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

CONTENTS

SECTION A. General description of project activity

A.1 Title of the project activity:

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A power generation project using waste heat from the Coke Dry Quenching (CDQ) equipment in China, ver.01.1, Nov. 10, 2006.

A.2. Description of the project activity:

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Shanxi Antai Group Holding Co., Ltd. (hereafter referred to as the "Antai Group"), located in Jiexiu City, Shanxi Province, China, was established in 1984. The group owns several companies dealing with various fields of industries including coke, steel, building material, etc. Judging from the volume of cokes and pig iron production, it is a small or medium-sized private company comparing to other state-owned large companies.

Antai Group has recently installed a mechanical coke production plant (coke oven) with annual production capacity of 1.1 million tons. However, it did not install the Coke Dry Quenching (CDQ) equipment mainly because of its low profitability and high initial investment cost. Neither Shanxi nor Jiexiu government has not set a specific incentive/penalty scheme yet that would mandate the installation of the CDQ equipment.

This proposed CDM project activity is to install CDQ plant in a coke oven, which would be the second case in Shanxi and the first case under commercial condition and it will achieve the reduction of CO_2 emissions by recovering sensible waste heat from red-hot coke and by avoiding CO_2 emissions from electricity generation by fossil fuel power plants that presently supply the North China Power Grid. GHG emission reduction will be approximately 493.2 k-ton CO_2 in total during seven years of the crediting period (from 2008 to 2014).

The cokes treated with the CDQ will be partly used internally for steel making and be party sold to external buyers. All of the electricity generated by the CDQ will be used internally.

The specific goals of the project are to:

· reduce greenhouse gas emissions in China compared to a business-as-usual scenario;
· help to stimulate the dissemination of the CDQ installation in China;
· create local employment.

Especially, the implementation of this project activity will improve not only global environment but also local surroundings. In regards to the local surroundings, it can reduce the emissions of air pollutants, such as SO_2, NO_X, and CO, in the flue gas generated from the combustion of fossil fuels. In addition, the introduction of CDQ equipment will make it possible to avoid both the excess use of the water and the emissions of fine particles cokes generated from the quenching of cokes with mass sprinkling of chilled water in a quenching tower.

All of these benefits will contribute to the sustainable development of China.

A.3. Project participants:

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Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
China	Shanxi Antai Group Holding Co., Ltd	No
Japan	Tohoku University	No
Japan	Japan Carbon Finance, Ltd.	No

Note: Although the Tohoku University is one of the project participants, it will not claim the acquisition of the CER generated with this proposed project activity.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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The project activity is to take place in the premise of the Antai Group in Jiexiu City in the existing site. It is located next to the coke oven plant.

A.4.1.1. Host Party(ies):

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People's Republic of China

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

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Shanxi Province

A.4.1.3. City/Town/Community etc:

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Jiexiu City

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

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Shanxi Province is located at the latitude around 34 degrees north and longitude 110 to 114 degrees east, in the northern part of China, southwest of Beijing, and in the middle reaches of the Yellow River (Huang He). The parallelogram-shaped land stretches 290 km east-west wise and 550 km north-south wise. Plateaux of around 1000 m altitude constitute the vast majority of the 156 thousand km^2 terrain (1.6% of the whole nation), approximately 72% of which being mountains, hills, and highlands, and other 28% being basin.

The area abounds with various resources. To name some major resources, coal and iron ore reserves in 2000 amounts to 256.53 billion and 3.35 billion tons, constituting approximately 25.5 % and 7.3% of the

national total, respectively. Coal, particularly, is plentiful, that it is found in 40% of the land. Furthermore, there are a large number of coal mines whose coal layer is only a dozen meter deep, which is a favourable condition for mining.

Manufacturing, particularly heavy manufacturing supports vast part of the industry in the region. Active industries include: coal industry (annual production of 250 million tons, 25.2% of national total in 2000) and thermal power generation; iron and steel, especially pig iron production (annual production of 16.28 million tons, 12.4 % of the national total in 2000); coke manufacturing (annual production of 49.6 million tons, 41.1 % of the national total in 2000); non-ferrous metal; machinery; and chemical.

Jiexiu City is located in the mid-south of Shanxi Province and at the south end of Jinzhong basin, with a surface area of 743.7 km^2 and population of 351 thousand (Figure 1).

Figure 1. Location of the Jiexiu city in the Shanxi Province, China

The distance to Taiyuan City in the north is 137 km, and to Linfen City in the south 135 km. Jiexiu abounds with coal, playing an important role as a province's coke supply base. The industrial zone is located 10 km from Jiexiu City, and the headquarters of the Antai Group company is lacated 3 km south of the zone (Figure 2).

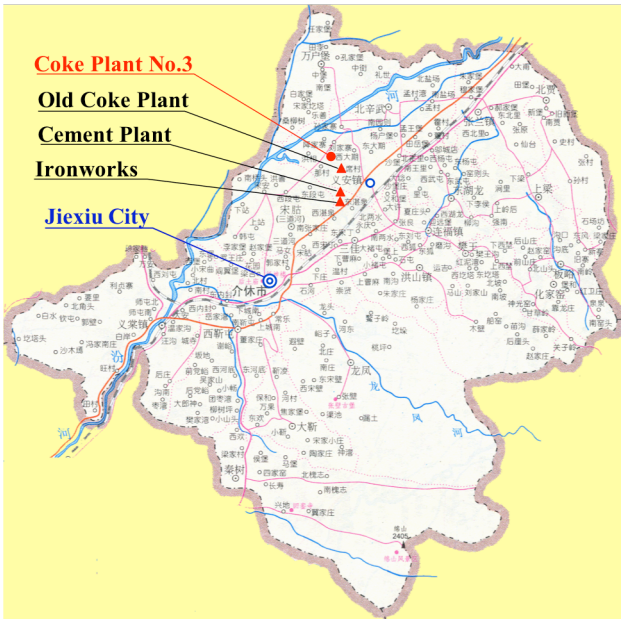

Figure 2. Location of the Antai Group Company in Jiexiu City

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

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Sectoral Scope: 01(Energy Industry)

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

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Red-hot coke taken out of the coke oven is normally cooled with a water spray in a quench tower, which is a process known as wet quenching (Coke Wet Quenching: CWQ). A dry quenching (Coke Dry Quenching: CDQ) equipment, on the other hand, recovers sensible waste heat from red-hot coke, which accounts for 40 to 50 % of heat loss in a coke oven, as steam, in order to recycle energy.

The proposed CDM project activity is to newly install CDQ equipment, in which the CDQ equipment will be used in coke quenching, while existing CWQ equipment is used: 1) during the suspension of CDQ equipment operation due to authorities' inspection, and periodical maintenance works and 2) for the cokes which can not be treated with the CDQ because of the lack of the CDQ capacity. The project activity involves a process to convert part of wasted heat to electricity generation[1]. Moreover, this facility allows less leak of particulate during the process of feeding red-hot coke in the oven and of discharging the quenched coke. Furthermore it does not produce a massive amount of vapour as CWQ does. The CDQ installation would be the first case in the Province under commercial condition.

[1] In this proposed project activity, part of the waste-heat is planned to be used for the steam which will replace the steam generated elsewhere. In addition, the cokes treated with the CDQ will be used for the reduction of the iron ore in the blast furnace of the Antai Group Company and it will improve the efficiency of iron making by increased coke/iron-ore rate, which will also lead to the GHG emission reduction. However we only claim the emission reduction generated by the replacement of the North China Power grid electricity, which is conservative.

Figure 3 and Figure 4 below show: 1) the process flow of a CDQ equipment , 2) project boundary, 3) proposed project activity and baseline scenario.

