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

CONTENTS

First Draft: December 2007

SECTION A. General description of project activity

A.1. Title of the project activity:

Please indicate[1]
- *The title of the project activity*
- *The current version number of the document*
- *The date of the document was completed.*

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The title of the project activity:

"Low Temperature Waste Heat Recovery and Utilization for Power Generation Project at Cement Industry in Jiangsu Province, China"

The current version number of the document: Version 03

The date of the document was completed: 2007.12.27

A.2. Description of the project activity:

Please include in the description
- *the purpose of the project activity*
- *explain how the proposed project activity reduces greenhouse gas emissions (i.e. what type of technology is being employed, what exact measures are undertaken as part of the project activity, etc)*
- *the view of the project participants on the contribution of the project activity to sustainable development (max. one page).*

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The Project Activity is a low temperature waste heat recovery and utilization for power generation project located at Jiangsu Province of the People's Republic of China. Project owner which was the Zhenjiang Cement Factory in 1958, now has an asset of 6.8 hundreds million yuan and take an area of 400 units. Now they has a he 1000 tons per day clinker production line commenced operation and a 1000 tons per day clinker production line commenced operation with a aggregate 2,650,000 tons high-quality cement production using the new dry process technique. The 15MW Waste Heat Recovery and Utilisation Power Generation factory is being commenced operation. And three 5000 tons per day clinker production lines are also being commenced operation.

The main objectives of the Project Activity are to meet the increasing electrical supply needs of the Project owner. and to reduce greenhouse gas emissions through the recovery and use of low temperature waste heat from the kilns of the cement clinker production lines. The waste heat is currently vented to atmosphere but once captured can be used in a power generation plant. The

[1] The hint lines presenting the *blue italic fonts* were added below most sub-section titles for the purpose of facilitating PDD development and should be deleted when the PDD is completed. The content of the hints is taken from "Part II, B. Specific guidelines for completing the Project Design Document (CDM-PDD)" in "Guidelines for Completing the Project Design Document (CDM-PDD), and the Proposed New Baseline and Monitoring Methodologies (CDM-NM), Version 06 in effect on July 28, 2006.)", and is therefore subject to updating over time. (see http://cdm.unfccc.int/meetings/025/eb25repan16.pdf).

system can reduce heat and powder pollution around the plant as well as bring great benefit to the enterprise. The Project Activity can help to recycle and reclaim waste heat strongly, improve efficiency and dedicate to "Green Consumption" of resources. The power generation plants will be respectively rated at 15MW, and will produce totally 98.14 million kWh of annual electricity generation with no significant associated emissions of CO2.

Project's contribution to sustainable development:

Contradiction of relatively insufficient resources will gradually be apparent with the increasing of the population and development of China's economy. The key to solve the problem lies in searching for new resources or recycled energy as well as synthetically using the existing valuable resources reasonably.

China economy is highly dependent on "Coal" as fuel to generate energy and for production processes. Thermal power plants are one of the major consumers of coal in China. As one of main coal combustion productions, CO2 plays the key role to lead to the greenhouse effect. So changing coal consumption patterns will be a very essential work. It will require a multi-pronged strategy focusing on demand, reducing wastage of energy and the proper use of finite resources in the production process.

Since this project activity has eliminated its power demand on the grid it has positively contributed towards the reduction of wastage (in the form waste heat energy) and reduction in use of finite natural resource, especially coal, minimizing depletion or else increasing its availability to other important processes.

This project activity leads to a reduction in the temperature of the vented hot air from over and also reduces the volume of water that is consumed by the humidifying pump in the cooling towers and thereby save water resources in the area.

This project activity significantly reduces harmful emissions (including SOx, NOx and floating particles), and thus improves the local environment.

This project activity increases energy supply from clean energy sources and improves energy security at a time of energy shortage in the eastern provinces of China.

This project activity supports the development of the waste heat recovery and power generation sector in China which has considerable energy saving potential in many important sectors of the Chinese economy such as the chemical, aluminum and steel sectors.

This project activity also mitigates the impacts of climate change on China which are already beginning to be felt and includes the significant shrinkage of the Qinghai-Tibet glaciers which are one of the main sources of water in North West China.

A.3. Project participants:

Please list project participants and Party(ies) involved and provide contact information in Annex 1. Information shall be in indicated using the following tabular format.		
Name of Party involved	**Private and/or public**	**Kindly indicate if**

(*) ((host) indicates a host Party)	entity(ies) project participants (*) (as applicable)	the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China	Project owner.	Yes
Japan	New Energy and Industrial Technology Development Organization(NEDO)	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		
Note: *When the PDD is filled in support of a proposed new methodology (form CDM-NM),* at least the host Party(ies) and any known project participant (e.g. those proposing a new methodology) shall be identified.		

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A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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The Project Activity is located in Gaozi County of Zhenjiang in Jiangsu Province. The project's geographical coordinates are 32°12′, 119°24′E.

A.4.1.1. Host Party(ies):

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The Host country is the People's Republic of China.

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

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The Project Activity is located in Gaozi County of Zhenjiang in Jiangsu Province.

A.4.1.3. City/Town/Community etc:

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The nearest county level town is Gaozi and the nearest city is Zhenjiang.

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

Please fill in the field and do not exceed one page.

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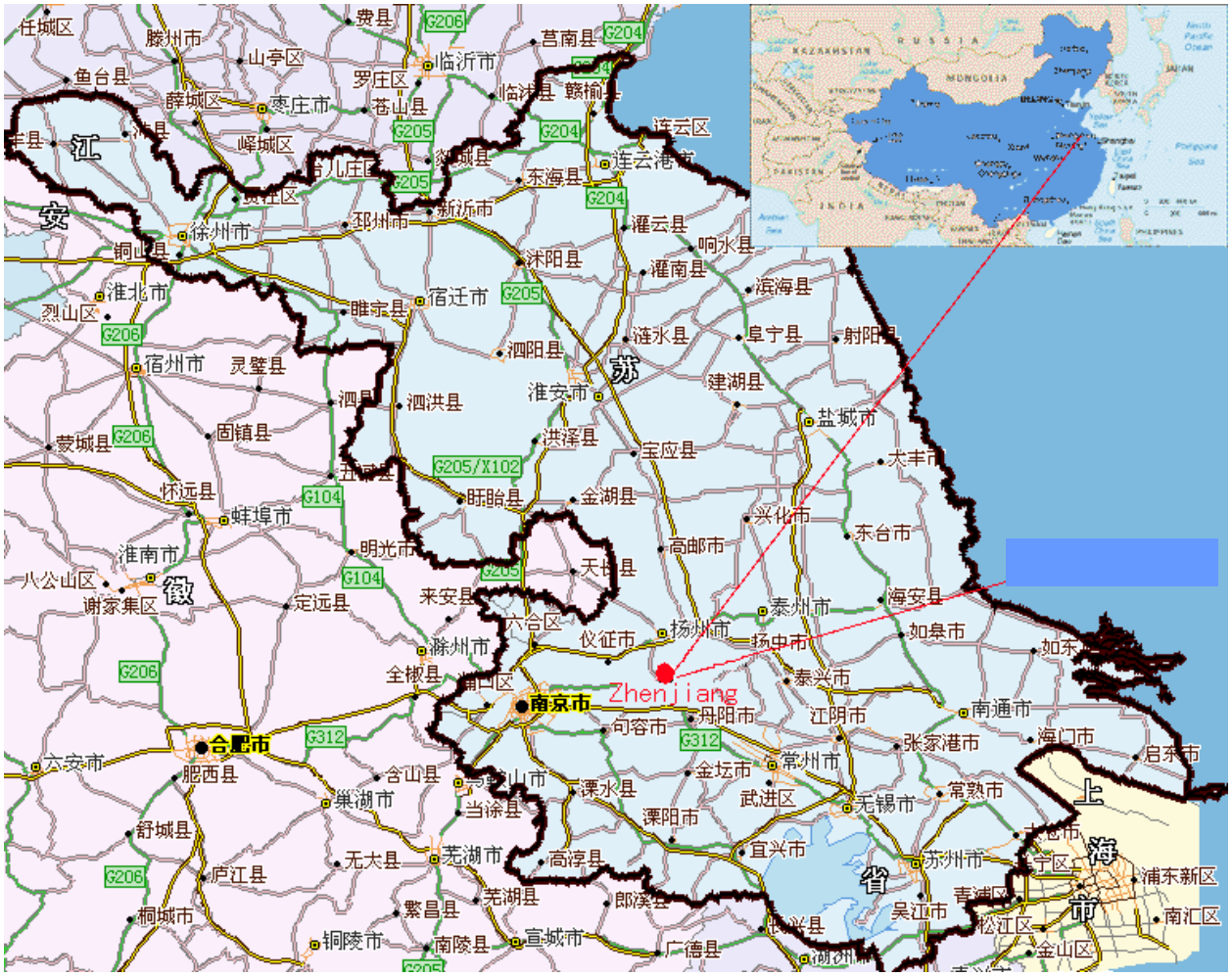

Figure 1: The detail location of the Project Activity

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

Please use the list of categories of project activities and of registered CDM project activities by category available on the UNFCCC CDM web site, please specify the category(ies) of project activities into which this project activity falls. If no suitable category(ies) of project activities can be identified, please suggest a new category(ies) descriptor and its definition, being guided by relevant information on the UNFCCC CDM web site.

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The project activity falls under partial scope 4 – Manufacturing Industries, specifically the cement sector. The project activity is also relevant to partial scope 1 – Energy and partial scope 8 – Mining/mineral production.

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

This section should include a description of how environmentally safe and sound technology, and know-how to be used, is transferred to the host Party(ies).

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The production of cement relies on several processes:
Raw material preparation→grinding clinker→production→clinker storage→grinding cement silos and dispatch

A large portion of the energy consumption for the production of cement occurs in the calcination process in clinker production. This involves passing the ground raw materials through a pre-heater stack containing cyclone heaters to a shaft kiln to create clinker and then cooling this in the clinker cooler. Waste heat is typically vented to atmosphere and if captured and used for power generation, as proposed in this Project Activity, can lead to significant greenhouse gas emission reductions.

According the scheme, in order to reach the gaol of energy-saving and waste heat recovery, together with the cement production technics, thermodynamic system can be confirmed as follows:

The technology to be used in the system is a combination of 4 heat recovery boilers, one situated in the middle of the waste heat outlet of the condenser, which lies in the head of the rotating kilns of the cement production lines. In order to reduce the boiler abrasion, the power separator is set ahead of AQC. The AQC is divided into two parts. One is the steam part, and the other is hot water part. At the end of the kiln, SP is set at the outlet of waste heat pre-heater. The SP only has a steam part. The 15MW condensing steam turbine generator, located between the two cement production lines.

