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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Jiangsu Jiaoqiao Cement Plant's Low Temperature Waste Heat Power Generation Project

Version of document: 02

Date of document: 27/06/2008

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 Jiangsu Jiaoqiao Cement Co. Ltd., Yangxiang 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 (2500t/d) of this company. Thus it is a project of waste heat recovery and power generation in cement factory. The total installed capacity is 4.5MW, expected annual power generation is 2.736×10^7kW·h and the net electricity is 2.517×10^7kW·h per year.

In the past, 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 utilized the part of waste heat emitted to the atmosphere to generate electric power, which will not affect the heat recycling utilization in the 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 22,086t; 220,869tCO_2 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 18 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)	Jiangsu Jiaoqiao 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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Yangxiang Town, Yangxiang 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 Yangxiang Town, Yixing City, in the southern mountainous area of Jiangsu Province, The specific site location is at longitude 119° 36´0.5´´E and at latitude 31° 29´51.8´´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, Jintang 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 Jiangsu Jiaoqiao Cement Low-temperature Waste Heat Power Plant

Figure 2. Sketch Map for Jiangsu Province, China

Figure 3 Geography Location of Jiangsu Jiaoqiao 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 scope 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.

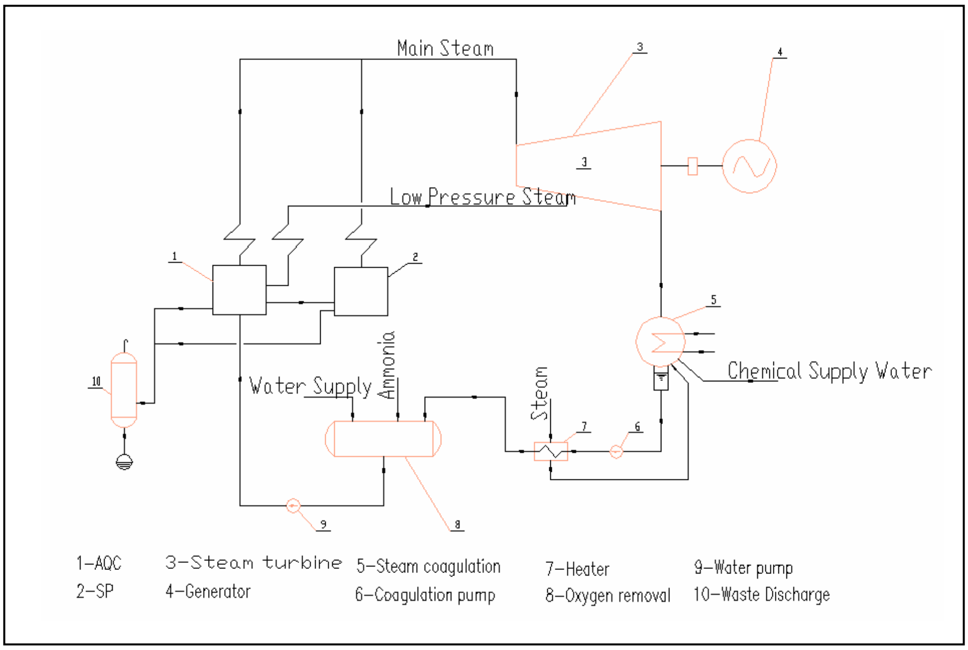

Figure 4 Waste Heat Recovery System

According to the feasibility report of the project, except for the pipeline pressure and the temperature loss, waste heat from SP boiler is 1987×10^4kJ/h and waste heat from AQC is 5021×10^4kJ/h.

The totally steam-gas produced by waste heat boilers possesses a power generation capability of 12,300 $\times10^4$kJ/h. Therefore, 4.5MW condensing steam turbines and generator will be installed for the power stations. The main parameters of the equipments employed are showed in the following table.

Table A.4.3.1 Parameters of Main Equipment

Name	Number	Technical Parameter	Manufacturer
Steam Turbine	1	Model： BN9-1.6/0.35 Nominal capacity： 4.5MW Nominal speed： 3000r/min Feed temperature： 320℃	Qingdao Jieneng Steam Co., ltd.
4.5MW Generator	1	Model： QF-K9-2 Nominal capacity： 4.5MW Nominal speed： 3000r/min Nominal voltage： 10.5kV	Hangzhou Generation Co., ltd
2500t/d AQC Boiler	1	Waste gas cons： 180，000 Nm3/h—360℃ Steam Output： 1.7 MPa, 345 ℃ Feed Water Temperature： 55℃	Hangzhou Boiler Co., ltd
2500t/d SP Boiler	1	Waste gas cons： 340000m3/h—350℃ Steam 1.7 Mp—330 ℃—23 t/h Feed Water Temperature： From AQC	

The generator terminal voltage is 10.5kV, 10kV electric power generated by 4.5MW generator is conveyed to a substation with the specification of 35/10kV.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 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 22,086 tCO2e annually； And 220,869 tCO2e within the 10-year credit period.

Table A.4.4.1 Estimated amount of emission reduction over chosen crediting period

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	
Years	**Annual estimation of emission reductions in tones of CO_2 e**

2008	2,656[1]
2009	17,077[2]
2010	22,770
2011	22,770
2012	22,770
2013	22,770
2014	22,770
2015	22,770
2016	22,770
2017	22,770
2018	18,975
Total estimated reductions (tonnes of CO_2e)	**220,869**
Total number of crediting years	**10**
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	**22,086**

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 AM0024: "Consolidated baseline methodology for waste gas and/or heat and/or pressure for power generation" (AM0024/Version 01, Sectoral Scope: 01 and 04, 04 30 September 2005). 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， EB36） http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

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[1] 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.

