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

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SECTION A. General description of project activity

A.1 Title of the project activity:

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The Waste Heat Recovery Based Coke Dry Quenching Power Generation Project of Xingang Company
Version: 1.7
Date: 07/04/2009

Version history:

Version 1.0	18/03/2008
Version 1.1	08/05/2008
Version 1.2	10/06/2008
Version 1.3	05/08/2008
Version 1.4	01/12/2008
Version 1.5	25/12/2008
Version 1.6	17/02/2009

A.2. Description of the project activity:

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Project introduction

The Waste Heat Recovery Based Coke Dry Quenching Power Generation Project of Xingang Company (hereinafter referred to as the "Project") is located at Xinyu city of Jiangxi province, China and implemented by Xinyu Iron and Steel Co., Ltd. (hereinafter referred to as "Xingang"). There are currently 4 coke ovens (1#-4#, 192 batteries, 4.3m) at Xingang and the red coke is quenched by the wet coke quenching facility which uses water to cool down the red coke and releases the steam generated to the atmosphere directly.

The Project will adopt the Coke Dry Quenching (CDQ) technology to replace the wet coke quenching facility and recover the sensible heat of the red coke for power generation. The Project involves the installation of two sets of CDQ systems with the capacity of 90t/h each, two sets of CDQ boilers and one turbine generator of 25MW. The CDQ system is designed to run 345 days per year with the rest 20 days for maintenance. The existing wet coke quenching system will be used as a standby during the shutdown of the CDQ system to ensure continuous coke production.

It is estimated that the annual power generation by the Project would be around 205 GWh and the annual net power supply of the Project would be around 197 GWh, which otherwise would be supplied by Central China Power Grid (CCPG). Therefore, equivalent amount of electricity from CCPG will be replaced due to the Project and GHG emission reductions of 127,597 tCO_2e/yr can be realized.

Project's contribution to the sustainable development

The Project will bring about social and environmental benefits and contribute to the sustainable development of the local area through the following aspects:

Environmental wellbeing

Through replacement of the power supply from the fossil-fuel dominated CCPG, the project will reduce the GHG emissions associated with the fossil fuel used for power generation. Meanwhile, other pollutions associated with the consumption of fossil fuel will also be reduced. Furthermore, the implementation of the Project will substitute the existing wet coke quenching facility which used to release plenty of noxious gas with industrial dust, phenol, cyan, sulphide etc. that might exacerbate the environment degradation. Therefore, the Project will contribute to the improvement of the local and global environment.

Social wellbeing

The Project will contribute to the improvement of social wellbeing in different ways. First, it offers a new source of clean energy, which will not only help to improve the energy structure but also help to improve the awareness of local people for energy efficiency. Besides, some new jobs and training courses will be available for the local labour market. Finally, the Project will save plenty of water by replacing the wet coke quenching with CDQ.

A.3. Project participants:

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Table 1: Project participants

Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (Host)	Xinyu Iron and Steel Co., Ltd.	No
United Kingdom of Great Britain and Northern Ireland	Deutsche Bank AG, London Branch	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party (ies):

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People's Republic of China

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

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Jiangxi Province

A.4.1.3. City/Town/Community etc:

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Xinyu 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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The Project site is located at Xinyu city in Jiangxi Province of China, which is to the south of the Zhejiang-Jiangxi Railway, to the west of the Jiangxi-Guangdong Highway and closely to the northwest of the Yuanhe River, a branch of the Ganjiang River.

The coordinates of the Project site are:

Longitude: 114°55′23″ E
Latitude: 27°46′54″ N

Geographical location of the Project is shown below:

Figure 1: Location of the Project

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

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The project activity involves waste heat recovery based power generation in the steel industry and therefore falls under Sectoral Scope 1: Energy Industries (renewable / non-renewable sources) and Sectoral Scope 4: Manufacturing Industries.

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

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Prior to the implementation of the project activity, the CWQ process was employed for the quenching of red coke and the waste heat generated during the quenching of the red coke was released into the atmosphere directly in the form of steam. The remaining lifetime of the existing CWQ system is estimated to be at least 15 years. In this scenario, the power demand of the project owner was met by the power supply from CCPG.

The scenario prior to the implementation of the project also represents the baseline scenario of the project, as discussed in detail in section B.4 below.

The emission source involved is mainly the electricity generation at CCPG in the baseline scenario and the greenhouse gas involved is mainly CO_2.

The Project adopts the advanced CDQ technology imported from Japan while as much as possible domestic equipment is used to reduce the total investment.

The sensible heat of the red hot coke is recovered through the heat exchange between the circulating nitrogen gas and the red coke in the CDQ chamber. The nitrogen gas can be heated to up to 970℃ if the temperature of the loaded red hot coke is at around 1050℃. During the operation of the CDQ system, the circulation gas used for cooling coke is blown into the dry quenching chamber from the bottom by gas blowers. The gas exiting the dry quenching chamber, with a temperature of up to 900℃, passes through the primary gas scrubber and flows into the CDQ boiler, where the temperature of the gas can be reduced to 170℃. The gas from the CDQ boiler then goes through the secondary gas scrubber and is blown into the CDQ chamber again after passing through the feed water pre-heater, where its temperature can be further reduced to about 130℃. The schematic process flow is shown in the following figure.

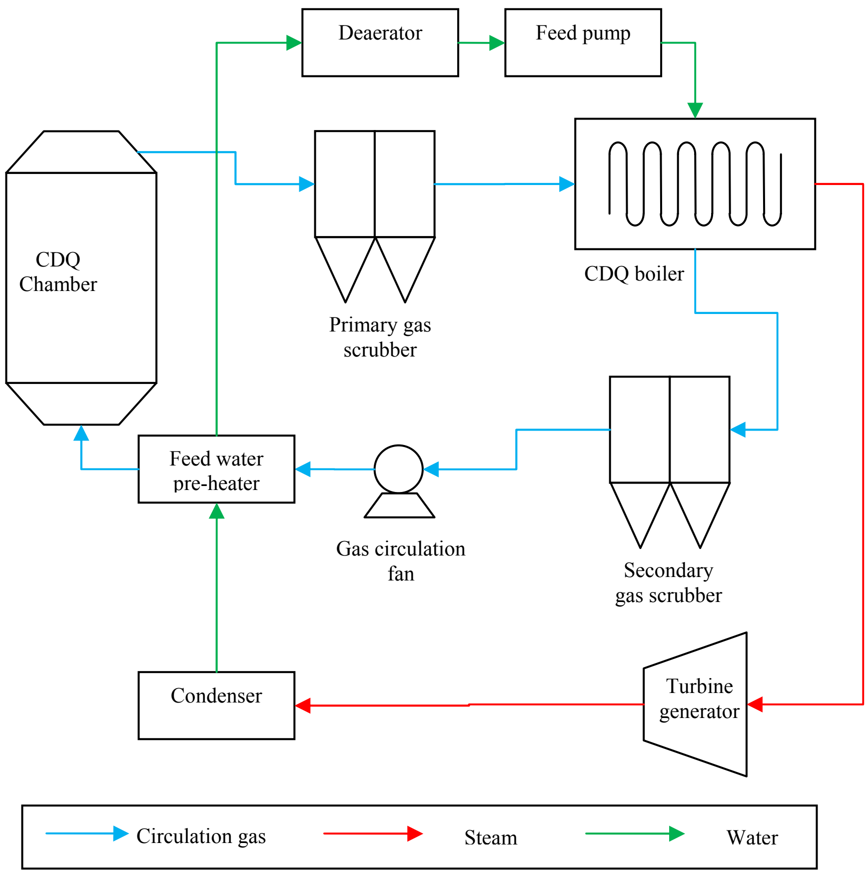

Figure 2: Process flow of CDQ system

The parameters of main equipment are as following:

1. General parameters of the CDQ system

No.	Items	Unit	Parameters	
			System No.1 (for 1# and 2# coke ovens)	System No.2 (for 3# and 4# coke ovens)
1	Coke oven specification		102 batteries X 4.3m	90 batteries X 4.3m
2	Hourly coke production	t/h	82.8	73
3	CDQ capacity	t/h	90	90
4	Coke temperature before quenching	℃	950-1050	950-1050
5	Coke temperature after quenching	℃	<200	<200
6	Circulation gas flow rate	m^3/h	126,000	126,000
7	Temperature of gas blown in	℃	130	130
8	Temperature of gas exiting	℃	900±50	900±50
9	Steam production rate	t/t coke	0.56	0.56
10	Operational hours	days/yr	345	345

2. CDQ boiler

Maximum evaporation capacity of the boiler: 50.4t/h

Practical evaporation capacity of the boiler:	46.3t/h (No.1 CDQ boiler), 40.9t/h (No.2 CDQ boiler)
Pressure of steam:	9.5MPa
Temperature of steam:	540℃
Gas flow rate at boiler's inlet:	126,000Nm^3/h
Gas temperature at boiler's inlet:	max. 970℃
Gas temperature at boiler's outlet:	<180℃

3. Condensing Turbine

Model number:	N25-8.83
Rated power:	25MW
Steam pressure at the inlet:	$8.83^{+0.196}_{-0.294}$Mpa
Steam temperature at the inlet:	535^{+10}_{-15}℃
Rated steam intake:	50.4+50.4=100.8t/h
Rated speed:	3000r/min

4. Generator

Model number:	QFW-25-A
Power:	25MW
Voltage:	10.5kV
Rated speed:	3000r/min
Frequency:	50Hz
Power factor:	0.8
Phase:	3
Class of insulation:	F
Type of cooling:	air cooling

Key equipment in the CDQ system will be imported from Japan. Therefore the implementation of the Project will result in the transfer of advanced technology to China and help to improve the technical development of the local industry.

