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:

>>
SDIC Xindeng Zhengzhou Cement Waste Heat Recovery Project
PDD Version: 06
22/03/2011

Version history of the PDD

Version number	Date	Nature of revision(s)
01	23/09/2009	First Draft (GSP Version)
02	24/02/2010	Revised according to Table3 in DVR
03	05/04/2010	Construct a renewable resource power plant has been discussed in determination of baseline scenario
04	17/06/2010	E_{CEMENT} in 2008 and 2009 has be updated based on actual stats
05	11/10/2010	Table B5.1 has be revised according to DOE’s comment
05.1	19/10/2010	The emission factor will be updated annually during the whole crediting period according to the requirement of Methodology
05.2	21/01/2011	The start date of credit period has been revised.
06	22/03/2011	The EIB has been updated. The start date of credit period has been revised.

A.2. Description of the project activity:

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SDIC Xindeng Zhengzhou Cement Waste Heat Recovery (WHR) Project (hereafter -as "project activity") is located in the site of SDIC Xindeng Zhengzhou Cement Co., Ltd (hereafter as "project entity") in Qingshigou Village, Xuanhua Town, Dengfeng City, Henan Province, China. The project entity has only one 4,500 tons/day new dry process cement clinker production line present which has been put into operation since March 2008. The majority of the waste heat from the kiln is vented to atmosphere and all the electricity consumed is purchased from the Central China Power Grid (hereafter as "CCPG") in the absence of the project activity, which is the same with the baseline scenario according to the analysis in Section B.4.

The project activity will utilize these vented waste heat produced in the clinker calcination process for power generation. The project activity started construction on 11/03/2009 and will be put into formal operation on 01/06/2010. With the implementation of the project activity, a 9MW WHR power generation system will be equipped for the 4,500 tons/day new dry process cement clinker production line. The electricity generated by the project activity is 65,360 MWh per year and the electricity supplied is approximately 60,150 MWh per year which will be 100% used for the cement production. Prior to the implementation of the project activity, the whole electricity consumption of the cement plant is 72,513 MWh and 147,529 MWh in 2008 and 2009 respectively[1], the electricity fully supplied by the CCPG. So the project activity will displace an equivalent amount of electricity supplied (60,150 MWh per year) by fossil fuel based CCPG for the practical and economical reasons, thereby reducing approximately 51,299 tCO_2e per year.

The project activity will produce positive social and, environmental benefits, and contribute to the local sustainable development as follows:

- The total investment of this project activity is RMB 78.47 million[2]. The construction of this project activity will bring in related economic benefits for the local community and will provide some job opportunities for the professionals, workers and residents in the region.
- The project activity will utilize the waste heat for power generation; thereby reduce impacts of thermal pollution which will benefit the environment.
- The electricity generated from the project activity will displace an equivalent amount of electricity supplied by CCPG in the absence of the project activity, thereby significantly reducing the emission of greenhouse gases (GHGs).

[1] The monitoring records of the project entity

[2] FSR of the project activity, page 4.

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)
People's Republic of China (host Party)	SDIC Xindeng Zhengzhou Cement Co., Ltd. (state-owned entity)	No
France	ORBEO	No

For detailed information on participants in the project activity please refer to Annex 1.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party (ies):

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People's Republic of China

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

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Henan Province

A.4.1.3. City/Town/Community etc:

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Xuanhua Town, Dengfeng 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 activity is located in the site of SDIC Xindeng Zhengzhou Cement Co. Ltd., which is situated in Qingshigou Village, Xuanhua Town, Dengfeng City, Henan Province, China. The geographical coordinates of the project site are north latitude 34º23′36″ and east longitude 113º14′16″.

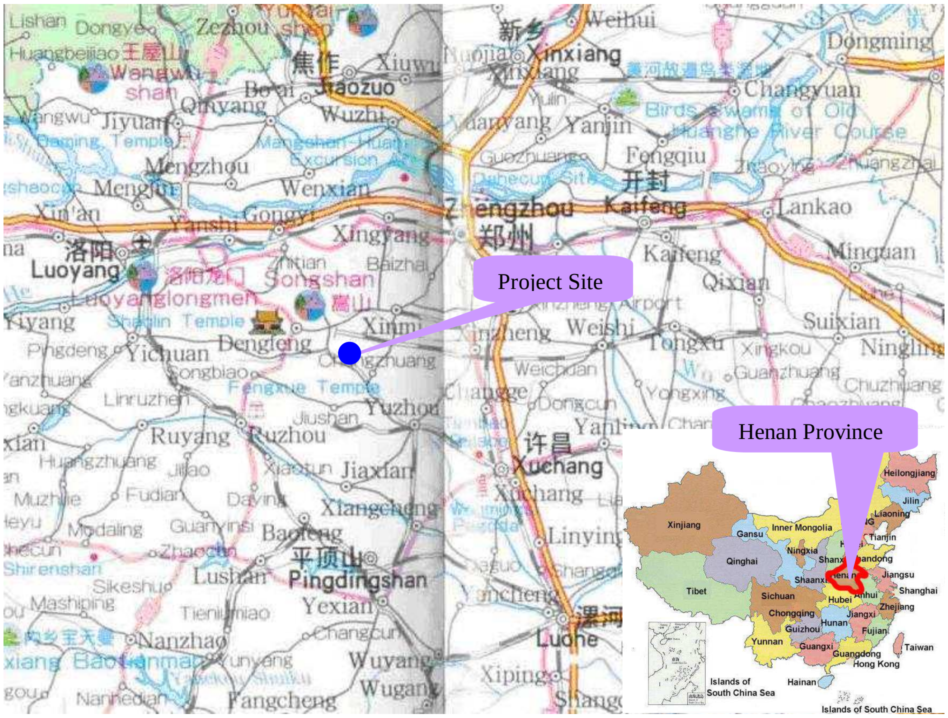

Fig.A-4-1 Site of the project activity

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

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As per the scope of the project activity defined in the 'list of sectoral scopes and approved baseline and monitoring methodologies'[3], the project activity falls under sectoral scope 1—Energy Industry and sectoral scope 4--Manufacturing Industry, specifically the cement sector.

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

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In the absence of the project activity, the electricity consumed by the clinker production lines is supplied by CCPG, the waste heat produced in the SP would be led to the conditioning tower and cooled to 220℃, then used for the drying of the raw materials and fuel after cooling down to 220℃ by conditioning tower. And the waste heat passed through Air Quenching Chamber (AQC) is vented to atmosphere.

The project will utilize the dual pressure thermal system to recovery the vented waste heat for power generation. The steam system of WHR power plant contains two parts: (1) the main steam system and (2) the low pressure steam system. The waste heat from the clinker production line will be transported to AQC and SP boilers to generate steam. High pressure overheated steam generated from the AQC (20t/h-1.6MPa-345℃) and SP (20.5t/h-1.6MPa-

[3] http://cdm.unfccc.int/DOE/scopes.html

315℃) boilers will be mixed as the main steam and be led to the steam turbine for power generation. And the low pressure overheated steam from the AQC boiler (5.9t/h-0.35MPa-190℃) will be led to the steam turbine through the supplemental steam inlet for power generation. Schematic diagram of the proposed project activity is demonstrated in Fig.A-4-2 (below). Among the whole process, no auxiliary sources fed with fossil fuel are needed, but only the electricity for the operation of auxiliary equipments which is provide by the project activity.

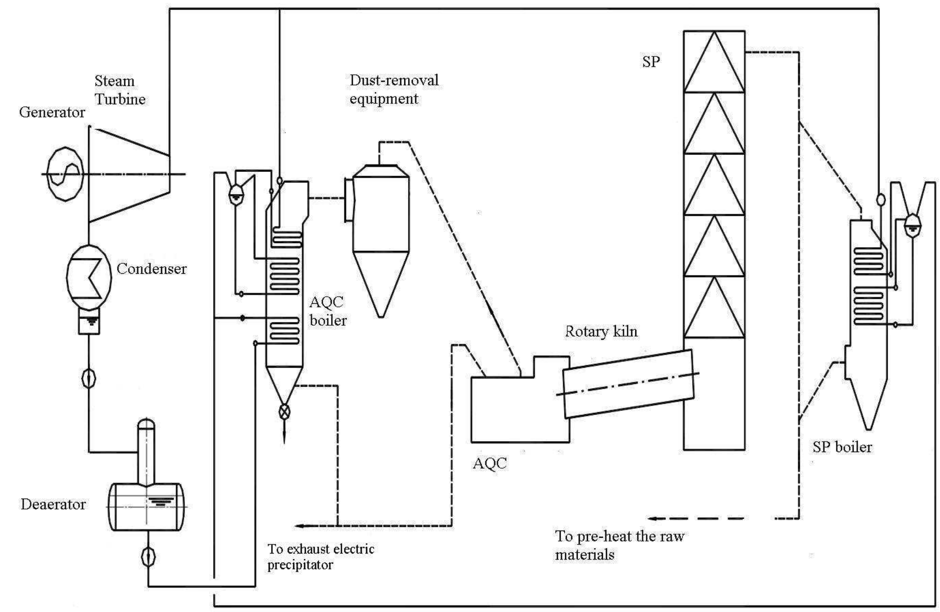

Fig.A-4-2 Schematic diagram of the proposed project activity

The project activity started construction on 11/03/2009 and will start formal operation 01/06/2010. With the implementation of the project activity, a 9MW WHR power generation system will be equipped for the 4,500 tons/d new dry process cement clinker production line. The electricity supplied by the project activity (approximately 60,150 MWh per year) will be used for the cement production. And the whole electricity consumption of the cement plant is 171,000 MWh[4].The waste heat from SP will be led to SP boiler instead of conditioning tower, and Distribution Control System (DCS) of WHR power station will control the whole process to make sure that the waste heat can be used for the drying of the input raw materials and fuel after cooled to 220℃ in the SP boiler by heat exchange.

Domestic technology and equipment are used in the project activity and no international technology transfer is involved. One AQC boiler, one SP boiler and one set of stream turbine generator will be installed to a 9MW power station. The designed lifetime of the equipment used in the project is 15 years. The overall efficiency of power generation is 21.56%. The detailed information of the equipment please refers to the table A4-1.

[4] FSR of the project activity, page 26

Table A-4-1 The specification of major equipment in the project activity

Name	Number	Technical parameter	
Generator	1	Model number: Standard power: Standard rotational speed: Output voltage:	QF-K9-2 9 MW 3,000r/min 10,500V
Steam turbine	1	Model number: Standard power: Standard rotational speed: Pressure of main steam: Temperature of main steam: Pressure of supplemental steam: Temperature of supplemental steam Exhaust pressure:	 BN9-1.6/0.35 9 MW 3,000r/min 1.5 MPa 320°C 0.25 Mpa 180°C 0.007 Mpa
SP boiler	1	Inlet exhaust gas parameter: Outlet exhaust gas temperature: Main steam parameter:	340,000 Nm^3/h-330°C 220°C 20.5t/h-1.6 Mpa- 315°C(overheat)
AQC Boiler	1	Inlet exhaust gas parameter: Outlet exhaust gas temperature: Main steam parameters: Low pressure steam parameters	240,000 Nm^3/h-360°C 96°C 20t/h-1.6Mpa-345°C (overheat) 5.9t/h-0.35Mpa-190°C

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

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The PDD adopts the fixed 10 years crediting period. The crediting period is from 01/06/2011 to 31/05/2021. The ex-ante annual emission reductions are 51,299 tCO_2e and the emission reductions in the whole crediting period are 512,990 tCO_2e.

Years	Annual estimation of emission reductions in tons of CO_2
01/06/2011~31/05/2012	29,924
01/06/2012~31/05/2013	51,299
01/06/2013~31/05/2014	51,299
01/06/2014~31/05/2015	51,299
01/06/2015~31/05/2016	51,299
01/06/2016~31/05/2017	51,299
01/06/2017~31/05/2018	51,299
01/06/2018~31/05/2019	51,299
01/06/2019~31/05/2020	51,299
01/06/2020~31/05/2021	21,375
Total estimated reductions (tons of CO_2)	512,990
Total number of crediting years	10

Annual average over the crediting period of estimated reductions (tons of CO_2)	51,299

A.4.5. Public funding of the project activity:

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No public funding from any Annex I parties are 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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The approved baseline methodology applied:

Baseline methodology for greenhouse gas reductions through waste heat recovery and utilization for power generation at cement plants – AM0024 (version 02.1)

The tools referred:

Tool to calculate the emission factor for an electricity system (version 02) and Tool for the Demonstration and Assessment of Additionality (version 05.2)

The approved monitoring methodology applied:

Monitoring methodology for greenhouse gas reductions through waste heat recovery and utilization for power generation at cement plants – AM0024 (version 02.1)

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

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

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Applicability Criteria

1) The electricity produced is used within the cement works where the proposed project activity is located and excess electricity is supplied to the grid; it is assumed that there is no electricity export to the grid in the baseline scenario (in case of existing captive power plant);

All electricity supplied by the proposed project activity will be used within the cement works. No captive power plant, prior to the implementation of the project activity, belongs to the project entity. There is no electricity exported to CCPG in the baseline scenario.

2) Electricity generated under the project activity displaces either grid electricity or from an identified specific generation source. Identified specific generation source could be either an existing captive power generation source or new generation source;

Electricity supplied by the proposed project activity will displace equivalent amount electricity imported from CCPG.