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

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The methodology AM0024 (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 Comparison of applicability conditions

	Methodology AM0024	The Proposed Project Activity
1	The electricity produced is used within the cement works where the proposed project activity is located and excess electricity is supplied to the grid; it is assumed that there is no electricity export to the grid in the baseline scenario (in case of existing captive power plant);	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 AM0024.
2	Electricity generated under the project activity displaces either grid electricity or from an identified specific generation source. Identified specific generation source could be either an existing captive power generation source or new generation source;	Energy generated under this project displaces grid electricity, which is in consistent with AM0024.
3	The grid or identified specific generation source option is clearly identifiable;	The grid here is East China Power Grid is clearly defined.
4	Waste heat is only to be used in the project activity;	Waste here in this project is only to be used in Jiaoqiao cement company for electricity generation purpose, which is in consistent with AM0024.
5	In the baseline scenario, the recycling of waste heat is possible only within the boundary of the clinker making process (e.g. clinker production lines in baseline scenario could include some heat recovery systems to capture a portion of the waste heat from the cooler end of	Before the proposed project, a portion of the waste heat from the cooler end of the clinker kiln is used to heat up the incoming raw materials and the rest waste heat is released into the atmosphere, the proposed project is going to use the heat that is released into the air for electricity generation purpose, which is in consistent with

	the clinker kiln and use this to heat up the incoming raw materials and fuel - so called Type 1 Waste Heat Utilization as described in explanatory note below)	AM0024.

Therefore, the methodology AM0024 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 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.
Project Activity	On-site fossil fuel consumption due to the project activity	CO_2	Included	Maybe an important emission source.
		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 AM0024, 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

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

site.

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

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

1.A Identify and list, within the local context, the current business, as usual utilization of, and options technically feasible for, waste heat utilization. Include an assessment of potential use of waste heat in the cement work. For identifying and assessing the potential alternative waste heat uses in the baseline, the following approach should be used:

o *Identify the current use of waste heat from the kilns at the cement works and identify the normal uses for waste heat in the cement production process in the local context, which would be replaced by the project activity;*

The current situation in Jiaoqiao cement company plant is that most of the waste heat from the kilns is vented to atmosphere and some is re-circulated to pre-heat the raw materials and coal prior to entering the milling machines.

o *Establish whether there are other demands for any additional waste heat use that should be considered as part of the baseline;*

The most usual way is to release the waste heat into air. There are no other potential demands for heat or other industry utilization of the additional waste heat around the project site.

o *Demonstrate that this waste heat is within the energy balance boundary of the clinker making process (Type 1 waste heat utilization as earlier defined which is a condition of applicability of this methodology).*

The waste heat used is within the boundary of the clinker making process as it occurs to heat the coal that is milled for raising the heat for the clinker production and the raw materials that are used to make the clinker. As outlined in methodology, before and after measurements of specific fuel consumption per unit clinker output of the clinker lines connected to the Project Activity would capture any change in emission resulting from this change in Type 1 waste heat flows.

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

o For identifying the current electricity supply and demand baseline, the following should be used:

i. *ECEMENT and ELOAD are the electricity demand of the cement works and other local loads, which should be included in the Project Design Document for at least two years prior to the start date of the project activity. Ex-ante projection of these demands over the crediting period should be presented.*

The meter records and production plan of the cement works and load design data of the cement works can be used for this estimate as can the data for other local loads (if any).

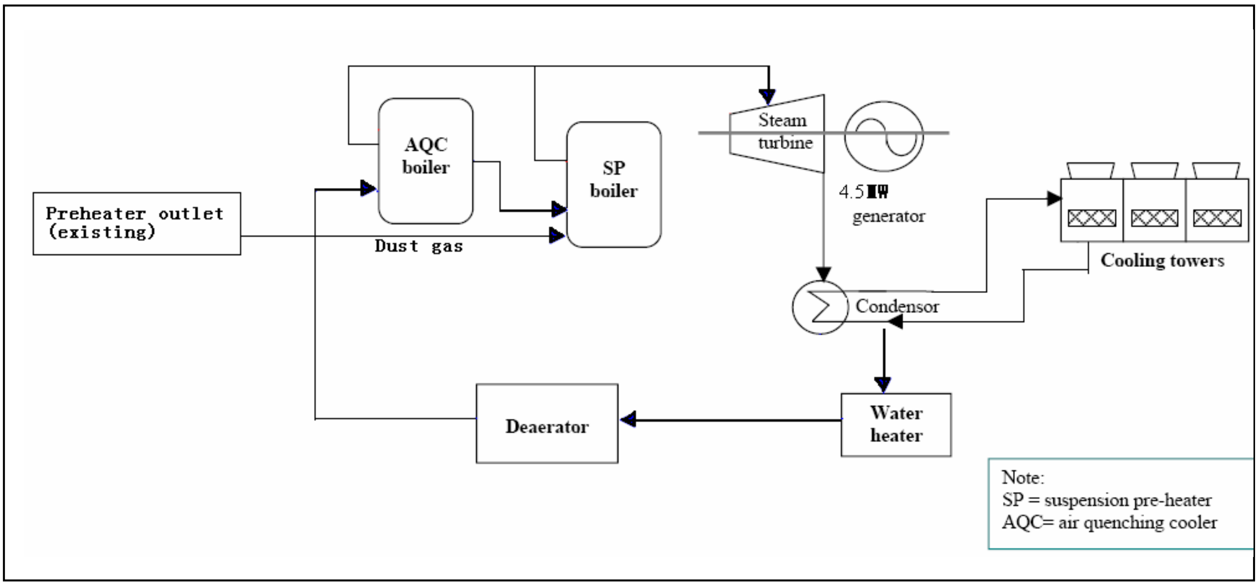
ii. *EGATEXIST is the baseline electricity generation of the existing captive power plant (if existing). Production data for at least the two years prior to the start date of the project activity should be included in the Project Design Document. Ex-ante projection of production capacity for the crediting period too should be included.*

The production records and plan of the captive power plant can be used for this estimate.

iii. *The data in (i) and (ii) above should be collected once at the start of each crediting period of the*

project activity and can be analyzed to see if there is an increase of energy demand expected and how this demand could be met, by supply from the grid or alternative captive power sources.

The following figure outlines the key components of waste heat utilization system for easy understanding of the process.