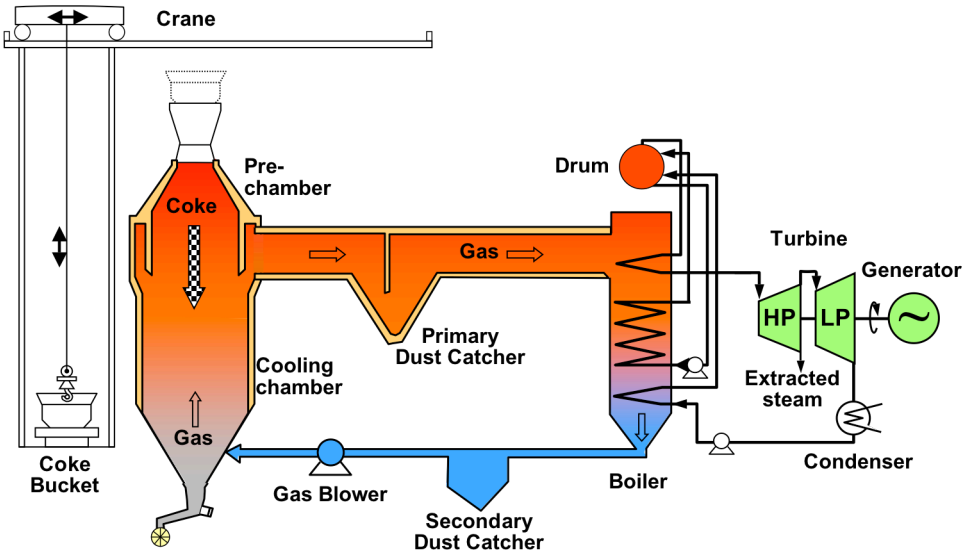

Figure 3. Process flow of the CDQ

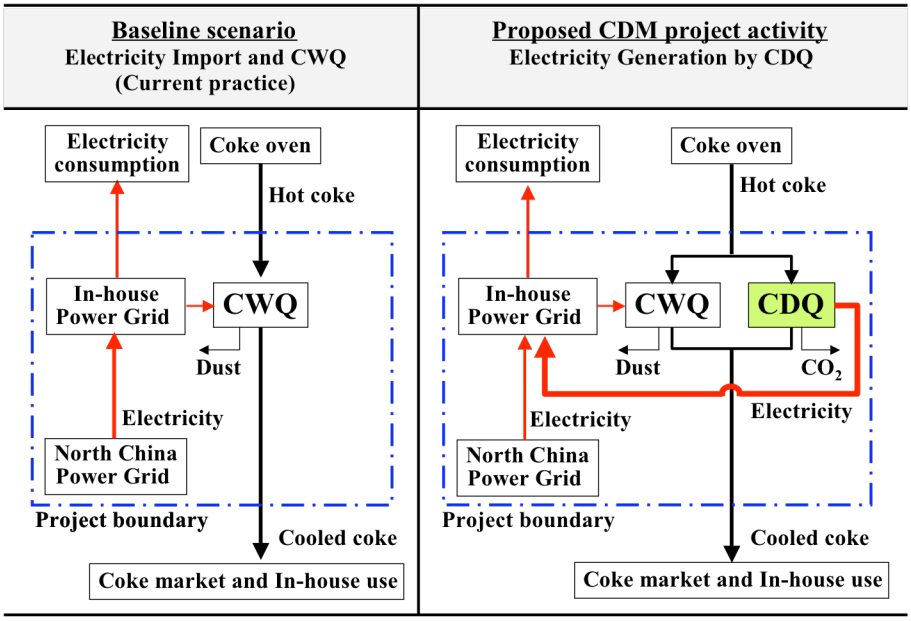

Figure 4. Proposed CDM project activity, baseline and boundary

The following Table 1 shows main benefits expected from the installation of CDQ.

Table 1. Main benefits expected from the installation of CDQ

Type	Benefits
1. Recovery of waste heat from coke	Heat recovery: 2 GJ/t-coke Electricity generation：85 kWh/ t-coke Reduction of GHG, SO_x, NO_x by possible reduction of fossil fuel consumption in the power grid
2. Improved surrounding environment	Reduction of airborne particles (approx. 0.4kg/t-coke) No massive vapour emission unlike CWQ

***Note**:* There is the possibility that more dust will be generated during the transportation of the CDQ-treated dry cokes from the cokes oven to the blast furnace through the belt conveyor compared with the case of the CWQ-treated wet cokes. We will monitor the dust generation regularly and take necessary measures to avoid serious environmentally negative impacts by, for example, covering of the connection part of the belt conveyer with the hard and thick cloth. Please refer to the section B.7.2.

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

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Table 2. Projection of the emission reduction by the proposed project activity

Years	Annual estimation of emission reductions in tonnes of CO_2 e
2008	12,029
2009	80,196
2010	80,196
2011	80,196
2012	80,196
2013	80,196
2014	80,196
Total estimated reduction (t-CO_2)	**493,203**
Total number of crediting years	**7**
Annual average over the crediting period of estimated reductions (tonnes of CO_2 e)	**70,458**

A.4.5. Public funding of the project activity:

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Official funding from the Annex I Parties in the Kyoto Protocol, including ODA, will not be allocated to this project activity.

SECTION B. Application of a baseline and monitoring methodology

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

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Approved consolidated baseline methodology ACM 0004 "Consolidated baseline methodology for waste gas and/or heat for power generation", ver.2, Sectoral Scope: 01, 3 March 2006 (hereafter referred to as the "Version 02 of ACM0004")

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

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According to the Version 02 of ACM0004, it applies to the project activities that generate electricity form waste heat or the combustion of waste gases in industrial facilities.

The methodology applies to electricity generation project activities:

- *that displace electricity generation with fossil fuels in the electricity grid or displace captive electricity generation from fossil fuels, electricity;*
- *where no fuel switch is done in the process where the waste heat or the waste gas is produced after the implementation of the project activity*

As described in the section A of this PDD, the installation of the CDQ in the proposed project activity by Antai Group which uses the waste heat to generate electricity fits all applicability conditions mentioned above and application is justified because:

(a) CDQ installation is electricity generation project activities that displace electricity generation with fossil fuels in the North China Power grid.
(b) The North China Power Grid is dominated by coal-fired power generation. Generating sources with zero or low operating costs such as hydro, geothermal, wind, solar, nuclear, and low cost biomass only account for a small amount of the total capacity of the North China Power Grid.
(c) Utilization of the waste heat is not the most likely baseline scenario (please see the section B.4. of this PDD below)
(d) There exists no possibility for a fuel switch in the process where the waste heat is produced as this is a newly-built mechanical coke oven with fixed input and output energy sources over the crediting period.

As mentioned in the footnote #1 of this PDD, in this proposed project activity, a part of the waste-heat is planned to be used for the steam which will replace the steam generated elsewhere. However we only claim the emission reduction generated by the replacement of the North China Power grid electricity, which is conservative.

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

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Table 3. Overview of emissions sources included in or excluded from the project boundary

	Source	Gas	Inclueded/ Excluded	Justification/Explanation
Baseline	Grid electricity generation	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification. This is conservative
		N_2O	Excluded	Excluded for simplification. This is conservative
Project Activity	On-site fossil fuel consumption due to the project activity	CO_2	Included	Minor emission source (***Note***)
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.

***Note*:** A CDQ plant could emit CO_2 as approx. 0.3% of coke (powder coke) in the process of combustion depending on the condition it is operated[2]. Since the amount of sensible heat to be recovered will be much larger than GHG emission from combusted powder coke, GHG reduction can be achieved through the project as a whole.

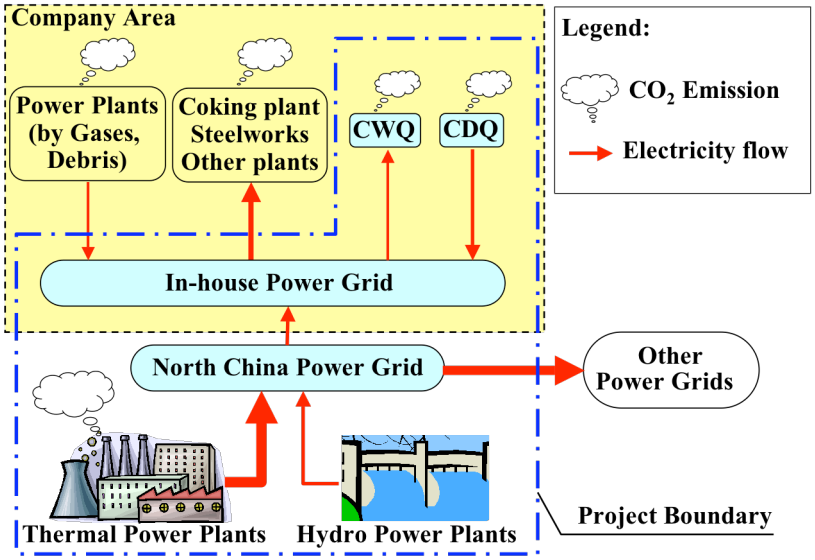

Figure 5. Project boundary of the proposed project activity

[2] Nakajima *et al*. "Installation and operation of the CDQ at the Fukuyama Cokes oven No.4", *NKK Technical Report*, No.115, p.48-56, 1986.

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

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As mentioned previously, the baseline is determined by using the Version 02 of ACM0004 as follows.

Version 02 of ACM0004 methodology specifies following conditions and options regarding the baseline scenario and the proposed project activity.

The baseline scenario alternatives should include all possible options that provide or produce electricity for in-house consumption and/or sale to grid and/or other consumers. The project participant shall exclude baseline options that:

• do not comply with legal and regulatory requirements; or

• depend on key resources such as fuels, materials or technology that are not available at the project site

The project participant shall provide evidence and supporting documents to exclude baseline options that meet the above-mentioned criteria.

The possible alternative scenarios in absence of the CDM project activity would be as follows:

(a) The proposed project activity not undertaken as a CDM project activity;

(b) Import of electricity from the grid;

(c) Existing or new captive power generation on-site, using other energy sources than waste heat and/or gas, such as coal, diesel, natural gas, hydro, wind, etc;

(d) A mix of options (b) and (c), in which case the mix of grid and captive power should be specified

(e) Other uses of the waste heat and waste gas;

(f) The continuation of the current situation, whether this is captive or grid-based power supply (if not already included in the options above).

Examination of the each baseline option candidate

(a) The proposed project activity not undertaken as a CDM project activity;

This can be a candidate of the baseline option of the proposed CDM activity.

