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:

>>
A power generation project using waste heat from the Coke Dry Quenching (CDQ) equipment in China, ver.02.2, Feb. 12, 2008.

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 a mechanical coke production plants (coke oven) construction plan which consists of two phases. In 2005, Antai Group started the operation of two new mechanical coke ovens with annual production capacity of 1.1 million tons (end of the first phase of the construction plan) and another mechanical coke oven (0.65 million ton/year) is to start operation in early 2008 (second phase of the construction plan)[1].

However, it did not install the Coke Dry Quenching (CDQ) equipment mainly because of its low profitability and high initial investment cost. Instead of the CDQ, red-hot coke taken out of the above-mentioned two mechanical coke ovens has been cooled with a water spray in a quench tower, which is a process known as wet quenching (Coke Wet Quenching: CWQ). Neither Shanxi nor Jiexiu government has set a specific incentive/penalty scheme yet that would mandate the installation of the CDQ equipment instead of the CWQ equipment.

This proposed CDM project activity is to install CDQ equipment near a coke oven, which would be the second case in Shanxi and be the first case without the foreign government's Official Development Assistance (ODA) in Shanxi. It will achieve the reduction of CO_2 emissions by recovering sensible waste heat from red-hot coke, which will lead to the avoidance of the CO_2 emissions both from electricity generation by fossil fuel power plants that presently supply the North China Power Grid and from captive power plants. GHG emission reduction will be approximately 942,593 ton CO_2 in total during seven years of the crediting period (from 2009 to 2016).

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

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[1] The starting date of the construction of another coke oven in the second phase and its precise cokes production amount are not yet decided. Although the total cokes production amounts may be over 2 million ton after the completion of the second phase, the construction plan of the mechanical cokes oven is usually called as "2 million coke oven production plan".

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 for the operation of the CDQ and its auxiliary instruments.

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 by CWQ with mass sprinkling of chilled water in a quenching tower.

These benefits are summarized in the following Table 1 and all of these benefits will contribute to the sustainable development of China.

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, 12 MW, 97.92 GWh/year Emission reduction of GHG, SO_x, NO_x by reduction of fossil fuel consumption in the grid and captive power plants
2. Improved surrounding environment	Reduction of airborne particles (approx. 0.155 kg/t-coke) and vapour emission

Note1: There is a possibility that 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 soft dustproof cover. Please refer to the section B.7.2.
Note2: There is an agreement between Antai and the electricity utility company as for the linkage which is specified by the standard GB/T177883-1999 and DL/T614-1997 (Feb.2, 2001).

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 of the Antai Group.

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 in the northern part of China, southwest of Beijing, and in the middle reaches of the Yellow River (Fig.1). 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 (Fig.2).

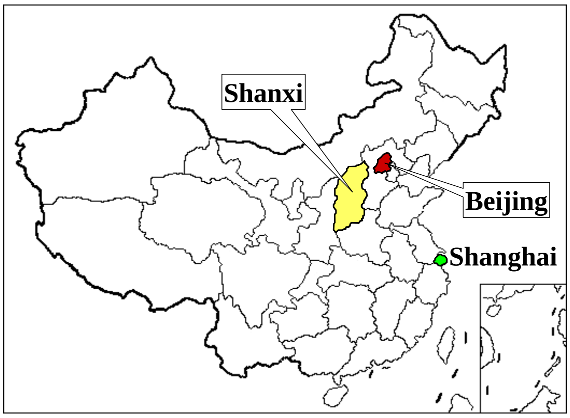


Fig. 1. Location of the Shanxi Province

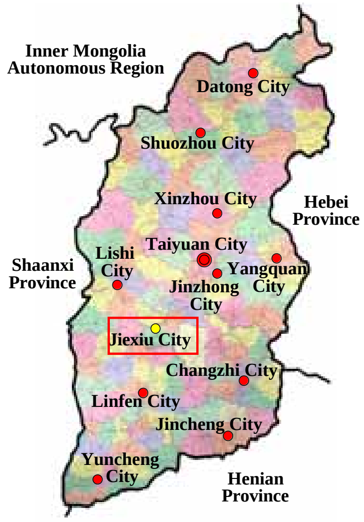
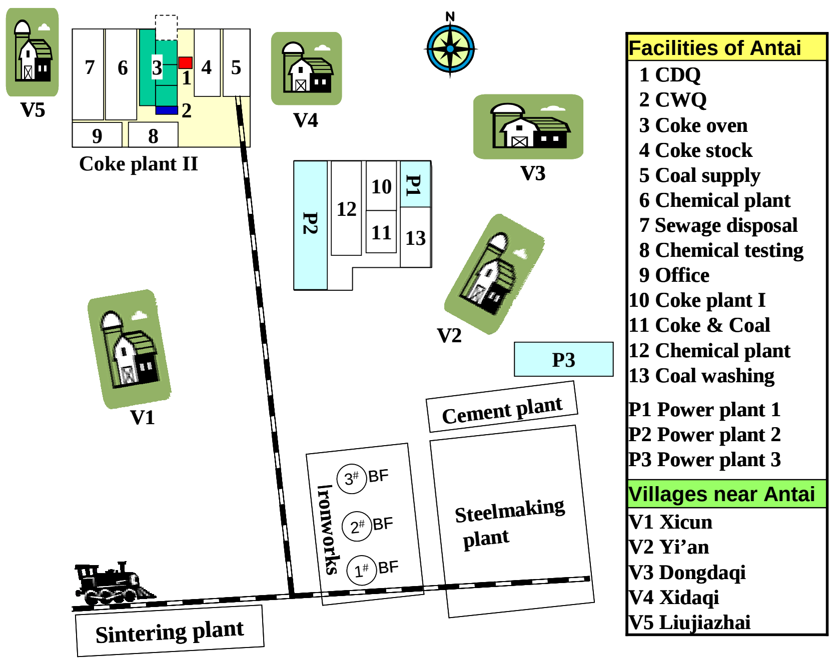


Fig. 2. Location of the Jiexiu city in the Shanxi Province

Fig.3 below shows the layouts of the facilities in Antai Group.



Note1: There are three captive power plants that consist of seven captive power units. Construction date of the cokes oven #4 (white part in the Fig.3) is not yet decided.

Note2: Several residents from the villages #1-#5 near Antai Group were interviewed as the stake-holders of this project. Please refer to the Section E of this PDD.

Note3: Distance from Antai to near-by villages is about 1-2 km.

Note4: BF means Blast Furnace.

Note5: Power plant 1 consists of captive power unit #1 and # 2; Power plant 2 consists of captive power unit #3, # 4 and #5; Power plant 3 consists of captive power unit #7 and # 8.

Fig. 3. Layout of the facilities of Antai Group

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

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Sectoral scope: (1) Energy industries (renewable - / non-renewable sources).

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 during the suspension of CDQ equipment operation due to authorities' inspection, and periodical maintenance works. The proposed project activity involves a process to convert part of wasted heat to electricity generation[2]. 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.

Brief description of the CDQ technology

Fig. 4 below shows the process flow of a CDQ equipment.

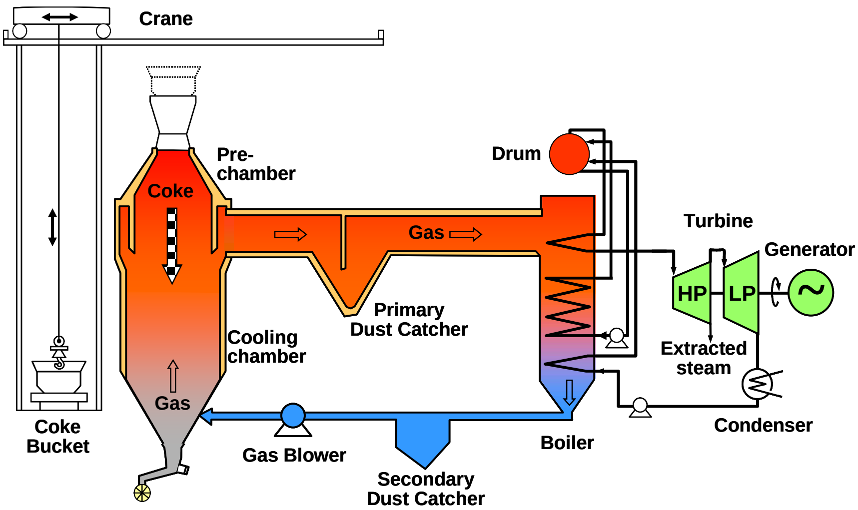

Fig. 4. Process flow of the CDQ

Coke coming out of coke ovens is commonly quenched with water and waste heat is emitted without any use. Coke dry quenching is a process by which coke is cooled with low temperature inert gas in a shaft-like cooling unit called cooling chamber in a CDQ plant (max 150 ton-cokes/hour).

2 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 decreased coke/iron ratio, 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.

As shown in the Fig. 4, a coke-bucket transfer car loaded with red-hot coke will be pulled by locomotive to the bottom of a derrick. An elevator will then send the coke bucket to the top of the CDQ oven. When pushed out of the coke oven, the coke has a temperature of about 1,000 °C and with the CDQ it is cooled to 200-250°C. The gas, through the process of heat exchanges (cooling coke), is heated to 900-950 °C and expel from upside of cooling chamber. Though the primary dust catcher, thick dusts in the hot gas are removed; then, the hot gas will be imported to the boiler. By the boiler, the hot gas exchanges its heat with boiler water and produces steam, produced steam will be imbibed to use as to generate electricity. The temperature of hot gas out of boiler will be cooled to 200°C, thin dusts in this gas can be collected again in the second dust catcher; then, the pressure of cooled and cleaned gas will be increased by the gas-flower, the gas will be insufflated into cooling chamber from chamber's bottom once again. Between gas-flower and cooling chamber, a water-pre-heater is set, therefore, the temperature of gas blown into cool chamber will be decreased to 130°C, and it can increase the efficiency of cooling coke in the cooling chamber.