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

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The Project is expected to reduce GHG emissions by 1,275,970 tCO_2e over the 10-year fixed crediting period as detailed in Table 2 below:

Table 2: Estimated amount of emission reductions

Year	Annual estimation of emission reductions in t CO_2e
2009 (July – December)	63,799
2010	127,597
2011	127,597
2012	127,597
2013	127,597
2014	127,597
2015	127,597
2016	127,597
2017	127,597
2018	127,597
2019 (January – June)	63,798

Total estimated reductions (t CO_2e)	1,275,970
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (t CO_2e)	127,597

A.4.5. Public funding of the project activity:

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No public funding from Annex I countries is involved in the 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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Methodology applied to the Project:

Approved consolidated baseline and monitoring methodology ACM0012: "*Consolidated baseline methodology for GHG emission reductions for waste gas or waste heat or waste pressure based energy system*", Version 2. (Version 3 of ACM0012 is also applied for the calculation of f_{cap}.)

With references to:

"*Tool for the demonstration and assessment of additionality*", Version 5.2, and
"*Tool to calculate the emission factor for an electricity system*", Version 01.1.

Details about the above mentioned Methodology and tools are available on the following website:
http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

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

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The consolidated methodology ACM0012 is for project activities that utilize waste gas and/or waste heat as an energy source for:

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

The consolidated methodology is also applicable to project activities that use waste pressure to generate electricity.

The Project utilizes the recovered waste heat for electricity generation which falls under the applicability scope of ACM0012. The Project also meets all the applicability conditions as discussed below.

- **If project activity is use of waste pressure to generate electricity, electricity generated using waste gas pressure should be measurable.**

  This condition is not applicable to the Project as the Project will not use waste pressure to generate electricity.

- **Energy generated in the project activity may be used within the industrial facility or exported outside the industrial facility.**

  The electricity generated from the Project will be used by Xingang itself, i.e. within the industrial facility.

- **The electricity generated in the project activity may be exported to the grid.**

The electricity generated from the Project will be used by Xingang and will not be exported to the grid.

- **Energy in the project activity can be generated by the owner of the industrial facility producing the waste gas/heat or by a third party (e.g. ESCO) within the industrial facility.**

  Energy in the Project will be generated by Xingang itself, which is the owner of the industrial facility producing the waste heat.

- **Regulations do not constrain the industrial facility generating waste gas from using the fossil fuels being used prior to the implementation of the project activity.**

  The Project is to use waste heat for power generation. The waste heat used in the Project is generated by the coke ovens, which use coking coal as raw material and do not use other fossil fuels. There is currently no regulations in China that constrain the use of coking coal for coke production in coke ovens.Therefore, this condition is met.

- **The methodology covers both new and existing facilities. For existing facilities, the methodology applies to existing capacity. If capacity expansion is planned, the added capacity must be treated as a new facility.**

  All the four coke ovens supplying waste heat for the Project are existing facilities and there is no expansion plan for them.

- **The waste gas/pressure utilized in the project activity was flared or released into the atmosphere in the absence of the project activity at existing facility.**

  The waste heat utilized in the Project was released into the atmosphere before the implementation of the Project, which can be checked by DOE prior to the project implementation to prove that there has been no equipment for waste heat recovery installed.

- **The credits are claimed by the generator of energy using waste gas/heat/pressure.**

  All the electricity generated by the Project will be supplied to Xingang and Xingang will be both the energy generator and the energy consumer. The credits will be only claimed by Xingang.

- **For those facilities and recipients, included in the project boundary, which prior to implementation of the project activity (current situation) generated energy on-site (sources of energy in the baseline), the credits can be claimed for minimum of the following time periods:**
  - **The remaining lifetime of equipments currently being used; and**
  - **Credit period.**

  The baseline of the Project is grid power supply and there is no facility included in the Project boundary that generated energy on-site as sources of energy in the baseline. Therefore, this condition is not applicable to the Project.

- **Waste gas/pressure that is released under abnormal operation (emergencies, shut down) of the plant shall not be accounted for.**

  During the abnormal operation (emergencies, shut down), the existing coke wet quenching equipment will be used and the steam generated will be released into the atmosphere without being accounted for.

- **Cogeneration of energy is from combined heat and power and not combined cycle mode of electricity generation.**

  The Project will generate electricity energy only and therefore this condition is not applicable to the Project.

According to the consolidated methodology ACM0012, if the displaced electricity of the Project is supplied by a connected grid system, the CO_2 emission factor of the displaced electricity shall be determined following the guidance provided in the "Tool to calculate the emission factor for an electricity system". Therefore, the "Tool to calculate the emission factor for an electricity system" is applicable to the Project.

According to ACM0012, the additionality of the project activity shall be demonstrated and assessed using the latest version of the "*Tool for the demonstration and assessment of additionality*" agreed by the CDM Executive Board. Therefore, the "*Tool for the demonstration and assessment of additionality*" (verion 5.2) is applicable to the proposed project activity.

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

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As per ACM0012, the geographical extent boundary of the Project includes the following:

1. The industrial facility where waste heat is generated (generator of waste energy), i.e. the coke ovens;
2. The facility where electricity is generated (generator of electricity), which is the power generator in the Project;
3. The facility/s where electricity is used (the recipient plant(s)), which is the industrial facilities of Xingang.

Since the Project will replace the electricity supply from the Central China Power Grid (CCPG), the power plants connected with CCPG is also included in the Project boundary as shown in Figure 3.

Emission sources and gases included in the Project boundary are shown in Table 3 below:

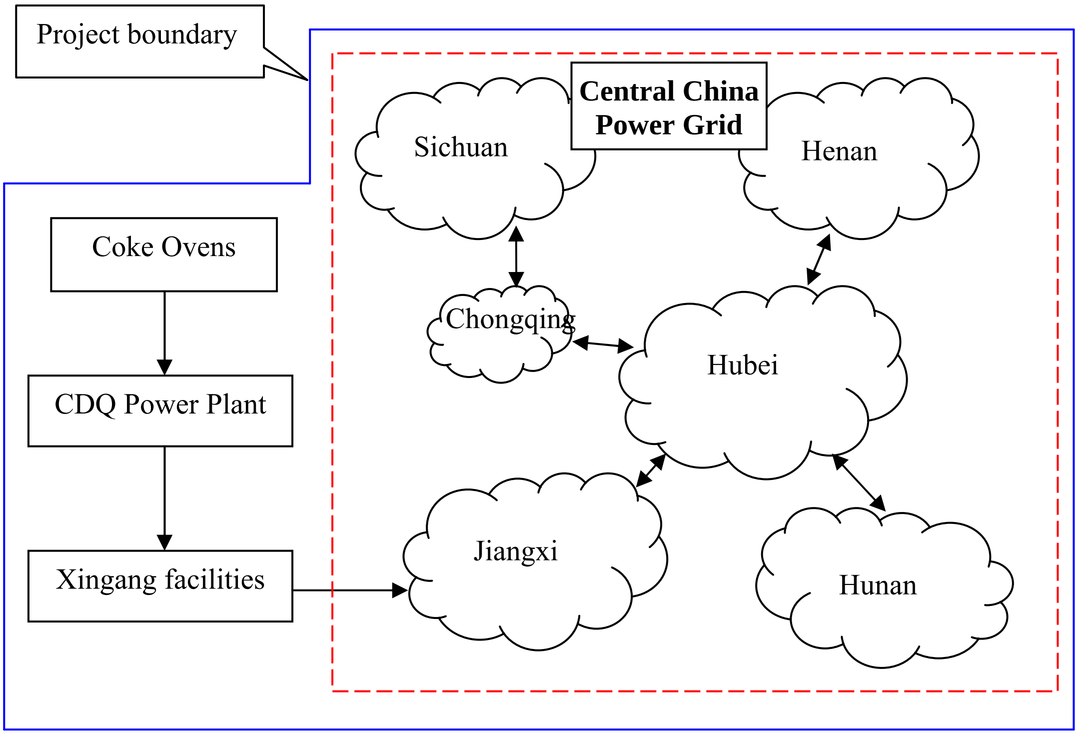

Figure 3: Project boundary

Table 3: Overview of emission sources included in or excluded from the Project boundary

	Source	Gas	Included	Justification/explanation
Baseline	Electricity generation at CCPG	CO_2	Included	Main emission source.
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	
	Fossil fuel consumption in boiler for thermal energy	CO_2	Excluded	The Project only generates electricity and there is no thermal energy production in the baseline scenario.
		CH_4	Excluded	
		N_2O	Excluded	
	Fossil fuel consumption in cogeneration plant	CO_2	Excluded	The Project only generates electricity and there is no cogeneration plant in the baseline scenario.
		CH_4	Excluded	
		N_2O	Excluded	
	Baseline emissions form generation of steam used in the flaring process	CO_2	Excluded	Not applicable to the Project.
		CH_4	Excluded	
		N_2O	Excluded	
Project activity	Supplemental fossil fuel consumption at the project plant	CO_2	Excluded	No supplemental fossil fuel consumption at the Project plant
		CH_4	Excluded	
		N_2O	Excluded	
	Supplemental electricity consumption	CO_2	Included	Main emission source.
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.
	Project emission from cleaning of gas	CO_2	Excluded	Included in the supplemental electricity consumption.
		CH_4	Excluded	
		N_2O	Excluded	

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

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As per methodology ACM0012, the baseline scenario is identified as the most plausible baseline scenario among all realistic and credible alternatives.

