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:

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Yixing Shuanglong Cement Plant's Low Temperature Waste Heat Power Generation Project

Version of document: 02

Date of document: 26/06/2008

Version 01, 22/08/2007, subscribed to GSP for open comments

A.2. Description of the project activity:

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The proposed project is located in the cement factory of Yixing Shuanglong Cement Co. Ltd., Xinjie Town, Yixing City, south of Jiangsu Province. A pure low temperature waste heat generating unit will be constructed to utilize the waste heat from the head and the rear of the cement clinker production line (5000t/d) of this company. Thus it is a project of waste heat recovery and power generation in cement factory. The total installed capacity is 9MW, expected annual power generation is 59.50GWh and the net electricity available for sale to the grid is 54.14GWh per year.

Under the normal situation, only a part of the waste heat from cement production line was utilized to preheat the raw materials for production, and the rest were emitted to the atmosphere. The project activity is going to utilize the part of waste heat emitted to the atmosphere to generate electric power, which will not affect the existing heat recycling utilization in the cement production process.

The waste heat power plant will carry out paralleling with the current power system, and the operation mode is to parallel with the power grid but not to connect to the power grid, which is in order to substitute the part of electricity purchased from East China Power Grid during the cement production course. At the same time, CO_2 emission during the corresponding power generation course could also be avoided, and GHG emission reductions will be carried out. The proposed project will replace a part of electric power produced by some fossil fuel power plants in East China Power Grid, consequently mitigate the CO_2 emission; after the construction completed, the expected annual CO_2 emission reductions is 45,133t; 451,330 tCO2 is expected within the 10 years credit period.

The project's construction is in line with the choice of China energy industry's prior area, it could be promote the sustainable development of host party country and the local area as follows:

Socio-economic benefits:

- Promote the clean production of cement industry and the development of recycling economy, and increasing the sustainable capability;
- Increasing the employment chances, and offering 15 jobs;
- Benefiting for spreading the low temperature waste heat power generation technology in the cement industry;

Environmental benefits:

- Reduce effects of thermal pollution because of the utilizing of waste heat;
- Mitigating the emission of GHG and other polluting materials comparing to normal power generation manner.

A.3. Project participants:

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The participants of the proposed project include:

TableA.3.1 Information of project participants

Name of Party involved (×) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (×) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (Host)	Yixing Shuanglong Cement Co. Ltd. (Project Owner)	No
Japan	Marubeni Corporation	No

Detailed contact information on the Participants and other Parties are provided in 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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Jiangsu Province

A.4.1.3. City/Town/Community etc:

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Pushu Village， Xinjie Town, Yixing 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 locates in Pushu Village， XinjieTown, Yixing City, in the southern mountainous area of Jiangsu Province, The specific site location is at longitude 119°39′10.4″E and at latitude 31°19′38.1″N. In the east is Lake Taihu which has the common boundary with Zhejiang Province and Anhui Province in the south. 104 state highway(Ningbo to Hangzhou Section) is near to the plant site, and Tangsheng highway also passes by the plant area. Tangsheng Highway is the provincial main line, the highway could directly reach to the district of Yixing, Changzhou, Jintan and Wuxi etc, and it has connected with Huning Speedway and Xiyi Speedway. The completed Xinchang Railway also passes by the plant area, also a railway freight station is near to the plant area. The plant site is close to Huaxi River, where the 200t-lighter is open to navigation, and could reach to Lake Taihu and Grand Canal, so both of the landway and waterway transportation are very convenient. The location of the project is shown in the map of Figure1 to Figure3.

Figure 1. Sketch Map for Yixing Shuanglong Cement Low-temperature Waste Heat Power Plant

Figure 2. Sketch Map for Jiangsu Province, China

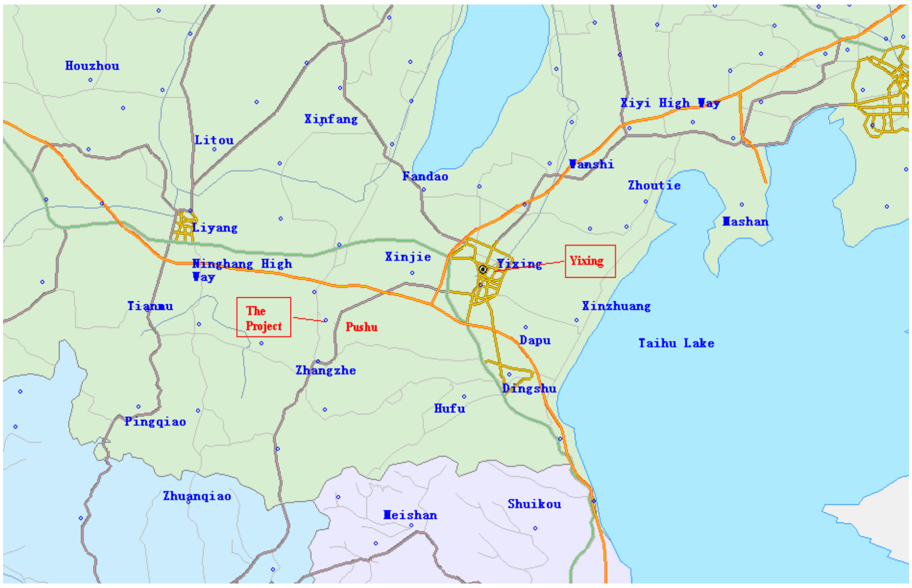

Figure 3 Geography Location of Yixing Shuanglong Cement Low-temperature Waste Heat Power Plant

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

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The project falls within the sectoral scope 1: Energy Industries, and 4: Manufacturing Industries.

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

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The waste heat recovery system consists of Suspension Preheater boiler(SP boiler) , Air Quenching Chamber (AQC boiler), steam turbine generator, controlling system and water circulation system etc. The waste heat is fed into the SP and AQC boilers where steam is produced. Then , the steam from SP and AQC boiler is fed into the steam turbine generator to produce electricity. The waste heat recovery system is demonstrated in figure 4.

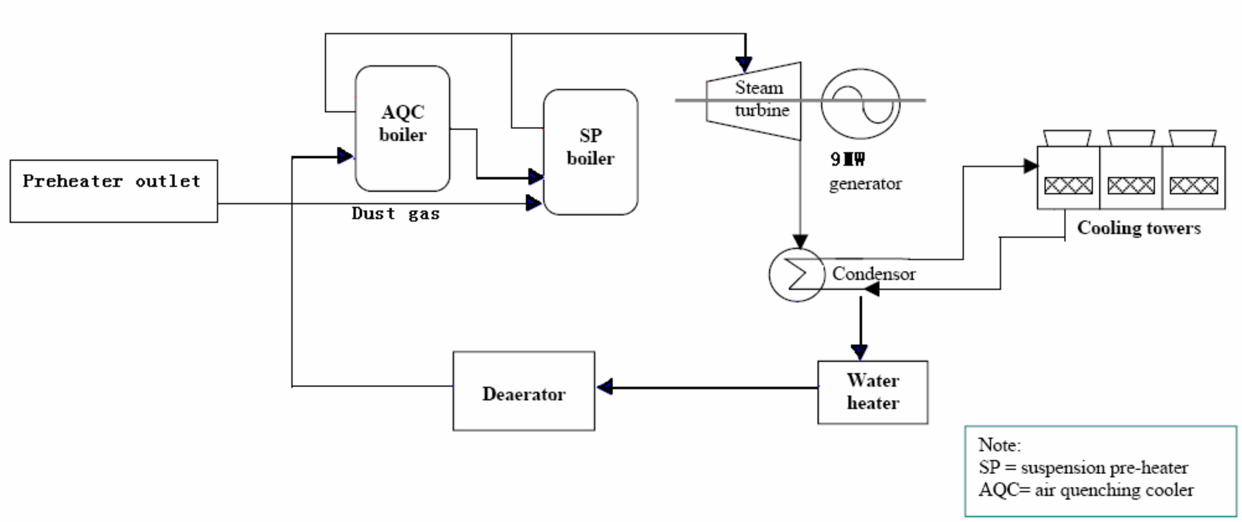

Figure 4 Waste Heat Recovery System

According to the feasibility report of the project, except for the pipeline pressure and the temperature loss, waste heat from SP boiler is 6.0×10^7kJ/h and waste heat from AQC is 6.3×10^7 kJ/h.

The totally steam-gas produced by waste heat boilers possesses a power generation capability of 1.23×10^8kJ/h. Therefore, 9MW condensing steam turbines and generator will be installed for the power stations. The main parameter of the equipments employed are showed in the following table.

Table A4.3.1 Main parameter of the equipments

Name	Number	Technical Parameter	Manufacture
Steam Turbine	1	Model： BN9-1.6/0.35 Nominal capacity： 9MW Nominal speed： 3000r/min Feed temperature： 320℃	Hangzhou Power Generation Equipments Company
9MW Generator	1	Model： QF-K9-2 Nominal capacity： 9MW Nominal speed： 3000r/min Nominal voltage： 10.5kV	Qingdao Jieneng Generator Group Company, Ltd.

5000t/d AQC Boiler	1	Waste gas cons： 180，000 Nm3/h—360℃ Steam Output： 1.7 MPa, 345℃ Feed Water Temperature： 55℃	Hangzhou Boiler Group Company
5000t/d SP Boiler	1	Waste gas cons： 340000m3/h—350℃ Steam 1.7 Mp—330 ℃—23 t/h Feed Water Temperature： From AQC	

The 10kV electric power generated by 9MW generator is conveyed to a substation with the specification of 10kV.The waste heat power station will connect with the existing power system, and its operation way is to connect with the East China power grid but electricity generated will not supply to the grid (for self use only).

There is no technology to be transferred from abroad to the host Party.

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

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The project will apply a fixed 10 years credit period, and will generate an ex-ante estimated 46,529 tCO2e annually； and 451,331tCO2e within the 10-year credit period.

Table A4.4.1 Estimated emission reductions

The 10 years of crediting period (Nov.1st, 2008-Oct.31st 2018) or From the date that the project is registered till the end of a 10years crediting period	
Years	**Annual estimation of emission reductions in tones of CO_2 e**
2008	5,428[1]
2009	34,896[2]
2010	46,529
2011	46,529
2012	46,529

[1] Note: For conservation purpose, according to feasibility report, emission reduction of the first crediting year has a 30% discount.

[2] For conservation purpose, according to feasibility report, emission reduction of the first crediting year has a 30% discount. The first crediting year includes 2008.11-12 and 2009.01-10, which means that the CERs of the first 10 months in 2009 have a 30% discount.

2013	46,529
2014	46,529
2015	46,529
2016	46,529
2017	46,529
2018	38,774
Total estimated reductions (tonnes of CO_2e)	**451,330**
Total number of crediting years	**10**
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	**45，133**

A.4.5. Public funding of the project activity:

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No official funds of Parties included in Annex I have been involved in the project.

SECTION B. Application of a baseline methodology

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

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Baseline and Monitoring Methodology ACM0012: "Consolidated baseline methodology for waste gas and/or heat and/or pressure for power generation" (ACM0012/Version 01, Sectoral Scope: 01 and 04, 04 July 2007). The detail information sees also on http://cdm.unfccc.int/methodologies/approved.

Baseline and monitoring methodology ACM0002: "Consolidated baseline and monitoring methodology f or grid-connected electricity generation from renewable sources" (ACM0002/Version 06, Sectoral Scope: 01, 19 May 2006). The detail information sees also on http://cdm.unfccc.int/ methodologies/approved.

