRR is not likely to reach 8%.

- Annual electricity generation: The annual electricity generation is influenced mainly by the annual operational hours. The expected operating hours of the Project indicated in the FSR were calculated based on operation hours of the carbon black plant production lines. The operational hours are likely to fluctuate only within a small range. A substantial increase would mean that the annual operating hours would be more than the number of hours in one year. For that reason, increasing the operation hours is clearly not possible. In addition, the theoretical parameters of the capacity and relative parameters of the turbines and generators are designed for electricity generation quantity calculation. Therefore, increasing the annual electricity generation is not impossible and cannot cause the Project IRR to be greater than the benchmark IRR.

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[12] National Bureau of Statistic of China. Source: http://www.stats.gov.cn/tjsj/ndsj/2008/html/F0501e.htm

[13] National Bureau of Statistic of China. Source: http://www.stats.gov.cn/tjsj/ndsj/2008/html/I0816E.HTM

[14] Inner Mongolia Autonomous Region Bureau of Statistic. Source: http://www.nmgtj.gov.cn/Html/zgpjgzhzs/2009-8/21/0982118524550.shtml

Electricity tariff: According to the grid-connection dispatching agreement signed between power Grid Company and project owner, the power grid will receive annual electricity delivered by the project is 85% (top limited)except the electricity self-used. In this case, with the actual occurred construction investment and operational cost in financial audit report of the project in Year 2010 and the actual tariff of the project is 0.2699RMB/kwh (including VAT), the project IRR is 4.21% which is still lower than the benchmark. Even if the electricity tariff is increased by 10% based on the actual tariff, the project IRR is 7.07% which is still lower than the benchmark. Furthermore, in China, the electricity tariff is strictly regulated by government and is related tightly to the national economy and livelihood of people, therefore, by increasing the tariff of the project is unrealistic and that consequently it is cannot reach the IRR benchmark.

The results mentioned above show that very favorable circumstances, which are not realistic, would be needed for the Project IRR to reach the benchmark IRR. We can conclude that the Project IRR is lower than the benchmark IRR for a realistic range of assumptions for the input parameters of the financial analysis, and therefore that the project is also not financially attractive.

All the input parameters used in the financial analysis are taken from the FSR developed in May 2008 by Xi'an Datang Electric Power Design and Research Institute and approved by DRC of Inner Mongolia Autonomous Region. The input parameters used in the financial analysis can thus be considered information provided by an independent and recognized source. All the above input parameters were available at the time when the investment decision was made on 03 June 2008.

In conclusion, without CDM CERs income, the Project will lack financial attraction and couldn't become the baseline scenario; therefore, the Project is additional.

Step 3: Barriers analysis

According to the *Tool for Demonstration and Assessment of Additionality* (version 05.2), Step 3 is not applicable (only step 2 is selected).

Step 4. Common practice analysis

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

The purpose of the common practices is to analyse the projects with similar conditions to the proposed project, such as investment conditions (including technology, scale, regulatory, tax and financing conditions, etc.) and natural conditions (including geographical, climate, development conditions, etc.) in order to demonstrate the additionality of the Project.

In addition, according to the *Tool for the Demonstration and Assessment of Additionality*, projects are considered 'similar' in case they are located in the 'same country/region', are of 'similar scale', and 'take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc.'.

China is a very large country. The investment environment for each province in China is different. This is due to variation of available natural resources such as coal, the economic development level, the industrial structure, the fundamental infrastructure, development strategy and the policy framework. These all affect the demand for the products in terms of amount as well as the types of products and technologies. In the same way, the project is located in the NCPG covering

provinces (Beijing, Tianjin, Hebei Province, Shanxi Province, Shandong Province and Inner Mongolia Autonomous Area) do not have similar investment and natural conditions in terms of regulatory framework, tax, financing, geographical, climate, and development conditions. Therefore the NCPG region is also rather too large to be chosen as with 'similar conditions' to the proposed project.

Due to the above information, we chose the projects involve the utilization of waste gas from carbon black production lines for power generation located in Inner Mongolia Autonomous Area for analysis.

There are 3 carbon black plants in Inner Mongolia Autonomous Area. The information is listed in the table B.5-5.

Table B.5-5 carbon black plants in Inner Mongolia Autonomous Area

Company name	Carbon black production	utilization waste gas for power generation(Yes/No)	Total capacity of power generation
Inner Mongolia Erdos Hengxin Carbon Black Co., Ltd	31,000t/y	No	NA
Inner Mongolia Jintai-Senka Acetylene Black Co., Ltd	5,000t/y	No	NA
The Project	160,000t/y	Yes	30MW

According to the statistics of China Carbon Black Association, there are about 60 carbon black plants as the members of Association[15]. However, there is only 1 carbon black plant in Inner Mongolia Autonomous Area, that is, Inner Mongolia Erdos Hengxin Carbon Black Co., Ltd[16&17] who is only engaged in business of carbon black production with no installation for utilization of waste gas from carbon black production lines for power generation. So it is not the same case with the proposed project.

For the sake of completed information, information of another carbon black plant in Inner Mongolia Autonomous Area is available. The company name is Inner Mongolia Jintai-Senka Acetylene Black Co., Ltd. [18]. Not only there is no information about its utilization of waste gas from carbon black production lines for power generation, but also the company who is invested by joint venture enterprises (65% of investment is from Senka Black PL India). It demonstrates that this project is easy to access financing support from foreign investors and without investment difficulties.

The third one is the Project, Inner Mongolia Wuhai 30MW Waste Gas Power Generation Project. The Project is not profitable and competitive according to its investment assessment by design institute, an independent third party in FSR phase. Considering the Project meet the requirements of CDM project development and the expected additional income from CER revenue will

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15 http://www.carbonblack.org.cn/cn/zhongdianqiye.asp

16 http://cn.made-in-china.com/showroom/hxzhanghui

17 http://www.coatinfo.cn/company/1/company.asp?Id=278426&fl=1

18 http://finance.sina.com.cn/chanjing/b/20050719/02531809841.shtml

improve the project benefits, CDM project development is suggested by the design institute. In addition, 70% of the project investment is from bank loan which will be paid only if the Project is profitable. The Project is developed and registered as CDM project that is a supplement income could be acquired to change the financial status through CERs trade of project GHG emission reduction. Furthermore, domestic companies in China lack experience in the international capital market, so does the project owner. They don't have much chance to contact a foreign direct investor for financing of this kind of project.

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

According to the information shown in step 4a, it notes that the carbon black plant of Inner Mongolia Autonomous Region is rare and there is no carbon black waste gas utilization for power generation projects that have been implemented in the Inner Mongolia Autonomous Region. Furthermore, it shows that waste gas utilization technology is very slowly disseminating in the Inner Mongolia Autonomous Region and that the Project would be the first such project. Therefore, it is not common practice in the wider project area. The Project is additionality.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

In accordance with the consolidated methodology ACM0012, the emission reduction is calculated with follow procedures:

Baseline Emission:

The baseline scenario is determined to be "Purchase of equivalent electricity from the North China Power Grid" According to the methodology, the emission factor for displaced electricity is calculated as follows:

$$BE_y = BE_{En,y} + BE_{flst,y} \qquad \text{(B.6-1)}$$

Where:

BE_y = Total baseline emissions during the year y in tons of CO_2;

$BE_{En,y}$ = Baseline emissions from energy generated by project activity during the year y in tons of CO2;

$BE_{flst,y}$ = Baseline emissions from generation of steam, if any, using fossil fuel, that would have been used for flaring the waste gas in absence of the project activity (tCO_2e per year), calculated as per equation 1c. This is relevant for those project activities where in the baseline steam is used to flare the waste gas.

There is no fossil fuel used for flaring the waste gas in absence of the project activity, so

$$BE_y = BE_{En,y} + BE_{flst,y} = BE_{En,y} \qquad \text{(B.6-2)}$$

Calculation $BE_{En,y}$ is as followings.

$$BE_{En,y} = BE_{Elec,y} + BE_{Ther,y} \qquad \text{(B.6-3)}$$

Where:

$BE_{Elec,y}$ =baseline emissions from electricity during the year y in tons of CO_2;

$BE_{Ther,y}$ =baseline emissions from thermal energy (due to heat generation by element process) during the year y in tons of CO_2.

The Project activity only generates electricity and no thermal energy is involved, so:

$$BE_{En,y} = BE_{Elec,y} + BE_{Ther,y} = BE_{Elec,y} \qquad (B.6\text{-}4)$$

Baseline emissions from electricity ($BE_{Elec,y}$)

It is calculated by the following formula:

$$BE_{Elec,y} = f_{cap} * f_{wcm} * \sum_{j}\sum_{i}(EG_{i,j,y} * EF_{Elec,i,j,y}) \qquad (B.6\text{-}5)$$

Where:

$BE_{Elec,y}$ = Baseline emissions due to displacement of electricity during the year y in tons of CO_2;

$EG_{i,j,y}$ = The quantity of electricity supplied to the recipient j by generator, which in the absence of the project activity would have been sourced from ith source (i can be either grid or identified source) during the year y in MWh; and

$EF_{Elec,i,j,y}$ = The CO_2 emission factor for the electricity source i (i=gr (grid) or i=is (identified source)), displaced due to the project activity, during the year y in tons CO_2/MWh;

f_{wcm} = Fraction of total electricity generated by the project activity using waste gas. This fraction is 1 if the electricity generation is purely from use of waste gas.

f_{cap} = Energy that would have been produced in project year y using waste gas/heat generated in base year expressed as a fraction of total energy produced using waste gas in year y. The ratio is 1 if the waste gas/heat/pressure generated in project year y is same or less then that generated in base year.

Calculate f_{cap}:

As an introduction to the element of conservativeness, this methodology requires that baseline emissions should be capped irrespective of planned/unplanned or actual increase in output of plant, change in operational parameters and practices, change in fuel type and quantity resulting in an increase in generation of waste energy. In case of planned expansion a separate CDM project should be registered for additional capacity. The cap can be estimated using the three Methods described below. Project proponents shall use Method-1 to estimate the cap if data is available. In case of project activities implemented in a new facility, or in facilities where three-year data on production is unavailable, Method-2 shall be used. In case the project proponents demonstrate technical limitations in direct monitoring of waste heat / pressure of waste energy carrying medium (WECM), then Method-3 is used.

Method 1:

Where the historical data on energy released by the waste energy carrying medium is available, the baseline emissions are capped at the maximum quantity of waste energy released into the atmosphere under normal operation conditions in the three years previous to the project activity.

Method 2:

The manufacturer's data for the industrial facility shall be used to estimate the amount of waste energy the industrial facility generates per unit of product generated by the process that generates waste energy (either product of departmental process or product of entire plant, whichever is more justifiable and accurate). In case any modification is carried out by the project proponent or in case the manufacturer's data is not available for an assessment, this should be carried out by independent qualified/certified external process experts such as a chartered engineer on a

conservative quantity of waste energy generated by plant per unit of product manufactured by the process generating waste energy. The value arrived based on above sources of data, shall be used to estimate the baseline cap (f_{cap}). The documentation of such assessment shall be verified by the validating DOE. The basis for using the capped value (including manufacturer's design document/letter and the expert's analysis) should be provided to DoE during validation.

