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

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

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The title of the project activity: The Blended Cement project utilizing the additives to decrease the clinker content in Shanxi Guashan Cement
The current version number of the document: Version 1.0
The date of the document was completed: 25/12/2007

A.2. Description of the project activity:

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Project Summary
Luliang Guangsha Tezhong Jiancai Youxian Gongsi ("Luliang Guangsha Material"), admixture manufacturer in Shanxi Province, China, is characterized by their major product of concrete admixture (multifunction specialty pozzolan) which allows to contain large amount of blast-furnace slag and fly ash.

Shanxi Province, mid-east of China, is a great reservoir of natural resources such as coal, iron ore and lime stone, and produces resources and energies which have contributed to China's economic growth. On the other hand, however, it generates enormous amount of industrial wastes as results, including blast furnace slag from iron works and fly ash from coal-fired power stations, most of which have never been recycled but simply disposed.

Focusing on this fact, Luliang Guangsha Material launched a development of multifunctional specialty pozzolan, a concrete admixture which allows to contain massive blast-furnace slag and fly ash about 14 years ago, because cement and water, etc. were mixed in construction field for concrete production in Chinese customs, and successfully developed the concrete admixture in 1990s. This admixture greatly improved concrete strength when using lower strength cement. It has received a high reputation for the spread to the market in addition to the strength improvement, and then won the 3rd prize of Shanxi Province science and technology advancement, etc. Luliang Guangsha Material continued R&D of this admixture after receiving this prize and won some other prizes in Shanxi Province.

In addition, this company had started the development of the cement mixture since 2001, considering possible use in the CDM project. As a result, Luliang Guangsha Material has succeeded to suppress the clinker mixing rate, by using industrial waste (such as blast furnace slag and fly ash), and then to control CO2 emission. With cooperation of and verification by Nishi-Nippon Institute of Technology in Japan in the development stage, the company successfully developed a high-performance admixture to use cement with lower clinker content which has been decreased to 35.0-42.5% from current approx. 60% level.

Although without the admixture blended cement with lower clinker content which is decreased to 35% does not have enough compressive strength in 3 days, with the admixture it increases to the level that can be in use which complies with the standard.

In the meantime, Shanxi Guashan Cement is a major cement manufacturer in Shanxi Province with 350 kt of annual production. This company has also conducted R&D to utilize such industrial wastes (blast furnace slag, fly ash) in the Province, from corporate social responsibility perspective, which decreased clinker content to approx. 60%. Seeking further improvement of the clinker content, the company decided to cooperate Luliang Guangsha Material on its full-fledged production of the blended cement (clinker content: 35.0-42.5%) to learn Luliang Guangsha Material's production technologies.

Method of CO2 Reduction

CO2 emissions in cement manufacturing are caused mainly in clinker manufacturing which causes about 1 tCO2/t-clinker. This project activity will decrease the clinker content by using the admixture, and can also decrease CO2 emissions.

Environmental Impact and Sustainable Development

This project aims to establish a production system for blended cement which contains large amount of blast furnace slag by using Luliang Guangsha Material's admixture, lowering clinker content from the current baseline to 35.0-42.5%, and consequently reduce CO2 emissions from clinker production. In addition, the reduction of clinker content also preserves natural resources such as limestone, plaster and fluorite.

Also, this project activity needs additional industrial waste such as blast furnaces slag. There are a lot of industrial wastes within Shanxi Province, and this project use these waste effectively. So this project is expected for sustainable development by local governments and local residents.

A.3. Project participants:

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Name of Party involved	Private and/or public entity (ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as a project participant
China (host)	Private entity: Shanxi Guashan Cement	No
Japan	Private entity: Kyushu Electric Power Co.,Inc.	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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The project takes place at the cement plant owned and run by Shanxi Guashan Cement. The location of the cement plant is outlined below:

Shanxi Guashan Cement:
Northwest of Tan Village, Jiaochen County, Shanxi Province, P.R.China

A.4.1.1. Host Party(ies):

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P.R.China

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

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Shanxi Province

A.4.1.3. City/Town/Community etc:

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Luliang

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

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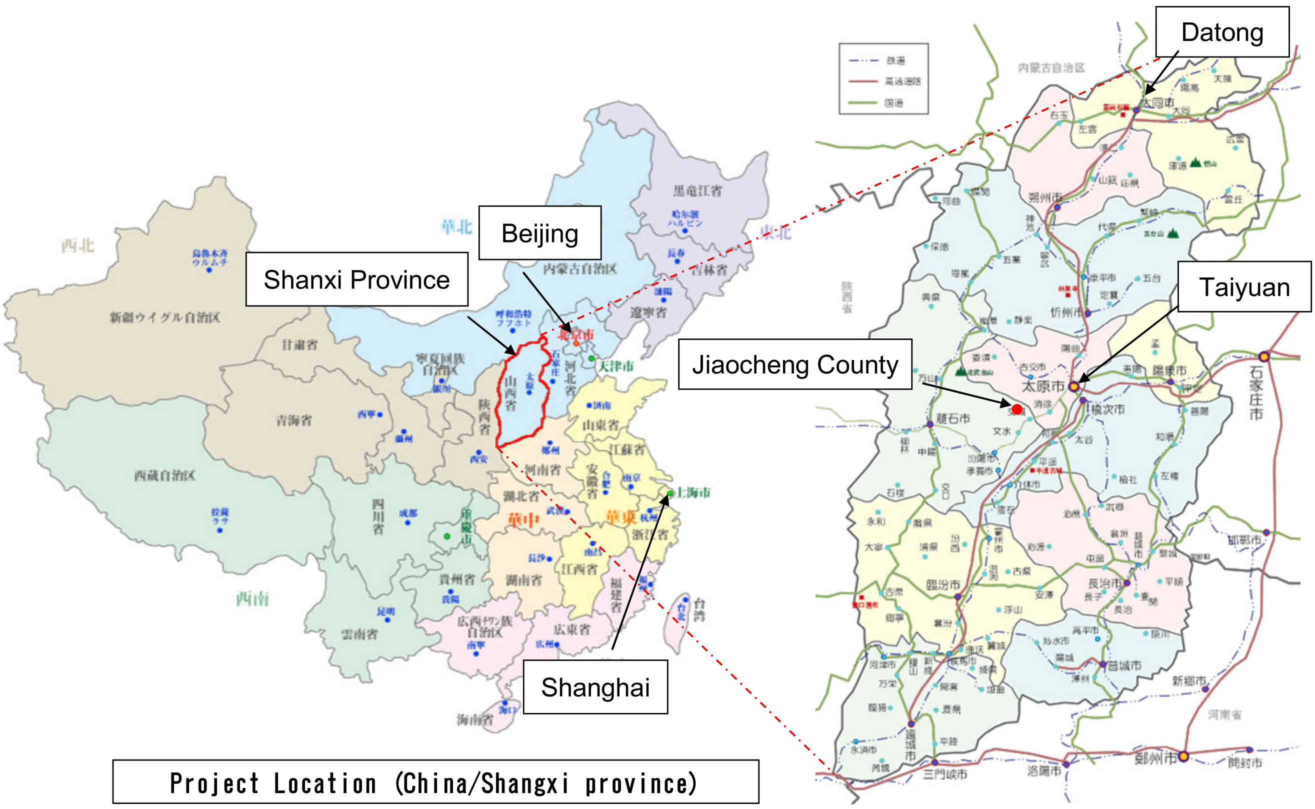
The blend cement manufacturing plant of the project activity at latitude 37° 28’ - 37° 54’ north and longitude 111° 24’ - 112° 17’ east is located at Northwest of Tan Village, Jiaocheng County, Shanxi Province. In addition to the project site, the suppliers of blast-furnace slag and fly ash also locate in Shanxi Province. Taiyuan, provincial capital in Shanxi Province, is 550 km west of Beijing.



Project Location (China/Shangxi province)

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

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The project activity is a cement sector specific project activity. The project activity is categorized in Category 4: Manufacturing Industries.

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

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Blended cement, containing large amount of blast furnace slag and fly ash, entails problems on early strength and durability, which has to be solved because otherwise the product cannot be accepted in the market. Therefore, the most important technology to be employed in this project is for cement admixture to give blended cement of better quality than other type of products.

In order to optimize the clinker content per tonne of cement with taking environmental safety into consideration, Luliang Guangsha Material has conducted meticulous R&D and then succeeded to suppress the clinker mixing rate by using industrial waste. With cooperation of and verification by Nishi-Nippon Institute of Technology in Japan in the development stage, the developed cement admixture can decrease to 35.0 - 42.5% from current approx. 60% level.

As for the blended cement, the strength is generally insufficient. But the blended cement made in this project activity with the cement admixture has sufficient strength though there are various barriers such as technology and market acceptability.

Luliang Guangsha Material has the technical know-how to make the admixture, enabling cement manufacturers to blend both additives more than the current average level in Shanxi Province, although there are some technical difficulties. The company has already tested numerously the impact on the quality in order to combine final impacts on strength properties and appropriate blended mixture for end users.

By reducing CO_2 emissions in cement manufacturing, the project activity is improving global and local environment. Air pollution control together with the ISO 14001 assures that the project is environmentally safe.

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

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For the both reasons of taking a conservative standpoint and remaining uncertainty of baseline scenario at the beginning of the second renewable crediting period, the fixed crediting period of 10 years has been chosen for the project activity.

Years	Annual estimation of emission reductions in tonnes of CO_2e
2008	44,787
2009	85,680
2010	112,343
2011	104,144
2012	98,459
2013	92,658
2014	86,742
2015	80,708
2016	74,553
2017	68,275
2018	30,936
Total estimated reductions (tonnes of CO_2e)	879,285
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	87,928

In addition, as the crediting period will be from 01/07/2008 to 30/06/2018, emission reductions will be reduced by half in the first and the final year.

A.4.5. Public funding of the project activity:

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No public funding or official development assistant (ODA) has been used on this project activity.

SECTION B. Application of a baseline and monitoring methodology

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

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The approved methodology applied by this project is referenced as ACM0005 (Version 04), "Consolidated Baseline Methodology for increasing the Blend in Cement Production" and "Consolidated Monitoring Methodology for increasing the Blend in Cement Production".

According to the requirements of ACM0005 / Version 04, "Tool for the demonstration and assessment of additionality (Version 04)" and "Tool to calculate the emission factor for an electricity system" agreed by CDM Executive Board is used during the baseline identification process and the baseline and project emission calculation process in the project activity.

For more information please refer to the UNFCCC CDM-Executive Board website under the following link: http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

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

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It is necessary to satisfy three conditions in order to choose the ACM0005 / Version 04. These conditions are as follows.

- There is no shortage of additives related to the lack of blending materials. Project participants should demonstrate that there is no alternative allocation or use for the additional amount of additives used in the project activity. If the surplus availability of additives is not substantiated the project emissions reductions (ERs) will be discounted as outlined below.
- This methodology is applicable to domestically sold output of the project activity plant and excludes export of blended cement.
- Adequate data are available on cement types in the market.

The demonstration below justifies the choice of ACM0005 / Version 04 for this project activity.

- There is no shortage of additives related to the lack of blending materials. Project participants should demonstrate that there is no alternative allocation or use for the additional amount of additives used in the project activity. If the surplus availability of additives is not substantiated the project emissions reductions (ERs) will be discounted as outlined below.

Natural resources such as coal, iron ore, and lime stones exist abundantly in Shanxi Province, and it has been continued to produce the resources and energy that supports economic growth in China. On the other hand, however, a large amount of industrial wastes such as blast-furnace slag from the ironworks and fly ash from the coal-fired power plant has been generated, and the almost all are abandoned, not recycled even today.

Four steel plants have plans to supply blast-furnace slag to this project activity, which are approx. 600, 400, 500 and 800 kt/year respectively. The blast-furnace slag needed by this project activity is 319 kt/year at most, based on the production plan. As shown in the following table, supply rates of each wastes are planned between 5 to 30%, so sufficient amount of the blending materials can be obtained by recycling such industrial wastes.

Material	Company	Dispose [kt/year]	Supply [kt/year]	Supply Rate	Remnant [kt/year]	Transport Distance [km]
Blast-furnace Slag	A	600	160	27%	440	5.1
	B	400	120	30%	280	5.2
	C	500	80	16%	420	10
	D	800	40	5%	760	20

Source: Shanxi Guashan Cement

- This methodology is applicable to domestically sold output of the project activity plant and excludes export of blended cement.

This project activity is fit the requirement. The cement produced in this project activity is sold in the domestic market, which is almost all in Shanxi Province.

Cement Type	Production [kt/yr]	Sales [kt/yr]		Import [kt/yr]
		Shanxi Province	Others	
PS	10,000	8,000	2,000	2,000
PC	5,000	5,000		
Other	15,000	15,000		
Total	30,000	28,000	2,000	2,000

Source: Shanxi Building Material Industry Administration Office

- Adequate data are available on cement types in the market.

This project activity is fit the requirement. The data is available from Shanxi Building Material Industry Administration Office.

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

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The project boundary includes only CO2 emissions from the cement production plants (fuel use in the kilns and calcination) and the power generation in the grid.

The table below describes which emission sources and gases are included in the project boundary for the purpose of calculating project emissions and baseline emissions.