3) The grid or identified specific generation source option is clearly identifiable;

Central China Power grid is an independent power grid which is one of the six regional power grids of China[5]. The geographical scope of CCPG contains Henan Province, Hunan Province, Hubei Province, Jiangxi Province, Sichuan Province and Chongqing City, the boundary of

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[5] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/2008/200887164119674.pdf

which is clearly identifiable. Information of CCPG is reported annually in the *China Electric Power Yearbook*.

4) Waste heat is only to be used in the project activity;

Waste heat recovered from the clinker production line will be used only to generate electricity in the project activity.

5) In the baseline scenario, the recycling of waste heat is possible only within the boundary of the clinker making process.

In the baseline scenario, part of the waste heat from the back-end of the kiln will be used for the drying of raw materials after cooled down by the conditioning tower. So the recycling of waste heat is within the boundary of the clinker making process.

Non-applicability Criteria

This methodology is NOT applicable to project activities,

1) Where the current use of waste heat or the identified alternative business as usual use of waste heat is located outside of the clinker making process

Currently, the waste heat is only used within the clinker making process and there is no other alternative business as usual use of the waste heat.

2) That affect process emissions from cement plants

The clinker making process is a chemical reaction with pre-determined material inputs. The emissions would not change if the mixture ratio is fixed. The project activity only utilizes the waste heat generated by the clinker production line and will not change the mixture ratio of the raw materials. So the project activity will not affect process emissions from cement plants.

According to the above description of the project activity, the baseline methodology AM0024 (version 02.1) can be applied to this project activity.

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

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The project boundary is defined as the rotating kiln, waste heat recovery boilers (SP boiler and AQC boiler), waste heat generator unit and its auxiliary facilities and all power plants which connect with CCPG (Refers to Fig.B-3-1).

Table B-3-1: Overview of emission sources included in or excluded from the project boundary

	Source	**Gas**	Included?	**Justification/Explanation**
Baseline	Grid electricity generation	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
Project activity	On-site fossil fuel consumption due to the	CO_2	Included	Included in case of project activity does increase the energy consumption per unit in clinker production. Otherwise, the emission source excluded.

	project activity	CH_4	Excluded	Excluded for simplification. This emission source is very small.
		N_2O	Excluded	Excluded for simplification. This emission source is very small.

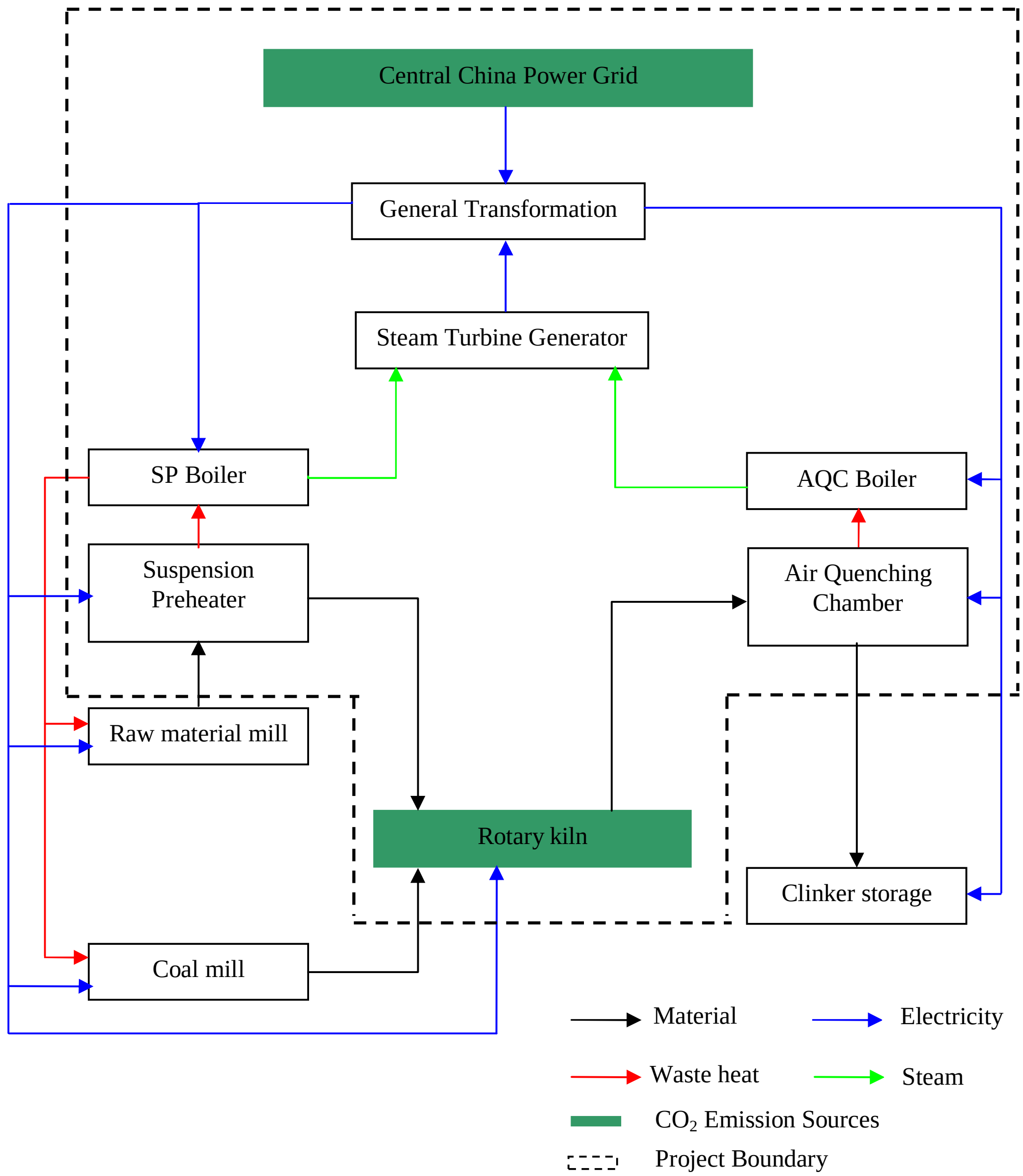

Fig.B-3-1 Schematic diagram of Project Boundary

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

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The baseline scenario for the project activity will be identified through the following steps:

Step 1: Determination of technically feasible alternatives to the project activity:

Sub-step 1.a: Identify and list, within the local context, the current business, as usual utilization of, and options technically feasible for, waste heat utilization. Include an assessment of potential use of waste heat in the cement work.

The current situation is that most of the waste heat from kilns is vented to the atmosphere and some is cooled by conditioning tower and then used in raw materials and fuels drying. This is also the normal use of waste heat in local context.

There are no other potential demands for waste heat. The project activity is located in rural area, where no residential or industrial areas around. Besides, it is not financially attractive to transmit waste heat to the urban district due to the long distance and large investment in pipe network. So it is not applicable to utilize the waste heat as resident or industry heat source and prior to the implementation of the project activity, most of the waste heat is vented to atmosphere without any utilization and only a small portion of waste heat is used in drying of raw material.

The calcination process in the kilns is a chemical reaction process and the total energy of the process is in balance, total energy entered the kilns provided by the combustion of the coal is equal to the sum of energy absorbed by the clinker and exhaust gas vented to the atmosphere. In the baseline scenario, part of the waste heat is used for drying of raw materials and fuel, and the rest is released to the atmosphere after cooling. The project activity will still provide waste heat from SP boiler for the drying of raw materials and fuels, and the so far unused waste heat will be utilized in power generation. The fuel demand remains the same under the two situations. Therefore the recovery of waste heat is within the energy balance boundary of the clinker making process and it is reflected in the specific fuel consumption of the clinker line per unit output of clinker.

Sub-step 1.b: Identify and list the source of electric energy supply for the cement plants, in the local context. The current and future situation of the electricity demand and supply to the cement plant, where the project activity is located, should be included in the CDM-PDD in order to determine what electricity supply is likely to be displaced by the project activity.

The purpose of this step is to analyze the current and future electricity supply and demand situation at Xindeng Cement Works. There is no other local loads and existing captive power plant in Xindeng plant, so the E_{load} and $EG_{ATEXIST}$ is zero.

Table B 4-1. Historical and projected electrical supply and demand at the Xindeng Cement Works over the crediting period (excluding the project activity)

Item	2008.06 ~2009.05	2009.06 ~2010.05	2010.06 ~2011.05	2011.06 ~2012.05	2012.06 ~2013.05	2013.06-2019.05

Project entity Cement Plant Annual Demand (MWh), E_{CEMENT}	125,188[6]	144,742[7]	171,000[8]	171,000	171,000	171,000
Project entity Cement Plant Annual Power Purchase from CCPG (MWh)	125,188	144,742	171,000	171,000	171,000	171,000

Table B 4-1 shows that the project entity has imported all the consumed electricity from CCPG in the absence of the project activity. The future projected demand shows that the power demand is stable. The project entity will get the demanded electricity by the following ways:

(1) Continue importing the electricity from CCPG to meet all the electricity demands;

Importing electricity from the CCPG is the current practice for the project entity. There is no any technical barrier to the project entity.

(2) Construct a WHR power plant, the electricity supplied by which will be used for the clinker production and the electricity shortage will be met through importing electricity from CCPG;

Domestic low-temperature cogeneration technology has developed to some extent. There are no technically barriers for the implementation of the project activity.

(3) Construct a fossil fuels fired power plant, the electricity supplied by which will be used for the clinker production and the electricity shortage will be met through importing electricity from CCPG.

The majority units of the CCPG are thermal power plant. A thermal power plant with same capacity as the project activity can be considered to meet the power demand of the project entity. It is a technically feasible alternative.

(4) Construct a renewable resource power plant, the electricity supplied by which will be used for the clinker production and the electricity shortage will be met through importing electricity from CCPG.

The cement plant is located in a mountainous area which lack of hydraulic resource. Wind power resource[9] and geothermal resource[10]are not sufficient in Henan Province either. Also due to the material collection and investment barrier biomass is also not been consider as an option[11]. Thus there are barriers for building a renewable resource power plant. This option could be ruled out.

Based on the above description, the technically feasible alternatives to the project activity are listed below:

Scenario 1: Proposed project activity not undertaken as a CDM project activity

The project entity may adopt 9MW waste heat recovery and utilization system for power

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6 The monitoring records of the project entity

7 The monitoring records of the project entity

8 FSR of the project activity, page 26

9 http://cwera.cma.gov.cn/upload/b_2_left_02.jpg

10 http://www.crein.org.cn/view/viewnews.aspx?id=20080410133557851

11 http://www.sdpc.gov.cn/zjgx/t20071123_174054.htm

generation without the support of the revenues from CERs.

Scenario 2: Import equivalent electricity from CCPG and vent the waste heat to atmosphere as continuation of the current situation

The project entity can continue the current practice which is to purchase all the demanded electricity from CCPG.

Scenario 3: Implementation of a new 9MW fossil fuels fired power plant

The project entity can also generate equivalent amount of power by a fossil fuels fired power plant. There are no onsite power stations for the cement production line as all power comes from the Grid. The project entity would install a 9MW thermal power station to meet the demand.

Step 2: Compliance with regulatory requirements:

Scenario 1: Proposed project activity not undertaken as a CDM project activity

Proposed project activity not undertaken as a CDM project activity is the comprehensive utilization of resources encouraged by the Chinese government[12]. This alternative is in compliance with all applicable legal and regulatory requirements.

Scenario 2: Import equivalent electricity from CCPG and vent the waste heat to atmosphere as continuation of the current situation

Importing electricity from the Grid is common practice for the Chinese cement company. And there is no regulation to constrict the waste heat releasing in the cement industry. This alternative is in compliance with all applicable legal and regulatory requirements.

Scenario 3: Implementation of a new 9MW fossil fuels fired power plant

According to State Council (2006)[13], installation of new thermal power plants of less than 135MW is prohibited. As the installed capacity of the project activity is only 9MW which is less than 135MW, the construction and operation of thermal power plant does not comply with the legal and regulatory requirements. Therefore this scenario should be excluded from the baseline scenario.

Since scenario 3 is eliminated, the project entity will continue to purchase power from CCPG or undertake the project activity without the support of CDM.

Step 3 Undertake economic analyses of all options that meets the regulatory requirements.

The following is brief economic analysis of the scenario 1 and 2. The detailed information refers to section B.5:

Scenario 1: Proposed project activity not undertaken as a CDM project activity

The investment returns of this scenario have been calculated on the basis of savings from substituting power from CCPG. According to the Feasibility Study Report of the Waster Heat Recovery Power Station, the IRR of equity investment is 7.98%, and for the detailed

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12 http://www.sdpc.gov.cn/zcfb/zcfbtz/tz2006/t20061019_89080.htm
http://www.sdpc.gov.cn/zcfb/zcfbl/l2006/t20061019_89081.htm

13 Notice on Strictly Prohibiting the Installation of Fuel-fired Generators with the Capacity of 135MW or below issued by the General Office of the State Council, decree No. 2002-6.

information please refer to **Investment Analysis** in section **B.5.**

Scenario 2: Continue venting the waste heat and importing same amount electricity as the project supplied from CCPG

In this scenario, the project entity will continue purchasing power from the CCPG and the waste heat will be released to atmosphere as in the baseline scenario. No extra investment will be required for this scenario, and no any barriers exist in smooth operation of clinker production lines.