Tool for the demonstration and assessment of additionality (Version 04 ， EB29 ） http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

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

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The methodology ACM0012 (Version 01) for project activities that utilize waste gas and/or waste heat (henceforth referred to as waste gas/heat) as an energy source for:
Cogeneration; or

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

The proposed project is going to utilize waste heat in cement production for generation of electricity, which is in consistent with ACM0012.

Also, methodology ACM0012 (Version 01) lists its applicability conditions and all of these conditions clearly apply to this project activity as showed in the following table:

Table B.2.1 Justification of methodology applicable conditions

No.	Methodology ACM0012	The Proposed Project Activity
1.	If project activity is use of waste pressure to generate electricity, electricity generated using waste gas pressure should be measurable.	Not applicable.
2.	Energy generated in the project activity may be used within the industrial facility or exported outside the industrial facility;	The proposed project will use the electricity generated by utilization of waste heat for cement production purpose only and within the project boundary, which is in consistent with ACM0012.
3.	Energy in the project activity can be generated by the owner of the industrial facility producing the waste gas/heat or by a third party (e.g. ESCO) within the industrial facility.	Energy in the project is from the cement production facility of SP and AQC, which is in consistent with ACM0012.
4.	Regulations do not constrain the industrial facility generating waste gas from using the fossil fuels being used prior to the implementation of the project activity.	No regulations in China constrain the cement company to use the waste gas.
5.	The methodology covers both new and existing facilities. For existing facilities, the methodology applies to existing capacity. If capacity expansion is planned, the added capacity must be treated as a new facility.	The proposed project belongs to new facilities, which is in consistent with ACM0012.
6.	The waste gas/pressure utilized in the project activity was flared or released into the atmosphere in the absence of the project activity at existing facility.	Under common conditions for cement production, waste heat is release into the air. the proposed project belongs to newly built capacity, the building of cement clinker production line and waste heat utilization project is simultaneously. The waste heat going to be utilized can be estimated by certified external experts.
7.	The credits are claimed by the generator of energy using waste gas/heat/pressure.	The credits is going to be claimed by the owner of the facilities(cement

	• In case the energy is exported to other facilities an agreement is signed by the owner's of the project energy generation plant (henceforth referred to as generator, unless specified otherwise) with the recipient plant(s) that the emission reductions would not be claimed by recipient plant(s) for using a zero-emission energy source.	kiln) which generates the waste heat.
8.	For those facilities and recipients, included in the project boundary, which prior to implementation of the project activity (current situation) generated energy on-site (sources of energy in the baseline), the credits can be claimed for minimum of the following time periods: The remaining lifetime of equipments currently being used; and Credit period.	The life of the cement production line is supposed to be more than 20yrs, which is much longer than the claimed 10yrs crediting periods
9.	Waste gas/pressure that is released under abnormal operation (emergencies , shut down) of the plant shall not be accounted for.	Emission reduction credit released under abnormal operation will not be claimed.

Therefore, the methodology ACM0012 is applicable for the proposed project.

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

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The boundary of the project includes the rotating kiln generating the waste heat of the project, waste heat recovery equipment, power production equipment and the power plants involved in East China Power Grid, the power grid will be affected by the project activities.

According to "Explain about confirming baseline emission factor of regional power grid in China" announced by Office of National Coordination Committee on Climate Change , National Development and Reform Commission (NDRC) of China (DNA of China) on Aug. 9th, 2007[3]. East China Power Grid is a regional grid in China, 5 provinces of Shanghai, Jiangsu, Zhejiang, Anhui and Fujian are included.

Table B.3.1 sources and gases included in the project boundary

	Source	**Gas**		Justification / Explanation
Baseline	East China Power Grid	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
	Fossil fuel	CO_2	Excluded	There is no fossil fuel consummated

[3] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/2006/2006121591135575.pdf

	consumption in boiler for thermal energy			in the proposed project.
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
	Fossil fuel consumption in cogeneration plant	CO_2	Excluded	This is not a cogeneration plant
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.
	Baseline emissions from generation of steam used in the flaring process, if any	CO_2	Excluded	There is no emission from generation of steam used in the flaring process.
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
Project Activity	Supplemental fossil fuel consumption at the project plant	CO_2	Excluded	There is no Supplemental fossil fuel.
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.
	Supplemental electricity consumption.	CO_2	Included	Emission source
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.
	Project emissions from cleaning of gas	CO_2	Included	Only in case waste gas cleaning is required and leads to emissions related to the energy requirement of the cleaning.
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.

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

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According to ACM0012, the baseline scenario alternatives should include all possible options that provide or produce electricity for in-house consumption and/or sale to grid and/or other consumers. The project participant shall exclude baseline options that:

- do not comply with legal and regulatory requirements; or
- depend on key resources such as fuels, materials or technology that are not available at the project site

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

According to ACM0012, the baseline scenario can be identified as following:

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

The baseline candidates should be considered for following facilities:

For the industrial facility where the waste gas/heat/pressure is generated; and
For the facility where the energy is produced; and
For the facility where the energy is consumed.

Step 1a Baseline scenario for waste gas

For the use of waste gas, the realistic and credible alternative(s) may include, *inter alia*:

W1 Waste gas is directly vented to atmosphere without incineration;

W2 Waste gas is released to the atmosphere after incineration or waste heat is released to the atmosphere (waste pressure energy is not utilized);

W3 Waste gas/heat is sold as an energy source;

W4 Waste gas/heat/pressure is used for meeting energy demand.

We discuss each of these alternatives in turn.

Alternative W1 is not applicable, as the waste energy resource is waste heat, not waste gas.

Alternative W2 is applicable and cannot be a priori rejected. It corresponds to the current practice at the proposed project activity. The waste heat to be utilized in the proposed project activity is currently not used, and is released into the atmosphere.

Alternative W3 is not applicable, as there are no users of heat located near to the cement production facility. Therefore, transport of heat over long distances is not economical. Additionally, sale of heat to surrounding consumers is not applicable neither.

Alternative W4, if interpreted as implying any other use of waste heat than generating power (to be discussed below), is not applicable as the cement plant is already self-sufficient in heat. Alternative W4 is also not consistent with current practice. Alternative W4 is applicable and cannot be rejected to the extent that it implies the use of waste heat for power generation.

Conclusion: We conclude that alternative W2, atmospheric release of waste heat, and W4, the use of waste heat to meet energy (*in casu*, power) demand, are the possible baseline alternatives for the use of waste heat available at the cement production facility.

Step 1b Baseline scenario for power supply

For power generation, the realistic and credible alternative(s) may include, *inter alia*

P1 Proposed project activity not undertaken as a CDM project activity;

P2 On-site or off-site existing/new fossil fuel fired cogeneration plant[6];

P3 On-site or off-site existing/new renewable energy based cogeneration plant[7];

P4 On-site or off-site existing/new fossil fuel based existing captive or identified plant;

P5 On-site or off-site existing/new renewable energy based existing captive or identified plant;

P6 Sourced Grid-connected power plants;

P7 Captive Electricity generation from waste gas (if project activity is captive generation with waste gas, this scenario represents captive generation with lower efficiency than the project activity.);

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

Of these alternatives, we can exclude P2 and P3 as irrelevant, because the proposed project activity does not have a heat supply component. We also can eliminate alternatives P7 and P8, because the waste energy resource utilized is waste heat, not waste gas. We therefore confine our discussion to alternatives P1, P4, P5 and P6.

Alternative P1 is applicable. It is in conformity with Chinese laws and cannot be a priori rejected.

Alternative P4 is not applicable. There is no existing captive power generation capacity or 'identified plants', as currently the grid provides all power required by the cement production facility. Creation of captive power generation capacity are impossible because: (1) the construction of small thermal power plants is prohibited by the Chinese government (see Section B.5, sub-step 1b for details); and (2) gasfired thermal power generation is not feasible due to the fact that there is no connection to a natural gas pipeline at the project location.

Alternative P5 is not applicable. The project location does not have sufficient renewable energy resources(hydro, wind, biomass) to establish a power plant using renewable resources.

Alternative P6 is applicable. It is in conformity with Chinese laws and cannot be a priori rejected.
Conclusion: We conclude that alternative P1, the proposed project activity not undertaken as a CDM project activity, and alternative P6, sourced grid connected power plants, are the possible baseline alternatives for the supply of power.

Our conclusions may be summarized in the following matrix, which provides the possible alternative baseline combinations.

Table B.4.1 Possible alternative baseline combinations

Power generation option Use of waste heat	**P1**	**P6**
W2	Not applicable. This scenario is not internally consistent – if the waste heat is released in the atmosphere, it is not available for power generation.	**Alternatives combination I** Applicable. This scenario corresponds to the current situation: power supply by the grid, and non-utilization of the waste heat
W4	**Alternatives combination II** Applicable This scenario uses the waste heat to generate power to replace power supplied by the grid, without the support of CDM	Not applicable. This scenario is not internally consistent – there would be no energy use for the waste heat

Alternative combinations I and II are further investigated in the next steps.

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

This step is skipped, because both alternative combinations identified in Step I do not give rise to the selection of a fuel. The reasons are: (1) there is no heating component; (2) the two alternatives for the power supply do either use no fossil fuel (the proposed project activity undertaken without the support of CDM, or use the generation mix of the grid.

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

As argued in Step 1, only two alternative combinations of the use of waste heat and power supply options cannot be rejected a priori. These are the current situation: power supply by the grid, and non-utilization of the waste heat (Alternative combination I) and the proposed project activity without the support from CDM (Alternative combination II). A detailed barrier analysis based on Version 3 of the Tool for the demonstration and assessment of additionality is performed in Section B5, to which we refer for details. Below we present the summary of the results of the barrier analysis, summarizing why different scenarios are eliminated during the barrier analysis.

- Alternative combination I is not eliminated. It corresponds to current practice
- Alternative combination II is eliminated, because the proposed project activity, without the support from CDM, faces a number of barriers, which include investment barriers, barriers due to prevailing practice, technological barriers, and financial barriers. (See Section B.5, sub-step 3a for details).

Therefore, alternative combination I, power imports from the grid combined with the non-utilization of waste heat, is the only scenario that is not eliminated and is hence selected as the baseline scenario of the project. The baseline scenario of the project there involves the continued operation of existing power plants connected to the North China Grid plus the addition of new power plants connected to the North China Grid to meet the demand of electric power.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):

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The additionality of the project activity is demonstrated using the steps described in the 'Tool for the Demonstration and Assessment of Additionality' (Version 04)

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

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

This methodological step requires a number of sub-steps, the first of which is the identification of realistic and credible alternatives to the project activity. We will work with the same alternatives as mentioned in section B4:

Alternatives for the waste energy resource

- W1 Waste gas is directly vented to atmosphere without incineration;
- W2 Waste gas is released to the atmosphere after incineration or waste heat is released to the atmosphere (waste pressure energy is not utilized);
- W3 Waste gas/heat is sold as an energy source;

- W4 Waste gas/heat/pressure is used for meeting energy demand.

Alternatives for power supply

- P1 Proposed project activity not undertaken as a CDM project activity;
- P2 On-site or off-site existing/new fossil fuel fired cogeneration plant;
- P3 On-site or off-site existing/new renewable energy based cogeneration plant;
- P4 On-site or off-site existing/new fossil fuel based existing captive or identified plant;
- P5 On-site or off-site existing/new renewable energy based existing captive or identified plant;
- P6 Sourced Grid-connected power plants;
- P7 Captive Electricity generation from waste gas (if project activity is captive generation with waste gas, this scenario represents captive generation with lower efficiency than the project activity.);
- P8 Cogeneration from waste gas (if project activity is cogeneration with waste gas, this scenario represents cogeneration with lower efficiency than the project activity).