Transport related emissions for delivery of additional additives are included in the project activity emissions as leakage.

	Source	Gas	Included ?	Justification / Explanation
Baseline	Kiln fuel use	CO_2	YES	Direct emissions from firing the kiln and processing
		CH_4	NO	CH_4 emissions from combustion processes are considered negligible and excluded because these emissions by the cement industry are negligible (see WBCSD / WRI Cement protocol)
		N_2O	NO	see CH_4
	Calcination	CO_2	YES	Direct emissions due to calcination of limestone
		CH_4	NO	NO CH_4 emission
		N_2O	NO	NO N_2O emission
	Electricity from the grid	CO_2	YES	Indirect emissions from fossil fuels combustion of power plants from the grid due to electricity used for: drying, crushing and grinding raw materials used for clinker production and additives, driving the kiln and kiln fans, grinding and mixing of cement.
		CH_4	NO	CH_4 emissions are considered negligible.
		N_2O	NO	N_2O emissions are considered negligible.
Project activity	Kiln fuel use	CO_2	YES	Direct emissions from firing the kiln and processing
		CH_4	NO	CH_4 emissions from combustion processes are considered negligible and excluded because these emissions by the cement industry are negligible (see WBCSD / WRI Cement protocol)
		N_2O	NO	see CH_4
	Calcination	CO_2	YES	Direct emissions due to calcination of limestone
		CH_4	NO	NO CH_4 emission
		N_2O	NO	NO N_2O emission
	Electricity from the grid	CO_2	YES	Indirect emissions from fossil fuels combustion of power plants from the grid due to electricity used for: drying, crushing and grinding raw materials used for clinker production and additives, driving the kiln and kiln fans, grinding and mixing of cement.
		CH_4	NO	CH_4 emissions are considered negligible.
		N_2O	NO	N_2O emissions are considered negligible.

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

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Identification of the baseline scenario

In China, cement characteristics are subject to the National Standards. The standards specify the contents of materials, quality level required (strength or durability), inspection methods and rules, and so on. For portland blast furnace-slag cement, portland pozzolana cement and portland fly-ash cement, the standards applied are "GB 1344-1999" and "GB 12958-1999" in the National Standards (GB means mandatory standards).

Cement type	Blast furnace slag	Fly ash	Volcanic Ash	Limestone	Kiln dust
P.S (Slag cement)	20 – 70 %	< 8 %			
P.P (Volcanic ash cement)			20 – 50 %		
P.F (Fly ash cement)		20 – 40 %			
P.C (Composite portland cement)	15 – 50 %				< 8 %
P.M (Other cement)	No restrictions				

Source: Building Materials Standards (Cement 2003), China Standards Publishing House

Including for continuation of the current blend level, theoretically possible baseline scenarios are:

(i) Implementation of the proposed project activity, but not as a CDM project;

(ii) A switch to production of another type of blended cement (P.C cement, P.F cement, P.P cement and P.M cement);

(iii) A continuation of the blend level to produce P.S cement.

On (i) above, because the project activity is unlikely to be financially attractive without being CDM project and there are various barriers to implement as described in B.5, it is impossible to regard it as the baseline scenario.

On (ii) above, P.C cement is the most probable type of cement that Shanxi Guashan Cement may produce in the near future, except for P.S cement. However, Shanxi Guashan Cement has no will to produce P.C cement instead of P.S cement because of the following reasons: first, P.C cement is used to produce mortar that has limited demand than concrete, produced by using P.S cement; second, P.C cement has much darker color than P.S cement and tends to be disliked by many buyers; third, it takes higher cost to produce P.C cement than P.S cement, because it is necessary to divide fly ash according to particle sizes, which is contained much more in P.C cement than P.S cement.

P.F cement contains much fly ash so Shanxi Guashan Cement has no will to produce because of the same reasons as for P.C cement. P.F cement is not produced in Shanxi Province, which is defined as the "Region" applied for the project, as mentioned later.

P.P cement is also not produced in Shanxi Province, because there is no volcanic ash in Shanxi Province, which must be blended.

P.M cement has no restriction for blending additives, but it usually cannot meet the standards, and even if it passes, such cement is disliked by many buyers.

So the probable baseline scenario is (iii): the continuation of the blend level to produce P.S cement.

The realistic and credible alternatives can consequently be restricted to the following two scenarios- the existing practice of cement production and the proposed project activity of adding additives, slag or fly ash.

Description of the baseline scenario

The first element in the calculation of baseline emissions is the benchmark share of clinker. In line with the applied methodology this is calculated as the lowest value among the following:

(i) The average (weighted by production) mass percentage of clinker for the 5 highest blend cement brands for the relevant cement type in the region. If the region comprises less than 5 blend cement brands, the national market should be used as the default market; or

(ii) The production weighted average mass percentage of clinker in the top 20% (in terms of share of additives) of the total production of the blended cement type in the region. If 20% falls on part capacity of a plant, that plant is included in the calculation; or

(iii) The mass percentage of clinker in the relevant cement type produced in the proposed project activity plant before the implementation of the CDM project activity, if applicable (For Greenfield project activity this option may be excluded)

The first step is to define the relevant region for each project. As outlined in the methodology:

Definition of region

The "Region" for the benchmark calculation needs to be clearly determined and justified by project participants. The default is the national market but project participants can define a geographic region as the area where each of the following conditions are met: (i) at least 75% of project activity plant's cement production is sold (percentage of domestic sales only); (ii) includes at least 5 other plants with the required published data; and (iii) the production in the region is at least four times the project activity plant's output. Only domestically sold output is considered and any export of cement produced by the project activity plant are excluded in the estimation of emission reductions.

Shanxi Province is chosen as the "Region" upon the conditions (i), (ii) and (iii) above being met.

Project Site	Region	Condition (i)	Condition (ii)	Condition (iii)
Shanxi Guashan Cement	Shanxi Province	100% of cement production is planned to be sold	In the published data there are 17 other plants	The production in the region is 30 times Shanxi Guashan Cement plant's planned maximum output, and the former is to be increased

The national market is not defined as the "Region" because China is a large country and the key elements which define the extent of additive blending can vary greatly within the country considering quality of cement products and market perceptions. Therefore the region is defined as the area that meets the above three criteria for each project activity plant.

The sales data used to establish the above region is shown below. This is combined with data from Shanxi Building Material Industry Administration Office on the production of other cement plants in the region.

Plantwise production of blended cement (P.S. cement) – 2006 ('000 tonnes)

Cement Plant	Production (sorted by P.S. cement production)	Clinker Content
A	1,000	55%
B	425	58%
Shanxi Guashan Cement	300	65%
C	300	60%
D	200	60%
E	180	50%
F	200	60%
G	150	66%
H	150	55%
I	90	50%
J	100	58%
K	80	60%
L	80	55%
M	70	50%
N	60	63%
O	60	52%
P	50	60%
Q	50	50%
The other plants	< 50	60% - 70%
Total (Shanxi Province)	10,000	

Source: Shanxi Building Material Industry Administration Office

Determination of benchmark

Having established the region, the next step is to determine the benchmark clinker and additive content of blended cement in the region. As outlined in the applied methodology, the benchmark for baseline emissions is defined as the lowest among the following:

(i) The average (weighted by production) mass percentage of clinker for the 5 highest blend cement brands for the relevant cement type in the region; If the region comprises of less than 5 blend cement brands, the national market should be used as the default region; or

(ii) The production weighted average mass percentage of clinker in the top 20% (in terms of share of additives) of the total production of the blended cement type in the region. If 20% falls on part capacity of a plant, that plant is included in the calculations; or

(iii) The mass percentage of clinker in the relevant cement type produced in the proposed project activity plant before the implementation of the CDM project activity, if applicable (For Greenfield project activity this option may be excluded).

To determine benchmarks above, the methodology stipulates either statistically significant random sampling or the use of reliable and up to date annual data from a reputable and verifiable source. Data on blended cement production and on clinker production and grinding at cement plants in the region, Shanxi Province, is provided by Shanxi Building Material Industry Administration Office.

Project activity plant	Benchmark clinker content, 2006

Shanxi Guashan Cement	(i) 58.0% (ii) 54.7% (iii) 64%

The methodology stipulates that the lowest value among the three options be selected as the benchmark baseline for the base year (2006). These are illustrated below:

Project activity plant	**Selected benchmark baseline for base year**
Shanxi Guashan Cement	(ii) 54.7%

Trends increase in additive blend.
As outlined in the methodology, we have selected to specify ex-ante an annual increase in the additive blend. The reason for this is to alleviate the monitoring burden and importantly to increase the certainty of CER volumes. There is no clear trend evident in the additive blend in the above regions, nor sufficient data to estimate such a trend. Therefore we have selected the default annual 2% increase in additives.

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

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As outlined in the methodology, we used the Tool for the demonstration and assessment of additionality (version 04) developed by the CDM Executive Board (EB).

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

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

As outlined in the methodology and confirmed in section B.4., the available alternatives are restricted to:

- The proposed project activity
- The continuation of the current situation

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

Production of P.S cement in China is subject to “GB 1344-1999” in the National Standards, under which percentages of raw materials or qualities (the compressive strength or durability) must be complied:

Raw materials for P.S. cement

Cement type	Clinker	Blast furnace slag	Fly ash	Volcanic Ash	Limestone	Kiln dust
P.S (Slag cement)	30 – 80 %	20 – 70 %	< 8 %			

Source: Building Materials Standards (Cement 2003), China Standards Publishing House

Qualities required for P.S. cement

Strength Classification	The compressive strength		The flexural properties	
	3 days	28 days	3 days	28 days
P.S 32.5	10.0	32.5	2.5	5.5

Note: "P.S 32.5" is the type of the cement to be applied in the project.
Source: Building Materials Standards (Cement 2003), China Standards Publishing House

Both of the above alternatives will meet these requirements. Although without the admixture P.S cement with lower clinker content which is decreased to 35% only has 3 - 5 of the compressive strength in 3 days, which does not comply with the standard, with the admixture it increases to 12.0 that can be in use as the P.S. cement.

"GB 1344-1999" in the National Standards is mandatory (GB means mandatory standards).

From the above discussion, we conclude that both alternatives are in compliance with the applicable laws and regulations.

Step 2. Investment analysis

Sub-step 2a. Determine appropriate analysis method

The CDM project activity generates financial benefits other than CDM related income, so the simple cost analysis (Option I.) cannot be applied.

There is no benchmark which represents standard returns in the market considering the specific risk of the project type. Therefore, the option which is to be applied in Sub-step 2 is not the benchmark analysis (Option III.), but the investment comparison analysis (Option II.).

Sub-step 2b. – Option II. Apply investment comparison analysis

Because there is no financial investment for any equipment or facilities both in the baseline scenario and the project scenario, it is more valid to make analysis using NPV than IRR.

The main financial parameters used in the financial analysis are as follows:

Main Parameters Used for Financial Calculations

Materials for Cement Production	Unit Price (yuan/t)	Use in the Baseline Scenario (t/t-cement)	Use in the Project Scenario (t/t-cement)
Clinker	113.63	0.64	0.35
Slag	27	0.31	0.58
Plaster	50	0.05	0.06
Admixture	2,600	0	0.01
Electricity	0.5 (yuan/kWh)	59.14 (kWh)	59.14 (kWh)

Cost Table Used for Financial Calculations (yuan/t-cement)

	Baseline Scenario	Project Scenario
Cement Production		
Clinker	**72.7**	**39.8**
Slag	**8.4**	**15.7**
Plaster	**2.5**	**3.0**
Admixture	**0**	**26.0**
Electricity	29.6	29.6
Other (Direct)	7.6	7.6
Other (Indirect)	35.3	35.3
Packaging	20.6	20.6
Financial	4.6	4.6
Managing	12.8	12.8
Marketing	**9.1**	**10.1**
Taxes	27.0	27.0
Total	**230.1**	**232.0**
Sales	**235.0**	**235.0**
CER revenue	**0**	**80 (yuan/t-CO2)**

Although in the project scenario the cost for producing cement clinker decreases, the additional cost to purchase slag and admixture sets it off and increases the total production cost by 0.84 yuan/t-cement.

Not only the production cost, but the marketing cost is also assumed to be increased to 10.1 yuan/t-cement, which is more expensive than the baseline scenario by 1.0 yuan/t-cement, mainly because of the sales promotion and explanation to the buyers of cement.