And the following table shows:

Table B.4.1 History and future electricity supply and demand

Year	2005	2006	2007(estimated) (pre-estimated)	2008-2018(estimated) (pre-estimated)
Total electricity needed (MWh)	80198.853	79187.310	80198.853	80198.853
Electricity consumption of 2500 t/d cement production line(MWh)	1706.07	1698.78	1706.07	1706.07
Electricity from the Grid of 2500 t/d cement production line(MWh)	1706.07	1698.78	1706.07	1706.07
Electricity	0	0	0	2517

generated from waste heat utilization of 2500 t/d cement production line(×10^4KWh)				

From table above, it shown that historically the project owner has imported all of their electricity from the regional grid. The future demand shows that there will be no change in the power demand on the production line. Therefore the project owner will not be under any pressure to meet additional power needs and would be expected to continue with power purchase from East China Power Grid

o The following broad categories of options should be analyzed to identify baseline electricity options:

- Supply from grid;
- Supply from existing capacity or in case of increase of energy demand expansion of captive power generation source, if one exists; and
- Construction of a captive plant with different fuel options if electricity demand is increasing.

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

1) The proposed project activity not undertaken as a CDM project activity;
2) Import of electricity from the grid;
3) Existing or new captive power generation on-site, using other energy sources than waste heat and/or gas, such as coal, diesel, natural gas, hydro, wind, etc;
4) A mix of options 2) and 3), in which case the mix of grid and captive power should be specified;
5) Other uses of the waste heat and waste gas.

Alternative 1)- The proposed project activity not undertaken as a CDM project activity;

The project owner may adopt waste heat recovery utilization systems for power generation to generate electricity. It is in compliance with all applicable legal and regulatory requirements. Although China Government encourage the cement plant to recovery the waste heat from the process of cement production[4], however, there is no legal binding in China cement industry to implement the Project Activity, and because of series of barriers (more details in B5) ,this alternative is predictably prohibitive. So, alternative 1) can not be taken as baseline scenario.

Alternative 2)- Import of electricity from the grid;

The current situation and the most usual practice of the project owner is to purchase all the electricity from East China Power Grid, which would result in an equivalent amount of $CO2$ emissions corresponding to the power generation in the grid connected fossil fuel power plants. This alternative is in compliance with all applicable legal and regulatory requirements and there will be no additional investment and cost, it is economically attractive.

Currently, the project owner purchases electricity from the East China Power Gird for cement production. This alternative scenario is actually what the Jiaoqiao Cement plant has been taken before the proposed Project Activity. So, alternative 2) can be taken as baseline scenario for the project.

Alternative 3)- Existing or new captive power generation on-site, using other energy sources than waste heat and/or gas, such as coal, diesel, natural gas, hydro, wind, etc;

[4] http://www.bmlink.com/news/html/news_Info82_092641817.html

According to the electric power rules in China, fossil fuel power plant with the capacity below 135MW is prohibited to construct if the district is covered by a big power grid[5], and thermal power units with the single-unit capacity below 100MW[6] are strictly controlled to be constructed. Therefore, constructing a fossil fuel (*included coal, diesel, natural gas etc.)* power plant with equal capacity (4.5MW) will violate the requirements of national rules and laws. Therefore it is not a credible baseline scenario.

There is no usable hydro and wind resource at the project site. So, alternative 3) can not be taken as baseline scenario.

Alternative 4)- A mix of options 2) and 3), in which case the mix of grid and captive power should be specified;

Alternative 3) is not feasible, so it's not feasible of alternative 4) (A mix of options 2) and 3)); So, alternative 4) can not be taken as baseline scenario.

Alternative 5)- Other uses of the waste heat and waste gas

Currently, most of waste heat from clinker production has been emitted into the air. The cement plant lies in southeast of China where civil heating is not demanded. There are no any other potential demands for heating or other industry utilization of the additional waste heat locally. Therefore, alternative 5) can not be taken as baseline scenario.

Step 2: Compliance with regulatory requirements:

As required in methodology, alternative that do not meet the regulatory requirements should be deleted.

As discussed in step 1, alternative 3) and 4) should be deleted because of inconsistence with national regulation.

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

As discussed above, among all the plausible baseline scenarios mentioned above, only Alternative 2), i.e., import of equivalent amount of electricity from East China Power Grid can be taken as the proposed project's baseline scenario.

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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Step1. Identification of alternatives to the project activity consistent with current laws and regulations

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[5]. http://www.law-lib.com/law/law_view.asp?id=38686

Notification from State Council on Prohibiting Constructing Thermal Power Units with the Installation Capability under135 Thousand KWh, 2002

[6] http://www.law-lib.com/law/law_view.asp?id=13423

Temporary Rules on Small-scale Thermal Power Units' Construction Management (August, 1997).

The objective of Step1 is to decide the actual and feasible substitutable scheme by the following sub-steps. These actual and feasible substitutable scheme will become (a part of) baseline scenario.

Sub-step 1a. Identify alternatives to the project activity:

Plausible and credible alternatives available to the project that provide outputs or services comparable with the proposed CDM project activity include:

1) The proposed project activity not undertaken as a CDM project activity;
2) Import of electricity from the grid;
3) Existing or new captive power generation on-site, using other energy sources than waste heat and/or gas, such as coal, diesel, natural gas, hydro, wind, etc;
4) A mix of options 2) and 3), in which case the mix of grid and captive power should be specified;
5) Other uses of the waste heat and waste gas.

According to B4, alternative 2) are in consistent with current laws and regulations and is the identified alternative to the proposed project activity.

Sub-step 1b. Enforcement of applicable laws and regulations:

According to B4:Alternative 2)- Import of electricity from the grid is in compliance with all legal and regulatory requirements of the host country China.

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

Tools 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 *Economic Assessment method and parameter of Construction Projects by NDRC(National Development and Reform Committee) and MOC(Ministry of Construction),* 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.5.1 Basic parameters for calculation of financial indicators

Installed capacity:	4.5MW
Operation capacity:	3.8MW
Operation period:	7200hours/y
Estimated annual generated electricity:	3.736×10^{7}kW·h
Estimated annual net-electricity:	2.517×10^{7}kW·h
Project lifetime:	20yrs
Capital investment:	RMB 30.51 million Yuan
Operation Cost	RMB 4.49 million Yuan
Prospective electricity price:	RMB 0.323Yuan/kWh (excluding VAT)
Tax:	income tax rate is 25%; 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 US$/t CO_2e (Exchange rate: 1:7.53) (Term Sheet for the Purchase of CERs)

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

IRR and NPV of the Project, with and without CDM revenues, are shown in Table 2. Without CDM revenue, the IRR of total project investment is 8.82%, which is much lower than 12.0%[7].The proposed project can be considered as financially unattractive to investors. It is infeasible in business.