(b) Import of electricity from the grid;

The Antai Group has increased the demand of the electricity and has increased the import from the grid. Therefore this is status quo and it can be a candidate of the baseline option.

(c) Existing or new captive power generation on-site, using other energy sources than waste heat and/or gas, such as coal, diesel, natural gas, hydro, wind, etc;

The Chinese government has been implementing a policy to reduce the number of the small coal-fired power plants since 1996. Since there are no supply of natural gas and no possibility to introduce renewable energy such as solar, wind, small hydro in the region, coal is the only energy source for the fugitive power plant. Therefore this option is against the policy of the Chinese government and cannot be a candidate of the baseline option.

(d) A mix of options (b) and (c), in which case the mix of grid and captive power should be specified

This option can be included in (b) and (c).

(e) Other uses of the waste heat and waste gas;

As mentioned both in the footnote #1 and in the section B.2. of this PDD, in this proposed project activity, a part of the waste-heat is planned to be used for the steam which will replace the steam generated elsewhere. However we only claim the emission reduction generated by the replacement of the North China Power Grid electricity, which is conservative. From this reason, this option is not considered as a viable option in this PDD.

(f) The continuation of the current situation, whether this is captive or grid-based power supply (if not already included in the options above).

This option can be included in (b) and (c).

Therefore, in view of CDQ installation in Antai Group, following two options are available for project participants as investment options

***Option I** : Installation of the CDQ equipment and auxiliary equipment such as turbines, in addition to currently existing CWQ equipment[3] ; corresponds to the scenario (a) in the Version 02 of ACM0004 alternatives mentioned above.*

***Option II** : Import of the electricity from the grid, which is the continuation of the current situation (current practice); corresponds to the scenario (b) in the Version 02 of ACM0004 alternatives mentioned above.*

[3] Coke ovens and quenching apparatus are generally operated continuously. Therefore, CWQ equipment must be installed with CDQ equipment to back up CDQ equipment in case of operation suspension during its periodical inspection or maintenance works, and for emergency.

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): >>

We use the 'Tool for the demonstration and assessment of additionality, Version 02 dated 28 November 2005' (hereafter referred to as the "Version 02 of Additionality Tool") to demonstrate the additionality of the proposed project.

(0) Step 0: Preliminary screening based on the starting date of the project activity

Since the project is not scheduled to start before December 31, 2005, this step can be skipped.

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

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

We have already defined the alternatives in the previous section B.4 of this PDD.

(1-b) Sub-step 1b: Enforcement with applicable laws and regulations

Each of the above two options complies with the Chinese laws and regulations.

(2) Step 2: Investment Analysis

We chose barrier analysis (Step 3 below) instead of the investment analysis to verify the additionality.

(3) Step 3: Barrier Analysis

Investment Barriers

Huge initial capital investment

Option I needs huge initial investment because of the construction of industrial facilities. These are the irreversible investment with a fair amount of unpredictable risk. On the other hand, for the Antai Group, the grid electricity is not only the economically feasible power source in the long run but also requires no capital investment at any time. This option, import of the electricity, also does not require any in-house expertise to operate and maintain.

Further, the Antai Group meets all legal and regulatory requirements to be able to purchase electricity on a continual basis. Agreement on purchase of electricity with the grid requires minimal formalities and does not pose a barrier. Therefore, ***Option II***, import of the electricity from the local grid would have less preventive factors than ***Option I***.

Low profitability

Recently there has been a tremendous increase of the coke price and there have been many more attracting investing opportunities in Shanxi province such as cokes production which brings cash revenue. Actually the Antai Group needs to have focused its investment on constructing the cokes production facility because of the hike of the coke price. It is a common business practice to get the low-hanging fruits first and not to diverse its investment money on other relatively lower profitability project. Therefore, these factors prevent the ***Option I***, the CDQ installation, from being actually realized.

Negative incentive

One of the co-benefits of the CDQ installation is that the CDQ will reduce water contents in cokes that will make a positive economic impact on the steel production. However, in case of selling cokes from the CDQ directly to external buyers, there may be a negative economic impact. As the CDQ removes water, it will make the specific gravity of the coke smaller and the weight less, so the sales price of the coke will be less and the business less profitable. Since the Antai Group will sell a part of the cokes treated with the CDQ to external buyers, drying the cokes will work as a negative incentive for the installation of the CDQ. Therefore it can be said that the Antai Group has less incentive to install the CDQ equipment compared to the other state-owned big companies producing mass volume of steel which will consume all of the cokes treated with the CDQ internally.

Difficulty in obtaining the bank loan

The external investor to this project activity (such as bankers of financial institutes) may perceive risks to their investment due to unfamiliarity of the technology that would be used to generate power from waste heat utilization. In addition, the management may also feel that the investment required for the project activity has associated risks since the project activity is the "first of its kind" in the region. Therefore, at this moment, it is not yet sure exactly how much the Antai Group can borrow the capital needed for the CDQ installation from the bank. Moreover, the coal industry sector in China is under reform. This has meant that it is difficult for financial institutions to extend project finance loans for high-risk projects of coal industry in general. Project developer, therefore, need to resort to balance sheet financing which limits their ability to develop projects without additional revenue from CDM. Therefore, these factors prevent the ***Option I***, the CDQ installation, from being actually realized.

Technology barrier

The preparation and operation of the CDQ technology can be more complicated compared to the CWQ equipment. It is also possible that CDQ installation that are located in China's more remote areas, especially in Shanxi province, will face technological barrier due to the more complicated civil works and operation skills required, which prevents the ***Option I***, the CDQ installation, from being actually realized.

(4) Step 4: Common Practice Analysis

In China, from the year 1997, CDQ installation were started to be established and operated with the public financial support. According to the information from several employees working for Japanese steel companies, the operating state of the CDQ in the whole China is 28 units (currently in operation) in 2005, in which the installation without public financial support is less than half (Table 4).

Table 4. Status of the CDQ installation in China (as of 2005)

Name of the steel company	Name of the province	Company status	Number of units in operation	Public support
Shougang	Beijing	State-owned	2	Yes
Wuhan	Hubei	State-owned	2	No
Xiangtan	Hunan	State-owned	1	Yes
Baoshang	Shanghai	State-owned	12	Yes
Maanshan	Anfei	State-owned	2	Yes
Echeng	Hubei	State-owned	1	Yes
Anshan	Liaoning	State-owned	2	unknown
Tangshan	Hebei	State-owned	2	unknown
Jiangsu Shagging	Jiangsu	State-owned	3	unknown
Bengxi	Liaoning	State-owned	1	unknown
Tonghua	Jilin	State-owned	1	unknown

Source: Personal communication with several employees working for Japanese steel companies.

As shown in this Table 4 above, the companies that have already installed or are now preparing the installation are all state-owned big steel companies.

Currently, the Chinese government has a scheme to support the installation of the CDQ by providing the subsidy. However only several companies have been eligible for this subsidy scheme and Antai Group is not supposed to receive this financial support in the near future mainly because it is not a big, state-owned company[4].

Table 5 below shows the status of the CDQ penetration in China. Although larger companies have a higher penetration rate, the penetration rate is very small (3 %) in the case of small and medium-sized companies (< 5 million ton annual steel production). Therefore, it is clear that, despite more than ten years of governmental support, the CDQ installation is still in a nascent stage in the case of small to medium-seized companies, such as the Antai Group which just currently completed the construction of steel furnace and started making the crude steel with annual production of just 1.5 million ton, and only a tiny percentage of CDQ potentials has been successfully developed and explored in this category.

[4] Strictly speaking, due to the privatization and reform ongoing in China, the relationship between the company and the governments is changing and taking many different forms. Having said that, still almost all those big steel companies are state-owned in the past and retain strong relationships with both local and central governments

Table 5. Penetration rate of the CDQ in China (as of 2005) *

Steel production (mil.ton)	Number of company	Total steel production in 2004 (mil.ton/year)	Estimated coke consumption (mil.ton/year)	Estimated CDQ treatment (mil.ton/year)***	Estimated CDQ penetration rate (%)
>10	2	3.3	1.3	0.98	76
5-10	13	9.0	3.5	1.2	35
<5	NA**	15.0	6.9	0.22	3
Total	NA	27.3	11.7	2.43	21

Source: Personal communication with several employees working for Japanese steel companies. Original data is quoted from *China Steel Industry 2005* and *Statistics of the China Steel Industry 2004*.

Note: Coke consumption is estimated by using the following parameters.
Iron-steel ratio: 0.92 (Based on total production volume in China)
Coke-iron ratio for enterprises with production capacity exceeding 2 million ton: 0.43 (average of key enterprises)
Coke-iron ratio for enterprises with production is less than 2 million ton: 0.57 (average of all iron making enterprises)
Only CDQ facilities of iron and steel producres are counted. CDQ facilities of independent coke producer are not counted.
*CDQ facilities in operation as of August 2005.
**Total of 56 member companies and non-member companies of China Iron and Steel Association. Number of non-member companyies is not available.
*** CDQ capacity× number of facility× 0.95 (estimated average operating ratio)

Moreover, in Shanxi province, there exists only one CDQ project planned with the use of Japanese Official Development Assistance (ODA), which will start construction in 2006. Therefore, this proposed CDM project activity will become the second CDQ installation in the Shanxi Province and the first one by a private small/medium size company without public financial support, such as the Japanese ODA and Chinese government's subsidy in the Province.