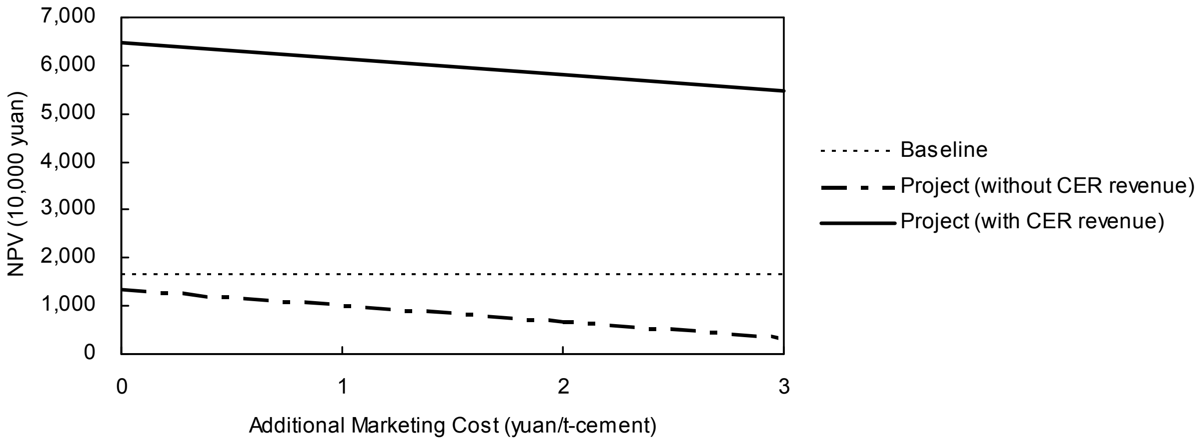
The financial analysis results are shown below. As shown in the table, without carbon credits the project's NPV is 10.19 Million yuan, which is lower than the baseline scenario, 16.39 Million yuan. With the revenue by selling CERs, the project's NPV increases to 61.47 Million yuan, which is much higher than baseline scenario.

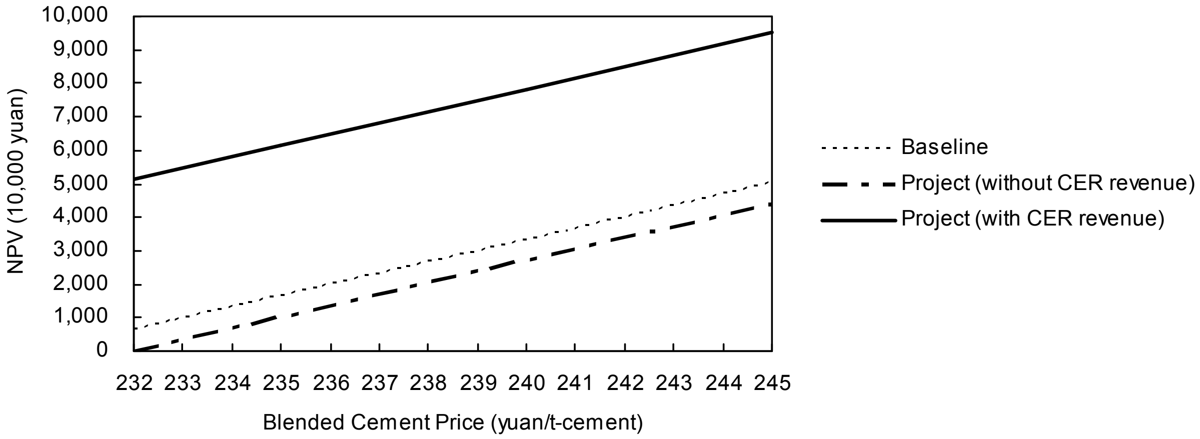
The Financial Analysis Results (NPV) (Unit: Million Yuan)

Baseline Scenario	16.39
Project Scenario (without CER revenue)	10.19
Project Scenario (with CER revenue)	61.47

Notes: NPV uses 6% discount rate that is general in China.

The sensitivity tests of the additional costs in the project scenario, purchasing admixture and increasing marketing cost, are shown below. The NPV in the project scenario without CER selling revenue are always less than those in the baseline scenario.





Step 3. Barrier analysis

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

The increase of the additives in the project activity will raise the blend level higher than that of common practice in Shanxi Province.

There are a number of important barriers preventing achievement of the target rate. These barriers can be characterized as:

1. Technological barriers

It is difficult to increase the percentage of additives to the level anticipated in the project activity whilst maintaining the quality of the cement.

Since started R&D work in 1993 with the objective of utilizing large amount of slag from steel companies and fly ash from coal power plants, Luliang Guangsha Material has the technical know-how to make the admixture, enabling cement manufacturers to blend both additives more than the current average level in Shanxi Province. However, there are technical barriers for Shanxi Guashan Cement to reach the level anticipated in the project activity, except for just only using the admixture. Indeed, it is still very difficult to keep the strength and durability of this type of blended cement.

Concerning blending with slag and fly ash, there is as well technical issues to maintain appropriate particle size distribution of cement. Because appropriateness of particle size distribution is different among clinker, slag and fly ash, in the project activity it is necessary to divide milled materials and cement according to particle sizes and to blend them in a proper way, after maintaining or reconstructing the balls inside the mills.

In order to overcome above technological difficulties, it is also necessary to educate employees and to strengthen a management for analyses and inspections.

2. Barriers due to prevailing practice

The project is a "first of its kind" project in Shanxi Province according to Shanxi Building Material Industry Administration Office.

3. Market acceptability barriers

It is crucial that the increase in additives neither reduces the quality nor results in a customer's perception that the cement is of a lower quality. Therefore the cement sold by Shanxi Guashan Cement should respect the National Standards.

Although in Shanxi Province many cement manufacturers have been producing blended cement utilizing slag or fly ash by up to 50% as a substitute for clinker, there is still a general perception that the quality of such blended cements is inferior to that of usual blended cement, especially that fly ash or slag reduce cement early strength and durability. So therefore customers feel such cement is undesirable in the market and do not tend to purchase such type of cement.

Therefore, the a-priori assumption that blended cement with high additive content is of an inferior quality from customers represent major barriers needed to be removed for implementation of the project activity. At the same time, substantial educational effort must be undertaken to ensure customers' awareness that the quality remains despite the increase of additives, as well as to make additional marketing effort to establish a certain share of higher blend cement in the market. Specifically, first, it is necessary to make and distribute free-of-charge brochures to customers explaining that blended cement with high-additive content can keep qualities such as early strength or durability, while to improve the website to provide more detailed marketing/customer information (http://gshcement.com/index.htm). Second, Shanxi Guashan Cement needs to understand requirements by potential cement buyers and some measures to meet the requirements should be taken. Third, in order to set cement buyers at ease, Shanxi Guashan Cement must promise buyers for after-sales services and prepare their own organization for giving such services. Fourth, Shanxi Guashan Cement is demanded by cement buyers to have technical guidance on making concrete by using the cement, e.g. ratio of cement and water.

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

The alternative to the project activity is the continuation of current practice. This would face much less intensive barriers than outlined above.

Step 4. Common practice analysis
Sub-step 4a. Analyze other activities similar to the proposed project activity

There have not been any other activities implemented previously or current underway that are similar to the project activity. As described in Sub-step 3a, the baseline level from which the project activity will increase the additives in the blended cement exceeds common practice in Shanxi Province. Although in Shanxi Province many cement manufacturers have been producing blended cement utilizing slag or fly ash by up to 50% as a substitute for clinker (in 2006, 18 highest blend cement brands have the clinker contents between 34% to 50% as described in B.4), there is still a general perception that the quality of blended cements utilizing additives more than 50% as a substitute for clinker is inferior to that of usual blended cement, and therefore that blended cement with a higher fly ash or slag blend is undesirable.

Moreover, the project is a “first of its kind” project in Shanxi Province. So there has not been any cement manufacturer to try similar project.

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

Similar activities are neither widely observed nor commonly carried out, and similar activities cannot be identified.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Step 1: Baseline emissions

According to ACM0005 / Version 04, the annual baseline emissions per tonne of blended cement are determined as the following equation:

$$BE_{BC,y} = [BE_{clinker} * B_{Blend,y}] + BE_{ele\_ADD\_BC} \quad (1)$$

Where:

$BE_{BC,y}$	Baseline CO_2 emissions per tonne of blended cement type (BC) (tCO_2/tonne of BC)
$BE_{clinker}$	CO_2 emissions per tonne of clinker in the baseline in the project activity plant (tCO_2/tonne of clinker) and defined below
$B_{Blend,y}$	Baseline benchmark of share of clinker per tonne of BC updated for year y (tonne of clinker/tonne of BC)
$BE_{ele\_ADD\_BC}$	Baseline electricity emissions for BC grinding and preparation of additives (tCO_2/tonne of

BC)

CO_2 per tonne of clinker in the project activity plant in the baseline is calculated as follows:

$$BE_{clinker} = BE_{calcin} + BE_{fossil\_fuel} + BE_{ele\_grid\_CLNK} + BE_{ele\_sg\_CLNK} \quad (1.1)$$

Where:

$BE_{clinker}$	Baseline emissions of CO_2 per tonne of clinker in the project activity plant (t CO_2/tonne of clinker)
BE_{calcin}	Baseline emissions per tonne of clinker due to calcinations of calcium carbonate and magnesium carbonate (t CO_2/tonne of clinker)
BE_{fossil_fuel}	Baseline emissions per tonne of clinker due to combustion of fossil fuels for clinker production (t CO_2/tonne of clinker)
$BE_{ele\_grid\_CLNK}$	Baseline grid electricity emissions for clinker production per tonne of clinker (t CO_2/tonne of clinker)
$BE_{ele\_sg\_CLNK}$	Baseline emissions from self generated electricity for clinker production per tonne of clinker (t CO_2/tonne of clinker)

Emissions from the calcinations of limestone are calculated as follows:

$$BE_{calcin} = [0.785*(OutCaO - InCaO) + 1.092*(OutMgO - InMgO)] / [CLNK_{BSL} * 1000] \quad (1.1.1)$$

Where:

BE_{calcin}	Emissions from the calcinations of limestone (tCO_2/tonne of clinker)
0.785	Stoichiometric emission factor for CaO (tCO_2/t CaO)
OutCaO	CaO content (%) of the clinker * clinker produced (tonne)
InCaO	CaO content (%) of the raw material * raw material quantity (tonne)
1.092	Stoichiometric emission factor for MgO (tCO_2/t MgO)
OutMgO	MgO content (%) of the clinker * clinker produced (tonne)
InMgO	MgO content (%) of the raw material * raw material quantity (tonne)
$CLNK_{BSL}$	Annual production of clinker in the base year (kilo tonne of clinker)

Emissions per tonne of clinker due to combustion of fossil fuels are calculated as follows:

$$BE_{fossil\_fuel} = [\ \Sigma FF_{i\_BSL} * EFF_i] / [CLNK_{BSL} * 1000] \quad (1.1.2)$$

Where:

FF_{i_BSL}	Fossil fuel of type i consumed for clinker production in the baseline (tones of fuel i)
EFF_i	Emission factor for fossil fuel i (t CO_2/tonne of fuel)

Baseline consumption of grid electricity for clinker production is calculated as follows:

$$BE_{ele\_grid\_CLNK} = [\ BELE_{grid\_CLNK} * EF_{grid\_BSL}] / CLNK_{BSL} * 1000 \quad (1.1.3)$$

Where:
$BELE_{grid\_CLNK}$ Baseline grid electricity for clinker production (MWh)
EF_{grid_BSL} Baseline grid emission factor (t CO_2/MWh)

Emissions from self generated electricity for clinker production per tonne of clinker are calculated as follows:

$$BE_{elec\_sg\_CLNK} = [BELE_{sg\_CLNK} * EF_{sg\_BSL}] / [CLNK_{BSL} * 1000] \quad (1.1.4)$$

Where:
$BELE_{sg\_CLNK}$ Baseline self generation of electricity for clinker production (MWh)
EF_{sg_BSL} Baseline electricity self generation emission factor (t CO_2/MWh)

Emissions due to electricity consumption for BC grinding and preparation of additives are calculated as follows:

$$BE_{ele\_ADD\_BC} = BE_{ele\_grid\_BC} + BE_{ele\_sg\_BC} + BE_{ele\_grid\_ADD} + BE_{ele\_sg\_ADD} \quad (1.2)$$

Where:
$BE_{ele\_grid\_BC}$ Baseline grid electricity emissions for BC grinding (tCO_2/tonne of BC)
$BE_{ele\_sg\_BC}$ Baseline self generated electricity emissions for BC grinding (tCO_2/tonne of BC)
$BE_{ele\_grid\_ADD}$ Baseline grid electricity emissions for additive preparation (tCO_2/tonne of BC)
$BE_{ele\_sg\_ADD}$ Baseline self generated electricity emissions for additive preparation (tCO_2/tonne of BC)

Baseline grid electricity emissions for BC grinding are calculated as follows:

$$BE_{ele\_grid\_BC} = [BELE_{grid\_BC} * EF_{grid\_BSL}] / [BC_{BSL} * 1000] \quad (1.2.1)$$

Where:
$BELE_{grid\_BC}$ Baseline grid electricity for grinding BC (MWh)
EF_{grid_BSL} Baseline grid emission factor (t CO2/MWh)
BC_{BSL} Annual production of BC in the base year (kilo tonne of BC)

Baseline self generated electricity emissions for BC grinding are calculated as follows:

$$BE_{elec\_sg\_BC} = [BELE_{sg\_BC} * EF_{sg\_BSL}] / [BC_{BSL} * 1000] \quad (1.2.2)$$

Where:
$BELE_{sg\_BC}$ Baseline self generation electricity for grinding BC (MWh)
EF_{sg_BSL} Baseline electricity self generation emission factor (t CO_2/MWh)

Baseline grid electricity emissions for additive preparation are calculated as follows:

$BE_{ele\_grid\_ADD}$ = [$BELE_{grid\_ADD}$ * EF_{grid_BSL}] /[BC_{BSL} * 1000] (1.2.3)