With the CDM revenue (10 US$ /t CO_2e, 10 years crediting period), CERs revenue will significantly improve both IRR and NPV. IRR of total investment will be improved significantly to be 12.38%. Therefore, the project with CDM revenue can be considered as financially attractive to investors, and the business feasibility will also be improved.

[7] Economic Assessment method and parameter of Construction Projects by SDPC and MOC

Table B.5.2. Financial indicators of Jiaoqiao Cement Plant's Low Temperature Waste Heat Power Generation Project

	IRR(total investment)benchmark=12%
Without CDM	8.82%
With CDM	12.38%

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 Table 3 and Figure 3 for details.

Table B.5.3 IRR sensitivity to different financial parameters of the project (total investment, without CDM)

	-10%	-5%	0	+5%	+10%
Electricity Volume	6.54	7.74	8.82	9.84	10.85
Electricity Price (excluding VAT)	6.07	7.52	8.82	10.04	11.25
Annual O&M Cost	10.21	9.53	8.82	8.07	7.32
Total Static Investment	10.26	9.52	8.82	8.14	7.54

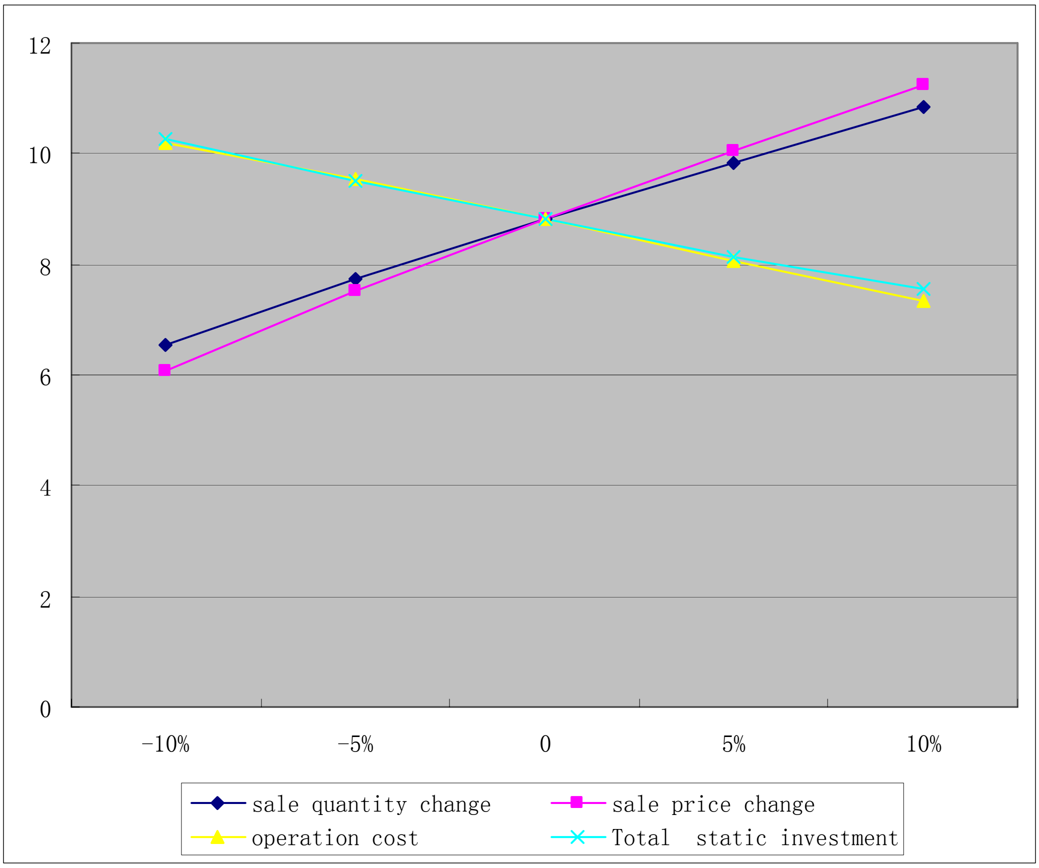

Figure 3. IRR sensitivity to different financial parameters of the Project (total investment, without CDM)

When the three financial parameters above fluctuated within the range from -10% to +10%, the IRR of total investment of the project without CDM revenue varies to different extent.

When the three parameters fluctuated, the investment analysis will not exceed 12%, as shown in table 3 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:

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[8]. 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[9]. 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.

Financial 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 and availability of alternative investment instruments (such as risk capital) provided through the investment services sector is limited in China.

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, and 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.

Milestones of the proposed project:

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[8] http://www1.dcement.com/Html/yrfd/yrfd_hl/2007-3/19/20070319181021678 37.asp

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.

[9] http://cdm.unfccc.int/UserManagement/FileStorage/0D9ELN7EWQRHPO98QE4ZA3TGZ6U665

See 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.

Time	Milestones of the proposed project
2003	The 2500t/d cement production line was put into production in 2003.
09/2006	CDM issues are taken into consideration, when the proposed project gained its approval from local government *Economy and Trade committee of Jiangsu Province*, it is recommended that the project owner to apply for support from CDM.
03/2007	Main equipments boilers order contract signed.
04/2007	Environmental impact assessment was approved by Environmental Protection Administration of Jiangsu Province
09/2007	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):

As mentioned on above, *the alternative 2)*, i.e. import of equivalent amount of electricity from East China power does not need extra investment and is in compliance with China's relative laws and rules.

And *the alternative 2)* would not face the technological and investment barriers. So the barriers mentioned above would not prevent the implementation of *the alternative 2).*

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[10] cement companies in Jiangsu Province, and among which new dry cement lines in Jiangsu take a proportion of 58.6% [11]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 Jiaoqiao project itself)[12].The information of the projects is shown in the following table.