The hot coke will be unloaded into the CDQ oven by the coke-charging unit. The cooled coke will be discharged to a conveyer belt and sent to the coke screening system.

Although the technology of the CDQ is quite advanced technology which is obvious from the low penetration rate in the world, the manufacturer of the CDQ will be the Anshan institute of the coal technology which has already installed CDQ facilities to several steel plants in other provinces of China. Therefore the installation is expected to be done without any technological problem.

Electricity generation by the CDQ

The heated gas is used to produce steam (volume: 74 t/hr, pressure: 4.14 MPa, temperature: 450°C) in a boiler to generate electricity (capacity: 12 MW, amounts: 97.9 GWh/year) with extraction-condensing turbines.

Mechanical cokes oven plants construction plan in Antai

The plan has been divided into three phases (Table 2, Table 3, Table 4). First phase was the construction of the two 0.55 million-ton/year capacity of mechanical coke ovens (unit #1 and unit #2 coke oven). Second phase consists of the addition of two 0.65 million ton/year capacity each. The Antai Group has already finished the first phase and started the operation of these two coke ovens (1.1 million ton/year in total) in July 2005. One of the coke ovens in Phase 2 is close to its completion and to start operation in early 2008. Now, the uncertainty of construction coke oven unit #4 and blast furnace #4 (Phase 3) is increasing because of the change of coke market. BF and other instruments have been and will be constructed with coke ovens and CDQ, which will increase the total electricity demand.

Table 2. General description of coke oven and CDQ

Plant No.	Coke oven						CDQ			
	Unit No.	Chamber size (height×width×length)	Number of kettle	Production capacity (10,000t/y)	Production capacity (t/h)	Starting date	Cooling capacity (t/h)	Boiler capacity (t/h)	Generator capacity (MW)	Starting date
I	1	2.8m×450mm×12m	35	12	40.0	Feb.1999				
	2	2.8m×450mm×12m	35	12	40.0	Feb.1999				
	3	2.8m×450mm×12m	35	12	40.0	Jan.2001				
	4	2.8m×450mm×12m	35	12	40.0	Jan.2001				
II	1	6.3m×450mm×16m	55	55	62.8	Sep. 2004				
	2	6.3m×450mm×16m	55	55	62.8	July 2005	150 max	74 (84max)	12	June 2009 (Scheduled)
	3	6.3m×450mm×16m	65	65	74.2	Jan. 2008				
	4	6.3m×450mm×16m	65	65	74.2	Undecided				

Note: Plant I: existing old coke ovens, Plant II: new mechanical coke ovens.

Table 3. Construction plan of the new mechanical coke ovens, BF and other instruments

	Project	production capacity	Starting date
Phase 1: 2003-2005	Coke oven #1 (height 6.3m, 55 kettles)	550,000 t/y	Sep. 2004
	Coke oven #2 (height 6.3m, 55 kettles)	550,001 t/y	July 2005
	BF #1 (inner volume 450 m^3)	568,000 t/y	Dec. 2005
	BF #2 (inner volume 450 m^3)	568,000 t/y	May 2004
	Converter #1 (capacity 75t)	942,000 t/y	Jan. 2005
	H-rolling (120,000t)	120,000 t/y	Dec. 2008 (Scheduled)
	Oxygen production (10,000 m^3)		Sep. 2005
Phase 2: 2007-	Coke oven #3 (height 6.3m, 65 kettles)	650,000 t/y	Jan. 2008
	Coke oven #4 (height 6.3m，65 kettles)	650,000 t/y	Undecided
	BF #3 (inner volume 450 m^3)	568,000 t/y	Dec. 2007
	Convertor #2 (Capacity 90t)	1140,000 t/y	Dec. 2007
	Rod rolling (800,000t)	800,000 t/y	Dec. 2008 (Scheduled)
Phase 3:	BF #4 (inner volume 1080 m^3)		Undecided

Table 4. Output of Antai's main products in past 3 years and projection of 2008 (as of Nov. 23, 2007)

Project	Unit	2004	2005	2006	2008 (Projection)	Note
Cokes	**10,000t**	**61.56**	**108.87**	**136.48**	**219.68**	
Total of plant Ⅰ	10,000t	47.78	43.21	43.44	47.94	Started at Jan. 2001
Coke oven unit #1 of plant II	10,000t	13.78	52.27	46.52	55.29	Started at Sep. 2004
Coke oven unit #2 of plant II	10,000t		13.39	46.52	55.29	Started at July 2005 and CDQ will be installed for the cokes from coke oven unit #2
Coke oven unit #3 of plant II	10,000t				61.16	Started at Jan. 2008 and CDQ will be installed for the cokes from coke oven unit #3
Coke oven unit #4 of plant II	10,000t					Undecided
Milling steel	**10,000t**	**20.91**	**43.26**	**85.24**	**168.04**	
Crude steel	**10,000t**		**3.68**	**60.88**	**174.91**	Convertor #1 started at Jan. 2005
Captive power generation	**GWh**	**100.67**	**126.81**	**258.04**	**548.93**	

Note1: Plant I: old coke ovens, Plant II: new mechanical coke ovens.
Note2: Although the generation of the captive power has increased and will increase in 2008, purchase from the Grid has also increased and will increase drastically due to the expansion of the business. Total consumption of the electricity is expected to reach 720.15 GWh in 2008.

Existing Cokes Wet Quenching (CWQ) facility in Antai

In the wet quenching process, red-hot coke from the coke furnace is quenched with water and the steam generated from the quenching water is discharged to the atmosphere. Heat energy of the red-hot coke is vaporized, and this system releases coke particles in the air. There is a CWQ equipment quenching the cokes from the #1 new mechanical coke oven and #2 new mechanical coke oven (1.1 million ton cokes/year). Antai cooperation has been building another CWQ for the cokes from #3 coke oven that is to start its operation in early 2008.

Technology transfer elements of the CDQ installation

In Shanxi province, CWQ are being used in most of the cokes oven operation, which means that Shanxi province has no past experience of introducing CDQ to cokes oven[3]. In other words, the above-mentioned CDQ and power generation technologies are not in practical application in Shanxi province at all. However, they have been commonly applied in Japan and other provinces such as Shanghai with public financial support and have improved local/global environment and realizing effective energy use. Therefore, although most of the part of the CDQ will be produced in China, when introducing such technologies to Shanxi province, it will be necessary to provide appropriate training and education opportunities such as the operation of the control system to realize proper operation. Moreover, Tohoku University, one of the project participants of this CDM project activity, has been collaborating with the

[3] The first CDQ in Shanxi province has finalized its contract in 2006 and is planned to operate in 2008. Since this first CDQ installation in the Province is financed by the Japanese Government's ODA, the CDQ installation by the Antai Group would be the first case in the Province under the commercial condition with CDM scheme.

Antai Group since 2001 focusing on the various energy-related technologies that have contributed to the significant improvement of the energy efficiency. Tohoku University has transferred and will continue to transfer the knowledge about cokes/steel production including the CDQ through the use of the CDM scheme. Moreover, since these technologies have reached a fairly advanced stage of maturation in recent years, there is little likelihood they will be superseded by superior technology during the project period.

Existing captive power plants and electricity demand/supply in Antai

There are seven existing captive power units which are connected to the North China Grid (Fig.5). As for the use of these existing captive power units, the Antai Group has been and will use, even with the power generation from the CDQ.

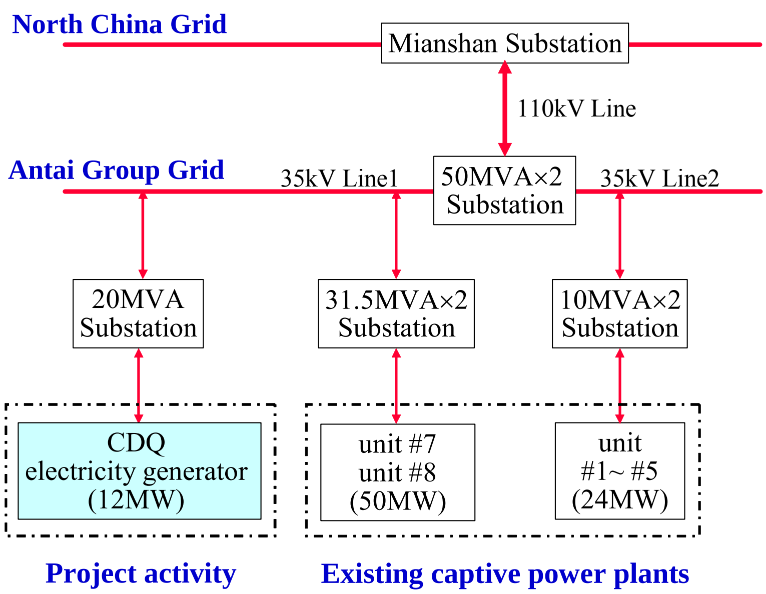

Fig. 5. Power system network between Antai and North China Grid

Use of steam in Antai

As for the use of the steam, the new coke ovens and other facilities will need 70 t/h of steam for operation in total. To meet the demand, along with the existing gas boiler, the CDQ will provide 24 t/h of stream.

Fig.6 below shows the project boundary, proposed project activity and baseline considering the situation of the Antai described above.