Realistic and credible alternatives should be determined for:
- Waste gas/heat/pressure use in the absence of the project activity; and
- Power generation in the absence of the project activity; and
- Steam/heat generation in the absence of the project activity

Since the Project is to utilize the waste heat for electricity generation only and there is no heat generation, the alternatives for heat generation in the absence of the Project will not be considered.

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

For the use of waste heat, the realistic and credible alternatives include:

W1：Waste gas is directly vented to atmosphere without incineration;
The Project is a waste heat based project and there is no waste gas in the baseline scenario. Therefore, W1 is not applicable to the Project.

W2：Waste gas is released to the atmosphere after incineration or waste heat is released to the atmosphere (waste pressure energy is not utilized);
In the absence of the proposed Project, the waste heat was released to the atmosphere in the coke wet quenching system in the form of steam. Therefore, W2 can be considered as a baseline scenario alternative.

W3：Waste gas/heat is sold as an energy source;
There are no waste heat users around the proposed Project and it is not practical to collect the waste heat from the existing coke wet quenching system. Therefore, W3 can not be considered as a baseline scenario alternative.

W4：Waste gas/heat/pressure is used for meeting energy demand.
CDQ technology is currently the only commercially available technology that recovers the waste heat from red coke for energy generation. Therefore, W4 can be considered as a baseline scenario alternative, which would be represented by the alternative P1 below.

For power generation, the realistic and credible alternatives include:

P1：Proposed project activity not undertaken as a CDM project activity;
P1 can be considered as a baseline scenario alternative.

P2：On-site or off-site existing/new fossil fuel fired cogeneration plant;

Since the proposed project generates electricity only and is not a cogeneration plant, P2 can not be the baseline scenario of the Project.

P3: On-site or off-site existing/new renewable energy based cogeneration plant;
For the same reason as for P2, P3 also can not be the baseline scenario of the Project.

P4: On-site or off-site existing/new fossil fuel based captive or identified plant;
There is no fossil fuel based captive power plant at Xingang. Other existing fossil fuel based power plants in the local area are all connected to the grid and can not supply power directly to Xingang. In addition, to build a new fossil fuel based power plant with equivalent capacity would be against relevant laws and regulations of China[1]. Therefore, P4 can not be considered as a baseline scenario alternative.

P5: On-site or off-site existing/new renewable energy based captive or identified plant;
There is no renewable energy based captive power plant at Xingang. Other existing renewable energy based power plants in the local area are all connected to the grid and can not supply power directly to Xingang. In addition, there are no renewable energy resources available at the Project site for the building of a new renewable energy based power plant. About half of the hydropower resources in Jiangxi province has been developed and the remainning resources are faced with big difficulties in development and bad economic return[2]. The wind resources in Jiangxi province is mainly located in the Poyang Lake area, which is about 200 km away from the project site.[3]. Therefore, P5 can not be considered as a baseline scenario alternative.

P6: Sourced from Grid-connected power plants;
P6 can be considered as a baseline scenario alternative as Xingang has been importing power from the local grid before the implementation of the Project.

P7: Captive Electricity generation from waste gas (if project activity is captive generation with waste gas, this scenario represents captive generation with lower efficiency than the project activity);
The proposed Project activity is waste heat based power generation. Therefore, P7 is not applicable to the proposed Project.

P8: Cogeneration from waste gas (if project activity is cogeneration with waste gas, this scenario represents cogeneration with lower efficiency than the project activity).
The proposed Project activity is waste heat based power generation. Therefore P8 is not applicable to the proposed Project.

From the discussion above, it can be determined that there are two plausible combined baseline scenarios for the proposed Project:

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[1] *Notice on Strictly Prohibiting the Installation of Fossil Fuel-fired Generators with the Capacity of 135 MW or below* issued by the General Office of the State Council, http://www.gov.cn/gongbao/content/2002/content_61480.htm

[2] Speech at the working meeting on the circulation economy of Jiangxi province, by Mr. Hong Lihe on 5 July 2006, http://www.jxdpc.gov.cn/onews.asp?newsid=9687

[3] Jiangxi plans to develop the wind resources mainly in the Poyang Lake area, http://news.xinhuanet.com/fortune/2007-04/10/content_5957489.htm

- Baseline scenario 1: Waste heat is used for meeting energy demand and the proposed project activity not undertaken as a CDM project activity (W4 and P1);
- Baseline scenario 2: Waste heat is released to the atmosphere and source the electricity from the grid.

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

In the above Baseline scenario 1, the electricity energy is generated from the waste heat based power plant without any consumption of fuels. In the Baseline scenario 2, the electricity energy is imported from CCPG which mainly consists of large fossil fuels fired power plants and the main fossil fuel used by these plants is coal which is abundant in China with no supply limitation.

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

Step 2 of the "Tool for the demonstration and assessment of additionality" is used to identify the most plausible baseline scenario for the Project.

The investment analysis for the Project is detailed in the Step 2 of Section B.5. Based on the calculation in B.5, the IRR of the Project is only 3.4%, much lower than the benchmark (13%), which means the proposed Project is not financially attractive. Therefore, Baseline scenario 1 is not a feasible option and can not be considered as a plausible baseline scenario alternative.

Step 4: If more than one credible and plausible alternative scenario remains, the alternative with the lowest baseline emissions shall be considered as the most likely baseline scenario.
From the analysis in ***Step 3***, only the Baseline scenario 2 can be considered as the most likely baseline scenario, which represents the scenario where the waste heat is released into the atmosphere and the equivalent electricity is supplied by the CCPG.

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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The Project start date is before the date of validation, however, the incentive from CDM revenues was seriously considered during the decision making process of the project. Key mile stones during the development of the project are listed below:

27/06/2006	Management decision to proceed with the project
26/10/2006	Project feasibility study report approved by local authority
26/10/2006	EIA approved by local environmental authority
08/12/2006	CDM development agreement signed with consultant
25/06/2007	Construction contract for the project signed
12/11/2007	Project submitted to the Chinese DNA for approval
18/03/2008	Validation contract signed

"Tool for the demonstration and assessment of additionality" (Version 5.2) is used to demonstrate and assess the additionality of the Project.

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

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

Referring to Section B.4, the possible alternative scenarios to the Project activity include:

Alternative a: The proposed Project activity not undertaken as a CDM project activity;
Alternative b: The waste heat is released into the atmosphere and equivalent electricity is supplied from the grid.

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

Chinese government has no mandatory policies or laws that require the building of CDQ system for existing coke ovens. Therefore, the project owner has no legal obligation to build the proposed Project, which means both Alternative a and Alternative b are consistent with all regulations and laws.

Step2: Investment Analysis

The purpose of this step is to determine whether the project activity is economically or financially less attractive than other alternatives without the revenue from the sale of certified emission reductions (CERs). The investment analysis is conducted by using the following steps:

Sub-step2a: Determine appropriate analysis method:

The "Tool for the Demonstration and Assessment of Additionality" provides three analysis methods that are simple cost analysis (Option I), investment comparison analysis (Option II) and benchmark analysis (Option III). Since the proposed Project will have revenues not only from the CERs sales but also from electricity sales, Option I can not be used for the Project. In addition, since the Alternative b does not involve capital investment while Alternative a will involve capital investment, Option II is also not applicable to the Project. Option III is then determined to be the appropriate analysis method for the proposed Project.

Sub-step 2b: Benchmark Analysis Method (Option III):

Following the common practice, the Internal Rate of Return (IRR) is used as the financial indicator for the analysis. According to "Methods and Parameters for Economic Assessment of Construction Project" (version 3) compiled by the National Development and Reform Commission and the Ministry of Construction, the benchmark IRR for construction projects in the iron and steel industry is 13% (equity IRR after tax). However, a more conservative benchmark of 12% is used for the proposed project.

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

The parameters used for the calculation of the IRR of the Project are all from the feasibility study report of the Project as summarized in Table 4 below.

Table 4: Parameters used for the calculation of IRR

Parameters	**Value (unit)**	**Data source**
Total investment	161,000,000 RMB	Feasibility Study Report

Loan in the total investment		96,600,000 RMB	Feasibility Study Report
Loan interest rate		6.84%	Feasibility Study Report
Annual O&M costs		89,280,000 RMB	Feasibility Study Report
Of which:	Raw and auxiliary material	21,690,000 RMB	
	Fuel and power	40,140,000 RMB	
	Salary and welfare	1,090,000 RMB	
	Maintenance	8,050,000 RMB	
	Others	18,310,000 RMB	
Evaluation period for the project		20years	Feasibility Study Report
Years for depreciation		15years	Feasibility Study Report
Income tax rate		25%	Feasibility Study Report
Added value tax rate		17%	Feasibility Study Report
Urban maintenance and construction tax rate		7%	Feasibility Study Report
Education additional tax rate		3%	Feasibility Study Report
Electricity supply price (excl. VAT)		0.46 RMB/kWh	Grid company
Annual electricity supply		197.13 GWh	Feasibility Study Report
Coke powder price		530 RMB/ton	Feasibility Study Report
Annual coke powder production		25,800 ton	Feasibility Study Report

Based on the above information, the IRR is calculated as 3.4%, which is much lower than the benchmark of 12% for the industry.