Discussion of alternatives for the waste energy resource

Alternative W1 is not applicable, as the waste energy resource is waste heat, not waste gas.

Alternative W2 is applicable and cannot be a priori rejected. It corresponds to the current practice at the proposed project activity. The waste heat to be utilized in the proposed project activity would not be used in the absence of the project activity, and would be released into the atmosphere.

Alternative W3 is not applicable, as there are no users of heat located near to the cement production facility. Therefore, transport of heat over long distances is not economical. Additionally, sale of heat to surrounding consumers faces institutional barriers relating to the enforcement of contracts.

Alternative W4, if interpreted as implying any other use of waste heat than generating power (to be discussed below), is not applicable as the cement plant is already self-sufficient in heat. Alternative W4 is also not consistent with current practice. Alternative W4 is applicable and cannot be rejected to the extent that it implies the use of waste heat for power generation.

Conclusion: We conclude that alternative W2, atmospheric release of waste heat, and W4, the use of waste heat to meet energy (*in casu*, power) demand, are the a priori credible baseline alternatives for the use of waste heat available at the cement production facility.

Discussion of alternatives for the power supply

Of the alternatives listed above, we can exclude P2 and P3 as irrelevant, because the proposed project activity does not have a heat supply component. We also can eliminate alternatives P7 and P8, because the waste energy resource utilized is waste heat, not waste gas. We therefore confine our discussion to alternatives P1, P4, P5 and P6.
Alternative P1 is credible. It cannot be a priori rejected.

Alternative P4 is credible. The construction of additional coal-fired power generation capacity to provide power to the cement production process is prima facie a practical and credible alternative and will be analyzed below. Other fossil-fuel based alternatives to provide captive power are not credible. Note that gas-fired thermal power generation is not feasible due to the fact that there is no connection to a natural gas pipeline at the project location. See Section B.4 for details.

Alternative P5 is not credible. The project location does not have sufficient renewable energy resources (hydro, wind, biomass) to establish a power plant using renewable resources

Alternative P6 is applicable. It is in conformity with Chinese laws and cannot be a priori rejected.
Conclusion: We conclude that alternative P1, the proposed project activity not undertaken as a CDM project activity, alternative P4, the use of captive or identified fossil-fuel fired power plants (coal-fired

only), and alternative P6, sourced grid connected power plants, are the a priori credible baseline alternatives for the supply of power.

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

The second sub-step involves the confrontation of the alternatives with China's applicable laws and regulations.

Use of waste heat

Both alternatives for waste heat utilization (W2 and W4) are in agreement with Chinese laws and regulations. In the case of the non-use of the waste heat, this may require some further explanation. China has several policies, laws and regulations in place (see below), and this may raise the question of whether use of the waste heat is mandatory.
The key policies / regulations /laws to encourage improvements in energy efficiency which bear relevance to the proposed project activity are the *Cleaner Production Promotion Law*, the *Energy Conservation Law*, the *Policies Outline of Energy Conservation Technologies* (enacted in 1984 and revised in 1996), and the *China Medium and Long Term Energy Conservation Plan* among others. The above-mentioned policies encourage the utilization of waste heat but do not include specific measures which would involve mandatory implementation of waste heat utilization or financial incentives in the form of grants or subsidies.[3] Therefore, atmospheric release of the waste heat, although not encouraged by the Chinese authorities, is in compliance with existing policies and regulations.

Power supply options

Alternative P1**,** the proposed project activity without the support of CDM, is in accordance with applicable laws and regulations and will be considered a realistic alternative.

Alternative P4, the use of captive coal-fired thermal power plants, is not a credible alternative. Construction of captive power generation capacity is not compatible with policies and regulations that forbid the construction of small-scale thermal power units (see notices by the State Economic and Trade Commission and the General Office of the State Council[5]). For this reason, we eliminate Alternative P4.

Alternative P6, provision of power from the grid, corresponds to the present situation and is in line with the Chinese regulations.

Conclusion: Alternatives W2 and W4 are credible alternatives for the use of waste heat, while Alternatives P1 and P6 are credible alternatives as options for power supply. Our conclusions may be summarized in the following matrix, which provides the possible alternative baseline combinations.

Table B.5.1 Possible alternative baseline combinations

Power generation option **Use of waste heat**	**P1**	**P6**
W2	Not applicable. This scenario is not internally consistent – if the waste heat is released in the atmosphere, it is not available for power generation.	**Alternatives combination I** Applicable. This scenario corresponds to the current situation: power supply by the grid, and non-utilization of the waste heat
W4	**Alternatives combination II** Applicable	Not applicable. This scenario is not internally

	This scenario uses the waste heat to generate power to replace power supplied by the grid, without the support of CDM	consistent – there would be no energy use for the waste heat

Alternative combinations I and II are in line with the Chinese regulations and are further investigated in the next steps. We will argue that there are several barriers that prevent alternative combination II, the waste heat recovery project without the benefits from registration as a CDM project, from being implemented. These barriers include an investment barrier (elaborated in Step 2 below) and technological and first-of-its-kind barriers (elaborated in Step 3).

Step 2. Investment Analysis

The purpose of this step is to determine whether the project activity is economically or financially less attractive than other alternatives without an additional revenue/funding, possibly from the sale of certified emission reductions (CERs).The investment analysis was conducted in the following steps:

Sub-step 2a. Determine appropriate analysis method

Tool for the demonstration and assessment of additionality suggests three analysis methods, i.e. simple cost analysis (option I), investment comparison analysis (option II) and benchmark analysis (option III). Since the proposed project will obtain the revenues not only from CDM but also from decreasing electricity purchase, the simple cost analysis method (option I) is not appropriate.

Investment comparison analysis method (option II) is applicable to projects whose alternatives are also investment projects. Only on such basis, comparison analysis can be conducted. The alternative baseline scenario of the project is the Ease China Power Grid rather than new investment projects. Therefore the option II is not an appropriate method for the decision-making context.

The project will use benchmark analysis method based on the consideration that benchmark IRR of the power sector is available.

Sub-step 2b- Option III. Apply Benchmark Analysis

With reference to *Inform on Economic Assessment method and parameter of Construction Projects by SDPC and MOC,* the financial benchmark rate of return (after tax) of Chinese building materials industries accounts for 12% of the total investment IRR. Presently, the financial benchmark rate of return is used in the analysis of the majority of cement projects in China. On the basis of above benchmark, calculation and comparison of financial indicators are carried out in sub-step 2c.

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

(1) Basic parameters for calculation of financial indicators

Based on the *feasibility study report* of the Project, basic parameters for calculation of financial indicators are as follows:

Table B.5.2 Main Financial Indicators

Installed capacity:	9MW

Operation capacity:	8.5 MW
Operation hours annually :	7000 hours
Electricity generated annually:	59.50GWh
Estimated annual net-electricity:	54.14GWh
Operation cost:	10.04 million Yuan RMB
Total investment:	56.53 million Yuan RMB
Project lifetime:	20yrs
Prospective electricity price:	0.323Yuan/kWh (excluding VAT) RMB[4]
Tax:	income tax rate is 33%; value added tax rate is 17%, city construction maintenance tax is 7% of VAT, education appended fee is 3% of VAT
Crediting period:	10yrs
Expected CERs price:	10.6 US $/t CO_2e

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

IRR and NPV of the Project, with and without CDM revenues, are shown in Table B.5.3 Without CDM revenue, the IRR of total project investment is 6.78%, which is much lower than 12.0%[5].The proposed project can be considered as financially unattractive to investors. It is infeasible in business.

With the CDM revenue, CERs revenue will significantly improve both IRR and NPV. IRR of total investment will be 11.01%. Therefore, the project with CDM revenue can be considered as financially attractive to investors, and the business feasibility will also be improved.

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[4] Prospected electricity prices for similar projects in the same region(cements plants in Yixing City, Jiangsu Province) are showed as follows:
1. Project 1309 : Jiangsu Qingshi Cement Plant's Low Temperature Waste Heat Power Generation Project/; http://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1188202627.76/view; [0.342Yuan/KWh]
2. Yixing Jinshu Cement Co.ltd Low Temperature Waste Heat Power Generation Project[http://cdm.unfccc.int/Projects/Validation/DB/ZCEWR2HTP23590ZGOAJR1IZRN49TYI/view.html] [0.323 Yuan/KWh]
3. Yixing Tiansheng Cement Co.ltd Low Temperature Waste Heat Power Generation Project http://cdm.unfccc.int/Projects/Validation/DB/CZM2J3IQ4FK4L8M1QLE3XVZB0BC85P/view.html [0.323 Yuan/KWh]

Conclusion: Prospected electricity price in the same region are very close. The price of the proposed project is reasonable and believable.

[5] Economic Assessment Method and Parameter of Construction Projects.(Version 03, published on 03/07/2006 by National Development and Reform Committee and Ministry of Construction of China)

Table B.5.3 Financial indicators of Shuanglong Cement Plant's Low Temperature Waste Heat Power Generation Project

	IRR(total investment)benchmark=12%
Without CDM	6.78%
With CDM	11.01%

Sub-step 2d. Sensitivity analysis

For the proposed project, the following financial parameters were taken as uncertain factors for sensitive analysis of financial attractiveness:

1) Electricity price (not including VAT)

2) Electricity volume

3) Annual O&M cost

4) Total static investment

The impacts of total investment, electricity price and annual O&M cost of the project on IRR of total investment were analyzed. Provided the three parameters fluctuate within the range of -10%-+10%. The corresponding impacts on IRR of the project's total investment are shown in TableB.5.4 and Figure 3 for details.

Table B.5.4 IRR sensitivity to different financial parameters of the project (total investment, without CDM)

	-10%	-5%	0	+5%	+10%
Electricity Price (excluding VAT)	3.78	5.38	6.78	8.41	9.85
Electricity volume	3.56	5.26	6.78	8.52	10.12
Annual O&M Cost	8.65	7.81	6.78	6.08	5.18
Total Static Investment	7.84	7.40	6.78	6.51	6.05

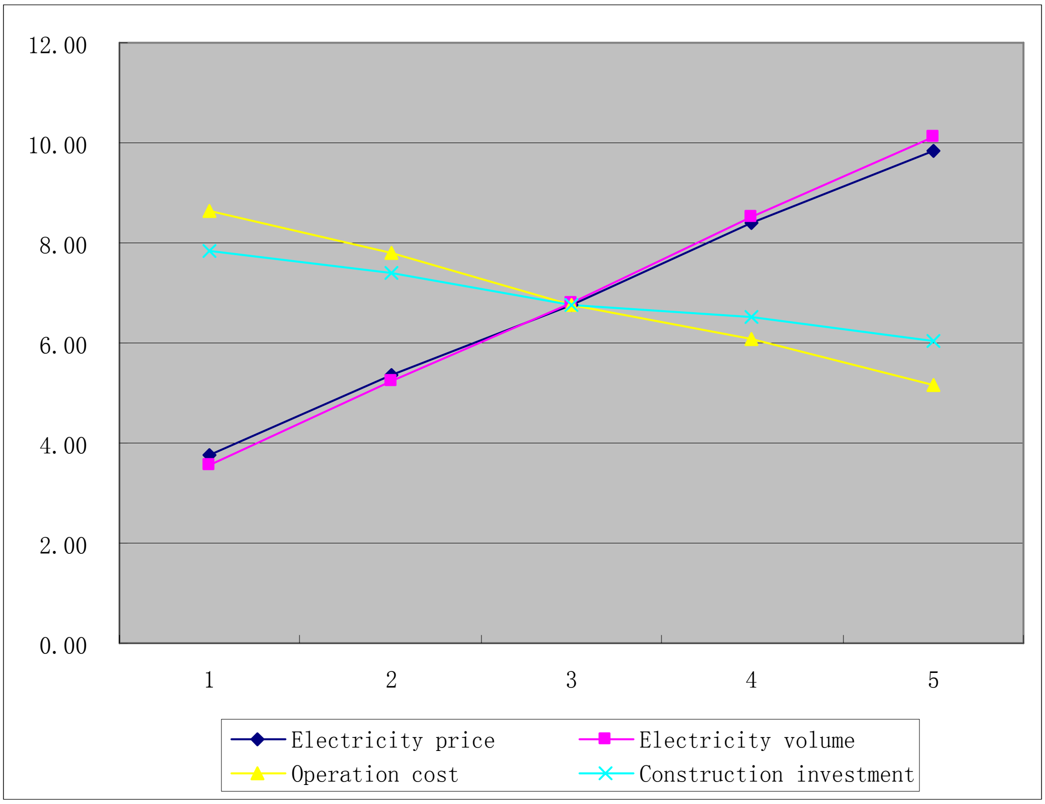

Figure 3. IRR sensitivity to different financial parameters of the Project (total investment, without CDM)

When the three financial parameters above fluctuated within the range from -10% to +10%, the IRR will not exceed 12%, as shown in table B5.4 and figure 3. So, the three parameters will not affect the investment analysis.