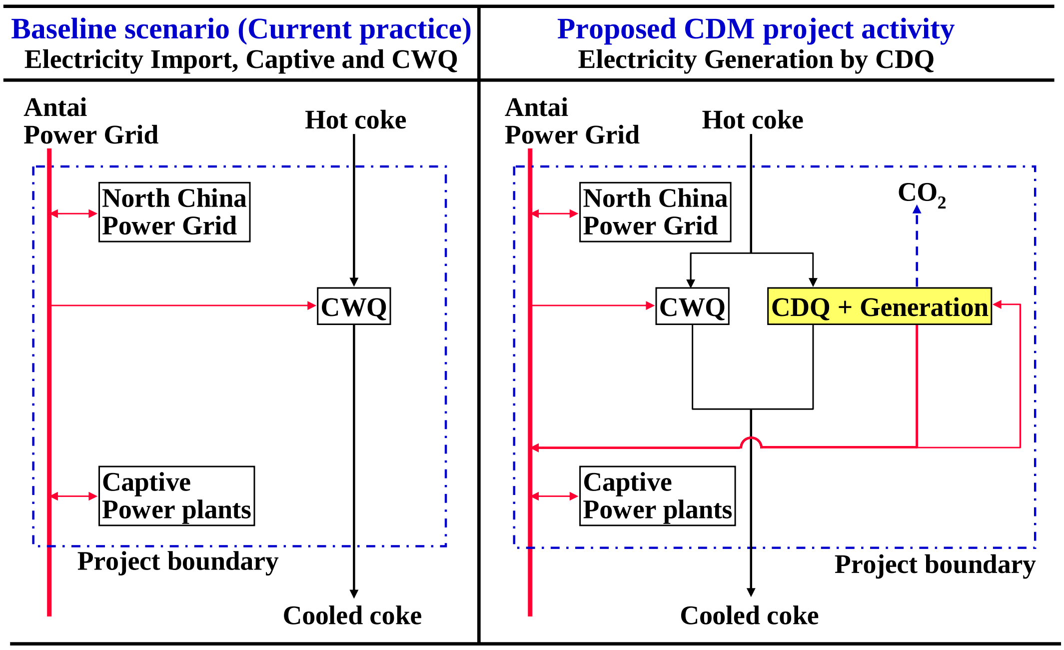

Fig. 6. Proposed CDM project activity, baseline and project boundary

Note1: This project activity utilizes waste heat from hot coke with the existing capacity and the heat capacity doesn't change between baseline scenario and the project activity.

Note2: CWQ operation in the proposed CDM project activity will be undertaken at the time when the CDQ operation is suspended for regular inspection.

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

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Table 5. Projection of the emission reduction by the proposed project activity

Years	Annual estimation of emission reductions in tonnes of CO_2 e
2009 (Jul - Dec)	54,585
2010	136,625
2011	136,625
2012	136,625
2013	136,625
2014	136,625
2015	136,625
2016 (Jan - Jun)	68,258
Total estimated reduction (tonnes of CO_2 e)	**942,593**
Total number of crediting years	**7**
Annual average over the crediting period of estimated reductions (tonnes of CO_2 e)	**134,656**

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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ACM 0004 "Consolidated baseline methodology for waste gas and/or heat and/or pressure for power generation", Version 02, Sectoral Scope: 01, 3 March 2006 (hereafter referred to as the "Version 02 of ACM0004"), ACM 0004 "Consolidated monitoring methodology for waste gas and/or heat and/or pressure for power generation", Version 02, Sectoral Scope: 01, 3 March 2006, ACM0002 "Consolidated baseline methodology for grid connected electricity generation from renewable sources,Version 06 , 19 May 2006 (hereafter referred to as the "Version 06 of ACM0002") ACM0002 "Consolidated monitoring methodology for grid connected electricity generation from renewable sources,Version 06 , 19 May 2006 , "Tool for the demonstration and assessment of additionality, Version 04 November 30, 2007" (hereafter referred to as the "Version 04 of Additionality Tool")

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 from 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;*
- *where no fuel switch is done in the process where the waste heat or pressure 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 with electricity generation is the project activities that displace electricity generation with fossil fuels both in the North China Power grid and in the captive power plants.
(b) The North China Power Grid is dominated by coal-fired power generation. Captive power plants also use fossil fuels. 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.

The methodology covers both new and existing facilities. For existing facilities, the methodology applies to existing capacity, as well as to planned increases in capacity during the crediting period. If capacity expansion is planned, the added capacity must be treated as a new facility. Expansion of the capacity for the cokes treatment by the CDQ is not planned in this CDM project activity.

As mentioned in the footnote #2 (page 6) 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 electricity, which is conservative.

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

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Table 6 below shows the sources of the project boundary described previously in the section A4.3. and Fig.6.

Table 6. Overview of emissions sources included in or excluded from the project boundary

	Source	Gas	Included/ 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
	Captive power plants 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
	Electricity consumption by the CWQ operation	CO_2	Included	Minor emission source
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.
Project Activity	On-site cokes consumption due to the CDQ operation	CO_2	Included	Minor emission source (***Note1***)
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.
	Electricity consumption by the CDQ operation	CO_2	Included	Minor emission source
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.
	Electricity consumption by the CWQ operation	CO_2	Included	Minor emission source
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.
	Fuel consumption to produce steam for CDQ start-up	CO_2	Included	Minor emission source
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.

Note1: A CDQ equipment could emit CO_2 as approx. 0.3% of cokes treated with the CDQ due to the combustion depending on the condition it is operated[4]. 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.
Note2: Since there are no utilization in the whole process**,** other type of GHGs (HFCs, PFCs, SF_6) will not be emitted either in the baseline nor project activity.
Note3: During the CWQ operation, there will be CO_2 emission due to the reaction between cokes and quenching water. However, we can dismiss the emission because we are conservative and will not claim it as a baseline emission.

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4 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.

Considering the Version 02 of ACM0004 methodology, 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. In addition, Antai Group has been using the CWQ for quenching the cokes and will use to meet the demand of the cokes quenching and to substitute the CDQ during its suspension due to the maintenance check. 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;

As mentioned in the section A, there are seven existing captive power units. As for the use of these existing captive power plants, the Antai Group has been and will use all existing captive power plants, even with the power generation from the CDQ, to meet the increasing demand for the electricity. Since the generation cost is much cheaper than price of the electricity imported from the grid, it is rational to continue to use these captive power plants. Therefore, using existing captive power plants is possible baseline scenario.

However, as for the possibility of building new captive power plant, 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 building the new captive power plant 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 is possible baseline scenario. As for the weights, please refer to the section B.6.1.

(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[5] ; corresponds to the scenario (a) above.*

Option II *: Import of the electricity from the grid and use of existing facility (CWQ and captive power plants) which is the continuation of the current situation (current practice); corresponds to the scenario (d).*

We have chosen the ***Option II*** as a baseline scenario considering the result of its additionality check described in B.5 below.

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5 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):

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We use the 'Tool for the demonstration and assessment of additionality, Version 04, November 30, 2007' ("Version 04 of Additionality Tool") to demonstrate the additionality of the proposed project.

(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

In the absence of CDM, alternative ***Option I*** is not economically attractive compared with alternative ***Option II*** and is therefore considered to be less plausible. The construction of the proposed CDQ project requires a large investment and the annual maintenance cost is high. Further information on the financial analysis and sensitivity analysis is provided below.

(2-a) Sub-step 2a: Determine appropriate analysis method

According to the *Tool for the demonstration and assessment of additionality*, the project may employ a simple cost analysis, investment comparison analysis, or benchmark analysis.

When the CDQ project is completed, the CWQ system will become standby equipment to back up the CDQ ovens during repair and maintenance. The project can generate revenue from electricity sales, so the simple cost analysis is not applicable. As there is more than one alternative baseline scenario, option 2 in the *Tool for the demonstration and assessment of additionality* is not applicable. Therefore, the project will undertake a benchmark analysis, identifying the internal rate of return (IRR) as the indicator to judge whether the proposed project is financially attractive.

(2-b) Sub-step 2b: Apply benchmark analysis

According to the Chinese government, *the benchmark* IRR for an investment project in the iron and steel industry is 12% (Table 8).

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

Table 7 shows the parameters used to calculate IRR and Table 8 show the result of the calculation.

Table 7. Major parameters for financial analysis

Item	Quantity
Installed power capacity	12 MW
Total fixed investment	187.79 Million RMB
Annual operating cost	31.07 Million RMB
Electricity generated	97.92 GWh/ year
Electricity consumed	5.68 GWh/ year
Price of electricity generated	284.62 RMB/MWh
Price of electricity consumed	538.43 RMB/MWh
Tax rate of value added	17%
Tax rate of income	33%
Lifetime of project	21 year
Crediting period of CERs	20 year
Expected price of CERs	10 $/t-CO$_2$

Source: "Feasibility Study Report of CDQ and Cogeneration of Antai Group", ACRE Coking & Engineering Consulting Corporation, MCC. 2004. Both 'period of CERs' and 'price of CERs' are expected figure made for this PDD.

Note: Amount of the electricity generated has increased from original 84 GWh/year (figures in the F/S report by ACRE Coking & Engineering Consulting Corporation mentioned above) to 97.92 GWh/year due to the change of the specification of the CDQ. This change will make IRR without CERs from 8.21% to10.5% that is the number still below the benchmark (Table 8, Table 9).

Table 8. Comparison of the IRR with and without CERs revenue

Item	Without CERs	Benchmark	With CERs revenue
IRR of whole investment	8.21%	12%	13.25%

Note: Benchmark figure is from "Economic Evaluation Method and Parameters of Construction Project", NDRC and Ministry of Construction, China Planning Publishing, 2006, p.202. As for the detail on the IRR calculation, please refer to the Appendix of this PDD.

(2-d) Sub-step 2d: Sensitivity analysis

Sensitivity analysis will include the economic impact of the following three parameters:

1) Total fixed investment;

2) Variable cost;

3) Electricity and steam generated

When the parameters vary in the range of -10% to +10%, the IRR (without CER) will change accordingly. Variations in IRR are shown in the following Table 9.

Table 9. The impact of parameters changes on the IRR

Change of Sensitivity factor	-10%	-5%	0	5%	10%
Total fixed investment	9.35	8.76	8.21	7.71	7.23
Electricity and steam generated	6.79	7.52	8.21	8.88	9.54
Variable cost	9.16	8.69	8.21	7.72	7.21

The above numbers show that the IRR is maintained to be less than the benchmark of 12% while the three parameters fluctuate in the range of -10% to +10%. Since the project is not economically attractive without CER revenue, the project owner will not invest in the CDQ systems unless the project is developed under the CDM. This demonstrates one aspect of the project's 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 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, drying the cokes works 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. 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 29 units (currently in operation) in 2005, in which the installation without public financial support is less than half (Table 10).