(5) Step 5: Impact of CDM Registration

The CER revenue represents a significant source of funds for the project implementation. Therefore the carbon finance is very important factor in the decision making of the Antai Group. With regard to the CDM registration, we provide following information which describe: 1) Investment/financial parameter of the project, 2) Legal and Regulatory Requirement and 3) policy additionality

Investment/financial parameter of the project activity

Table 6 below shows the Internal Rate of Return (IRR) of the ***Option I*** and the impacts of the carbon credit finance.

Table 6. Impact of the CER revenue on IRR

	Option I (CDQ installation)	
	Without carbon finance	With carbon finance
IRR	11.0	13.0

Note 1: The electric power and steam generated through the ***Option I*** will be self-consumed within the Antai Group, and will not be sold/exported to external entities.

Note 2: Additional information with more detailed financial data will be submitted separately to the Designated Operational Entity (DOE) for the validation.

It is quite common for the Chinese companies such as Antai Group to make the investment decision by considering the IRR.

In the case of this proposed project activity, as shown in the Table 6 above, without the carbon revenue, the IRR is 11.0. However, in calculation of the IRR, we have included the cost reduction effects resulting from decreased coke/iron ratio. Since there is a possibility that the cokes treated with the CDQ will not be used internally for steel making but be sold to external buyers, depending on changes in the business environment of cokes production and steel making, it is possible not to include the cost reduction effect in calculating the IRR. In such case, the IRR value will be decreased from 11.0 to 8.62.

In any case, since the Antai Group is a private medium-sized company, it has a higher capital cost compared to the other larger state-owned companies in China because of its higher risk. The IRR above is not high enough for the project investment by the Antai Group, considering its high capital cost.

Legal and Regulatory Requirement

In July 2005, The Chinese government published its policy on the CDQ, which say that newly constructed coke oven should install the CDQ at the same time. However, these policies are not effective enough to force the Antai Group to install the CDQ because of following reasons:

(a) The Antai Group has been investigating the possibility of the CDM activity long before the governmental policy announcement in 2005.

(b) It is not the “law” but the “policy” which has been published just recently by the Chinese government and, generally speaking, in China, the “policy” only provides principles and guidance but lacks clear detailed contents of the rule. In case of the “policy”, relevant government departments need to formulate specific measures to ensure the policy can be carried out.

(c) The Antai Group’s construction plan of the coke oven has been divided into four phases. First phase was the construction of the 0.55 million-ton/year capacity of coke oven. Second, third and fourth phase consists of the addition of 0.55 million ton/year capacity each. The Antai Group has finished the second phase (1.1 million ton/year in total) and is planning to start the third phase. The local authority is asking to install the CDQ with the construction of the cokes oven in Phase 3, and 4. However, mainly due to the lack of capital needed and weak enforcement of the order by the local authority, it is very likely that Antai Group will not install the CDQ without the CER revenue.

(d) The Jiexiu City has no plan to implement concrete policies, such as favourable treatment measures or penalties, to realize the CDQ introduction at the Antai Group.[5]

(e) As mentioned previously, Antai Group is a purely private company and not the state owned company. Therefore, the Antai Group makes own investment decision purely based on the economic rationale. Unlike many of other state-owned companies, the management of the Antai Group is quite independent from the local administration.

EB rule on the policy additionality

There is the CDM EB Decision that "national and/or sectoral policies or regulations that give positive comparative advantages to less emissions-intensive technologies over more emissions-intensive technologies… that have been implemented since… November 2001… may not be taken into account in developing a baseline scenario" [6]. Therefore it can be said that the current policy does not influence the baseline determination of this CDM project activity.

Conclusion on the baseline scenario determination and additionality demonstration

The above analysis using the Version 02 of ACM0004 and Version 02 of Additionality Tool provides clear evidence that the registration and approval as a CDM project activity allows the CDQ project to overcome barriers that are currently proving prohibitive to the installation of the CDQ. It is also clarified that the current practice (import of the electricity from the grid) is to be considered as the baseline option.

B.6. Emission reduction

B.6.1. Explanation of methodological choices:

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The following paragraphs describe the way in which the consolidated baseline methodology Version 02 of ACM0004 can be applied to the project.

1) Application of the Version 02 of ACM0004 to the project

According to the Version 02 of ACM0004, Baseline emissions are given as:

$$BE_{electricity,\,y} = EG_y \times EF_{electricity} \quad (1)$$

where:

$BE_{electricity,\,y}$:	Baseline GHG emissions ($ktCO_2/y$) during the year y
EG_y:	Net quantity of electricity supplied by the project during the year y in MWh
$EF_{electricity}$:	CO_2 emission factor for the electricity displaced due to the project activity during the year y ($ktCO_2/MWh$).

[5] From the interview with the Jiexiu City Economic and Trade Council (January 2003).

[6] http://cdm.unfccc.int/EB/Meetings/0 /eb repan3.pdf

In case of the proposed project activity, baseline scenario is determined to be grid power supply and the Emissions Factor for displaced electricity is calculated as in ACM0002 ver.06 , 19 May 2006 (hereafter referred to as the "Version 06 of ACM0002") (please refer to B.4. of this PDD for the baseline option determination).

In determining the *net* quantity of electricity supplied, it is necessary to subtract the quantity of electricity required for the operation of the CDQ and to add the net electricity consumption by the CWQ. Therefore the Net quantity of electricity which can be equal to the electricity replaced by the project activity is:

$$\begin{aligned} EG_y &= EG_{CDQ,y} + EG_{CWQ,y} \\ &= W_{ck,CDQ} \times (p_{CDQ} - y_{CDQ}) + W_{ck,CDQ} \times y_{CWQ} \\ &= W_{ck,CDQ} \times (p_{CDQ} - y_{CDQ} + y_{CWQ}) \end{aligned} \quad (2)$$

where:

$EG_{CDQ,y}$:	Net electricity generation using CDQ equipment that replaces electricity from North China Power Grid (MWh/y)
$EG_{CWQ,y}$:	Net electricity consumption reduction by the CWQ equipment caused by the reduced operation time due to the CDQ installation (MWh/y)
$W_{ck,CDQ}$:	Cokes amounts treated with the CDQ (kt-coke/y)
p_{CDQ}:	Electricity generation coefficient of CDQ equipment (kWh/t-coke)
y_{CDQ}:	Electricity self-consumption coefficient of CDQ equipment (kWh/t-coke)
y_{CWQ}:	Electricity self-consumption coefficient of CWQ equipment (kWh/t-coke)

In the actual measurement through monitoring, the power consumption in the auxiliary equipment of CWQ, such as circulation pumps, ventilation pumps, etc. is determined by the monitoring of CWQ operation performance during the stoppage of CDQ[7]. Then, using the actual values obtained, the intensity of power consumption against coke production is calculated, which will be used along with the GHG emission factor of North China Power Grid to calculate the GHG emissions. The CO_2 emission factor of the North China Power Grid can be calculated as in the next section.

[7] Strictly speaking, there are two kinds of yCWQ. First is the yCWQ in which the CWQ has been used without the CDQ. Second is the yCWQ in which the CWQ will be used as a temporary substitute of the CDQ. Former yCWQ can be monitored simultaneously with the operation of the CWQ. Since CWQ is being operated and will be operated continuously due to the imbalance between the high cokes amounts to be quenched and low CDQ capacity in this proposed project activity, we can use the existing data of the CWQ operation for the latter yCWQ.

2) CO_2 emission factor of the North China Power Grid

The CO_2 emission factor of the North China Power Grid ($EF_{electricity}$) was calculated based on Version 06 of ACM0002. Baseline emission factors of operating margin ($EF_{OM,y}$) and build margin ($EF_{BM,y}$) were calculated based on the data of the North China Power Grid, which include installed capacity, electricity output and consumption of different fuels of all plants within the North China Power Grid. Along with this calculation, the baseline emission factor ($EF_{electricity, y}$) is calculated as a combined margin (CM) of $EF_{OM,y}$ and $EF_{BM,y}$, according to the following three steps.

Step 1. Calculate the Operating Margin Emission Factor ($EF_{OM,y}$)

According to the Version 06 of ACM0002, calculation of the $EF_{OM,y}$ is based on the one of the four following methods.

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

Each method is described and discussed as below.

Method (a): Simple OM
The simple OM method only can be used when low-cost/must-run resources constitute less than 50% of total amount grid generating output 1) in the five most recent years, or 2) by taking into account longterm normal for hydroelectricity generation. According to the *China Electric Power Yearbook 2004*, among the total electricity generation in 2003, the grid where the proposed project connected into has the amount of hydropower output accounting for about 1.17%, and others accounts for about 0.06 %, far less than 50%. Thus, the method (a) Simple OM can be used to calculate the baseline emission factor of operating margin ($EF_{OM,y}$) for the proposed project.