Method 3:

In some cases, it may not be possible to measure the waste energy (heat, sensible heat, heat of reaction, heat of combustion etc.), enthalpy or pressure content of WECM. Therefore there is no historic data available for these cases. These cases may be of following two types.

Case 1: The energy is recovered from WECM and converted into final output energy through waste heat recovery equipment. For such cases f_{cap} should be the ratio of maximum theoretical energy recoverable using the project activity waste heat recovery equipment and actual energy recovered under the project activity (using direct measurement). For estimating the theoretical recoverable energy, manufacturer's specifications can be used. Alternatively, technical assessment can be conducted by independent qualified/certified external process experts such as chartered engineers.

Case 2: The energy is recovered from WECM in intermediate energy recovery equipment using an intermediate source. For example, an intermediate source to carry energy from primary WECM may include the sources such as water, oil or air to extract waste energy entrapped in chemicals (heat of reaction) or solids (sensible heat). This intermediate energy source is finally used to generate the output energy in the final waste heat recovery equipment. For these cases fcap is the ratio of maximum theoretical intermediate energy recoverable from intermediate waste heat recovery equipment and actual intermediate energy recovered under the project activity (using direct measurement). For estimating the theoretical energy, manufacturer's specifications can be used. Alternatively, technical assessment can be carried out by independent qualified/certified external process experts such as chartered engineers.

From above all, there are three methods for estimating *fcap*. For the project, there is no monitoring device previous to the project implementation, so the historical data is unavailable. Meanwhile, the waste gas generated will be directly monitored, and therefore, Method 2 is applied to estimate *fcap*:

$$f_{cap} = \frac{Q_{WCM,BL}}{Q_{WCM,y}} \quad \text{(B.6-6)}$$

$$Q_{WCM,BL} = Q_{BL,product} * q_{wcm,product} \quad \text{(B.6-7)}$$

Where:

$Q_{WCM,BL}$ = Quantity of waste energy generated prior to the start of the project activity estimated using Equation B.6-7. (kg of WECM or other relevant unit)

$Q_{BL\ product,}$ = Production associated with the relevant waste energy generation as it occurs in the baseline scenario. The minimum of the following two figures should be used: (1) average annual historical production data from start-up, if the plant's operational history is less than three years, of the plant or (2) the most relevant manufacture's

data for normal operating conditions. In case of new facilities or where data is not available the manufacture's data for normal operating conditions shall be used.

$q_{wcm, product}$ = Amount of waste energy per unit of product generated by the process (that generates waste energy) in the industrial facility.

According to the independent external expert of FSR, by calculated theoretically, the maximum production associated with the relevant waste gas generation is 160,000ton annual and with the waste gas flow is 160,000Nm3/h, the value of f_{cap} is assumed to be 1 for ex-ante calculation in the PDD. In the fixed crediting period, the f_{cap} will be updated when $Q_{WCM, y}$ is monitored (direct measurement) and the value is available for calculating the f_{cap} according to the equation above.

Calculate f_{wcm}

f_{wcm} is the fraction of total electricity generated by the project activity using waste energy. The Project is utilizes the waste gas which comes from the black carbon production for power generation only. So f_{wcm} =1.

Hence, baseline emission from electricity can be calculated as followings:

$$BE_{Elec,y} = EG_{i,j,y} * EF_{Elec,y} \qquad \text{(B.6-8)}$$

Calculation of the CO_2 emission factor ($EF_{Elec,y}$)

The identified baseline scenario is "Purchase of equivalent electricity from NCPG". So $EF_{Elec,y}$ shall be determined by "*Tool to calculate the emission factor for an electricity system (V02)*".

Step 1. Identify the relevant electricity systems

Prior to the Project coming on line, Inner Mongolia Wuhai Black Cat Carbon Black Co., LTD obtained all of its electricity from NCPG. So $EF_{Elec,i,j,y}$ is emission factor of NCPG. According to the Chinese DNA, Beijing, Tianjin, Hebei Province, Shanxi Province, Shandong Province and Inner Mongolia Autonomous Area are included.

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

Option I: Only grid power plants are included in the calculation.

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

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:
(a) Simple OM,
(b) Simple adjusted OM,
(c) Dispatch Data Analysis OM, or
(d) Average OM.

Dispatch data analysis is not applicable on account that the information is not available in China, and that it is business sensitive intellectual property of the power station. The simple adjusted OM,

option (b), requires the annual load duration curve of the grid. So simple adjusted OM is not applicable due to the above reason. Method (a) is therefore applicable.

Power plants registered as CDM project activities are included in the sample group that is used to calculate the OM as long as the criteria for including the power sources in the sample group apply.

The "Tool to calculate the emission factor for an electricity system *(version 02)*" offers the choice between two data vintages to calculate the Simple OM:

- *Ex-ante* option: A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period; or

- *Ex-post* option: Ex post option: The year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required calculating 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.

$EF_{grid,OM,y}$ is calculated *ex-ante* using the data from 2005 to 2007, available in the China Energy Statistics Yearbooks 2006-2008 and the China Electric Power Yearbooks 2006-2008. These data vintage remains fixed during the crediting period.

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

According to the "Tool to calculate the emission factor for an electricity system" (version 02), there are two options to calculating the Simple OM emission factor:

• Option A: Based on the net electricity generation and a CO2 emission factor of each power unit; or
• Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Option B can only be used if:
(a) The necessary data for Option A is not available; and

(b) Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and

(c) Off-grid power plants are not included in the calculation (i.e., if Option I has been chosen in Step 2).

Option A should be preferred and must be used if fuel consumption data or average efficiency and fuel type(s) used are available for each power plant / unit. However, the required data for each power plant /unit is unavailable in China. So option B is applied to calculate the operating margin emission factor.

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

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

$$EF_{grid,OM,y} = \frac{\sum_i (FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y})}{EG_y} \qquad \text{(B.6-9)}$$

Where:

$EF_{grid,\ OM,\ y}$ = Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)

$FC_{i,y}$ = Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)

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

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

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

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

Calculations for this combined margin is based on data from an official source (where available) and publicly available: power generation, installed capacity and Rate of Electricity Consumption are from China Electric Power Yearbook (2006-2008); fuel consumption by generating electricity and net calorific value are from China Energy Statistic Yearbook (2006-2008); and the CO_2 emission factor per unit of energy and oxidation factor are from "2006 IPCC Guidelines for National Greenhouse Gas Inventories" Volume 2 Energy, first chapter, Table 1.3 and 1.4 in page 1.21 to 1.24.

The Chinese DNA published OM figures and calculation process for different grid areas in China. It made the calculations by applying the simple OM method. All of the data come from "China Electric Power Yearbook" and "China Energy Statistics Yearbook".

Since the DNA is the highest authority in China for CDM projects, the data published by it shall be used.

The value for OM is 1.0069 tCO_2/MWh for North China Power Grid according to Chinese DNA published on 02/07/2009. [19]

Step 5. Identify the group of power units to be included in the build margin (BM)

The sample group of power units *m* used to calculate the build margin consists of either:

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[19] See footnote 2. China NDRC (02/07/2009), 2009 Baseline Emission Factors for Regional Power Grids in China. Source: http://qhs.ndrc.gov.cn/qjfzjz/t20090703_289357.htm

(a) The set of five power units that have been built most recently: or

(b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

However, due to the fact that data on electricity generation of each power plant / unit in the grid is currently not available in P. R. China (see Step 3), EB guidance on the estimation of the build margin in P.R. China can be applied for the purpose of defining the sample group. In accordance with the guidance, the build margin consists of the set of power capacity additions in the electricity system that comprises 20% of the system generation capacity (in MW) and that have been built most recently.

Since data on the electricity generation of each individual power plant / unit in the grid is not available in P. R. China, power plants registered as CDM project activities cannot be isolated and are taken into account in the build margin.

The "Tool to calculate the emission factor for an electricity system (version 02)" offers the choice between two data vintages to calculate the BM:

- *Option 1*. For the first crediting period, the build margin emission factor is calculated *ex-ante* based on the most recent information available on units already built for sample group *m* at the time of CDM-PDD submission to the DOE for validation.

- *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 activity.

The BM emission factor ($EF_{grid,BM,y}$) is calculated *ex-ante* using the data from 2005 to 2007, available in the China Energy Statistics Yearbook 2006-2008 and the China Electric Power Yearbooks 2006-2008. These data vintage remains fixed during the first crediting period and will be updated for the second crediting period.

Step 6. Calculate the build margin emission factor

The build margin emissions factor is the generation-weighted average emission factor (tCO_2e/MWh) of all power plants *m* during the most recent year *y* for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \qquad \text{(B.6-10)}$$

where:

$EF_{grid,BM,y}$ =Build margin CO_2 emission factor in year *y* (tCO_2e/MWh)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
$EF_{EL,m,y}$ = CO_2 emission factor of power unit *m* in year *y* (tCO_2e/MWh)
m = Power units included in the build margin
y = Most recent historical year for which power generation data is available

Because capacities of technologies using coal, oil and gas cannot be separated from the total thermal power generation from publicly available statistics, the following method is used for the calculation: first, use the energy balance data of the most recent year available and calculate the percentages of CO_2 emissions of power generation using solid, liquid and gas fuel in the total CO_2 emission. Second, calculate grid thermal power emission factors, using the percentages (as weights) and emission factors of technologies corresponding to best available efficiencies. Lastly, the thermal power emission factor is multiplied by the percentage of thermal power in the newest 20% capacity in the grid, and the result is the Build Margin emission factor of the grid.

Note that the data used can not distinguish the capacity installed in coal, fossil fuel, and gas from total fire power generation. Therefore, the calculation used as following:

Step a: Calculate the proportions of the corresponding CO_2 emissions of the solid fuel, liquid fuel and gas fuel to the total emission:

$$\lambda_{\mathrm{Coal,y}} = \frac{\sum_{\mathrm{i=Coal,j}} \mathrm{F_{i,j,y}} * NCV_{i,y} * EF_{\mathrm{CO2,\,i},j,y}}{\sum_{\mathrm{i,j}} \mathrm{F_{i,j,y}} * NCV_{i,y} * EF_{\mathrm{CO2,\,i},j,y}} \quad \text{(B.6-11)}$$

$$\lambda_{\mathrm{Oil,y}} = \frac{\sum_{\mathrm{i=Oil,j}} \mathrm{F_{i,j,y}} * NCV_{i,y} * EF_{\mathrm{CO2,\,i},j,y}}{\sum_{\mathrm{i,j}} \mathrm{F_{i,j,y}} * NCV_{i,y} * EF_{\mathrm{CO2,\,i},j,y}} \quad \text{(B.6-12)}$$

$$\lambda_{\mathrm{Gas,y}} = \frac{\sum_{\mathrm{i=Gas,j}} \mathrm{F_{i,j,y}} * NCV_{i,y} * EF_{\mathrm{CO2,\,i},j,y}}{\sum_{\mathrm{i,j}} \mathrm{F_{i,j,y}} * NCV_{i,y} * EF_{\mathrm{CO2,\,i},j,y}} \quad \text{(B.6-13)}$$

Where:

$F_{i,j,y}$ = The fuel, *i* (tce), consumption of province *i*, *j* in year *y*;

$NCV_{i,y}$ = Net calorific value of the biomass residue type *i* (GJ/ton of dry matter or GJ/liter);

$EF_{CO2,i,j,y}$ = Emission factor of type *i*, *j* in year *y* (tCO_2/MWh);

Coal, Oil and Gas = Solid fuel, liquid fuel and gaseous fuel respectively.