Table 10. 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 financial 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	AnHei	State-owned	2	Yes
Echeng	Hubei	State-owned	1	Yes
Anshan	Liaoning	State-owned	2	unknown
Tangshan	Hebei	State-owned	2	unknown
Jiangsu Shagang	Jiangsu	State-owned	3	unknown
Benxi	Liaoning	State-owned	1	unknown
Tonghua	Jilin	State-owned	1	unknown

Source: Result of our survey made by interviewing employees working for Japanese and Chinese steel companies.

As shown in Table 10 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[6].

Table 11 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.

6 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 11. 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	33	13	9.8	76
5-10	13	90	35	12	35
<5	NA**	150	69	2.2	3
Total	NA	273	117	24.3	21

Source: Result of our survey made by interviewing employees working for Japanese and Chinese 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 producers 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 companies is not available.
*** CDQ capacity× number of facility× 0.95 (estimated average operating ratio)

Otherwise, in the recent report of IEA (International Energy Agency), it is said that the penetration rate of CDQ in China is about 25%. (IEA（2007）“Tracking Industrial Energy Efficiency and CO_2 Emissions: In support of the G8 plan of Action”.)

Moreover, in Shanxi province, as previously mentioned in the Section A.2 and A.4.3, there exists only one CDQ project planned with the use of Japanese Official Development Assistance (ODA), which will start operation in 2008. 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) Additional information

The CER revenue represents a significant source of funds for the project implementation. Successful registration of the project activity will contribute to installation of advanced technology of developed countries to Antai, to acquisition of personnel such as managers and engineers at international level, and to increase the level of energy efficiency improvement as well as environmental technology. The approval and registration of the project activity would clearly alleviate the barriers discussed in the Step 3 of the additionality test, which enables it to be undertaken as a CDM project activity. In addition, CDM project activity could only be realized with the financial and technical help which would lower the barriers. Especially expected revenue from CERs would facilitate large investment decision for the energy efficiency measures not for the main production line.

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) Legal and Regulatory Requirement and 2) Policy additionality.

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 two phases. First phase was the construction of two 0.55 million-ton/year capacity of coke ovens. Second phase consists of the addition of 0.55 million ton/year capacity. The Antai Group has finished the first phase (1.1 million ton/year in total) and has started the second phase. The local authority has asked to install the CDQ with the construction of the cokes oven in the second phase. However, mainly due to the lack of capital needed and weak enforcement of the order by the local authority, Antai Group will not install the CDQ without the CER revenue. In addition, there is a very large uncertainty regarding the construction of another coke oven second phase.

(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.[7]

(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" [8]. Therefore it can be said that the current policy does not influence the baseline determination of this CDM project activity.

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

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

Conclusion on the baseline scenario determination and additionality demonstration

The above analysis using the Version 02 of ACM0004 and Version 04 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:

$$BE_y = EG_y \times EF_{electricit,\, y} \qquad (1)$$

where:

BE_y: Baseline GHG emissions (kt-CO_2/y) during the year y

EG_y: Net quantity of electricity supplied by the project activity during the year y in GWh (This is the sum of the net electricity generation by the CDQ and electricity self-consumption by the CWQ in the baseline scenario)

$EF_{electricity,\, y}$: CO_2 emission factor for the electricity displaced due to the project activity during the year y (t-CO_2/MWh).

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 Version 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 replaced, it is necessary 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:

$$\begin{aligned} EG_y &= \text{Net quantity of electricity supplied by the project activity} \\ &= \text{Net electricity generation by the CDQ + electricity self-consumption by the CWQ} \\ &= [W_{ck,\, CDQ} \times (p_{CDQ} - y_{CDQ}) + (W_{ck,\, CDQ} + W_{ck,\, CWQ}) \times y_{CWQ}] \times 10^{-3} \\ &= EG_{CDQ} - E_{CDQ} + E_{CWQ} \times (W_{ck,\, CDQ} + W_{ck,\, CWQ})/W_{ck,\, CWQ} \qquad (2) \end{aligned}$$

where:

$W_{ck, CDQ}$:	Cokes amounts treated with the CDQ (kt-coke/y)
$W_{ck, CWQ}$:	Cokes amounts treated with the CWQ during the suspension and operation of 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)
EG_{CDQ}	Electricity generated by the CDQ equipment (GWh/y)
E_{CDQ}	Electricity self-consumed by the CDQ equipment (GWh/y)
E_{CWQ}	Electricity self-consumed by the CWQ equipment (GWh/y)

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[9]. 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 baseline to calculate the GHG emissions.

As shown in Version 02 of ACM0004, when the baseline scenario includes both captive and grid power, the emissions factors for the baseline are the weighted average of the emissions factors for both grid power and captive power:

$$EF_{electricity,y} = w_{grid} \times EF_{grid,y} + w_{captive} \times EF_{captive,y}$$

where:

$EF_{grid,y}$	CO_2 baseline emission factor for the grid electricity displaced due to the project activity during the year y (t-CO_2/MWh)
$EF_{captive,y}$	CO_2 baseline emission factor for the captive electricity displaced due to the project activity during the year y (t-CO_2/MWh)
w_{grid}	Share of facility electricity consumption supplied by grid import over the last 3 years(%)
$w_{captive}$	Share of facility electricity consumption supplied by captive power plant over the last 3 years (%)

9 Strictly speaking, there are two kinds of y_{CWQ}. First is the y_{CWQ} in which the CWQ has been used without the CDQ. Second is the y_{CWQ} in which the CWQ will be used as a temporary substitute of the CDQ. Former y_{CWQ} 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 y_{CWQ}.

2) CO_2 emission factor of the North China Power Grid

The CO_2 emission factor of the North China Power Grid (EF_{grid}) 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 ($EF_{grid,y}$) 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[10]. Based on this information, the Simple OM Emission Factor ($EF_{OM,\,simple,\,y}$) of the North China Power Grid is calculated as 1.1208 t-CO_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 Emission Factor is 0.9397 t-CO_2e/MWh.

Step 3. Calculate the baseline emission factor $EFgrid_y$ for the grid electricity

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., $w_{OM} = w_{BM} = 0.5$)[11], and $EF_{OM,\,y}$ and $EF_{BM,\,y}$ were calculated as described in Steps 1 and 2 above and were expressed in t-CO_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
= (1.1208 +0.9397) / 2 = 1.03025 (t-CO_2e/MWh).

3) CO_2 emission factor of the captive power plants

Table 12 below shows the caloric value and carbon factor of the fuel for power plants of Antai. By using these numbers and fuel consumption pattern shown in Table 13 gives emission factor of the captive power plants as 2.0637 (t-CO_2/MWh).

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[10] 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/WebSite/CDM/UpFile/File1364.pdf) (as of Aug.9, 2007).

[11] 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.

Table 12. Emission factor of the fuel for captive power plants

Fuel type	Carbon emission factor ($t\text{-}CO_2/kNm^3$, t)
COG (Coke Oven Gas)	0.7258
BFG (Blast Furnace Gas)	0.7543
CW (Coal Waste)	1.3315

Source: Calculation by the Antai group with actual analysis of the carbon contents in each substance as follows;

EF_{COG} **:** Carbon emission factor of COG（$t\text{-}CO_2/kNm^3$）
= (%CO + %CO_2 + %CH_4 + 2×%C_2H_4) /100×44/12

EF_{BFG} **:**Carbon emission factor of BFG（$t\text{-}CO_2/kNm^3$）
= (%CO + %CO_2) /100 ×44/12

EF_{CW} **:**Carbon emission factor of CW の CO_2（$t\text{-}CO_2/t$）
= %C/100 ×44/12

Note: In the volatile, CO, CH_4 and other carbon-containing material is contained, as the data of composition cannot be obtained, they treated as zero carbon content, which is conservative.

Table 13. Captive power plants generation in past 3 years of Antai (2004 - 2006)

Year	Unit No.	Starting date	Capacity of generator (MW)	Generated electricity (GWh)	Fuel Consumption			Carbon emission factor (kg-CO_2/kWh)
					COG (kNm^3)	BFG (kNm^3)	CW (t)	
2004	#1	1998.04	3	22.28	24,460	18,002		1.4064
	#2	1998.07	3	9.39	10,314	7,597		1.4069
	#3	2001.09	6	27.66			33,191	1.5978
	#4	2002.01	6	41.34			49,602	1.5978
	Total		18	100.67	34,774	25,600	82,793	1.5376
2005	#1	1998.04	3	22.08	21,360	29,396		1.7061
	#2	1998.07	3	22.27	21,544	29,645		1.7060
	#3	2001.09	6	35.35			42,419	1.5978
	#4	2002.01	6	45.75			54,900	1.5978
	#5	2005.11	6	1.36	1,313	1,810		1.7069
	Total		24	126.81	44,217	60,850	97,319	1.6368
2006	#1	1998.04	3	22.21	9,801	75,923		2.8988
	#2	1998.07	3	23.52	10,379	80,402		2.8988
	#3	2001.09	6	29.41			35,110	1.5895
	#4	2002.01	6	35.02			41,925	1.5940
	#5	2005.11	6	36.74	16,173	125,283		2.8916
	#7	2006.04	25	111.14	45,404	351,715		2.6835
	Total		49	258.04	81,758	633,324	77,035	2.4788
Average of 3 years(2004 – 2006)				**161.84**	**53,583**	**239,925**	**85,716**	**2.0637**

Source: Calculation by the Antai group.

Note1: Carbon emission factor in Table 13 was calculated by using the number of carbon emission factor for the captive power plants in Table 12 and generated electricity & fuel consumption in Table 13.

Note2: **As of Jan. 2008,** there is another captive power unit #8 which started in 2007.