According to the methodology AM0024 (version 02.1), "the option with the highest IRR is the baseline scenario for waste heat recovery and electricity supply to the cement works".

Therefore, the most likely baseline scenario is "**Continue venting the waste heat and importing same amount electricity as the project supplied from 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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At the beginning of 2007, the project entity did some research of WHR project in the cement companies and they found that the WHR project was not financial attractive[14]. As a cement company, the first consideration of project entity is to expand the cement production capacity and survive the serious challenges of the structural adjustment in Chinese cement industry. The project entity would not consider the project activity without the support of CDM, since it is not financial attractive.

The project entity learned CDM information in a seminar held by the Henan Provincial Construction Material Industry Association. After communication with the CDM project developer during and after the seminar, the project entity has been informed that there were WHR power generation projects in China Cement Industry registered in CDM EB and received the CERs revenues. The project entity learned that the additional benefits from CDM could make the project activity to be financial attractive. So the project entity determined to develop the project as a CDM project.

The project entity fully considered CDM from the very beginning of the project. And the actions taken by the project entity and related document are listed in table B-1.

Table B5-1 Key time point for considering the CDM

Actual/Expected Date	Project Activity	CDM Activity	Reference and comments
March 2007	Consulting other cement company which began to start the WHR project activity.		Consulting letter and related reply

[13] Consulting letter reply from other cement company and Building Material Industrial Association of Henan Province

May 2007		Consulting Building Material Industrial Association of Henan Province for how to overcome the barriers in the construction of WHR power station by CDM.	Consulting letter and related reply
26/06/2007		Attending a seminar hold by Building Material Industrial Association of Henan Province for the information of CDM	Photos and report of the seminar
08/09/2007		Board Decision to seeking CDM development	Board decision report
18/09/2007		CDM Development Agreement signed	CDM Project Development Agreement
September 2007~November 2007		Stakeholders consultancy	Questionnaire of the local stakeholders and related summary.
March 2008	Environmental Impact Assessment completed		Environmental Impact Assessment Report
18/04/2008	Environmental Impact Assessment Approved		Approval of Environmental Impact Assessment issued by Environmental Protection Agency of Zhengzhou City
October 2008		Feasibility Study Report (FSR) completed.	The design institute suggest project owner seeking for the help of CDM in FSR
27/11/2008		Feasibility Study Report (FSR) approved.	Approval of Feasibility Study Report (FSR) by Henan Development & Reform Committee. The design institute suggest project owner seeking for the help of CDM in FSR
10/12/2008	Loan Contract Signed		Short-term loan agreement with Zhengzhou Xindeng Enterprise Group Co., Ltd.

22/12/2008	Turnkey Contract Signed		Turnkey Contract.(the starting data of project activity)
11/03/2009	Construction Start Date		The report of construction start.
12/05/2009		Inform NDRC for the CDM project development	Notification form for CDM project
01/07/2009		Signed Term sheet for the forward sale and purchase of certified emission reductions with buyer	Term sheet for the forward sale and purchase of certified emission reduction
03/07/2009		Submitted to NDRC for Letter of approval	Application letter for CDM project
11/09/2009		Inform EB for the CDM project development	Prior Consideration of the CDM Form
16/09/2009		Signed ERPA.	ERPA
22/09/2009		Letter of approval recieved	Letter of approval
09/11/2009		On-site Validation	
01/06/2010	Start formal operation		Grid Connection Agreement

According to the requirements of baseline methodology AM0024 (version 02.1), the additionality of the proposed project activity shall be demonstrated and assessed using the “Tool for the demonstration and assessment of additionality” (version 05.2) agreed by the CDM Executive Board.

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

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

Based on the analysis and identification in Step 1 of Section 4, there are three possible alternatives to the project activity:

Alternative 1: Proposed project activity not undertaken as a CDM project activity;

Alternative 2: Import equivalent electricity from CCPG and vent the waste heat to atmosphere as continuation of the current situation;

Alternative 3: Implementation of a new 9MW fossil fuels fired power plant;

According to the analysis in Section B.4, all three alternatives are technically feasible alternatives.

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

As shown in section B.4, **Alternative 1, Alternative 2** are in conformity with applicable laws and regulations. And **Alternative 3** is not one credible alternative as this alternative does not

comply with 'Notice on Strictly Prohibiting the Installation of Fuel-fired Generators with the Capacity of 135MW or Below'.

Step 2 Investment analysis

Sub-step 2.a. Determine appropriate analysis method

"Tools for the demonstration and assessment of additionality" (version 05.2) suggests three analysis methods including simple cost analysis (option I), investment comparison analysis (option II) and benchmark analysis (option III). And the **Annex: Guidance on the Assessment of Investment Analysis (Version 02)** further claims that 'benchmark approach should be selected in case of the alternative to the project activity is the supply of electricity from a grid'. As the alternative to the project activity is satisfied to this criterion, Benchmark Analysis Method (Option III) is considered appropriate to assess the additionality of the project.

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

In the absence of the project activity, the total annual electricity consumption of the cement production is 171,000 MWh. Among which, 60,150 MWh (35% of the total annual electricity consumption) will be provided by the 9MW WHR power station. Thus, the benchmark of Chinese Cement Industry can be used in the investment analysis.
And based on the description of the latest edition of *Project Economic Evaluation Methods and Parameters* (Version 03), the equity investment '*IRR reflects the profitability requirement of the whole investors' equity*', '*reflects the overall level of investor equity return under a certain financing package'*, '*and is the basis for final financing decision of the investor'*. Thus the equity investment IRR (after tax) for Chinese Cement Industry (12%[15]) is selected as the indicator for the benchmark analysis of the project activity.

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

(1) Basic parameters for calculation of financial indicators

Basic parameters for calculation of financial indicators are quoted from the FSR of the project which is completed in October 2008 by China National Investment & Consulting Co., Ltd. And the FSR was approved by the Development and Reform Commission of Henan Province. The detailed information is shown in table B 5-2 (below):

Table B 5-2 Basic parameters for calculation of financial indicators

No.	Parameters	Value	Sources
1	Installed capacity	9MW	FSR
2	Average power generation capacity	8.6MW	FSR
3	Annual operation hour	7,600h	FSR
4	Overall thermal efficiency for power generation	21.56%	FSR
5	Load factor of the equipment	86.76%	FSR
6	Amount of the waste heat for power generation	$14,360\times10^4$kJ/h	FSR
7	Price of the waste heat	0	FSR

15 The Third Edition of "Project Economic Evaluation Methods and Parameters", 2006,page 74

8	Estimated annual power supply		60,150 MWh	FSR
9	Project lifetime		15 years	FSR
10	Fixed Asset value		RMB 76.31 million	FSR
11	Loan	Sum	RMB 47.80 million	FSR
		Interest value	7.83%	FSR
12	The price of purchasing electricity from CCPG		0.343 Yuan/KWh (excluded VAT)	FSR
13	Annual operational cost	Material fees	RMB 4.08 million	FSR
		Salary	RMB 1.31 million	FSR
		Repairing fees	RMB 1.84 million	FSR
		Other fees	RMB 3.07 million	FSR
		Total	RMB 10.31 million	FSR
14	Tax rate	Value added tax	17%	FSR
		Income tax	25%	FSR
		City maintenance construction tax	7% of value added tax	FSR
		Education surtax	3% of value added tax	FSR
15	Period of depreciation		15 year	FSR
16	Salvage value (Salvage value rate)		RMB 3.84 million (5%)	FSR
17	Crediting period		10 year	
18	Expected CERs price		8.0 €/tCO_2e (exchange rate: 1 €= RMB 8.79)	

(2) Comparison of IRR for the project and the financial benchmark

In accordance with benchmark analysis (Option III), if the financial indicators (such as IRR) of the project are lower than the benchmark, the project is not considered as financially attractive.

Table B 5-3 Financial indicators of the project activity

	IRR (Equity investment, Benchmark=12%)
Without CDM	7.98%
With CDM	13.38%

Table B 5-3 shows without CDM revenue the project is not financially attractive. Despite of lower returns, the project promoters have decided to invest in the project activity just to promote waste heat recovery projects keeping in mind that the CDM benefit will improve the returns.

Sub-step 2d. Sensitivity analysis

The objective of sensitivity analysis is to show whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions. The investment analysis provides a valid argument in support of additionality only if it consistently supports (for a realistic range of assumptions) the conclusion that the project activity is unlikely to be the most financially attractive or is unlikely to be financially attractive.

For the project, the following financial parameters, which are the key parameters to affect the profit of the project, were taken as uncertain factors for sensitive analysis of financial attractiveness:

(1) Construction investment

(2) Annual operational cost

(3) Electricity supplied by the project activity

(4) Electricity Tariff

When the above four financial indicators fluctuate within the range of -10% to +10%, the IRR of the project varies to different extent. The impacts to IRR by above parameters fluctuation are (not considering CERs income) seen in table B 5-4.

Table B 5-4 Sensitivity analysis of the IRR of the project activity without CDM

Fluctuation range of parameters	-10%	-5%	0	5%	10%	The IRR equal to the benchmark
Electricity supplied by the project activity	3.58%	5.93%	7.98%	9.86%	11.62%	11.08%
Annual operational cost	9.91%	8.96%	7.98%	6.96%	5.88%	-21.64%
Construction investment	10.02%	8.96%	7.98%	7.05%	6.16%	-18.50%
Electricity Tariff	3.58%	5.93%	7.98%	9.86%	11.62%	11.08%

It can be seen from table B 5-4 that even the fluctuation reaches 10%, the IRR of the Project could not reach the benchmark--- 12%.

It also can be seen from table B 5-4 that when the construction investment decreases 18.50%, the project achieve benchmark. However, it is impossible to implement the project if reducing the construction investment by at least 18.50%, due to a fact that the price index of capital goods has increased 3.1% on year-on-year basis in 2007 and has increased 7.7% on year-on-year basis in 2008[16](official statistics from National Bureau of Statistics of China) .

As indicated by the above table, the project would be taken as financially attractive when the annual O&M costs decrease 21.64%; However, the salary to the working staff increased 19.7% and 12.4% in 2008 and 2009 until September[17] (according to the official statistics from National Bureau of Statistics of China), therefore, it is unlikely to decrease the annual O&M costs by such percentage.

When annual electricity supply increases 11.08%, the project achieves benchmark, but there is no possibility to achieve this, because it would require an increase of annual operation time to at least 8442 hours or efficiency of generator to at least 11.08%, And it is impossible for project activity achieve to 8442 hours (based on the operation record of clinker production lines in 2007 and 2008) and the efficiency of generator is mainly above 90%, so it is impossible for the electricity supply to the benchmark.

If the electricity tariff increases by 11.08%, the project achieves the benchmark. For the

[16] http://www.stats.gov.cn/tjgb/ndtjgb/qgndtjgb/t20080228_402464933.htm
http://www.stats.gov.cn/tjgb/ndtjgb/qgndtjgb/t20090226_402540710.htm

[17] http://www.stats.gov.cn/tjsj/jdsj/t20090430_402556246.htm
http://www.stats.gov.cn/tjsj/jdsj/t20091113_402606680.htm

electricity tariff is under strict control of the central government in China. In order to ensure price stability for the whole country, the central government controls price of basic elements, such as electricity and commodity. Adjustment of electricity tariffs involves negotiations among several government departments and may even need to be approved by the CPC Central Committee[18]. Secondly, even the electricity tariff can increase 11.08%, the equity IRR of the project can not reach the benchmark level because the electricity tariff increasing alone is not a realistic assumption. Under the real situation, the other parameters used in the investment analysis, like investment costs and O&M costs, will also increase. The rise of electricity tariff will increase the IRR whilst the rise of O&M costs will lower them. Both parameters work against each other. And if the same inflation for the products is considered, their increase will cancel out each other. According to the statistics public by National Bureau of Statistics of China[19], the growth rate in other costs will definitely escalate faster than electricity tariff as electricity tariff is under the intervention of the Chinese Central government.

Therefore, the project activity is still lack of financial attraction.

In conclusion, without CERs revenues, the project is not economically attractive.

Step 3: Barrier analysis

The barrier analysis will not be adopted in this PDD.

Step 4 Common Practice Analyses

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

As the project activity is located in Henan Province, The production and sales of cement are usually limited by region. The price of cement product, the receptivity of the region, the price of raw material, the salary of working staff and taxes of the project are all similar for all the projects in Henan province. Then Henan Province will be selected for the geographical area.

According China Cement Industry Association[20] , there are 50sets of new dry process cement clinker production lines in Henan Province and 10 of them are equipping or have equipped WHR power plant by the end of 2007. All of 10 projects shares the same WHR technology and have similar size.

Of which, the WHR projects of Zhumadian Yulong Tongli Cement Co., Ltd.[21], Xinxiang Pingyuan Tongli Cement Co., Ltd.[22], Luoyang Huanghe Tongli Cement Co., Ltd.[23], Henan Yuhe Tongli Cement Co., Ltd.[24], Henan Xichuan Cement Co., Ltd.[25] and Henan Baofeng

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[18] Interim Provisions for the Administration of Power Selling Prices, China NDRC, March 28, 2005.