Step3 Barrier Analysis

Sub-step 3a. Identify barriers that would prevent the implementation of type of the proposed project activity:

To determine that if there are certain barriers, which would prevent the implementation of the type of project activity from being carried out if the project activity was not registered as a CDM activity. Those barriers include:

Technological barriers (Details should be shown especially for the project itself)

Pure low temperature waste heat recycling power generation is a relatively mature technology in most developed countries. The implementation of these technologies in China has been prevented to some degree by the high cost of advanced imported equipment. This can be demonstrated by the fact that although the NEDO demonstration project was highly successful, the manufacturer of the waste-heat utilization technology has been unable to build up substantial sales to other cement plants in China due to

the high cost of its equipment.[6] The high cost of equipment prevents Chinese companies from implementing these technologies.

Domestic industrial technology companies have been developing waste heat utilization technologies, but these technologies have not yet achieved the same standards in efficiency and in particular reliability as foreign manufacturers[7]. In addition the technologies have only become operational recently and the reliability remains unproven. This creates uncertainty with respect to future income and costs and presents significant risk to the project.

Besides, the project owner has no experience on operation of power generation, they have been faced many challenges from power station. The project owner has made special arrangement for its staff to become familiar with waste heat capture and utilization technology. Staff of the project attended the training sessions in order to operate and maintain the waste heat utilization equipment. All of these is trying to decrease the technological operation risk .For all mentioned above, the project do face technological barriers.

Investment barriers:

Cement industries is now considered as highly energy consumption and environment polluting , this is sufficient reason for a bank not to extend a loan to the project owner.

As the project is a domestically oriented manufacturer with limited experience with international transaction, alternative investment channels such as through international capital markets were not available to the project owner.

So the project can't obtain investment approach because it's lack of economic and finance feasibility. The project owner is a private company, and as a building materials practitioner the project owner is lack of experience and advantage in power investment, so the investment risk is greater. For all mentioned above, the project do face investment barriers.

In conclusion, for the technology barriers, investment barriers, the project as not a CDM activity *(alternative 1))* will face a lot of barriers on operation. Therefore, the project owner hopes to get higher CDM revenue to make the project feasible.

We conclude that on the basis of the barrier analysis (Sub-step 3a) Alternatives Combination II can be eliminated as baseline scenario. Thus the only remaining baseline scenario is Alternatives Combination I**,** i.e. the current practice at cement production facilities in the project area, i.e. the production facility imports power from the grid and does not utilize the waste heat.

Milestones of the proposed project is showed in the following table.

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[6] The first applications of advanced waste heat utilization technology in the Chinese cement industry was a demonstration project at the Anhui Ningguo Cement Plant supported by the New Energy and Industrial Technology Development Organization (NEDO) of Japan and the State Development and Planning Commission which became operational in 1998.

[7] See (Refer to) for more information on energy efficiency promotion policies: Global Environment Institute(2005), Financing of Energy Efficiency Improvement for Cement Industry in China, GEI Report, January 2005.

Table B.5.5 Milestones of the proposed project

Time	Milestones
05/2007	Environmental impact assessment was approved by Environmental Protection Administration of Jiangsu Province.
07/2007	CDM issues are taken into consideration, when the proposed project gained its approval from government, it is recommended that the project owner to apply for support from CDM.
07/2007	Feasibility Study Report was approved by Economy and Trade committee of Jiangsu Province.
09/2007	Main equipments boilers order contract signed.
10/2007	The 5000t/d cement production line was put into production.
03/2008	Construction started.

Sub-step 3 b. Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

The current practice for new cement production facilities in the project area, i.e. import of power from the grid and non-utilization of waste heat, is not affected by the above mentioned barriers. The continued consumption of power from the grid does not involve any risks and is common for cement plants in the region.

Step 4 Common practice analysis

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

According to Statistic Data of 2007, there are 291[8] cement companies in Jiangsu Province, and among which new dry cement lines in Jiangsu take a proportion of 58.6% [9]of total cement clinker production in Jiangsu Province, which means new dry cement process is the dominant cement process in Jiangsu Province. And among the 291 cement companies in Jiangsu Province, according to statistic data from *Economy and Commerce Commission of Jiangsu Province*, there are only 10 cement plants which intend to implement Waste Heat Recovery project and try for CDM (including the proposed project shuanglong project itself)[10].The information of the projects is shown in the following table.

Table B.5.6 Basic situation of cements with similar dimensions in Jiangsu

No .	Project Name	Location	Scale	Comments/Discussion
1.	Jiangsu Henglai Building Materials Co. Ltd	Xizhuang Village, Yanggang Town,	2000 t/d +2000 t/d +5000 t/d	Registered, http://cdm.unfccc.int/Projects/DB/TUEV-SUED1192017345.26/view

[8] http://www.in-en.com/coal/html/coal-1240124081136556.html

[9] http://www.in-en.com/coal/html/coal-1240124081136556_3.html

[10] Source: Local government statistic data from ***Economy and Commerce Commission of Jiangsu Province***

		Yixing City		
2.	Yixing Jiaoqiao Cement Waste Heat Utilization Project	Yixing, Jiangsu Province	5000 t/d	Construction Started and GSP started; http://cdm.unfccc.int/Projects/Validation/DB/3165SMIT6WDZ7R7VUD8XW999BICA5W/view.html
3.	Jiangsu Jinshu Cement Waste Heat Utilization Project	Yixing, Jiangsu Province	2500 t/d	Construction Started and and GSP started; http://cdm.unfccc.int/Projects/Validation/DB/3165SMIT6WDZ7R7VUD8XW999BICA5W/view.html
4.	Zhonglian Julong Cement Co. Ltd	Beijiao, Xuzhou City	3700t/d +5000 t/d	Construction Started and GSP started; http://cdm.unfccc.int/Projects/Validation/DB/XMK60RVVULIX0O18721IZHCTCAPAFY/view.html
5.	Jiangsu Qingshi Cement Waste Heat Utilization Project	Yixing, Jiangsu Province	1000 t/d +2000 t/d +5000 t/d	Construction Finished and GSP started; http://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1188202627.76/view
6.	Yixing Tiansheng Waste Heat Utilization Project	Yixing, Jiangsu Province	2500 t/d	Construction Finished and GSP started; http://cdm.unfccc.int/Projects/Validation/DB/CZM2J3IQ4FK4L8M1QLE3XVZB0BC85P/view.html
7.	Jiangsu Jinfeng Cement Waste Heat Utilization Project	Changzhou, Jiangsu Province	2500 t/d +5000 t/d	Construction Started and is approved by DNA of China; http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1839.pdf
8.	Jiangsu Leida Cement Waste Heat Utilization Project	Dongtai, Jiangsu Province	2×5000 t/d	Construction Started and Applying for CDM support[11]
9.	Jiangsu Sute Cement Waste Heat Utilization Project	Liyang, Jiangsu Province	2500 t/d +5000 t/d	

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

The existence of above projects will not affect the additionality of the proposed project. Because:

Among the above listed projects (Table B.5.6), project (No.1.) is registered; projects (No.2.3.4.5.6.) have started global stakeholder consultation; project (No.7.) is approved by DNA of China, that means this

[11] Source: Local government statistic data from ***Economy and Commerce Commission of Jiangsu Province***

project is also applying support from CDM; the left 2 projects (No.8.9.) are also applying support from CDM according to statistic data from local government *Economy and Commerce Commission of Jiangsu Province.*

So, it is clear that there is no existing cement plant that has applied a cement waste heat recovery project without CDM. The proposed project is not a common practice, it has a strong additionality.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

The project will calculate GHG emission reductions carried out by the project activity according to methodology ACM0012.

The project activity carries out GHG emission reductions by substituting part of electric power produced by fossil fuel plant with cement plant's waste heat recycle and utilization. The emission reductions (ER_y) of the project activity in year *y* are the difference between baseline emission (BE_y) and project emission (PE_y), and the calculation formula is as follow:

$$ER_y = BE_y - PE_y \quad (1)$$

Where:

BE_y are the avoided baseline emissions in year y, expressed in tCO2.

PE_y are the project emissions due to fuel consumption changes in the cement kilns, of the cement works where the proposed project is located, as a result of the project activity in year y, expressed in tCO2.

The calculation methods of project emission and baseline emission which determine the emission reductions will be instructed in the follow.

Step1: Estimate the Baseline Emission (BE_y)

The baseline emissions for the year y shall be determined as follows:

$BE_y = BE_{En,y} + BE_{flst,y}$ are total baseline emissions during the year y in tons of CO2

Where:

BE_y are total baseline emissions during the year y in tons of CO2;

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

$BE_{flst,y}$ Baseline emissions from generation of steam, if any, using fossil fuel, that would have been used for flaring the waste gas in absence of the project(t CO2e per year). This is relevant for those project activities where in the baseline steam is used to flare the waste gas.

According to ACM0012, the calculation of baseline emission ($BE_{En,y}$) depends on the identified baseline scenario. And for this project the identified baseline scenario is *Scenario 1*.

The baseline emission in year y is calculated as follow:

$$BE_y = BE_{Elc,y} + BE_{Ther,y}$$

$BE_{Elc,y}$ are baseline emissions from electricity during the year y in tons of CO_2.

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

For the proposed project, $BE_{Ther,y} = 0$.

$BE_y = BE_{Elc,y}$ (2)

According to ACM0012,

$$BE_{Elec,y} = f_{cap} * f_{wg} * \sum_j \sum_i (EG_{i,j,y} * EF_{Elec,i,j,y}) \quad (3)$$

Where:

$BE_{elec,y}$ are baseline emissions due to displacement of electricity during the year *y* in tons of CO_2.

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

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

f_{wg} Fraction of total electricity generated by the project activity using waste gas. This fraction is 1 if the electricity generation is purely from use of waste gas.
NOTE: For project activity using waste pressure to generate electricity, electricity generated from waste pressure use should be measurable and this fraction is 1.

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

For the reason that the project activities is implemented in anew facility, method 2 shall be used. According to ACM0012:

$$f_{cap} = \frac{Q_{WG,y}}{Q_{WG,y}} \quad (4)$$

$$Q_{WG,BL} = Q_{BL,product} \times q_{wg,product} \quad (5)$$

Where:

$Q_{WG,BL}$ Quantity of waste gas generated prior to the start of the project activity. (Nm^3);

$Q_{WG,y}$ Quantity of waste gas used for energy generation during year y (Nm^3);

$q_{wg,product}$ Amount of waste gas/heat/pressure the industrial facility generates per unit of product generated by the process that generates waste gas/heat/pressure.