Table B.5.4 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

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

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

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

		Yixing City		
2.	Yixing Shuanglong Cement Waste Heat Utilization Project	Yixing, Jiangsu Province	5000 t/d	Construction Started and GSP started; http://cdm.unfccc.int/Projects/Validation/DB/1EWL7LF5TW3E7WFGLRWWTU947KKQJX/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[13]
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:

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

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 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 AM0024.

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 are those from electricity generation source(s) that:

(a) would have supplied the cement works and

(b) would have been generated by the operation of grid-connected power plants in absence of the proposed CDM project activity. The baseline emissions during a given year y are calculated as:

$$BE_y = EG_{CP,y} * EF_{Elec,y} + EG_{Grid,y} * EF_{Grid,y} \quad (2)$$

Where:

$EG_{CP,y}$ is the electricity supplied from the project activity to the cement plant , expressed in MWh;

$EF_{Elec,y}$ is the emissions factor of the baseline electricity supply source, expressed as tCO_2 / MWh. If in the baseline scenario electricity is supplied from the grid, then $EF_{Elec,y}$ is the emission factor of the grid - $EF_{Grid,y}$; if electricity is supplied from the identified specific captive power generation source, then $EF_{Elec,y}$ is the emission factor of it – $EF_{Captive,y}$

$EG_{Grid,y}$ is the electricity supplied from the project activity to the grid , expressed in MWh;

$EF_{Grid,y}$ is the emissions factor of the electricity grid, expressed as tCO_2 / MWh.

In this project, there is no electricity supplied to the power gird, so $EG_{Grid,y}$=0

$$BE_y = EG_{CP,y} * EF_{Elec,y}$$

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 $EF_{Grid,y}$* 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 2002-2006 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):

$$EF_{OM,simple,y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j,y}}{\sum_{j} GEN_{j,y}} \quad (3)$$

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:

$$COEF_i = NCV_i \cdot EF_{CO_2,i} \cdot OXID_i \quad (4)$$

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);

$EF_{CO2,i}$ 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.

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \cdot COEF_{i,m,y}}{\sum_{m} GEN_{m,y}} \quad (5)$$

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:

(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 2003, 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 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

$$\lambda_{Coal} = \frac{\sum_{i \in COAL, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \qquad (6)$$

$$\lambda_{Oil} = \frac{\sum_{i \in OIL, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \qquad (7)$$

$$\lambda_{Gas} = \frac{\sum_{i \in GAS, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \qquad (8)$$

$F_{i,j,y}$ 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

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} \qquad (9)$$

$EF_{Coal,Adv}$ 、$EF_{Oil,Adv}$ 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

$$EF_{BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} \qquad (10)$$

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:

$$EF_y = \omega_{OM} \cdot EF_{OM,y} + \omega_{BM} \cdot EF_{BM,y} \quad (11)$$

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:

$$EF_{CM,y} = 0.5 \times 0.9422 + 0.5 \times 0.8672 = 0.90465 tCO_2 / MWh$$

Step3: Estimate the Project Emission (PE_y)

According to the baseline and monitoring methodology AM0024, project emission (PE_y) is the difference in CO_2 emissions from use of fossil fuel in the clinker making process in cement manufacturing unit, where the project is being implemented, before and after the project implementation.

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

where:

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

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

$COEF_{fuel,y}$ is the carbon coefficient (tCO2 / TJ of input fuel) of the fuel used in the cement works in year y to raise the necessary heat for clinker production.

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

$$EI_B = \frac{F_B}{O_{clinker,B}}$$

where:

F_B is the average annual energy consumption, expressed in TJ, of clinker making process prior to the start of operation of the project activity. At least one full year of data should be used.
If a year's worth of pre-Project Activity data is not available, then the Project Developer should outline the plan for ensuring conservativeness based on a combination of the exante design estimate of energy consumption plus available measured data.

$O_{clinker,B}$ is the average annual output, expressed in tonnes, of clinker prior to the start of operation of the project activity. At least one full year of data should be used.

$$EI_{P,y} = \frac{F_{P,y}}{O_{clinker,y}}$$

where:

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

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

$$COEF_{Fuel,y} = NCV_{fuel,y} * EF_{CO_2,fuel,y} * OXID_{fuel}$$

where:

$NCV_{fuel,y}$ is the net calorific value (energy content) per mass or volume unit of a fuel used in clinker making process in year y;

$OXID_{fuel}$ is the oxidation factor of the fuel (see Table 1-6, page 1.29 in the Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories), expressed as percentage;

$EF_{CO2,fuel,y}$ is the CO_2 emission factor per unit of energy of the fuel used in year y, expressed as tCO_2 per unit mass or volume unit.

Local values of $NCV_{fuel,y}$ and $EF_{CO2,\ fuel,y}$ should be used where available. If no such values are available, country-specific values (see e.g. IPCC Good Practice Guidance for LULUCF) are preferable to IPCC world-wide default values.

The project proponents should report ex-ante estimate of PE_y in the CDM project design document (CDM-PDD). Ex-ante estimate of PE_y could be based on feasibility report for the project activity. The exante estimate of PE_y can be calculated using the following formula:

$$PE_y = \sum_i \Delta EI_i * [O_{clinker,i}] * COEF_{fuel,i}$$

where:

I is the index for each clinker production line in the cement plant where the project activity is being implemented;

ΔEI_i is the ex-ante design estimate of the change in the energy consumption of each clinker kiln in TJ / ton Clinker, due to project implementation.

Step4: Estimating leakage (*LE_y*)

According to AM0024, 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.$EF_{CO2,i}$
Data unit:	tC/TJ
Description:	Emission factor of fuel i
Source of data used:	Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Energy
Value applied:	As in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	2.$OXID_i$
Data unit:	%
Description:	Carbon oxidation rate of fuel i
Source of data used:	Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Energy
Value applied:	As in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	3.NCV_i
Data unit:	MJ/t or MJ/km^3
Description:	Net heat value of fuel i
Source of data used:	China Energy Statistical Yearbook 2006
Value applied:	As in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	4.F_B
Data unit:	TJ
Description:	Average annual energy (fuel) consumption of clinker making process prior to project implementation.
Source of data used:	Project owner
Value applied:	2176.9
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	5.$O_{clinker,B}$
Data unit:	Ton
Description:	Average annual production of Clinker prior to implementation of project
Source of data used:	Project owner
Value applied:	682992.5

Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	6.Ecement
Data unit:	MWh
Description:	Electricity consumption of cement works prior to the project
Source of data used:	Project owner
Value applied:	Year 2005: 1706.07; Year 2006: 1698.78;
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	At least two years data should be reported in CDM-PDD. This data is used to ex-ante projection of future electricity demand.