[19] http://www.stats.gov.cn/tjsj/ndsj/2009/indexch.htm

[20] China Cement Industry Association published the data of new dry process cement clinker production lines in 2007. The refer website is below,
http://www.cnrmc.com/news/list.asp?id=38768

[21] http://cdm.unfccc.int/Projects/DB/TUEV-SUED1203344226.45/view

[22] http://cdm.unfccc.int/Projects/DB/TUEV-SUED1203346530.12/view

[23] http://cdm.unfccc.int/Projects/DB/TUEV-SUED1203342601.93/view

[24] http://cdm.unfccc.int/Projects/DB/TUEV-SUED1203325077.19/view

County Cement Co., Ltd.[26] have been registered as CDM project. And the WHR projects of Tianrui Group Cement Co., Ltd.[27], Tianrui Group Ruzhou Cement Co., Ltd.[28], Weihui City Tianrui Cement Co., Ltd.[29], and Henan Jinrong Cement Co., Ltd.[30] faced the same barriers as mentioned in Sub-step 4.a., and have been seeking for the help of CDM.

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

There is not any other waste heat recovery project activity been in construction or operation in Henan Province, China without the help of CDM.

Based on the above information, project activities similar to the proposed project activity can only be implemented with the help of the CDM support. The project activity is not the common practice in Henan Province.

The project activity is additional.

B.6. Emission reductions:

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B.6.1. Explanation of methodological choices:

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According to the approved consolidated baseline methodology AM0024 (version 02.1), the emission reductions of the project activity are calculated as below:

Step 1 Determination of baseline emissions:

Sub-Step 1.a Formula for calculation of baseline emissions

The electricity supplied by the project activity will be used for the cement production, which would be imported from CCPG in the baseline scenario. According to methodology AM0024 (version 02.1), the calculation formulas of baseline emission express as bellow:

$$EB_y = EG_{CP,y} * EF_{Grid,y} \quad \text{(B. 6-1)}$$

Where:

EB_y	are the baseline emissions in year y, expressed in tCO_2e.
$EG_{CP,y}$	is the electricity supplied from the project activity to the cement plant, expressed in MWh;
$EF_{Grid,y}$	is the emission factor of the baseline electricity supply source—CCPG, expressed as tCO_2e / MWh.

Sub-Step 1.b Calculation of Emission Factor of the CCPG

[25] http://cdm.unfccc.int/Projects/DB/DNV-CUK1204744113.55/view

[26] http://cdm.unfccc.int/Projects/DB/DNV-CUK1204739530.8/view

[27] http://cdm.unfccc.int/Projects/Validation/DB/8GT9VD7GHLUB17MW7O4ETNXD5AZL77/view.html

[28] http://cdm.unfccc.int/Projects/Validation/DB/1J1UIJ1VY8ZTJT815W9KPYJ64U7GBL/view.html

[29] http://cdm.unfccc.int/Projects/Validation/DB/8G1ZB5U9D8X43O3C750557R6G650KZ/view.html

[30] http://cdm.unfccc.int/Projects/Validation/DB/1FPCMWTI7YTDLFOXK35O73L1KTS42J/view.html

The baseline grid emission factor ($EF_{Grid,y}$) is calculated as the simple average of the operating margin emission factor ($EF_{OM,y}$) and the build margin emission factor ($EF_{BM,y}$) of CCPG. In accordance with "Tool to calculate the emission factor for an electricity system" (version 02), the baseline emission factor should be calculated as described below:

Sub-Step 1.b.1 Identify the relevant electric power system

The project entity would import electricity from CCPG in the absence of the project activity. CCPG is an independent power grid which boundary can be clearly identified.

Sub-Step 1.b.2 Choose whether to include off-grid power plants in the project electricity system

According to the "Tool to calculate the emission factor for an electricity system" (version 02), project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

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

Option II: Both grid power plants and off-grid power plants are included in the calculation.

The Central China Power Grid chosen in this project does not include any off-grid power plants in its electricity system. Hence only grid power plants are included in the calculation.

Sub-Step 1.b.3 Select an operating margin (OM) method

Tool to calculate the emission factor for an electricity system (version 02) provides four methods to calculate the operating margin emission factor.

(a) Simple OM; or

(b) Simple adjusted OM, or

(c) Dispatch data analysis OM, or

(d) Average OM.

Method (a) Simple OM has been chosen for the calculation of the operation margin emission factor of CCPG, since the low-cost/must run resources constitute less than 50% of total electricity generations in 2003-2007 of CCPG. The detailed information refers to annex 3.

Sub-Step 1.b.4 Calculate the operating margin emission factor according to the selected method

In accordance with "Tool to calculate the emission factor for an electricity system" (version 02), the simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units. It may be calculated:

- Based on data net electricity generation and a CO2 emission factor of each power unit (Option A), or
- Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system (Option B)，

Option B can only be used if:

(a) The necessary data for Option A is not available; and

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

(c) Off-grid power plants are not included in the calculation (i.e. if Option I has been chosen in sub-step 1-2).

As the data of the net electricity generation, fuel consumption and fuel type for every plant of the power grid are not public available, Option B is used for OM calculation. And 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:

$$EF_{grid,OM,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y} \qquad \text{(B. 6-2)}$$

Where:

$EF_{grid,OM,y}$	Simple operating margin CO_2 emission factor in year y (tCO_2e/MWh);
$FC_{i,y}$	Amount of fossil fuel type i consumed in CCPG in year y (mass or volume unit);
$NCV_{i,y}$	Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit);
$EF_{CO2,i,y}$	CO_2 emission factor of fossil fuel type i in year y (tCO_2e/GJ);
EG_y	Net electricity generated and delivered to the grid by all power sources serving CCPG, not including low-cost / must-run power plants / units, in year y (MWh);
i	All fossil fuel types combusted in power sources in CCPG 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 (ex ante option).

Based on the official statistical data[31], CCPG net imported some power from Northwest China Power Grid (hereafter refers to "NCPG") in 2006 and 2007. According to Tool to calculate the emission factor for an electricity system (version 02), power dispatching between regional power grids should be considered in the calculation of the operating margin emission factor. The electricity imported from NCPG and emissions CO_2 generated during this power generation are fully considered in the calculation of the operating margin emission factor.

The OM emission factor of CCPG has been calculated as 1.1255 tCO_2e/MWh, details please refer to Annex 3. The ex-ante calculated OM emission factor will be used to estimate the emission reductions. The OM emission factor will be updated yearly according to the newest NDRC stats available during the whole crediting period.

Sub-Step 1.b.5 Identify the cohort of power units to be included in the build margin (BM)

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

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

[31] Electricity Industry Statistic Data Abstract 2006

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

Project participants should use the set of power units that comprises the larger annual generation.

As a general guidance, a power unit is considered to have been built at the date when it started to supply electricity to the grid.

Power plant registered as CDM project activities should be excluded from the sample group m. However, if group of power units, not registered as CDM project activity, identified for estimating the build margin emission factor includes power unit(s) that is (are) built more than 10 years ago then:

(i) exclude power unit(s) that is (are) built more than 10 years ago from the group; and

(ii) include grid connected power projects registered as CDM project activities, which are dispatched by dispatching authority to the electricity system.

Capacity additions from retrofits of power plants should not be included in the calculation of the build margin emission factor.

In terms of vintage of data, project participants can choose between one of the following two options:

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.

Option 2 For the first crediting period, the build margin emission factor shall be updated annually, ex-post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex-ante, as described in option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

Option 2 has been chosen for calculation of the build margin emission factor. But ex-ante build margin emission factor will be used to estimate the emission reductions. The BM emission factor will be updated yearly according to the newest NDRC stats available during the whole crediting period.

Sub-Step 1.b.6 Calculate the Build Margin Emission Factor

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

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad \text{(B. 6-3)}$$

Where:

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

As per the clarifications are given by EB, the project activity can:

1) Use of capacity additions during last 1-3 years for estimating the build margin emission factor for grid electricity.

2) Use of weights estimated using installed capacity in place of annual electricity generation to calculate BM emission coefficient.

3) Use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy, for each fuel type in estimating the fuel consumption.

As the limit of data obtained for calculation the proportion of Coal-fired, Gas-fired and oil-fired power capacity to the total power capacity in CCPG, this PDD will adopt the following method to calculate BM emission factor:

(a) Use the data of fuel consumption in the latest year to calculate the proportion of the GHGs emissions of Coal-fired, Oil-fired and Gas-fired resources to the total GHGs emissions, the proportion is given by:

$$\lambda_{Coal} = \frac{\sum_{i \in COAL} F_{i,y} \times COEF_i}{\sum_i F_{i,y} \times COEF_i}$$

$$\lambda_{Oil} = \frac{\sum_{I \in oil} F_{i,y} \times COEF_i}{\sum_i F_{i,y} \times COEF_i}$$

$$\lambda_{Gas} = \frac{\sum_{i \in GAS} F_{i,y} \times COEF_i}{\sum_i F_{i,y} \times COEF_i} \quad \text{(B. 6-4)}$$

Where:

$F_{i,y}$	is the amount of fuel *i* (in tce) consumed in CCPG in year *y*;
$COEF_{i,y}$	is the CO_2 emission coefficient of fuel *i* (tCO_2e / mass or volume unit of the fuel), taking into account the carbon content of the fuels used by CCPG and the

percent oxidation of the fuel in year *y*.

(b) Use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy, for each fuel type in estimating the fuel consumption, and the above data to calculate the emission factor of thermal power.

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} \qquad \text{(B. 6-5)}$$

Where $EF_{Coal,Adv}$, $EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ represent the emission factor of efficiency level of Coal-fired, Oil-fired and Gas-fired respectively of the best technology commercially available respectively.

(c) Use the data obtained in (b) and the increased percentages of thermal power to calculate Build Margin emission factor of CCPG.

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

Where:

CAP_{Total}	is the total newly added capacity of power capacity;
$CAP_{Thermal}$	i is the newly added capacity of thermal power.

The BM emission factor of CCPG has been calculated as 0.5802 tCO_2e/MWh, details please refer to Annex 3. The ex-ante calculated BM emission factor will be used to estimate the emission reductions. The BM emission factor will be updated yearly according to the newest NDRC stats available during the whole crediting period.

Sub-Step 1.b.7: Calculate of combined margin emissions factor

The combined margin emissions factor is calculated as follows:

$$EF_{grid,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \qquad \text{(B. 6-7)}$$

Where:

$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year *y* (tCO_2e/MWh);
$EF_{grid,OM,y}$	Operating margin CO_2 emission factor in year *y* (tCO_2e/MWh);
w_{OM}	Weighting of operating margin emission factor;
w_{BM}	Weighting of build margin emission factor;

The weighted w_{OM} and w_{BM}, by default, are 50%, will used to calculate the combined margin emissions factor of CCPG in the fixed crediting period. The detailed calculation process refers to annex 3.

Step 2 Determination of Project Emissions

Project emission (PE_y) is the difference in CO_2 emissions from use of fossil fuel in the clinker making process in cement manufacturing unit, where the project is being implemented, before and after the project implementation. And it is determined as follows:

$$PE_y = (EI_{P,y} - EI_B) * O_{clinker,y} * COEF_{fuel,y} \quad \text{(B. 6-8)}$$

Where:

PE_y is project emissions generated by project activity;

$EI_{P,y}$ is the ex-post energy consumption per unit output of clinker for given year, y, in TJ/ton of clinker produced;

EI_B is the pre-project energy consumption per unit output of clinker in TJ/ton of clinker produced (i.e. measured before the Project activity goes into operation);

$O_{clinker,y}$ is the clinker output of the cement works in a given year y;

$COEF_{fuel,y}$ is the carbon coefficient (tCO_2e / TJ of input fuel) of the fuel used in the cement works in year y to raise the necessary heat for clinker production;

$$EI_B = \frac{F_B}{O_{clinker,B}} \quad \text{(B. 6-9)}$$

Where:

F_B is average annual energy consumption, expressed in TJ, of clinker making process prior to the start of operation of the project activity. At least one full year of data should be used.

If a year's worth of pre-project activity data is not available, then the project developer should outline the plan for ensuring conservativeness based on a combination of the ex-ante design estimate of energy consumption plus available measured data.

$O_{clinker,B}$ is average annual output, expressed in tonnes, of clinker prior to the start of operation of the project activity. At least one full year of data should be used. The data will be monitored, recorded and saved by project entity Cement Works;

$$EI_{P,y} = \frac{F_{P,y}}{O_{clinker,y}} \quad \text{(B. 6-10)}$$

Where:

$F_{P,y}$ is monitored annual energy consumption in a year y, expressed in TJ, of clinker making process;

$O_{clinker,y}$ is monitored annual output, expressed in a year y, in tones of clinker;

According to the operation practice of the project entity, the energy consumption (F) in the calcinations process can not be directly monitored. The project entity monitors the quantity of the fuel consumed in the calcinations process (FC_{fuel}) and the net calorific value of the fuel (NCV_{fuel}), and uses the equal $F = FC_{fuel} * NCV_{fuel}$ to calculate the energy consumption in the calcinations process. And it is the common practice in Chinese Cement Industry.

Furthermore, the project entity will not directly monitor the CO_2 emission factor of the fuel.