And according to external expert's evaluation , the $Q_{WG,BL}$ is calculated as follow[12]:

The annual product for a 5000t/d cement line is 1.55×10^6t clinker;

Waste gas from AQC is 1.4 Nm^3/kg; from SP is 0.8 Nm^3/kg ;

q_{wg} =2.2 Nm^3/kg

$$Q_{WG,BL} = Q_{BL,product} \times q_{wg,product}$$

$$= 155 \times 10^7 \times 2.2$$

$$= 3.41 \times 10^9 \text{ Nm}^3$$

[12] Note: The assessment is carried out by independent qualified external expert.

Together with the monitored data $Q_{WG,y}$, f_{cap} will be determined ex-post.

For a conservative purpose, a value of 0.95 is taken for f_{cap}.

Step2: Determine Baseline Emission Factor (EF_y)

According to ACM0002, The detailed steps on calculating Baseline Emission Factor (*EF_y, hereafter EF_y is used to substitute $EF_{elec,i,j,y}$* for calculation simple) are enumerated as following:

Substep1. Calculation of the Operation Margin Emission Factor ($EF_{OM,y}$)

Methodology ACM0002 provides the following four options to calculate Operation Margin Emission Factor ($EF_{OM,y}$):

(a) The Simple Operation Margin Emission Factor (S-OM);

(b) The Simple Adjusted Operation Margin Emission Factor;

(c) Dispatch data analysis Operation Margin Emission Factor;

(d) The average Operation Margin Emission Factor.

Where the option (a) —— The Simple OM method (a) can only be used where low-operating cost/must run power plants less than 50% of total grid generation. Typical low cost/must run power plants usually comprise of power generation by water energy, terrestrial heat, wind energy, low-operating cost biomass energy, nuclear power and solar energy. According to the historical generating capacity data of East China Power Grid in last 5 years, power generation from hydropower and other renewable energy accounted for the proportion far less than 50% (according to China Electric Power Yearbook, average proportion of 2000-2004 is 10%), so it meet the condition that the proportion of low-operating cost/must run power plants is less than 50% of the total grid generation. Therefore, the option (a) of Simple Operation Margin Emission Factor could be employed on calculating the project's Operation Margin Emission ($EF_{OM,y}$).

Option(b)——the option of Simple Adjusted Operation Margin Emission Factor will require the power grid to provide annual Load Duration Curve. However, Chinese electric power industry is experiencing the reforming period of "separating power grids from power plants", and most power grids and power plants take their specific dispatching data and the fuel consumption data as business secrets, so they won't release these kinds of data in public. Under most conditions, it is difficult to take the option (b) to calculate OM. With the same reason, the project also could not gain the detailed dispatching data from East China Power Grid. Therefore, option (b) is inaccessible.

Option (c)——Calculation of OM from grid dispatch data analysis can give the most reliable estimation of emission reduction since this method counted in the actual portion of the grid generation which will be substituted by output of the proposed project. However this option requires detailed running dispatch data of the connected-grid power plants. For the same reason with option (b), the project couldn't gain the complete dispatching data from East China Power Grid. Therefore, the option (c) is inaccessible.

Option (d) —— the option of average OM is suitable for low cost/must run power plant surpass 50% of the power generation of the grid, and the detailed data to apply option (b) is unavailable, and the detailed data of option (c) is unavailable. However, within the 5 years' power generation of East China Power Grid, the proportion of thermal power is far beyond 50%, so the project doesn't meet the condition of low cost/must run power plant must surpass 50%, and option (d) can't be applied.

According to the above analysis, option (a)—the option of Simple Operation Margin Emission Factor is the only appropriate option to calculate the Operation Margin Emission Factor. Therefore, the project will take option (a) to calculate the Operation Margin Emission Factor.

According to the description of ACM0002, The Simple OM emission factor ($EF_{OM, simple, y}$)is calculated as the generation-weighted average emissions per electricity unit (tCO_2e/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants. The calculating formula of $EF_{OM\ simple\ y}$ is shown in formula (3):

$$EF_{OM,simple,y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j,y}}{\sum_{j} GEN_{j,y}} \qquad (6)$$

Where $F_{i\ ,j,\ y}$ is the amount of fuel *i* (in a mass or volume unit) consumed by power plant sample *j* in year(s) *y*, *j* refers to the power sources delivering electricity to the grid, not including low-operating cost and must run power plants, and including imports to the grid;

$COEF_{i,j\ y}$ is the CO_2 emission coefficient of fuel *i* (tCO_2 /mass or volume unit of the fuel), taking into account the carbon content of the fuels used by power plant sample *j* and the percent oxidation of the fuel in year(s) *y*, and

$GEN_{j,y}$ is the electricity (MWh) delivered to the grid by source *j*.

According to the Formula (4), CO_2 emission coefficient $COEF_i$ is obtained as:

$$COEF_i = NCV_i \cdot EF_{CO_2,i} \cdot OXID_i \qquad (7)$$

Where:

NCV_i is the net calorific value (energy content) per mass or volume unit of a fuel *i*,

$OXID_i$ is the oxidation factor of the fuel (see 2006 Revised IPCC Guidelines for default values);

$EF_{CO2\cdot i}$ is the CO2 emission factor per unit of energy of the fuel *i* (tCO_2/TJ).

Based on East China Power Gird data from China Power Yearbook and China Energy Statitics Yearbook, the OM Emission Factor of East China Power Grid under the current power generation structure could be obtained as 0.9422 tCO_2/MWh.

Substep2. Calculation of the Build Margin Emission Factor ($EF_{BM,y}$)

According to the methodology ACM0002, Formula (5) is adopted to calculate baseline Build Margin Emission Factor.

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \cdot COEF_{i,m,y}}{\sum_{m} GEN_{m,y}} \qquad (8)$$

Where $F_{i,m,y}$ is the amount of fuel *i* (in a mass or volume unit) consumed by power plant sample *m* in

year(s) *y*, *m* refers to the power sources delivering electricity to the grid, not including low-operating cost and must run power plants, and including imports to the grid;

$COEF_{i,m,y}$ is the CO_2 emission coefficient of fuel *i* (tCO_2/mass or volume unit of the fuel), taking into account the carbon content of the fuels used by power plant sample *m* and the percent oxidation of the fuel in year(s) *y*, and

$GEN_{m,y}$ is the electricity (MWh) delivered to the grid by source *m*.

Project participants shall choose between one of the following two options to calculate Build Margin Emission Factor ($EF_{BM,y}$):

Option 1: Calculate the Build Margin emission factor $EF_{BM,y}$ *ex-ante* based on the most recent information available on plants already built for sample group *m* at the time of PDD submission. The sample group *m* consists of either the five power plants that have been built in most recent, or the power plant 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 from these two options that sample group that comprises the larger annual generation.

Option2. For the first crediting period, the Build Margin emission factor $EF_{BM,y}$ must be updated annually *ex-post* for the year in which actual project generation and associated emissions reductions occur. For subsequent crediting periods, $EF_{BM,y}$ should be calculated *ex-ante*, as described in option 1 above. Sample groups' choice is similar to the *Option 1*.

The proposed project chooses the *Option 1,* i.e. calculating the Build Margin emission factor $EF_{BM,,y}$ *ex-ante*. However, under the current circumstance of China, the power plants take the Build Margin data as important business data and won't let them published. Therefore, it is difficult to get the data of five power plants that have been put into operation most recently or the newly built power plant capacity additions in the electricity system that comprise 20% of the system generation. In allusion to the situation, CDM EB approves the following methodology deviation[13]:

(1) Estimating power grid's Build Margin Emission Factor according to the new increasing capacity in the past 1~3 years;

(2) Substituting installed capacity with annual power generation to estimating weighted, and suggesting to take the most advanced commercial technology efficiency level of provincial/ regional/ national power grid as a kind of conservative approximation.

The sample *m* of the proposed project according to the newly increased installed capacity of East China Power Grid of recent 1-3 years. Back to the year 2002, the accumulated newly increased installed capacity occupy 20.97% of the total installed capacity, which is the nearest to the 20% in the recent 1-3 years.

Because current statistics data can't separate coal, oil and gas fueled power, firstly the PDD make use of the latest energy balance data to calculate all sorts of emission scale in total emission from coal, oil and gas fueled power; then based on the emission factor under the business best technology, calculated the

[13] EB guidance for "Request for guidance: Application of AM0005 and AMS-ID in China, 2005.10.7": Request for clarification on use of approved methodology AM0005 for several projects in China. http://cdm.unfccc.int/Projects/Deviations

fueled power emission factor of the grid; last multiply the fuelled power emission factor and fuelled power proportion of the total power, it's the BM of the grid. Particular step and formula as follow:

1: Calculate the proportion of the CO_2 emission from coal, oil and gas fuelled power in total emission

$$\lambda_{Coal} = \frac{\sum_{i \in COAL, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (9)$$

$$\lambda_{Oil} = \frac{\sum_{i \in OIL, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (10)$$

$$\lambda_{Gas} = \frac{\sum_{i \in GAS, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (11)$$

$F_{i,j,y}$ is the consumption of fuel i in number j province y year（tce）；

$COEF_{i,j}$ is emission factor of fuel i（tCO_2/tce），considering the carbon content and oxidation rate in y year;

COAL、OIL and GAS are feet of coal, oil and gas fuel.

2:: Calculate the emission factor of fueled power

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} \quad (12)$$

$EF_{Coal,Adv}$、$EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ are emission factors of the business best efficiency of fueled coal, fueled oil and fueled gas power.

3: Calculate the BM of the Grid

$$EF_{BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} \quad (33)$$

CAP_{Total} is the new added capacity, $CAP_{Thermal}$ is the new added fueled power capacity.

The Build Margin Emission Factor ($EF_{BM,y}$) of East China Power Grid could be obtained to be: 0.8672CO_2/MWh.

Substep3. Calculate the Baseline Emission Factor (*EFy*)

According to methodology ACM0002, the Baseline Emission Factor (*EFy*) was calculated as a combined margin (CM), consisting of the weighted average of both the resulting OM and the resulting BM as following:

$$EF_y = \omega_{OM} \cdot EF_{OM,y} + \omega_{BM} \cdot EF_{BM,y} \qquad (44)$$

Where the weights ω_{OM} and ω_{NM} , by default, are 0.5, i.e. the weights of Operation Margin Emission Factor and Build Margin Emission Factor are equal.

According to the formula, the Baseline Emission Factor is obtained to be:

$$EF_{CM,y} = 0.5 \times 0.9421 + 0.5 \times 0.8672 = 0.90465 tCO_2 / MWh .$$

Step3: Estimate the Project Emission (*PE_y*)

According to the baseline and monitoring methodology ACM0012, Project Emissions(*PE_y*) include emissions due to combustion of auxiliary fuel to supplement waste gas and electricity emissions due to consumption of electricity for cleaning of gas before being used for generation of heat/energy/electricity.

$$PE_y = PE_{AF,y} + PE_{EL,y}$$

Where:

PE_y Project emissions due to project activity.

$PE_{AF,y}$ Project activity emissions from on-site consumption of fossil fuels by the cogenerationplant(s), in case they are used as supplementary fuels, due to non-availability of waste gas to the project activity or due to any other reason.

$PE_{EL,y}$ Project activity emissions from on-site consumption of electricity for gas cleaning equipment.

For the proposed project, there are no auxiliary fossil fuels consumption on-site, and there is no electricity consumption for gas cleaning , so PE_y＝0.