Method (b) : Simple adjusted OM
The simple adjusted OM needs the annual load duration curve of the grid. In China, the detailed data of dispatch and fuel consumption are taken as confidential business information by the grid company and the power plants, therefore those data are not publicly available. Therefore, it is difficult for this CDM project activity to adopt Method (b) for the calculation of the baseline emission factor of operating margin ($EF_{OM,y}$).

Method (c): Dispatch data analysis OM
This method (c) cannot be adopted for the proposed project because of unavailability of the dispatch data of the North China Power Grid, which is similar reason as method (b).

Method (d) : Average OM
Among the total amount of electricity output in 2003 of the North China Power Grid where the proposed project connected into, the hydropower accounts for far less than 50%, so method (d) is not suitable for the proposed project.

In conclusion, Method (a) Simple OM is the only reasonable and feasible method among the four methods for the calculation of the OM emission factor ($EF_{OM,y}$) of the proposed project.

In accordance with Version 06 of ACM0002, the Simple OM emission factor ($EF_{OM, simple, y}$) is calculated as the generation-weighted average emissions per electricity unit (t CO_2/MWh) of all generating sources serving the system, excluding those must-run power plants with lower-operating costs.

For the convenience of developing qualified projects and projects in priority areas with high efficiency, the Office of NCCCC, NDRC of the Chinese Government recently worked out China's regional grid baseline emission factors based on the EB approved consolidated methodology ACM0002 for CDM project owners[8]. Based on this information, the Simple OM Emission Factor ($EF_{OM, simple, y}$) of the North China Power Grid is calculated as 1.0585 tCO_2e/MWh.

Step 2. Calculate the Build Margin Emission Factor ($EF_{BM,y}$)

The Office of NCCCC, NDRC of the Chinese Government has also worked out China's regional grid baseline Build Margin emission factors based on the EB approved consolidated methodology ACM0002 for CDM project owners. Based on this information, the Build Margin OM Emission Factor is 0.9066 tCO_2e/MWh.

Step 3. Calculate the baseline emission factor EF_y

Based on Version 06 of ACM0002, the baseline emission factor EF*y* was calculated as the weighted average of the OM emission factor ($EF_{OM, y}$) and the BM emission factor ($EF_{BM, y}$), where the weights *w*OM and *w*BM, by default, were 50% (i.e., *w*OM = *w*BM = 0.5)[9], and $EF_{OM, y}$ and $EF_{BM, y}$ were calculated as described in Steps 1 and 2 above and were expressed in tCO_2e/MWh. This Step 3 means that, in the absence of the proposed project activity, the electricity generation of the proposed project would be provided by other generating sources in the grid through the operation and expansion of the electric sector.

From the step 1 and step 2 above, the baseline combined emission factor = (1.0585 + 0.9060) / 2 = 0.9826 (tCO_2e/MWh).

[8] For the detailed information of calculation, data sources and explanation, please refer to the Bulletin Board in the website of the Chinese CDM DNA (http://cdm.ccchina.gov.cn/) (as of Oct.18, 2006)

[9] Although the Version 06 of ACM0002 allows alternative weight, we have chosen the 0.5 because the proposed project activity is neither Solar PV projects nor the project with suppressed demand of electricity.

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

Data / Parameter:	$EF_{electricity}$
Data unit:	kt-CO_2/MWh
Description:	CO_2 emission factor of the grid
Source of data used:	Calculated as a weighted sum of the OM and BM emission factors.
Value applied:	0.9826
Justification of the choice of data or description of measurement methods and procedures actually applied :	Please refer to the section B.6.1.
Any comment:	Calculated by using the combined margin method specified in Version 06 of ACM0002. Before the project activity starts, the emission factor will be calculated and fixed over the crediting period.

B.6.3 Ex-ante calculation of emission reductions:

>>

The emission reduction ER_y by the project activity during a given year y is the difference between the baseline emissions through substitution of electricity generation with fossil fuels (BE_y) and project emissions (PE_y), as follows:

$$ER_y = BE_y - PE_y \quad (9)$$

Where:

ER_y: Emissions reductions of the project activity during the year y in tons of CO_2

BE_y: Baseline emissions due to displacement of electricity during the year y in tons of CO_2

PE_y: Project emissions during the year y in tons of CO_2

PE can be calculated as follows:

$$PE_y = W_{ck,\,CDQ} \times COEF_{CDQ} \times 10^{-3} \quad (10)$$

Where,

PE_y: Project activity GHG emissions (kt-CO_2/y)

$W_{ck,\,CDQ}$: Cokes amount treated with the CDQ (kt-coke/y)

$COEF_{CDQ,\,y}$: CO_2 emissions factor from powder cokes combustion in CDQ equipment (kg-CO_2/t-coke)

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

>>

Table 7. Data for the ex-ante estimation of emission reduction

Data/Parameter	description	Unit	1st year	One year	7 years
PE	Project activity GHG emissions	kt-CO_2	1.619	10.791	66.365
$W_{ck, CDQ}$	Cokes amount treated with the CDQ	kt-coke	164	1,090	6,704
$COEF_{CDQ}$	CO_2 emissions factor of the CDQ	kg-CO_2/t-coke	9.9	9.9	9.9
BE	Baseline emissions	kt-CO_2	13.648	90.987	559.568
$\mathbf{EG_y}$	Net quantity of electricity supplied by the project	MWh	13,890	92,603	569,505
$W_{ck, CDQ}$	Ammounts of cokes treated with the CDQ	kt-coke	164	1,090	6,704
p_{CDQ}	Electricity generation coefficient of CDQ equipment	kWh/t-coke	89.835	89.835	89.835
y_{CDQ}	Electricity self-consumption coefficient of CDQ equipment	kWh/t-coke	5.210	5.210	5.210
y_{CWQ}	Electricity self-consumption coefficient of CWQ equipment	kWh/t-coke	0.332	0.332	0.332
EF	CO_2 emission factor of the grid	t-CO_2/MWh	0.98255	0.98255	0.98255
ER	CO_2 emission reduction	kt-CO_2	**12.029**	**80.196**	**493.203**

Table 8. Summary of the ex-ante estimation of emission reduction

Year	Estimation of project activity emission (tonnes of CO_2e)	Estimation of baseline emission (tonnes of CO_2e)	Estimation of Leakage (tonnes of CO_2e)	Estimation of overall emission reduction (tonnes of CO_2e)
1st	1,619	13,648	0	12,029
2nd	10,791	90,987	0	80,196
3rd	10,791	90,987	0	80,196
4th	10,791	90,987	0	80,196
5th	10,791	90,987	0	80,196
6th	10,791	90,987	0	80,196
7th	10,791	90,987	0	80,196
Total	**66,365**	**559,568**	**0**	**493,203**

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

B.7.1 Data and parameters monitored:

Data / Parameter:	**#1. $W_{ck, CDQ}$**
Data unit:	kt-coke/y
Description:	Cokes amounts treated with the CDQ
Source of data to be used:	On-site measurement
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1st year: 164 2nd -7th year: 1090
Description of measurement methods and procedures to be applied:	Continuously measured with meter and electronically archived
QA/QC procedures to be applied:	Measurement results should be cross-checked with the quantity of the sales.
Any comment:	Amount of the cokes treated with the CDQ in the 1st year is assumed to be 15% of the average yearly amounts.

Data / Parameter:	**#2. $W_{ck, CWQ}$**
Data unit:	kt-coke/y
Description:	Cokes amounts treated with the CWQ
Source of data to be used:	On-site measurement
Value of data applied for the purpose of calculating expected emission reductions in section B.5	NA
Description of measurement methods and procedures to be applied:	Continuously measured with meter and electronically archived
QA/QC procedures to be applied:	Measurement results should be cross-checked with the quantity of the sales.
Any comment:	Cokes amounts to be treated with the CWQ depends on the total quantity of the cokes and the cokes amounts to be treated with CDQ. This $W_{ck, CWQ}$ is necessary to calculate the y_{CWQ} (Electricity self-consumption coefficient of CWQ equipment).