The common practice is monitoring the carbon content (C%), and calculating the CO_2 emission factor of the fuel follow the equation $EF_{CO2,fuel,y} = C\% * 44/12$. It is assumed that all carbon content in the fuel are fully transferred to CO_2 after burning.

$$COEF_{fuel,y} = EF_{CO2,fuel,y} / NCV_{fuel,y} \quad \text{(B. 6-11)}$$

Where:

$NCV_{fuel,y}$	is the net calorific value (energy content) per mass or volume unit of a fuel used in clinker making process in year y;
$EF_{CO2,fuel,y}$	is the CO_2 emission factor per unit of energy of the fuel used in year y, expressed as tCO_2e per unit mass or volume unit;

The monitoring records (June 2008 to May 2010) of the clinker output, fuel consumption, the net calorific value (NCV) and carbon content of the fuel are used for calculating the energy consumption per unit output of clinker (EI_B).

The project activity has been designed without any influence to the clinker production, and the project entity claimed that no more emissions will be occurred with the implementation of the project activity, then the PDD has adopted $EI_{P,y} = EI_B$ for calculation project emissions. But the ex-post energy consumption per unit output of clinker and project emissions will be updated according to the actual practice.

Step 3 Determination of Leakage

The project activity could lead to the following leakages: construction and fuel handling. But the methodology considers that corresponding emissions are negligible and can therefore be ignored.

Step 4 Determination of Emission Reductions

Emission reductions due to the project activity during year y are calculated as follows:

$$ER_y = EB_y - PE_y \quad \text{(B. 6-12)}$$

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

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Data / Parameter:	E_{CEMENT}
Data unit:	MWh
Description:	Electricity consumption of Xindeng cement works in (June 2008 to May 2010)
Source of data used:	Monitoring records of the project entity
Value applied:	Refer to Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Measured on-site by the electricity meter
Any comment:	

Data / Parameter:	Installed capacity of CCPG
Data unit:	MW
Description:	Installed capacity of CCPG in 2005-2007
Source of data used:	*China Electric Power Yearbook* (2006-2008)
Value applied:	Refer to Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Deriving from official statistical data
Any comment:	To calculate the Build Margin emission factor

Data / Parameter:	EG_{GEN}
Data unit:	GWh
Description:	Power generation from CCPG in 2005-2007 and Power Generation from NCPG in 2006 and 2007.
Source of data used:	*China Electric Power Yearbook* (2006-2008)
Value applied:	Refer to Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Deriving from official statistical data
Any comment:	To calculate percent of low-cost/must run resources to total amount of grid power generation and Operation Margin emission factor

Data / Parameter:	Thermal power plant self-use rate
Data unit:	%
Description:	Thermal power plant self-use rate of CCPG in 2005-2007
Source of data used:	*China Electric Power Yearbook* (2006-2008)
Value applied:	Refer to Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Deriving from official statistical data
Any comment:	To calculate Operation Margin emission factor

Data / Parameter:	Power plant self-use rate
Data unit:	%
Description:	Power plant self-use rate of NCPG in 2006 and 2007
Source of data used:	*China Electric Power Yearbook* (2007, 2008)
Value applied:	Refer to Annex 3

Justification of the choice of data or description of measurement methods and procedures actually applied :	Deriving from official statistical data
Any comment:	To calculate Operation Margin emission factor

Data / Parameter:	$FC_{i,y}$
Data unit:	10^4t or 10^8m^3
Description:	Amount of fuels consumed by the power sources delivering electricity to CCPG (2005-2007) and NCPG (2006 and 2007)
Source of data used:	*China Energy Statistical Yearbook* (2006-2008)
Value applied:	Refer to Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Deriving from official statistical data
Any comment:	To calculate the Operation Margin emission factor

Data / Parameter:	$NCV_{i,y}$
Data unit:	TJ/10^4t, 10^8m^3, 10^4tce
Description:	It is the net calorific value (energy content) per mass or volume unit of the fuel consumed by the power sources delivering electricity to CCPG and NCPG.
Source of data used:	*China Energy Statistical Yearbook* 2008
Value applied:	Refer to Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Deriving from official statistical data
Any comment:	To calculate the Operation Margin emission factor

Data / Parameter:	$EF_{CO2,i}$
Data unit:	T_{CO2}/GJ
Description:	CO_2 emission factor of the fuel consumed by the power sources delivering electricity to CCPG and NCPG.
Source of data used:	*2006 IPCC Guidelines*
Value applied:	Refer to Annex 3
Justification of the choice of data or description of	Default values

measurement methods and procedures actually applied :	
Any comment:	To calculate the Operation Margin emission factor

Data / Parameter:	η
Data unit:	%
Description:	The commercial optimized efficiency of China thermal power generation
Source of data used:	Reported by China national development and reform committee
Value applied:	Refer to Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Deriving from official statistical data
Any comment:	

Data / Parameter:	F_B
Data unit:	TJ
Description:	Average annual energy (fuel) consumption of clinker making process prior to project implementation.
Source of data used:	Monitoring records (June 2008 to May 2010)
Value applied:	5,439,043
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated based on the monitoring records, calibrate the equipments periodically and crosscheck with the value in the invoice of the coal.
Any comment:	The annual energy consumption will be calculated by formula: $F_B = FC_{fuel,B} \times NCV_{fuel,B}$. $FC_{fuel,B}$ refers to annual weight flow of the fuel which is monitored by electronic scales and crosschecked by the invoice of the coal.

Data / Parameter:	$O_{clinker,B}$
Data unit:	Ton
Description:	Average annual production of clinker in the baseline scenario.
Source of data used:	Monitoring records (June 2008 to May 2010)
Value applied:	1,536,080
Justification of the choice of data or description of measurement methods	Weighbridge is used for monitoring the clinker output, calibrate the equipments periodically and crosscheck with the value calculated by the consumption of the raw materials.

and procedures actually applied :	
Any comment:	For details, see description reported in the "monitoring of the clinker production" in the Monitoring Plan (Section B.7.2 of the PDD)

Data / Parameter:	EI_B
Data unit:	GJ/ton clinker
Description:	The energy consumption per unit output of the clinker of the clinker production line in the baseline scenario.
Source of data used:	Monitoring records (June 2008 to May 2010)
Value applied:	3.5408
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated value based on the monitoring record of the project entity.
Any comment:	

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

>>

The emission reductions of the project activity will be calculated ex-ante as:

Step 6.3-1 Estimate baseline emissions

The baseline emission is ex-ante estimated as:

$$EB_y = EG_{CP,y} * EF_{Grid,y}$$

As the baseline emission factor ($EF_{grid,y}$) is 0.85285 tCO_2e/MWh, the annual electricity displaced by the project activity ($EG_{CP,y}$) is 60,150 MWh (based on the FSR), then the annual baseline emissions of the project activity (EB_y) are 51,299 tCO_2e.

Step 6.3-2 Estimate of project emissions

The project emission is ex-ante estimated as:

$$PE_y = (EI_{P,y} - EI_B) * O_{clinker,y} * COEF_{fuel,y}$$

The PDD assumed that $EI_{P,y}$ is equal with EI_B for conservation. Therefore the ex-ante project emission is zero.

Step 6.3-3 Estimate leakage

As per AM0024 (version 02.1), the corresponding emissions are negligible and can therefore be ignored.

Step 6.3-4 Estimate emission reductions of the project activity

The emission reduction of the project activity in the proposed year *y* is the difference between the baseline emission (EB_y) and the project emission (PE_y).

$ER_y = EB_y - PE_y$ =51,299-0=51,299 tCO_2e

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

>>

The PDD adopts the fixed crediting period. The crediting period is from 01/06/2011 to 31/05/2021. The ex-ante annual emission reductions are 51,299 tCO_2e and the emission reductions in the whole crediting period are 512,990 tCO_2e.

Year(month)	Estimation of project activity emissions (tons of CO_2e)	Estimation of baseline emissions (tons of CO_2e)	Estimation of leakage (tons of CO_2e)	Estimation of overall emission reductions (tons of CO_2e)
01/06/2011~31/05/2012	0	29,924	0	29,924
01/06/2012~31/05/2013	0	51,299	0	51,299
01/06/2013~31/05/2014	0	51,299	0	51,299
01/06/2014~31/05/2015	0	51,299	0	51,299
01/06/2015~31/05/2016	0	51,299	0	51,299
01/06/2016~31/05/2017	0	51,299	0	51,299
01/06/2017~31/05/2018	0	51,299	0	51,299
01/06/2018~31/05/2019	0	51,299	0	51,299
01/06/2019~31/05/2020	0	51,299	0	51,299
01/06/2020~31/05/2021	0	51,299	0	21,375
Total (tCO_2e)	0	512,990	0	512,990

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

>>

B.7.1. Data and parameters monitored:

>>

Data / Parameter:	$NCV_{fuel,y}$
Data unit:	$TJ/10^4$ton
Description:	Net Calorific Value of coal used in the 4,500t/d clinker production line in the year *y*.
Source of data to be used:	Monitoring records of project entity
Value of data applied for the purpose of calculating expected emission reductions in section B.5	None
Description of measurement methods and	Measured by the calorimeter, the calorimeter will be calibrated by the project owner according to the GB/T212-2001 of China.

procedures to be applied:	
QA/QC procedures to be applied:	Calibrate the equipments periodically and crosscheck with the value in the invoice of the coal.
Any comment:	For calculating the annual energy consumption. The calculation formula is $F_{P,y} = FC_{fuel,y} \times NCV_{fuel,y}$

Data / Parameter:	$F_{P,y}$
Data unit:	TJ
Description:	Annual energy (fuel) consumption of the clinker making process in the project year y.
Source of data to be used:	Monitoring records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	None
Description of measurement methods and procedures to be applied:	Calculated based on the monitoring records
QA/QC procedures to be applied:	Calibrate the equipments periodically and crosscheck with the value in the invoice of the coal.
Any comment:	The annual energy consumption will be calculated by formula: $F_{P,y} = FC_{fuel,y} \times NCV_{fuel,y}$. $FC_{fuel,y}$ refers to annual weight flow of the fuel.

Data / Parameter:	$EF_{CO2,fuel,y}$
Data unit:	tCO_2e/unit mass or volume
Description:	Emission factor of fuel used in clinker production.
Source of data to be used:	Monitoring records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	None
Description of measurement methods and procedures to be applied:	Calculated based on the monitoring records.
QA/QC procedures to be applied:	Calibrate the equipments periodically and crosscheck with the value in the invoice of the coal.
Any comment:	The project entity will not directly monitor the CO_2 emission factor of the fuel. The common practice is monitoring the carbon content (C%), and calculating the CO_2 emission factor of the fuel by the equal $EF_{CO2,fuel,y} = C\% * 44/12$ with the assumption that all carbon content in the fuel are fully transferred to CO_2 after burning.

Data / Parameter:	$O_{clinker,y}$

Data unit:	Ton
Description:	Average annual production of clinker after project implementation
Source of data to be used:	Monitoring records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	None
Description of measurement methods and procedures to be applied:	Weighbridge is used for monitoring the clinker output. Weighbridge will be calibrated at least once a year
QA/QC procedures to be applied:	Calibrate the equipments periodically and crosscheck with the value calculated by the consumption of the raw materials
Any comment:	

Data / Parameter:	$EG_{CP,y}$
Data unit:	MWh
Description:	Quantity of electricity supplied by the 9MW power plant in the year y
Source of data to be used:	Monitoring record
Value of data applied for the purpose of calculating expected emission reductions in section B.5	60,150
Description of measurement methods and procedures to be applied:	Monitored by electricity meter
QA/QC procedures to be applied:	Calibrate the meter periodically and crosscheck with the value monitored by DCS
Any comment:	

Data / Parameter:	$EF_{Elec,y}$
Data unit:	tCO_2/MWh
Description:	Emission factor of electricity displaced by project implementation
Source of data to be used:	National Development and Reform Committee
Value of data applied for the purpose of calculating expected emission reductions in section B.5	None
Description of measurement methods and procedures to be applied:	Calculated based on newest NDRC stat available
QA/QC procedures to be applied:	Calculated based on newest NDRC stat available
Any comment:	After the implementation of the project activity, electricity from grid will be displaced,

	$EF_{Elec,y} = EF_{grid,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$

B.7.2. Description of the monitoring plan:

>>

The monitoring methodology was designed as required by AM0024 (version 02.1).

1. Monitoring parameters

According to the monitoring methodology AM0024 (version 02.1), the PDD ex-ante calculates the baseline emission factor for estimation of emission reductions and the emission factor will be updated in the whole crediting period yearly based on newest available NDRC stats. The main monitoring parameters are described below. The annual emission reductions will be calculated by the monitoring data of these parameters.

The main contents of the monitoring:

- $EG_{CP,y}$ Quantity of electricity supplied to cement plant;
- $O_{clinker,y}$ Annual production of clinker after project implementation;
- $F_{P,y}$ Annual fuel consumption of clinker making process after project implementation;
- $NCV_{fuel,y}$ Calorific Value of fuel used in Clinker Production lines;
- $EF_{CO2,fuel,y}$ Emission factor of fuel used in Clinker production.
- $EF_{Elec,y}$ Emission factor of electricity displaced by project implementation

The Consumption ($Q_{fuel,y}$) and Calorific Value of fuel ($NCV_{fuel,y}$) will be measured and used to calculate $F_{P,y}$ as below:

$$F_{P,y} = Q_{fuel,y} \times NCV_{fuel,y}$$

The carbon content of fuel ($EF_{C,fuel,y}$) will be measured and used to calculate $EF_{CO2,fuel,y}$ as below:

$$EF_{CO2,fuel,y} = EF_{C,fuel,y} \times 44/12$$

After the implementation of the project activity, electricity from grid will be displaced, thus $EF_{Elec,y}$ will be monitored according to the newest NDRC stats of emission factor available.