Sub-step 2d: Sensitivity analysis:

A sensitivity analysis is done for the Project with ±10% variation of the key parameters such as total investment, annual O&M costs, power price and power supply. Results of the sensitivity analysis are shown in Table 5 below.

Table 5: Results of sensitivity analysis

Range / Parameters	-10%	-5%	0	+5%	+10%
Power price	-5.9%	0.03%	3.4%	6.1%	8.6%
Power supply	-6.8%	-2.0%	3.4%	7.2%	10.5%
Annual O&M costs	10.5%	7.2%	3.4%	-1.9%	-6.8%
Total investment	4.8%	4.1%	3.4%	2.8%	2.2%

From the above analysis, it can be seen that even if the key parameters fluctuate by 10%, the IRR is still below the benchmark. Since these parameters are not likely to fluctuate by over 10% during the lifetime of the project, the sensitivity analysis above further support the result of the investment analysis, i.e. the project is not financially attractive. If the CDM revenues are included, the project IRR will be increased to 13.9%, which would make the project financially feasible.

In conclusion, the proposed Project is not financial attractive. Therefore, step 3 of the tool is omitted.

Step 4: Common Practice analysis

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

There is no other existing CDQ project built or under construction in Jiangxi province. Therefore, there are no other activities similar to the proposed project activity.

Sub-step 4b: Discuss any similar options that are occurring:
Since there is no similar project observed in Jiangxi Province, this step is not applicable to the Project.

In conclusion, the proposed Project is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Baseline Emissions

According to the methodology ACM0012, the baseline emissions of the Project are determined as follows:

$$BE_y = BE_{En,y} + BE_{flst,y} \quad (1)$$

Where:

BE_y	are total baseline emissions during the year y in tons of CO2
$BE_{En,y}$	are baseline emissions from energy generated by the Project during the year y in tons of CO_2
$BE_{flst,y}$	baseline emissions from generation of steam, if any, using fossil fuel, that would have been used for flaring the waste gas in absence of the project activity (t CO_2e per year).

In the baseline scenario of the Project, the waste heat is released into the atmosphere and there is no waste gas that needs steam for flaring. Therefore, the baseline emissions from generation of steam that would have been used for flaring the waste gas, i.e. $BE_{flst,y}$ is zero.

According to the methodology ACM0012, the calculation of baseline emissions $BE_{En,y}$ depends on the identified baseline scenario. Since the baseline scenario of the proposed Project is to import the equivalent electricity from the CCPG, Scenario 1 as mentioned in the methodology shall apply to the Project. Therefore, the calculation of $BE_{En,y}$ is as following:

$$BE_{En,y} = BE_{elec,y} + BE_{Ther,y} \quad (2)$$

Where:

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

Since the Project generates only one form of energy, i.e. electricity, and there is no thermal energy generation in the baseline scenario, the baseline emissions from thermal energy for the Project, i.e. $BE_{Ther,y}$ is zero. Therefore, the formula (2) above can be changed to the following:

$$BE_{En,y} = BE_{elec,y} \quad (3)$$

The calculation of $BE_{elec,y}$ is as follows:

$$BE_{elec,y} = f_{cap} * f_{wg} * \sum_{j}\sum_{i}(EG_{i,j,y} * EF_{Elec,i,j,y}) \qquad (4)$$

Where:

$BE_{elec,y}$	are baseline emissions due to displacement of electricity during the year y in tons of CO_2
$EG_{i,j,y}$	is the quantity of electricity supplied to the recipient j by generator, which in the absence of the project activity would have been sourced from i^{th} source (i can be either grid or identified source) during the year y in MWh, and
$EF_{Elec,i,j,y}$	is the CO_2 emission factor for the electricity source i displaced due to the project activity during the year y in tons CO_2/MWh
f_{wg}	Fraction of total electricity generated by the project activity using waste heat
f_{cap}	Energy that would have been produced in project year y using waste heat generated in base year expressed as a fraction of total energy produced using waste heat in year y.

Since there is only one recipient in the Project, which is Xingang, and in the absence of the Project electricity is only sourced from one source, which is CCPG, and all the electricity generated by the Project is from waste heat, i.e. $f_{wg} = 1$, the equation (4) above is simplified as follows:

$$BE_{elec,y} = f_{cap} * EG_{y,Xingang} * EF_y \qquad (4a)$$

Where:

$EG_{y,Xingang}$	is the quantity of electricity supplied to Xingang by the Project during the year y in MWh
EF_y	is the CO_2 emission factor for CCPG during the year y in tons CO_2/MWh

The Chinese DNA has announced on its website the 2007 baseline emission factors for regional power grids in China[4]. The calculation following the guidance in the "Tool to calculate the emission factor for an electricity system" is detailed in the following steps.

Step 1. Identify the relevant electric power system

Since the DNA of the host country has published a delineation of the power grids in the country, such delineation is used for the identification of the project electricity system and connected electricity systems. According to the information published by the DNA, the project electricity system of the Project is identified as the Central China Power Grid (CCPG), which covers Henan Province, Hunan Province, Hubei Province, Jiangxi Province, Sichuan Province and Chongqing Municipality. Connected electricity systems of the Project include the Northeast China Power Grid, North China Power Grid, East China Power Grid, Northwest China Power Grid and South China Power Grid.

Step 2. Select an operating margin (OM) method

According to the "Tool to calculate the emission factor for an electricity system" (Version 01), any of the four following methods can be used for the calculation of the operating margin emission factor ($EF_{grid,OM,y}$):

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

[4] http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=2193

(d) Average OM.

However, the simple OM method (option a) can only be used if low-cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

The low-cost/must-run resources constitute, on average, 36.64% (36.76% in 2001, 35.95% in 2002, 34.43% in 2003, 37.89% in 2004 and 38.18% in 2005) of the total grid generation of the project electricity system, i.e. CCPG, based on the most recent 5-year data available at the time of PDD completion. Therefore, the simple OM method (option a) is selected for the calculation of $EF_{OM,y}$.

The data vintage used for the calculation of the OM emission factor is as following:

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

Step 3. Calculate the operating margin emission factor according to the selected method

Since data on the fuel consumption, net electricity generation and the average efficiency of each power plant serving the project electricity system are not publicly available in China, Option A and Option B as listed in the "Tool to calculate the emission factor for an electricity system" (Version 01) for the calculation of the simple OM emission factor can not be used. Meanwhile, only nuclear and renewable power generation are considered as low-cost / must-run power sources in China and the quantity of electricity supplied to the grid by these sources is known. Therefore, Option C for the calculation of the simple OM emission factor is used, where the simple OM emission factor is calculated based on the net electricity supplied to the grid by all power plants serving the system, not including low-cost / must-run power plants / units, and based on the fuel types and total fuel consumption of the project electricity system, as follows:

$$EF_{OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y} \quad (5)$$

Where:

$EF_{OMsimple,y}$	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$FC_{i,y}$	Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)
$NCV_{i,y}$	Net calorific value (energy content) of fossil fuel type i consumed in year y (GJ / mass or volume unit)
$EF_{CO2,i,y}$	CO_2 emission factor of fossil fuel type i consumed in year y (tCO_2/GJ)
EG_y	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year y (MWh)
i	All fossil fuel types consumed in power sources in the project electricity system in year y
y	The three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation

The net electricity generation EG_y is calculated using the following formula:

$EG_y = TEG_y * (1 - \eta_y)$ (6)

Where:

TEG_y	Total electricity generated by all power sources serving the system, not including low-cost / must-run power plants / units, in year y (MWh)
η_y	Self consumption rate of the power sources serving the system, not including low-cost / must-run power plants / units, in year y (%)

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

Since the electricity generation data of individual power plant are not publicly available in China, the sample group of power units used to calculate build margin is defined as the set of power capacity additions in the electricity system that comprise 20% of the system capacity, instead of system generation, and that have been built most recently. This deviation was accepted by the EB[5] in its reply to the request for clarification on the use of AM0005 (replaced by ACM0002) in China.

In terms of vintage of data, the following option is chosen for the Project:

> ***Option 1***. For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Step 5. Calculate the build margin emission factor

Due to the unavailability of the relevant data, an alternative method that has been suggested and accepted by CDM EB[6] is adopted with the following steps:

Step a): Calculate the proportion of the corresponding CO_2 emissions of solid, liquid and gas fuel in the total emissions of power generation using the most recent one year fuel consumption information available at the time of PDD submission:

$$\lambda_{Solid} = \frac{\sum_{i \in Solid} FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{\sum_{i} FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}} \quad (7)$$

$$\lambda_{Liquid} = \frac{\sum_{i \in Liquid} FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{\sum_{i} FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}} \quad (8)$$

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5 http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ

6 http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ

$$\lambda_{Gas} = \frac{\sum_{i \in Gas} FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{\sum_{i} FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}} \qquad (9)$$

Where:

λ	Proportion of the CO_2 emissions of each fuel category (solid, liquid and gas) in the total CO_2 emissions of power generation (%)
$FC_{i,y}$	The amount of fuel i consumed (mass or volume unit) in year y
$NCV_{i,y}$	Net calorific value (energy content) of fossil fuel type i consumed in year y (GJ / mass or volume unit)
$EF_{CO2,i,y}$	CO_2 emission factor of fossil fuel type i consumed in year y (tCO_2/GJ)
Solid, Liquid, Gas	Foot marks for solid, liquid and gas fuels