The 15MW steam turbine generator will be built as follows:

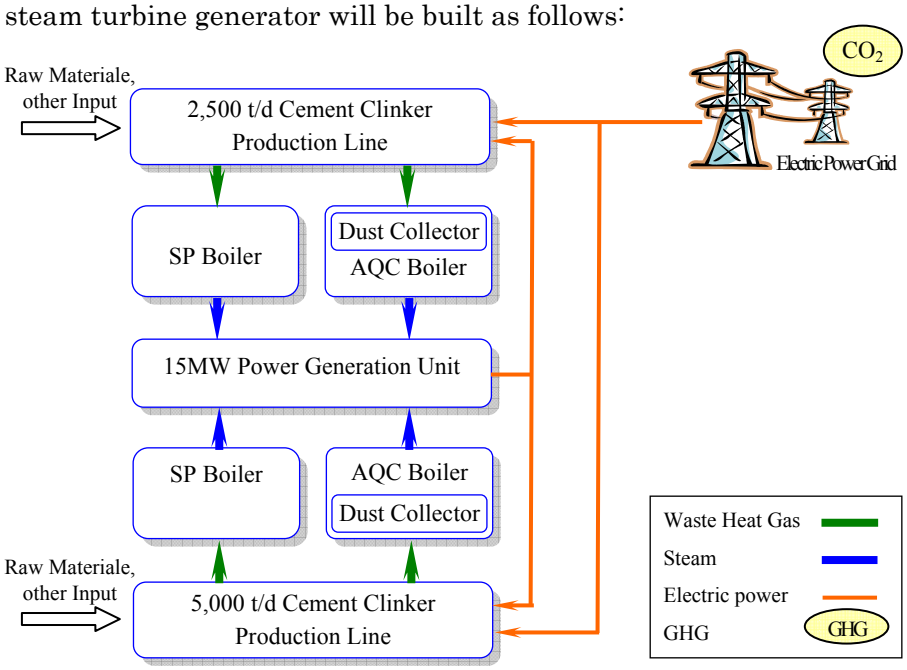

Figure 2: Partial Block Diagram of the Project Activity

At the "hot" (SP) end of each kiln a high temperature waste heat recovery boiler will replace one of the cyclone heaters which are used to heat the raw clinker material. At the "cool" (ACQ) end of each kiln a lower temperature waste heat recovery boiler will replace the cooling tower which is used to cool the exhaust gases thus also saving precious local water resources.

The four waste heat recovery boilers mentioned before will produce super-heated steam which will be sent to the main steam pipe of the machine room. Without the consideration of the pressure and heat losses, the super-heated steam will do work in the steam turbine, then the waste steam will condense to water. Condensation will supply for the two waste heat boilers and this is consisted of the whole system.

The model numbers and performance characteristics of the main equipment can be seen in the Table below[1]:

1. The 15MW power station:

Table 1. Key Characteristics of Major Technology Employed by the Project Activity

Sequence Number	Equipment Name	Amount	Key performance characteristics
1	AQC1 Heat Recovery Boiler	1	Waste gas: 105000m3/h (STP) Waste gas temperature: 420□ Outlet waste gas temperature: 72□ Air leakage: 2% Steam output: 12t/h Steam pressure: 1.35Mpa Steam temperature: 360□ Economizer water: 30t/h Economizer outlet water temperatur: 180□ Supplied water temperature: 40□
2	SP1 Heat Recovery Boiler	1	Waste gas: 228000m3/h (STP) Waste gas temperature: 330□ Outlet waste gas temperature: 220□ Steam output: 17t/h Steam pressure: 1.35Mpa Steam temperature: 310□ Supplied water temperature: 175□
3	1#Dirt Eliminator	1	Inlet waste gas: 120000Nm3/h Inlet waste gas temperature: 420□(transient 450□) Pressure loss: ＜400Pa
4	AQC2 Heat Recovery Boiler	1	Waste gas: 228000m3/h (STP) Waste gas temperature: 360□ Outlet waste gas temperature: 95□ Air leakage: 2% Steam output: 18.8t/h Steam pressure: 1.35Mpa Steam temperature: 340□ Economizer water: 74.8t/h Economizer outlet water temperatur: 180□ Supplied water temperature: 40□
5	SP2 Heat Recovery Boiler	1	Waste gas: 411000m3/h (STP) Waste gas temperature: 320□ Outlet waste gas temperature: 180□ Sect I steam output: 24.2t/h Sect I steam pressure: 1.35Mpa Sect I steam temperature: 300□ Sect I supplied water temperature: 175□

Sequence Number	Equipment Name	Amount	Key performance characteristics
			Sect II steam Output: 13.5t/h Sect II steam pressure: 0.2Mpa Sect II steam temperature: 170□
6	2#Dirt Eliminator	1	Inlet waste gas: 240000Nm3/h Inlet waste gas temperature: 380□(transient 450□) Pressure loss: ＜400Pa
7	Complement Condensing Steam Turbine	1	Model: BN15—1.25/0.12 Rated power: 15MW Rated rev: 3000r/min Enter steam pressure: 1.25MPa Enter steam temperature: 310□ Supplied steam pressure: 0.12MPa Enter steam temperature: 170□ Let steam temperature: 0.007MPa
8	Generator	1	Model: QF15-2 Rated power: 15MW Rated rev: 3000r/min Voltage: 10.5kV
9	Condensate Pump	2	Model: 6N6A Flux: 110t/h Head: 42m
10	Vacuum Deoxidizer & Water Tank	1	Working pressure: 0.007MPa Dispose capacity: 100t/h Water Tank Available capacity: 20m3
11	Flash Vessel	1	Working pressure: 0.15MPa Enter water temperature: 180□ Flash evaporating water: 34t/h Flash evaporating steam: 4.4t/h
12	Boiler Supplied Water Pump	3	Model: DG46-50×6 Flux: 28～50t/h Head: 345~288m
13	Circle Cooling Pump	2	Flux: 2440～4532t/h Head: 34～26m
14	Force Ventilation Frp Cooling Tower	4	Model: 10BZGN-2000 Cooling water: 2000t/h
15	Integral Water-Softening Plant	1	Dispose capacity: 20t/h
16	Station Transformer	2	Model: SCB9－500/10 Capacity: 500kVA
17	Computer system	1	DCS system
18	Slow Bridge Crane	1	Model: 32/5-16.5 A5 Span: 16.5m Rise weight: 32t/5t
19	SP Fan Overhaul Electric Hoist	2	Spec: 20t
20	Continuous Blowdown Flash Tanks for Boiler	4	Model: LP－0.75 Working pressure: 0.5Mpa Design temperature: <210□ Available capacity: 0.75m3

Sequence Number	Equipment Name	Amount	Key performance characteristics
21	Medicate Equipment	4	
22	FU Chain Conveyor	2	Model: FU320 Length: about 22m
23	Screw Conveyer	2	Model: LS400 Length: about 15m

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

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Please indicate the chosen crediting period and provide the total estimation of emission reductions as well as annual estimates for the chosen crediting period. Information on the emission reductions shall be indicated using the following tabular format.

Years	Annual estimation of emission reductions in tonnes of CO2e
2009	79,904*
2010	88,782
2011	88,782
2012	88,782
Subtotal estimated reductions of first crediting period (tonnes of CO2e)	346,255
2013	88,782
2014	88,782
2015	88,782
Subtotal estimated reductions of the second crediting period (tonnes of CO2e)	266,346
2016	88,782
2017	88,782
2018	88,782
2019	88,782
Total estimated reductions (tonnes of CO2e)	967,729

* ： First year power output is calculated by 90% of normal power generation

The First Crediting Period has four years（2009~2012）, The Second Crediting Period has three years（2013~2015）

A.4.5. Public funding of the project activity:

In case public funding from Parties included in Annex I is involved, please provide in Annex 2 information on sources of public funding for the project activity from Parties included in Annex I, which shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial

obligations of those Parties.

Note: *When the PDD is filled in support of a proposed new methodology (form CDM-NM), it is to be indicated whether public funding from Parties included in Annex I is likely to be involved indicating the Party(ies) to the extent possible.*

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There is no public funding of the Project Activity.

SECTION B. Application of a baseline and monitoring methodology:

Where project participants wish to propose a new baseline methodology, please complete the form for "Proposed New Methodology: Baseline and Monitoring Methodologies (CDM-NM)" in accordance with procedures for submission and consideration of proposed new methodologies (see Part III of these Guidelines).

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

Please refer to the UNFCCC CDM web site for the title and [LS1]the details of approved baseline and monitoring methodologies[2]. Please indicate

- *the approved methodology and the version of the methodology that is used (e.g. "Version 02 of AM0001")*
- *any methodologies or tools which the approved methodology draws upon and their version (e.g. "Version 02 of the tool for demonstration and assessment of additionality" or "Version 04 of ACM0002")*

>>

Title: Low Temperature Waste Heat Recovery and Utilization for Power Generation Project at Cement Industry in Jiangsu Province, China

Approved consolidated baseline methodology ACM0012 "Consolidated baseline methodology for waste gas and/or heat and/or pressure for power generation" is adopted , meanwhile, the relative parts of ACM0002, V.02 are referred.

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

Please justify the choice of methodology by showing that the proposed project activity meets each of the applicability conditions of the methodology. Explain documentation has been used and provide the references to the document or include the documentation in Annex 3.

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The methodology referenced above is applicable to this project activity because it fulfils the required criteria of ACM0012:

- The project involves activities that displace electricity generation with fossil fuels
- No fuel switch is done during the process of project activities, where the waste heat or pressure or the waste gas is produced, after the implementation of the project activity;

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

Describe which emission sources and gases are included in the project boundary for the purpose of calculating project emissions and baseline emissions, using the table below. In cases where the methodology allows project participants to choose whether a source or gas is to be included in the project boundary, explain and, where necessary, justify the choice.

	Source	Gas	Included?	Justification / Explanation
Baselin	Electricity	CO_2	Included	Main emission source

[2] If a new baseline methodology is proposed, please complete the form for "Proposed New Baseline and Monitoring Methodologies"(CDM-NM).

e	generation, grid or captive source	CH_4	Excluded	Excluded for simplification. This is conservative
		N_2O	Excluded	Excluded for simplification. This is conservative
	Captive electricity generation	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification. This is conservative
		N_2O	Excluded	Excluded for simplification. This is conservative
Project Activity	Supplemental fossil fuel consumption at the project plant	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification
		N_2O	Excluded	Excluded for simplification
	Supplemental electricity consumption	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification
		N_2O	Excluded	Excluded for simplification
	Project emissions from cleaning of gas	CO_2	Included	Only in case waste gas cleaning is required and leads to emissions related to the energy requirement of the cleaning.
		CH_4	Excluded	Excluded for simplification
		N_2O	Excluded	Excluded for simplification

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

Please explain how the most plausible baseline scenario is identified. Where the procedure involves several steps, describe how each step is applied and transparently document the outcome of each step. Explain and justify key assumptions and rationales. Provide relevant documentation or references. Illustrate in a transparent manner all data used to determine the baseline scenario (variables, parameters, data sources etc.), preferably in a table form.