PE_y and EI_B are calculated according to the equation B.6-8 and B.6-9 by the parameters monitored above.

2. Monitoring management system

According to the operational characteristic of the WHR power pant, the project entity has already set up a monitoring management system for the power station. The following is an illustration of the management structure:

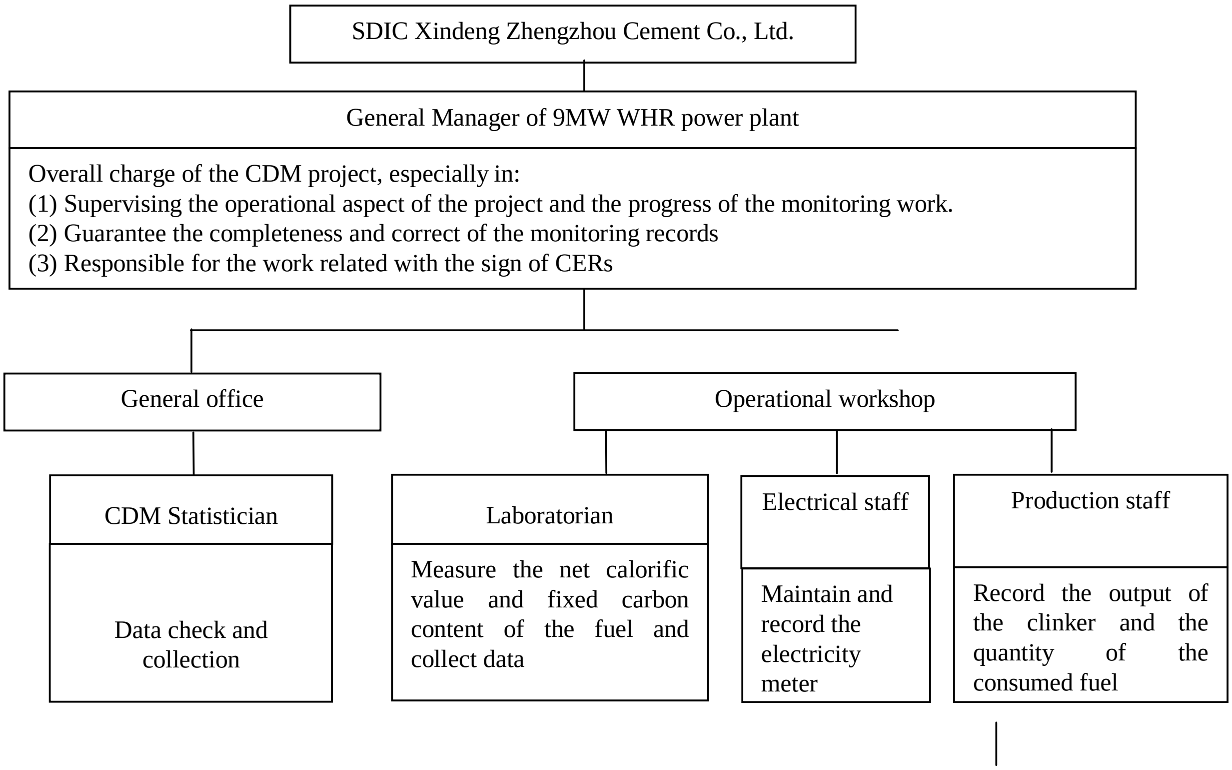

Figure B-7-1 The management structure of 9MW WHR power plant of project entity

3. Installation of monitoring equipments

Six bi-directional electricity meters (M1, M2, M3, M4, M5, M6 with an accuracy of class 0.2 and 0.2S to measure electricity generation and supply.) will be used to monitor the power supplied to the cement production line. Before the implementation of the power plant, a qualified entity will inspect and insure the correct installation of these meters. Meter M1 are used to measure gross electricity generation installed in the central control room. Meter M2, M3, M4 and M5 are used to measure the self-consumed electricity which will be installed in the power room. Meter M6 is used to measure net electricity supply also installed in the central control room. All electricity meters keep running all the time. Meter M1, M2, M3, M4, M5 are also used as backup system for the monitoring of net electricity supply which are monitored by main meter M6. The net electricity supply can be calculated as self-consumed electricity subtracts from gross electricity generation using data from Meter M1, M2, M3, M4, M5 if the main meter M6 which measure net electricity supply are out of function. Please see Fig.B.7.2.1 the simplified electrical diagram.

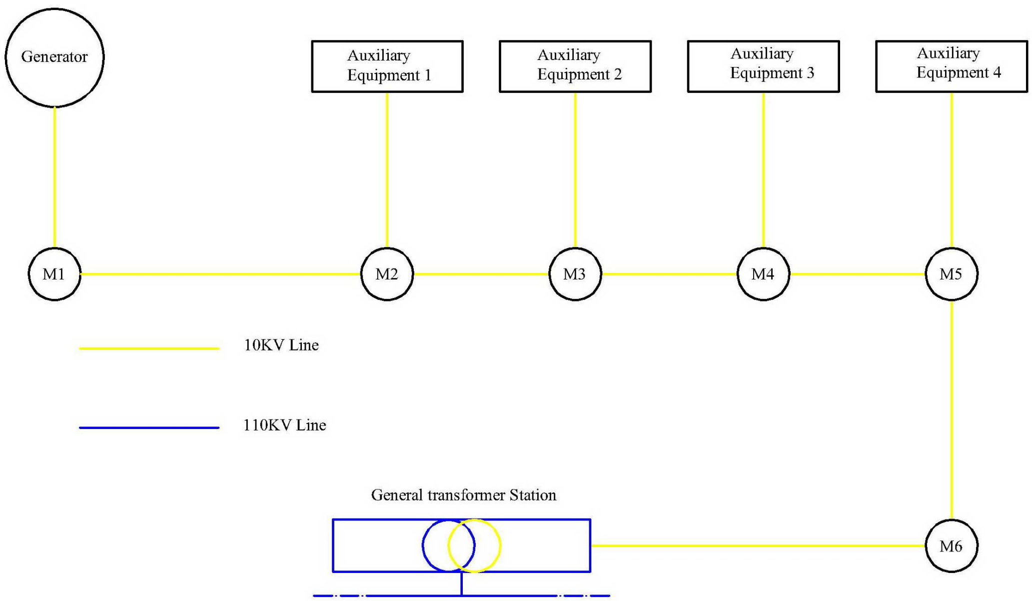

Fig.B.7.2.1 the simplified electrical diagram

The quantity of fuel consumption and clinker production will be measured by motor truck scale with an accuracy of class Ⅲ; The net calorific value of the consumed fuel is measured by the calorimeter with an accuracy of less than 0.2％and the fixed carbon content of the consumed fuel is measured according to the standard method: GB/T212-2001 of China.

4. Collection of the data and Calculation of related parameters

4.1 Monitoring of electricity

- The net electricity supply, the gross electricity generation as well as the self-consumed electricity will be continuously monitored by the electricity meters. And reading of the meters will be recorded once for every eight hours manually.
- The monitoring data from main meter M6 will be used for the emission reductions calculation, and monitoring data from other meters (M1-M5) will be used as backup.
- The project entity canonically fills the monthly reports of the power plant according to the records.
- For the verification of the emission reductions, the project entity provides the monthly reports of the power plant to DOE.

4.2 Monitoring of the clinker production

- The fuel (wet) consumed in the calcination process will be continuously monitored by weighbridge.

- The production of clinker will be continuously monitored by weighbridge. The production of clinker is determined by the equation below[32]:

$O_{clinker,y} = O_{clincker\ closing\ stock,y} - O_{clincker\ opening\ stock,y} + O_{clinker\ sales,y}$
$O_{clincker\ sales,y}$ is clinker sales in year y
$O_{clincker\ closing\ stock,y}$ is the amount of clinker in the storage at the end of year y
$O_{clincker\ opening\ stock,y}$ is the amount of clinker in the storage at the begin of year y
In which: $O_{clinker\ sales,y}$ is measured by weighbridge continuously, the amount of clinker in the storage is measured by weighbridge periodically(less than one year, e.g. half year), so $O_{clincker\ closing\ stock,y}$ *and* $O_{clincker\ opening\ stock,y}$ are determined by measure the amount of clinker in the storage.

- The project entity monitors the net calorific value and the fixed carbon content of the fuel according to the laboratory reports. The net calorific value and the fixed carbon content of the fuel are continuously monitored and monthly recorded,
- All monitor data will be recorded manually or electronically.

5. Maintenance and calibration of the monitoring equipments

5.1 Maintenance and calibration of the electricity meters

Instruments should be calibrated at least once a year to ensure the reliability of the system and the accuracy of the readings to ensure that error must be controlled under the permitted error range of the monitoring meters. The calibration will be carried out following the national standard (JJG596-1999) by an independent entity (Zhengzhou Bureau of Quality and Technical Supervision). The relevant instruments should be calibrated, repaired and replaced if the reading error of instruments exceeds the permitted error range.
Under normal condition, the project entity is responsible for operation and maintenance of the meters in the WHR captive power stations. Once the reading error of instruments exceeds the permitted error range or the instrument is found to be malfunctioning: (1) the recordings of the meter need be repaired, calibrated or replaced should be recorded; (2) the relevant electric meters should be calibrated and reinstalled after passing the calibration.

5.2 Maintenance and calibration of other monitoring equipments

The meters for monitoring of $NCV_{fuel,y}$, $Q_{fuel,y}$, $EF_{C,fuel,y}$ and $O_{clinker,y}$ are in the clinker process, and the project entity and the manufactures will be in charge of the maintenance and calibration. The calibration of motor truck scale will be carried out following the national standard (JJG 539-1997) by an independent entity (Bureau of Quality and Technical Supervision of Dengfeng). The frequency of the calibration of weighbridge will be at least once a year. The calorimeter will be maintained and calibrated according to GB/T 213-2008 by the project owner.

6. Data management

- The monthly monitoring reports of the power plant, the operational records of the clinker production line and the laboratory reports will be copied and filed by the project entity.
- The electrical data of the DCS will be filed by the project entity. These data will be copied

[32] The clinker output is continuously monitored by weighbridge after storage due to the temperature of clinker is very high just after production; there is no way to measure them directly by weighbridge before they are stored and cooled.

to CD regularly.

- The writing of monitoring data must be normative and can not be optionally altered. If the monitoring data assuredly need be adjusted, it will be modified after being approved by the manager of the station. The person who modified the monitoring data must make a signature on where the modification has been made. In comment column, the reason why the monitoring data are modified and modifying data will be written, and the signature will also be required.
- All monitoring data will be preserved throughout the whole crediting period as well as the following two years. Necessary back-up of monitoring data will be done at regular intervals.

7. Monitoring report

The general manager of the power plant will write a monitoring report in the end of the year. The monitoring report will contains the monitoring data of the electricity generated, supplied and consumed by the 9MW WHR power plant, the annual outputs of the clinker production line, the quantity of the fuels consumed in the calcinations process, the net calorific value and fixed carbon content of the consumed fuels. The monitoring report also contains the calculation report of the emission reductions and the maintenance and calibration records of the monitoring equipments.

8. Quality control system for monitoring data

1) The monitoring data will be daily recorded, and then filed carefully. The writing of monitoring data must be normative and can not be optionally altered. If the monitoring data assuredly need be corrected, it will be modified after being approved by the workshop manager. The person who modified the monitoring data must make a signature in the place besides the modified monitoring data. In reference column, the reasons why the monitoring data are modified and modifying data will be written, and the signature also will be made.
2) The authenticity, veracity, timeliness and standardization of the monitoring data should be checked by the workshop manager. Once something inconformity is found, it must be corrected immediately.
3) All monitoring data will be preserved throughout the whole crediting period and the following two years. Necessary back-up of monitoring data will be done at regular intervals.
4) The data from backup system will be used to calculate the net electricity supply during the time meter M6 which measures the net electricity supply is out of function.
5) There’s also a backup system for motor truck scale. Spare motor truck scale will be used while main meters are malfunctioning. The malfunctioning meters will be sent for maintenance.

9. Training of relevant personnel

In order to ensure the proper installation and smooth-running of the WHR captive power station, the project entity has planned to invite technical and management personnel for construction and operation of the WHR captive power station. Plans are also made to train the staff, and the staff in WHR power station should pass the periodical test carried out by the project entity.

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)

>>

Date of completing the baseline and monitoring methodology study	20/12/2008
Person determining the baseline methodology:	Chen Ximing
Tel:	+86-21-32500303
Fax:	+86-21-32500219
Email:	cdm009@163.com
Organization:	Shanghai Chuanji Investment Management Co., Ltd.
Assistants:	Ma Zhiwei (Shanghai Chuanji Investment Management Co., Ltd.)

Shanghai Chuanji Investment Management Co., Ltd. is not the project participant.

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:

>>

The construction date of the project activity is 22/12/2008 (Turnkey Contract Signing Date).

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

>>
15 years

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

>>

The project uses fixed crediting period.