Step b: calculating $EF_{Thermal,y}$

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} \quad \text{(B.6-14)}$$

Where,

$EF_{Coal,Adv,y}$, $EF_{Oil,Adv,y}$ and $EF_{Gas,Adv,y}$ are emission factors of the most advanced commercial coal, oil and gas power generation technologies.

Step c: calculating $EF_{BM,y}$**:**

$$EF_{grid,BM,y} = \frac{CAP_{Thermal,y}}{CAP_{Total,y}} \times EF_{Thermal,y} \quad \text{(B.6-15)}$$

Where,

$CAP_{Total,y}$ = total newly capacity installed;

$CAP_{Thermal,y}$ = capacity of thermal generation installed.

$EF_{grid,BM,y}$ = 0.7802 tCO_2/MWh

The project adopts the data from the latest published by Chinese DNA on 02/07/2009[20]. For detailed information, please see Annex 3.

Step 7. Calculate the combined margin emissions factor

The combined margin emission factor is calculated as follows:

$$EF_{grid,CM,y} = W_{OM} \times EF_{grid,OM,y} + W_{BM} \times EF_{grid,BM,y} \quad \text{(B.6-16)}$$

Where:

$EF_{grid,OM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,BM,y}$ = Operating margin CO_2 emission factor in year y (tCO_2/MWh)
W_{OM} = Weighting of operating margin emission factor (%)
W_{BM} = Weighting of build margin emission factor (%)

Therefore, the combined margin emission factor is:
$EF_{grid,CM,y} = W_{OM} \times EF_{grid,OM,y} + W_{BM} \times EF_{grid,BM,y}$
= 0.5*1.0069 tCO_2/MWh + 0.5*0.7802 tCO_2/MWh
= 0.89355 tCO_2/MWh

Project Emissions

Project Emissions include emissions due to (1) combustion of auxiliary fuel to supplement waste gas/heat and (2) electricity emissions due to consumption of electricity for cleaning of gas before being used for generation of energy or other supplementary electricity consumption; and (3) emissions due to consumption of imported electricity that in the absence of project activity would have been supplied by captive electricity generated (only for Type-2 project activities).

$$PE_y = PE_{AF,y} + PE_{EL,y} + PE_{EL,Import,y} \quad \text{(B.6-17)}$$

Where,
PE_y = Project emissions due to project activity
$PE_{AF,y}$ = Project activity emissions from on-site consumption of fossil fuels by the cogeneration plant(s), in case they are used as supplementary fuels, due to nonavailability of waste

[20] See footnote 2.China NDRC (02/07/2009), 2009 Baseline Emission Factors for Regional Power Grids in China. Source: http://qhs.ndrc.gov.cn/qjfzjz/t20090703_289357.htm

energy to the project activity or due to any other reason

$PE_{EL,y}$ = Project activity emissions from on-site consumption of electricity for gas cleaning equipment or other supplementary electricity consumption (as per Table 1: Summary of gases and sources included in the project boundary)

$PE_{EL,\ Import,\ y}$ = Project activity emissions from import of electricity replacing captive electricity generated in the absence of the project activity for Type-2 project activities

Note: In cases where the electricity was consumed in gas cleaning equipment in the baseline as well, project emissions due to electricity consumption for gas cleaning can be ignored.

For the Project is the type-1 project, so the $PE_{EL,\ Import,\ y}$ is zero.

Due to the Project is not using fossil fuels as supplementary fuels on site. Therefore, there is no project emission from on-site consumption of fossil fuels, that is, $PE_{AF,y}$ is considered to be zero.

Project emissions due to electricity consumption as a result of the project activity have been considered and subtracted in the calculation of baseline emissions, thus the project emissions due to electricity consumption as a result of the project activity needn't to be taken into account in this step. Over the ten years' crediting period, the project emissions as a result of the project activity will be monitored and considered in the calculation of net electricity supply by the project activity, the parameters are listed in the section B7.2. So in this section, project emissions due to electricity consumption as a result of the project activity $PE_{EL,\,y}$ is considered to be zero.

Based on the Project information, there is not using auxiliary fuel in boiler. But only the coke oven gas will be used to start-up and the amount is very small. According to the "*tool to calculate project or leakage CO2 emissions from fossil fuel combustion (version 02)"* The project emission is calculated as follows:

$$PE_{FC,j,y} = \sum FC_{i,j,y} * COEF_{i,y} \qquad \text{(B.6-18)}$$

Where:

$PE_{FC,j,y}$ = Are the CO_2 emissions from fossil fuel combustion in process j during the year y (tCO_2/yr);

$FC_{i,j,y}$ = Is the quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr);

$COEF_{i,y}$ = Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)

i = Are the fuel types combusted in process j during the year y

According to the "*tool to calculate project or leakage CO2 emissions from fossil fuel combustion (version 02)",* The CO_2 emission coefficient $COEF_{i,\ y}$ can be calculated by two Options, depending on the availability of data on the fossil fuel type *i.* Although option A is the preferred approach, the data of fossil fuel (the weighted average mass fraction of carbon in fuel and the weighted average mass fraction of carbon in fuel) is unavailable. So the option B is adopted. The project emission is calculated as follows:

$$PE_{FC,j,y} = \sum FC_{i,j,y} * NCV_{i,y} * EF_{CO2,i,y}$$
$$= 0.31tCO_2$$

The Project consumed about 500Nm3/y coke oven gas for start-up. According to China Energy Statistical Yearbook 2008 and IPCC default, the net calorific value and CO_2 emission factor of coke oven gas are respectively to be 16,726MJ/t and 37,300kgCO_2/TJ.

This emission is calculated and only 0.00017% of total emission reduction of the project, which is lower than 1%. So it does not need to count as the project emission.

Hence, the project emission is considered to be zero.

$$PE_y = 0$$

Leakage emission

According to methodology ACM0012, no leakage is considered.

$$L_y = 0$$

Emission reduction

The emission reductions ER_y by the proposed Project during a given year y calculation is as follows:

$$ER_y = BE_y - PE_y - L_y \qquad \text{(B.6-19)}$$

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

The data and parameters used in the calculations of the baseline emissions and project emissions are listed below. Details are provided in the Annex 3.

Data / Parameter:	$FC_{i,y}$
Data unit:	Mass or volume unit
Description:	Amount of fossil fuel type *i* consumed by power plant in year *y*
Source of data used:	“Chinese Energy Statistical Yearbook”, 2006-2008 editions.
Value applied:	Varies for each fuel and year, see Annex 3 for detail.
Measurement procedures (if any):	The choice of data satisfies the tool for calculate the Operating Margin Emission Factor.
Any comment:	

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Net electricity generation by power plant in the year y
Source of data used:	“Chinese Energy Statistical Yearbook”, 2006-2008 editions.
Value applied:	Varies for each type of fuel used and year, see Annex 3 for detail.
Measurement procedures (if any):	
Any comment:	See Annex 3 for detailed data.

Data / Parameter:	$NCV_{i,y}$
Data unit:	GJ/mass or volume unit

Description:	Net calorific value (energy content) of fossil fuel type *i*.
Source of data used:	"Chinese Energy Statistical Yearbook" 2006-2008
Value applied:	See Annex 3 for detail.
Measurement procedures (if any):	The choice of data satisfies the guidance for the purpose of calculating fuel emission factors.
Any comment:	See Annex 3 for detailed data.

Data / Parameter:	$EF_{CO2,i,y}$
Data unit:	tCO_2/GJ
Description:	CO_2 emission factor of fossil fuel type *i* used in power plant in year y
Source of data used:	"2006 IPCC Guidelines for National Greenhouse Gas Inventories" Volume 2 Energy
Value applied:	See Annex 3 for detail.
Measurement procedures (if any):	The choice of data satisfies the guidance for the purpose of calculating fuel emission factors
Any comment:	Please see Annex 3 for detail.

Data / Parameter:	$CAP_{i,j,y}$
Data unit:	MW
Description:	Installed generation capacity, i, per year, y, and provincial grid, j
Source of data used:	"Chinese Electricity Yearbook" 2006-2008 editions.
Value applied:	Varies with province and year
Measurement procedures (if any):	The choice of data satisfies the guidance for the purpose of calculating BM.
Any comment:	See Annex 3 for detailed data.

Data / Parameter:	$EF_{i,Adv}$
Data unit:	gce/kWh
Description:	Emission Factor of the best available commercial power plants for fuel i power plants, i = coal, oil and gas.
Source of data used:	"2006 IPCC Guidelines for National Greenhouse Gas Inventories" Volume 2 Energy
Value applied:	See Annex 3 for detail.
Measurement procedures (if any):	The choice of data satisfies the guidance for the purpose of BM calculation. Data is from an official source.
Any comment:	

Data / Parameter:	λ_{Coal}, λ_{Oil}, λ_{Gas}
Data unit:	%
Description:	The percentage of CO_2 emitted for each source, coal, oil and gas, in the total emission at year 2006.
Source of data used:	"Chinese Energy Statistical Yearbook" 2008 edition
Value applied:	See Annex 3 for detail.
Measurement procedures (if any):	Data is from an official national source. See section B.6.1. Step 2 for details.
Any comment:	

Data / Parameter:	$EF_{grid,OM,y}$
Data unit:	tCO_2e/MWh
Description:	Operating Margin Emission Factor of NCPG
Source of data used:	2009 Baseline Emission Factors of Power Grids in China published by NDRC.
Value applied:	1.0069
Measurement procedures (if any):	As per the procedures described in the "Tool to calculate the emission factor for an electricity system"
Any comment:	

Data / Parameter:	$EF_{grid,BM,y}$
Data unit:	tCO_2e/MWh
Description:	Build Margin Emission Factor of NCPG
Source of data used:	2009 Baseline Emission Factors of Power Grids in China published by NDRC.
Value applied:	0.7802
Measurement procedures (if any):	As per the procedures described in the "Tool to calculate the emission factor for an electricity system"
Any comment:	

Data / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO_2e/MWh
Description:	CM Emission factor of NCPG
Source of data used:	2009 Baseline Emission Factors of Power Grids in China published by NDRC.
Value applied:	0.89355
Measurement procedures (if any):	As per the procedures described in the "Tool to calculate the emission factor for an electricity system"
Any comment:	

Data / Parameter:	$Q_{WCM,BL}$
Data unit:	Nm3/yr
Description:	Average quantity of waste energy released in atmosphere by WECM in three years prior to the start of the project activity
Source of data used:	FSR
Value applied	1,280,000,000
Measurement procedures (if any):	For industrial facility, it is determined by either of two methods: (1) Direct measurements of amount of the waste energy for at least *three years* prior to the start of the project activity; (2) Estimated based on information provided by the technology supplier and the external expert on the waste energy generation per unit of product and volume or quantity of production.
Any comment:	