Step4: Estimating leakage (*LE_y*)

According to ACM0012, the leakage effect of the project activity could be neglected.

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

The detailed data and parameter used in the baseline calculation as follow.

Data / Parameter:	1.EF_{OM}
Data unit:	tCO_2/MWh
Description:	Operation Marginal Emission Factor
Source of data:	China Electric Power Yearbook 2004-2006, revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Value applied: 0.9421
Measurement	Make the ex ante estimation according to the 3 years’ average data

procedures(if any)	
Any comment:	

Data / Parameter:	2.EF_{BM}
Data unit:	tCO_2/MWh
Description:	Build Marginal Emission Factor
Source of data:	China Electric Power Yearbook 2004-2006, revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Value applied: 0.8672
Measurement procedures(if any):	Make the ex ante estimation according to the weighted emission factor of 20% recently constructed power plants
Any comment:	

Data / Parameter:	3. OXIDi
Data unit:	%
Description:	Carbon Oxygenation Rate of fuel i
Source of data used:	Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Energy; Value applied: Refer to annex 3
Measurement procedures(if any)	
Any comment:	

Data / Parameter:	4.NCVi
Data unit:	MJ/t,km3
Description:	Net Caloric Value of fuel i
Source of data used:	China Energy Statistical Yearbook 2006; Value applied: Refer to annex 3
Measurement procedures(if any)	

Any comment:	

Data / Parameter:	5. QWG,BL
Data unit:	Nm3
Description:	Quantity of waste gas generated prior to the start of the project activity.
Source of data:	External expert calculation. Value applied: 3.41×10^9 Nm^3
Measurement procedures (if any):	Estimated based on information provided by the technology supplier and the external expert on the waste gas/heat/pressure generation per unit of product and volume or quantity of production.
Any comment:	

Data / Parameter:	6. QBL ,product
Data unit:	Tons/yr
Description:	Plant or departmental. Production process which most logically relates to waste gas generation in baseline. This is estimated based on 3 years average prior to start of project activity.
Source of data:	Assessment of external expert; Value applied: 1.55×10^6t
Measurement procedures (if any):	Based on audited production records, balance sheets etc. Data for three years prior to project implementation.
Any comment:	

Data / Parameter:	7. qwg ,product
Data unit:	m3/Ton
Description:	Specific waste gas production per unit of product (departmental or plant product which most logically relates to waste gas generation) generated as per manufacturer's or external expert's data.
Source of data:	Assessment of external expert.

	Value applied: 2.2 Nm^3/kg
Measurement procedures (if any):	Assessment of external expert.
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

The PDD apply ex-ante calculation of emission reductions.

According to B.6.1, the emission reduction of the project activity in the proposed year y is the difference between the baseline emission (BE_y) and the project emission (PE_y). The calculation formula is as follow:

$$ER_y = BE_y - PE_y$$

According to the feasibility study report, the annual average electric power supply of the project is $EG_{i,j,y}$=5.414×10^7 kWh (totally supply for cement production)

According to B6.1, the baseline emission factor of the proposed project is calculated to be 0.90465CO_2/MWh by the baseline and monitoring methodology ACM0002. According to the baseline emission calculation formula in the section B.6.1, the annual GHG emission of the project's baseline is:

$BE_y = BE_{Elc,\ y}$

$$BE_{Elec,y} = f_{cap} * f_{wg} * \sum_j \sum_i (EG_{i,j,y} * EF_{Elec,i,j,y})$$
$$= 0.95 \times 1 \times 54140 \times 0.90465$$
$$= 46,529 \quad t$$

Supplemental electricity consumption is deducted from $EG_{i,j,y}$, and electricity consumption of cleaning of gas in the project is considered to be zero. So, the annual GHG emission of the project activity:

$PE_y = 0$

Therefore, the ex-ante value of the project's annual emission reductions is:

$$ER_y = BE_y - PE_y = 46,529 - 0 = 46,529 \text{tCO}_2$$

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

The estimated value of the project activity's net emission reduction in the 10 years' crediting period is **451,331** tCO2e.

Table B.6.4 Project Activity's Net Emission Reduction

Year	Estimation of baseline emissions (tCO_2e)	Estimation of the project activity emissions (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of emission reductions (tCO_2e)
2008	5,428	0	0	5,428[14]
2009	34,896	0	0	34,896[15]
2010	46,529	0	0	46,529
2011	46,529	0	0	46,529
2012	46,529	0	0	46,529
2013	46,529	0	0	46,529
2014	46,529	0	0	46,529
2015	46,529	0	0	46,529
2016	46,529	0	0	46,529
2017	46,529	0	0	46,529
2018	38,774	0	0	38,774
Total emission reductions (tCO2e)	**451,330**	**0**	**0**	**451,330**

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

B.7.1 Data and parameters monitored:

Data / Parameter:	1.$EG_{i,j,y}$
Data unit:	MWh
Description:	Electricity supplied by the project
Source of data:	Electricity Ammeter
Measurement procedures(if any)	Measured by Electricity Ammeter; Accuracy: 0.5s.
Monitoring frequency:	Monthly
QA/QC procedures:	Electricity meters will be calibrated according to national standard DL/T448-2000
Any comment:	Continuously recording.

Data / Parameter:	**2.$Q_{WG,y}$**
Data unit:	**Nm^3**

[14] Note: For conservation purpose, according to feasibility report, emission reduction of the first crediting year has a 30% discount.

[15] For conservation purpose, according to feasibility report, emission reduction of the first crediting year has a 30% discount. The first crediting year includes 2008.11-12 and 2009.01-09, which means that the CERs of the first 10 months in 2009 have a 30% discount.

Description:	Quantity of waste gas used for energy generation during year y (Nm^3)
Source of data:	Generator of gas
Measurement procedures(if any)	Direct Measurements by project participants through an appropriate metering device (turbine flow meter)
Monitoring frequency:	Continuously
QA/QC procedures :	Measuring equipment should be calibrated on regular equipment. During the time of calibration and maintenance, alternative equipment should be used for monitoring.
Any comment:	

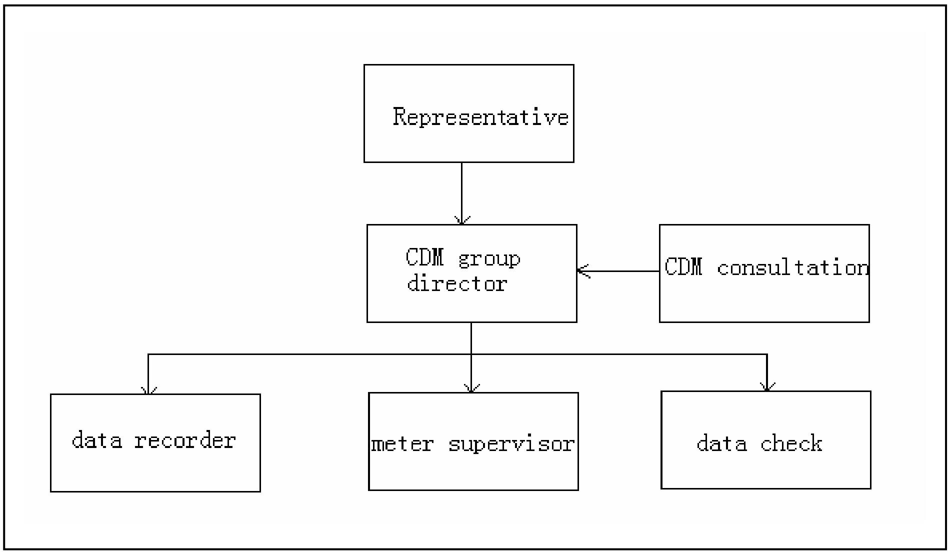
Data / Parameter:	**3.EF**elec,i,j,y
Data unit:	tCO2/MWh
Description:	CO_2 emission factor for the electricity source i(i=gr(grid)), displaced due to the project activity, during the year y in tons CO2/MWh
Source of data:	As calculated in Annex 3 of the PDD
Measurement procedures (if any):	
Monitoring frequency:	Yearly
QA/QC procedures :	
Any comment:	"Consolidated baseline methodology for grid-connected electricity generation from renewable sources(ACM0002)" shall be used

B.7.2 Description of the monitoring plan:

The monitoring plan will be responsibly implemented by the project owner, it will ensure the emission reduction of the project during crediting period.

1. Monitoring organization

The project owner will set up a special CDM group to take charge data collection, supervision, verification and recordation. The group director will be trained and supported in technology by CDM consultation, the organization of the monitor group as follows:



CDM group director: Responsibility everything for developing, operating, monitoring, maintaining and communicating.

Data recorder: Responsibilities for record monitor data and pack up periodical.

Meter supervisor: responsibility for examine and maintenance of monitor meters, inspect and lead sealing of meters with third party (power grid company).

Data check: Responsibilities for supervising of monitor data and verify monitor data with power grid company.

2. Monitoring data

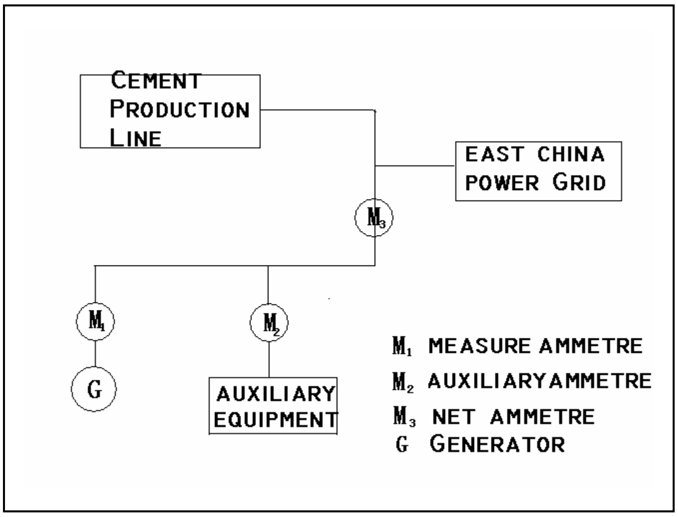
Because the baseline emission factor is ex-ante calculated, gross electricity generated, electricity used by power station of the project are mostly monitoring data.

3. Monitoring equipment and installation

Power measure equipment installation should be collocated according "Technique Management Regulation of Power Measure Equipment" (DL/T448-2000, issued by State Economic and Trade Commission on Nov.03, 2000 and implemented on Jan.1, 2001). Before the power measure equipment operation, the project owner and power grid company should check and accept according "Technique Management Regulation of Power Measure Equipment" (DL/T448-2000).

Three Electricity Ammeters should be installed for the project. The first Electricity Ammeter is a measure Electricity Ammeter, should be installed at the export of the generator (measure Electricity Ammeter) to measure net electricity generated from the unit, it's managed by power grid company; the second Electricity Ammeter should be installed at the import of the power station (auxiliary Electricity Ammeter) to measure electricity used by the power station, it's managed by the project owner, the third Electricity Ammeter(net Electricity Ammeter) should be installed before the first two Electricity Ammeters. Net electricity supplied to cement production line should be the measured electricity generated(gross electricity) subtract the auxiliary electricity.

Simplified electrical diagram is demonstrated in the following figure:



4. Data collection

The steps of monitoring net electricity supplied to facility as follows:

(1) The project owner and power gird company should read and note data from measure Electricity Ammeter and auxiliary Electricity Ammeters at 24:00 clock on last day every month;

(2) The project owner should periodical read and note data from measure Electricity Ammeter and auxiliary Electricity Ammeters on every day;

(3) The power gird company should offer gross electricity generated and auxiliary electricity every month;

(4) The project owner should offer reading record of Electricity Ammeters.