Provide a transparent and detailed description of the identified baseline scenario, including a description of the technology that would be employed and/or the activities that would take place in the absence of the proposed project activity.

In order to get the most appropriate and conservative baseline scenario the procedure for 'Determining the baseline scenario' suggests four steps.
1. Identification possible baseline alternatives
2. Assessment of common practices and modified common practices
3. Ranking of baseline options
4. Selection of appropriate and conservative baseline scenario

1.Identification of possible baseline options, which may be available with the project proponent in absence of project activity implementation.

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

- Do not comply with legal and regulatory requirements; or
- Depend on fuels (used for generation of heat and/or power), that are not available at the project site

The proposed project is going to use waste heat for electricity generation purpose only, according to ACM0012, 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; (P1)
2) Waste gas is released to the atmosphere after incineration or waste heat is released to the atmosphere (waste pressure energy is not utilized) (W2);
3) On-site or off-site existing/new fossil fuel based existing captive or identified plant (P4);
4) On-site or off-site existing/new renewable energy based existing captive or identified plant (P5);
5) Sourced Grid-connected power plants (P6); and continue the current situation to import electricity from East China power grid.

Alternative 1- The proposed project activity not undertaken as a CDM project activity(P1);
The project entity may adopt waste heat recovery utilization system for power generation to generate electricity. It is in compliance with all applicable legal and regulatory requirements. However, this alternative faces series of barriers(details in B.5.) making it predictably prohibitive. Hence this scenario should not be taken as a baseline scenario.

Alternative 2- Waste gas is released to the atmosphere after incineration or waste heat is released to the atmosphere (waste pressure energy is not utilized) (W2);
The common situation for cement company to deal with waste heat is to release the waste heat to the atmosphere, however with technology advancement, it is possible to utilize these waste heat for generation of electricity and so could displace electricity from the grid which comes from consumption of fossil fuel, and reduce Greenhouse Gas emission and cut the cost of the project owner. So, if waste heat is release to the atmosphere, the project owner will continue to import electricity needed from the grid, which is similar to Alternative 5).

Alternative 3-On-site or off-site existing/new fossil fuel based existing captive or identified plant (P4);
According to the electric power rules in China, fossil fuel power plant with the capacity below 135MW is prohibited to be constructed if the district is covered by a large power grid, and thermal power units with the single-unit capacity below 100MW are strictly controlled to be constructed. Therefore, constructing a new fossil fuel (included coal, oil and gas) based captive power plant with equal capacity (15MW) will violate the requirements of national rules and laws. So it is not a feasible baseline scenario. So, Alternative 3) can not be taken as a baseline scenario for the proposed project.

Alternative 4- On-site or off-site existing/new renewable energy based existing captive or identified plant (P5);

There is no accessible renewable resource like hydro, wind resource etc. in Zhenjiang district; so on-site or .off-site existing/new renewable energy based existing captive or identified plant can not be taken as a baseline scenario.

Alternative 5- Sourced Grid-connected power plants (P6); and continue the current situation to import electricity from East China power grid;
The most usual way is to release the waste heat into the atmosphere. There are no other potential demands for heat or other industry utilization of the additional waste heat around the project site . So import electricity from sourced grid-connected power plants is the continuation of the current situation, which will need no excess investment and new technology, and the project owner will have no risk or barrier. So, Alternative 5) can be taken as a baseline scenario.

Among all the plausible baseline scenarios mentioned above, Alternative 5)- Sourced Grid-connected power plants (P6); and continue the current situation to import electricity from East China power grid can be taken as the proposed project's baseline scenario.

2.Assessment of common and modified practices
The methodology requires the project proponent to analyze the current prevailing practices in the similar industries in order to assess the most common course of action among the identified baseline options.
From Jan. to May in 2006, the total cement production of China is 429,265,700 ton[2] and the production proportion of cement works to use waste heat recovery and utilization for power generation is less than 3%. There have been more than 615 dry process cement production lines by the end of 2005, among which there are 331 lines whose production are more than 2000t/d[3-4]. There are very few cement plants, which generate their own power from fossil fuel based power plant. The Baseline option 5 occurs in 97% of the similar industries and is therefore a common practice. We may therefore conclude that from the assessment of common practices adopted by the cement manufacturing units it is evident that Baseline option 5: Sourced Grid-connected power plants (P6); and continue the current situation to
import electricity from East China power grid.

3. Selection of appropriate and conservative baseline scenario

In view of the above analysis the Baseline option 5: 'Sourced Grid-connected power plants (P6); and continue the current situation to import electricity from East China power grid' is most likely baseline scenario and has been considered as business as usual scenario for the baseline emission calculations. We may therefore conclude that in the absence of project activity Project plant would draw power from the East China Grid, and the system boundary would include the grid's generation mix. It may also be noted that in the pre-project scenario the Project plant drew power from the East China Grid. This further substantiates that the grid as baseline will be the most appropriate baseline.

The grid's generation mix comprises of power generated through sources such as coal based thermal power plants and hydro power stations. The project activity would therefore displace an equivalent amount of electricity the plant would have drawn from the grid. The project proponent is required to estimate the Baseline Emission Factor as the guidance provided in Appendix 3 of the methodology

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):

Explanation of how and why this project activity is additional and therefore not the baseline scenario in accordance with the selected baseline methodology. Where the procedure involves several steps, describe how each step is applied and transparently document the outcome of each step. Where the barriers are involved in demonstrating additionality, only select the (most) relevant barriers. Explain and justify key assumptions and rationales. Provide relevant documentation or references. Illustrate in a transparent manner all data used to assess the additionality of the project activity (variables, parameters, data sources etc.), preferably in a table form.

If the starting date of the project activity is before the date of validation, provide evidence that the incentive from the CDM was seriously considered in the decision to proceed with the project activity. This evidence shall be based on (preferably official, legal and/or other corporate) documentation that was available at, or prior to, the start of the project activity.

Establishing additionality of the project activity

This step is based on UNFCCC documents: "Tool for the demonstration and assessment of additionality(version 04)" 30 November 2007. Information/data related to industry practice and other regulatory and project related documents were used to establish the additionality of the project activity.
A step-wise approach is used to demonstrate and assess additionality. These steps include:
- Identification of alternatives to the project activity;
- Investment analysis to determine that the proposed project activity is not the most economically or financially attractive;
- Barriers analysis;
- Common practice analysis; and
- Impact of registration of the proposed project activity as a CDM project activity.

Step 1. Identification of alternatives to the project activity consistent with current laws and regulations.
The project proponent is required to define realistic and credible alternatives to the project activity(s) that can be (part of) the baseline scenario.
As mentioned above the baseline options 5 was identified to meet Project owner's power requirement in absence of CDM project activity

Further there is no legal binding on Project owner. to implement the project activity. In China it is not mandatory for cement units to implement waste heat recovery based power generation plants from waste gases of the kilns. Neither are there any planned regulations for cement manufacturing industries that will enforce them to implement project activity in China. The pollution control board does require cement units to operate such that the dust levels of the waste gases to be emitted into the atmosphere should be within a certain limit. These pollution control board norms were being met even in absence of the project.

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

Sub-step 2c Calculation and comparison of financial indicators

(1) Basic parameters for calculation of financial indicators Based on the feasibility study report of the Project[1], basic parameters for calculation of financial indicators are as follows:

The income of power generation is calculated by the product of the quantity of power generation and the power price which Project owner buys electric power from East China Grid. Considering the production line is operated 24 hours we use the average power price of Jiangsu province as the basis of income calculation. The price of power system of Jiangsu province is listed as following[5,6] . Considering the project activity belongs to the same group with Project owner, there should be some discount. So the final price of electricity is decided to about 85% of that from East China Grid, namely 0.45 RMB/kWh and the price of steam is 35 RMB/ton.

Description	Time	Price(Tax including, RMB)
On-peak Power	8:00~12:00 and 17:00~21:00	0.845

Normal Power	12:00~17:00 and 21:00~24:00	0.507
Off-peak Power	0:00~8:00	0.229

The operation period is 7200 hour per year, load rate is around 96% and the power consumption inside the low temperature waste heat power plant is 6%[1] of the total power generation according to the operation experience and conservative rule. We don't consider the increasing cost of the investment of the baseline scenario.

Installed capacity: 15MW
Estimated annual net-electricity: 98.14GWh
Project lifetime: 20yrs
Total investment: RMB 89.51 million yuan
Prospective electricity price: RMB 0.45Yuan/kWh (excluding VAT)
Prospective heat price: RMB 35Yuan/ton steam (excluding VAT)
Tax: income tax rate is 33%; value added tax rate is 17%, city construction maintenance tax is 7% of VAT, education appended fee is 3% of VAT
Crediting period: 11yrs

(2) The Project's IRR
The Project IRR is chosen as the appropriate comparison measure as both investments would be carried out with funds from the Group which would be reflected on their balance sheet. The following Table outlines the assumptions used in deriving the Project IRR of the cumulative cash flow of the Project Activity over a 20 year period(without CERs).

Description	Investment Return Period(year, aft. tax)	Project IRR
Project Activity	9.2	9.7%

Sub-step2d Sensitivity analysis

The most sensitive factor is the price of electric power, So we conduct the sensitivity analysis by increasing the price of electric power by 10%(without CERs). The results are listed as following:

Description	Investment Return Period(year, aft. tax)	Project IRR
Project Activity(+10% electricity power price)	7.8	12.9%
Project Activity(-10% electricity power price)	11.54	5.9%

When pool (electricity) purchase price has risen 10%, the IRR of the project will exceed 12%. According to the supply-need status of power in China, pool purchase price will be stable in the future and will not rise greatly. So scenario of pool purchase price rising 10% is supposed not to appear.
We can see from the above data, If the fluctuation of power price is within a realistic range, that the conclusion that the project activity is unlikely to be attractive compared with the benchmark is correct.

Step 3. Barrier analysis.

The project proponent is required to determine whether the proposed project activity faces barriers that: (a) Prevent the implementation of this type of proposed project activity; and (b) Do not prevent the implementation of at least one of the alternatives through the following sub-steps:

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

The project activity had its associated barriers to successful implementation. The barriers are outlined in the following Table B-2

Table B-2. Barrier analysis for the Project Activity

Barriers	Applicable	Detailed Description
Technological Barriers	Yes	This Project is an early example of the internationally well known concept of heat recovery boilers and turbines fitted to a large cement works that has been developed by a domestic design institute using domestically manufactured and installed equipment. The barriers fall into two main categories – design risks inherent in designing the special heat recovery boilers and the steam turbine (which is also special in that it has a second inlet to accept the output of the flash steam generator) and risks associated with the manufacture and installation of such new equipment. The Project Owners are taking a not insignificant risk in proceeding with the Project Activity, which CDM can help to offset via increasing the returns of the Project Activity.
Investment Barriers	Yes	The capital cost of the equipment for the Project Activity is much higher than the baseline. With the CDM revenue of the effective revenue of the Project, the CDM can help the Group overcome this barrier by increasing the returns of the Project Activity.
Other barrier	Yes	Project owner personnel lacked the necessary technical background to develop and implement a waste heat recovery based power plant with technological innovation. They had to strengthen their internal capacity by inviting external expertise to implement the project activity. Project owner personnel at various levels lacked relevant managerial background for project activity implementation, operation and maintenance. They were provided with training to ensure smooth operation. They had no background

		strength in the power sector economics and power generation sector.