Step b): Calculate the emission factor of fossil-fuel fired power plants using the efficiency level of the best technology commercially available:

$$EF_{Thermal} = \lambda_{Solid} \times EF_{Solid,Adv} + \lambda_{Liquid} \times EF_{Liquid,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} \qquad (10)$$

Where:

$EF_{Thermal}$	Emission factor of fossil-fuel fired power plants using the efficiency level of the best technology commercially available (tCO_2/MWh)
$EF_{Solid,Adv}$	Emission factor of best commercially available solid-fuel fired technology (tCO_2/MWh)
$EF_{Liquid,Adv}$	Emission factor of best commercially available liquid-fuel fired technology (tCO_2/MWh)
$EF_{Gas,Adv}$	Emission factor of best commercially available gas-fuel fired technology (tCO_2/MWh)

The emission factors of best commercially available technologies are calculated as follows:

$$EF_{Solid,Adv} = 3.6 * EF_{CO2,Solid} / \eta_{Solid,Adv} \qquad (11)$$
$$EF_{Liquid,Adv} = 3.6 * EF_{CO2,Liquid} / \eta_{Liquid,Adv} \qquad (12)$$
$$EF_{Gas,Adv} = 3.6 * EF_{CO2,Gas} / \eta_{Gas,Adv} \qquad (13)$$

Where:

$EF_{CO2,Solid}$	CO_2 emission factor of solid fossil fuel (tCO_2/GJ)
$EF_{CO2,Liquid}$	CO_2 emission factor of liquid fossil fuel (tCO_2/GJ)
$EF_{CO2,Gas}$	CO_2 emission factor of gas fossil fuel (tCO_2/GJ)
$\eta_{Solid,Adv}$	Power generation efficiency of best commercially available technology using solid fuel (%)
$\eta_{Liquid,Adv}$	Power generation efficiency of best commercially available technology using Liquid fuel (%)
$\eta_{Gas,Adv}$	Power generation efficiency of best commercially available technology using gas fuel (%)

Step c): Calculate the BM:

$$EF_{BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} \qquad (14)$$

Where:

CAP_{Total}	The total newly added installed capacity in the project electricity system in most recent year(s) that comprise at least 20% of the total installed capacity (MW)
$CAP_{Thermal}$	The fossil-fuel fired installed capacity in the newly added at least 20% capacity in most recent year(s) (MW)

Step 6. Calculate the combined margin emission factor

The combined margin emission factor is calculated as follows:

$$EF_{CM,y} = EF_{OMsimple,y} \times w_{OM} + EF_{BM,y} \times w_{BM} \quad (15)$$

Where:

$EF_{OMsimple,y}$	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{BM,y}$	Build margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM}	Weighting of operating margin emission factor (%)
w_{BM}	Weighting of build margin emission factor (%)

The following default values for w_{OM} and w_{BM} are used: w_{OM} = 0.5 and w_{BM} = 0.5.

Capping of baseline emissions

For the capping of the baseline emissions, the latest version of the methodology, i.e. version 3, is applied.

As required by the methodology, the baseline emissions of the Project are capped at the historical production level. Since the quantity of waste heat released to the atmosphere prior to the start of the Project was not measured, the Method-1 as included in the methodology can not be used for the estimation of f_{cap}. Therefore, the Method-2 as included in the methodology is used to estimate the f_{cap} of the Project. According to the Method-2, f_{cap} should be estimated with the following equations:

$$f_{cap} = Q_{WCM,BL}/Q_{WCM,y} \quad (16)$$
$$Q_{WCM,BL} = Q_{BL,product} * q_{wcm,product} \quad (17)$$

Where:

$Q_{WCM,BL}$	Quantity of waste heat generated prior to the start of the project activity (kJ)
$Q_{WCM,y}$	Quantity of waste heat used for electricity generation during year y (kJ)
$Q_{BL,product}$	Production by process that most logically relates to waste heat generation in baseline
$q_{wcm,product}$	Amount of waste heat the industrial facility generates per unit of product generated

For the calculation of $Q_{WCM,y}$, the following equation is applied:

$$Q_{WCM,y} = Q_{F,y} \times \rho \times (t_{in} * C_{in} - t_{out} * C_{out}) \quad (18)$$

Where:

$Q_{F,y}$	Circulation gas volume in the waste heat boiler of the project activity in year y, Nm^3
ρ	Density of the circulation gas, kg/m^3
C_{in}	Specific heat of circulation gas at the waste heat boiler inlet (kJ/kg·℃);
C_{out}	Specific heat of circulation gas at the waste heat boiler outlet (kJ/kg·℃);
t_{in}	Temperature of circulation gas at the waste heat boiler inlet (℃);
t_{out}	Temperature of circulation gas at the waste heat boiler outlet (℃).

Project Emissions

According to the methodology ACM0012, project emissions include emissions due to combustion of auxiliary fuel to supplement waste heat and electricity emissions due to consumption of electricity for cleaning of gas before being used for generation of electricity, as shown in the following equation:

$$PE_y = PE_{AF,y} + PE_{EL,y} \quad (18)$$

Where:

PE_y	Project emissions due to project activity
$PE_{AF,y}$	Project activity emissions from on-site consumption of fossil fuels
$PE_{EL,y}$	Project activity emissions from on-site consumption of electricity

Since the Project uses only the recovered waste heat for power generation and no supplementary fossil fuel is used, the project emission from on-site consumption of fossil fuels, i.e. $PE_{AF,y}$, is zero. The project emissions from on-site consumption of electricity are calculated as following:

$$PE_{EL,y} = EC_{PJ,y} * EF_{CO2,EL,y} \quad (19)$$

Where:

$EC_{PJ,y}$	Additional electricity consumed in year y as a result of the implementation of the Project activity (MWh)
$EF_{CO2,El,y}$	CO_2 emission factor for the electricity consumed by the Project in year y (tCO_2/MWh)

The electricity consumed by the Project activity will be supplied by CCPG. Therefore, the emission factor of CCPG calculated above can be used for the purpose of project emission calculation.

Leakage

No leakage is considered according to methodology ACM0012.

Emission Reductions

The emission reductions due to the Project during a given year y is the difference between the baseline emissions and project emissions, as follows:

$$ER_{\mathrm{y}} = BE_y - PE_y = BE_{elec,y} - PE_{EL,y} \quad (20)$$

Where:

ER_{y}	Emissions reductions of the project activity during year *y* in tons of CO_2
$BE_{elec,y}$	Baseline emissions due to displacement of electricity during year *y* in tons of CO_2
$PE_{EL,y}$	Project emissions due to on-site consumption of electricity during year *y* in tons of CO_2

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

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

Description:	Net calorific value per mass or volume unit of fuel i used in year y
Source of data used:	National default values
Value applied:	A series of data as included in **Annex 3**
Justification of the choice of data or description of measurement methods and procedures actually applied :	The national default values of net calorific values for different fuel types are included in the *China Energy Statistical Yearbook*, which is compiled by the relevant national authorities and published annually.
Any comment:	

Data / Parameter:	$EF_{CO2,i,y}$
Data unit:	tCO_2/GJ
Description:	CO_2 emission factor of fuel i used in year y
Source of data used:	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval
Value applied:	A series of data as included in **Annex 3**
Justification of the choice of data or description of measurement methods and procedures actually applied :	As provided in table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.
Any comment:	

Data / Parameter:	$FC_{i,y}$
Data unit:	mass or volume unit
Description:	The amount of fuel i consumed in year y
Source of data used:	Official publications
Value applied:	A series of data as included in **Annex 3**
Justification of the choice of data or description of measurement methods and procedures actually applied :	The information is included in the *China Energy Statistical Yearbook*, which is compiled by the relevant national authorities and published annually.
Any comment:	

Data / Parameter:	TEG_y
Data unit:	MWh
Description:	Total electricity generated by all power sources serving the system, not including low-cost / must-run power plants / units, in year y
Source of data used:	Official publications
Value applied:	A series of data as included in **Annex 3**
Justification of the choice of data or description of measurement methods	Information used is from *China Electric Power Yearbook*, which is published annually by the national authority.

and procedures actually applied :	
Any comment:	

Data / Parameter:	η_y
Data unit:	%
Description:	Self consumption rate of the power sources serving the system, not including low-cost / must-run power plants / units, in year y
Source of data used:	Official publications
Value applied:	A series of data as included in **Annex 3**
Justification of the choice of data or description of measurement methods and procedures actually applied :	Information used is from *China Electric Power Yearbook*, which is published annually by the national authority.
Any comment:	

Data / Parameter:	CAP_{Total}
Data unit:	MW
Description:	The total newly added installed capacity in the project electricity system in most recent year(s) that comprise at 20% of the total installed capacity
Source of data used:	Official publications
Value applied:	24,258.50 (see **Annex 3** for details)
Justification of the choice of data or description of measurement methods and procedures actually applied :	Information used is from *China Electric Power Yearbook*, which is published annually by the national authority.
Any comment:	

Data / Parameter:	$CAP_{Thermal}$
Data unit:	MW
Description:	The fossil-fuel fired installed capacity in the newly added at least 20% capacity in most recent year(s)
Source of data used:	Official publications
Value applied:	16,864.00(see **Annex 3** for details)
Justification of the choice of data or description of measurement methods and procedures actually applied :	Information used is from *China Electric Power Yearbook*, which is published annually by the national authority.
Any comment:	

Data / Parameter:	$\eta_{Solid,Adv}$, $\eta_{Liquid,Adv}$, $\eta_{Gas,Adv}$
Data unit:	%