Data / Parameter:	7.Eload
Data unit:	MWh
Description:	Electricity consumption of other load in the cements work complex prior to the project
Source of data used:	Project owner
Value applied:	Year 2005: 78492.78; Year 2006: 77488.53;
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	At least two years data should be reported in CDM-PDD. This data is used to ex-ante projection of future electricity demand.

Data / Parameter:	8.OXIDfuel
Data unit:	Fraction
Description:	Oxidation ratio of fuel used in Clinker
Source of data used:	Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	97%
Justification of the choice of data or description of measurement methods and procedures actually	

applied :	
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:

$$ER_y = BE_y - PE_y \qquad \text{(B6.3.1)}$$

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:

$$BE_y = EG_{CP,y} * EF_{Elec,y} + EG_{Grid,y} * EF_{Grid,y}$$

For the proposed project, there is no electricity supplied to power Grid, so, the baseline emission should be:

$$BE_y = EG_{CP,y} * EF_{Elec,y}$$

$=2.517\times10^4\times0.90465$

$=22,770\ tCO_2\ e$

And,

$$PE_y = (EI_{P,y} - EI_B) * O_{clinker,y} * COEF_{fuel,y} \qquad \text{(B6.3.2)}$$

where:

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

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

$COEF_{fuel,y}$ is the carbon coefficient (tCO2 / TJ of input fuel) of the fuel used in the cement works in year y to raise the necessary heat for clinker production.

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

$$EI_B = \frac{F_B}{O_{clinker,B}} \qquad \text{(B6.3.3)}$$

where:

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

be used.
If a year's worth of pre-Project Activity data is not available, then the Project Developer should outline the plan for ensuring conservativeness based on a combination of the exante design estimate of energy consumption plus available measured data.

$O_{clinker,B}$ is the average annual output, expressed in tonnes, of clinker prior to the start of operation of the project activity. At least one full year of data should be used.

$$EI_{P,y} = \frac{F_{P,y}}{O_{clinker,y}} \quad (B6.3.4)$$

where:

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

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

$$COEF_{Fuel,y} = NCV_{fuel,y} * EF_{CO_2,fuel,y} * OXID_{fuel} \quad (B6.3.5)$$

where:

$NCV_{fuel,y}$ is the net calorific value (energy content) per mass or volume unit of a fuel used in clinker making process in year y;

$OXID_{fuel}$ is the oxidation factor of the fuel (see Table 1-6, page 1.29 in the Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories), expressed as percentage;

$EF_{CO2,fuel,y}$ is the CO_2 emission factor per unit of energy of the fuel used in year y, expressed as tCO_2 per unit mass or volume unit.

Local values of $NCV_{fuel,y}$ and $EF_{CO2,\ fuel,y}$ should be used where available. If no such values are available, country-specific values (see e.g. IPCC Good Practice Guidance for LULUCF) are preferable to IPCC world-wide default values.
The project proponents should report ex-ante estimate of PE_y in the CDM project design document (CDM-PDD). Ex-ante estimate of PE_y could be based on feasibility report for the project activity. The exante estimate of PE_y can be calculated using the following formula:

$$PE_y = \sum_i \Delta EI_i * [O_{clinker,i}] * COEF_{fuel,i} \quad (B6.3.6)$$

where:

I is the index for each clinker production line in the cement plant where the project activity is being implemented;

ΔEI_i is the ex-ante design estimate of the change in the energy consumption of each clinker kiln in TJ / ton Clinker, due to project implementation.

Calculation of project emissions，(PEy)
Project emission is the difference CO2 emissions from the use of fossil fuel in the clinker making process before and after project implementation (per ton of clinker produced). Project emission is calculated using equation (B6.3.2-B6.3.6). Clinker production requires a predetermined blend of raw materials (limestone and coal) to produce a tonne of clinker, the balance of these raw materials cannot be adjusted and therefore the coal requirement per ton of

clinker produced does not change. The waste heat is therefore exactly the same with that before the implementation of the waste heat recovery project and electricity production can not be increased by increasing the quantity of coal to produce clinker. In this way, there will be no project emission, but for the monitoring purpose, the project emission will be calculated as follow. And if in any case, there should be any change in the use of fossil fuel, the project emission will be calculated according to the monitor data.

Table B6.3.1 Energy Consumption of Clinker Production

Energy Consumption Of clinker production	Baseline Energy Consumption				Project Energy Consumption			
	A	B	C	D	E	F	G	H
Calculate yearly PE_y	Full year tons of coal used	Full year tons of clinker output	Energy Value of coal used	EI_B Baseline energy consumption Per unit of clinker	Full year tons of coal used	Full year tons of clinker output	Energy Value of coal used	$EI_{P,y}$ Project energy consumption Per unit of clinker
Unit	Tons of coal	Tons of clinker	TJ/ton coal	TJ/ton clinker	Tons of coal	Tons of clinker	TJ/ton coal	TJ/ton clinker
Source	Based on 2006 data for 2500t/d	Based on 2006 data for 2500t/d	From 2006 Raw Coal Quality Assay	From Measured Data	Initially based on EI_B	Based on 2006 data for 2500t/d	From 2006 Raw Coal Quality Assay	=E/F*G
Notes	To be updated ex-post annually	To be updated ex-post annually	To be updated ex-post annually	Calculated based on 2006 data	Measured ex-post	To be updated ex-post annually	To be updated ex-post annually	Calculated ex-post annually
Value	103468	682992.5	0.02104	0.003187	103468	682992.5	0.02104	0.003187