Sub-step 3 b. Show that the identified barriers would not prevent a wide spread implementation of at least one of the alternatives (excepted the proposed project activity already considered in step 3a):

These barriers do not exist for the alternative 5 and they do not prevent the wide spread implementation of the alternative5. The barriers identified in Sub-step 3a affect badly the Alternative 1: Waste Heat recovery based captive power plant without CDM benefits. Therefore Project owner - CDM project activity had its associated barriers to successful implementation, which must been overcome in order to implement the project and reduce additional green house gas reductions.

Sub-step 4. Common practice analysis

The project proponent is further required to conduct the common practice analysis as a credibility check to complement the investment analysis (Step 2) or barrier analysis (Step 3). The project proponent is required to identify and discuss the existing common practice:

An investigation has been carried out to understand if the proposed Project Activity represents common practice in China. This is a difficult process in China as there are more than 4700 cement plants in operation in China[4]. However from internet searches and discussions with the technical experts involved in this Project (from designers, manufacturers , the Mizuho Information &Research Institute in Japan, Systec World Company Ltd. and Tongji Univ. in Shanghai) the following similar projects in cement plants of similar size to the Project Activity have been identified and are listed in TableB-3 together with any facilitating circumstances. Only several similar projects have been identified as implemented in China at similar sized cement plants to date – two using imported equipment and five using domestic equipment. These Projects are smaller than the proposed Project Activity and are also fitted to just a single cement production line. Considering the low penetration levels at conventional cement works and the increased size and complexity of the Project Activity versus other examples, it is considered that the Project Activity passes this step.

Table.B-3 Other similar projects at similar sized cement works in China and facilitating circumstances[7]

Project Name	Public Source / reference	Facilitating circumstances
Anhui Ningo Cement Plant (4000 t/d)	（http://green.cei.gov.cn/doc/LY31/200204192475.htm）	Japanese NEDO granted Equipment - 4000 tons/day Cement works
Jiangsu Qingshi Co. Ltd	（http://www.ecsino.com/corp/detail/28/741290.asp）	Uses proven Japanese equipment
Guangxi YuFeng Cement Plant	（http://nntb.mofcom.gov.cn/article/200308/20030800119065_1.xml ）	Uses proven Japanese equipment.

(5.7MW)		
Zhejiang Sanshi Cement Works 5000 t/d	www.cement.net	First of its kind to use domestic design and equipment – scheduled to begin operation in June 2004.
Shanghai Wanan Cement Works 1200 t/d	www.cement.net	commence operation in May,2003.
Zhejiang meishan Zhongsheng Cement Co, Ltd., 5000t/d	www.chinacements.com	use domestic design and equipment, smaller than the proposed Project Activity and are also fitted to just a single cement production line
Zhejiang zhongxinyuan Cement Works, 2500t/d	www.chinacements.com	use domestic design and equipment, smaller than the proposed Project Activity and are also fitted to just a single cement production line
Jiangsu Jiaoqiao Cement Works Co.Ltd	http://cdm.ccchina.gov.cn	Uses proven Japanese equipment

Step 5. Impact of CDM Registration

Before implementation of the project activity Project owner considered all the barriers mentioned above. Each of them especially regulatory/institutional barriers and the technological barriers could result in project failure resulting in huge financial losses. Project owner's management discussed various aspects of project activity implementation in the Board of Director's Meeting. Project owner's management took the decision of taking the investment risks and secure financing partially from bank funding and partially through internal accruals so as to invest in the CDM project activity after computing the proposed carbon financing. The foreign currency exchange rate is 7.3 and the results of the financial analysis is listed under 9, 10, 11 U.S. dollar per ton CO2 emission reduction as following:

	No Income of CO2 Emission Reduction	9$ per CO2 Emission Reduction	10$ per CO2 Emission Reduction	11$ per CO2 Emission Reduction
Investment Return Period(year, aft. tax)	9.2	7.4	7.2	7.0
Project IRR	9.7%	14.1%	14.6%	15%

So we conclude that the financial result of Project Activity can be improved obviously by CERs and It is ascertained that the project activity would not have occurred in the absence of the CDM simply because no sufficient financial, policy, or other incentives exist locally to foster its development in China and without the proposed carbon financing for the project Project owner would not have taken the investment risks in order to implement the project activity. Further

CDM fund will provide additional coverage to the risk due to failure of project activity and loss of production. Since the plant has no grid connectivity project failure would affect all plant operations.
The increased cash flow resulting from the CDM revenue will also help the Project Owners to properly maintain the new equipment and be trained in its use and maintain adequate reserves to purchase grid supplied electricity in the event of an outage. This is especially important in the first few years of the Project (when the CDM revenue is being earned) as operational problems would typically be ironed out by the end of the crediting period.

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B.6. Emission reductions:

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B.6.1. Explanation of methodological choices:

Explain how the procedures, in the approved methodology to calculate project emissions, baseline emissions, leakage emissions and emission reductions are applied to the proposed project activity. Clearly state which equations will be used in calculating emission reductions.

Explain and justify all relevant methodological choices, including:

- *where the methodology includes different scenarios or cases, explain and justify which scenario or case applies to the project activity (e.g. which scenario in ACM0006 is applicable);*
- *where the methodology provides different options to choose from (e.g. which methodological approach is used to calculate the "operating margin" in ACM0002), explain and justify which option is chosen for the project activity;*
- *where the methodology provides for different default values, explain and justify which of the default values have been chosen for the project activity.*

The Approved consolidated baseline and monitoring methodology ACM0012"Consolidated baseline methodology for GHG emission reductions for waste gas or waste heat or waste pressure based energy system", Version 02 EB 35, Para 24,19 October 2007 is used in calculating project emissions, baseline emissions, leakage emissions and emission reductions. There are four steps to calculate the emission reduction:

Step1 Calculation of the baseline Emissions
The baseline emissions for the year *y* shall be determined as follows:

$$BE_y = BE_{En,y} + BE_{flst,y}$$

Where:
BEy——are total baseline emissions during the year *y* in tons of CO2
BEEn,y—— are baseline emissions from energy generated by project activity during the year *y* in tons of CO2
BEflst,y——Baseline emissions from generation of steam, if any, using fossil fuel, that would have been used for flaring the waste gas in absence of the project activity (tCO2e per year). This is relevant for those project activities where in the baseline steam is used to flare the waste gas. Because the project employs the waste heat of kiln to produce steam to generate electricity by steam turbine and there is no fossil fuel added, the *BEflst,y* do not exist.

$$BE_y = BE_{En,y}$$

The electricity is obtained from the grid and this situation is belonged the scenario 1 in the ACM0012.

$$BE_{En,y} = BE_{Elec,y} + BE_{Ther,y}$$

$BE_{Elec,y}$——are baseline emissions from electricity during the year y in tons of CO2
$BE_{Ther,y}$——are baseline emissions from thermal energy (due to heat generation by element process)during the year y in tons of CO2
Because **the project activity is generation of electricity only** and there are not any new emissions from thermal energy, the $BE_{Ther,y}$ do not exist.

$$BE_{En,y} = BE_{Elec,y}$$

$$BE_{Elec,y} = f_{cap} * f_{wg} * \sum\sum((EG_{i,j,y} * EF_{Elec,i,j,y}) \qquad (1a\text{-}1)$$

Where:
$BE_{elec,y}$—— are baseline emissions due to displacement of electricity during the year y in tons ofCO2.
$EG_{i,j,y}$——is the quantity of electricity supplied to the recipient j by generator, which in the absence of the project activity would have been sourced from i^{th} source (i can be either grid or identified source) during the year y in MWh, and
$EF_{elec,i,j,y}$—— is the CO2 emission factor for the electricity source i (i=gr (grid) or i=is (identified source)), displaced due to the project activity, during the year y in tons CO2/MWh
f_{wg}——Fraction of total electricity generated by the project activity using waste gas.
f_{cap}——Energy that would have been produced in project year y using waste gas/heat generated in base year expressed as a fraction of total energy produced using waste gas in year y.
The electricity generation is purely from use of waste gas and the f_{wg} is 1. the waste gas/heat/pressure generated in project year y is same that generated in base year and f_{cap} is 1. In the absence of the project the electricity sourced from the grid. Then:

$$BE_y = BE_{ny} = BE_{Elec,y} = EG_y * EF_y$$

The displaced electricity for recipient is supplied by a connected grid system, the CO2 emission factor of the electricity $EFelec,gr,j,y$ shall be determined following the guidance provided in the "Tool to calculate the emission factor for an electricity system". EB 35, Annex 12 19 October 2007

$$EF_y = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y}$$

Where, the calculation method of $EF_{OM,y}$ and $EF_{BM,y}$ is listed in Annex3.

Step2 The calculation of project emissions

$$PE_y = PE_{AF,y} + PE_{EL,y} \qquad (2)$$

Where:
PEy——Project emissions due to project activity.
PEAF y——Project activity emissions from on-site consumption of fossil fuels by the cogeneration plant (s), in case they are used as supplementary fuels, due to non-availability of waste gas to the project activity or due to any other reason.

PEEL y——Project activity emissions from on-site consumption of electricity for gas cleaning equipment.
The project doesn't concen fossil fuels as supplementary fuels, when it can't gain enough waste gas and the quantity of power used in plant equipment will be calculated as Auxiliary Electricity. Therefore,
$PE_y=0$

Step 3 Calculation of Leakage

Since no other source of leakage can be identified in this project, leakage is therefore not taken into account.

Step 4 Calculation of Emission Reduction

$$ER_y = BE_y - PE_y$$

Where:
ERy——are the total emissions reductions during the year *y* in tons of CO2
PEy——are the emissions from the project activity during the year *y* in tons of CO2
BEy——are the baseline emissions for the project activity during the year *y* in tons of CO2

$$ER_y = BE_y$$

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

This section shall include a compilation of information on the data and parameters that are not monitored throughout the crediting period but that are determined only once and thus remains fixed throughout the crediting period AND that are available when validation is undertaken. Data that becomes available only after validation of the project activity (e.g. measurements after the implementation of the project activity) should not need to be included here but in the table in section B.7.1.

This may includes data that is measured or sampled, and data that is collected from other sources (e.g. official statistics, expert judgment, proprietary data, IPCC, commercial and scientific literature, etc.). Data that is calculated with equations provided in the methodology or default values specified in the methodology should not be included in the compilation.