Where:
$BELE_{grid\_ADD}$ Baseline grid electricity for grinding additives (MWh)
EF_{grid_BSL} Baseline grid emission factor (t CO_2/MWh)

Baseline self generated electricity emissions for additive preparation are calculated as follows:

$BE_{elec\_sg\_ADD}$ = [$BELE_{sg\_ADD}$ * EF_{sg_BSL}] / [BC_{BSL} * 1000] (1.2.4)

Where:
$BELE_{sg\_ADD}$ Baseline self generation electricity for grinding additives (MWh)
EF_{sg_BSL} Baseline electricity self generation emission factor (t CO_2/MWh)

Step 2: Project Activity Emissions

According to ACM0005 / Version 04, emissions per tonne of BC in the project activity plant in year y are calculated as follows:

$PE_{BC,y}$ = [$PE_{clinker,y}$ * $P_{Blend,y}$] + $PE_{ele\_ADD\_BC,y}$ (2)

Where:
$PE_{BC,y}$ CO_2 emissions per tonne of BC in the project activity plant in year y(tCO_2/tonne of BC)
$PE_{clinker,y}$ CO_2 emissions per tonne of clinker in the project activity plant in year y (t CO_2/tonne of clinker)
$P_{Blend,y}$ Share of clinker per tonne of BC in year y (tonne of clinker/tonne of BC)
$PE_{ele\_ADD\_BC,y}$ Electricity emissions for BC grinding and preparation of additives in year y (tCO_2/tonne of BC)

CO2 emissions per tonne of clinker in the project activity plant in year y are calculated as follows:

$PE_{clinker,y}$ = $PE_{calcin,y}$ + $PE_{fossil\_fuel,y}$ + $PE_{ele\_grid\_CLNK,y}$ + $PE_{ele\_sg\_CLNK,y}$ (2.1)

Where:
$PE_{calcin,y}$ Emissions per tonne of clinker due to calcinations of calcium carbonate and magnesium carbonate in year y (tCO_2/tonne of clinker)
$PE_{fossil\_fuel,y}$ Emissions per tonne of clinker due to combustion of fossil fuels for clinker production in year y (tCO_2/tonne of clinker)
$PE_{ele\_grid\_CLNK,y}$ Grid electricity emissions for clinker production per tonne of clinker in year y (tCO_2/tonne of clinker)
$PE_{ele\_sg\_CLNK,y}$ Emissions from self-generated electricity per tonne of clinker production in year y (tCO_2/tonne of clinker)

Emissions from the calcinations of limestone are calculated as follows:

$PE_{calcin,y} = 0.785*(OutCaO_y - InCaO_y) + 1.092*(OutMgO_y - InMgO_y) / [CLNK_y * 1000]$ (2.1.1)

Where:

0.785	Stoichiometric emission factor for CaO (tCO2/t CaO)
$OutCaO_y$	CaO content (%) of the clinker * clinker produced (tonne)
$InCaO_y$	CaO content (%) of the raw material * raw material quantity (tonne)
1.092	Stoichiometric emission factor for MgO (tCO2/t MgO)
$OutMgO_y$	MgO content (%) of the clinker * clinker produced (tonne)
$InMgO_y$	MgO content (%) of the raw material * raw material quantity (tonne)
$CLNK_y$	Annual production of clinker in year y (kilo tonne of klinker)

Emissions per tonne of clinker due to combustion of fossil fuels for clinker production are calculated as follows:

$PE_{fossil\_fuel, y} = [\Sigma FF_{i,y} * EFF_i] /CLNK_y * 1000$ (2.1.2)

Where:

$FF_{i,y}$	Fossil fuel of type i consumed for clinker production in year y (tonne of fuel i)
EFF_i	Emission factor for fossil fuel i (tCO_2/tonne of fuel)

Grid electricity emissions for clinker production per tonne of clinker are calculated as follows:

$PE_{ele\_grid\_CLNK,y} = [PELE_{grid\_CLNK,y} * EF_{grid\_y}] / [CLNK_y * 1000]$ (2.1.3)

Where:

$PELE_{grid\_CLNK,y}$	Grid electricity for clinker production in year y (MWh)
EF_{grid_y}	Grid emission factor in year y(t CO_2/MWh)

Emissions from self-generated electricity per tonne of clinker production are calculated as follows:

$PE_{elec\_sg\_CLNK,y} = [PELE_{sg\_CLNK ,y} * EF_{sg\_y}] /[CLNK_y * 1000]$ (2.1.4)

Where:

$PELE_{sg\_CLNK ,y}$	Self generation of electricity for clinker production in year y (MWh)
EF_{sg_y}	Emission factor for self generated electricity in year y (t CO_2/MWh)

Electricity emissions for BC grinding and preparation of additives are calculated as follows:

$PE_{ele\_ADD\_BC,y} = PE_{ele\_grid\_BC,y} + PE_{ele\_sg\_BC,y} + PE_{ele\_grid\_ADD,y} + PE_{ele\_sg\_ADD,y}$ (2.2)

Where:
$PE_{ele\_grid\_BC,y}$ Grid electricity emissions for BC grinding in year y (tCO_2/tonne of BC)
$PE_{ele\_sg\_BC,y}$ Emissions from self generated electricity for BC grinding in year y (tCO_2/tonne of BC)
$PE_{ele\_grid\_ADD,y}$ Grid electricity emissions for additive preparation in year y (tCO_2/tonne of BC)
$PE_{ele\_sg\_ADD,y}$ Emissions from self generated electricity additive preparation in year y (tCO_2/tonne of BC)

Grid electricity emissions for BC grinding are calculated as follows:

$$PE_{ele\_grid\_BC,y} = [PELE_{grid\_BC,y} * EF_{grid\_BSL,y}] /[BC_y * 1000] \qquad (2.2.1)$$

Where:
$PELE_{grid\_BC,y}$ Baseline grid electricity for grinding BC (MWh)
$EF_{grid\_BSL,y}$ Grid emission factor in year y(t CO2/MWh)
BC_y Annual production of BC in year y (kilo tonne of BC)
Emissions from self generated electricity for BC grinding are calculated as follows:

$$PE_{elec\_sg\_BC,y} = [PELE_{sg\_BC,y} * EF_{sg\_y}] / [BC_y * 1000] \qquad (2.2.2)$$

Where:
$PELE_{sg\_BC,y}$ Self generated electricity for grinding BC in year y (MWh)
EF_{sg_y} Emission factor for self generated electricity in year y (t CO_2/MWh)

Grid electricity emissions for additive preparation are calculated as follows:

$$PE_{ele\_grid\_ADD,y} = [PELE_{grid\_ADD,y} * EF_{grid\_y}] /[BC_y * 1000] \qquad (2.2.3)$$

Where:
$PELE_{grid\_ADD,y}$ Baseline grid electricity for grinding additives (MWh)

Emissions from self generated electricity additive preparation are calculated as follows:

$$PE_{elec\_sg\_ADD,y} = [PELE_{sg\_ADD,y} * EF_{sg\_y}] / [BC_y * 1000] \qquad (2.2.4)$$

Where:
$PELE_{sg\_ADD,y}$ Self generation electricity for grinding additives (MWh)
EF_{sg_y} Emission factor for self generated electricity in year y (t CO2/MWh)

<u>Step 3: Electricity Emission Factor</u>

For the calculation of the specific emissions from power generation from the grid, the Methodological tool, "Tool to calculate the emission factor for an electricity system" is applied.

Under the tool, four various methods are provided for calculating the Operating Margin, including:

a) Simple OM;
b) Simple Adjusted OM;
c) Dispatch data analysis OM;
d) Average OM

Detailed information to carry out a dispatch data analysis is not publicly available, therefore the dispatch data analysis OM is not suitable for the proposed project.

According to THE TOOL, the Simple OM method is applicable to the project if the low-cost resources constitute less than 50% of total grid generation in average of the five most recent years. According to DNA of China, the most recent year with available data in yearbook is 2005, and since generation from all sources (including hydro power) other than thermal plants were less than 2% of total generation in the North China Power Grid from 2001 to 2005, the Simple OM method is applicable to the proposed project[1].

The Simple OM can be calculated using either of the two following data vintages for years(s) y:

(ex-ante) the full generation-weighted average for the most recent 3 years for which data are available at the time of PDD submission, if or,

the year in which project generation occurs, if $EF_{OM,y}$ is updated based on ex-post monitoring.

Project participants of this project chooses ex-ante vintage, and EF_{OM} is fixed during the first crediting period.

On the other hand, the tool allows project participants to choose between two given options for calculating the Build Margin for the project, one is ex-ante calculation, and the other is annual ex-post updating in the first crediting period. For this project the first option is chosen.
The Build Margin Emission Factor, therefore, is based ex-ante on the most recent information available on plants already built at the time of PDD submission.

Step 4: Leakage

According to ACM0005 / Version 04, emissions due to transportation of additives should be accounted as leakage. Thus, transport related emissions for additives are calculated as follows:

$$L_{add\_trans} = [(TF_{cons} * D_{add\_source} * TEF) * 1/Q_{add} * 1/1000 + (ELE_{conveyor\_ADD} * EF_{grid}) * 1/ADD_y] \qquad (4)$$

Where:

L_{add_trans}	Transport related emissions per tonne of additives (t CO_2/tonne of additive)
TF_{cons}	Fuel consumption for the vehicle per kilometre (kg of fuel/kilometre)
D_{add_source}	Distance between the source of additive and the project activity plant (km)
TEF	Emission factor for transport fuel (kg CO_2/kg of fuel)
Q_{add}	Quantity of additive carried in one trip per vehicle (tonne of additive)

[1] http://cdm.ccchina.gov.cn/english/NewsInfo.asp?NewsId=1891

$ELE_{conveyor\_ADD}$	Annual Electricity consumption for conveyor system for additives (MWh)
EF_{grid}	Grid electricity emission factor (tonne of CO_2/MWh)
ADD_y	Annual consumption of additives in year y. (tonne of additives)

Leakage emissions per tonne of BC due to additional additives are determined by:

$$L_y = L_{add\_trans} * [A_{blend,y} - P_{blend,y}] * BC_y \qquad (4.1)$$

Where:

L_y	Leakage emissions for transport of additives (kilo tonne of CO_2)
$A_{blend,y}$	Baseline benchmark share of additives per tonne of BC updated for year y (tonne of additives/tonne of BC)
$P_{blend,y}$	Share of additives per tonne of BC in year y (tonne of additives/tonne of BC)
BC_y	Production of BC in year y (kilo tonne of BC)

Another possible leakage due to the diversion of additives does not occur.

Step 5: Emission Reductions

The project activity mainly reduces CO2 emissions through substitution of clinker in cement by blending materials. Emissions reductions in year y are the difference in the CO2 emissions per tonne of BC in the baseline and in the project activity multiplied by the production of BC in year y.
The emissions reductions are discounted for the percentage of additives for which surplus availability is not substantiated.

$$ER_y = \{ [BE_{BC,y} - PE_{BC,y}] * BC_y + L_y \} * (1 - \alpha_y) \qquad (5)$$

where

ER_y	Emissions reductions in year y due to project activity (kilo tonne of CO2)
$BE_{BC,y}$	Baseline emissions per tonne of BC in year y (tCO2/tonne of BC)
$PE_{BC,y}$	Project emissions per tonne of BC in year y (tCO2/tonne of BC)
BC_y	BC production in year y (kilo tonne of BC)
L_y	Leakage emissions for transport of additives (kilo tonne of CO2)
α_y	Share of additional amounts of additives used as surplus in year y

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

Data / Parameter:	$InCaO_{BSL}$
Data unit:	%
Description:	CaO content of the raw material
Source of data used:	Plant record
Value applied:	0.7
Justification of the choice of data or description of measurement methods and procedures actually applied :	The inspection is carried every time the raw material is brought in the plant. The inspection includes analyses of moisture content, calorific value, grain size and component. The result of analysis is written on paper by a plant staff and retained for three years. This is their usual operation of cement production.
Any comment:	None

Data / Parameter:	$OutCaO_{BSL}$
Data unit:	%
Description:	CaO content of the clinker
Source of data used:	Plant record
Value applied:	64.47
Justification of the choice of data or description of measurement methods and procedures actually applied :	The inspection is carried every eight hours daily. It includes analyses of moisture content, calorific value, grain size and component. The result of analysis is written on paper by a plant staff and retained for three years. This is their usual operation of cement production.
Any comment:	None

Data / Parameter:	$InMgO_{BSL}$
Data unit:	%
Description:	MgO content of the raw material
Source of data used:	Plant record
Value applied:	0.17
Justification of the choice of data or description of measurement methods and procedures actually applied :	The inspection is carried every time the raw material is brought in the plant. The inspection includes analyses of moisture content, calorific value, grain size and component. The result of analysis is written on paper by a plant staff and retained for three years. This is their usual operation of cement production.
Any comment:	None

Data / Parameter:	$OutMgO_{BSL}$

Data unit:	%
Description:	MgO content of the clinker
Source of data used:	Plant record
Value applied:	3.82
Justification of the choice of data or description of measurement methods and procedures actually applied :	The inspection is carried every eight hours daily. It includes analyses of moisture content, calorific value, grain size and component. The result of analysis is written on paper by a plant staff and retained for three years. This is their usual operation of cement production.
Any comment:	None