Description:	Power generation efficiencies of best commercially available technology using solid, liquid and gas fuels
Source of data used:	Publication of DNA
Value applied:	See **Annex 3** for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Information used is from the *Bulletin on determining the baseline emission factors of power grids in China* published by the DNA of the host country.
Any comment:	

Data / Parameter:	$q_{wcm, product}$
Data unit:	kJ/kg
Description:	Amount of waste heat the industrial facility generates per unit of product generated
Source of data used:	Expert assessment
Value applied:	1,494.68
Justification of the choice of data or description of measurement methods and procedures actually applied :	Assessment carried out by qualified process expert.
Any comment:	

Data / Parameter:	$Q_{BL, product}$
Data unit:	tons/yr
Description:	Average annual coke production from the coke ovens related to the Project during 2005-2007.
Source of data used:	Production log
Value applied:	1,323,400
Justification of the choice of data or description of measurement methods and procedures actually applied :	Actual production data from the production log are used.
Any comment:	

Data / Parameter:	$Q_{WCM,BL}$
Data unit:	kJ/yr
Description:	Quantity of waste heat generated per year prior to the start of the project activity
Source of data used:	Calculated as the production of $q_{wcm, product}$ and $Q_{BL, product}$
Value applied:	1,978,059,512,000
Justification of the choice of data or description of	Calculated as per methodology

measurement methods and procedures actually applied :	
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

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According to the publication of the Chinese DNA, following the procedures as described in section B.6.1, the combined margin emission factor of the project electricity system, i.e. CCPG, is calculated to be 0.9223 tCO_2/MWh. Detailed calculation process is included in Annex 3.

According to the Feasibility Study Report of the Project, the estimated annual net electricity supply by the Project is 197,126.4 MWh. For the purpose of ex-ante calculation, the capping factor f_{cap} is estimated to be 1. Therefore, the estimated baseline emissions of the Project are as follows:

$BE_y = BE_{elec,y} = f_{cap} * EG_{y,Xingang} * EF_y$ = 1*197,126.4*0.9223 = 181,810 tCO_2

Additional electricity consumption due to the implementation of the Project is estimated to be 58,780 MWh according to the Feasibility Study Report of the Project. Since the additional electricity consumption will be supplied by CCPG, the emission factor of CCPG as calculated above is used to calculate the project emissions, as follows:

$PE_y = PE_{EL,y} = EC_{PJ,y} * EF_{CO2,EL,y}$ = 58,780*0.9223 = 54,213 tCO_2

The emission reductions of the Project are then estimated as follows:

$ER_y = BE_y – PE_y$ = 181,810 – 54,213 = 127,597 tCO_2

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

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The 10-year fixed crediting period is chosen for the Project. The total emission reductions generated by the Project are estimated to be 1,275,970 tCO_2 during the crediting period. Summary of the ex-ante estimation of the emission reductions is shown in Table 6 below.

Table 6: Summary of the ex-ante estimation of emission reductions

Years	**Estimation of project activity emissions** (tCO_2 e)	**Estimation of baseline emissions** (tCO_2 e)	**Estimation of leakage** (tCO_2 e)	**Estimation of overall emission reductions** (tCO_2 e)
2009 (Jul.-Dec.)	27,106	140,905	0	63,799
2010	54,213	181,810	0	127,597
2011	54,213	181,810	0	127,597
2012	54,213	181,810	0	127,597
2013	54,213	181,810	0	127,597
2014	54,213	181,810	0	127,597
2015	54,213	181,810	0	127,597
2016	54,213	181,810	0	127,597
2017	54,213	181,810	0	127,597
2018	54,213	181,810	0	127,597

2019 (Jan.-Jun.)	27,107	140,905	0	63,798
Total (tCO_2 e)	542,130	1,818,100	0	1,275,970

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

B.7.1 Data and parameters monitored:

Data / Parameter:	$EG_{y,Xingang}$
Data unit:	MWh
Description:	Quantity of electricity supplied to Xingang by the Project during the year y
Source of data to be used:	Electricity meter installed on site
Value of data applied for the purpose of calculating expected emission reductions in section B.6:	197,126.4
Description of measurement methods and procedures to be applied:	Electricity meters with accuracy of 1.0 grade will be installed at the Project site to monitor the electricity delivered to Xingang by the Project. The parameter will be measured continuously and recorded monthly.
QA/QC procedures to be applied:	The meters will be calibrated by qualified organization according to the manufacturer’s requirement.
Any comment:	

Data / Parameter:	$EG_{PJ,y}$
Data unit:	MWh
Description:	Quantity of additional electricity consumption as a result of the implementation of the Project during the year y
Source of data to be used:	Electricity meter installed on site
Value of data applied for the purpose of calculating expected emission reductions in section B.6:	58,780
Description of measurement methods and procedures to be applied:	Electricity meters with accuracy of 1.0 gradewill be installed at the Project site to monitor the additional electricity consumption by the Project. The parameter will be measured continuously and recorded monthly.
QA/QC procedures to be applied:	The meters will be calibrated by qualified organization according to the manufacturer’s requirement.
Any comment:	

Data / Parameter:	$Q_{F,y}$
Data unit:	Nm^3
Description:	The volume of circulating gas used in the waste heat boiler during project year y
Source of data to be used:	Flow meter
Value of data applied	Not applicable

for the purpose of calculating expected emission reductions in section B.6:	
Description of measurement methods and procedures to be applied:	Continuous measurement by flow meter and the result will be normalized according to the relevant temperature and pressure.
QA/QC procedures to be applied:	The meters will be regularly maintained and calibrated following the relevant national regulation and standard.
Any comment:	

Data / Parameter:	t_{in}
Data unit:	℃
Description:	Circulating gas temperature at the waste heat boiler inlet
Source of data to be used:	Thermocouple
Value of data applied for the purpose of calculating expected emission reductions in section B.6:	For the purpose of ex-ante estimation of the emission reductions, f_{cap} was estimated to be 1 and no value of t_{in} was used.
Description of measurement methods and procedures to be applied:	The circulating gas temperature is measured by the thermocouple and recorded by the DCS system.
QA/QC procedures to be applied:	To conduct the calibration and DCS maintenance according to the relevant regulations.
Any comment:	

Data / Parameter:	t_{out}
Data unit:	℃
Description:	Circulating gas temperature at the waste heat boiler outlet
Source of data to be used:	Thermocouple
Value of data applied for the purpose of calculating expected emission reductions in section B.6:	For the purpose of ex-ante estimation of the emission reductions, f_{cap} was estimated to be 1 and no value of t_{out} was used.
Description of measurement methods and procedures to be applied:	The circulating gas temperature is measured by the thermocouple and recorded by the DCS system.
QA/QC procedures to be applied:	To conduct the calibration and DCS maintenance according to the relevant regulations.
Any comment:	

Data / Parameter:	C_{in}
Data unit:	kJ/kg·℃
Description:	the specific heat of circulation gas at the waste heat boiler inlet
Source of data to be used:	Documentation
Value of data applied for the purpose of calculating expected emission reductions in section B.6:	For the purpose of ex-ante estimation of the emission reductions, f_{cap} was estimated to be 1 and no value of C_{in} was used.
Description of measurement methods and procedures to be applied:	To calculate from standard engineering books/textbooks (e.g. the gaseous heat physical properties table) according to the gas temperature and content.
QA/QC procedures to be applied:	Not applicable
Any comment:	

Data / Parameter:	C_{out}
Data unit:	kJ/kg·℃
Description:	the specific heat of circulation gas at the waste heat boiler outlet
Source of data to be used:	Documentation
Value of data applied for the purpose of calculating expected emission reductions in section B.6:	For the purpose of ex-ante estimation of the emission reductions, f_{cap} was estimated to be 1 and no value of C_{out} was used.
Description of measurement methods and procedures to be applied:	To calculate from standard engineering books/textbooks (e.g. the gaseous heat physical properties table) according to the gas temperature and content.
QA/QC procedures to be applied:	Not applicable
Any comment:	

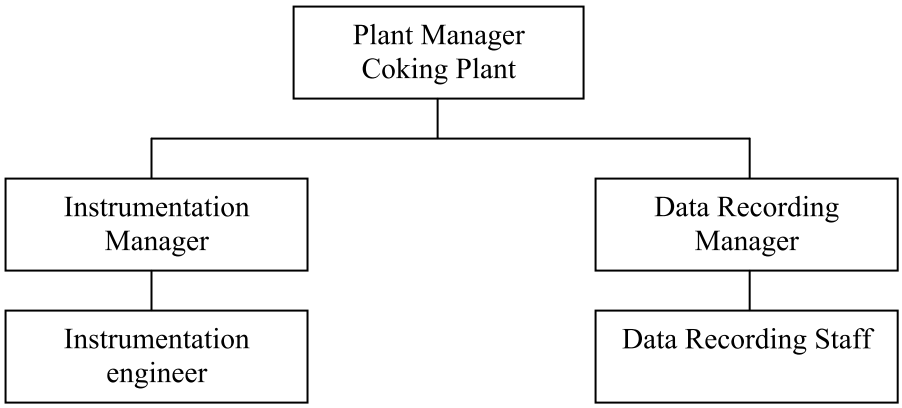
Data / Parameter:	ρ
Data unit:	kg/m^3
Description:	Density of the circulation gas
Source of data to be used:	Documentation
Value of data applied for the purpose of calculating expected emission reductions in section B.6:	For the purpose of ex-ante estimation of the emission reductions, f_{cap} was estimated to be 1 and no value of ρ was used.