Provide for each data or parameter the chosen value or, where relevant, the qualitative information, using the table provided below. Particularly:

- *Provide the actual value applied. Where time series of data is used, where several measurements are undertaken or where surveys have been conducted, provide detailed information in Annex 3.*
- *Explain and justify the choice for the source of data. Provide clear and transparent references or additional documentation in Annex 3.*
- *Where values have been measured, include a description of the measurement methods and procedures (e.g. which standards have been used), indicate the responsible person / entity having undertaken the measurement, the date of measurement(s) and the measurement results. More detailed information can be provided in Annex 3.*

(Copy this table for each data and parameter)

Data / Parameter:	*EF*
Data unit:	*tCO_2/MWh*
Description:	*CO_2 emission factor of the grid*

Source of data used:	*Calculated based on the data collected for the data collected on an annual basis from State Electricity Boards*
Value applied[8]:	0.9047 OM=0.9421 BM=0.8672
Justification of the choice of data or description of measurement methods and procedures actually applied :	*Calculated as a weighted sum of the OM and BM emission factors and should be recorded yearly and kept during the crediting period. Proportion of data to be monitored shall be 100%.*
Any comment:	

Data / Parameter:	$COEF_{CW}$
Data unit:	*tCO2/ GJ*
Description:	*GHG emission coefficient of fuel*
Source of data used:	*Get them from official documents of the state*
Value applied:	Different according to types of fuels
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	NCV_{WH}
Data unit:	kJ/m^3
Description:	*Net calorific value of the waste heat*
Source of data used:	*Calculated based on the data collected for the data collected on an annual basis from State Electricity Boards*
Value applied:	23932E4
Justification of the choice of data or description of measurement methods and procedures actually applied :	*It is measured and should be recorded continuously and kept during the credit period and two years after, whose data achieved by electronic. Proportion of data to be monitored shall be 100%.*
Any comment:	

Data / Parameter:	Q_{WH}
Data unit:	Nm^3/h
Description:	*Flow rate of the waste heat*
Source of data used:	*Calculated based on the data collected for the data collected on an annual basis from State Electricity Boards*
Value applied:	964000

Justification of the choice of data or description of measurement methods and procedures actually applied :	*It is measured and should be recorded continuously and logged on hourly basis, whose data achieved by electronic should be kept during the credit period and two years after. Proportion of data to be monitored shall be 100%.*
Any comment:	

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

Provide a transparent ex-ante calculation of project emissions, baseline emissions (or, where applicable, direct calculation of emission reductions) and leakage emissions expected during the crediting period, applying all relevant equations provided in the approved methodology. Use estimations for parameters that are not available when validation is undertaken or that are monitored during the crediting period.

Document how each equation is applied, in a manner that enables the reader to reproduce the calculation. Where relevant, provide additional background information and or data in Annex 3, including relevant electronic files (i.e. spreadsheets).

Step1 The calculation of project emissions

Because the project employs the waste heat of kiln to produce steam to generate electricity by steam turbine and there is no fossil fuel added, the new emissions do not exist.

Step 2 Calculation of the baseline Emissions

Baseline emissions are given as:

$$BE_{electricity,y} = EG_y \cdot EF_{electricity,y}$$

Where, *EGy*—— Net quantity of electricity supplied to the manufacturing facility by the project during the
year y in MWh

EFy——CO2 baseline emission factor for the electricity displaced due to the project activity during the year *y* (tCO2/MWh)

According to the operational experience of Project owner and considering conservative rules, the power plant operates 300 days every year. The power generation capacity of the project is 15MW，the average value is 14.5MW and so the total power generation per year is 104.40×10^6kW·h[1]

After subtracting 6%[2] for the quantity of electricity required for the operation of the power plant, the net total power generation supplying to the manufacturing facility by the project is 98.14GW·h per year.

So, we can get:

$$EGy = 98.14\text{GW}\cdot\text{h}$$

According to ACM0012, If the baseline scenario is determined to be grid power supply, the Emissions Factor for displaced electricity is calculated as in Annex 12 Methodological tool **"Tool to calculate the emission factor for an electricity system" (Version 01,** EB 35, Annex 12 19 October 2007**)**:

$$EF_y = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y}$$

By the newest data of DNA of China[8]:

$$EF_{OM,y} = 0.9421$$

$$EF_{BM,y} = 0.8672$$

And because of the nature of off-peak output and relatively intermittence, so:

$$w_{OM} = 0.5$$

$$w_{BM} = 0.5$$

Therefore, we can get:

$$EF_y = 0.9047$$

$$BE_{electricity,y} = 88{,}782$$

Step 3 Calculation of Leakage

Since no other source of leakage can be identified in this project, leakage is therefore not taken into account.

Step 4 Calculation of Emission Reduction

$$ER_y = BE_y - PE_y$$

$$ER_y = BE_y = 88{,}782$$

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

Summarize the results of the ex-ante estimation of emission reductions for all years of the crediting period, using the table below.

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Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
2009	*0*	79,904	*0*	79,904
2010	*0*	88,782	*0*	88,782
2011	*0*	88,782	*0*	88,782
2012	*0*	88,782	*0*	88,782
Subtotal Emission Reduction of the First Crediting Period		*346,255*		*346,255*
2013	*0*	88,782	*0*	88,782

2014	*0*	88,782	*0*	88,782
2015	*0*	88,782	*0*	88,782
Subtotal Emission Reduction of the Second Crediting Period		*266,346*		*266,346*
2016	*0*	88,782	*0*	88,782
2017	*0*	88,782	*0*	88,782
2018	*0*	88,782	*0*	88,782
2019	*0*	88,782	*0*	88,782
Total Emission Reduction		*967,729*		*967,729*

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

The following two sections (B.7.1 and B.7.2) shall provide a detailed description of the application of the monitoring methodology and a description of the monitoring plan, including an identification of the data to be monitored and the procedures that will be applied during monitoring.

Please note that data monitored and required for verification and issuance are to be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.
>>
This project is conducted on an Approved consolidated baseline and monitoring methodology "Consolidated baseline methodology for GHG emission reductions for waste gas or waste heat or waste pressure based energy system"(ACM0012/version 02), what also refers to the Approved consolidated baseline and monitoring methodology "Tool to calculate the emission factor for an electricity system" (Version 01, EB 35, Annex 12 19 October 2007). The applicability criteria using ACM0012 are the same as for the Baseline Methodology and this is outlined in B.2., while the applicability criteria is mentioned in ANNEX 4.

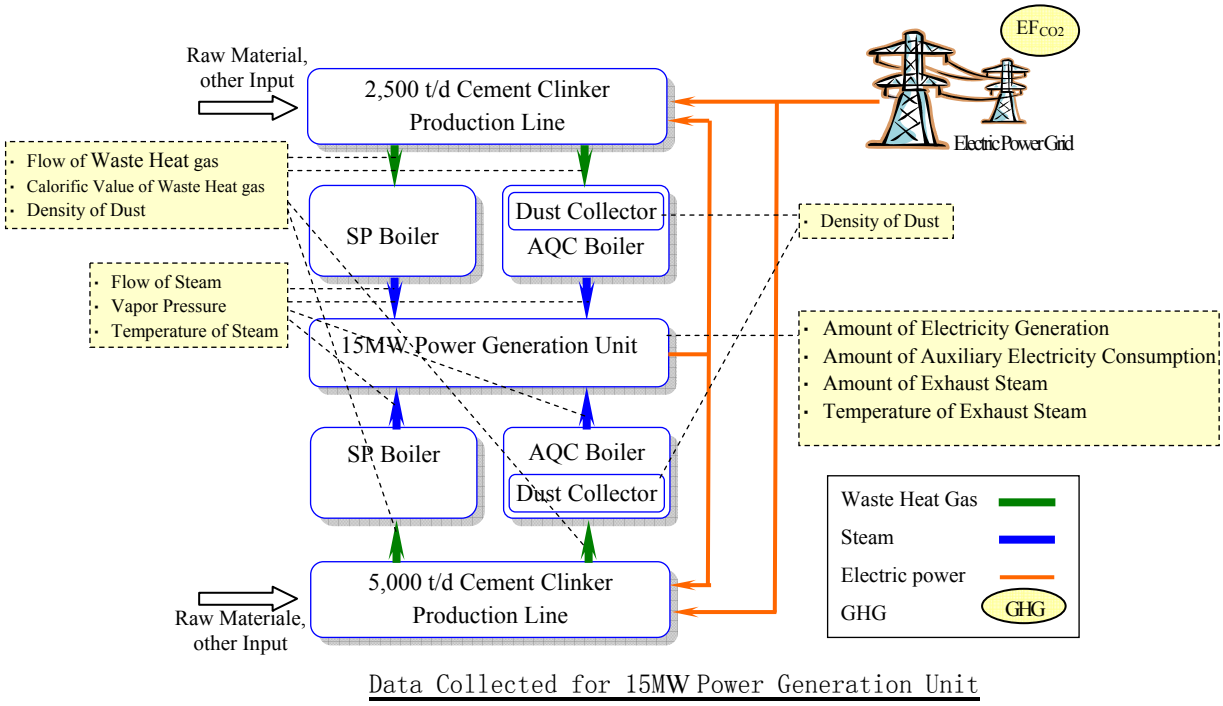
B.7.1. Data and parameters monitored:

This section shall include specific information on how the data and parameters that need to be monitored would actually be collected during monitoring for the project activity. Data that is determined only once for the crediting period but that becomes available only after validation of the project activity (e.g. measurements after the implementation of the project activity) should be included here.

Provide for each parameter the following information, using the table provided below:
- *The source(s) of data that will be actually used for the proposed project activity (e.g. which exact national statistics). Where several sources may be used, explain and justify which data sources should be preferred.*
- *Where data or parameters are supposed to be measured, specify the measurement methods and procedures, including a specification which accepted industry standards or national or international standards will be applied, which measurement equipment is used, how the measurement is undertaken, which calibration procedures are applied, what is the accuracy of the measurement method, who is the responsible person / entity that should undertake the measurements and what is the measurement interval.*
- *A description of the QA/QC procedures (if any) that should be applied.*
- *Where relevant: any further comment.*

Provide any relevant further background documentation in Annex 4.

Parameters Monitor Illustration



Data Collected for 15MW Power Generation Unit

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B.7.1.1. Data to be collected in order to monitor emissions from the project activity and how this data will be archived

The emissions from the Project Activity are due to the impact on the consumption of fossil fuel used to generate the required heat for the cement plant's operation which will increase as a result of the Project. The parameters for calculating this change in fuel consumption are being monitored currently and a year's worth of data will be available for each kiln connected to the Project Activity by the operation date of the Project when it is implemented.
Data collected to monitor the project emissions are given below.