If reading of Electricity Ammeters is not within allowed precision range at any month or Electricity Ammeter function is not abnormal, net electricity supplied to facility should be confirmed as follow:

(1) Firstly, the power grid company offer one data of gross electricity generated confirmed by the project owner;

(2) The project owner should offer one data of auxiliary electricity confirmed by the power grid company.

(3) If the project owner and power grid company can't compass consistent idea about the method to estimate reading, it should be arbitrated according to conventional process to confirm consistency of reading estimated.

5. QC

The project owner should sign an agreement with power grid company that regulated quality control process of measure and adjust to ensure measure precision of net electricity supplied to facility. Seasonal Electricity Ammeter inspection and locale check should be implemented according to standard and regulations of state electric power industry. After inspection and locale check, Electricity Ammeters must be sealed. The project owner and power grid company should inspect and seal the Electricity Ammeters together, no one can remove seal or modify the Electricity Ammeter when other one (or its representative) is absent.

All the installed Electricity Ammeters should be tested by measure inspection institution entrusted by the project owner and power grid company together, 10 days after something unexpected happened as follows:

(1) Measure error of measure Electricity Ammeter and check Electricity Ammeter exceeds the permitted error range;

(2) Electricity Ammeter has been repaired as parts trouble of Electricity Ammeter.

6. Data management

The CDM group appointed by the project owner should keep monitoring data in the electron archives at every month end, electron document should be copied and printed to save as letter documents. The project owner should keep electricity sell/purchase invoice. Letter documents, as map, form, EIA report etc, should use with monitoring plan to check authenticity of data. In order to expediently obtain involved document and information of the project by verification team of DOE, the project owner should offer index of project document and monitoring report. All of the letter data and information should be keep in the archives by CDM group, all of the document should have one copy backup. All of the data should be saved after 2 years of crediting period.

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

The study of the baseline and the monitoring methodology was completed on 26/06/2008.

The key individuals involved in the baseline study include:

1. **Mr. Xu Jieming**, xujieming0@163.com, Productivity center of Jiangsu Province. No.175, Longpan Road, Nanjing City, Jiangsu Province, Tel: (8625)85485909.

2. **Mr. Duan Jianping,** duanjp008@yahoo.com.cn, Productivity center of Jiangsu Province. No.175, Longpan Road, Nanjing City, Jiangsu Province, Tel: (8625)85485909.

The above individuals or organizations are not the project participants.

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:

>>

04/07/2007, when the proposed project was approved by ***Economy and Commerce Commission of Jiangsu Province*** .

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

>>

21 years

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

C.2.1. Renewable crediting period

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

>>

C.2.1.2. Length of the crediting period:

>>

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>> 01/11/2008 or the date of registration, whichever is later.

C.2.2.2. Length:

>> The 10years crediting period of (01/11/2008- 31/10/2018) or from the date that the project is registered till the end of a 10years crediting period.

SECTION D. Environmental impacts

>>

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

>>

The environmental impact assessment (EIA) report was approved by the Environmental Protection Administration of Jiangsu Province in 28/05/2007.

The environmental impacts arising from the Project are analyzed in the following two phases:

Construction Phase

- Atmosphere impact

During the construction period, the constructing machine and the conveyance will discharge exhausted gas. Earthwork, loading and unloading of the construction materials, dump and transportation process will produce dust. So management in constructing area will be strengthen, workplace and hillock will be watered properly, and the constructing area will be set up barriers. By taking these measures, the environmental quality of atmosphere during the construction period could reach the standard.

- Noise impact

Running of constructing machines and conveyances in the construction period will bring noise pollution. Fitment, installation of electric saw and crane will also produce noises. Mix of these noises will produce higher sound and broader radiation scope. Work time will be properly arranged, constructing measures with less noises will be taken as possible, number and density of motor vehicles will be cut down to guarantee that the noises will not exceed the standard during the construction period.

- Waste water impact

Waste water during the construction period mainly comprises of living waste water and production waste water. The production waste water is composed by slurry, cooling water of machines and the cleaning water, which contains some soil and greasy dirt. Living waste water will be mainly produced by construction team, including washing water and flushing water, which contains lots of organic matters and pathogenic agents. Improper disposing of the waste water will affect the health of water body and the workers. Waste water production will be reduced and water collection pool will be constructed. Waste water will be collected up to be discharge into municipal pipeline grid and disposed by waste water treatment plant. By taking these measures, waste water produced during the construction period will be guaranteed to not discharge outside, and the surrounding water environmental quality will not be affected.

- Solid waste impact

Solid waste produced during the construction period mainly composes of construction waste and domestic garbage produced by the construction team. Dust will be produced if the construction waste is not cleaned up in time. Mosquitoes and diseases will be induced if the domestic garbage is not cleaned up in time, and the environment will also be affected. The solid waste will be collected in specialty, which will be disposed by the environmental sanitation department, and secondary pollution will be avoided.

Operation Phase

- Atmosphere impact

The project itself will not produce atmosphere pollutants. But after the exhausted gas from production lines passes by the heat surface, a part of dust will be subsided and conveyed back to the cement production line by the transportation system, and the tail gas of waste heat boilers will be back to the production lines; implementation of the power generation system will improve the situation of dust in cement kilns which has reached the standard. Therefore, implementation of the project will improve the surrounding atmosphere quality in some degree.

- Waste water impact

After the pre-treatment, the waste water will be cooled by circulating water system and be utilized in the cement production lines to cool the production equipment. The waste water will not be discharged outside and will not affect the surrounding water environment.

- Noise impact

The turbo-generator plant of the project utilizes semi-closed plant, and the waste heat boiler is installed with anechoic equipment. After the disposal, the noises will be mitigated a lot. It is estimated that the contribution value of the noises mitigation to the plant boundary will be 42.5dB(A), which is lower than discharge standard. After adding to the primary value of the noise in the plant boundary, the primary level will be kept up. Because the primary noise around the plant could not reach the standard in the night, so after the construction of the project, the noises from equipment and the primary noises will still surpass

the standard in the night. For the nearest resident area is 600 meters far from the plant boundary, the noises from equipments after construction of the project will not disturb these residents.

According to the environmental impact assessment report of the project, during the construction and operation course, no other ecological environmental impact and danger will be brought up, and the construction of the project will not induce new pollutants' emission. The project will affect little on outside environment, and will not change the environmental function in local place.

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:

>>

According to the report of environment impacts and the ratification of relative government departments, the project's environment impacts are not considered significant. No instruction is applicable.

SECTION E. Stakeholders' comments

>>

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

>>

In order to investigate the attitudes of social strata on constructing the proposed project, the public participants comprise of the relative clerks in the government, general public, local residents and the organizations for research and design.

Local government and experts proposed some pieces of suggestion on environmental effect, water and soil erosion and biologic resource, and both of them are positive on the problem. They consider that the proposed project properly utilizes the cement plant's waste heat resource, and will promote the economic development in local place. They provide the letter of support, which could be rechecked by DOE.

In April, 2007, the project owner has pasted some bulletins in government site and factory, and investigated the residents around the power plants of the project by symposium. The summary of the symposium will be narrated in the section E.2. The result of public investigation could be rechecked by DOE.

E.2. Summary of the comments received:

>>

The assessment of stakeholders is summarized as follow:

Summary of stakeholders' symposium about Yixing Shuanglong Cement Plant's Low Temperature Waste Heat Power Generation Project

Time: April 24th 2007

Place: Meeting room, second floor, Yixing Shuanglong Cement Co.,Ltd

Attendee: the project owner employee, local government agent, labor union agent, neighborhood resident agent

The symposium was held on April 24th 2007 at the meeting room, Yixing Shuanglong Cement Co. Ltd. There are 2 labor union agents, 2 neighborhood resident agents, other attendees and presider.

The meeting was presided by Zhang Junwei, vice manager of Yixing Shuanglong Cement Co. Ltd. He introduced the basic content, economy benefit and environment protection benefit induced by the Project. Then the attendee declares themselves.

Labor union agent: the project is benefit to improve the employment rate, increase factory income, increase worker income, decrease heat pollution etc. The project is feasible, and all of the workers support the project.

Neighborhood resident agent: the project can't bring obvious affect, reduce heat pollution, decrease the electric demand from grid, is benefit to improve local environment, and advance employment rate. The residents support the project.

Summarize: stakeholders think that the project is benefit to improve environment, advance economy benefit, energy saving and reduce electric demand.

The project owner can provide some document about the symposium.

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

>>

All of the local residents and government support the project. According to the assessment from stakeholders, there is no necessity to adjust the design, construction and operation manner of the project at present.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Title:	-
Salutation:	Mr.
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No official funds from any Annex 1 country are involved in the proposed project.

Annex 3

BASELINE INFORMATION

For the calculation of OM and BM, open data is also published by China's DNA-National Development and Reform Commission (NDRC) of China (DNA of China) on 9th Aug. 2007. Details can be found in the following web link.

http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1364.pdf
http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1358.xls

http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1374.pdf

Table A1-A3 are the basic data of the East China Power Grid from 2003 to 2005, including installed capacities and annual power generation. TableA4-A9 is the calculation process of OM and BM emission factor of East China Power Grid.

Table A1. Basic data of East China Power Grid in 2003

Installed capacity	Unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Sum
Fuel-fired Power	MW	11092.6	22245	15321.2	9284.9	7092.8	65036.5
Hydro Power	MW	0	137.8	6054.5	649.1	6761.1	13602.5
nuclear power	MW	0	0	2406	0	0	2406
Wind & other	MW	0	0	39.7	0	12	51.7
Sum	MW	11092.6	22382.7	23821.4	9934	13865.8	81096.5

Table A2. Basic data of East China Power Grid in 2004

Installed capacity	Unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Sum
Fuel-fired Power	MW	12014.9	28289.5	21439.8	9364.5	8315.4	79424.1
Hydro Power	MW	0	126.5	6418.4	692.8	7180.1	14417.8
nuclear power	MW	0	0	3056	0	0	3056
Wind & other	MW	3.4	17.5	39.7	0	12	72.6
Sum	MW	12018.3	28433.5	30953.9	10057.3	15507.5	96970.5

Table A3. Basic data of East China Power Grid in 2005

Installed capacity	Unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Sum
Fuel-fired Power	MW	13113.5	42506.4	27688.1	11423.2	9345.4	104076.6
Hydro Power	MW	0	142.6	6952.1	749.8	8224.9	16069.4
nuclear power	MW	0	0	3066	0	0	3066
Wind & other	MW	253.3	58.8	37.2	0	52	401.3
Sum	MW	13366.8	42707.8	37743.4	12173	17622.3	123613.