Data / Parameter:	$Q_{BL, product}$
Data unit:	Tons/yr
Description:	Production associated with the relevant waste energy generation as it occurs in the baseline scenario. The minimum of the following two figures should be

	used: (1) historical production data from start-up, if plant operational history is less than three years, of the plant or (2) the most relevant manufacture's data for normal operating conditions. In case of new facilities or where data is not available the manufacture's data for normal operating conditions shall be used
Source of data used:	FSR and the manufacture's data of carbon black production reactors.
Value applied	160,000
Measurement procedures (if any):	-
Any comment:	-

Data / Parameter:	$q_{wcm, product}$
Data unit:	Nm3/ton
Description:	Specific waste energy production per unit of product (departmental or plant product which most logically relates to waste energy generation) generated as per manufacturer's or external expert's data. This parameter should be analysed for each modification in process which can potentially impact the waste energy quantity
Source of data used:	FSR
Value applied	8,000
Measurement procedures (if any):	-
Any comment:	-

Data / Parameter:	t_{ref} , P_{ref} , H_{ref}
Data unit:	deg C , kg/cm2 (a), kJ/kg respectively or other appropriate unit
Description:	Reference temperature, pressure and enthalpy
Source of data used:	Use the following values or other appropriate pressure with proper justification: 0 for reference temperature; 1 atm for reference pressure; 0 kJ/kg for reference enthalpy
Value applied	
Measurement procedures (if any):	Not applicable
Any comment:	The proposed project activity does not involve this parameter for calculation as it applies Method-2, Therefore, the parameter is not applicable.

Data / Parameter:	$Q_{OE,BL}$
Data unit:	MWh
Description:	Output/intermediate energy that can be theoretically produced (in appropriate unit), to be determined on the basis of maximum recoverable energy from the WECM, which would have been released (or WECM would have been flared or energy content of WECM would have been wasted) in the absence of CDM Project
Source of data used:	Not applicable
Value applied:	Not applicable
Measurement	Not applicable

procedures (if any):	
Any comment:	The proposed project activity does not involve this parameter for calculation as it applies Method-2, Therefore, the parameter is not applicable.

Data / Parameter:	$\eta_{BL,t}(\eta_{EP,i,j,t}/\eta_{Plant,j,t}/\eta_{Cogen}/\ \eta_{mech,tur}/\ \eta_{mech,mot})$
Data unit:	-
Description:	Baseline efficiency of the element process/captive power plant/cogeneration plant/mechanical energy conversion equipment during time interval *t* where *t* is a discrete time interval during the year *y*
Source of data used:	Not applicable
Value applied	
Measurement procedures (if any):	Not applicable
Any comment:	The proposed project activity does not involve element process / captive power/cogeneration in the baseline scenario. Furthermore, this data/ parameter is only applicable if measurement based load v/s efficiency curve option is chosen. Therefore no value is applied.

Data / Parameter:	$\eta_{BL}\ (\eta_{EP,i,j},\ \eta_{Plant,j},\ \eta_{Cogen},\ \eta_{mech})$
Data unit:	-
Description:	Baseline efficiency of the element process/captive power plant/cogeneration plant/mechanical energy conversion equipment
Source of data used:	Not applicable
Value applied	
Measurement procedures (if any):	Not applicable
Any comment:	The proposed project activity does not involve element process / captive power/cogeneration in the baseline scenario. Therefore no value is applied and no monitoring is required.

Data / Parameter:	$t_{wcm,BL}$
Data unit:	deg C or other appropriate unit
Description:	Average temperature of WECM in three years prior to the start of the project
Source of data used:	Not applicable
Value applied	
Measurement procedures (if any):	Not applicable
Any comment:	The proposed project activity does not involve this parameter for calculation as it applies Method-2. Therefore, the parameter is not applicable.

Data / Parameter:	$P_{wcm,BL}$
Data unit:	kg/cm^2 (a) or any other appropriate unit
Description:	Average pressure of WECM in three years prior to the start of the project
Source of data used:	Not applicable
Value applied	
Measurement procedures (if any):	Not applicable
Any comment:	The proposed project activity does not involve this parameter for calculation

	as it applies Method-2. Therefore, the parameter is not applicable.

Data / Parameter:	$H_{wcm,BL}$
Data unit:	kJ/kg or any other appropriate unit
Description:	Average enthalpy of WECM in three years prior to the start of the project
Source of data used:	Not applicable
Value applied	
Measurement procedures (if any):	Not applicable
Any comment:	The proposed project activity does not involve this parameter for calculation as it applies Method-2. Therefore, the parameter is not applicable.

Data / Parameter:	$d_{wcm,BL}$
Data unit:	(kg/m^3 at actual conditions)
Description:	Density of WECM at actual temperature and pressure in three years prior to the start of the project activity (kg/m^3 at actual conditions)
Source of data used:	Not applicable
Value applied	
Measurement procedures (if any):	Not applicable
Any comment:	The proposed project activity does not involve this parameter for calculation as it applies Method-2. Therefore, the parameter is not applicable.

Data / Parameter:	$Q_{ff,fl,B}$
Data unit:	TJ
Description:	Fossil fuel used to flare (directly) the waste gas prior to the implementation of the project activity. At least one year's historic data shall be used and preferably three years historic should be used. Preferably three years historic data shall be used and at least one-year historic data should be used.
Source of data used:	Not applicable
Value applied	
Measurement procedures (if any):	Not applicable
Any comment:	There is no fossil fuel used to flare (directly) the waste gas prior to the implementation of the project activity and also no historic data for the project. Therefore, the parameter is not applicable.

Data / Parameter:	$Q_{WG,Fl,B}$
Data unit:	kg or m^3 at NTP
Description:	The amount of waste gas flared using steam prior to the implementation of the project activity. Preferably three years historic data shall be used and at least one-year historic data should be used
Source of data used:	Not applicable
Value applied	
Measurement procedures (if any):	Not applicable
Any comment:	There is no the waste gas flared using steam prior to the implementation of the project activity and also no historic data for the project. Therefore, the

	parameter is not applicable.

Data / Parameter:	$Q_{st,fl,B}$
Data unit:	TJ
Description:	Steam used to flare the waste gas prior to the implementation of the project activity. At least one year's historic data shall be used and preferably three years historic should be used. Preferably three years historic data shall be used and at least one-year historic data should be used
Source of data used:	Not applicable
Value applied	
Measurement procedures (if any):	Not applicable
Any comment:	There is no steam used to flare the waste gas prior to the implementation of the project activity and also no historic data for the project. Therefore, the parameter is not applicable.

Data / Parameter:	$EG_{Captive,B}$
Data unit:	MWh
Description:	Captive electricity generated from the captured portion of waste gas produced at the facility in the absence of the project activity (MWh); the maximum value for the 3 years prior to the project activity is used in calculations where indicated as the conservative approach
Source of data used:	Not applicable
Value applied	
Measurement procedures (if any):	Not applicable
Any comment:	Due to the project is a new facility, it does not involved in captive electricity generation from the captured portion of waste gas produced at the facility in the absence of the project activity. Therefore, the parameter is not applicable.

Data / Parameter:	$Q_{WG,captive, BL}$
Data unit:	Kg
Description:	Quantity of waste gas captured and used for captive power generation in the absence of the project activity, use the maximum figure from 3 years historic data
Source of data used:	Not applicable
Value applied	
Measurement procedures (if any):	Not applicable
Any comment:	Due to the project is a new facility, it does not involved in captive electricity generation from the captured portion of waste gas produced at the facility in the absence of the project activity. Therefore, the parameter is not applicable.

Data / Parameter:	Thermal energy produced using stream of WECM considered under Type-2 project activity
Data unit:	Any suitable unit (MWh, TJ, MCal)
Description:	Average annual quantity of thermal energy produced using stream (or part of stream) of WECM considered under Type-2 project activity for three years

	prior to its implementation
Source of data used:	Not applicable
Value applied	
Measurement procedures (if any):	Not applicable
Any comment:	Due to the project is Type-1 project, Therefore, the parameter is not applicable.

B.6.3. Ex-ante calculation of emission reductions:

The *ex-ante* emission reductions (*ERy*) are calculated as follows:

$$ER_y = BE_y - PE_y - L_y$$

ER_y Emission reductions in year y (tCO_2)

BE_y Baseline emissions in year y (tCO_2)

PE_y Project Emissions in year y (tCO_2)

L_y Leakage emissions in year y (tCO_2)

According to the FSR of the Project, the annual electricity supply to the recipient plants ($EG_{i, j, y}$) is estimated to be 209,520 MWh.

The Project utilizes waste gas which produced by carbon black production only to generate electricity, so the value of *fwcm* is 1.

fcap is assumed to be 1 in ex-ante calculation of emission reductions.

The baseline emissions are calculated as:

$$BE_{Elec,y} = f_{cap} * f_{wcm} * \sum_j \sum_i (EG_{i,j,y} * EF_{Elec,i,j,y})$$

$$=1 \times 1 \times 0.89355 \times 209{,}520 = 187{,}216 \ tCO_2/yr$$

As shown in section B.6.1 project emissions are calculated. Hence:

$$PE_y = 0$$

As shown in section B.6.1, leakage need not be considered. Hence:

$$L_y = 0$$

Therefore, the Project emission reduction is calculated as:

$$ER_y = BE_y - PE_y = 187{,}216 tCO_2/yr$$

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

Year	Estimation of project activity emissions(tonnes of CO_2 e)	Estimation of baseline emissions(tonnes of CO_2 e)	Estimation of leakage(tonnes of CO_2 e)	Estimation of emission reductions(tonnes of CO_2 e)
01/06/2011-31/12/2011	0	109,209	0	109,209
01/01/2012-31/12/2012	0	187,216	0	187,216
01/01/2013-31/12/2013	0	187,216	0	187,216
01/01/2014-31/12/2014	0	187,216	0	187,216
01/01/2015-31/12/2015	0	187,216	0	187,216
01/01/2016-31/12/2016	0	187,216	0	187,216
01/01/2017-31/12/2017	0	187,216	0	187,216
01/01/2018-31/12/2018	0	187,216	0	187,216
01/01/2019-31/12/2019	0	187,216	0	187,216
01/01/2020-31/12/2020	0	187,216	0	187,216
01/01/2021-31/05/2021	0	78,007		78,007
Total(tonnes of CO2e)	0	1,872,160	0	1,872,160

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

B.7.1 Data and parameters monitored:

Data / Parameter:	$EG_{i,j,y}$
Data unit:	MWh
Description:	Quantity of electricity supplied to recipient plants during year *y*
Source of data	Monitored data. 209,520MWh is used in the PDD.
Measurement procedures (if any):	Direct measurements by electronic meters.
Monitoring frequency	Monthly.
QA/QC procedures	Equipment: The metering instrument will undergo regular maintenance/calibration to the industry/ national standard. A calibration report will be provided by the qualified institution or entity and kept by the project owner. Data: a) The electricity generation delivered to the carbon black lines will be measured by meters of grid company and the power plant. Both meters are installed in the power plant. The main meter is meter of the grid company, the meter of power plant is used for backup. The monthly data will be recorded by operators of power plant and grid company respectively and used for cross check. b) The electricity generation delivered to the grid will be measured and recorded by power plant and grid company. The meter of Grid Company as a main meter is installed in the grid company and the meter which is installed in the power plant as a backup mater The monthly records and sales receipts will be used for cross check. c) The accuracy of the meters is 0.5s.
Any comment:	

Data / Parameter:	$Q_{WCM,y}$
Data unit:	Mass unit (kg) or Nm3
Description:	Quantity of WECM /Waste Gas used for energy generation during year y
Source of data	Monitored data
Measurement procedures (if any):	Direct Measurements by project participants through appropriate metering devices. The waste gas flow meters will be installed at the entrance of the gas fired boilers to measure the waste gas used for power generation.
Monitoring frequency	Continuous
QA/QC procedures	Measuring equipment should be calibrated on regular equipment. During the time of calibration and maintenance, alternative equipment should be used for monitoring.
Any comment:	The waste gas can be measured before it enters the point of use (e.g. Waste gas fired boiler). Considering this value is monitored only for the purpose of capping the emission reduction, the mass unit is equals to volume unit multiple density of waste gas. If we consider the temperature and pressure of waste gas at the monitoring point is the same, the density of the waste gas is the same. $f_{\text{cap}} = \frac{Q_{WCM,BL}}{Q_{WCM,y}} = \frac{Mass_{WCM,BL}}{Mass_{WCM,y}} = \frac{Volume_{WCM,BL} * Density_{WCM,BL}}{Volume_{WCM,y} * Density_{WCM,y}} = \frac{Volume_{WCM,BL}}{Volume_{WCM,y}}$ According to the actual monitoring records, the data showed in the flow meters are the value under the normal temperature and pressure condition, which is the same as the situation where the quantity of waste gas estimated in the baseline scenario. Hence, in this case, monitoring mass unit is equivalent to monitoring volume at normal temperature and pressure. The volume unit Nm3 is more appropriate than mass unit kg.

Data / Parameter:	$EC_{PJ,y}$
Data unit:	MWh
Description:	Additional electricity consumed in year *y*, for gas cleaning equipment, or any other project related equipment, as a result of the implementation of the project
Source of data	Monitored data
Measurement procedures (if any):	Direct measurements by electronic meters.
Monitoring frequency	Measured continuously and recorded monthly.
QA/QC procedures	The metering instrument will undergo regular maintenance/calibration. A calibration report will be provided by the qualified institution or entity and kept by the project owner. Data: The project owner will arrange operators recording the data monthly; monthly records are used to ensure the consistency.
Any comment:	

Data / Parameter:	$Q_{OE,y}$
Data unit:	Appropriate unit
Description:	Quantity of actual output/intermediate energy during year y
Source of data	Not applicable
Measurement procedures (if any):	Not applicable

Monitoring frequency	Not applicable
QA/QC procedures	Not applicable
Any comment:	There is no necessity to measure the quantity of actual output/intermediate energy. The project applies Method-2.Therefore no value is applied in the calculation of emission reductions due to the project activity and monitoring is not required.

Data / Parameter:	$EF_{elec,i,,j,y}$
Data unit:	tCO_2/MWh
Description:	CO_2 emission factor for the electricity source i (i=gr (grid) or i=is (identified source)), displaced due to the project activity, during the year *y* in tons CO_2/MWh
Source of data	Baseline Emission Factors of Power Grids in China published by NDRC.
Measurement procedures (if any):	As per the procedures described in the "Tool to calculate the emission factor for an electricity system"
Monitoring frequency	
QA/QC procedures	-
Any comment:	

Data / Parameter:	$FF_{i,y}$
Data unit:	NM_3 or ton
Description:	Quantity of fossil fuel type *i* combusted to supplement WECM in the project activity during the year *y,* in energy or mass units
Source of data	Not applicable
Measurement procedures (if any):	
Monitoring frequency	Not applicable
QA/QC procedures	Not applicable
Any comment:	There is no fossil fuel combustion as the supplement fuels on site, therefore, the parameter is not applicable.

Data / Parameter:	$ws_{i,j}$
Data unit:	
Description:	Fraction of total heat that is used by the recipient j in the project that in absence of the project activity would have been supplied by the i^{th} boiler
Source of data	Not applicable.
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	The project does involve supply of heat to the recipient in the baseline. Therefore no value is applied in the calculation of emission reductions due to the project activity and monitoring is not required.

Data / Parameter:	$EF_{CO2,is,j}$
Data unit:	Tonnes CO_2/TJ
Description:	CO_2 emission factor per unit of energy of the fossil fuel used in the baseline generation source i (i=is) providing energy to recipient *j*

Source of data	Not applicable.
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	The baseline generation source cannot be identified. Therefore no value is applied in the calculation of emission reductions due to the project activity and monitoring is not required.

Data / Parameter:	$EF_{CO2,COGEN}$
Data unit:	Tonnes CO_2/TJ
Description:	CO_2 emission factor per unit of energy of the fuel that would have been used in the baseline cogeneration plant
Source of data	Not applicable.
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	Due to the project is not a cogeneration plant, Therefore no value is applied in the calculation of emission reductions due to the project activity and monitoring is not required.

Data / Parameter:	$HG_{j,y}$
Data unit:	TJ
Description:	Net quantity of heat supplied to the recipient plant j by the project activity during the year *y* in TJ. In case of steam this is expressed as difference of energy content between the steam supplied to the recipient plant and feed water to the boiler. The enthalpy of feed water to the boiler takes into account the enthalpy of condensate returned to the boiler (if any) and any other waste heat recovery (including economiser, blow down heat recovery etc.). In case of hot water/oil generator this is expressed as difference in energy content between the hot water/oil supplied to and returned by the recipient plant(s) to element process of cogeneration plant)
Source of data	Not applicable.
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	Due to the project does not supply heat energy to the recipient plant. Therefore no value is applied in the calculation of emission reductions due to the project activity and monitoring is not required.

Data / Parameter:	$MG_{i,j,y,mot}$ or $MG_{i,j,y,tur}$
Data unit:	MWh
Description:	Mechanical energy supplied to the recipient *j* by generator, that is supplied by motor *i* or steam turbine *i* in the absence of the project activity in year *y*
Source of data	Not applicable.
Measurement	

procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	Due to the project does not supply mechanical energy to the recipient plant. Therefore no value is applied in the calculation of emission reductions due to the project activity and monitoring is not required.

Data / Parameter:	$EF_{CO2,i,j}$
Data unit:	Tonnes CO_2/TJ
Description:	CO_2 emission factor per unit of energy of the baseline fuel used in i^{th} boiler used by recipient *j*, in tCO_2/TJ, in absence of the project activity
Source of data	Not applicable.
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	The proposed project does not involve a boiler at the recipient site in the baseline (recipient relies on electricity from the grid). Therefore no value is applied in the calculation of emission reductions due to the project activity and monitoring is not required.

Data / Parameter:	$EF_{CO2,j}$
Data unit:	Tonnes CO_2/TJ
Description:	CO_2 emission factor of fossil fuel (tCO_2/TJ) that would have been used at facility '*j*' for flaring the waste gas.
Source of data	Not applicable.
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	There is no waste gas flared and no fossil fuel used for waste gas flaring in the absence of the project. Therefore no value is applied in the calculation of emission reductions due to the project activity and monitoring is not required.

Data / Parameter:	$EF_{CO2,I}$
Data unit:	Tonnes CO_2/TJ
Description:	CO_2 emission factor per unit of energy or mass of the fuel type *i*
Source of data	Not applicable
Measurement procedures (if any):	
Monitoring frequency	Not applicable
QA/QC procedures	Not applicable
Any comment:	There is no supplement fuel consumption on site. Therefore no value is applied in the calculation of emission reductions due to the project activity and monitoring is not required.

Data / Parameter:	$Q_{i,h}$
Data unit:	kg/h

Description:	Amount of individual fuel (and other fuel(s)) i consumed at the energy generation unit during hour h
Source of data	Not applicable.
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	Due to the project does not use individual fuel (and other fuel(s) for the energy generation unit. Therefore no value is applied in the calculation of emission reductions due to the project activity and monitoring is not required.

Data / Parameter:	$EG_{tot,y}$
Data unit:	TJ/year
Description:	Total annual energy produced at the cogeneration plants, using waste energy and fossil fuel
Source of data	Not applicable.
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	Due to the project is not a cogeneration plant, Therefore no value is applied in the calculation of emission reductions due to the project activity and monitoring is not required.

Data / Parameter:	$Q_{wcm,h}$
Data unit:	kg/h
Description:	Quantity of WECM recovered in hour h
Source of data	Not applicable.
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	The project is not used this parameter for calculating *fwcm,* therefore, the parameter is not applicable and monitoring is not required.

Data / Parameter:	$NCV_{wcm,y}$
Data unit:	TJ/kg
Description:	Net Calorific Value annual average for WECM.
Source of data	Not applicable.
Measurement procedures (if any):	
Monitoring frequency	Not applicable
QA/QC procedures	Not applicable
Any comment:	There is no supplement fuel consumption on site. Therefore no value is applied in the calculation of emission reductions due to the project activity and monitoring is not required.

Data / Parameter:	Cp_{wcm} or CP_i

Data unit:	TJ/kg-deg C or other suitable unit
Description:	Specific Heat of WECM or fuel
Source of data	Not applicable.
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	There is no necessity to use the specific heat of fuel of the project Therefore no value is applied in the calculation of emission reductions due to the project activity and monitoring is not required.

Data / Parameter:	$t_{wcm,h}$ or $t_{i,h}$
Data unit:	(deg C or other appropriate unit)
Description:	The temperature of WECM (or fuel) in hour *h*
Source of data	Not applicable.
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	There is no necessity to measure the temperature of WECM (or fuel). The project applies Method-2.Therefore no value is applied in the calculation of emission reductions due to the project activity and monitoring is not required.

Data / Parameter:	$t_{wcm,y}$
Data unit:	deg C or other appropriate unit
Description:	Average temperature of Waste Energy Carrying Medium (WECM) in year *y*
Source of data	Not applicable.
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	There is no necessity to measure the temperature of WECM (or fuel). The project applies Method-2.Therefore no value is applied in the calculation of emission reductions due to the project activity and monitoring is not required.

Data / Parameter:	$P_{wcm,y}$
Data unit:	kg/cm^2 (a) or any other appropriate unit
Description:	Average pressure of WECM in year *y*
Source of data	Not applicable.
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	The project does not involve in waste pressure utilization. Therefore no value is applied in the calculation of emission reductions due to the project activity and monitoring is not required.

Data / Parameter:	$H_{wcm,y}$

Data unit:	kJ/kg or any other appropriate unit
Description:	Average enthalpy of WECM in year *y*
Source of data	Not applicable.
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	There is no necessity to measure the enthalpy of WECM. The project applies Method-2.Therefore no value is applied in the calculation of emission reductions due to the project activity and monitoring is not required.