Data / Parameter:	**Quantity of clinker raw material**
Data unit:	Kilo tonne
Description:	Quantity of clinker raw material
Source of data used:	Plant record
Value applied:	446
Justification of the choice of data or description of measurement methods and procedures actually applied :	1 tonne of clinker needs 1.652 tonne of raw material. The componential breakdown is: Limestone: 1.173 tonnes, Raw coal: 0.19 tonnes, Clay:0.198 tonnes and Others: 0.091 tonnes
Any comment:	None

Data / Parameter:	$\mathbf{CLNK_{BSL}}$
Data unit:	Kilo tonne
Description:	Annual production of clinker
Source of data used:	Plant record
Value applied:	270
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data is from an actual operation in the process of blending. The data of clinker production is written on paper by a process staff every eight hours basis and compiled annual basis. This is their usual operation of cement production.
Any comment:	None

Data / Parameter:	$\mathbf{FF_{1\ BSL}}$
Data unit:	tonne of fuel
Description:	Fossil fuel of type 1 consumed for clinker production
Source of data used:	Plant record

Value applied:	51300
Justification of the choice of data or description of measurement methods and procedures actually applied :	This is coal consumption as a raw material for clinker production.
Any comment:	Coal

Data / Parameter:	**FF_{2_BSL}**
Data unit:	tonne of fuel
Description:	Fossil fuel of type 2 consumed for clinker production
Source of data used:	Plant record
Value applied:	7068
Justification of the choice of data or description of measurement methods and procedures actually applied :	This is coal consumption as fuel of desiccation for raw materials.
Any comment:	Coal

Data / Parameter:	**EFF_{coal}**
Data unit:	t CO2/tonne of fuel
Description:	Emission factor for fossil fuel
Source of data used:	IPCC/regional data
Value applied:	1.978
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value is calculated based on the following data: Calorific value of raw coal: 20908 kJ/kg Emission factor of raw coal: 25.80 t-C/TJ Oxidation rate: 1.0
Any comment:	None

Data / Parameter:	**$BELE_{grid\_CLNK}$**
Data unit:	MWh
Description:	Baseline grid electricity for clinker production
Source of data used:	Plant record
Value applied:	17280
Justification of the choice of data or description of	Electricity is used for grinding of materials in the process of clinker production. The data is monitored by an integrating watt meter in power control room.

measurement methods and procedures actually applied :	
Any comment:	None

Data / Parameter:	EF_{grid_BSL}
Data unit:	tCO2/MWh
Description:	Baseline grid emission factor
Source of data used:	Chinese government
Value applied:	1.03025
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated according to values of OM and BM published by DNA of China dated 9 August, 2007[2]. OM: 1.1208 tCO2/MWh BM: 0.9397 tCO2/MWh CM: 1.03025 tCO2/MWh
Any comment:	See Annex 3.

Data / Parameter:	$BELE_{grid\_BC}$
Data unit:	MWh
Description:	Baseline grid electricity for grinding BC
Source of data used:	Plant record
Value applied:	12600
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to consumption of 42kWh per 1 tonne of BC. Electricity is used for grinding of materials in the process of clinker production. The data is monitored by an integrating watt meter in power control room.
Any comment:	None

Data / Parameter:	$BELE_{grid\_ADD}$
Data unit:	MWh
Description:	Baseline grid electricity for grinding additives
Source of data used:	Plant record
Value applied:	540
Justification of the choice of data or description of measurement methods	According to consumption of 1.8kWh per 1 tonne of BC. Electricity is used for grinding of materials in the process of clinker production. The data is monitored by an integrating watt meter in power control room.

[2] http://cdm.ccchina.gov.cn/english/NewsInfo.asp?NewsId=1891

and procedures actually applied :	
Any comment:	None

Data / Parameter:	**$B_{Blend,y}$**
Data unit:	Tonne of clinker / tonne of BC
Description:	Baseline benchmark of share of clinker per tonne of BC in year y
Source of data used:	Plant record
Value applied:	0.529 – 0.425
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data is from an actual operation in the process of blending. The data of clinker production is written on paper by a process staff every eight hours basis and compiled annual basis. This is their usual operation of cement production.
Any comment:	See B.6.3

Data / Parameter:	**$A_{blend,y}$**
Data unit:	Tonne of additives / tonne of BC
Description:	Baseline benchmark share of additives per tonne of BC in year y
Source of data used:	Plant record
Value applied:	0.4713 – 0.5745
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data is from an actual operation in the process of blending. The data of clinker production is written on paper by a process staff every eight hours basis and compiled annual basis. This is their usual operation of cement production.
Any comment:	See B.6.3

B.6.3 Ex-ante calculation of emission reductions:

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Baseline emissions

The following table shows parameters for baseline emissions.

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
BE_{BC_y}	0.592	0.582	0.572	0.562	0.552	0.541	0.530	0.519	0.508	0.497	0.485
B_{Blend_y}	0.529	0.519	0.510	0.500	0.490	0.480	0.469	0.459	0.448	0.437	0.425

Project activity emissions

The following table shows parameters for Blend Cement during crediting period.

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
PE_{BC_y}	0.368	0.368	0.368	0.373	0.373	0.373	0.373	0.373	0.373	0.373	0.373
$PE_{clinker\_y}$	1.050	1.050	1.050	1.064	1.064	1.064	1.064	1.064	1.064	1.064	1.064
P_{Blend_y}	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350
$PE_{ele\_ADD\_BC\_y}$	0.00013	0.00013	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014

Leakage

The following table shows leakage estimation due to transportation of additives for Blend Cement.

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
L_y	-0.0306	-0.0290	-0.0376	-0.0353	-0.0329	-0.0305	-0.0281	-0.0256	-0.0230	-0.0204	-0.0178
L_{add_trans}	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004
A_{blend_y}	0.4713	0.4807	0.4903	0.5001	0.5102	0.5204	0.5308	0.5414	0.5522	0.5632	0.5745

Emission reductions

The following table estimates emission reductions.

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
ER_y (t)	44787	85680	112343	104144	98459	92658	86742	80708	74553	68275	30936
BE (t)	118358	232818	314658	309080	303392	297589	291671	285634	279477	273196	133395
PE (t)	73555	147109	202277	204900	204900	204900	204900	204900	204900	204900	102450
Leakage (t)	-16	-29	-38	-36	-33	-31	-29	-26	-24	-21	-9
BC (kt)	400	400	550	550	550	550	550	550	550	550	550

In addition, the crediting period will be from 01/07/2008 to 30/06/2018, therefore, emission reduction will be reduced by half in the first year(2008) and the final year(2018).

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

>>

Year	Estimation of project activity emissions (tonnes of CO2e)	Estimation of baseline emissions (tonnes of CO2e)	Estimation of leakage (tonnes of CO2e)	Estimation of overall emission reductions (tonnes of CO2e)
2008	73,555	118,358	-16	44,787
2009	147,109	232,818	-29	85,680
2010	202,277	314,658	-38	112,343
2011	204,900	309,080	-36	104,144
2012	204,900	303,392	-33	98,459
2013	204,900	297,589	-31	92,658
2014	204,900	291,671	-29	86,742
2015	204,900	285,634	-26	80,708
2016	204,900	279,477	-24	74,553
2017	204,900	273,196	-21	68,275
2018	102,450	133,395	-9	30,936
Total (tonnes of CO2e)	1,959,691	2,839,268	-292	879,285

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

B.7.1 Data and parameters monitored:

Data / Parameter:	**$InCaO_y$**
Data unit:	%
Description:	CaO content of the raw material
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.7
Description of measurement methods and procedures to be applied:	The inspection is carried every time the raw material is brought in the plant. The inspection includes analyses of moisture content, calorific value, grain size and component. The result of analysis is written on paper by a plant staff and retained for three years. This is their usual operation of cement production.
QA/QC procedures to be applied:	The company has ISO9002 and ISO14001 certificate. The data will be treated subject to these schemes.
Any comment:	It will be estimated as part of usual operation.

Data / Parameter:	**$OutCaO_y$**
Data unit:	%
Description:	CaO content of the clinker
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	64.47
Description of measurement methods and procedures to be applied:	The inspection is carried every eight hours daily. It includes analyses of moisture content, calorific value, grain size and component. The result of analysis is written on paper by a plant staff and retained for three years. This is their usual operation of cement production.
QA/QC procedures to be applied:	The company has ISO9002 and ISO14001 certificate. The data will be treated subject to these schemes.
Any comment:	It will be estimated as part of usual operation.

Data / Parameter:	**$InMgO_y$**
Data unit:	%
Description:	MgO content of the raw material
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.17
Description of measurement methods and procedures to be applied:	The inspection is carried every time the raw material is brought in the plant. The inspection includes analyses of moisture content, calorific value, grain size and component. The result of analysis is written on paper by a plant staff and retained for three years. This is their usual operation of cement production.
QA/QC procedures to be applied:	The company has ISO9002 and ISO14001 certificate. The data will be treated subject to these schemes.
Any comment:	It will be estimated as part of usual operation.

Data / Parameter:	**$OutMgO_y$**
Data unit:	%
Description:	MgO content of the raw material
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected	3.82

emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	The inspection is carried every eight hours daily. It includes analyses of moisture content, calorific value, grain size and component. The result of analysis is written on paper by a plant staff and retained for three years. This is their usual operation of cement production.
QA/QC procedures to be applied:	The company has ISO9002 and ISO14001 certificate. The data will be treated subject to these schemes.
Any comment:	It will be estimated as part of usual operation.

Data / Parameter:	**Quantity of clinker raw material**
Data unit:	Kilo tonne
Description:	Quantity of raw material is used to produce clinker
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	446
Description of measurement methods and procedures to be applied:	Continuous weighing and recording system is already installed and used in usual operation. The equipment system for materials is located in cement production lines. Monitoring equipment is calibrated and checked by the company itself weekly. In addition, some important parts of this equipment is replaced annually. Measurement interval: each eight hours.
QA/QC procedures to be applied:	The company has ISO9002 and ISO14001 certificate. The data will be treated subject to these schemes.
Any comment:	It will be recorded as part of usual operation.

Data / Parameter:	**$CLNK_y$**
Data unit:	Kilo tonne
Description:	Annual production of clinker
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	270
Description of measurement methods and procedures to be applied:	Continuous weighing and recording system is already installed and used in usual operation. The equipment system for materials is located in cement production lines. Monitoring equipment is calibrated and checked by the company itself weekly. In addition, some important parts of this equipment is replaced annually.

	Measurement interval: each eight hours.
QA/QC procedures to be applied:	The company has ISO9002 and ISO14001 certificate. The data will be treated subject to these schemes.
Any comment:	It will be recorded as part of usual operation.

Data / Parameter:	$\mathbf{FF_{1,y}}$
Data unit:	Tonne
Description:	Coal consumed for clinker production in year y.
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	51300
Description of measurement methods and procedures to be applied:	Monitoring equipment is already installed and used in usual operation. This monitoring equipment is calibrated and checked by the company itself weekly. In addition, some important parts of this equipment is replaced annually. Measurement interval: each eight hours
QA/QC procedures to be applied:	The company has ISO9002 and ISO14001 certificate. The data will be treated subject to these schemes.
Any comment:	Only coal will be used for production of clinker.

Data / Parameter:	$\mathbf{FF_{2,y}}$
Data unit:	Tonne
Description:	Coal consumed for clinker production in year y.
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	8308
Description of measurement methods and procedures to be applied:	This data is monitored by a track scale every time coal is brought in the plant. Measurement interval is daily basis.
QA/QC procedures to be applied:	The company has ISO9002 and ISO14001 certificate. The data will be treated subject to these schemes.
Any comment:	Only coal will be used for production of clinker.

Data / Parameter:	$\mathbf{PELE_{grid\_CLNK,y}}$
Data unit:	MWh
Description:	Grid electricity for clinker production
Source of data to be used:	Plant records

Value of data applied for the purpose of calculating expected emission reductions in section B.5	17280
Description of measurement methods and procedures to be applied:	This data will be measured at an integrated watt meter. Data of electricity consumption will be transcribed each eight hour basis according to usual plant operation.
QA/QC procedures to be applied:	The meter used to measure the electricity consumed by the project will be in accordance with the manufacturer's recommendations for accuracy and reliability. The purchase specification of electricity will be used for cross-checked to enhance the quality.
Any comment:	It will be measured and managed subject to ISO9002 and ISO14001.

Data / Parameter:	**ADD_y**
Data unit:	Tonne
Description:	Annual consumption of additives for year y.
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	260
Description of measurement methods and procedures to be applied:	Continuous weighing and recording system is already installed and used in usual operation. The equipment system for materials is located in cement production lines. Monitoring equipment is calibrated and checked by the company itself weekly. In addition, some important parts of this equipment is replaced annually. Measurement interval: each eight hours.
QA/QC procedures to be applied:	The meter used to measure the additives consumed by the project will be in accordance with the manufacturer's recommendations for accuracy and reliability. The purchase specification of additives will be used for cross-checked to enhance the quality. In addition, as the company has ISO9002 and ISO14001 certificate, the data will be treated based on these schemes.
Any comment:	It will be recorded as part of usual operation.