4) CO_2 emission factor of the baseline

As mentioned in previous section, when the baseline scenario includes both captive and grid power, the emissions factors for the baseline are the weighted average of the emissions factors for both grid power and captive power. Using the data on the supply and demand of electricity in Antai (Table 14), weights can be calculated as shown in Table 15 below. Therefore, with these figures, emission factor of the baseline can be calculated as follows.

$$EF_{electricity,y} = w_{grig} \times EF_{grid,y} + w_{captive} \times EF_{captive,y}$$
$$= 0.46 \times 1.03025 + 0.54 \times 2.06372$$
$$= 1.5931$$

Table 14. Supply and demand of electricity (2004 - 2006)

	Data	unit	2004	2005	2006	Average
Capacity of captive power generation		MW	18	24	74	**38.70**
Electricity from the Captive power plants	$E_{captive}$	GWh	100.67	126.81	258.04	**161.84**
Electricity from Grid (Purchased electricity)	E_{grid}	GWh	41.08	112.90	252.03	**135.34**
Power consumption	$E_{captive}$ $+E_{grid}$	GWh	141.75	239.71	510.07	**297.18**
Weight of captive power generation	$w_{captive}$	—	0.71	0.53	0.51	**0.54**

Note: $w_{captive} = E_{captive}/(E_{grid} + E_{captive})$

Table 15. Ratio of input and captive power and emission factor

	Weight	Emission factor ($t\text{-}CO_2/MWh$)
North China Power Grid	0.46	1.03025
Captive power generation in Antai	0.54	2.06372

Note: Emission factor of North China Grid is the average of 2003-2005.

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:

$$ER_y = BE_y - PE_y \quad (3)$$

where:

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

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

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

PE can be calculated as follows:

$$PE_y = W_{ck,CDQ} \times COEF_{CDQ} / 1000 + (W_{ck,CWQ} \times y_{CWQ}) \times EF_{electricity,y} / 1000 + PE_{start\text{-}up}$$
$$= W_{ck,CDQ} \times COEF_{CDQ,y} / 1000 + E_{CWQ} \times EF_{electricity,y} + PE_{start\text{-}up} \qquad (4)$$

where:

$W_{ck,CDQ}$: 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)

$W_{ck,CWQ}$: Cokes amounts treated with the CWQ during the suspension of the CDQ operation (kt-coke/y)

y_{CWQ}: Electricity self-consumption coefficient of CWQ equipment (kWh/t-coke)

$EF_{electricity,y}$: CO_2 emission factor for the electricity displaced due to the project activity during the year y (t-CO_2/MWh).

$PE_{start\text{-}up}$: Project emission for CDQ start-up (kt-CO_2/y)

E_{CWQ}: Electricity self-consumed by the CWQ equipment (GWh/y)

As for the $PE_{start\text{-}up}$, Antai is supposed to use the COG (Coke oven gas) for start-up of the CDQ. Therefore, $PE_{start\text{-}up}$, can be calculated as follows.

$$PE_{start\text{-}up} = Q_{COG} \times EF_{COG} / 1000 \qquad (5)$$

where:

Q_{COG}: Coke oven gas for CDQ start-up (kNm^3)

EF_{COG}: Carbon emissions factor of coke oven gas (t-CO_2/kNm^3)

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

Data / Parameter:	**COEF**$_{CDQ}$
Data unit:	kg-CO_2/t-coke
Description:	CO_2 emissions factor from powder cokes combustion in CDQ equipment
Source of data used:	A CDQ equipment could emit CO_2 as approx. 0.3% of cokes treated with the CDQ due to the combustion depending on the condition it is operated. COEF can be calculated with this assumption (0.3%) and cokes amount treated with the CDQ.
Value applied:	9.9
Justification of the choice of data or description of measurement methods and procedures actually applied :	Please refer to the section B.3.
Any comment:	NA

Data / Parameter:	**EF**$_{electricity}$
Data unit:	t-CO_2/MWh
Description:	CO_2 emission factor for the electricity displaced due to the project activity
Source of data used:	Calculated as a weighted sum of the emission factors of Grid and captive power plants
Value applied:	1.5931
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:	NA

Data / Parameter:	**Q** $_{COG}$
Data unit:	kNm^3
Description:	Coke oven gas for CDQ start-up
Source of data used:	Specific value of the type of the CDQ to be installed to Antai
Value applied:	148
Justification of the choice of data or description of measurement methods and procedures actually applied :	Please refer to the section B.6.3.
Any comment:	NA

Data / Parameter:	**EF** $_{COG}$
Data unit:	$t\text{-}CO_2/kNm^3$
Description:	Carbon emissions factor of coke oven gas
Source of data used:	Data calculated by the Antai
Value applied:	0.7258
Justification of the choice of data or description of measurement methods and procedures actually applied :	Please refer to the section B.6.1 (Table.12) and B.6.3.
Any comment:	NA

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

>>

Ex-ante calculation of emission reductions consists of four parts: 1) calculation of the baseline emission, 2) calculation of the project emission, 3) calculation of the leakage emission and 4) calculation of the emission reduction.

(1) Calculate the baseline emission: BE_y

(1-1) GHG emissions replaced by the net CDQ electricity generation $BE_{1,y}$

$$BE_{1,y} = (EG_{CDQ} - E_{CDQ}) \times EF_{electricity,y}$$
$$= (97.920 - 5.679) \times 1.5931 = 146.946 \text{ kt-}CO_2$$

(1-2) GHG emissions due to the CWQ treatment $BE_{2,y}$

$$BE_{2,y} = E_{CWQ} \times (W_{ck,CDQ} + W_{ck,CWQ}) / W_{ck,CWQ} \times EF_{electricity,y}$$
$$= 0.219 \times (1090 + 660) / 660 \times 1.5931 = 0.926 \text{ kt-}CO_2$$

$$BE_y = BE_{1,y} + BE_{2,y}$$
$$= 146.946 + 0.926 = 147.871 \text{ kt-}CO_2$$

(2) Calculate the project emission: PE_y

(2-1) On-site powder cokes consumption due to the CDQ operation $PE_{1,y}$

$$PE_{1,y} = W_{ck,CDQ} \times COEF_{CDQ} / 1000$$
$$= 1090 \times 9.9 / 1000 = 10.791 \text{ kt-}CO_2$$

(2-2) Electricity consumption by the CWQ operation $PE_{2,y}$

$$PE_{2,y} = E_{CWQ} \times EF_{electricity,y}$$
$$= 0.219 \times 1.5931 = 0.349 \text{ kt-}CO_2$$

(2-3) Project emission for CDQ start-up $PE_{start\text{-}up}$

$$PE_{start\text{-}up} = Q_{COG} \times EF_{COG} / 1000$$
$$= 148 \times 0.72580 / 1000 = 0.107 \text{ kt-}CO_2$$

$$PE_y = PE_{1,y} + PE_{2,y} + PE_{start\text{-}up}$$
$$= 10.791 + 0.349 + 0.107 = 11.247 \text{ kt-}CO_2$$

(3) Leakage: L_y

According to ACM0004, no leakage is considered, i.e. $L_y = 0$ kt-CO_2

(4) Emission reduction: ER_y

$ER_y = BE_y - PE_y - L_y$
$= 147.871 - 11.247 - 0 = 136.624$ kt-CO_2

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

>>

Table 16. Data for the ex-ante estimation of emission reduction

Data/ Parameter	Description	Unit	1st year	One year	last year	7 years
$W_{ck, CDQ}$	Cokes amount treated with the CDQ	kt-coke	436	1,090	545	7,521
$W_{ck, CWQ}$	Cokes amount treated with the CWQ during the suspension of the CDQ operation	kt-coke	439	660	330	4,729
$COEF_{CDQ}$	CO_2 emissions factor from powder cokes combustion in CDQ equipment	kg-CO_2/t-coke	9.9	9.9	9.9	9.9
Q_{COG}	Coke oven gas for CDQ start-up	kNm^3	148.0	148.0	148.0	1,184.0
EF_{COG}	Carbon emissions factor of coke oven gas	t-CO_2/kNm^3	0.7258	0.7258	0.7258	0.7258
EG_{CDQ}	Electricity generated by the CDQ equipment	GWh	36.896	97.920	48.960	675.648
E_{CDQ}	Electricity self-consumed by the CDQ equipment	GWh	2.272	5.679	2.840	39.188
E_{CWQ}	Electricity self-consumed by the CWQ equipment	GWh	0.088	0.219	0.110	1.512
EF	CO_2 emission factor for the electricity displaced due to the project activity	t-CO_2/MWh	1.5931	1.5931	1.5931	1.5931
Baseline GHG Emissions	1. GHG emissions replaced by the net CDQ electricity generation	kt-CO_2	58.778	146.946	73.473	1013.927
	2. GHG emissions due to the CWQ treatment	kt-CO_2	0.370	0.926	0.463	6.389
Project Activity GHG Emissions	1. On-site powder cokes consumption due to the CDQ operation	kt-CO_2	4.316	10.791	5.396	74.458
	2. Electricity consumption by the CWQ operation	kt-CO_2	0.140	0.349	0.175	2.409
	3. Project emission for CDQ start-up	kt-CO_2	0.107	0.107	0.107	0.856
ER	**CO_2 emission reduction**	kt-CO_2	**54.585**	**136.625**	**68.258**	**942.593**

Note: "one year" means emission per year from the second year to the seventh year. Operation rate of the 1st year is assumed to be 80% of the normal year.

Table 17. 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)
2009 (July-Dec)	4,563	59,148	0	54,585
2010	11,247	147,872	0	136,625
2011	11,247	147,872	0	136,625
2012	11,247	147,872	0	136,625
2013	11,247	147,872	0	136,625
2014	11,247	147,872	0	136,625
2015	11,247	147,872	0	136,625
2016 (Jan-Jun)	5,678	73,936	0	68,258
Total	**77,723**	**1,020,316**	**0**	**942,593**

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

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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	1^{st} year: 436 2^{nd} -7^{th} year: 1090 8^{th} year: 545
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 crosschecked with the quantity of the sales
Any comment:	Amount of the cokes treated with the CDQ in the 1^{st} year is assumed to be 40% of the average yearly amounts. Last year was 545. Amount of the cokes will be measured by the meter installed in the belt-conveyer system.