Data / Parameter:	$d_{wcm,y}$
Data unit:	kg/m3 (or other appropriate mass/volume unit) at actual conditions
Description:	Average density of WECM at actual temperature and pressure in year *y*
Source of data	Not applicable.
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	There is no necessity to measure the average density of WECM at actual temperature and pressure. The project applies Method-2.Therefore no value is applied in the calculation of emission reductions due to the project activity and monitoring is not required.

Data / Parameter:	$ST_{whr,y}$
Data unit:	kCal/kg or kJ/kg
Description:	Energy content of the steam generated in waste heat recovery boiler fed to turbine via common steam header
Source of data	Not applicable.
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	The electricity generation of the project is purely from use of waste energy. So the *fwcm* is 1. There is no need using this parameter in the calculation of *fwcm* due to the project activity and monitoring is not required.

Data / Parameter:	$ST_{other,y}$
Data unit:	kCal/kg or kJ/kg
Description:	Energy content of the steam generated in in other boiler fed to turbine via common steam header
Source of data	Not applicable.
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	The electricity generation of the project is purely from use of waste energy. So the *fwcm* is 1. There is no need using this parameter in the calculation of *fwcm*

	due to the project activity and monitoring is not required.

Data / Parameter:	$EF_{heat,j,y}$
Data unit:	Tonnes CO_2/TJ
Description:	CO_2 emission factor of the heat source that would have supplied the recipient plant j in absence of the project activity, expressed in tCO_2/TJ
Source of data	Not applicable.
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	The project does not supply heat energy to the recipient plant. Therefore no value is applied in the calculation of emission reductions due to the project activity and monitoring is not required.

Data / Parameter:	$EF_{CO2,EL,y}$
Data unit:	t CO_2/MWh
Description:	CO_2 emission factor for electricity consumed by the project activity in year *y*
Source of data	Choose between the following options: • Use a default emission factor of 1.3 t CO2/MWh; • Use the combined margin emission factor, determined according to the latest approved version of the "Tool to calculate the emission factor for an electricity system"
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	The project is a new facility and without captive plant on site. The project does not involve in electricity imported to replace the captive electricity and gas cleaning. Therefore no value is applied in the calculation of emission reductions due to the project activity and monitoring is not required.

Data / Parameter:	$FC_{EL,CP,k,y}$
Data unit:	Mass or volume unit
Description:	Quantity of fuel type *k* combusted in the captive power plant at the project site in year *y* where *k* are the fuel types fired in the captive power plant at the project site in year *y*
Source of data	
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	The project is a new facility and without captive plant on site. Therefore no value is applied in the calculation of emission reductions due to the project activity and monitoring is not required.

Data / Parameter:	NCV_k
Data unit:	GJ/mass or volume unit

Description:	Net calorific value of fuel type *k* where *k* are the fuel types fired in the captive power plant at the project site in year *y*
Source of data	
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	The project is a new facility and without captive plant on site. Therefore no value is applied in the calculation of emission reductions due to the project activity and monitoring is not required.

Data / Parameter:	$EF_{CO2,k}$
Data unit:	t CO_2/GJ
Description:	Emission factor of fuel type *k* where *k* are the fuel types fired in the captive power plant at the project site in year *y*
Source of data	
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	The project is a new facility and without captive plant on site. Therefore no value is applied in the calculation of emission reductions due to the project activity and monitoring is not required.

Data / Parameter:	$EC_{CP,y}$
Data unit:	MWh
Description:	Quantity of electricity generated in the captive power plant at the project site in year *y*
Source of data	Not applicable.
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	The project is a new facility and without captive plant on site. Therefore the parameter is not applied due to the project activity and monitoring is not required.

Data / Parameter:	$\eta_{Project\ plant,j}$
Data unit:	%
Description:	Efficiency is the overall efficiency of the new electricity generating plant (%) in year *y*
Source of data	Not applicable.
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	There is no captive power plant at the project site in the absence of the project. Therefore the parameter is not applied due to the project activity and

	monitoring is not required.

Data / Parameter:	$EC_{PJ,import\ i,y}$
Data unit:	MWh
Description:	Quantity of import electricity from source *i* consumed replacing captive electricity generated in the absence of the project activity during year *y* in MWh
Source of data	Not applicable.
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	The project is Type-1 project. Therefore the parameter is not applied due to the project activity and monitoring is not required.

Data / Parameter:	Thermal energy produced by Type-2 project activity
Data unit:	Any suitable unit (MWh, TJ, MCal)
Description:	Annual quantity of thermal energy produced by Type-2 project activity
Source of data	Not applicable.
Measurement procedures (if any):	
Monitoring frequency	Not applicable.
QA/QC procedures	Not applicable.
Any comment:	The project is Type-1 project. Therefore the parameter is not applied due to the project activity and monitoring is not required.

B.7.2. Description of the monitoring plan:

The objective of the monitoring plan is to ensure the complete, consistent, clear, and accurate monitoring and calculation of the emissions reductions during the whole crediting period. The project owner will be responsible for the implementation of the monitoring plan.

1. Operational and Management Structure:

The monitoring system has working staffs including general manager, the CDM group director, data recorders, meter supervisors and data reviewers. The staffs will be trained according to the requirement of CDM before they go on duty.

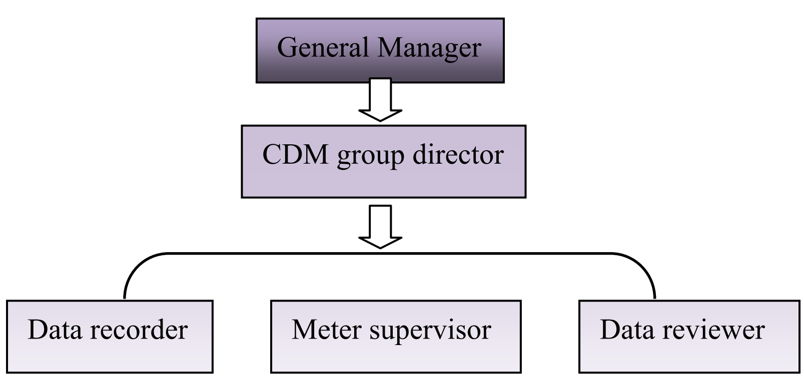

Fig.4. Operational and Management Scheme

Their respective responsibilities are as follows:

General manager: manage all the affairs related to CDM project monitoring.

CDM group director: supervise the project operation status related to data monitoring; ensure a smooth and orderly monitoring process; organize activities related to CER issuance; prepare monitoring reports.

Data recorder, Meter supervisor and Data reviewer: Data recorder is designated to record the meter; Meter supervisor is for the maintenance of all the monitoring equipments; data reviewer is responsible for data-checking and data-verifying.

2. Data to be monitored

Since the emission factor is calculated as ex-ante and according to the Monitoring Methodology ACM0012, the data to be monitored should be:
a) Quantity of waste gas used for energy generation during year y ($Q_{wcm,y}$)
b) The electricity supply to the recipient plants ($EG_{i,j,y}$)
c) Electricity consumption as a result of the project ($EC_{PJ,y}$)

3. Monitoring equipment and Installation

The waste gas flow meters will be installed at the entrance of the gas fired boilers to measure the waste gas used for power generation according to the manufacture's specification. The electricity monitoring equipment-Meters should be installed and configured according to the technical administrative code of electric energy metering device (DL/T488-2000). The metering equipment will be checked by both the project owner and Grid Company before the Project commissioning. The monitoring diagram of the Project is in the following.

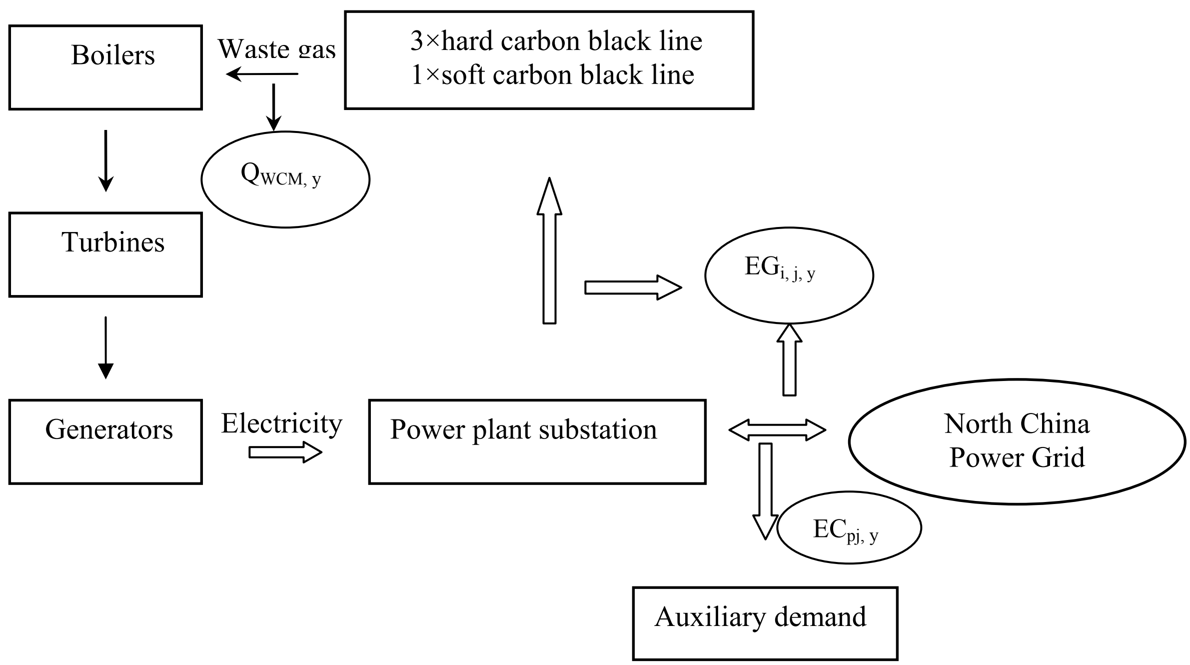

Fig 5. Simplified diagram of monitoring system

4. Data Collection

a) Quantity of waste gas used for energy generation during year *y* ($Q_{wcm, y}$)
The waste gas flow meters will be installed to monitoring waste gas for electricity generation. The meters will be operated and maintained by project owner.

b) The electricity supply to the recipient plants ($EG_{i, j, y}$)
The electricity supply to the recipient plants ($EG_{i, j, y}$) includes the electricity supply to the carbon black plant and to the grid company.
The electricity generation delivered to the carbon black lines will be measured by the meters of Grid Company and power plant. Both meters are installed on the power plant. The main meter is meter of the grid company, the meter of power plant is used for backup. The monthly data will be recorded by operators of Grid Company and power plant respectively and used for cross check.
The electricity delivered to the grid will be measured and recorded by power plant and Grid Company. The meter of Grid Company as a main meter is installed in the grid company and the meter which is installed in the power plant as a backup mater. The monthly records and sales receipts will be used for cross check.
The accuracy of the meters is 0.5s.

c) Electricity consumption as a result of the project ($EC_{PJ, y}$)
Electricity meters are installed to measure the auxiliary consumption of electricity caused by the project. The data measured by meters will be archived in the electronic way. And the data will be recorded monthly.