Data / Parameter:	**$PELE_{grid\ BC,y}$**
Data unit:	MWh
Description:	Grid electricity consumption for grinding BC in year y.
Source of data to be used:	Plant records

Value of data applied for the purpose of calculating expected emission reductions in section B.5	56
Description of measurement methods and procedures to be applied:	This data will be measured at an integrated watt meter. Data of electricity consumption will be printed out monthly basis and also will be transcribed daily according to normal plant operation.
QA/QC procedures to be applied:	The meter used to measure the electricity consumed by the project will be in accordance with the manufacturer's recommendations for accuracy and reliability. The purchase specification of electricity will be used for cross-checked to enhance the quality.
Any comment:	It will be measured and managed subject to ISO9002 and ISO14001.

Data / Parameter:	**$PELE_{grid\_ADD,y}$**
Data unit:	MWh
Description:	Grid electricity consumption for grinding additives
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	2.4
Description of measurement methods and procedures to be applied:	This data will be measured at an integrated watt meter. Data of electricity consumption will be printed out monthly basis and also will be transcribed daily according to normal plant operation.
QA/QC procedures to be applied:	The meter used to measure the electricity consumed by the project will be in accordance with the manufacturer's recommendations for accuracy and reliability. The purchase specification of electricity will be used for cross-checked to enhance the quality.
Any comment:	It will be measured and managed subject to ISO9002 and ISO14001.

Data / Parameter:	**BC_y**
Data unit:	Kilo tonne
Description:	Annual production of BC for year y.
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in	400

section B.5	
Description of measurement methods and procedures to be applied:	Continuous weighing and recording system is already installed and used in usual operation. The equipment system for materials is located in cement production lines. Monitoring equipment is calibrated and checked by the company itself weekly. In addition, some important parts of this equipment is replaced annually. Measurement interval: each eight hours.
QA/QC procedures to be applied:	The company has ISO9002 and ISO14001 certificate. The data will be treated subject to these schemes.
Any comment:	It will be recorded as part of usual operation.

Data / Parameter:	$P_{blend,y}$
Data unit:	Tonne of additives/tonne of blended cement
Description:	Share of additives per blended cement for year y.
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	65%
Description of measurement methods and procedures to be applied:	Continuous weighing and recording system is already installed and used in usual operation. The equipment system for materials is located in cement production lines. Monitoring equipment is calibrated and checked by the company itself weekly. In addition, some important parts of this equipment is replaced annually. Measurement interval: each eight hours.
QA/QC procedures to be applied:	The company has ISO9002 and ISO14001 certificate. The data will be treated subject to these schemes.
Any comment:	It will be recorded as part of usual operation.

Data / Parameter:	TF_{cons}
Data unit:	kg of fuel/kilometre
Description:	Fuel consumption for the vehicle per kilometre
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.4
Description of measurement methods and procedures to be applied:	The data is based on actual performance of plant operation.
QA/QC procedures to	The company has ISO9002 and ISO14001 certificate. The data will be treated

be applied:	subject to these schemes.
Any comment:	According to ACM0005 / Version 04, uncertainty level of the data is low.

Data / Parameter:	$D_{add\ source}$
Data unit:	km
Description:	Distance between the source of the additives and the project activity plant.
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	10
Description of measurement methods and procedures to be applied:	The data is based on actual performance of plant operation.
QA/QC procedures to be applied:	The company has ISO9002 and ISO14001 certificate. The data will be treated subject to these schemes.
Any comment:	According to ACM0005 / Version 04, uncertainty level of the data is low, therefore, data will be cross-checked with map.

Data / Parameter:	**TEF**
Data unit:	kg of CO2/kg of fuel
Description:	Emission factor of transport fuel
Source of data to be used:	IPCC
Value of data applied for the purpose of calculating expected emission reductions in section B.5	3.20853
Description of measurement methods and procedures to be applied:	This is IPCC default value.
QA/QC procedures to be applied:	According to ACM0005 / Version 04, uncertainty level of the data is low, therefore, data will be re-check by reports of IPCC periodically.
Any comment:	This value will be fixed during the project period.

Data / Parameter:	Q_{add}
Data unit:	Tonne of additives/vehicle
Description:	Quantity of additives carried in one trip per vehicle.
Source of data to be used:	Plant records

Value of data applied for the purpose of calculating expected emission reductions in section B.5	30
Description of measurement methods and procedures to be applied:	The data is based on actual performance of plant operation.
QA/QC procedures to be applied:	According to ACM0005 / Version 04, uncertainty level of the data is low, therefore, data will originate from vehicle manufactures.
Any comment:	According to ACM0005 / Version 04, uncertainty level of the data is low.

Data / Parameter:	α_y
Data unit:	Tonne of additive
Description:	Share of additional amounts of additives used as surplus in year y.
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	There is no plan to use surplus of additives.
QA/QC procedures to be applied:	None
Any comment:	According to ACM0005 / Version 04, uncertainty level of the data is low.

B.7.2 Description of the monitoring plan:

>>

The monitoring plan is established according to the requirement of approved monitoring methodology ACM0005 / Version 04.

In order to achieve the real, credible CERs of the project design document has calculated, it needs the managers of project participants to ensure the safe operation of the project, to satisfy the information need of the DOE for verifying project as part of verification and certification process, to establish and maintain the appropriate monitoring system.

The environmental manager will be requested to be responsible for all interrelated CDM activity.
The quality assurance and quality control for recording, maintaining and archiving data shall be approved as the part of this CDM project activity. This is on going process that ensured by the CDM mechanism in terms of need for verification emission on the annual basis.

The company has ISO9002 and ISO14001 certificate, therefore, they have already quality control, quality assurance system and environmental management system for daily usual operation. In this CDM project, these management systems will be utilized effectively.

For more detail information of monitoring plan, please see Annex 4.

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

>>

Date of completion of the baseline study and monitoring methodology: 19/10/2007.

Contact information of the person responsible:

Entity	Contact details	Project participants
Mizuho Information & Research Institute Co.,Inc.	Mr. Akira Saito +81-3-5281-5410 akira.saitou@mizuho-ir.co.jp	No
Greenensign (Beijing) New Energy and Technology Co. Ltd.	Ms. Feng Yuxin +86(10) 58156375-821 fengyx@greenensign.com Mr. Bao Cheng +86(10)58156375-823 baoch@greenensign.com Ms. Deng Ping +86(10)58156375-816 dengp@greenensign.com	No

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 the project activity is 04/09/2007.

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

>>
Operational lifetime is estimated to be 20 years.

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

C.2.1. Renewable crediting period

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

>>
Not applicable (NA)

C.2.1.2. Length of the first crediting period:

>>
Not applicable (NA)

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
01/07/2008

C.2.2.2. Length:

>>
10 years

SECTION D. Environmental impacts

>>

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

>>

The project activity contributes to sustainable development and the benefit key impact is mainly environmental as the project activity will reduce the direct emissions on site generated by calcination per tonne of blended cement. The drop of clinker content also preserves natural resources such as limestone, plaster and fluorite.

Before Shanxi Guashan Cement constructed the new kiln, it has executed environmental impact assessment in 1998 both on the newly-built kiln and existing kiln observing the regulations in China. According to the environmental impact assessment report, SP (Suspended Particulates) and SO2 were selected as the substances that have environmental impacts, and Shanxi Guashan Cement has taken measures to mitigate those impacts to meet the national standard "GB3095-1996". Now air pollution control system is efficiently in operation and the air quality is better than the standard norm, and points are covered and provided with dust collection systems.

The environment management system of Shanxi Guashan Cement is ISO 14001-certified. This means that Shanxi Guashan Cement has undertaken a systematic review of the key environmental impacts of their operations, has identified appropriate management and monitoring of those impacts and undertakes regular management review of their environmental performance and the performance of the management system.

Although it is not necessary for the project to execute new environmental impact assessment, the local governments approve the project for reducing environmental impacts (SP and SO2), waste (slag) and GHG emissions.

The project has also no negative impact on the water, air, waste and noise because the same facilities are used and only the raw materials are changed, except for the impact that may be due to transportation described below.

Increase of additives will also result in additional transportation which may involve some environmental impacts. The GHG emissions from this transportation are deducted from the amount of CERs generated by the project activity. The increase of noise and dust from this transportation does not have direct impact on the residents in the region, because there is no house alongside the transportation route. However, the interviews to the residents were executed to make sure of no additional environmental impacts to them, and received positive responses from residents.

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:

>>

An environmental impact assessment is not required for the project activity.

SECTION E. Stakeholders' comments

>>

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

>>

Stakeholder's comments have been obtained through some routes.

- Stakeholder's meeting at Luliang City and Jiaocheng Country
  - Schedule: 4th Sep. 2007
  - Location: Governmental office at Luliang City
  - Participants: Governmental staffs of Luliang City and Jiaocheng County, Shanxi Guashan Cement, Luliang Guangsha Material, Kyushu Electric Power Co, Inc., and Mizuho Information & Research Institute. The persons have been invited by official invitation.
  - Methods: Kyushu Electric Power Co., Inc. has demonstrated the summary of Kyoto mechanism and this cement CDM project in Shanxi Province and then received some comments from governmental stakeholders.

- Local residents
  - Schedule: From 4th Dec. 2007 to 7th Dec. 2007
  - Location: Tan Village and around the project site
  - Participants: 32 local residents
  - Methods: Face-to-Face interviews were executed. The understanding of this project activity was confirmed after that summary was explained, and then their opinions were gathered.

E.2. Summary of the comments received:

>>

A Stakeholder's comments we received are summarized as follows.

- Stakeholder's meeting at Luliang City and and Jiaocheng Country

The governmental staffs have given a welcome to this CDM project. The government has already taken some energy efficiency and CO2 reduction project, so this CDM project is very attractive from the viewpoint of improvement of the environmental performance such as industrial waste in Shanxi Province.

The government expect that this will become model project, and the project, which improves environmental performance in Shanxi Province, take in addition.

Each staff's comment is as follows.

- Mr. Guo Zheng (Luliang Energy Saving Leading Group Vice Director, City Government Vice Secretary General)

  The Jiaochen County government has promoted the energy efficiency and GHG reduction, it has devoted to support for advantageous cooperate activities. This CDM project activity with Kyushu

Electric Power Co., Inc. and Luliang Guangsha Material become the model project in Shanxi Province, so it has deep meaning. The government expect that this activity become the model project for sustainable society and economical development as first CDM project in Shanxi Province.

- Mr. Liu Pingze (Luliang Energy Saving Leading Group Vice Director and Office Director, Economic Committee Director of the city)
  Energy efficiency and CO2 reduction are important issue faced by the local government. Jiaochen County has promoted these themes as the model city of sustainable society in Shanxi. The government expect that this activity with Kyushu Electric Power Co., Inc. and Luliang Guangsha Material will pass through the severe CDM EB process and approve as CDM project.

- Mr. Ren Jianfeng (Chief Engineer, Luliang Environmental Protection Agency)
  It is very attractive from the viewpoint of the environmental protection only as no mere CDM. The Luliang Environmental Protection Agency expects that this activity promote to utilize industrial waste such as blast furnace slag and fly ash and support project participants.

- Mr. Liu Wenhai (Vice Secretary, Jiaocheng County Committee)
  The Jiaochen County government has promoted the energy efficiency and CO2 emission reduction projects long time as model city for sustainable society in Shanxi Province. The government expect that this project will pass through the CDM process and success CO2 reduction.

- Local residents

Then opinions we received from local residents are mainly summarized as follows. We have no negative response from local residents. They expect that this project activity improve local air pollution and strengthen sustainable development.

- It is hoped to be implemented the project activity as soon as possible because this reduces air pollution and then guarantees human health.
- The government should strongly support it and companies positively promote it.
- It is necessary to decrease environmental pollution and then strengthen the sustainable development.
- The project should be supported because the industrial wastes are used efficiently and this reduce environmental burden.
- This project activity is profitable for local villagers, and we support it strongly.

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

>>

No additional action was required because any issues were not raised.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Shanxi Guashan Cement
Street/P.O.Box:	Northwest of Tan Village
Building:	Shanxi Guashan Cement Plant
City:	Jiaocheng County
State/Region:	Shanxi Province
Postfix/ZIP:	030500
Country:	P.R.China
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URL:	http://www.gshcement.com/
Represented by:	Lu Enyuan
Title:	General Manager & Chairman of the Board
Salutation:	Mr.
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Middle Name:	En
First Name:	Yuan
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City:	Chuo-ku
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding or official development assistant (ODA) has been used on this project activity.

Annex 3

BASELINE INFORMATION

Baseline emission factor for electricity

Step 1. Calculation of the Operating Margin Emission Factor

Table A 1 Calculation of CO2 emissions of North China Power Grid in 2003.