Data / Parameter:	PE_y
Data unit:	tCO_2
Description:	*Project emissions*
Source of data to be used:	*Calculated from change in specific energy consumption of the kilns from before and after the project implementation as Baseline Methodology*
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	*It is Calculated from measurements and should be recorded annually, whose data achieved by electronic and paper. Proportion of data to be monitored shall be 100%.*
QA/QC procedures to be applied:	*Yes, this data will be directly used for calculation of the project emissions and will be monitored weighing meters for the clinker lines connected to the Project Activity. Sales records of coal to the*

	cement plant and clinker production records will be used to ensure consistency.
Any comment:	*Calculated using formulae in ANNEX 4 and in accompanying spreadsheet*

Data / Parameter:	*$COEF_{CW}$*
Data unit:	*tCO2/ GJ*
Description:	*GHG emission coefficient of fuel used for cement clinker production line*
Source of data to be used:	*Baseline year measurements*
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.092
Description of measurement methods and procedures to be applied:	*It is measured and should be recorded Once at start of or renewal of crediting period, whose data achieved by electronic and paper. Proportion of data to be monitored shall be 100%.*
QA/QC procedures to be applied:	*Yes, IPCC and other data will be used to check the representative nature of these figures.*
Any comment:	*Same coal is used in Captive Power plant and cement plant.*

Data / Parameter:	*F_{CW}*
Data unit:	*GCal / tClinker*
Description:	*Energy consumption rate for unit output of clinker production*
Source of data to be used:	*Assumed to be the same fuel and factor as for $COEF_{AT}$*
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.81
Description of measurement methods and procedures to be applied:	*It is measured and should be recorded Once prior to start of or renewal of crediting period, whose data achieved by electronic and paper. Proportion of data to be monitored shall be 100%.*
QA/QC procedures to be applied:	*Yes, IPCC and other data will be used to check the representative nature of these figures.*
Any comment:	*Measured values are preferred*

Data / Parameter:	*F_{CWy}*
Data unit:	*KCal / tClinker*
Description:	*GHG emission coefficient of fuel used for cement clinker production line*
Source of data to be used:	*Calculated annually from fuel conveyor weighing station to cement clinker production line(s) and based on clinker output production records*
Value of data applied for the purpose of calculating expected emission reductions in	

section B.5	
Description of measurement methods and procedures to be applied:	*It is measured and should be recorded annually, whose data achieved by electronic and paper. Proportion of data to be monitored shall be 100%.*
QA/QC procedures to be applied:	*Yes, this data will be directly used for calculation of the project emissions and will be monitored weighing meters for the clinker lines connected to the Project Activity. Sales records of coal to the cement plant and clinker production records will be used to ensure consistency.*
Any comment:	*The measurements will be checked against coal purchase records and clinker production records.*

Data / Parameter:	$Fuel_{CLy}$
Data unit:	*GCal*
Description:	*Energy from fuel used during year to create clinker in all lines connected to the Project Activity*
Source of data to be used:	*Measured annually from fuel conveyor weighing station to cement clinker production line(s) and converted to energy value through energy value from fuel sampling*
Value of data applied for the purpose of calculating expected emission reductions in section B.5	200.88E4
Description of measurement methods and procedures to be applied:	*It is measured and should be recorded continuously, whose data achieved by electronic and paper. Proportion of data to be monitored shall be 100%.*
QA/QC procedures to be applied:	*Yes, this data will be directly used for calculation of the project emissions and will be monitored weighing meters for the clinker lines connected to the Project Activity. Sales records of coal to the cement plant and clinker production records will be used to ensure consistency.*
Any comment:	*The measurements will be checked against coal purchase records and coal sample analysis.*

Data / Parameter:	$Clinker_{OUTy}$
Data unit:	*tClinker*
Description:	*Tonnes of clinker produced in a year*
Source of data to be used:	*Measured directly by clinker weighing instruments.*
Value of data applied for the purpose of calculating expected emission reductions in section B.5	2,550,000t/a
Description of measurement methods and procedures to be applied:	*It is measured and should be recorded continuously, whose data achieved by electronic and paper. Proportion of data to be monitored shall be 100%.*
QA/QC procedures to be applied:	*Yes, this data will be directly used for calculation of the project emissions and will be monitored weighing meters for the clinker*

	lines connected to the Project Activity. Sales records of coal to the cement plant and clinker production records will be used to ensure consistency.
Any comment:	*Checked against clinker output production records*

B.7.1.2. Data to be collected in order to monitor for Electricity Generation by Project Activity

Data / Parameter:	EG_{EN}
Data unit:	*kWh*
Description:	*Total Electricity Generated*
Source of data to be used:	*Meters at plant and DCS will measure the data.*
Value of data applied for the purpose of calculating expected emission reductions in section B.5	10440E4
Description of measurement methods and procedures to be applied:	*It is online measured and should be recorded continuously and kept 3 years after the issue of the CERs, whose data achieved by electronic. Proportion of data to be monitored shall be 100%.*
QA/QC procedures to be applied:	*Yes. This data will be required for estimation of electricity generation and export by project activity*
Any comment:	*Manager In-charge would be responsible for regular calibration of the meter.*

Data / Parameter:	E_{AUX}
Data unit:	*kWh*
Description:	*Auxiliary Electricity*
Source of data to be used:	*The data will be measured by meters at plant and DCS.*
Value of data applied for the purpose of calculating expected emission reductions in section B.5	626.4E4
Description of measurement methods and procedures to be applied:	*It is online measured and should be recorded continuously and kept 3 years after the issue of the CERs, whose data achieved by electronic. Proportion of data to be monitored shall be 100%.*
QA/QC procedures to be applied:	*Yes. This data will be required for estimation of electricity generation and export by project activity*
Any comment:	*Manager In-charge would be responsible for regular calibration of the meter.*

Data / Parameter:	EG_y
Data unit:	*kWh*
Description:	*Net Electricity supplied to facility*
Source of data to be used:	*Calculated from the above measured parameters.*
Value of data applied for the purpose of calculating expected emission reductions in	9814E4

section B.5	
Description of measurement methods and procedures to be applied:	*It is calculated by "EG_{GEN} –EG_{AUX}" and should be recorded continuously and kept 3 years after the issue of the CERs, whose data achieved by electronic. Proportion of data to be monitored shall be 100%.*
QA/QC procedures to be applied:	*Yes. This data will be required for estimation of electricity generation and export by project activity*
Any comment:	*Algorithm for project emission calculations given in baseline methodology.*

Data / Parameter:	NCV_{WH}
Data unit:	*kJ/h*
Description:	*Net calorific value of the waste heat*
Source of data to be used:	*Measured on basis of the temperature and pressureof the waste heat*
Value of data applied for the purpose of calculating expected emission reductions in section B.5	23932E4
Description of measurement methods and procedures to be applied:	*It is measured and should be recorded continuously and kept during the credit period and two years after, whose data achieved by electronic. Proportion of data to be monitored shall be 100%.*
QA/QC procedures to be applied:	*Yes. This data will be used for the calculation of project electricity generation.*
Any comment:	

Data / Parameter:	Q_{WH}
Data unit:	Nm^3/h
Description:	*Flow rate of the waste heat*
Source of data to be used:	*Measured*
Value of data applied for the purpose of calculating expected emission reductions in section B.5	964000
Description of measurement methods and procedures to be applied:	*It is measured and should be recorded continuously and logged on hourly basis, whose data achieved by electronic should be kept during the credit period and two years after. Proportion of data to be monitored shall be 100%.*
QA/QC procedures to be applied:	*Yes. This data will be used for the calculation of project electricity generation.*
Any comment:	

B.7.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived

Data / Parameter:	$GEN_{j,y}$
Data unit:	*MWh*
Description:	*Electricity generation of each power source / plant*

Source of data to be used:	*Obtained from the power producers, dispatch centers or latest local statistics.*
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	*It is measured and should be recorded yearly and kept During the crediting period and two years after, whose data achieved by electronic. Proportion of data to be monitored shall be 100%.*
QA/QC procedures to be applied:	*No. This data is calculated, so does not need QA procedures*
Any comment:	

Data / Parameter:	*EF*
Data unit:	*tCO_2/MWh*
Description:	*CO_2 emission factor of the grid*
Source of data to be used:	*Calculated based on the data collected for the data collected on an annual basis from State Electricity Boards*
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.9234 OM=0.9421 BM=0.8672
Description of measurement methods and procedures to be applied:	*Calculated as a weighted sum of the OM and BM emission factors and should be recorded yearly and kept during the crediting period and two years after, whose data achieved by electronic. Proportion of data to be monitored shall be 100%.*
QA/QC procedures to be applied:	*Yes. This data will be required for the calculation of baseline emissions (from grid electricity)and will be obtained through published and official sources.*
Any comment:	

Data / Parameter:	*$COEF_{i,k}$*
Data unit:	*tCO^2 /t or m^3*
Description:	*CO_2 emission coefficient of each fuel type and each power source/ plant*
Source of data to be used:	*Measured*
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	*It is measured and should be recorded yearly and kept during the crediting period and two years after, whose data achieved by electronic and paper. Proportion of data to be monitored shall be 100%. And Baseline Methods of simple OM and BM must be included in this element.*

QA/QC procedures to be applied:	*Yes. This data will be required for the calculation of baseline emissions (from grid electricity)and will be obtained through published and official sources.*
Any comment:	*Plant or country specific values to calculate COEF are preferred to IPCC default values.*

Data / Parameter:	$F_{i,j,y}$
Data unit:	*t or m^3/yr*
Description:	*Amount of each fossil fuel consumed by each power source / plant*
Source of data to be used:	*Obtained from the power producers, dispatch centers or latest local statistics.*
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	*It is measured and should be recorded yearly and kept during the crediting period and two years after, whose data achieved by electronic and paper. Proportion of data to be monitored shall be 100%. And Baseline Methods of simple OM and BM must be included in this element.*
QA/QC procedures to be applied:	*Yes. This data will be required for the calculation of baseline emissions (from grid electricity)and will be obtained through published and official sources.*
Any comment:	

Direct monitoring of emission reductions from the project activity is not used according to the methodology.
No significant change in anthropogenic emissions by sources of greenhouse gases outside the project boundary is identified that is not already part of the baseline. Although CO_2 emission by coal consumed for cement clinker production line can be leakage, the amount is the same in the baseline and project scenario. Therefore, its calculation is not necessary.

B.7.2. Description of the monitoring plan:

Please provide a detailed description of the monitoring plan. Describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects generated by the project activity. Clearly indicate the responsibilities for and institutional arrangements for data collection and archiving. The monitoring plan should reflect good monitoring practice appropriate to the type of project activity. Provide any relevant further background information in Annex 4.
>>
There are three key types of information that must be monitored according to the approved monitoring methodologies, ACM0012 and ACM0002:

1) Measurable/calculated information that is collected once prior to validation of the Project Design Document
2) Documented evidences of various sorts that are collected once prior to validation of the Project Design Document

3) Information that must be monitored ex-post, notably:
   i. The Generation output from the Project Activity, EG_y
   ii. The changes in fuel consumption per unit output of the cement works, F_{CWy}, as a result of the Project Activity to calculate the project emissions from any such changes, PE_y

For items 1 and 2 above, copies of these values/documents will be included in the Project's CDM Manual and Monitoring and Verification Plan, which the validator and verifier can check annually.
For item 3 above, an outline of the specific ex-post monitoring plan for the Project is now described.