Data / Parameter:	**#2. $W_{ck, CWQ}$**
Data unit:	kt-coke/y
Description:	Cokes amounts treated with the CWQ during the suspension of the CDQ operation
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	1^{st} year: 439 2^{nd} -7^{th} year: 660 8^{th} year: 330
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 crosschecked with the quantity of the sales
Any comment:	This $W_{ck, CWQ}$ is necessary to calculate the y_{CWQ} (Electricity self-consumption coefficient of CWQ equipment). Amount of the cokes will be measured by the meter installed in the belt-conveyer system.

Data / Parameter:	#3. EG_{CDQ}
Data unit:	GWh/y
Description:	Electricity generated by the 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	1^{st} year: 36.896 2^{nd} -7^{th} year: 97.920 8^{th} year: 48.960
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. There are personnel responsible for making periodic adjustments as needed.
Any comment:	There is an agreement between Antai and the utility company as for the linkage which is specified by the standard GB/T177883-1999 and DL/T614-1997 (Feb.2, 2001).

Data / Parameter:	#4. E_{CDQ}
Data unit:	GWh/y
Description:	Electricity self-consumed by the 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	1^{st} year: 2.272 2^{nd} -7^{th} year: 5.679 8^{th} year: 2.840
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. There are personnel responsible for making periodic adjustments as needed.
Any comment:	There is an agreement between Antai and the utility company as for the linkage which is specified by the standard GB/T177883-1999 and DL/T614-1997 (Feb.2, 2001).

Data / Parameter:	**#5. E_{CWQ}**
Data unit:	GWh/y
Description:	Electricity self-consumed by the 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	1^{st} year: 0.088 2^{nd} -7^{th} year: 0.219 8^{th} year: 0.110
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. There are personnel responsible for making periodic adjustments as needed.
Any comment:	y_{CWQ} can be calculated as: $y_{CWQ} = E_{CWQ} / W_{ck, CWQ} \times 1000$. There are two CWQ equipments. First CWQ is for the cokes oven #1 and #2. Second CWQ is now under construction and for the cokes oven #3 that is to start its operation form Apr.2007. There is an agreement between Antai and the utility company as for the linkage which is specified by the standard GB/T177883-1999 and DL/T614-1997 (Feb.2, 2001).

Data / Parameter:	**#6. E_{grid}**
Data unit:	GWh/y
Description:	Electricity from the Grid
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	135.34 (please refer to B.6.1, Table 14)
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 crosschecked with the quantity of the sales.
Any comment:	Amounts of electricity imported from the grid will be used to compare the demand and supply of the electricity in the boundary of this project activity. There is an agreement between Antai and the utility company as for the linkage which is specified by the standard GB/T177883-1999 and DL/T614-1997 (Feb.2, 2001).

Data / Parameter:	#7. $E_{captive}$
Data unit:	GWh/y
Description:	Electricity from the Captive power plants
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	161.84 (please refer to B.6.1, Table 14)
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 crosschecked with the quantity of the sales.
Any comment:	Amounts of electricity imported from the grid will be used to compare the demand and supply of the electricity in the boundary of this project activity. There is an agreement between Antai and the utility company as for the linkage which is specified by the standard GB/T177883-1999 and DL/T614-1997 (Feb.2, 2001).

B.7.2. Description of the monitoring plan:

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We separate the monitoring items into the following two categories. Fig.7 below shows the flowchart of the monitoring plan for the CO_2 emission reduction and Table 18 shows the information on the monitoring both for the CO_2 emission reduction and for the other environmental impacts.

1. Monitoring for the CO_2 emission reduction

Fig. 7 shows the flowchart of the monitoring plan for CO_2 emission reduction. In the actual measurement through monitoring, in addition to the cokes amount treated both with CDQ and CWQ, electricity generation by CDQ, electricity consumed by CDQ, electricity import from the Grid, electricity generation by the captive power plants, steam for the CDQ start-up, the power consumption both by the CWQ and by the auxiliary equipments of CWQ, such as circulation pumps, ventilation pumps, etc. are determined by the monitoring of CWQ operation performance. As for the CWQ, 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 to calculate the GHG emissions reduction.

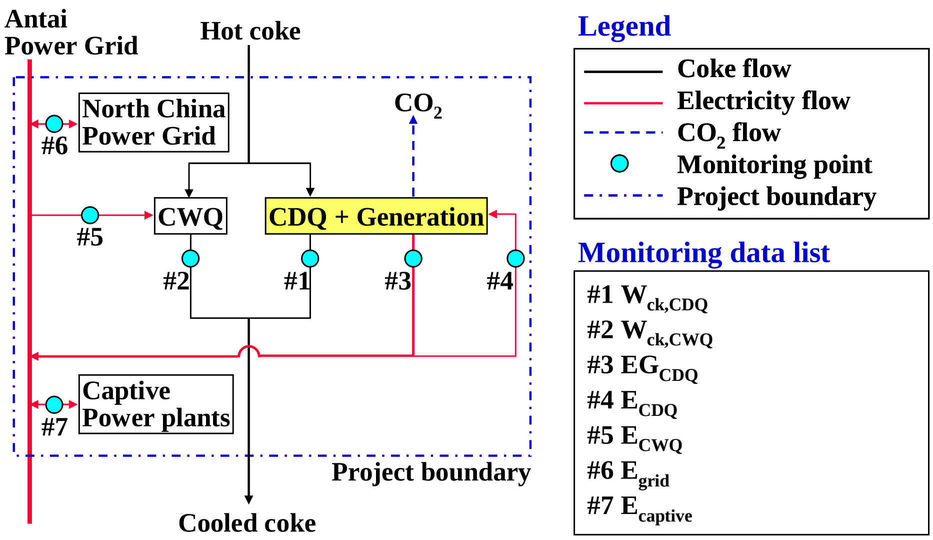

Fig. 7. Flowchart of the monitoring plan for CO_2 emission reduction

Note1: There are two CWQ equipments. First CWQ is for the coke oven unit #1 and #2. Second CWQ is now under construction and for the coke oven unit #3 that is to start its operation form early 2007. Cokes amounts treated with these two CWQ equipments will be measured together as one portion after being cooled, however each electricity consumption will be measured separately.

Note2: This project activity utilizes waste heat from hot coke with the existing capacity and the heat capacity doesn't change between baseline scenario and the project activity.

Note3: CWQ operation in the proposed CDM project activity will be undertaken at the time when the CDQ operation is suspended for regular inspection.

Table 18. Monitoring data for the GHG emission reduction and other environment impacts

Data (description)	Monitoring method	Person/department in charge	Comments/ Counter measures to be taken
1. $W_{ck, CDQ}$ (Cokes amounts treated with the CDQ)	meter	General manager of the CDM project activity	See section B.7.1. of this PDD
2. $W_{ck,CWQ}$ (Cokes amounts treated with the CWQ)	meter	General manager of the CDM project activity	See section B.7.1. of this PDD
3. $EG_{CDQ, y}$ (electricity generated by the CDQ equipment)	Electric meter	General manager of the CDM project activity	See section B.7.1. of this PDD
4. E_{CDQ} (Electricity self-consumed by the CDQ equipment)	Electric meter	General manager of the CDM project activity	See section B.7.1. of this PDD
5. E_{CWQ} (Electricity self-consumed by the CWQ equipment)	Electric meter	General manager of the CDM project activity	See section B.7.1. of this PDD
6. E_{grid} (Electricity imported from the Grid)	Electric meter	General manager of the CDM project activity	See section B.7.1. of this PDD
7. $E_{captive}$ (Electricity generated by the captive power plants)	Electric meter	General manager of the CDM project activity	See section B.7.1. of this PDD
8. Water consumption by the CWQ	Electric meter	General manager of the CDM project activity	Water consumption data of the CWQ will be used as the baseline water usage.
9. Dust generated by the cokes transportation	Sighting survey	General manager of the CDM project activity	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.

2. Monitoring for the other environmental impacts

As the other environmental impacts of this project activity, we will focus on 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.

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.

To calculate the emission reductions, the Antai Group will monitor the amount of consumed steam as well as the net electricity import. The monitoring could be achieved by means of installing flow meters in the steam pipes. The net electricity import can be measured by the ammeter fixed on the power distribution lines. The personnel in charge of the monitoring read the steam flow meters.

Vice-president of the Antai Group is responsible for the monitoring as the general manager of the CDM project. Along with Mr. Wang who is the general manager of the CDM at present, several employees will be nominated as the member of assisting group for the CDM project activity and they will take a responsibility for the actual monitoring (Fig. 8).

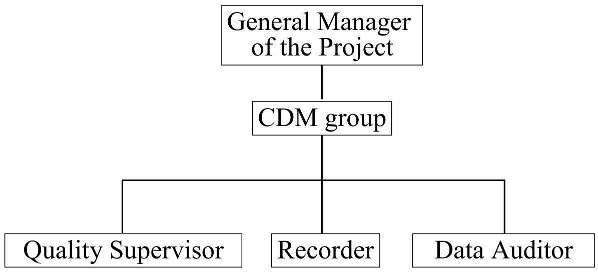

Fig. 8. Organization chart and responsibility for the monitoring in the Antai Group

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:

26/12/2007

Name of person/entity determining the baseline:

Jusen ASUKA, Professor, Tohoku University, Kawauchi, Aoba-ku, Sendai, 980-8576
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Tel&Fax: +81-166-48-3121, chokouwa@asahikawa-u.ac.jp

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:

>>
09/10/2004

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

>>
21 years and 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:

>>
01/07/2009

C.2.1.2. Length of the first crediting period:

>>
7 years and 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) result and concrete procedure of the Environmental Impact Assessment (hereinafter referred to as EIA) of this 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) Result and concrete procedure of the environmental impact analysis of this project

EIA of this CDQ project was conducted with two steps as follows.