Fuel Type	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total	Carbon emission factor	Oxidation rate	Low caloric value	CO2 emission
									（tc/TJ）	（%）	（MJ/t,km3）	(t-CO2e)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K=G*H*I*J*44/12/1000
Raw coal	10000 ton	714.73	1052.74	5482.64	4528.51	3949.32	6808.00	22535.94	25.8	100	20908	**445737636.11**
Cleaned coal	10000 ton						9.41	9.41	25.8	100	26344	**234510.60**
Other washed coal	10000 ton	6.31		67.28	208.21		450.90	732.70	25.8	100	8363	**5796681.31**
Coke	10000 ton					2.80		2.80	25.8	100	28435	**75318.63**
Coke oven gas	10^8 m^3	0.24	1.71		0.90	0.21	0.02	3.08	12.1	100	16726	**228559.67**
Other coal gas	10^8 m^3	16.92		10.63		10.32	1.56	39.43	12.1	100	5227	**914399.71**
Crude oil	10000 ton						29.68	29.68	20.0	100	41816	**910139.18**
Gasoline	10000 ton						0.01	0.01	18.9	100	43070	**298.48**
Diesel	10000 ton	0.29	1.35	4.00		2.91	5.40	13.95	20.2	100	42652	**440693.26**
Fuel oil	10000 ton	13.95	0.02	1.11		0.65	10.07	25.80	21.1	100	41816	**834672.45**
LPG	10000 ton							0.00	17.2	100	50179	**0.00**
Refinery gas	10000 ton			0.27			0.83	1.10	18.2	100	46055	**33807.44**
Natural gas	10^8 m^3		0.50				1.08	1.58	15.3	100	38931	**345076.60**
Other petloreum product	10000 ton							0.00	20.0	100	38369	**0.00**
Other energy	10000 ton	9.83					39.21	49.04	0.0	100	0	**0.00**
											Total	**455551793.43**

Source: China Energy Statistical Year Book (2004) and the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Table A 2 Calculation of CO2 emissions of Northeast Power Grid in 2003.

Fuel Type	Unit	Liaoning	Jilin	Heilong jiang	Total	Carbon emission factor (tc/TJ)	Oxidation rate (%)	Low caloric value (MJ/t,km3)	CO2 emission (t-CO2e)
		A	B	C	D=A+B+C	E	F	G	H=G*D*E*F*44/12/1000
Raw coal	10000 ton	3556.51	2006.66	2763.62	8326.79	25.8	100	20908	**164695312.95**
Cleaned coal	10000 ton	70.83		3.00	73.83	25.8	100	26344	**1839948.73**
Other washed coal	10000 ton	617.04	15.90	53.41	686.35	25.8	100	8363	**5429988.02**
Coke	10000 ton				0.00	25.8	100	28435	**0.00**
Coke oven gas	10^8 m^3	1.66			1.66	12.1	100	16726	**123184.76**
Other coal gas	10^8 m^3	5.31			5.31	12.1	100	5227	**123141.32**
Crude oil	10000 ton	3.39			3.39	20.0	100	41816	**103954.58**
Gasoline	10000 ton					18.9	100	43070	**0.00**
Diesel	10000 ton	0.32	0.34		0.66	20.2	100	42652	**20850.00**
Fuel oil	10000 ton	14.87	0.70	4.32	19.89	21.1	100	41816	**643474.23**
LPG	10000 ton	1.55			1.55	17.2	100	50179	**49051.65**
Refinery gas	10000 ton	4.03		0.46	4.49	18.2	100	46055	**137995.82**
Natural gas	10^8 m^3		0.04	4.47	4.51	15.3	100	38931	**984997.12**
Other petloreum product	10000 ton				0.00	20.0	100	38369	**0.00**
Other energy	10000 ton	29.38			29.38	0.0	100	0	**0.00**
								Total	**174151899.19**

Source: China Energy Statistical Year Book (2004) and the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Table A 3 Power generation of Northeast Power Grid in 2003.

Region	Generation (MWh)	Self usage rate （%）	Supply (MWh)
Liaoning	79751000	7.17	**74032853.3**
Jilin	29739000	7.32	**27562105.2**
Heilong jiang	48493000	8.48	**44380793.6**
Total			**145975752.1**

Source: China Electric Power Year Book (2004)

Table A 4 Power generation of North China Power Grid in 2003.

Region	Generation (MWh)	Self usage rate (%)	Supply (MWh)
Beijing	18608000	7.52	**17208678.4**
Tianjin	32191000	6.79	**30005231.1**
Hebei	108261000	6.50	**101224035.0**
Shanxi	93962000	7.69	**86736322.2**
Inner Mongolia	65106000	7.66	**60118880.4**
Shandong	139547000	6.79	**130071758.7**
Total			**425364905.8**

Source: China Electric Power Year Book (2004)

The CO_2 emission of North China Power Grid in 2003: 455551793.43 t-CO_2
The import electricity from Northeast Power Grid to North China Power Grid in 2003: 4,244,380 MWh
The average emission factor of Northeast Power Grid in 2003: 1.136558745 t-CO_2/MWh

The power supply of thermal plants in North China Power Grid in 2003: 425364905.8 MWh
Therefore, the emission factor of Operating Margin of North China Power Grid in 2003 is **1.071615** t-CO2/MWh.

Table A 5 Calculation of CO2 emissions of North China Power Grid in 2004.

Fuel Type	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total	Carbon emission factor （tc/TJ）	Oxidation rate （%）	Low caloric value （MJ/t,km3）	CO2 emission (t-CO2e)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K=G*H*I*J*44/12/1000
Raw coal	10000 ton	823.09	1410.00	6299.80	5213.20	4932.20	8550.00	27228.29	25.8	100	20908	**538547476.60**
Cleaned coal	10000 ton						40.00	40.00	25.8	100	26344	**996856.96**
Other washed coal	10000 ton	6.48		101.04	354.17		284.22	745.91	25.8	100	8363	**5901190.88**
Coke	10000 ton					0.22		0.22	25.8	100	28435	**5917.89**
Coke oven gas	10^8 m^3	0.55		0.54	5.32	0.40	8.73	15.54	12.1	100	16726	**1153187.45**
Other coal gas	10^8 m^3	17.74		24.25	8.20	16.47	1.41	68.07	12.1	100	5227	**1578574.39**
Crude oil	10000 ton							0.00	20.0	100	41816	**0.00**
Gasoline	10000 ton								18.9	100	43070	**0.00**
Diesel	10000 ton	0.39	0.84	4.66				5.89	20.2	100	42652	**186070.49**
Fuel oil	10000 ton	14.66		0.16				14.82	21.1	100	41816	**479451.38**
LPG	10000 ton							0.00	17.2	100	50179	**0.00**
Refinery gas	10000 ton		0.55	1.42				1.97	18.2	100	46055	**60546.05**
Natural gas	10^8 m^3		0.37		0.19			0.56	15.3	100	38931	**122305.63**
Other petloreum product	10000 ton							0.00	20.0	100	38369	**0.00**
Other energy	10000 ton	9.41		34.64	109.73	4.48		158.26	0.0	100	0	**0.00**
											Total	**549031577.73**

Source: China Energy Statistical Year Book (2005) and the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Table A 6 Calculation of CO2 emissions of Northeast Power Grid in 2004.

Fuel Type	Unit	Liaoning	Jilin	Heilong jiang	Total	Carbon emission factor (tc/TJ)	Oxidation rate (%)	Low caloric value (MJ/t,km3)	CO2 emission (t-CO2e)
		A	B	C	D=A+B+C	E	F	G	H=G*D*E*F*44/12/1000
Raw coal	10000 ton	4144.20	2310.90	3084.80	9539.90	25.8	100	20908	**188689376.82**
Cleaned coal	10000 ton	84.75	1.09	4.88	90.72	25.8	100	26344	**2260871.59**
Other washed coal	10000 ton	577.67	14.26	61.00	652.93	25.8	100	8363	**5165589.10**
Coke	10000 ton				0.00	25.8	100	28435	**0.00**
Coke oven gas	10^8 m^3	4.83	2.91		7.74	12.1	100	16726	**574367.49**
Other coal gas	10^8 m^3	57.33	4.19		61.52	12.1	100	5227	**1426676.89**
Crude oil	10000 ton				0.00	20.0	100	41816	**0.00**
Gasoline	10000 ton					18.9	100	43070	**0.00**
Diesel	10000 ton	2.04	1.16	0.24	3.44	20.2	100	42652	**108672.75**
Fuel oil	10000 ton	12.81	1.78	2.86	17.45	21.1	100	41816	**564536.21**
LPG	10000 ton	2.19			2.19	17.2	100	50179	**69305.23**
Refinery gas	10000 ton	9.79		1.14	10.93	18.2	100	46055	**335923.02**
Natural gas	10^8 m^3		0.03	2.53	2.56	15.3	100	38931	**559111.45**
Other petloreum product	10000 ton				0.00	20.0	100	38369	**0.00**
Other energy	10000 ton	26.97	5.07		32.04	0.0	100	0	**0.00**
								Total	**199754430.55**

Source: China Energy Statistical Year Book (2005) and the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Table A 7 Power generation of Northeast Power Grid in 2004.

Region	Generation (MWh)	Self usage rate (%)	Supply (MWh)
Liaoning	84543000	7.21	**78447449.7**
Jilin	33242000	7.68	**30689014.4**
Heilong jiang	53482000	7.84	**49289011.2**
Total			**158425475.3**

Source: China Electric Power Year Book (2005)

Table A 8 Power generation of North China Power Grid in 2004.

Region	Generation (MWh)	Self usage rate (%)	Supply (MWh)
Beijing	18579000	7.94	17103827.4
Tianjin	33952000	6.35	31796048.0
Hebei	124970000	6.50	116846950.0
Shanxi	104926000	7.70	96846698.0
Inner Mongolia	80427000	7.17	74660384.1
Shandong	163918000	7.32	151919202.4
Total			489173109.9

Source: China Electric Power Year Book (2005)

The CO2 emission of North China Power Grid in 2004: 549031577.73 t-CO2
The import electricity from Northeast Power Grid to North China Power Grid in 2004: 4,514,550 MWh
The average emission factor of Northeast Power Grid in 2004: 1.174108289 t-CO2/MWh
The power supply of thermal plants in North China Power Grid in 2004: 489173109.9 MWh
Therefore, the emission factor of Operating Margin of North China Power Grid in 2004 is **1.122840** t-CO2/MWh.

Table A 9 Calculation of CO2 emissions of North China Power Grid in 2005.

Fuel Type	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total	Carbon emission factor	Oxidation rate	Low caloric value	CO2 emission
									（tc/TJ）	（%）	（MJ/t,km3）	(t-CO2e)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K=G*H*I*J*44/12/1000
Raw coal	10000 ton	897.75	1675.20	6726.50	6176.45	6277.23	10405.40	32158.53	25.8	100	20908	**636062535.80**
Cleaned coal	10000 ton						42.18	42.18	25.8	100	26344	**1051185.66**
Other washed coal	10000 ton	6.57		167.45	373.65		108.69	656.36	25.8	100	8363	**5192725.19**
Coke	10000 ton					0.21	0.11	0.32	25.8	100	28435	**8607.84**
Coke oven gas	10^8 m^3	0.64	0.75	0.62	21.08	0.39		23.48	12.1	100	16726	**1742396.48**
Other coal gas	10^8 m^3	16.09	7.86	38.83	9.88	18.37		91.03	12.1	100	5227	**2111027.27**
Crude oil	10000 ton					0.73		0.73	20.0	100	41816	**22385.50**
Gasoline	10000 ton			0.01				0.01	18.9	100	43070	**298.48**
Diesel	10000 ton	0.48		3.54		0.12		4.14	20.2	100	42652	**130786.39**
Fuel oil	10000 ton	12.25		0.23		0.06		12.54	21.1	100	41816	**405689.63**
LPG	10000 ton							0.00	17.2	100	50179	**0.00**
Refinery gas	10000 ton			9.02				9.02	18.2	100	46055	**277221.01**
Natural gas	10^8 m^3	0.28	0.08		2.76			3.12	15.3	100	38931	**681417.08**
Other petloreum product	10000 ton							0.00	20.0	100	38369	**0.00**
Other energy	10000 ton	8.58		32.35	69.31	7.27	118.90	236.41	0.0	100	0	**0.00**
											Total	**647686276.33**

Source: China Energy Statistical Year Book (2006) and the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Table A 10 Calculation of CO2 emissions of Northeast Power Grid in 2005.

Fuel Type	Unit	Liaoning	Jilin	Heilong jiang	Total	Carbon emission factor （tc/TJ）	Oxidation rate （%）	Low caloric value （MJ/t,km3）	CO2 emission (t-CO2e)
		A	B	C	D=A+B+C	E	F	G	H=G*D*E*F*44/12/1000
Raw coal	10000 ton	4305.41	2446.13	3383.21	10134.75	25.8	100	20908	**200454895.94**
Cleaned coal	10000 ton				0.00	25.8	100	26344	**0.00**
Other washed coal	10000 ton	524.74	19.26	24.16	568.16	25.8	100	8363	**4494939.89**
Coke	10000 ton				0.00	25.8	100	28435	**0.00**
Coke oven gas	10^8 m^3	1.03	3.57	0.68	5.28	12.1	100	16726	**391816.59**
Other coal gas	10^8 m^3	12.62	8.37		20.99	12.1	100	5227	**486767.69**
Crude oil	10000 ton	1.16			1.16	20.0	100	41816	**35571.48**
Gasoline	10000 ton				0.00	18.9	100	43070	**0.00**
Diesel	10000 ton	1.18	1.48	0.57	3.23	20.2	100	42652	**102038.65**
Fuel oil	10000 ton	9.32	2.46	1.55	13.33	21.1	100	41816	**431247.43**
LPG	10000 ton	0.12			0.12	17.2	100	50179	**3797.55**
Refinery gas	10000 ton	5.48		1.32	6.80	18.2	100	46055	**208991.45**
Natural gas	10^8 m^3		0.84	2.24	3.08	15.3	100	38931	**672680.96**
Other petloreum product	10000 ton				0.00	20.0	100	38369	**0.00**
Other energy	10000 ton	16.18			16.18	0.0	100	0	**0.00**
								Total	**207282747.62**

Source: China Energy Statistical Year Book (2006) and the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Table A 11 Power generation of Northeast Power Grid in 2005.