Table B6.3.2 Project Emission

Project emission	A	B	C	D	E	F	H	I
Ex-ante estimation of	% Carbon in coal	Local Coal CV,	Calculation of TC/TJ	IPCC value	Non-Oxidation	Emission Factor $EF_{CO2,fuel,y}$	Change in energy consump	Project Direct Emissio

project emission		$NCV_{fuel,y}$	For local coal		factor		tion ($EI_{P,y}$-EI_B)	n
Unit	Fraction	TJ/ton	TC/TJ	TC/TJ	Fraction	TC/TJ	TJ/ton	tCO2/year
Source	Jiaoqiao 2006 Raw Coal Quality Analysis	Jiaoqiao 2006 Raw Coal Quality Analysis	=A/B	From IPCC 2006 Report	IPCC value for CFB Boiler	=C*(1-E)*44/12	=Table B6.3.1(D-H)	=H*F*B Table 6.3.1(F)
Notes	Data provided for each train load and value taken as weighted average for the year according to tonnage Data for all three production lines	Data provided for each train load and value taken as weighted average for the year according to tonnage Data for all three production lines		For comparison only		To be updated ex-post annually	To be updated ex-post annually	To be updated ex-post annually
Value	0.4496	0.02104	21.3688	25.8	3%	76.0017	0	0

As calculated (estimation) above, the annual GHG emission of the project activity PE_y =0.

This is for the ex-ante estimation of the project emission reduction; the exact emission of the project activity will be calculated according to monitor data during the crediting period.

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

$$ER_y = BE_y - PE_y = 22,770 - 0 = 22,770\text{tCO}_2$$.

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 220,869 tCO2e.

Table B.6.4.1 Ex-ante estimation of emission reductions:

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	2,656	0	0	2,656[14]
2009	17,077	0	**0**	17,077[15]
2010	22,770	0	**0**	22,770
2011	22,770	0	**0**	22,770
2012	22,770	0	**0**	22,770
2013	22,770	0	**0**	22,770
2014	22,770	0	**0**	22,770
2015	22,770	0	**0**	22,770
2016	22,770	0	**0**	22,770
2017	22,770	0	**0**	22,770
2018	18,975	0	0	18,975
Total emission reductions (tCO2e)	**220,869**	**0**	**0**	**220,869**

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

B.7.1 Data and parameters monitored:

Data / Parameter:	1. $F_{P,y}$
Data unit:	TJ

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[14] 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 2009.01-10, which means that the CERs of the first 10 months in 2009 have a 30% discount.

Description:	Annual energy (fuel) consumption of clinker making process after project implementation.
Source of data to be used:	Fuel purchase invoice
Value of data applied for the purpose of calculating expected emission reductions in section B.6	To be monitored. Value applied for the purpose of estimating ERs:2176.7TJ
Description of measurement methods and procedures to be applied:	Fuel consumed will be weighted before going into the kiln by weight equipment.
QA/QC procedures to be applied:	Weight equipment shall be calibrated 3 times a year, accuracy is ±1
Any comment:	Continuously recording.

Data / Parameter:	2. $O_{clinker,\ y}$
Data unit:	Ton
Description:	Annual production of Clinker after implementation of project.
Source of data to be used:	Production selling invoice& production records.
Value of data applied for the purpose of calculating expected emission reductions in section B.6	To be monitored Value applied for the purpose of estimating ERs： 103468
Description of measurement methods and procedures to be applied:	Measured by production line weight equipment
QA/QC procedures to be applied:	Weight equipment shall be calibrated 3 times a year, accuracy is ±1
Any comment:	Continuously recording.

Data / Parameter:	3. $EG_{CP,y}$
Data unit:	MWh
Description:	Expected quantity of electricity to be supplied to cement plant from project
Source of data to be used:	Electricity meter
Value of data applied for the purpose of calculating expected emission reductions in section B.6	To be monitored. Value applied for the purpose of estimating ERs:25170
Description of measurement methods and procedures to be applied:	Measured by electricity meter. Accuracy: 0.5s.
QA/QC procedures to be applied:	Electricity meters will be calibrated according to national standard DL/T448-2000
Any comment:	Online measurement & continuously recording.

Data / Parameter:	4. $NCVfuel_{,y}$
Data unit:	TJ/ton
Description:	Caloric Value of fuel used in clinker production

Source of data to be used:	Raw coal quality assay of project owner
Value of data applied for the purpose of calculating expected emission reductions in section B.6	Value will be taken according to Jiaoqiao raw coal quality assay. Value applied for the purpose of estimating ERs :0.02104
Description of measurement methods and procedures to be applied:	To be monitored.
QA/QC procedures to be applied:	Equipment shall be calibrated 1 times a year, according to national standards GB/T 212-2001
Any comment:	

Data / Parameter:	5.**EF**co2,fuel,y
Data unit:	tCO2e/TJ
Description:	GHG emission coefficient of fuel used for cement clinker production line
Source of data to be used:	Project Owner's Raw Coal Quality Analysis
Value of data applied for the purpose of calculating expected emission reductions in section B.6	To be calculated according to project owner's raw coal quality analysis; Value applied for the purpose of estimating ERs :76.0017
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	6.EF_{OM}
Data unit:	tCO_2/MWh
Description:	Operating Margin Emission Factor
Source of data to be used:	China Electric Power Yearbook 2004-2006, revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
Value of data applied for the purpose of calculating expected emission reductions in section B.6	Refer to annex 3.
Description of measurement methods and procedures to be applied:	
Justification of the choice of data or description of measurement methods and procedures actually applied :	Make the ex ante estimation according to the 3 years' average data
QA/QC procedures to be applied:	
Any comment:	