Step1: EIA as a part of the EIA of the cokes oven plant construction project

The Coal Industrial Taiyuan Design Research Institute (License No.: State Environmental Assessment Certificate Class 1, No. 1303, hereinafter referred to as Taiyuan Design Research Institute) has conducted the EIA of the Cokes Oven Construction Project. Simultaneously, EIA of this CDQ installation project was conducted as a part of the EIA of the cokes oven construction project.

The Environmental Protection Administration (EPA) of the Chinese government accepted the EIA Report (license application version) of cokes oven plant construction project and approved the implementation of the project in April 15, 2004 (No.2004-146).

The following describes the summary of the procedure of the EIA of the cokes oven plant construction project.

The formal title of the assessment report is called “EIA Report on the Shanxi Antai Group Corporation’s Project for Cokes Production Technology Improvement with Annual Production Capacity of 2 Million Tons (for license application)”. The applicable laws and regulations include: 1) Law of the People’s Republic of China on the Environmental Protection (Effective on December 26, 1989), 2) Law of the People’s Republic of China on the Prevention and Control of Atmospheric Pollution (Effective on April 29, 2000), 3) Law of the People's Republic of China on the Promotion of Clean Production (Effective on June 29, 2002), 4) Law of the People's Republic of China on the Environmental Impact Assessment (Effective on October 28, 2002), and others.

The EIA was conducted under the following specific procedures.

First, the Taiyuan Design Research Institute, as an assessor, visited the construction site, implemented the overall survey of the natural and physical environment, natural ecological environment, socio-economic situation, and living conditions of the region where the construction project is located, and collected relevant documents. After that, it prepared the “Outline of the EIA of the cokes production technology improvement project" (hereinafter referred to as the "Outline"), in accordance with the relevant laws and regulations of the State and the Shanxi Province. Next, the Environmental Process Assessment Center of the State Environmental Protection Administration held the assessment meeting to examine the "Outline" in Beijing on July 17, 2003. Furthermore, the Taiyuan Design Research Institute implemented more detailed survey of the overall situation of natural and social environment surrounding the planned construction project site, and studied the regional development plan as well as possible pollution sources, based on the viewpoints expressed by the expert team and reviewers of this "Outline". The Institute exchanged broad-ranged opinions with the Shanxi University, which is the regional environmental assessor of the Jiexiu City which is part of the Jinzhong City, while conducting the populace participation survey to local residents. In addition, they requested the Environmental Observation Station of the Jinzhong City, Shanxi Province to survey the environmental quality situation. Based on the result of such survey, the institute completed the "EIA Report of the cokes production technology improvement project with annual production capacity of 2 millions at the Shanxi Antai Group Corporation" (hereinafter referred to as the "Report"). Later, the Environmental Process Assessment Center of State Environmental Protection Administration held the review meeting of the "Report" on February 27-28, 2004, in Jiexiu City of Shanxi Province. Finally, as mentioned in the beginning, the Government of China accepted this EIA Report (license application version) in April 15, 2004 and approved the implementation of the cokes oven plant construction project.

This EIA Report (license application version) clearly identified the advantages of CDQ equipment introduction on page 49, 69, 82 including: 1) recovery of sensible heat from red hot cokes, 2) reduction of energy consumption, 3) reduction of pollutant emissions, and 4) improved quality of cokes. It also mentions the use of CWQ during the CDQ equipment maintenance or breakdown.

Step 2: EIA of the CDQ project itself

On top of the EIA of the cokes oven plant construction project mentioned above, the Second Design Research Institute of the Chemical Industry Department of the Chinese Government (License No.: State Environmental Assessment Certificate Class 2, No. 1331) has conducted the EIA of the CDQ project and issued the EIA report in Apr. 2005.

With regard to the EIA report submitted by the Second Design Research Institute of the Chemical Industry department of the Chinese government, the Environmental Protection Administration of the Shanxi province (EPA of the Shanxi) issued the official letter (No.185, 2005), which approved the CDQ installation by the Antai Group on June 20th, 2005. This approval was acknowledged officially again by the EPA of Shanxi province on Nov.19, 2007 (Official letter No. 2007-711).

The letter from the EPA of the Shanxi mentioned above highlights the following points of the CDQ implementation:

1) EIA report is complying with the official requirement and is suitable for the consideration regarding the approval of the CDQ projects by the EPA of the Shanxi.

2) EPA acknowledges the various benefits of the CDQ installation such as: a) energy conservation, b) reduction of the emissions of air pollutants and c) avoidance both of the excess use of the water and of the emissions of fine particles cokes. Therefore the EPA agrees to the implementation of the CDQ installation project.

3) EPA demands and checks that the Antai Group takes the environmental protection measures mentioned in the EIA report, for example, covering of the connection part of the belt conveyer with soft dustproof cover and realizing the improvement of the environment of the surrounding of the Antai Group.

4) EPA expects that the implementation of the CDQ project will send a good signal to the cokes industry in Shanxi province in terms of the environmental protection.

CDM application

In regards to the CDM application, two EIA Reports mentioned above do not directly refer to CDM, but the Tohoku University Group has offered extensive explanation to the Antai Group and Shanxi Province Government since 2001about the advantages and benefits of using CDM, leading to the Antai Group's consideration on the possible use of CDM scheme. In fact, the Tohoku University Group conducted the feasibility study of possible CDM usage to introduce CDQ for the Antai Group, with the subsidy funds provided by the New Energy and Industrial Technology Development Organization (NEDO) of Japan. Moreover, when the Tohoku University personnel met with Mr. Du Wuan, the Vice Governor of the Shanxi Province on October 8, 2002, the Vice Governor expressed his intention to promote CDM at the Shanxi Province, which was reported on the local paper of Shanxi Province the next day (October 9, 2002, Shanxi Daily). At the time of the meeting with the Vice Governor, the Tohoku University personnel held the seminar on CDM for the Shanxi Provincial Government officials.

In conclusion, 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, NOx, 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[12]. 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 to take necessary measures to prevent it and minimize the negative impacts as much as possible by, for example, covering of the connection part of the belt conveyer with soft dustproof cover.

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

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

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

Amount of Chinese raw coal replaced (kt-coal/y)
= Amount of power saved (GWh/y)
× Chinese standard coal consumption rate (t-ce/GWh) /1000
× Conversion rate from Chinese standard coal to Chinese raw coal (t-coal/t-ce)

From the amount of power saved, amount of Chinese raw coal 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 power saved (GWh/y)
× SO_2 discharge ratio from electricity generation (t/GWh)

c. NO_X emissions reduction

NO_X emissions reduction (t/y)
= Amount of Chinese raw coal replaced (kt-coal/y)
× NOx discharge ratio from electricity generation (t/kt-coal)

d. CO emissions reduction

CO emissions reduction (t/y)
= Amount of Chinese raw coal replaced (kt-coal/y)
× CO discharge ratio from electricity generation (t/kt-coal)
+ Yearly cokes amounts treated with the CDQ (kt-coke/y)
× CO discharge ratio from CWQ (t/kt-coke)

e. Dust emissions reduction

Dust emissions reduction (t/y)
= Amount of power saved (GWh/y)
× Dust discharge ratio from electricity generation (t/GWh)
+ Yearly cokes amounts treated with the CDQ (kt-coke/y)
× [Dust discharge ratio from CWQ – Dust discharge ratio from CDQ] (t/kt-coke)

Table 19 below lists the data used for the calculation of air pollutants emissions reduction, and Table 20 shows the estimates of air pollutant emissions reduction by this project activity, estimated using the data in Table 19.

Table 19. List of data used for the calculation of air pollutants emissions reduction

Item	Unit	Value	Reference
Conversion rate from Chinese standard coal to Chinese raw coal	t-coal/t-ce	1.176	Statistics Bureau of Shanxi Province ed.: Shanxi Statistical Yearbook, China Statistics Press (2007), p.163.
Chinese standard coal consumption rate of the North China power grid	t-ce/GWh	372	Clean Development Mechanism in China, China's Regional Grid Baseline Emission Factors 2007 (Chinese Version), http://cdm.ccchina.gov.cn/, (2007).
Dust discharge ratio from electricity generation	t/GWh	8.21	Science and Technology Department of State Environmental Protection Administration, Handbook of emission factors of Industrial Pollutants, China Environmental Science Publishing (1996, Chinese).
SO_2 discharge ratio from electricity generation	t/GWh	10.4	Same as above
NOx discharge ratio from electricity generation	t/kt-coal	5.77	Same as above
CO discharge ratio from electricity generation	t/kt-coal	2.07	Same as above
Dust discharge ratio from CDQ	t/kt-coke	0.045	Feasibility Study Report of CDQ and Cogeneration of Antai Group, ACRE Coking & Engineering Consulting Corporation, MCC (2004).
Dust discharge ratio from CWQ	t/kt-coke	0.200	Same as above
CO discharge ratio from CWQ	t/kt-coke	2.31	NEDO Report: Feasibility Study of Coke Dry Quenching (CDQ) equipment model project in India, Consigned by Nippon Steel Cooperation (2002).
Water consumption for CWQ	kt/kt-coke	0.4	Same as above

Table 20. Environmental improvement effects (estimated) of CDQ introduction

		Year								Total (7years)
Item	**Unit**	**1 st**	**2 nd**	**3 th**	**4 th**	**5 th**	**6 th**	**7 th**	**last**	
Cokes treated with the CDQ	kt-coke	436	1,090	1,090	1,090	1,090	1,090	1,090	545	7,521
Yearly CDQ operation day	day	170	340	340	340	340	340	340	170	2,380
Net electric power generated by CDQ	GWh	36.896	92.241	92.241	92.241	92.241	92.241	92.241	46.120	636.460
Reduction of power consumption due to the suspension of CWQ	GWh	0.145	0.362	0.362	0.362	0.362	0.362	0.362	0.181	2.497
Power saved	GWh	37.041	92.603	92.603	92.603	92.603	92.603	92.603	46.301	638.957
Amount of standard coal usage substituted	kt	13.763	34.408	34.408	34.408	34.408	34.408	34.408	17.204	237
Amount of raw coal usage substituted	kt	16.241	40.601	40.601	40.601	40.601	40.601	40.601	20.301	280.
SO_2 emission reduction	t	385	963	963	963	963	963	963	482	6,645
NO_X emission reduction	t	94	234	234	234	234	234	234	117	1,616
Reduction of CO emissions from water gas reaction	t	1,041	2,602	2,602	2,602	2,602	2,602	2,602	1,301	17,953
Particle emissions reduction	t	372	929	929	929	929	929	929	465	6,412

Water saving by introducing the CDQ

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

Amount of water saved (kt/y)
= Yearly cokes amounts treated with the CDQ (kt-coke/y)
× Water consumption for CWQ (kt/kt-coke)

Table 21 below shows the calculation result using 0.4 kt/kt-coke (shown in Table 19) as the estimates of quenching water intensity in CWQ and the date shown in Table 21.