Data / Parameter:	**#3. $COEF_{CDQ}$**
Data unit:	kg-CO_2/t-coke
Description:	CO_2 emissions factor of the CDQ combustion
Source of data to be used:	On-site measurement. Calculated with the powder coke combustion/emission rate and carbon contents in the cokes.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Powder coke combustion/emission rate : 0.3% Carbon contents of cokes: 90%
Description of measurement methods and procedures to be applied:	Specifically, $COEF_{CDQ}$ can be calculated with: 1) the volume of the combustion gas flow from CDQ equipment which contains the CO_2 and 2) the actual concentration of the CO_2 in the gas. They are continuously measured with meter and electronically archived
QA/QC procedures to be applied:	Meter should be calibrated regularly.
Any comment:	

Data / Parameter:	**#4. $EG_{CDQ, y}$**
Data unit:	MWh/y
Description:	Net electricity generation using CDQ equipment
Source of data to be used:	On-site electricity meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1st year: 13890 2nd -7th year: 92603
Description of measurement methods and procedures to be applied:	Continuously measured with meter and electronically archived
QA/QC procedures to be applied:	Meter should be calibrated regularly
Any comment:	With $W_{ck, CDQ}$, y_{CDQ} and EG_{CWQ} (replaced net electricity consumption by the CWQ), EG_y (Net quantity of the electricity replaced by the project) will be calculated

Data / Parameter:	**#5. y_{CWQ}**
Data unit:	kWh/t-coke
Description:	Electricity self-consumption coefficient of CWQ equipment
Source of data to be used:	On-site electricity meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.332
Description of measurement methods and procedures to be applied:	Specifically, y_{CWQ} can be calculated with $W_{CK, CWQ}$ and the amounts of the electricity consumed by the CWQ. They are continuously measured and electronically archived
QA/QC procedures to be applied:	Meter should be calibrated regularly
Any comment:	y_{CWQ} can be calculated as: $y_{CWQ} = E_{CWQ}/ W_{ck, CWQ}$, where E_{CWQ} is the amounts of electricity self-consumed by CWQ. Moreover, by using this y_{CWQ} and $W_{ck, CDQ}$, EG_{CWQ} (replaced net electricity consumption by the CWQ) will be calculated

B.7.2 Description of the monitoring plan:

>>

We separate the monitoring items into the following two categories.

1. Monitoring for the CO_2 emission reduction

In the actual measurement through monitoring, the power consumption both by the CWQ and by the auxiliary equipment of CWQ, such as circulation pumps, ventilation pumps, etc. are determined by the monitoring of CWQ operation performance. Then, using the actual values obtained, the intensity of power consumption against cokes amount treated with the CWQ is calculated, which will be used along with the GHG baseline emission factor of North China Power Grid to calculate the GHG emissions of the proposed project activity.

2. Monitoring for the other environmental impacts

As the other environmental impacts of this project activity, we will focus on the following two items: 1) reduction of the fossil fuels used in the grid through monitoring the cokes amount treated with the CDQ and water used in house which has environmentally positive impact, 2) generation of the dust during the transportation of the cokes from the cokes oven to the blast furnace which may have environmentally negative impacts.

Below is the detailed description of two monitoring items mentioned above.

1) Reduction of the fossil fuels used in the grid and water used in the Antai Group company
The amount of the reduction of the fossil fuels used in the grid and water used in house can be monitored by checking the cokes amounts treated with the CDQ and actual water consumed by the CWQ.

2) Generation of the dust
There is a possibility that the dust will be generated during the transportation of the cokes from the cokes oven to the blast furnace through the belt conveyors. Therefore it is very important to monitor the generation of the dust and to reduce the amount of dust by taking the countermeasures such as the installation of the dust-collector if necessary. We will monitor the dust generation regularly and take necessary measures to avoid serious environmentally negative impacts by, for example, covering of the connection part of the belt conveyers with the hard and thick cloth.

Table 9. Monitoring date for the GHG emission reduction and other environment impacts

Data (description)	Monitoring method	Person/department in charge	Comments/ Counter measures to be taken/
1. $\mathbf{W_{ck,\,CDQ}}$ (Cokes amounts treated with the CDQ)	Electric meter	Planning division, Mr. Wang Liduan	See section B.7.1. of this PDD
2. $\mathbf{W_{ck,CWQ}}$ (Cokes amounts treated with the CWQ)	Electric meter	Planning division, Mr. Wang Liduan	See section B.7.1. of this PDD
3. $\mathbf{COEF_{CDQ}}$ (CO_2 emissions factor of the CDQ combustion)	Electric meter	Planning division, Mr. Wang Liduan	See section B.7.1. of this PDD
4. $\mathbf{EG_{CDQ,\,y}}$ (Net electricity generation using CDQ equipment)	Electric meter	Planning division, Mr. Wang Liduan	See section B.7.1. of this PDD
5. $\mathbf{y_{CWQ}}$ (Electricity self-consumption coefficient of CWQ equipment)	Electric meter	Planning division, Mr. Wang Liduan	See section B.7.1. of this PDD
6. Water consumption by the CWQ	Electric meter	Planning division, Mr. Wang Liduan	Water consumption data of the CWQ will be used as the baseline water usage.
7. Dust generated by the cokes transportation	Sighting survey	Planning division, Mr. Wang Liduan	If the generation of the dust is serious, the dust collection by the collector especially at the connection part of the belt conveyers will be checked and new measure will be taken, such as improving the covering of belt conveyer connection parts with hard and thick cloth.

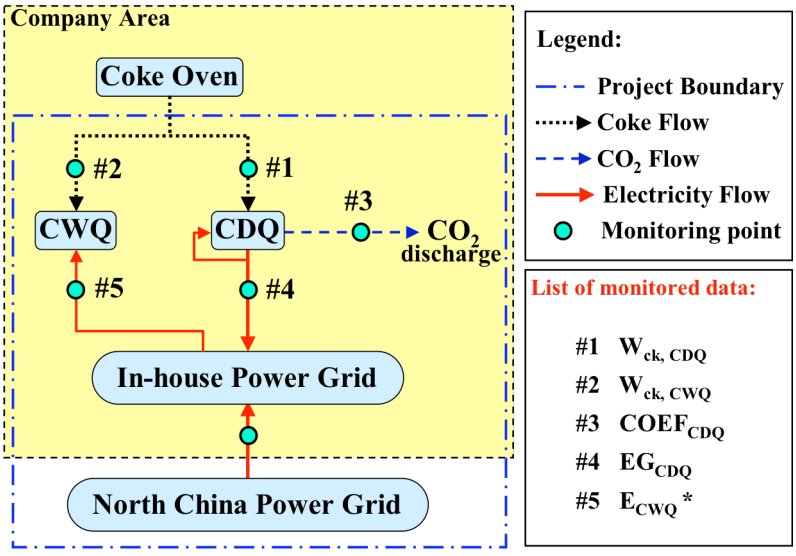

Figure 6. Flowchart of the monitoring plan

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)

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Date of completing the final draft of the baseline section:

26/10/2006

Name of person/entity determining the baseline:

Jusen ASUKA, Professor, Tohoku University, Kawauchi, Aoba-ku, Sendai, 980-8576
Tel&Fax: +81-22-795-7557, asuka@sal.tohoku.ac.jp

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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:

>>
01/07/2007

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

>>
23 years 0 months

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

C.2.1. Renewable crediting period

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

>>
01/11/2008.

C.2.1.2. Length of the first crediting period:

>>
7 years 0 months

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
N/A.

C.2.2.2. Length:

>>
N/A

SECTION D. Environmental impacts

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

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In this section D, we describe: 1) the importance of the environmental impacts of the proposed project and 2) the quantification of the estimated impacts (pollutants reduction and water saving) using the data/parameter obtained from the statistics, data of similar projects, etc.

1) Importance of environmental impacts

In accordance with the Environmental Law of China, the Antai Group has requested the Taiyuang Cokes Industry Design Research Institute to conduct the environmental impacts assessment (EIA) of the cokes-oven construction project including the installation of the CDQ, in order to obtain a building permit.

The stakeholder comments collected from neighbourhood residents and plant workers for this proposed project activity indicated that many of them highly valued the environmental improvement effects of implementing the project activity (please see the section E of this PDD).

At the back of such result may be the Chinese Government's policy to strengthen air pollution measures as exemplified below.

In 1995, the State Environmental Protection Bureau of the Chinese Government at that time ordered the closure of small cokes oven or coke oven operated under conventional method (burning off or bee hive method), as a part of policies and measures to prevent environmental deterioration by the emissions of air pollutants from cokes production as well as to conserve resources. In the latter half of "Ninth Five-Year" Planning Term (1996-2000), the subject of cokes production methods to be curtailed was extended to include some of improved bee hive method cokes oven.

Although there is a certain lead time required to disseminate such governmental policy change in the country, the policy is increasingly implemented at the local level. For example, Shanxi Province listed in its own "Ninth Five-Year" Plan, the targets to be achieved by 2000 such as: 1) control the gross production quantity of cokes to at around 50 million tons per year; 2) increase the ratio of mechanical cokes oven to 30% or higher, etc. In response, the City Government of Jiexiu set the City's policy, to be fulfilled within the shortest period possible: 1) to curtail every cokes oven of improved bee hive type, and 2) to restrict the gross production of mechanical cokes oven to less than 4.5 million tons per year.

Through the accomplishment of these targets and implementation of policies and measures, the number of non-cellar type cokes oven (burning-off, bee hive, and improved bee hive) has been drastically decreased. In the case of Shanxi Province, the ratio of non-mechanical method cokes oven in the gross cokes production was reduced from 87.7% in 1995 to 53.0% in 2001, according to the Shanxi Province Almanac of year 2002.

The *Shanxi Yearbook of Statistics for 2002* indicated that the Shanxi Province produced about 22% of coals production in China, about 40% of cokes, and about 6% of coal-fired power generation, making the Province the energy supply base of China. However, this fact necessitated the Shanxi Province to bear significant environmental burden in the form of large air pollutant emissions. For example, the Shanxi

Province's capital, Taiyuan, constantly appears in the list of Chinese cities with worst air pollution, published by the Chinese Environmental Protection Agency.