Region	Generation (MWh)	Self usage rate （%）	Supply (MWh)
Liaoning	83697000	7.03	**77813100.9**
Jilin	35294000	6.59	**32968125.4**
Heilong jiang	58000000	7.96	**53383200.0**
Total			**164164426.3**

Source: China Electric Power Year Book (2006)

Table A 12 Power generation of North China Power Grid in 2005.

Region	Generation (MWh)	Self usage rate (%)	Supply (MWh)
Beijing	20880000	7.73	19,265,976
Tianjin	36993000	6.63	34,540,364
Hebei	134348000	6.57	125,521,336
Shanxi	128785000	7.42	119,229,153
Inner Mongolia	92345000	7.01	85,871,616
Shandong	189880000	7.14	176,322,568
Total			560,751,013

Source: China Electric Power Year Book (2006)

The CO2 emission of North China Power Grid in 2005: 647686276.33 t-CO2
The import electricity from Northeast Power Grid to North China Power Grid in 2005: 23,423,000 MWh
The average emission factor of Northeast Power Grid in 2005: 1.157799983 t-CO2/MWh
The power supply of thermal plants in North China Power Grid in 2005: 560,751,013 MWh
Therefore, the emission factor of Operating Margin of North China Power Grid in 2005 is 1.155145 t-CO2/MWh.

As a result, Operating Margin Emission Factor of North China Power Grid is calculated in Table A 13.
Therefore, EM_{OM} = 1.1208 t-CO2/MWh.

Table A 13 Operating Margin Emission Factor of North China Power Grid.

Year	Total Emission	Total Supplied Power	OM	EFOM
	(t-CO2)	(MWh)	(t-CO2/MWh)	(t-CO2/MWh)
2003	460,375,781	429,609,286	1.071615	
2004	554,332,148	493,687,660	1.122840	
2005	674,805,425	584,174,013	1.155145	
Total	1,689,513,354	1,507,470,959		1.120760134

Step 2. Calculation of the Build Margin Emission Factor

Sub step 1. Calculation of percentage of each fuel
The CO2 emission percentage of coal, oil and gas fired in the total emissions of North China Power Grid is calculated.

Table A 14 Calculation of CO2 emissions of North China Power Grid in 2005.

Fuel Type	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total	Carbon emission factor （tc/TJ）	Oxidation rate （%）	Low caloric value （MJ/t,km3）	CO2 emission (t-CO2e)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K=G*H*I*J*44/12/1000
Raw coal	10000 ton	897.75	1675.20	6726.50	6176.45	6277.23	10405.40	32158.53	25.8	100	20908	**636062535.80**
Cleaned coal	10000 ton						42.18	42.18	25.8	100	26344	**1051185.66**
Other washed coal	10000 ton	6.57		167.45	373.65		108.69	656.36	25.8	100	8363	**5192725.19**
Coke	10000 ton					0.21	0.11	0.32	25.8	100	28435	**8607.84**
Sub total												**642315054.50**
Crude oil	10000 ton					0.73		0.73	20.0	100	41816	**22385.50**
Gasoline	10000 ton			0.01				0.01	18.9	100	43070	**298.48**
Diesel	10000 ton	0.48		3.54		0.12		4.14	20.2	100	42652	**130786.39**
Fuel oil	10000 ton	12.25		0.23		0.06		12.54	21.1	100	41816	**405689.63**
Other petloreum product	10000 ton							0.00	20.0	100	38369	**0.00**
Sub total												**559159.99**
Natural gas	10^8 m^3	0.28	0.08		2.76			3.12	15.3	100	38931	**681417.08**
Coke oven gas	10^8 m^3	0.64	0.75	0.62	21.08	0.39		23.48	12.1	100	16726	**1742396.48**
Other coal gas	10^8 m^3	16.09	7.86	38.83	9.88	18.37		91.03	12.1	100	5227	**2111027.27**
LPG	10000 ton							0.00	17.2	100	50179	**0.00**
Refinery gas	10000 ton			9.02				9.02	18.2	100	46055	**277221.01**
Sub total												**4812061.84**
												647686276.33

Source: China Energy Statistical Year Book (2006) and the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

According to Table A 14, each percentage of fuel is as follows:
The percentage for coal: 99.17%
The percentage for oil: 0.08%
The percentage for gas: 0.74%

Sub step 2. Calculation of the average emission factor of thermal power plants

Table A 15 Emission factor of thermal power plants.

Plant Type	Efficiency (%) A	Carbon emission factor (tC/TJ) B	Oxidation rate C	CO2 emission factor (t-CO2/MWh) D=3.6/A/1000*B*C*44/12
Coal fired	35.82	25.8	1	0.9508
Gas fired	47.67	15.3	1	0.4237
Oil fired	47.67	21.1	1	0.5843

Source: China Electric Power Year Book (2006)

The average emission factor of thermal power plants is:
99.17*0.9508 + 0.74*0.4237 + 0.08*0.5843 = 0.9465 t-CO2/MWh.

Sub step 3. Calculation of Build Margin Emission Factor

Table A 16 Installed capacity of North China Power Grid in 2003.

Plant type	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal	MW	3347.5	6008.5	17698.7	15035.8	11421.7	30494.4	84006.6
Hydro	MW	1058.1	5.0	764.3	795.7	592.1	50.8	3266.0
Nuclear	MW	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wind and Others	MW	0.0	0.0	13.5	0.0	76.6	0.0	90.1
Toral	MW	4405.6	6013.5	18476.5	15831.5	12090.4	30545.2	87362.7

Table A 17 Installed capacity of North China Power Grid in 2004.

Plant type	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal	MW	3458.5	6008.5	19932.7	17693.3	13641.5	32860.4	93594.9
Hydro	MW	1055.9	5.0	783.8	787.3	567.9	50.8	3250.7
Nuclear	MW	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wind and Others	MW	0.0	0.0	13.5	0.0	111.7	12.3	137.5
Toral	MW	4514.4	6013.5	20730.0	18480.6	14321.1	32923.5	96983.1

Table A 18 Installed capacity of North China Power Grid in 2005.

Plant type	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal	MW	3833.5	6149.9	22333.3	22246.8	19173.3	37332.0	111068.8
Hydro	MW	1025.0	5.0	784.5	783.0	567.9	50.8	3216.2
Nuclear	MW	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wind and Others	MW	24.0	24.0	48.0	0.0	208.9	30.6	335.5
Toral	MW	4882.5	6178.9	23165.8	23029.8	19950.1	37413.4	114620.5

Table A 19 Capacity change of North China Power Grid.

	2003	2004	2005	2003-2005	Share(%)
Thermal	84006.6	93594.9	111068.8	27062.2	99.28%
Hydro	3266.0	3250.7	3216.2	-49.8	-0.18%
Nuclear	0.0	0.0	0.0	0.0	0.00%
Wind and Others	90.1	137.5	335.5	245.4	0.90%
Toral	87362.7	96983.1	114620.5	27257.8	100.00%

Therefore, EF_{BM} = 0.9465*99.28% = 0.9397 t-CO2/MWh.

Step 3. Calculation of the Combined Margin Emission Factor

The emission factor of combined margin for North China Power grid is calculated as follows:
EM_{CM} = 0.5*1.1208 + 0.5*0.9397 = 1.03025 t-CO2/MWh.

Annex 4

MONITORING INFORMATION

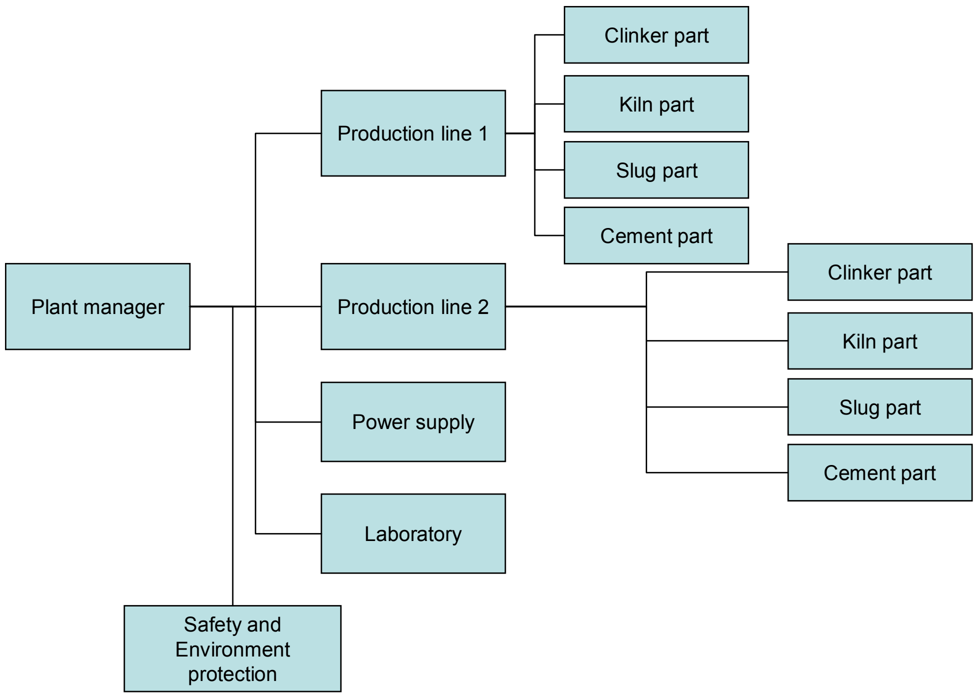
1. Introduction

The approved consolidated monitoring methodology ACM0005 / Version 04 "Consolidated Monitoring Methodology for increasing the Blend in Cement Production" is applied in this project.

The monitoring plan explains a guideline of monitoring procedures, schedule and responsibility. Information monitored should be real, measureable and retraceable.

2. Management system and Responsibility

The monitoring plan and monitoring system are established by own Shanxi Guashan Cement. Mr. Lu Enyuan, General manager of Shanxi Guashan Cement, is responsible for the monitoring and reporting of this project.
The cement production line of the company is divided into some parts, such as Clinker part, Kiln part, etc. Each part has a responsible person who will monitor and check the data required. Each personnel will transcribe data on a specific sheet.



3. Monitoring equipment and calibration

Monitoring equipment is already installed and used in usual operation. The equipment for materials are located in cement production lines. Other equipment for electricity and content analysis are located in a electricity distribution centre and laboratory respectively.

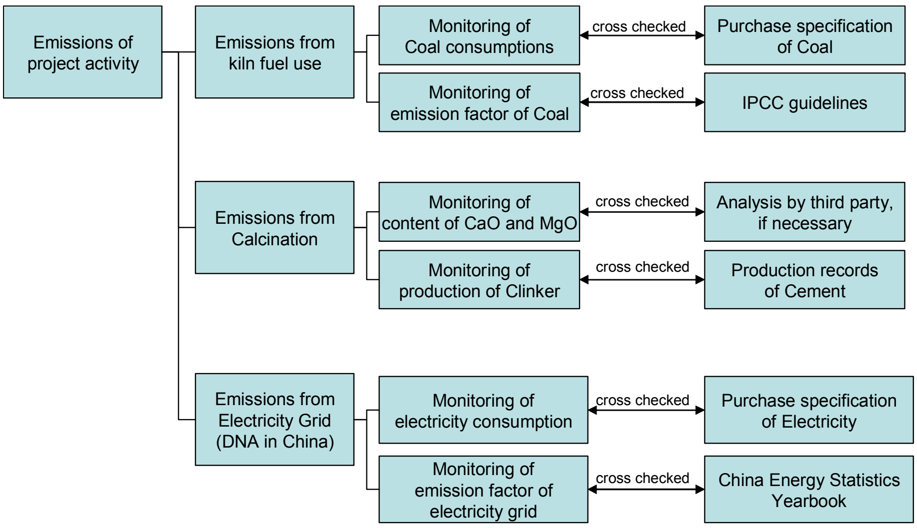
Some monitoring equipment for cement production lines are calibrated and checked by the company itself weekly because the company is the second class qualified inspector. In addition, some important parts of main equipment is replaced annually.

The other more important equipment, ex. a track scale for carrying materials in, is required to be examined and calibrated by the first class qualified inspector.

4. Data management and QA/QC

The company has ISO9002 and ISO14001 certificate, therefore, they have already quality control, quality assurance system and environmental management system for daily usual operation. In this CDM project, these management systems will be utilized effectively.

Furthermore, the company will do cross-check using evidence documentation, such as purchase specification, to enhance the quality of data monitored.



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