Table 21. Estimated water saving volume by this project activity

		Year								Total (7years)
Item	**Unit**	**1 st**	**2 nd**	**3 th**	**4 th**	**5 th**	**6 th**	**7 th**	**last**	
Amount of water saved	kt	174	436	436	436	436	436	436	218	3,008

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).

SECTION E. Stakeholders' comments

>>

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

>>

On Sep.27, 2007 and Sep.28, 2007, the Antai Group conducted the survey (interviews with questinaaire shown as Table 22) with individual stakeholders, with the resulting comments as summarized below. At the moment, the Antai Group has requested the Taiyuan Cokes Industry Design Research Institutem which is the agengy conducting EIA (ricence no. 1311 issued by the EPA of PRC on Dec.20, 2004) to organize the environmental impacts assessment of this project, in order to obtain a building permit.

The stakeholder survey (interviews) was conducted to 51 people in total from groups of: residents residing near the Antai Industrial Park; employees of Antai Group, government officials of Jiexiu City and academic researchers. There were 48 male and 3 female with ages between 19 to 66 (Table 23). The resisdents near the Antai were chosen from three villages because that: 1) the villages locates near the old coke oven and power plants ; 2) the village has received some environmental influences from the facilities of Antai and 3) the village may receive some influences from the new coke ovens that locates upwind of the village (Please refer to Fig.3 of this PDD, page 5).

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 mechanical cokes production plant by Antai Group, as well as the significance of introducing CDQ equipment using the CDM scheme introduced under the Kyoto protocol and its plan; then, each person was asked to write in simple comments and opinions. Comments and opinions were collected by Sep.28, 2007. 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 22. Questionnaire of EIA about Antai Group's CDQ project on residents and participations

<table>
<tr><td>Name</td><td></td><td>Sex</td><td></td><td>Age</td><td></td><td>Occupation</td><td></td></tr>
<tr><td>Education</td><td></td><td>Employment</td><td colspan="5"></td></tr>
<tr><td colspan="8">Project Summary: Installation of the CDQ equipment which aims to use wasted-heat for electric generation (12 MW). The technical process is as follows: First, the cooling inert gas will be insufflated into CDQ oven from bottom by gas-flower and exchange heat with red-hot coke. Second, through the primary dust catcher, heated inert gas will go through CDQ boiler to exchange heat. Third, with second dust catcher, inert gas is pressurized by gas-flower and sent into a heat exchanger to cool down. Fourth, recycled cooled inert gas will be insufflated into CDQ oven. Coke dust which is separated by dust catcher will be collected into a storage tanker by dedicated transmission equipment and loaded out when necessary. All smokes and dusts emitted from installing, sending, storing and gas-flowering of CDQ will be dealt by dust catcher before emission. This project is energy-saving and clean production. After operation of this project, enormous energy-saving and water-saving can be expected. Although this project will take all possible measures to control air pollution, it is still probable that a small amount of dust and noise will incur some environment impacts around the project location; therefore, this survey is conducted.</td></tr>
<tr><td colspan="6">1. How do you evaluate air environment where you live?
A. Satisfied B. Not too bad C. Poor D. Very poor</td><td colspan="2">For Example:</td></tr>
<tr><td colspan="8">2. In daily life, which is the most serious environment problem do you think?
A. Air B. Water C. Noise D. Solid pollutants</td></tr>
<tr><td colspan="6">3. How do you evaluate the pollution caused by Antai Group?
A. Serious B. Not so serious C. No problem</td><td colspan="2">Why?</td></tr>
<tr><td colspan="6">4. How do you evaluate the effect of this project on local development?
A. Important B. Not so important C. No effects D. Bad effects</td><td colspan="2">Why?</td></tr>
<tr><td colspan="6">5. From environment viewpoint, which do you think is the most important issue of this project?
A. Increase pollution control efforts B. Introduce advanced technology
C. Improve management D. Others</td><td colspan="2">Why?</td></tr>
<tr><td colspan="8">6. This is an energy-saving and clean production project. Project had taken effective prevention and control measures to avoid noise and dust pollutions, met emission standards. However, complete environmental protection cannot be ensured, what do you think about this?
A. Understand and accept B. Acceptable C. Serious, cannot accept</td></tr>
<tr><td colspan="8">7. Which is the most notable problem of this project do you think?
A. Pollution protecting measures B. Environment management C. Others</td></tr>
<tr><td colspan="8">8. Do you think there are environmental problems (list below) in your region recent years?
A. Rapid reduction of vegetation B. Serious soil erosion C. Reduction of crops and fruits D. Others</td></tr>
<tr><td colspan="8">9. What do you think about your life (income, living environment, welfare)?
A. Very good B. Good C. Normal D. Bad</td></tr>
<tr><td colspan="8">10. Do you have any opinions or suggestions on this project?</td></tr>
<tr><td colspan="8">11. Do you have any opinions and suggestions on this EIA?</td></tr>
</table>

Note:

1. This table is designed for the aim of understanding the environmental awareness of residents. Please give an answer about pros and cons of this project. Your answer will become a basis of decision.
2. Please choose the answer which is most representing your opinion, and fill the number in brackets
3. For the question without choices please fill in your opinions about this project.
4. This questionnaire will be distributed among residents living around CDQ project plant of Antai Group, employee of company, communities, organizations and government staffs.

Table 23. Description of commentators

		Number	%	Remarks
Group	Residents of the Antai Industrial Park neighbourhood	33	64	Resident of Yian, Xidaqi, Dongdaqi, Liujiazhai, Jiangjiazhai, and Xicun Village
	Antai Group employees	10	20	Employees of Coke factory ant Power generation factory
	Officers of Jiexiu city government	3	6	Environmental Protection Dept., Power Generation Dept. and Economy and Trade Dept.
	Officers of Yian town government	1	2	
	Eclectic power company in Jinzhong	2	4	
	Scholars	2	4	
Sex	Male	48	94	
	Female	3	6	
Age	19-30 years ole	12	24	
	31-50 years old	27	52	
	51-66 years old	12	24	
Level of education	Middle school or below	21	41	
	High school	10	20	
	College or above	20	39	

Note: the total number of commentator is 51.

Table 24. Summary of questionnaire of EIA

Content	Option	Number	%
Evaluation of the environment nearby	A. Satisfied	14	27.45
	B. Not too bad	34	66.67
	C. Poor	3	5.88
	D. Very poor	0	0
The most serious environment problem	A. Air	38	74.51
	B. Water	1	1.96
	C. Noise	1	1.96
	D. Solid Pollutant	1	1.96
Evaluation of the pollution caused by Antai Group	A. Serious	0	0
	B. Not so serious	49	96.08
	C. No problem	2	3.92
Evaluation the effect of this project on local development	A. Important	51	100
	B. Not so Important	0	0
	C. No effects	0	0
	D. Bad effects	0	0
The most important environment aspects of this project	A. Increase pollution control efforts	9	17.65
	B. Introduce advantage technology	8	35.29
	C. Improve management	12	23.53
	D. Others	11	21.57
Complete environment impacts cannot be ensured, what do you think about this?	A. Understand and accept	43	84.31
	B. Acceptable	8	15.69
	C. Serious, cannot accept	0	0
The most notable problem of this project	A. Pollution protecting measures	12	23.53
	B. Environment management	13	25.49
	C. Others	26	50.98
Eco-environment problems occurred in the region recent years	A. Rapid reduction of vegetation	0	0
	B. Serious soil erosion	0	0
	C. Reduction of crops and fruits	4	7.84
	D. Others	45	88.24
Evaluation of the condition of the life in general	A. Very good	3	5.88
	B. Good	39	76.47
	C. Normal	8	15.69
	D. Bad	1	1.96

Note1: On the question "In daily life, which is most serious environment problem do you think?", seven persons answered "No", 13.73% of total surveyed, 3 persons filled in A, B, 5.88% of total surveyed.
Note2: On "The most notable environment aspect of this project", one person filled in "No", 1.96% of total surveyed.
Note3: On "Do you think there are environmental problems in your region recent years?", two persons answered "No", 3.92% of total surveyed.

E.2. Summary of the comments received:

>>

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 CDM.

3) Officials of Jiexiu City Administration

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 CDM, 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 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 utilization of CDM scheme under the Kyoto protocol.

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

>>

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 decision.

Annex 1

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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 25 below shows the OM and BM of national grids in China.

Table 25. OM and BM of the each national grid in China

Grid	OM (t-CO_2/MWh)	BM (t-CO_2/MWh)
North China	**1.1208**	**0.9397**
North east	1.2404	0.8631
East China	0.9421	0.8672
Middle China	1.2899	0.6592
North west	1.1257	0.5739
South China	1.1257	0.5739
Hainan	1.0119	0.6748

Source: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1364.pdf (As of Aug.9, 2007).

[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

Please refer to the section B.7.1 and B.7.2. of this PDD.