5. Quality control and assurance

The following quality assurance measures will be taken relating to the monitoring equipment and its installation and operation:

1) All the meters and sensing devices will be designed and manufactured to be recognized standards.
2) All monitoring equipments will be regularly checked and inspection by the qualified entity to ensure their reliability.
3) All monitoring equipments will be located in secure location free from accidental damages.
4) Routine maintenance and calibration will be performed annually in accordance with the manufacturer's specification to ensure that the data remains accurate.

6. Emergencies

In the case of the monitoring equipment abnormal or failure of monitoring, any party should notify the other party and the authorized energy metering testing organization who has confirmed by the two parties.

The monitoring data, in the normal case, it will be based on the main meters. If the main meters failure, it will read the backup meters. These apply for the two parities. But if the main meter and backup meter of Grid Company are both abnormal or failure, the monitoring data will use the data from the meters of project owner side. If there is serious mistake, on the basis of fully consultation, two parties will determine the monitoring data of the abnormal period by relevant document and records.

All the documents like internal audit records, performance review records, corrective actions records, maintenance records and any calibration documents will be retained by the project owner.

7. Monitoring reports

Monitoring reports will be prepared by the CDM director, and then submitted to the general manager for final review. The monitoring report will be submitted to the DOE and other relevant agencies.

8. Data Management:

All the data, whether in electronic or hard copy, related to the monitoring plan and needed to calculate the emission reduction will be collected and recorded by the CDM group, and archived properly. And all the documents related to calibration and monitoring will be archived orderly so that they will be available for the DOE verification. All monitoring data will be preserved throughout the 10 year crediting period and the following two years.

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 study of the baseline and monitoring methodology was concluded on 15/08/2010.

Name of person/entity determining the baseline:

Hangzhou Runzhe Environmental Technology Co., Ltd

Room of 203, No.210 of Kangqiao Road, Gongshu District, Hangzhou City, Zhejiang province, P.R.China

Tel: +86 0571 8987 4286

Email: ry20020312@163.com

The entity is not one of the Project Participants listed in Annex 1 of the document.

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:

28/08/2008 (The date of main equipment purchase agreement signed.)

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

20years

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:

N/A

C.2.1.2. Length of the first crediting period:

N/A

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

01/06/2011 or the date of registration whichever is later.

C.2.2.2. Length:

10 years

SECTION D. Environmental impacts

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

Inner Mongolia Wuhai Black Cat Carbon Black Co., LTD has undergone and passed full Environmental Impact Assessments (EIA) in line with the requirements of the Chinese government. Additionally, the EIA report of the Project is approved by Environmental Protection Bureau of Inner Mongolia Autonomous Region on 18/12/2008. The main conclusions are as follows.

Noise Impact and Noise Prevention

The main noise sources in the construction period are construction machines. This can impose a degree of noise impact on people living nearby as well as workers. In order to reduce it, the project activity takes comprehensive measures, such as scientific arrangement of construction time, no loud-noise working at night, and the like. This impact will disappear as soon as the construction project is completed.

In the operational period, the noise is mainly produced by fans, turbines, and blow down piping. The countermeasure to this problem is the usage of low-noise equipments, with it meeting the requirement of Industrial Enterprise Boundary Standards of Noise (GB12348-90). Also, all the generators need to be equipped with thermal shrouds outside and acoustical boards inside; the stream outlet of turbines will be installed with mufflers and the beds of pumps will be revised to be less vibrating. All of these measures aim at reducing the noise level below the noise standard set by the country.

Waste water impact and prevention

The waste water will be reused through the waste water recycling system which is composed of septic tank, oxidizing pond, disinfect tank, etc. Hence, the pollution of waste water is limited. Besides, domestic sewage and industrial waste water are insulated by two sets of pipe net. The former flows through the tank, and then into sewage treatment plant, where it is processed and recycled; the latter is discharged into industrial waste water pipe net and re-utilized after treated.

Dust and waste gas impact and prevention

In the construction period, dust is mainly produced by digging, piling up, cleaning and other construction work. Since there are few people living nearby, workers become the main victim of dust pollution. The solution to this problem is to arrange the construction work scientifically. When the construction work is completed, the dust impact is near zero.

In the construction period, waste gas of the Project comes from the carbon black production lines. The waste gas will be connected and utilized by the power plant. The waste gas combusted from the boiler will release into the atmosphere in line with the requirements of 'Integrated emission standard of air pollutants' (GB16297-1996).

Conclusion

As a whole, by displacing electricity from NCPG, the project will reduce GHG and ambient air pollution emissions related to firing of fossil fuels in the power plants supplying electricity to the

grid, including carbon dioxide, sulphur oxides, nitrogen oxides, particulates, etc.The net impact with regard to environmental pollution would be positive, and any negative impacts will be minimized as all necessary abatement measures would be adopted and periodically monitored.

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:

As discussed above, the environmental impacts of the Project are not significant.

SECTION E. Stakeholders' comments

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

For the public to truly understand of the Project and giving full consideration to the vital interests of the local public, the project owner collected comments and suggestions extensively by publishing the Project in Wuhai Daily on 05/05/2008. Finally, there are no negative comments received.

In order to collect the stakeholder comments, the project owner organized a meeting about the Project public investigation on 10/07/2008. The meeting purpose planed to conduct public investigation from 18/07/2008 to 19/07/2008 in the area where could be affected by the Project. The participants in investigation are from local villages, factories and communities, including local workers, farmers and intellectuals. The investigation was made through delivering questionnaires.

E.2. Summary of the comments received:

50 Questionnaires were given to the local people, 100% feedback. Comments from these questionnaires for local people are summarized in this table.

Table E.2-1 The details of participants in investigation

Item	Content	Number	percentage
Age	under 30	20	40%
	31-40	24	48%
	above 40	6	12%
Education level	Junior school or under	11	22%
	Senior school	18	36%
	undergraduate or above	21	42%
occupation	cadre	10	20%
	worker	23	46%
	farmer and other	17	34%

Table E.2-2 Results of the questionnaire survey

No	Impacts due to the Project		Participants percentage (%)
1	Regarding the current status of the area's environmental quality, do you feel satisfied?	Satisfied	70%
		More satisfied	30%
		Unsatisfied	0%
2	Do you know of the proposed project?	Yes	98%
		No	2%
3	To what degree do you think the address of the Project is appropriate?	Appropriate	98%
		Not appropriate	0%
		Don't know	2%
4	To what degree do you think the project affect your lives and work?	Positive	30%
		Negative	0%
		No effect	68%
		Don't know	2%
5	What do you think is the Project impact on local economic development?	Very good	98%
		good	2%
		common	0%
6	What do you think is the Project impact on local environment?	Serious	0%
		Common	6%
		Slight	94%
7	Do you support to build the plant here?	Yes	98%
		No	0%
		Don't care about it	2%

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

Although no negative comments have been received on the project overall, the project owner will pay much attention to the concerns of stakeholders on specific issues. The project owner will closely follow all of the measures listed in the EIA during the constructing and operating stage. Moreover, the local community possesses strong positive comments on the effects that the Project will have on the local economy and infrastructure. Therefore, there has been no need to substantially modify the project due to comments received.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

The Project Owner

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The Buyer

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

This Project receives no public funding by Annex I Parties or from any other public sources.

Annex 3

BASELINE INFORMATION

Tables A3-1 Fossil Fuel-fired Power Generation of NCPG in 2005

Province	Electricity Generation (MWh)	Rate of Electricity (%)	Electricity Supply (MWh)
Beijing	20,880,000	7.73	19,265,976
Tianjing	36,993,000	6.63	34,540,364
Hebei	134,348,000	6.57	125,521,336
Shanxi	128,785,000	7.42	119,229,153
Inner Mongolia	92,345,000	7.01	85,871,616
Shandong	189,880,000	7.14	176,322,568
Total	603,231,000		560,751,013

Net MWh transferred from Northeast China Power Grid to NCPG	3,929,000
Simple OM of Northeast China Power Grid	1.16489
Total Electricity Supply (MWh)	564,680,013
Total Emission of CO2(tCO2e)	601,972,682
Emission factor of NCPG in 2005	1.06604

Data source: China Electric Power Yearbook 2006

Table A3-2 Calculate the Operating Margin Emission Factor of NCPG in 2005

Fuel	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total	Carbon content	$OXID_i$	$EFCO_{2,i}$	NCV_i	Emission of CO2(tCO_{2e})
									（tc/TJ）	（%）	($kgCO_2$/TJ)	（MJ/t,km3）	L=G*J*K/100000 （quantity）
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K	L=G*J*K/10000 (volume)
Raw coal	10^4t	897.75	1675.2	6726.5	6176.5	6277.23	10405.4	**32159**	25.8	100	87,300	20,908	586,979,486
Cleaned coal	10^4t						42.18	**42.18**	25.8	100	87,300	26,344	970,069
Other washed coal	10^4t	6.57		167.45	373.65		108.69	**656.36**	25.8	100	87,300	8,363	4,792,018
Coke	10^4t					0.21	0.11	**0.32**	29.2	100	95,700	28,435	8,708
Coke oven gas	10^8m^3	0.64	0.75	0.62	21.08	0.39		**23.48**	12.1	100	37,300	16,726	1,464,870
Other gas	10^8m^3	16.09	7.86	38.83	9.88	18.37		**91.03**	12.1	100	37,300	5,227	1,774,786
Crude oil	10^4t					0.73		**0.73**	20	100	71,100	41,816	21,704
Petrol	10^4t			0.01				**0.01**	18.9	100	67,500	43,070	291
Diesel oil	10^4t	0.48		3.54		0.12		**4.14**	20.2	100	72,600	42,652	128,197
Fuel oil	10^4t	12.25		0.23		0.06		**12.54**	21.1	100	75,500	41,816	395,901
LPG	10^4t							**0**	17.2	100	61,600	50,179	0
Refinery dry gas	10^4t			9.02				**9.02**	15.7	100	48,200	46,055	200,231
Nature gas	10^8m^3	0.28	0.08		2.76			**3.12**	15.3	100	54,300	38,931	659,553
Other petroleum products	10^4t							**0**	20	100	75,500	41,816	0
Other coking products	10^4t							**0**	25.8	100	95,700	28,435	0
Other energy	10^4tce	8.58		32.35	69.31	7.27	118.9	**236.41**	0	0	0	0	0
												Total	597,395,812

Data source: China Energy Statistical Yearbook 2006

Tables A3-3 Fossil Fuel-fired Power Generation of NCPG in 2006

Province	Electricity Generation (MWh)	Rate of Electricity (%)	Electricity Supply (MWh)
Beijing	20,705,000	7.51	19,150,055
Tianjing	35,924,000	6.86	33,459,614
Hebei	143,888,000	6.63	134,348,226
Shanxi	150,250,000	7.45	139,056,375
Inner Mongolia	139,593,000	7.58	129,011,851
Shandong	230,922,000	7.12	214,480,354
Total	721,282,000		669,506,473