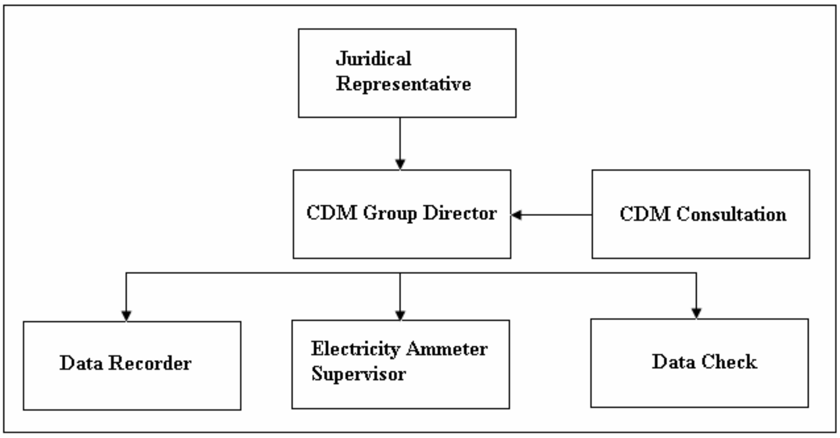
Data / Parameter:	7.EF_{BM}
Data unit:	tCO_2/MWh
Description:	Build Margin Emission Factor
Source of data to be used:	China Electric Power Yearbook 2004-2006, revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
Value of data applied for the purpose of calculating expected emission reductions in section B.6	Refer to annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Make the ex ante estimation according to the weighted emission factor of 20% recently constructed power plants
QA/QC procedures to be applied:	
Any comment:	

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, fuel (coal) used and output of clinker are mostly monitoring data.

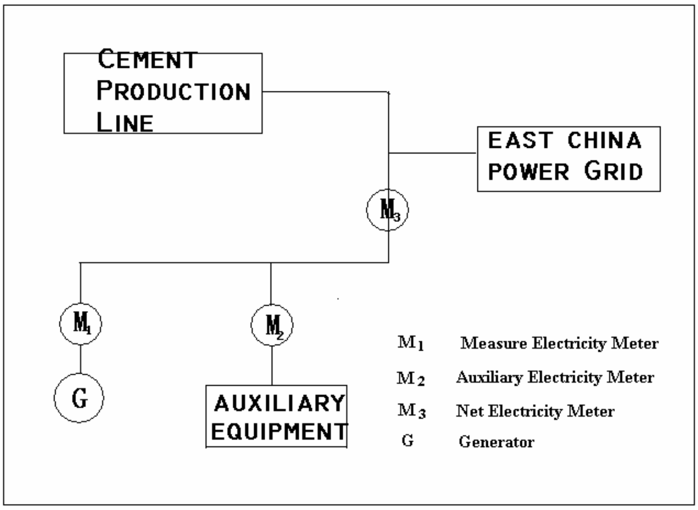
3. Monitoring equipment and installation

Power measure equipment installation should be calibrated 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 meters shall be installed for the project. The first electricity meter is a measure electricity meter, shall be installed at the export of the generator (M1-measure electricity meter) to measure net electricity generated from the unit, it's managed by power grid company; the second electricity meter

shall be installed at the import of the power station (M2-auxiliary electricity meter) to measure electricity used by the power station, it's managed by the project owner, the third electricity meter (M3-net electricity meter- $EG_{CP,y}$) shall be installed before the first two electricity meter. Net electricity supplied to cement production line shall be the data of the third electricity meter (M3-net electricity meter- $EG_{CP, y}$).

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 shall read and note data from measure electricity meter and auxiliary electricity meter every month;

(2) The project owner shall periodical read and note data from measure electricity meter and auxiliary electricity meter on every day;

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

(4) The project owner shall offer reading record of electricity meter.

If reading of electricity meter is not within allowed precision range at any month or electricity meter function is not abnormal, net electricity supplied to facility shall 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 shall 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 shall be arbitrated according to conventional process to confirm consistency of reading estimated.

For the monitoring of output of clinker, the following shall be applied:

(1) Record fuel(coal) consumption every month（weighted before into kiln，accumulated monthly）；

(2) Output of clinker（record monthly）

5. QC

The project owner shall 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. Electricity meter inspection and locale check shall be implemented according to standard and regulations of state electric power industry. After inspection and locale check, electricity meter must be sealed. The project owner and power grid company shall inspect and seal the electricity meter together, no one can remove seal or modify the electricity meter when other one (or its representative) is absent.

All the installed electricity meters shall 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 meter and check electricity meter exceeds the permitted error range;

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

(3) For the weight equipments, relative national standards shall be applied.

6. Data management

The CDM group appointed by the project owner shall keep monitoring data in the electron archives at every month end; electron document shall be copied and printed to save as letter documents. The project owner shall keep electricity sell/purchase invoice. Letter documents, as map, form, EIA report etc, shall 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 shall offer index of project document and monitoring report. All of the letter data and information shall be kept in the archives by CDM group; all of the document shall have one copy backup. All of the data shall 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 27/06/2008.

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:

>>

30/09/2006. 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.

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

>>

20 years

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

C.2.1. Renewable crediting period

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

>>

Not applicable

C.2.1.2. Length of the crediting period:

>>

Not applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>

01/11/ 2008 or the registration date, 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 April 30th, 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 release 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 electricity will be constructed. Waste water will be collected up to be release 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 release 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 released 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 release 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 04/2007, 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 Jiangsu Jiaoqiao Cement Plant's Low Temperature Waste Heat Power Generation Project

Time: 12/04/2007

Place: Meeting room, second floor, Jiangsu Jiaoqiao Cement Co.Ltd

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

The symposium was held on 12/04/at the meeting room, Jiangsu Jiaoqiao Cement Co. Ltd. There are 2 labor union agents, 2 neighborhood resident agents, other attendees and emcee.

The meeting was presided by Min Heping, vice manager of Jiangsu Jiaoqiao 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

Organization:	Jiangsu Jiaoqiao Cement Co.Ltd.
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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							0	25.8	100	28435	0.00

production											
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 Huazhor 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							0	25.8	100	26344	0.00

coal											
Other wash coal			5.46			4.63	10.09	25.8	100	8363	79826.01
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	Power								

		using ratio	supplied								
	（MWh)	（%）	（MWh)		From Shanxi Yangcheng to East China Grid(MWh)		11,649,610				
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 to East China Grid(MWh)		77,244,000			
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	2005y			

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	2847.31	4801.52	9888.06	3082.9	2107.69	22727.48	20908	25.8	1	449,526,100

	ton										
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 million	16.8	0	13.8	17.1	0	47.7	16726	12.1	1	353,971

	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