In addition, China is enforcing the policies to reduce SO_2 emissions, in response to the increased damages from acid rain, exerting to economic methods that focus on economic efficiencies in addition to conventional regulatory methods. For example, the Jiangsu Province started the emissions trading of pollutants (in this case SO_2), under the "Law to temporarily implement the management of pollutant emissions trading in the power sector" enforced since October 2002. In other words, emissions reduction of air pollutants other than CO_2 starts to have monetary values in China.

The implementation of this project activity will improve not only global environment but also local surroundings. In terms of improving global environment, first of all, the project will reduce GHG emissions by the use of fossil fuel alternatives. In regards to the improvement of local surroundings, on the other hand, it can reduce the emissions of air pollutants, such as SO_2, NO_X, and CO, in the flue gas generated from the combustion of fossil fuels, by the use of fossil fuel alternatives. In addition, the introduction of CDQ equipment will make it possible to avoid the emissions of fine particles cokes generated from the quenching of cokes with mass sprinkling of chilled water in a quenching tower[10]. Moreover, it can improve visual amenity as dry quenching can avoid the generation of massive water vapour containing fine particles of cokes.

Although there is a possibility that some amount of dust will be generated during the transportation of the cokes from the CDQ to the blast furnace, we are going the take necessary measures to prevent it and minimize the negative impacts as much as possible.

2) Quantification of the impacts estimated

Reduction of air pollutant emissions

The formula to calculate the reduction amount (saving amount) of each material and the cumulative values (estimate) are as follows:

a. Replaced amount of fossil fuels

The amount of Chinese coal replaced by this project activity can be calculated from the amount of power saved and the coal intensity of the project activity in comparison to baseline scenario.

First, the amount of power saved by the project activity can be calculated as follows:

Amount of power saved (kWh/y)
= Net electric power generated by CDQ (kWh/y)
+ Net electricity consumption reduction by the CWQ equipment caused by the reduced operation time due to the CDQ installation (kWh/y)

Therefore, the amount of Chinese coal replaced (t/y) can be obtained by the following formula:

Amount of Chinese coal replaced (t/y)
= Intensity of standard grade coal (gce/kWh) × 10^{-6}

[10] The fine particles included in cokes are either combusted and consumed in CDQ or recovered by dust chambers placed in or out of CDQ.

× Amount of power saved (kWh/y)
× Heat generated from standard grade coal (kcal/kg) / Heat generated from Chinese coal (GJ/kg)
× calorie conversion factor (GJ/kcal)

From the amount of fossil fuels replaced and the production of cokes, the reduction amount of air pollutants can be calculated as follows:

b. SO_2 emissions reduction

Reduction amount of SO_2 emissions (t/y)
= Amount of Chinese coal replaced (t/y) × S contents of coal × 64/32 × (1- S residue in ashes)

c. NO_X emissions reduction

NO_X emissions reduction (t/y)[11]
=1.65× Amount of Chinese coal replaced （t/y） × (conversion rate of N in a boiler) × N contents in coal
+ combustion gas emissions (Nm^3/kg-coal) × NO_X concentration in combustion gas (kg/Nm^3))

d. CO emissions reduction

CO emissions reduction by water gas reaction (t/y)
=Yearly cokes amounts treated with the CDQ (t/y)
× Cokes reacted in the CWQ quenching tower × C contents of cokes × 28/12

e. Fine particles emissions reduction

Fine particles emissions reduction (t/y)
=Yearly cokes amounts treated with the CDQ (t/y) × CWQ fine particle emissions (kg/t-coke) /10^{-3}

Table 10 below lists the data used for the calculation of air pollutants emissions reduction, and Table 11 shows the estimates of air pollutant emissions reduction by this project activity, estimated using the data in Table 10.

[11] This is empirical formula of China, developed from the result of interviews with the people related to coal combustion boilers in Japan and China.

Table 10. List of data used for the calculation of air pollutants emissions reduction

Item	Unit	Value	Reference
Calorific values of Chinese standard coal	kcal/kg	7000	"China Coal Industry Encyclopedia", Mei Tan Industrial Publishers, 1999
Calorific value conversion rate	GJ/kcal	4.1868×10^{-6}	Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook, 1.5, "Step 2 Converting To Common Energy Unit (TJ)"
Calorific values of Chinese raw coal s	GJ/kg	20.52×10^{-6}	Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual, 1.16, Table 1-2 "1990 Country-Specific Net Calorific Values for Selected Non-OECD Countries"
S contents in Chinese coal	—	0.01	According to Wang Hanchen's book, translated by Mikio Hamada, "Air pollution in China and its prevention" (1995, p.106)", Heavy Chemical Industry Communication Co., p.106, 1996, the sulfur contents of coals at National Important Coal Mines in China is 0.4% to 1.5% in 57.23% of coal, Therefore, we conservatively assume 1%.
N Contents of coals in China	—	0.01	According to "Environmental Assessment Technologies" edited by Environmental Information Science Center (Central Legal Publishers, p.164, 2002), the Nitrogen contents of coal in China are 0.75% for Da Tong coal, and 1.1% for Rui Bei coal. Here, the conservative number of 1% is used.
Sulfur (S) residue in ashes	—	0.20	Center for Coal Utilization in Japan, and the Institute of Energy Economics in Japan: NEDO Survey Report "Feasibility Study of Environmentally Friendly Coal Utilization System", p.289, fiscal 1996
Nitrogen (N) conversion in a boiler	—	0.225	Ministry of International Trade and Industries, Environmental Protection and Industrial Location Bureau, "Technologies and Laws of Pollution Prevention (Air Pollution)", p.123, 1995
Combustion gas emissions	Nm^3/kg-coal	12.9	Ministry of International Trade and Industries, Environmental Protection and Industrial Location Bureau, "Technologies and Law of Pollution Prevention (Air Pollution)", p.82, 1995
NO_X concentration in combustion gas	kg/Nm^3	93.8×10^{-6}	From the interviews of coal furnace experts in Japan and China
Reacted coke quantities in quenching tower	—	0.0011	NEDO Report: Feasibility Study of Coke Dry Quenching (CDQ) equipment model project in India (Consigned by Nippon Steel Cooperation)
Carbon contents in coke	—	0.90	From the actual value of Antai Group in 1998
Particle emissions from CWQ	kg/t-coke	0.4	According to the NEDO Report: Feasibility Study of Coke Dry Quenching (CDQ) equipment model project in India (Consigned by Nippon Steel Cooperation)

Table 11. Environmental improvement effects (estimated) of CDQ introduction

		Year							
Item	**Unit**	**1 st**	**2 nd**	**3 th**	**4 th**	**5 th**	**6 th**	**7 th**	**Total (7years)**
Cokes treated with the CDQ	kt-coke/y	164	1,090	1,090	1,090	1,090	1,090	1,090	6,704
Yearly CDQ operation day	day	51	340	340	340	340	340	340	2,091
Net electric power generated by CDQ	MWh/y	13,836	92,241	92,241	92,241	92,241	92,241	92,241	567,280
Reduction of power consumption due to the suspension of CWQ	MWh/y	54	362	362	362	362	362	362	2,226
Power saved	MWh/y	13,890	92,603	92,603	92,603	92,603	92,603	92,603	569,505
Amount of standard coal usage substituted	t/y	4,922	32,814	32,814	32,814	32,814	32,814	32,814	201,805
Amount of raw coal usage substituted	t/y	5,808	38,720	38,720	38,720	38,720	38,720	38,720	238,130
SO_2 emission reduction	t/y	144	963	963	963	963	963	963	5,923
NO_X emission reduction	t/y	34	223	223	223	223	223	223	1,374
Reduction of CO emissions from water gas reaction	t/y	390	2,598	2,598	2,598	2,598	2,598	2,598	15,978
Particle emissions reduction	t/y	179	1,196	1,196	1,196	1,196	1,196	1,196	7,357

Note: Chinese standard coal intensity in the power consumption of Shanxi Province is 397 gce/kWh

Water saving by introducing the CDQ

This project activity's water saving effects can be calculated by the following formula:

Amount of water saved (t/y)

＝Yearly cokes amounts treated with the CDQ (t/y)×Intensity of water used for quenching in CWQ (t/t-coke)

Table 12 below shows the calculation result using 0.4[12] as the estimates of quenching water intensity in CWQ (t/t-coke) and the date shown in Table 10.

Table 12. Estimated water saving volume by this project activity

Item	Unit	2008	2009	2010	2011	2012	2013	2014	Total
Amount of water saved	kt/y	65	436	436	436	436	436	436	2,681

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:

>>

Most of the environmental impacts are positive. As mentioned previously, although there is a possibility that the some amount of the dust will be generated during the transportation of the cokes from the CDQ equipment to the blast furnace, we are going to take the necessary measures to prevent it and minimize the negative impacts as much as possible (please refer to the section A.4.3. of this PDD).

[12] NEDO Report: Feasibility study of model projects for the introduction of cokes dry quenching equipment (CDQ) in India (Consigned by Nippon Steel Cooperation.)