Monitoring of the generation output from the Project Activity, EG_y,

The electrical system is well metered at the points and from reading these meters it is easy to isolate the figures required for recoding the electricity generated by the Project Activity.
The meters are maintained and recorded on a monthly basis, which also have an accumulated power flow meter and are calibrated by qualified staff from the local power grid company. Meter inspections are carried out with the third party to the meter reading being present to witness the reading.
The net meters are the property of the Huadong Power Grid and are maintained by them according to national calibration and maintenance procedures. The meter readings can be checked against electrical sales records from the grid plant to the cement plant.
The changes in fuel consumption per unit output of the 2500 ton per day and 5000 ton per day production lines will be monitored on a monthly basis by recording:

- ✓ The fuel consumed by each line (value taken from the weighing machine on the "fuel in" conveyor from the mine to the cement plant)
- ✓ The output of clinker from each line (value taken from the weighting machine on the "output" side of the production lines)
- ✓ On an annual basis this will be checked against the baseline values. Currently this value is 0.134 tons of as used raw coal per ton of clinker produced which equates to 3.39 GJ / tClinker output, but 2009 will be used as the benchmark year for this value.

Quality Assurance and Quality Control

The mines and cement plant's quality assurance and quality control procedures for recording, maintaining and archiving data will need to be improved as part of this CDM project. This is an on-going process which will be ensured through the CDM mechanism in terms of the need for verification of the emissions on an annual basis. See more details in ANNEX IV, "PROJECT PARAMETERS AFFECTING EMISSION REDUCTION CLAIMS".
The operational and management structure is established that the project operator will implement for the Project Activity and to monitor emissions reductions generated by the project activity. The nominated CDM responsible person for the Project will ensure it follows the requirements of the Monitoring and Verification Plan.

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)

Please provide date of completion of the application of the methodology to the project activity study in DD/MM/YYYY.

Please provide contact information of the persons(s)/entity(ies) responsible for the application of the baseline and monitoring methodology to the project activity and indicate if the person/entity is also a project participant listed in Annex 1.
>>

SECTION C. Duration of the project activity / Crediting period

C.1. Duration of the project activity:

C.1.1. Starting date of the project activity:

The starting date of a CDM project activity is the date on which the implementation or construction or real action of a project activity begins.

Project activities starting between 1 January 2000 and the date of the registration of a first clean development mechanism project activity, if the project activity is submitted for registration before 31 December 2005, have to provide documentation, at the time of registration, showing that the starting date fell within this period.

>>

Starting date of the project activity: Jan., 2009

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

Please state the expected operational lifetime of the project activity in years and months.

>>

Expected operational lifetime of the project activity: 20years

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

Please state whether the project activity will use a renewable or a fixed crediting period and complete C.2.1 or C.2.2 accordingly.

Note that the crediting period may only start after the date of registration of the proposed activity as a CDM project activity. In exceptional cases, (see instructions for section C.1.1. above) the starting date of the crediting period may be prior to the date of registration of the project activity as provided for in paragraphs 12 and 13 of decision 17/CP.7, paragraph 1 (c) of decision 18/CP.9 and through any guidance by the Executive Board, available on the UNFCCC CDM web site.

>>

20 years

C.2.1. Renewable crediting period

Each crediting period shall be at most 7 years and may be renewed at most two times, provided that, for each renewal, a designated operational entity determines and informs the executive board that the original project baseline is still valid or has been updated taking account of new data where applicable;

>>

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

Please state the dates in the following format: (DD/MM/YYYY).

>>

>>1/1/2009

Starting date of the first crediting period is assumed to be in January 2009

C.2.1.2. Length of the first crediting period:

Please state the length of the first crediting period in years and months.

>>
The Length of the first crediting period is four years

C.2.2. Fixed crediting period:

Fixed crediting period shall be at most ten (10) years.
>>
N/A

C.2.2.1. Starting date:

Please state the dates in the following format: (DD/MM/YYYY).
>>
N/A

C.2.2.2. Length:

Please state the length of the crediting period in years and months
>>
N/A

SECTION D. Environmental impacts

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

Please attach the documentation to the CDM-PDD.

>>

The two cement production lines have undergone and passed full Environmental Impact Assessments (EIA) in line with the requirements of the Chinese Government, which are available for the Validator to review. The Project Activity is an internal project to the company and is undergoing a separate EIA, which will be detailed in the final version of this PDD. However, in the interim, the Project Owners have established the following assessment of the key environmental impacts for the Project Activity and these are supported by the Feasibility Study and other documents:

Noise

Major sources of noise pollution include noise during construction and noise from the equipment installed as part of the Project Activity. As the Project is being built within the centre of an industrial facility, it has been estimated that these would not be in excess of the noise from construction and operation of the cement production lines (one of which is still under construction). The Cement Works will undertake to ensure that workers on the site are adequately warned of the dangers of noise exposure and protected accordingly.

Visual Impacts

The visual impact of the Project Activity is likely to be minimal as the major equipment is fitted within the middle area of the Cement Works and the equipment has a lower height than the main stacks.

Interference with Communications

There is not expected to be an increase in interference with communications as a result of the Project Activity.

Land Use Impacts

There are no land use impacts as the Project Activity is within an existing site which has already been converted to industrial use for the construction of the cement works.

In summary the project is expected to have a net environmental benefit in addition to the greenhouse gas emissions reductions.

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

>>

The Environmental impacts of the Project are considered to be positive and not significantly negative.

SECTION E. Stakeholders' comments

>>

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

Please describe the process by which comments by local stakeholders have been invited and compiled. An invitation for comments by local stakeholders shall be made in an open and transparent manner, in a way that facilities comments to be received from local stakeholders and allows for a reasonable time for comments to be submitted. In this regard, project participants shall describe a project activity in a manner which allows the local stakeholders to understand the project activity, taking into account confidentiality provisions of the CDM modalities and procedures. The local stakeholder process shall be completed before submitting the proposed project activity to a DOE for validation.

The responsible departments of the government including Jiangsu Industrial Office and Zhengjiang Environment Protection Bureau conducted the survey among all relevant government departments, enterprises, local resident and the collected are as following:

1. The project is in line with the industrial policy of building materials
2. Benefit local sustainable development
3. Improve impact on the environment by dust, noise, and waste heat

E.2. Summary of the comments received:

Please identify stakeholders that have made comments and provide a summary of these comments.

>>

Through the discussion among the local communities, local government authorities and the project developer, the local stakeholders support the Project.

No objection would appear for the Project as long as their requests will be fulfilled.

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

Please explain how due account have been taken of comments received.

>>

All requests and comments from the stakeholders have been well responded by the project developer and agreed with their requests.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Please copy and paste table as needed. Please fill for each organization listed in section A.3 the following mandatory fields: Organization, Name of contact person, Street, City, Postfix/ZIP, Country, Telephone and Fax or e-mail.

Organization:	
Street/P.O.Box:	
Building:	
City:	
State/Region:	
Postfix/ZIP:	
Country:	
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	
Last Name:	
Middle Name:	
First Name:	
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Please provide information from Parties included in Annex I on sources of public funding for the project activity which shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of those Parties

>>

This project obtains no capital support from ODA, Technical Support project of Asia Bank or GEF project.

Annex 3

BASELINE INFORMATION

Please provide any further background information used in the application of the baseline methodology. This may include tables with time series data, documentation of measurement results and data sources, etc.

>>

The followings deal with the procedure to calculate the emission factor according to the approved methodology ACM0012 , Version 02 and ACM0002, Version 07, The baseline information is presented in the following sections:

1)OM Emissions Factor of East China Grid

The baseline emission factor (EFy) is calculated as a combined margin (CM), consisting of thecombination of operating margin (OM) and build margin (BM) factors according to the following threesteps. Calculations for this combined margin must be based on data from an official source (where available) and made publicly available.

According to ACM0002, in calculating the operating margin (EF_{OM}, y), project developers have the option to select from four potential methods:

(a) Simple OM, or

(b) Simple adjusted OM, or

(c) Dispatch Data Analysis OM, or

(d) Average OM.

Options (b) and (c) are not chosen due to the limited availability of data within the People's Republic of China. As prescribed in the methodology, the Simple OM (a), can only be used if low-cost/must run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production. As the methodology states, "low operating cost and must run resources typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation.".As the newest official data, hydro, geothermal, wind, low-cost biomass, nuclear and solar generation plants constitute a share of total generating capacity less than 1% in East China Grid. Therefore, the Simple OM is chosen.

For the simple OM, the simple adjusted OM and the average OM, the emissions factor can be calculated using either of the two following data vintages:

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

- Ex post option: The year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required to calculate the emission factor for year y is usually only available later than six months after the end of year y,

This project adapt Ex ante option.

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units. It may be calculated:

- Based on data on fuel consumption and net electricity generation of each power plant / unit(Option A), or

- Based on data on net electricity generation, the average efficiency of each power unit and the fuel type(s) used in each power unit (Option B), or
- Based on data on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system (option C)

We choose the Simple OM option (option C). Data for calculating a three year average is taken from the period 2003-2005. The emission factor therefore calculates the generation-weighted average emissions per electricity unit (tCO2/GWh) and averaged over the past three years of all generating sources serving the system, not including low-operating cost and must-run power plants. Although some coal plants will be part of the low-cost/must run set of plants, the emission factor will remain conservative as coal plants would comprise the remainder of what is not considered low-cost/must run.

The formula is therefore given as follows:

$$EF_{grid,OM simple} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y}$$

Where:

$EF_{grid,OMsimple,y}$—Simple operating margin CO2 emission factor in year y (tCO2/MWh)

$FC_{i,y}$ —Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)

$NCV_{i,y}$ —Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume kgunit)

$EF_{CO2,i,y}$ —CO2 emission factor of fossil fuel type i in year y (tCO2/GJ)

EG_y —Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year y (MWh)

Using these formulas, the emission factor can be correspondingly calculated. We initially calculate an Operating Margin based only on the circumstances in the East China Grid (ECG), comprised of Shanghai, Jiangsu, Zhejiang, Anhui and Fujian province, but given the ECG imports a portion of its electricity from two other Chinese grids, our initial Average OM will be adjusted to include electricity imports before obtaining a final Average OM that includes the effect of electricity imports.