Data source:

China Electric Power Yearbook 2004-2006, revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Table A4. Simple OM calculation sheet of East China Power Grid in 2003

Fuel sort	unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	subtotal	Emission factor	Oxidation rate	Average caloric value	Emission of CO_2 （tCO_2e）
								（tc/TJ）	（%）	（MJ/t,km3）	J=G×H×I×F×44/12/10000 （quality）
		A	B	C	D	E	F=A+B+C+D+E	G	H	I	J=G×H×I×F×44/12/1000 (volume)
Raw coal	Ten thousand ton	2618	6417.74	3442.4	2669.67	1754	16901.81	25.8	100	20908	334300359.13
Wash extractive coal							0	25.8	100	26344	0.00
Other wash coal							0	25.8	100	8363	0.00
Coke							0	29.2	100	28435	0.00
Coke oven gas	Hundred million m^3	1.99	0.06				2.05	12.1	100	16726	152125.76
Other coal gas		66.34					66.34	12.1	100	5227	1538454.90
Crude oil	Ten thousand ton						0	20	100	41816	0.00
Gasoline								18.9	100	43070	0.00
Diesel oil		1.26	14.71	13.99			29.96	20.2	100	42652	946463.80
Fuel oil		95.49	0.76	174.48		18.89	289.62	21.1	100	41816	9369683.52
LPG							0	17.2	100	50179	0.00
Refine dry gas		0.49	0.96				1.45	15.7	100	46055	44564.35
Nature gas	Hundred million m^3						0	15.3	100	38931	0.00
Other oil production	Ten thousand ton	18.91	5.3	15.04			39.25	20	100	38369	1104387.72
Other coke production							0	25.8	100	28435	0.00

Other energy	Ten thousand tce	5.68		7.08			12.76	0	100	0	0.00
										sum	347456039.18

Table A5. East China Grid Fuel-fired Power Generation of 2003

	Generation	Self using ratio	Power supplied							
	（MWh)	（%）	（MWh)		From Shanxi Yangcheng to East China Grid(MWh)		10,705,870			
Shanshai	69444000	5.14	65,874,578		Emission Factor of Shanxi Yangcheng		0.949780	Coal Consumed 343(gce/kWh)		From Huazho Grid(MWh)
Jiangsu	133277000	5.9	125,413,657							Emission Factor of Hua
Zhejing	83089000	5.31	78,676,974							
Anhui	54156000	6.06	50,874,146		Total Emmision tCO2	368,586,454				
Fujian	42146000	5.07	40,009,198		Total Power Supplied MWh	385,310,464				
Sum			360,848,554	2003 y	Emission Factor	0.956596				

Table A6. Simple OM calculation sheet of East China Power Grid in 2004

Fuel sort	unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	subtotal	Emission factor	Oxidation rate	Average caloric value	Emission of CO_2 （tCO_2e）
								（tc/TJ）	（%）	（MJ/t,km3）	J=G×H×I×F×44/12/10000 （quality）
		A	B	C	D	E	F=A+B+C+D+E	G	H	I	J=G×H×I×F×44/12/1000 (volume)
Raw coal	Ten thousand ton	2779.6	7601.9	4008.9	2906.2	2183.7	19480.3	25.8	100	20908	385300230.33
Wash extractive coal							0	25.8	100	26344	0.00
Other wash			5.46			4.63	10.09	25.8	100	8363	79826.01

coal											
Coke							0	29.2	100	28435	0.00
Coke oven gas	Hundred million m^3	2.59					2.59	12.1	100	16726	192197.91
Other coal gas		72.46					72.46	12.1	100	5227	1680380.49
Crude oil	Ten thousand ton						0	20	100	41816	0.00
Gasoline							0	18.9	100	43070	0.00
Diesel oil		2.69	27.17	6.23			36.09	20.2	100	42652	1140116.11
Fuel oil		58.52	55.07	202.89		23.26	339.74	21.1	100	41816	10991147.99
LPG							0	17.2	100	50179	0.00
Refine dry gas		0.77	0.55				1.32	15.7	100	46055	40568.93
Nature gas	Hundred million m^3		0.14				0.14	15.3	100	38931	30576.41
Other oil production	Ten thousand ton	21.22	1.37	24.89			47.48	20	100	38369	1335957.42
Other coke production							0	25.8	100	28435	0.00
Other energy	Ten thousand tce	6.43		15.48			21.91	0	100	0	0.00
										sum	400791001.59

Table A7. East China Grid Fuel-fired Power Generation of 2004

	Generation	Self using ratio	Power supplied								
	（MWh)	（%）	（MWh)		From Shanxi Yangcheng		11,649,610				

					to East China Grid(MWh)						
Shanshai	71127000	5.22	67,414,171		Emission Factor of Shanxi Yangcheng		0.944241	Coal Consumed 341 (gce/kWh)		From Huazhong Grid(MWh)	26,933,850
Jiangsu	163545000	5.93	153,846,782					0.944241		Emission Factor of Huazhong	0.827319
Zhejing	95255000	5.68	89,844,516								
Anhui	59875000	6.03	56,264,538		Total Emmision tCO2	434,068,359					
Fujian	50490000	6.07	47,425,257		Total Power Supplied MWh	453,378,723					
Sum			414,795,263	2004 y	Emission Factor	0.957408					

Table A8. Simple OM calculation sheet of East China Power Grid in 2005

Fuel sort	unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	subtotal	Emission factor	Oxidation rate	Average caloric value	Emission of CO_2 （tCO_2e）
								（tc/TJ）	（%）	（MJ/t,km3）	J=G×H×I×F×44/12/10000 （quality）
		A	B	C	D	E	F=A+B+C+D+E	G	H	I	J=G×H×I×F×44/12/1000 (Volume)
Raw coal	Ten thousand ton	2847.31	9888.06	4801.52	3082.9	2107.69	22727.48	25.8	100	20908	449526099.64
Wash extractive coal							0	25.8	100	26344	0.00
Other wash coal							0	25.8	100	8363	0.00

Coke				0.03			0.03	29.2	100	28435	806.99
Coke oven gas	Hundred million m^3	1.68	1.38		1.71		4.77	12.1	100	16726	353970.67
Other coal gas		83.72	24.97	0.06	30		138.75	12.1	100	5227	3217675.86
Crude oil	Ten thousand ton			27.01			27.01	20	100	41816	828263.45
Gasoline							0	18.9	100	43070	0.00
Diesel oil		1.25	16	4.52		1.67	23.44	20.2	100	42652	740491.04
Fuel oil		59.39	13.22	153.22		7.45	233.28	21.1	100	41816	7546991.82
LPG							0	17.2	100	50179	0.00
Refine dry gas		0.57	0.83				1.4	15.7	100	46055	43027.65
Nature gas	Hundred million m^3	1.09	1.85	0.62			3.56	15.3	100	38931	777514.36
Other oil production	Ten thousand ton	21	8.38	34.8			64.18	20	100	38369	1805849.77
Other coke production							0	25.8	100	28435	0.00
Other energy	Ten thousand tce	12.36		15.29			27.65	0	100	0	0.00
										sum	464840691.25

Table A9. East China Grid Fuel-fired Power Generation of 2005

	Generation	Self using ratio	Power supplied	Generation							
	（10^8kWh)	（MWh)	（%）	（MWh)		From Shanxi Yangcheng		77,244,00			

						to East China Grid(MWh)		0			
Shanshai	746.06	74606000	5.05	70,838,397		Emission Factor of Shanxi Yangcheng		0.938703	Coal Consumed 339	From Huazhong Grid(MWh)	160,410,000
Jiangsu	2114.29	211429000	5.96	198,827,832					0.938703	Emission Factor of Huazhong	0.772159
Zhejing	1081.1	108110000	5.59	102,066,651							
Anhui	629.18	62918000	5.9	59,205,838		Total Emmision tCO2	661,206,183				
Fujian	486	48600000	4.57	46,378,980		Total Power Supplied MWh	714,971,698				
Sum				477,317,698		Emission Factor	0.92480	2005[y]			

Source: China Energy statistics yearbook 2004-2006

Emission factor of 3 yrs(2003-2005) weighted average: **0.9422(EF_{OM})**

Table A10. Proportion of CO2 Emissions of solid, liquid and gas fuel used for power generation

		Shanghai	**Zhejiang**	**Jiangsu**	**Anhui**	**Fujian**	**Sum**	**Calorific value**	**Emission factor**	**oxidation ratio**	**Emission Reduction**
Fuel variety	Unit	A	B	C	D	E	F=A+…+E	G	H	I	J=F×G×H×I×44/12/100

Raw coal	Ten thousand ton	2847.31	4801.52	9888.06	3082.9	2107.69	22727.48	20908	25.8	1	449,526,100
Wash extractive coal	Ten thousand ton	0	0	0	0	0	0	26344	25.8	1	0
Other wash coal	Ten thousand ton	0	0	0	0	0	0	8363	25.8	1	0
coke	Ten thousand ton	0	0.03	0	0	0	0.03	28435	29.2	1	807
Sum											449,526,907
Crude oil	Ten thousand ton	0	27.01	0	0	0	27.01	41816	20	1	828,263
Gasoline	Ten thousand ton	0	0	0	0	0	0	43070	18.9	1	0
kerosene	Ten thousand ton	0	0	0	0	0	0	43070	19.6	1	0
Diesel oil	Ten thousand ton	1.25	4.52	16	0	1.67	23.44	42652	20.2	1	740,491
fuel oil	Ten thousand ton	59.39	153.22	13.22	0	7.45	233.28	41816	21.1	1	7,546,992
Other oil production	Ten thousand ton	21	34.8	8.38	0	0	64.18	38369	20	1	1,805,850
Sum											10,921,596
Nature gas	Hundred million m^3	10.9	6.2	18.5	0	0	35.6	38931	15.3	1	777,514
coke oven gas	Hundred	16.8	0	13.8	17.1	0	47.7	16726	12.1	1	353,971

	million m^3										
Other coal gas	Hundred million m^3	837.2	0.6	249.7	300	0	1387.5	5227	12.1	1	3,217,676
LPG	Hundred million m^3	0	0	0	0	0	0	50179	17.2	1	0
Refine dry gas	Hundred million m^3	0.57	0	0.83	0	0	1.4	46055	15.7	1	43,028
Sum											4,392,189
Total Sum											464,840,691

From above table, the following can be calculated: $_{Coal}\lambda$ =96.71%, $_{Oil}\lambda$ =2.35%, $_{Gas}\lambda$ =0.94%。
Emission factor of thermal power is calculated as follow:

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,adv} + \lambda_{Gas} \times EF_{Gas,Adv}$$

$$= 0.9372$$

Table A11. Business best efficiency of all kinds of fuel-fired power

	variable	Efficiency of power supply	Emission factor of fuel （tc/TJ）	Oxidation rate	Emission factor （tCO2/MWh）
		A	B	C	D=3.6/A/1000×B×C×44/12
Coal	*EFCoal,Adv*	35.82%	25.8	1	0.9508
Gas	*EFGas,Adv*	47.67%	15.3	1	0.4237
Oil	*EFOil,Adv*	47.67%	21.1	1	0.5843

Table A12. BM of East China Grid calculation

	Installed capacity of 2003	*Installed capacity of 2004*	*Installed capacity of 2005*	*Installed capacity of 2004-2005*	*Proportion of newly installed capacity*
	A	*B*	*C*	*D=C-B*	
Fuel-fired Power	*65036.5*	*79424.1*	*104076.6*	*24652.5*	*92.53%*
Hydro Power	*13602.5*	*14417.8*	*16069.4*	*1651.6*	*6.20%*
nuclear power	*2406*	*3056*	*3066*	*10*	*0.04%*
Wind & other	*51.7*	*72.6*	*401.3*	*328.7*	*1.23%*
Sum	*81096.5*	*96970.5*	*123613.3*	*26642.8*	*100.00%*
Proportion of total installed capacity of 2005	*65.60%*	*78.45%*	*100%*		

$EF_{BM,y}$=0.9372×92.53%=0.8672 tCO_2/MWh。

Table A13. Calculation of BM and CM emission factor of East China Power Grid

Emission factor of fuel-fired power (tCO2e/MWh)	BM (tCO2e/MWh)	CM=(OM+BM)/2 (tCO2e/MWh)
0.9422	**0.8672**	**0.90465**

Data resource/ Calculation formula:

Change of installed capacity: this is the difference between 2003 and 2005;

Combined emission factor = (OM+BM)/2 (The default values of ω_{OM} and ω_{BM} are 0.5).

Annex 4

See B.7.2. for the monitoring plan and information