Description of measurement methods and procedures to be applied:	To calculate from standard engineering books/textbooks (e.g. the gaseous heat physical properties table) according to the gas temperature and content.
QA/QC procedures to be applied:	Not applicable
Any comment:	

B.7.2 Description of the monitoring plan:

>>

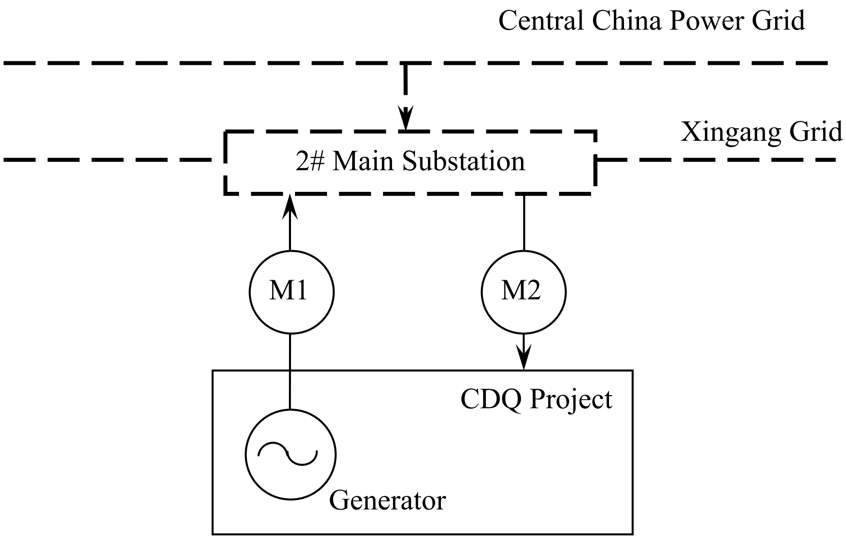
The project owner will establish the following operational and management structure for the monitoring task of the project.



The Plant Manager of Coking plant will be in charge of the overall implementation of the monitoring plan. The Instrumentation Manager will make sure all the related meters and instrumentations are calibrated timely according to relevant regulations and rules. The Instrumentation engineer will be responsible for the maintenance of the meters and will check if the meters work properly. The data recording staff will be responsible for the recording of all related parameters and the data recording manager will be responsible for the review of the recorded data.

The key parameters to be monitored throughout the crediting period of the Project include the electricity supplied by the Project to Xingang, additional electricity consumption by the Project and the volume and temperature of the circulation gas. The measurement of the electricity is shown in the following diagram.

Digital electricity meters with accuracy level of 1.0 will be installed for the measurement of the electricity amount. The electricity generated by the project will be connected with the Xingang power grid at the 2# Main substation, which will be measured by the meter installed at measuring point M1 as shown in the diagram. All the electricity consumption of the Project will be supplied by CCPG through the 2# Main Substation in the Xingang grid. The meter installed at the measuring point M2 will monitor the total electricity consumed by the project. Both parameters will be monitored continuously and recorded monthly with both soft and hard copies.



The volume and temperature of the circulation gas will be measured by a flow meter and temperature sensors and will be recorded everyday.

Trained staff will be appointed to record the readings of the meters and do the monthly and annually statistics and calculations. All data collected as part of monitoring will be archived both electronically and on paper and will be kept for at least 2 years after the end of the crediting period.

The meters will be calibrated according to relevant standards and rules by qualified entities to ensure accuracy of the data to be monitored. The calibration certificates will be kept for the verification of DOE.

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

>>

The baseline study of the Project was completed on 18/03/2008 by the following person/entity.

Mr. Wang Donglei
Beijing Changjia Investment Co., Ltd.
Address: Room 2504, Building G, Huiyuan International Plaza, Asian Games Village, Chaoyang District, Beijing, China 100101
Phone: 86-10-84972818
Fax: 86-10-64991543
Email: wangdonglei@263.net

Beijing Changjia Investment Co., Ltd. is not a project participant of the Project.

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:

>>
25/06/2007, when the construction contract for the project was signed.

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

>>
20 years.

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

C.2.1. Renewable crediting period

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

>>
Not applicable.

C.2.1.2. Length of the first crediting period:

>>
Not applicable.

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
01/07/2009, or the date of registration, whichever is later.

C.2.2.2. Length:

>>
10 years

SECTION D. Environmental impacts

>>

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

>>

An Environmental Impact Assessment form was completed for the Project and was approved by the Environmental Protection Administration of Jiangxi Province. The analysis of the environmental impacts of the Project is summarized below.

Potential impacts to the environment during the implementation of the Project include dust, noise and solid waste. Dust pollution mainly comes from the loading of red coke into the CDQ chamber, the discharge of coke from the CDQ chamber and the operation of the belt conveyor, etc. Noise will mainly come from the operation of the fans and blowers. Solid waste will be mainly the dust/coke powder collected by the dust collection system.

In order to address the dust issue, a dust collection system will be built as part of the Project, which will effectively reduce the dust released into the atmosphere. For the control of noise, low-noise equipment will be used wherever possible. Equipment with big noise will be located in-doors as long as possible. Insulation measures will also be taken to reduce the impact of noise. The waste solid will be recovered and used as fuel in the sintering process.

In general, after the implementation of the Project, the pollution resulted from the coke quenching process will be significantly reduced.

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

>>

The project will not have significant impacts on the local environment generally.

SECTION E. Stakeholders' comments

>>

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

>>

In May 2007, comments of the stakeholders near the proposed project have been collected by the project owner in the form of questionnaire. Thirty responses were received and among the respondents are government officials, local residents and company employees.

The questionnaire includes the following sections:
1) Brief introduction of the project
2) Basic information of respondents
3) Questions regarding the project:

- ♦ How do you know about the project?
- ♦ What do you think is the main environmental impact of the Project?
- ♦ What negative influence do you think the Project will bring up during its operation?
- ♦ What do you think is the main positive impact of the Project?
- ♦ What impact will the Project have towards your daily life?
- ♦ Do you think the Project is beneficial to the development of the local economy and improvement of the employment situation?
- ♦ What is your attitude towards the construction of the project?

E.2. Summary of the comments received:

>>

The comments received are summarized below:

- ♦ 19 of the respondents replied that they know the proposed project and 11 replied that not totally understand the proposed project;
- ♦ All of the respondents think that the proposed project will have no negative impact on the environment.
- ♦ 17 of the respondents think that the proposed project will help to improve the local economic development, 4 of them believe that the Project will increase employment opportunities and 16 of them think that the project will improve the local environmental quality.
- ♦ 24 of the respondents believe that the proposed project would improve their living condition, and 6 of them think that there will be no impact to the daily life.
- ♦ All the respondents agree that the proposed project will improve the local economy and labour employment condition.
- ♦ All the respondents are supportive to the construction of the proposed project.

The original questionnaires collected are available from the project owner.

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

>>

There is no negative comments received regarding the proposed project and therefore no change is done to the Project.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding from Annex I Countries involved in the project activity.

Annex 3
BASELINE INFORMATION

Table A3-1: Fuel consumption in CCPG in the three most recent years for which data is available (to be continued)

Fuel type	Unit	Jiangxi			Henan			Hubei		
		2003	2004	2005	2003	2004	2005	2003	2004	2005
Raw coal	ton	14,274,100	18,638,000	18,692,900	55,049,400	69,485,000	76,388,700	20,724,400	25,105,000	27,321,500
Clean coal	ton	-	-	200	-	23,400	-	-	-	-
Other washed coal	ton	20,300	489,300	-	396,300	1,042,200	1,381,200	-	-	-
Coke	ton	-	-	-	-	1,096,100	259,500	-	-	-
Coke oven gas	m^3	-	-	-	-	-	-	93,000,000	168,000,000	115,000,000
Other gas	m^3	-	-	-	-	-	1,020,000,000	-	-	-
Crude oil	ton	-	-	-	5,000	8,600	8,200	2,400	2,200	3,600
Gasoline	ton	-	-	-	-	600	200	-	-	-
Diesel oil	ton	5,200	200	13,000	25,400	38,600	30,300	6,900	17,000	23,900
Fuel oil	ton	4,200	10,900	6,400	2,500	1,900	2,900	21,700	95,500	31,500
Refinery gas	ton	17,600	35,200	7,100	65,300	22,700	34,100	-	-	17,600
Natural gas	m^3	-	-	-	-	-	-	-	-	-
Other coking products	ton	-	-	-	-	-	-	-	-	-
Other energy	tsce	-	-	-	110,400	169,200	28,800	-	-	-

Table A3-1 (Continued)