Year	2003		2004		2005	
Description	Total CO_2 Emission(tCO_2)	Total Power Supply(MWh)	Total CO_2 Emission(tCO_2)	Total Power Supply(MWh)	Total CO_2 Emission(tCO_2)	Total Power Supply(MWh)
Data	347456039.18	360848554	400791001.59	414795263	464840691.25	477317698
Weighted Mean EF_{OM}	0.942102					

2)BM Emissions Factor East China Grid

Calculate the Build Margin emission factor (EFBM,y) as the generation-weighted average emission factor (tCO2/MWh) of a sample of power plants *m*, as follows:

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

where *Fi,m,y*, *COEFi,m* and *GENm,y* are analogous to the variables described for the simple OM method
above for plants *m*.
ACM002 offers the option to calculate the Build Margin either ex ante or ex post by either selecting the five power plants that have been built most recently, or the power plants capacity additions in the electricity system that comprise 20% of the system generation and that have been built most recently.

Since in China data on most recently built power plants is not available, the Build Margin calculations are based on the power plants capacity additions in the electricity system that comprise 20% of the system generation and that have been built most recently.

The build margin will be determined ex ante and will involve gathering data on the most recent plants, which were built in the East China Grid and account for 25% of electricity generation of ECG as this comprises the larger share of annual generation.

Step1 Caculating the proportions of CO2 emissions generated by solid, ligulid and gas fuels

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

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

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

where *Fi,j,y*, *COEFi,j* are analogous to the variables described for the simple OM method above for plants *m*.

$\lambda_{coal} = 96.71\%$,
$\lambda_{Oil} = 2.35\%$,
$\lambda_{Gas} = 0.94\%$

Step2 Caculating the emissions factors of thermal power generation

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

Where $EF_{Coal,Adv}$, $EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ is the emission factors under commercial ptimum efficiency.

The Emission Factors Under Commercial Optimum Efficiency

	The Varables	Efficiency of Power Supply	Emission Factors of fuel(tc/TJ)	OXID	Emission Factors(tCO_2/MWh)
		A	B	C	D=3.6/A/1000*B*C*44/12
Coal Power Plant	$EF_{Coal,Adv}$	35.82%	25.8	0.98	0.9508
Gas Power Plant	$EF_{Gas,Adv}$	47.67%	15.3	0.995	0.4237
Oil Power Plant	$EF_{Oil,Adv}$	47.67%	21.1	0.99	0.5843

Therefore,
$EF_{Thermal} = 0.9372$

Step3 Caculating the emissions factors $EF_{BM,y}$ of the East China Grid

$$EF_{BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal}$$

Where, CAP_{Total} is the total newly added capacity of power generation and $CAP_{Thermal}$ is the newly added capacity of thermal power generation. By official statistic data,
$CAP_{Thermal} / CAP_{Total} = 0.9253$

So, we can get:
$EF_{BM,y} = 0.8672$

3)Baseline Emissions Factor

$$EF_y = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y}$$

Annex 4

MONITORING INFORMATION

Please provide any further background information used in the application of the monitoring methodology. This may include tables with time series data, additional documentation of measurement equipment, procedures, etc.
>>

APPLICABILITY FOR ACM0012

The consolidated methodology is for project activities that utilize waste gas and/or waste heat (henceforth referred to as waste gas/heat) as an energy source for:

- Cogeneration; or
- Generation of electricity; or
- Direct use as process heat source; or
- For generation of heat in element process3 (e.g. steam, hot water, hot oil, hot air);

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

PROJECT PARAMETERS AFFECTING EMISSION REDUCTION CLAIMS

Monitoring

The CDM mechanism stands on the quantification of emission reduction and keeping the track of the emissions reduced. The project activity reduces the carbon dioxide whereas an appropriate monitoring system ensures this reduction is quantified and helps maintaining the required level. Also a monitoring system brings about the flaws in the system if any are identified and opens up the opportunities for improvement.

Monitoring Approach

The general monitoring principles are based on:

Frequency
Reliability
Registration and reporting

Frequency of monitoring

The emission reduction units from the project activity are determined by the number of electrical units generate it becomes important for the project activity to monitor the net electricity production on real time basis. An on-line monitoring system is in place to monitor and record the net electricity generated. This also ensures the smooth operation of the plant.

Reliability

The amount of emission reduction units is proportional to the net energy generation from the project. Since the reliability of the monitoring system is governed by the accuracy of the measurement system and the quality of the equipment to produce the result,

- all measuring instruments must be calibrated by third party/ government agency once a year for ensuring reliability of the system
- the Standard Testing Laboratory (State Govt.) verifies the reliability of the meter reading; thereby ensuring the monitored results are highly reliable.

According to the state electricity board's (grid operator) regulations, also the annual calibration and verification of electricity meters is mandatory for all power generating units.

We may therefore conclude that the reliability of the results will be ensured by the project proponent both as a statutory requirement and for the project activity. Moreover, the net electricity generation value is included in the financial audit report (statutory requirement) that is published in the annual report of the company.

Registration and reporting

Registration of data is on-line in the control cabin through a microprocessor. However, hourly data logging must be there in addition to software memory. Daily, weekly and monthly reports are prepared stating the generation.

DESCRIPTION OF FORMULAE USED TO ESTIMATE PROJECT EMISSIONS

The emissions from the Project Activity, PE_y are due to the impact of the Project Activity on the consumption of fossil fuel used to generate the required heat for the cement plant's operation which will increase as a result of the Project. The proposed process for identifying these project emissions is:

1) Ex-ante estimate of the impact of the Project Activity on specific energy consumption of the kilns for use in the PDD using credible sources for this estimate, such as the feasibility report from the designers of the system

2)Comparison of the before and after measurements of the specific energy consumption of the kilns connected to the Project Activity to calculate the ex-post value for Project Emissions which is used to calculate claimed emission reductions

Ex-ante estimate of PEy

PE_y is first calculated ex-ante using a qualified estimate for $Energy\_COEF_{CL}$, which for this Project is the design optimisation report from the designers of the system which is included as an annex to the Chinese Project Feasibility Report. PE_ycan be estimated ex-ante by using the formula:

PE_y= Sum of ($Energy\_COEF_{CL}$ x [tons of clinker produced per year] x $COEF_{CW}$) for each clinker line connected to the Project Activity

Where $Energy\_COEF_{CL}$ is the design estimate of the impact of the Project Activity on the energy consumption of each clinker kiln in Kcal / tClinker (note different size kilns may have different estimated $Energy\_COEF_{CL}$) and where $COEF_{CW}$ is the carbon coefficient (tCO_2 / TJ of input fuel) of the fuel used in the cement works to raise the necessary heat for clinker production.

$Energy_COEF_{CL}$have been sourced from a design optimization report from the designers of the system included as an annex to the Chinese Project Feasibility Report and this is calculated to be as follows for each clinker line connected to the Project Activity:

- For the 2500 t/day clinker line, the ex-ante estimate of $Energy\_COEF_{CL}$ is 40 KCal / Kg
- For the 5000 t/day clinker line, the ex-ante estimate of $Energy\_COEF_{CL}$ is 45 KCal / Kg

Before and after measurements to calculate PEy

Before and after monitoring of the impact of the waste heat recovery project on the specific energy consumption of the kilns of the cement works will be carried out to calculate the value of PE_y for claiming emission reductions:

$PE_y = (F_{CWy} - F_{CW})$ x [tons of clinker produced in year] x $COEF_{CW}$

The current ex-ante estimate for F_{CW} is based on the design figure of 0.34 tons of as-used coal

per ton of clinker and this equates to 3.39GJ / t Clinker output. This design data will be replaced by a figure calculated from the one full year's measurements of F_{CW} for each kiln which are on-going and will be completed prior to the waste heat recovery project becoming operational. F_{CWy} is calculated from the fuel consumption in energy terms lower heating value, $Fuel_{CLy}$ and clinker output, $Clinker_{OUTy}$ of the cement kilns connected to the Project Activity for each year of operation after the Project Activity becomes operational.

Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

Emission Reduction

The emission reduction *ERy* by the project activity during a given year *y* is the difference between the
baseline emissions though substitution of electricity generation with fossil fuels (*BEy*) and project
emissions (*PEy*), as follows:

$$ER_y = BE_y - PE_y$$

where:

ERy are the emissions reductions of the project activity during the year *y* in tons of CO2,
BE,y are the baseline emissions due to displacement of electricity during the year *y* in tons of CO2,
PEy are the project emissions during the year *y* in tons of CO2, and In determining emission coefficients, emission factors or net calorific values in this methodology, guidanceby the 2000 IPCC Good Practice Guidance should be followed where appropriate. Project participants may either conduct regular measurements or they may use accurate and reliable local or national data where available. Where such data is not available, IPCC default emission factors (country-specific, if available) may be used if they are deemed to reasonably represent local circumstances. All values should be chosen in a conservative manner and the choice should be justified.

Table AN4-1	**A**	**B**	**C**	**D**	**E**
Maturing Coal Consumption	consumption quota **of Dry Basis** kg/t Clinker output	**Mass balance t/a (Considering 1% manufacture loss)**	**Fuel caloric value kJ/kg**	**Maturing Heat rate kJ/kg**	Clinker annual output t/a
2500t Line	125.42	**?**	**25264.6**	**3137**	75E4
5000t Line	137.06	**?**	**22190**	**3011**	150E4

Table AN4-2	A	B	C	D	E	F	G	H
Waste Heat Utility	Kiln Head Heat Recovery Boiler				Kiln End Heat Recovery Boiler			
	Inlet Waste Gas Volume Nm³/h	Inlet Temperature □	Outlet Temperature □	Heat Content kJ/h	Inlet Waste Gas Volume Nm³/h	Inlet Temperature □	Outlet Temperature □	Heat Content kJ/h
2500t Line	105000	420	72	3672E4	228000	330	220	2521E4
5000t Line	220000	360	95	5859E4	411000	320	180	5754E4
Total				9531E4				8275E4

Table AN4-3	A	B	C	D
Plant Technical Parameter	Annual Electricity generation kWh	Auxiliary Electricity kWh	Net Electricity supplied to facility kWh	Deduct Electricity Purchase from grid(considering 9.01% line loss) kWh
15MV	10440E4	626.4E4	9814E4	9323E4

Table AN4-4	A	B	C	D
Electricity Balance	Factory Installed Capacity kW	Factory Calculated Load kW	Factory Electricity Annual Consumption kWh	Necessary Purchase Power Load kW
	68760	54150	28750E4	39650

Table AN4-5	A	B	C
Calculate $COEF_{CW}=COEF_{AT}$	Chosen Value of TJ/TC	Factor in Oxidation Rate	Convert to tCO2/GJ
Source	IPCC 1996 Report	IPCC Value for CFB Boiler	= A * (1-B) * 44/12 and divide by 1000
Value	25.8	3%	0.092

Table AN4-6	A	B	C	D

Ex-ante estimate PE_y	ClinkerOut t/a	$COEF_{CW}$ tCO2/tJ	Energy_COEF_CL kcal/kg.cl	PEy=A*B*C*4.18/E6 tCO2
2500t	75E4	92	40	11537
5000t	150E4	92	45	25958
合计	225E4			37495

Annex 5 Reference

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