C.2.1. Renewable crediting period

>>
Not applicable – left open on purpose

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

>>

C.2.1.2. Length of the first crediting period:

>>

C.2.2. Fixed crediting period:

>>

C.2.2.1. Starting date:

>>
01/06/2011

C.2.2.2. Length:

>>
10 years

SECTION D. Environmental impacts

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

>>

The 9MW WHR project of SDIC Xindeng Zhengzhou Cement Co., Ltd. has undergone and passed full Environmental Impact Assessments (EIA) in line with all the requirements of Chinese Government and had obtained the written approval of Zhengzhou Environment Protection Agency on 18/04/2008.
Considering the environmental impacts associated with such a project activity, the project entity had considered the following environmental impacts, and proper measures have been adopted to mitigate those impacts.

Impact on Air Environment

The WHR boilers will catch a large portion of the fine dust particles originally directly discharged into the air by the cement production line; this will undoubtedly contribute to the well-being of ambient air quality. Thermal pollution is serious in cement plant because a great amount of heat has been vented to atmosphere without utilization. The project activity will utilize the waste heat for power generation and thereby reduce effects of thermal pollution which will decrease the heat pollution.

Impact on Acoustical Environment

Noise is mainly generated due to the operation of steam turbine generator and WHR boilers. To effectively reduce the noise, the project entity has planned to choose low noise equipments, equip the damping device and silencers, and install noise absorbing facilities.

Impact on Water Environment

There is no poisonous and harmful substance in wastewater generated from the project activity. The waste water will be discharged to the drainage system after treated up to the effluent standard. Therefore, the project activity has no obvious impact on the Water Environment.

Impact of the solid waste

The main solid wastes are the solid waste and household garbage produced in the construction period of the project. The construction garbage will be transported to the appointed position for further treatment. The garbage cans will be installed in the construction site for the collection of household garbage. The household garbage will be transported to and treated in the waste yard in time.

Ecological impact

The project is constructed on-site of the cement plant. The project will not destroy the vegetation. The ecological impact of the project is basically zero.

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

>>

As discussed above, the project activity will not have any adverse environmental impacts. And the project entity has carried out proper measures for environmental protection, and the negative effect has been reduced to the level allowed by related laws and regulations.

SECTION E. Stakeholders' comments

>>

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

> >

The local stakeholders are defined as the staff and resident nearby Because of the less environment impact of the project. The project entity had asked for the opinions and comments of the local stakeholders by carrying out questionnaire survey around the project site from September 2007 to November 2007.

1. Questionnaire object

The scope of survey concludes the village, town around the WHR power plant and Dengfeng City. The main questionnaires are villages, residents and workers.

The questionnaire fully considered the public opinions with different age, different culture and different job. The project entity had sent 60 questionnaires and taken back 55 valid questionnaires. The general information of the questionnaire survey object can be summarized as below:

<table>
<tr><td colspan="12">1. Sex</td></tr>
<tr><td colspan="6">male</td><td colspan="6">female</td></tr>
<tr><td colspan="6">70.9%</td><td colspan="6">29.1%</td></tr>
<tr><td colspan="12">2. The highest educational qualifications</td></tr>
<tr><td colspan="3">Junior college and above</td><td colspan="3">Technical secondary school</td><td colspan="3">Middle school</td><td colspan="3">Primary and below</td></tr>
<tr><td colspan="3">38.2%</td><td colspan="3">5.5%</td><td colspan="3">52.7%</td><td colspan="3">3.6%</td></tr>
<tr><td colspan="12">3. Job occupation</td></tr>
<tr><td colspan="4">Peasant</td><td colspan="4">Worker</td><td colspan="4">Cadre</td></tr>
<tr><td colspan="4">36.3%</td><td colspan="4">58.2%</td><td colspan="4">5.5%</td></tr>
</table>

2. Main content of the questionnaire

(1) What is the relationship between you and the project?

(2) What is your opinion on the temperature change of local atmosphere?

(3) What are the adverse influences of the operation of the project?

(4) What is the main influence of the construction of the project to you?

(5) What is the influence of the construction of the project to the around environment?

(6) What is the influence of CDM for the project?

(7) What is the influence of the project on the ease of the global warming?

(8) What is your most concern on the project?

(9) What is your attitude on the construction of the project?

E.2. Summary of the comments received:

>>

The result of the questionnaire survey can be concluded as below:

1. Of those polls, 92.7% have some relations with the project.
2. Of those polls, 100% say they support the construction of the project.
3. Of those polls, 81.8% think CDM is helpful for the construction of the project.
4. Of those polls, 78.2% think the construction of the project is helpful for the development of local economy, and can increase the job opportunity and income of local residents
5. Of those polls, 85.5% think the project will not produce any harmful aspects to local environment, 14.5% worry the noise generated during the construction of the project activity will do harm to the local environment, and 10.9% worry the noise pollution after the operation of the project activity.

Generally speaking, the public are support the construction of the project.

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

>>

According to the questionnaire results, the worries and questions concerned on the adverse influences may cause by the project activity. They hope the project entity can take measures to intensify the environment management during the construction and operation of the project and to do environment protection work conscientiously.

The project entity will seriously consider the opinions and advices of the questionnaire and will fully carry out the related measurements to solve the problem of the environment protection as described in the environmental impact report of the project, to guarantee the coordinated development of the construction of the project and environment protection and to reach the expected social, environmental and economic benefits.

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Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	SDIC Xindeng Zhengzhou Cement Co., Ltd.(Project entity)
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Personal E-Mail:	Phillipe.Rosier@eu.rhodia.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

>>
No public funding from any Annex I parties are involved in the project activity.

Annex 3

BASELINE INFORMATION

>>

1. Identification of baseline scenario

Table 3-1. Historical and Projected Electrical Supply and Demand at Xindeng Cement Works over the Crediting Period (excluding the Project Activity)[33]

Item	June 2008-May 2009	June 2009-May 2010	June 2010-May 2011	June 2011-May 2012	June 2012-May 2013	June 2013-May 2019
Project entity Cement Plant Annual Demand (MWh), E_{CEMENT}	125,188	144,742	171,000	171,000	171,000	171,000
Project entity Cement Plant Annual Power Purchase from the CCPG (MWh)	125,188	144,742	171,000	171,000	171,000	171,000

2. Calculation of baseline emissions

(1) Calculation of $EF_{grid,OM,y}$

Table 3-2 Power generation Mix of CCPG for most recent years

Energy Source	2003[34]	2004[35]	2005[36]	2006[37]	2007[38]
Total Power Available (10^8kWh)	3,672.89	4,406.65	4,964.30	5,478.59	6,324.65
Thermal (10^8kWh)	2,408.39	2,708.46	3,048.25	3,554.53	4,082.05
Hydro (10^8kWh)	1,264.48	1,690.94	1,915.48	1,922.96	2,240.35

[33] Data supplied by project entity based on actual data or predicted data for future years.
[34] China Electric Power Yearbook 2004, p.709
[35] China Electric Power Yearbook 2005, p.474
[36] China Electric Power Yearbook 2006, p.572
[37] China Electric Power Yearbook 2007, p.638
[38] China Electric Power Yearbook 2008, p.748

Other (10^8kWh)	0	0	0.57	1.02	2.25
Proportion of low cost and must run resources	34.43%	38.37%	38.60%	35.12%	35.46%

Table 3-3 Calculation of Operating Margin Emission Factor in CCPG (2005)

Fuel Type	Unit	Jiangxi	Henan	Hubei	Hunan	chongqing	Sichuan	Total	Fuel Emission Factor	NCV	CO_2 emissions
									（ $kgCO_2/TJ$ ）	（MJ/t,km³）	tCO_2e
		A	B	C	D	E	F	G=A+B+C +D+E+F	H	I	K=G*H*I /100000（mass unit） K=G*H*I/10000 (volume unit)
Raw Coal	10^4t	1,869.29	7,638.87	2,732.15	1,712.27	875.40	2,999.77	17,827.75	87,300	20,908	325,404,287.18
Cleaned Coal	10^4t	0.02						0.02	87,300	26,344	459.97
Other washed coal	10^4t		138.12			89.99		228.11	87,300	8,363	1,665,408.07
Coke	10^4t		25.95		105.00			130.95	95,700	28,435	3,563,450.03
Coke Oven Gas	10^8m^3			1.15		0.36		1.51	37,300	16,726	94,205.85
Other Coal Gas	10^8m^3		10.20			3.12		13.32	37,300	5,227	259,696.18
Crude Oil	10^4t		0.82	0.36				1.18	71,100	41,816	35,082.79
Gasoline	10^4t		0.02			0.02		0.04	67,500	43,070	1,162.89
Diesel	10^4t	1.30	3.03	2.39	1.39	1.38		9.49	72,600	42,652	293,861.19
Fuel Oil	10^4t	0.64	0.29	3.15	1.68	0.89	2.22	8.87	75,500	41,816	280,035.48
PLG	10^4t							0.00	61,600	50,179	0.00
Refinery Gas	10^4t	0.71	3.41	1.76	0.78			6.66	48,200	46,055	147,842.08
Natural Gas	10^8m^3						3.00	3.00	54,300	38,931	634,185.99
Other Petroleum Products	10^4t							0.00	75,500	38,369	0.00
Other Coking Products	10^4t				1.50			1.50	95,700	28,435	40,818.44
Other Energy	10^4tce		2.88		1.74	32.80		37.42	0	0	0.00
										Total	**332,420,496.13**

Table 3-4 Calculation of Operating Margin Emission Factor in CCPG (2006)

Fuel Type	Unit	Jiangxi	Henan	Hubei	Hunan	chongqing	Sichuan	Total	Fuel Emission Factor	NCV	CO_2 emissions
									（ $kgCO_2/TJ$ ）	（MJ/t,km³）	tCO_2e
		A	B	C	D	E	F	G=A+B+C +D+E+F	H	I	K=G*H*I /100000（mass unit） K=G*H*I/10000 (volume unit)
Raw Coal	10^4t	1,926.02	8,098.01	3,179.79	2,454.48	1,184.30	3,285.22	20,127.82	87,300	20,908	367,386,738.07
Cleaned Coal	10^4t					5.79		5.79	87,300	26,344	133,160.23
Other washed coal	10^4t	4.51	104.12		8.59	79.21		196.43	87,300	8,363	1,434,115.59
Moulded Coal	10^4t						0.01	0.01	87,300	20,908	182.53
Coke	10^4t		17.23		0.32			17.55	95,700	28,435	477,575.78
Coke Oven Gas	10^8m^3		0.52	1.07	4.24	0.38	0.01	6.22	37,300	16,726	388,053.24
Other Coal Gas	10^8m^3	12.69	3.95		1.70	4.36	0.01	22.71	37,300	5,227	442,770.28
Crude Oil	10^4t		0.49					0.49	71,100	41,816	14,568.28
Gasoline	10^4t		0.01					0.01	67,500	43,070	290.72
Diesel	10^4t	0.91	2.23	1.41	1.78	0.96		7.29	72,600	42,652	225,737.42
Fuel Oil	10^4t	0.51	1.26	1.31	0.80	0.57	3.49	7.94	75,500	41,816	250,674.38
PLG	10^4t							0.00	61,600	50,179	0.00
Refinery Gas	10^4t	0.86	8.10	1.00	0.97			10.93	48,200	46,055	242,629.71
Natural Gas	10^8m^3			0.28		0.16	18.63	19.07	54,300	38,931	4,031,308.94
Other Petroleum Products	10^4t							0.00	75,500	38,369	0.00
Other Coking Products	10^4t						0.01	0.01	95,700	28,435	272.12
Other Energy	10^4tce	17.45	37.36	31.55	18.29	29.35		134.00	0	0	0.00
										Total	**375,028,077.28**

Table 3-5 Calculation of Operating Margin Emission Factor in CCPG (2007)

Fuel Type	Unit	Jiangxi	Henan	Hubei	Hunan	chongqing	Sichuan	Total	Fuel Emission Factor	NCV	CO_2 emissions
									（ $kgCO_2/TJ$ ）	（MJ/t,km^3）	tCO_2e
		A	B	C	D	E	F	G=A+B+C +D+E+F	H	I	K=G*H*I /100000（mass unit） K=G*H*I/10000 (volume unit)
Raw Coal	10^4t	2,200.57	9,357	3,479.81	2,683.81	1,547.7	3,239	22,507.89	87,300	20,908	410,829,404
Cleaned Coal	10^4t		3.07			3.8		6.87	87,300	26,344	157,998
Other washed coal	10^4t	0.04	87.16		2.06	96.42		185.68	87,300	8,363	1,355,631
Moulded Coal	10^4t						0.01	0.01	87,300	20,908	183
Coke	10^4t							0	95,700	28,435	0
Coke Oven Gas	10^8m^3	0.08	2.61	0.25	0.31	0.91		4.16	37,300	16,726	259,534
Other Coal Gas	10^8m^3	29.17	25.79		24.69		23.98	103.63	37,300	5,227	2,020,444
Crude Oil	10^4t		0.43					0.43	71,100	41,816	12,784
Gasoline	10^4t				0.04	0.01		0.05	67,500	43,070	1,454
Diesel	10^4t	0.98	3.21	2.51	2.83	1.93		11.46	72,600	42,652	354,863
Fuel Oil	10^4t	0.42	1.25	1.33	0.63	0.64	1.74	6.01	75,500	41,816	189,742
PLG	10^4t							0	61,600	50,179	0
Refinery Gas	10^4t	1.43	10.01	0.97	0.7			13.11	48,200	46,055	291,022
Natural Gas	10^8m^3		0.12	0.18		0.2	1.87	2.37	54,300	38,931	501,007
Other Petroleum Products	10^4t							0	75,500	41,816	0
Other Coking Products	10^4t							0	95,700	28,435	0
Other Energy	10^4tce	23.43	63.65	35.95	29.46	23.21		175.7	0	0	0
										Total	**415,974,066**