SECTION E. Stakeholders' comments

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

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In May 2003, the Antai Group conducted the survey (interviews) with individual stakeholders, with the resulting comments as summarized below. At the moment, the Antai Group has requested the Taiyuang Cokes Industry Design Research Institute to conduct the environmental impacts assessment of this project, in order to obtain a building permit.

The stakeholder survey (interviews) was conducted to 16 people in total from four groups of: residents residing near the Antai Industrial Park; employees of Antai Group, government officials of Jiexiu City and academic researchers. There were 15 male and 1 female with ages between 21 to 66 (Table 13).

The survey was made as follows: first, Mr. Wang Liduan, the Vice President of An Tai Group, explained to individual subject of questionnaire about the outline of a plan to build 2 million tons cokes production plant by Antai Group, as well as the significance of introducing CDQ, and its plan; then, each person was asked to write in simple comments and opinions. Each person was also requested to write his/her name, occupation, age, date of response, and response contents (comments, opinions, proposal etc.) as well as the name, occupation, and age of the person explained the plan.

Table 13. Description of the commentators

	Group	Number of people	Names	Sex (M/F)	Age	Status
1	Residents of the Antai Industrial Park neighborhood	6	Liang Yi Ping	M	28	Resident of Yian Village
			Ren Yuntai	M	35	Resident of Yian Village
			Zheng Qinghui	M	22	Resident of Yian Village
			Co Jinlong	M	21	Resident of Xidaqi Village
			Ren Jingui	M	30	Resident of Xi Village
			Zheng Rukuai	M	34	Resident of Hongxiang Village
2	Antai Group employees	4	Wu Hui	M	39	Cokes Dept., Deputy General Manager
			Zhao Baofu	M	30	Cokes Dept., Engineer
			Huang Jinghu	F	40	Environmental Conservation Dept., Senior Engineer
			Duan Xiaodong	M	29	Power Generation Dept., Plant Manager
	Officers of Jiexiu City Government	3	Zhang Engui	M	41	Environmental Protection Dept., Director General
			Zhao Zhi	M	35	Power Industry Dept., Planning Dept. Director, Engineer
			Liang Guimin	M	42	Economy and Trade Dept., Director General
4	Scholars	3	Chen Zhiming	M	60	Cokes Production research, Senior Engineer
			Wang Zhenwang	M	66	Cokes Equipment research, Professor
			Wang Zhiqing	M	62	Environmental Conservation Dept., Engineer
	Total number of people surveyed	16	Average age		38	

E.2. Summary of the comments received:

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The response from the interview survey described above can be categorized and summarized as below:

1) Residents residing near the Antai Industrial Park

The cokes production using beehive method certainly promoted the local economy in the area surrounding Antai Industrial Park, but it did bring serious environmental pollution at the same time. Looking up the sky, we could not see anything, and looking down the earth, we found black particles all over. We had black phlegm day and night. Antai neighbourhood residents had suffered serious damages in the past. We strongly anticipate that the abandoning of bee hive coke oven, and construction of large scale mechanical cokes oven of 2 million tons capacity with the introduction of CDQ would significantly contribute to the environmental improvement of Antai neighbourhood.

2) Antai Group employees

CDQ project would not only provide the benefits, such as the recovery of waste heat, saving coal and water resource, comprehensive utilization of cokes oven gas, and cokes quality improvement, but also improve our work environment. Although there might be financial difficulties, we would certainly anticipate that Antai CDQ Project would be implemented with the introduction of CDQ.

3) Officials of Jiexiu City Administration

Antai Group Company has been a model company (Longtau or dragon head company) of Jiexiu City. We would strongly and actively support the project of 2 million tons of iron and steel plant (3 x 450 m^3 blast furnaces, 2 x 100 m^2 sintering machines, 2 x 60 ton converters, continuous casting, 2 x 10,000 m^3/h oxygen production) and the project of 2 million tons of cokes production. Jiexiu City has had serious environmental pollution with many kinds of environmental pollutants exceeding the standards. For the improvement of environmental pollution and sustainable development, we would expect the Antai Group Company to adopt advanced technologies in new projects, and to realize energy saving, lower consumption, lower pollution and higher efficiency, thereby gradually improving the quality of regional environment. When 2 million ton iron and steel project starts operation, there would be about 80,000 kW power shortages in the area. The introduction of CDQ would realize the integrated utilization of resources, improvement in environmental pollution, and better cokes quality, while mitigating the power supply. This would be beneficial to the company, society, and environment. By the introduction of CDQ, we would hope that the Antai Group Company would be able to resolve its financial difficulties. We would hope for the earliest introduction of CDQ.

4) Academic researchers

The elimination of beehive cokes oven and introduction of mechanical coke oven would significantly contribute to the effective use of resources and environmental improvement. However, the conventional mechanical cokes oven with CWQ would still result in the wasteful use of resources and polluting of environment. By adopting CDQ technology, following two benefits would be expected:

Integrated use of resources.

With CDQ, it would be possible to recover about 80% of sensible heat from red-hot cokes. In calculation, it would generate about 2.3 kW electricity from the heat recovered from the CDQ attached to a 1 million capacity coke oven.

Reduction of the pollutions

By power generation from heat recovered from the CDQ connected to a 1 million ton capacity coke

oven, it would be possible to save 80 to 100 thousand tons per year of coal for power generation. So, it would be possible to avoid the emissions of air pollutants from coal combustion, such as CO_2 and SO_2. As seen here, CDQ could provide many benefits, but it has not been introduced to Shanxi Province, because of the amount of investment required. If the Antai Group could introduce the CDQ, it would certainly have significant influence over the cokes industry in Shanxi Province. Reality is that the Antai Group, as a private entity, does not have sufficient ability to procure funds, even if it wishes to do so. We would hope that the Antai Group's introduction of CDQ would be realized as soon as possible through the introduction of CDM.

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

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No negative comments have been received with regard to the proposed activity to date. The residents and local government are all supportive of the project and there is no need to modify the project due to the comments received. These comments have already been sent to the executives of the Antai Group, and would likely to have significant influence over their final decision.

However, before starting the project activity, consultation with the local government etc. will be held again and their comments shall be taken into account. Moreover, in order to further develop thorough understanding of CDM, we are preparing the Chinese version of this PDD, and hope to distribute to as many stakeholders as possible.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding for this project (please refer to the section A.4.5. of this PDD)

Annex 3

BASELINE INFORMATION

For the convenience of developing qualified projects and projects in priority areas with high efficiency, the Office of NCCCC, NDRC of the Chinese Government recently worked out China's regional grid baseline emission factors based on the EB approved consolidated methodology ACM0002 for CDM project owners[13]. Table 15 below shows the OM and BM of the each national grid in China.

Table 14. OM and BM of the each national grid in China

Grid	OM (tCO_2/MWh)	BM (tCO_2/MWh)
North China	1.0585	0.9066
North east	1.1983	0.8108
East China	0.9448	0.7869
Middle China	1.2526	0.6363
North west	1.0329	0.6491
South China	0.9873	0.5714
Hainan	0.9040	0.7568

Source: http://cdm.ccchina.gov.cn/web/index.asp
(As of Oct.18, 2006)

[13] For the detailed information of calculation, data sources and explanation, please land in Bulletin Board in the Chinese CDM DNA Webpage (http://cdm.ccchina.gov.cn/web/index.asp)

Annex 4

MONITORING INFORMATION

Vice-president of the Antai Group, Mr. Wang Liduan will be responsible for the monitoring.
Along with Mr. Wang, assistant for the CDM project will be nominated and he will take a responsibility for the actual monitoring which will mainly forcus: 1) calculation of the combined margin from the official statistics and 2) measurement and archiving of the six main data/parameter as shown Figure 6 shown g below. Please refer to the section B.7.1 and B.7.2. of this PDD for detail.

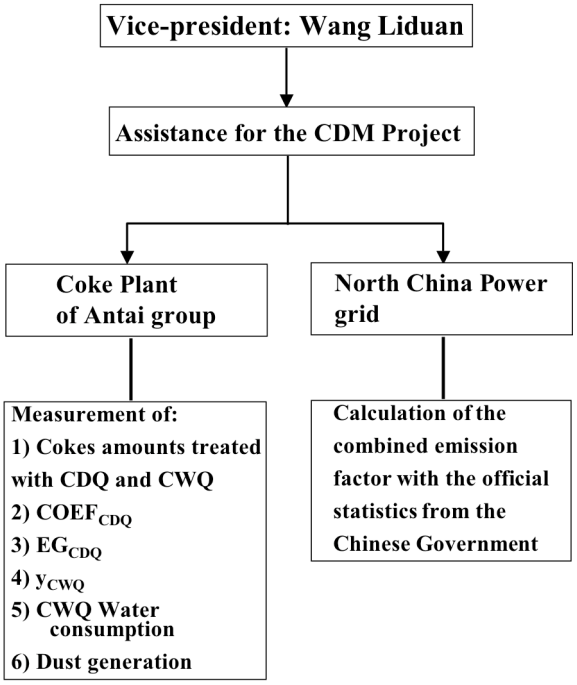

Figure 7. Organization chart and responsibility for the monitoring in the Antai Group