Fuel type	Unit	Hunan			Chongqing			Sichuan			Total
		2003	2004	2005	2003	2004	2005	2003	2004	2005	
Raw coal	ton	16,464,700	21,979,000	17,122,700	7,694,700	8,755,000	8,754,000	24,309,300	27,479,000	29,997,700	**488,235,100**
Clean coal	ton	-	-	-	-	-	-	-	-	-	**23,600**
Other washed coal	ton	-	-	-	1,061,200	897,200	899,900	-	-	-	**6,187,600**
Coke	ton	12,200	-	1,050,000	-	-	-	-	-	-	**2,417,800**
Coke oven gas	m^3	-	-	-	-	34,000,000	36,000,000	-	-	-	**446,000,000**
Other gas	m^3	-	-	-	-	261,000,000	312,000,000	-	-	-	**1,593,000,000**
Crude oil	ton	-	-	-	-	-	-	12,000	-	-	**42,000**
Gasoline	ton	-	-	-	-	100	200	-	-	-	**1,100**
Diesel oil	ton	12,100	17,200	13,900	7,700	11,400	13,800	-	-	-	**236,600**
Fuel oil	ton	5,400	13,800	16,800	2,800	4,800	8,900	12,000	16,800	22,200	**281,000**
Refinery gas	ton	6,600	-	7,800	-	-	-	-	-	-	**214,000**
Natural gas	m^3	-	-	-	4,000,000	-	-	220,000,000	227,000,000	300,000,000	**751,000,000**
Other coking products	ton	-	-	15,000	-	-	-	-	-	-	**15,000**
Other energy	tsce	-	152,000	17,400	162,000	209,500	328,000	-	-	-	**1,177,300**

Source: China Energy Statistical Yearbook, 2004, 2005, 2006

Table A3-2: Total power generation and net power supply in CCPG

Province	2003			2004			2005			Total net power supply
	Power generated	Self use rate	Net power supply	Power generated	Self use rate	Net power supply	Power generated	Self use rate	Net power supply	
	MWh	%	MWh	MWh	%	MWh	MWh	%	MWh	MWh
Jiangxi	27,165,000	6.43	25,418,291	30,127,000	7.04	28,006,059	30,000,000	6.48	28,056,000	81,480,350
Henan	95,518,000	7.68	88,182,218	109,352,000	8.19	100,396,071	131,590,000	7.32	121,957,612	310,535,901
Hubei	39,532,000	3.81	38,025,831	43,034,000	6.58	40,202,363	47,700,000	2.51	46,502,730	124,730,924
Hunan	29,501,000	4.58	28,149,854	37,186,000	7.47	34,408,206	39,900,000	5	37,905,000	100,463,060
Chongqing	16,341,000	8.97	14,875,212	16,520,000	11.06	14,692,888	17,584,000	8.05	16,168,488	45,736,588
Sichuan	32,782,000	4.41	31,336,314	34,627,000	9.41	31,368,599	37,202,000	4.27	35,613,475	98,318,388
Total			225,987,719			249,074,186			286,203,305	761,265,210

Source: China Electric Power Yearbook, 2004, 2005, 2006

Table A3-3: Simple OM emission factor calculation

Fuel type	CO_2 emission factor[1]	Net calorific value[2]	Fuel consumption[3]	CO_2 emission
	tCO_2/GJ	GJ/t, GJ/m^3	t, m^3	tCO_2
	A	B	C	D=A*B*C
Raw coal	0.0895	20.908	488,235,100	913,617,743
Clean coal	0.0895	26.344	23,600	55,644
Other washed coal	0.0895	8.363	6,187,600	4,631,347
Coke	0.0957	28.435	2,417,800	6,579,389
Coke oven gas	0.0373	0.016726	446,000,000	278,250
Other gas	0.0373	0.005227	1,593,000,000	310,583
Crude oil	0.0711	41.816	42,000	124,871
Gasoline	0.0675	43.07	1,100	3,198
Diesel oil	0.0726	42.652	236,600	732,640
Fuel oil	0.0755	41.816	281,000	887,147
Refinery gas	0.0482	46.055	214,000	475,048
Natural gas	0.0543	0.038931	751,000,000	1,587,579
Other coking products	0.0957	28.435	15,000	40,818
Other energy	0	0	1,177,300	0
Total CO_2 emission (tCO_2)				**929,324,257**
Total net power supply (MWh)[4]				**761,265,210**
Simple OM emission factor (tCO_2/MWh)				**1.2208**

Source: 1. 2006 IPCC Guidelines on National GHG Inventories, Vol. 2 (Energy), Chapter 1, table1.4
2. China Energy Statistical Yearbook 2006
3. Table A3-1 of the PDD.
4. Table A3-2 of the PDD.

Table A3-4: Calculation of the percentage of emission of each fuel category in the total emission

Fuel category	Fuel type	Unit	Fuel consumption in 2005[1]						Total	CO_2 emission factor[2]	Net calorific value[3]	CO_2 Emission	% of emission of each fuel category in total emission
			Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total	tCO2/GJ	GJ/t, GJ/m3	tCO2e	
			A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J=G*H*I	
Solid	Raw coal	ton	18,692,900	76,388,700	27,321,500	17,122,700	8,754,000	29,997,700	**178,277,500**	0.0895	20.908	333,604,624	
	Clean coal	ton	200	-	-	-	-	-	**200**	0.0895	26.344	472	
	Other washed coal	ton	-	1,381,200	-	-	899,900	-	**2,281,100**	0.0895	8.363	1,707,377	
	Coke	ton	-	259,500	-	1,050,000	-	-	**1,309,500**	0.0957	28.435	3,563,450	
	Other coking products	ton	-	-	-	15,000	-	-	**15,000**	0.0957	28.435	40,818	
	Subtotal											338,916,741	99.49%
Liquid	Crude oil	ton	-	8,200	3,600	-	-	-	**11,800**	0.0711	41.816	35,083	
	Gasoline	ton	-	200	-	-	200	-	**400**	0.0675	43.07	1,163	
	Diesel oil	ton	13,000	30,300	23,900	13,900	13,800	-	**94,900**	0.0726	42.652	293,861	
	Fuel oil	ton	6,400	2,900	31,500	16,800	8,900	22,200	**88,700**	0.0755	41.816	280,035	
	Subtotal											610,142	0.18%
Gas	Refinery gas	ton	7,100	34,100	17,600	7,800	-	-	**66,600**	0.0482	46.055	147,842	
	Natural gas	m^3	-	-	-	-	-	300,000,000	**300,000,000**	0.0543	0.038931	634,186	
	Coke oven gas	m^3	-	-	115,000,000	-	36,000,000	-	**151,000,000**	0.0373	0.016726	94,206	
	Other gas	m^3	-	1,020,000,000	-	-	312,000,000	-	**1,332,000,000**	0.0373	0.005227	259,696	
	Subtotal											1,135,930	0.33%
											Total	340,662,814	

Source: 1. China Electric Power Yearbook 2006

2. 2006 IPCC Guidelines on National GHG Inventories, Vol. 2 (Energy), Chapter 1, table1.4

3. China Energy Statistical Yearbook 2006

Table A3-5: Calculation of CO_2 emission factor of thermal power generation with best commercially available technology

Fuel category	Power generation efficiency of best commercially available technology[1]	CO_2 emission factor of fuel[2]	CO_2 emission factor of technology	Percentage of emission of each fuel category in total emission[3]	Weighted emission factor
		tCO_2/GJ	tCO_2/MWh		tCO_2/MWh
	A	B	C=3.6*B/A	D	E=C*D
Solid	35.82%	0.0895	0.8995	99.49%	0.8949
Liquid	47.67%	0.0755	0.5702	0.18%	0.0010
Gas	47.67%	0.0543	0.4101	0.33%	0.0014
	CO_2 emission factor of thermal power generation with best commercially available technology				**0.8973**

Source: 1. *Bulletin on determining the baseline emission factors of power grids in China*, Office of National Coordination Committee on Climate Change, NDRC.
2. 2006 IPCC Guidelines on National GHG Inventories, Vol. 2 (Energy), Chapter 1, table1.4
3. Table A3-4 of the PDD.

Table A3-6: Calculation of BM emission factor

Year	Province	Installed capacity (MW)[1]				% in the 2005 capacity
		Thermal	Hydro	Wind	Total	
2002	Jiangxi	5,128.80	2,197.40			
	Henan	15,904.50	2,438.00			
	Hubei	8,147.80	7,213.90			
	Hunan	4,975.60	6,135.30			
	Chongqing	3,004.50	1,195.50	-		
	Sichuan	6,142.00	11,854.60	-		
	Subtotal	43,303.20	31,034.70	-	74,337.90	75.40%
2003	Jiangxi	5,407.80	2,307.40	-		
	Henan	17,635.50	2,438.00			
	Hubei	8,173.30	7,337.20			
	Hunan	6,446.70	6,603.10			
	Chongqing	3,126.20	1,329.80	-		
	Sichuan	6,104.00	12,341.50	-		
	Subtotal	46,893.50	32,357.00	-	79,250.50	80.38%
2005	Jiangxi	5,906.00	3,019.00			
	Henan	26,267.80	2,539.90			
	Hubei	9,526.30	8,088.90			
	Hunan	7,211.60	7,905.10			
	Chongqing	3,759.50	1,892.70	24.00		
	Sichuan	7,496.00	14,959.60			
	Subtotal	60,167.20	38,405.20	24.00	98,596.40	100.00%

Capacity addition in 2002-2005	16,864.00	7,370.50	24.00	24,258.50	
% in the total addition	69.52%	30.38%	0.10%		
Emission factor[2] (tCO_2/MWh)	0.8973				
BM emission factor (tCO_2/MWh)	0.6238				

Source: 1. China Electrical Power Yearbook, 2003, 2004, 2006
2. Table A3-5 of the PDD.

Table A3-7: Calculation of CM emission factor

	Emission factor	**Weight**	**Weighted emission factor**
	tCO_2/MWh		tCO_2/MWh
BM	0.6238	0.5	0.3119
OM	1.2208	0.5	0.6104
		CM emission factor	**0.9223**

Annex 4

MONITORING INFORMATION

As per section B.7.