Table 3-6 Calculation of Operating Margin Emission Factor in NCPG (2006)

Fuel Type	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total	Fuel Emission Factor	Net Calorio Value	CO_2 Emissions
								($kgCO_2$/TJ)	（MJ/t,m3）	(tCO_2e）
		A	B	C	D	E	F=A+B+C+D+E	G	H	I=F×G×H/100000（Mass Unit） I=F×G×H/10000 (Volume Unit)
Raw Coal	10^4t	2,834.44	1,660.92	421.86	1,833.72	1,547.69	8,298.63	87,300	20,908	151,472,271.02
Cleaned Coal	10^4t					0.00	0.00	87,300	26,344	0.00
Other washed coal	10^4t				112.70	8.45	121.15	87,300	8,363	884,503.91
Coke	10^4t				0.01		0.01	95,700	28,435	272.12
Coke Oven Gas	10^8m^3	0.20				0.08	0.28	37,300	16,726	17,468.63
Other Coal Gas	10^8m^3	0.10					0.10	37,300	5,227	1,949.67
Crude Oil	10^4t					0.02	0.02	71,100	41,816	594.62
Gasoline	10^4t	0.01					0.01	67,500	43,070	290.72
Diesel	10^4t	1.14	0.24	0.61		1.25	3.24	72,600	42,652	100,327.74
Fuel Oil	10^4t		0.60			0.11	0.71	75,500	41,816	22,415.47
PLG	10^4t						0.00	61,600	50,179	0.00
Refinery Gas	10^4t						0.00	48,200	46,055	0.00
Natural Gas	10^8m^3	1.59	0.56	1.06		7.49	10.70	54,300	38,931	2,261,930.03
Other Petroleum Products	10^4t						0.00	75,500	38,369	0.00
Other Coking Products	10^4t	1.86					1.86	95,700	28,435	50,614.87
Other Energy	10^4tce	33.57	8.81			2.20	44.58	0	0	0.00
									Total	**154,812,638.82**

Table 3-7 Calculation of Operating Margin Emission Factor in NCPG (2007)

Fuel Type	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total	Fuel Emission Factor	Net Calorio Value	CO_2 Emissions
								($kgCO_2/TJ$)	（MJ/t,m3）	(tCO_2e）
		A	B	C	D	E	F=A+B+C+D+E	G	H	I=F×G×H/100000（Mass Unit） I=F×G×H/10000 (Volume Unit)
Raw Coal	10^4t	3,303.44	1,969.03	470.85	2,165.8	1,762.11	9,671.23	87,300	20,908	176,525,905
Cleaned Coal	10^4t						0	87,300	26,344	0
Other washed coal	10^4t	3.73			124.31	7.73	135.77	87,300	8,363	991,243
Moulded Coal	10^4t	3.53					3.53	87,300	20,908	64,432
Coke	10^4t						0	95,700	28,435	0
Coke Oven Gas	10^8m^3	0.52	0.65			0.26	1.43	37,300	16,726	89,215
Other Coal Gas	10^8m^3	14.14	0.71				14.85	37,300	5,227	289,526
Crude Oil	10^4t					0.09	0.09	71,100	41,816	2,676
Gasoline	10^4t	0.02					0.02	67,500	43,070	581
Diesel	10^4t	1.12	0.26	0.42		1.77	3.57	72,600	42,652	110,546
Fuel Oil	10^4t	0.01	1.05	0.04		0.05	1.15	75,500	41,816	36,307
PLG	10^4t						0	61,600	50,179	0
Refinery Gas	10^4t					5.99	5.99	48,200	46,055	132,969
Natural Gas	10^8m^3	1.68	0.49	1.93		8.66	12.76	54,300	38,931	2,697,404
Other Petroleum Products	10^4t						0	75,500	41,816	0
Other Coking Products	10^4t						0	95,700	28,435	0
Other Energy	10^4tce	94.36	9.73				104.09	0	0	0
									Total	**180,940,805**

Table 3-8 Generated and supplied electricity by the CCPG in 2005~2007

Province	2005			2006			2007		
	Generated	Self-consumed electricity rate	Supplied	Generated	Self-consumed electricity rate	Supplied	Generated	Self-consumed electricity rate	Supplied
	（MWh）	（%）	（MWh）	（MWh）	（%）	（MWh）	（MWh）	（%）	（MWh）
Jiangxi	30,000,000	6.48	28,056,000	34,449,000	6.17	32,323,497	42,100,000	7.72	38,849,880
Henan	131,590,000	7.32	121,957,612	151,235,000	7.06	140,557,809	177,300,000	7.55	163,913,850
Hubei	47,700,000	2.51	46,502,730	54,841,000	2.75	53,332,873	60,900,000	6.69	56,825,790
Hunan	39,900,000	5.00	37,905,000	46,408,000	4.95	44,110,804	54,200,000	7.18	50,308,440
Chongqing	17,584,000	8.05	16,168,488	23,487,000	8.45	21,502,349	28,800,000	9.2	26,150,400
Sichuan	37,202,000	4.27	35,613,475	44,193,000	4.51	42,199,896	45,100,000	8.68	41,185,320
Total			286,203,305			334,027,226			377,233,680

Data Source： *China Electric Yearbook* 2005~2007

Table 3-9 Generated and supplied electricity by the NCPG in 2006 and 2007

Province	2006			2007		
	Generated	Self- consumed electricity rate	Supplied	Generated	Self- consumed electricity rate	Supplied
	（MWh）	（%）	（MWh）	（MWh）	（%）	（MWh）
Shaanxi	54,482,000	6.97	50,684,605	59,100,000	6.77	55,098,930
Gansu	35,738,000	4.29	34,204,840	42,400,000	5.89	39,902,640
Qinghai	7,204,000	2.57	7,018,857	9,700,000	7.19	9,002,570
Ningxia	36,731,000	0.00	36,731,000	43,500,000		43,500,000
Xinjiang	29,901,000	8.02	27,502,940	34,600,000	9.2	31,416,800
Total			**156,142,241**			**178,920,940**

Data Source： *China Electric Yearbook* 2007~2008

Average Emission Factor of NCPG in 2006=154,812,639 tCO_2e/156,142,241 MWh=0.99148 tCO_2e/ MWh

Average Emission Factor of NCPG in 2007=180,940,805 tCO_2e/178,920,940 MWh=1.01129 tCO_2e/ MWh

Table 3-10 OM factor of CCPG in 2005~2007

Year	**Total Supplied Electricity**（MWh)	**Total Emissions** (tCO_2e)	**Emission Factor** (tCO_2e/MWh)
2005	286,203,305	332,420,496	1.16148
2006	337,056,176	378,031,235	1.12157
2007	380,239,080	419,013,395	1.10197
		Average	**1.12553**
Comment： The electricity net imported to CCPG from NCPG in 2006 (3,028,950MWh), 2007(3,005,400MWh) and emissions generated during the power generation has been considered In the calculation of the OM.			

(2) Calculation of $EF_{grid,BM,y}$

Table 3-11 Calculation of different type fuels emission weight in the CCPG (2007)

Fuel Type	Unit	Jiangxi	Henan	Hubei	Hunan	chongqing	Sichuan	Total	Net Calorio Value	Fuel Emission Factor	CO_2 Emissions
									（MJ/t,m3）	($kgCO_2/TJ$)	tCO_2
		A	B	C	D	E	F	G=A+B+C +D+E+F	H	I	J=G*H*I/100000
Raw Coal	10^4t	2,200.57	9,357	3,479.81	2,683.81	1,547.70	3,239	22,507.89	20,908	87,300	410,829,403.68
Cleaned Coal	10^4t	0	3.07	0	0	3.8	0	6.87	26,344	87,300	157,998.40
Other washed coal	10^4t	0.04	87.16	0	2.06	96.42	0	185.68	8,363	87,300	1,355,630.93
Moulded Coal	10^4t	0	0	0	0	0	0.01	0.01	20,908	87,300	182.53
Coke	10^4t	0	0	0	0	0	0	0.00	28,435	95,700	0.00
Other Coke Product	10^4t	0	0	0	0	0	0	0.00	28,435	95,700	0.00
Sum											412,343,215.53
Crude Oil	10^4ton	0	0.43	0	0	0	0	0.43	41,816	71,100	12,784.41
Gasoline	10^4ton	0	0	0	0.04	0.01	0	0.05	43,070	67,500	1,453.61
Diesel	10^4ton	0.98	3.21	2.51	2.83	1.93	0	11.46	42,652	72,600	354,862.93

Fuel Oil	10^4ton	0.42	1.25	1.33	0.63	0.64	1.74	6.01	41,816	75,500	189,742.19
Other Petroleum Products	10^4ton	0	0	0	0	0	0	0.00	38,369	75,500	0.00
Sum											558,843.14
Natural Gas	10^7m^3	0	1.2	1.8	0	2	18.7	23.70	38,931	54,300	501,006.93
Coke Oven Gas	10^7m^3	0.8	26.1	2.5	3.1	9.1	0	41.60	16,726	37,300	259,534.00
Other Coal Gas	10^7m^3	291.7	257.9	0	246.9	0	239.8	1,036.30	5,227	37,300	2,020,444.06
PLG	10^4ton	0	0	0	0	0	0	0.00	50,179	61,600	0.00
Refinery Gas	10^4ton	1.43	10.01	0.97	0.7	0	0	13.11	46,055	48,200.00	291,022.47
Sum											3,072,007.45
Total											415,974,066.13

Data Source：*China Energy Statistical Yearbook 2008*

$$\lambda_{Coal} = 99.13\%，\quad \lambda_{Oil} = 0.13\%，\quad \lambda_{Gas} = 0.74\%$$

Table 3-12 Advanced emission factor of different plants in China

	Parameter	Efficient	Fuel Emission Factor ($kgCO_2/TJ$)	Emission factor tCO_2e/MWh
		A	B	C=3.6/A/1,000,000*B
Coal-fired power plant	$EF_{Coal,Adv}$	38.10%	87,300	0.8249
Oil-fired power plant	$EF_{Oil,Adv}$	49.99%	75,500	0.5437
Gas-fired power plant	$EF_{Gas,Adv}$	49.99%	54,300	0.3910

Data Source: http://qhs.ndrc.gov.cn/qjfzjz/W020090703644239079814.doc;

Emission Factor of the thermal power plant in CCPG $EF_{thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv}$ = 0.8213 tCO_2e/ MWh

Table 3-13 Installed Capacity of CCPG in 2007

Installed Capacity	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Thermal Power	MW	9,270	38,540	13,040	13,360	6,370	12,000	92,580
Hydro Power	MW	3,570	2,740	24,020	9,220	2,240	19,860	61,650
Nuclear Power	MW	0	0	0	0	0	0	0
Wind Power and Others	MW	0	0	10	17	24	0	51
Total	MW	12,840	41,280	37,070	22,597	8,634	31,860	154,281

Data Source: *China Electric Yearbook 2008*

Table 3-14 Installed Capacity of CCPG in 2006

Installed Capacity	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Thermal Power	MW	6,568	32,603	11,623	10,715	5,594	9,555	76,658
Hydro Power	MW	3,288	2,553	18,320	8,648	1,979	17,730	52,518
Nuclear Power	MW	0	0	0	0	0	0	0
Wind Power and Others	MW	0	0	0	17	24	0	41
Total	MW	9,856	35,156	29,943	19,380	7,597	27,285	129,217

Data Source: *China Electric Yearbook 2007*

Table 3-15 Installed Capacity of CCPG in 2005

Installed Capacity	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Thermal Power	MW	5,906	26,268	9,526	7,212	3,760	7,496	60,167
Hydro Power	MW	3,019	2,540	17,889	7,905	1,893	14,960	48,205
Nuclear Power	MW	0	0	0	0	0	0	0
Wind Power and Others	MW	0	0	0	0	24	0	24
Total	MW	8,925	28,808	27,415	15,117	5,676	22,456	108,396

Data Source: *China Electric Yearbook 2006*

Table 3-16 Calculation of BM emission factor of CCPG

	Installed Capacity in 2005	Installed Capacity in 2006	Installed Capacity in 2007	Added capacity between 2005 to 2007	The proportion of the added thermal power capacity compare with the total added capacity in 2007
	A	B	C	D=C-B	
Thermal Power	60,167	76,658	92,580	32,412.8	70.64%
Hydro Power	48,205	52,518	61,650	13,444.8	29.30%
Nuclear Power	0	0	0	0	0.00%
Wind Power and Others	24	41	51	27	0.06%
Total	108,396.4	129,217	154,281	45,884.6	100.00%
Fraction of newly increased thermal Plants (%)	70.26%	83.75%	100.00%		

$$EF_{BM,y} = 0.8213 \times 70.64\% = \mathbf{0.5802}\ tCO_2e/MWh$$

(3) Calculation of emission factor of CCPG

$$EF_{CO2,Elec\_Grid} = (EF_{OM,y} + EF_{BM,y})/2 = \mathbf{0.85285}\ tCO_2e/MWh$$

Annex 4

MONITORING PLAN

>>
Refers to Section B.7 of the PDD.

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