Net MWh transferred from Northeast China Power Grid to NCPG	2,618,060
Simple OM of Northeast China Power Grid	1.14972
Net MWh transferred from Central China Power Grid to NCPG	497,060
Simple OM of Central China Power Grid	1.12157
Total Electricity Supply (MWh)	672,621,593
Total Emission of CO2(tCO2e)	670,617,037
Emission factor of NCPG in 2006	0.99702

Data source： China Electric Power Yearbook 2007

Tables A3-4 Calculate the Operating Margin Emission Factor of NCPG in 2006

Fuel	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total	Carbon content	$OXID_i$	$EFCO_{2,i}$	NCV_i	Emission of CO2(tCO_{2e})
									(tc/TJ)	(%)	($kgCO_2$/TJ)	(MJ/t,km3)	L=G*J*K/100000 (quantity)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K	L=G*J*K/10000 (volume)
Raw coal	10^4t	796.63	1639.2	6867.99	6968.88	8404.05	10930.66	**35607.41**	25.8	100	87,300	20,908	649,930,803
Cleaned coal	10^4t						39.77	**39.77**	25.8	100	87,300	26,344	914,643
Other washed coal	10^4t	6.36		214.13	371.14	61.77	544.6	**1198**	25.8	100	87,300	8,363	8,746,477
Briquette	10^4t	7.97					27.77	**35.74**	26.6	100	87,300	20,908	652,351
Coke	10^4t						3.23	**3.23**	29.2	100	95,700	28,435	87,896
Coke oven gas	10^8m^3	0.38	0.63	5.8	22.32	0.64	5.79	**35.56**	12.1	100	37,300	16,726	2,218,517
Other gas	10^8m^3	20.66	6.58	69.72	13.79	22.76	7.22	**140.73**	12.1	100	37,300	5,227	2,743,772
Crude oil	10^4t					0.74		**0.74**	20	100	71,100	41,816	22,001
Petrol	10^4t			0.01				**0.01**	18.9	100	67,500	43,070	291
Diesel oil	10^4t	0.21		3.01		0.07	6.32	**9.61**	20.2	100	72,600	42,652	297,577
Fuel oil	10^4t	6.38		0.08			4.1	**10.56**	21.1	100	75,500	41,816	333,391
LPG	10^4t						0.01	**0.01**	17.2	100	61,600	50,179	309
Refinery dry gas	10^4t			2.43			2.32	**4.75**	15.7	100	48,200	46,055	105,443
Nature gas	10^8m^3	3.41	0.73		0.53			**4.67**	15.3	100	54,300	38,931	987,216
Other petroleum products	10^4t						0.28	**0.28**	20	100	75,500	41,816	8,840
Other coking products	10^4t							**0**	25.8	100	95,700	28,435	0
Other energy	10^4tce	6.83		47.11	230.76	12.51	132.29	**429.5**	0	0	0	0	0
												Total	667,049,525

Data source: China Energy Statistical Yearbook 2007

Tables A3-5Fossil Fuel-fired Power Generation of NCPG in 2007

Province	Electricity Generation (MWh)	Rate of Electricity (%)	Electricity Supply (MWh)
Beijing	22,300,000	7.51	20,625,270
Tianjing	39,900,000	6.53	37,294,530
Hebei	163,300,000	6.67	152,407,890
Shanxi	173,400,000	7.99	159,545,340
Inner Mongolia	180,100,000	7.77	166,106,230
Shandong	259,100,000	7.23	240,367,070
Total	838,100,000		776,346,330

Net MWh transferred from Northeast China Power Grid to NCPG	1789750
Simple OM of Northeast China Power Grid	1.08186
Net MWh transferred from Central China Power Grid to NCPG	803,000
Simple OM of Central China Power Grid	1.10197
Total Electricity Supply (MWh)	778,939,080
Total Emission of CO2(tCO2e)	757,552,268
Emission factor of NCPG in 2007	0.97254

Data source: China Electric Power Yearbook 2008

Tables A3-6 Calculate the Operating Margin Emission Factor of NCPG in 2007

Fuel	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total	Carbon content	$OXID_i$	$EFCO_{2,i}$	NCV_i	Emission of CO2(t
									（tc/TJ）	（%）	($kgCO_2$/TJ)	（MJ/t,km3）	L=G*J*K/100000（qu
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K	L=G*J*K/10000 (volu
Raw coal	10^4t	816.17	1753.99	7716.13	7510.06	10434.25	11884.83	40115.43	25.8	100	87300	20908	732214267.3
Cleaned coal	10^4t						18.43	18.43	25.8	100	87300	26344	423858.8902
Other washed coal	10^4t	5.76		156.89	478.81	48.57	756.84	1446.87	25.8	100	87300	8363	10563451.74
Briquette	10^4t	7.93					42.86	50.79	26.6	100	87300	20908	927053.8204
Coke	10^4t			0.02			4.09	4.11	29.2	100	95700	28435	111842.5325
Coke oven gas	10^8m^3	0.07	0.72	3.13	25.46	2.58	13.61	45.57	12.1	100	37300	16726	2843020.249
Other gas	10^8m^3	11.8	7.6	88.38	72.8	28.17	29.64	238.39	12.1	100	37300	5227	4647820.697
Crude oil	10^4t							0	20	100	71100	41816	0
Petrol	10^4t			0.01				0.01	18.9	100	67500	43070	290.7225
Diesel oil	10^4t	0.33		2.35		0.62	5.08	8.38	20.2	100	72600	42652	259489.6498
Fuel oil	10^4t	4.74		0.18			2.35	7.27	21.1	100	75500	41816	229521.7516
LPG	10^4t							0	17.2	100	61600	50179	0
Refinery dry gas	10^4t	0.06		2.85			1.65	4.56	15.7	100	48200	46055	101225.2056
Nature gas	10^8m^3	5.03	0.73		0.54	4.22	0.01	10.53	15.3	100	54300	38931	2225992.825
Other petroleum products	10^4t	1.72						1.72	20	100	75500	41816	54302.2576
Other coking products	10^4t	4.74						4.74	25.8	100	95700	28435	128986.2783
Other energy	10^4tce	11.94		77.25	360.26	30.75	163.48	643.68	0	0	0	0	0
												Total	754731123.9

Data source: China Energy Statistical Yearbook 2008

Table A3-7 Breakdown per fuel of annual emissions

		Beijing	Tianjin	Hebei	Shanxi	Shandong	Inner Mongolia	Total	Calorific value	EF	Oxidation rate	Emission
Fuels	Unit	A	B	C	D	E	F	G=A+…+F	H	I	J	K=G×H×I×J/100,000
Raw coal	10^4t	816.17	1,753.99	7,716.13	7,510.06	11,884.83	10,434.30	40,115.43	20,908	87,300	1	732,214,267
Cleaned coal	10^4t	0	0	0	0	18.43	0	18.43	26,344	87,300	1	423,859
Other washed coal	10^4t	5.76	0	156.89	478.81	756.84	48.57	1,446.87	8,363	87,300	1	10,563,452
Briquette	10^4t	7.93	0	0	0	42.86	0	50.79	20,908	87,300	1	927,054
Coke	10^4t	0	0	0.02	0	4.09	0	4.11	28,435	95,700	1	111,843
Other coking products	10^4t	4.74	0	0	0	0	0	4.74	28,435	95,700	1	128,986
Total												**744,369,461**
Crude oil	10^4t	0	0	0	0	0	0	0	41,816	71,100	1	0
Gasoline	10^4t	0	0	0.01	0	0	0	0.01	43,070	67,500	1	291
Diesel oil	10^4t	0.33	0	2.35	0	5.08	0.62	8.38	42,652	72,600	1	259,490
Fuel oil	10^4t	4.74	0	0.18	0	2.35	0	7.27	41,816	75,500	1	229,522
Other petroleum products	10^4t	1.72	0	0	0	0	0	1.72	41,816	75,500	1	54,302
Total												**543,604**
Nature gas	10^7m^3	50.3	7.3	0	5.4	0.1	42.2	105.3	38,931	54,300	1	2,225,993
Coke oven gas	10^7m^3	0.7	7.2	31.3	254.6	136.1	25.8	455.7	16,726	37,300	1	2,843,020
Other gas	10^7m^3	118	76	883.8	728	296.4	281.7	2,383.90	5,227	37,300	1	4,647,821
LPG	10^4t	0	0	0	0	0	0	0	50,179	61,600	1	0
Refinery dry gas	10^4t	0.06	0	2.85	0	1.65	0	4.56	46,055	48,200	1	101,225
Total												**9,818,059**
Total												**754,731,124**

Data source: China Energy Statistical Yearbook 2008

Here:
$\lambda_{Coal,y}$ =98.63%，$\lambda_{Oil,y}$ =0.07%，$\lambda_{Gas,y}$ =1.30%

Therefore,

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} = 0.8191\ tCO_2/MWh$$

Table A3-8 Installed Capacity of NCPG in 2007

Installed Capacity	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal	MW	3900	6920	29020	30950	39870	54140	164800
Hydro	MW	1050	10	780	790	830	1050	4510
Nuclear	MW	0	0	0	0	0	0	0
Wind and other energies	MW	2.7	0	410	0	1096.5	210	1719.2
Total	MW	4952.7	6930	30210	31740	41796.5	55400	171029.2

Data source：China Energy Statistical Yearbook 2008

Table A3-9 Installed Capacity of NCPG in 2006

Installed Capacity	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal	MW	3984	6512	26087	26661	28899	49395	141538
Hydro	MW	1053	5	785	790	818	553	4004
Nuclear	MW	0	0	0	0	0	0	0
Wind	MW	24	24	218	0	565	106	937
Total	MW	5061	6541	27090	27451	30282	50054	146479

Data source：China Energy Statistical Yearbook 2007

Table A3-10 Installed Capacity of NCPG 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
Wind	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	114620.4

Data source: China Energy Statistical Yearbook 2006

Table A3-11 BM EF of NCPG

	Installed Capacity of 2004	Installed Capacity of 2005	Installed Capacity of 2006	Increase over previous year (MW)	Cumulative increase (%)
	A	B	C	D=C-A	
Thermal(MW)	111,068.7	141,538	164,800	53,731.3	95.25%
Hydro(MW)	3,216.2	4,004	4,510	1,293.8	2.29%
Nuclear(MW)	0	0	0	0	0.00%
Wind(MW)	335.5	937	1,719.2	1,383.7	2.45%
Total	**114,620.4**	**146,479**	**171,029.2**	**56,408.8**	**100.00%**
% versus 2007	67.02%	85.65%	100%		

$EF_{BM,y}$=0.8191×95.25%=0.7802 tCO_2/MWh

Table A3-12 CM EF of NCPG

OM (tCO_2/MWh)	BM (tCO_2/MWh)	CM=(OM+BM)/2 (tCO_2/MWh)
1.0069	0.7802	0.89355

Annex 4

MONITORING INFORMATION

There is no additional information.