



**CLEAN DEVELOPMENT MECHANISM
PROGRAMME OF ACTIVITIES DESIGN DOCUMENT FORM
(CDM-PoA-DD) Version 01**

CONTENTS

- A. General description of programme of activities (PoA)
- B. Duration of the programme of activities
- C. Environmental Analysis
- D. Stakeholder comments
- E. Application of a baseline and monitoring methodology to a typical CDM Programme Activity (CPA)

Annexes

Annex 1: Contact information on Coordinating/managing entity and participants of PoA

Annex 2: Information regarding public funding

Annex 3: Baseline information

Annex 4: Monitoring plan

NOTE:

This form is for the submission of a CDM PoA whose CPAs apply a large scale approved methodology.

At the time of requesting registration this form must be accompanied by a CDM-CPA-DD form that has been specified for the proposed PoA, as well as by one completed CDM-CPA-DD (using a real case).



SECTION A. General description of programme of activities (PoA)

A.1 Title of the programme of activities:

>>

Project title: Waste Heat Recovery and Utilization for Power Generation Project in cement sector in Shanxi Province, China
PDD Version: 1.0
Completion date PDD: 15/03/2010
Revision history:
Version 1.0: First draft

A.2. Description of the programme of activities:

>> Here the following information will be included

1. General operating and implementing framework of PoA

This project is a Program of Activity to promote waste heat recovery for power generation to cement plants in Shanxi Province, China, at the initiative of Shanxi Building Material Industry Administration Office, a local private industrial group that administers cement plants in the region, functioning as the coordinating/managing entity.

Each CDM program activity (CPA) will be implemented in geographically distinct area of Shanxi Province. Each CPA will be implemented and managed by the cement plants within the area, limited to the entities under the control of Shanxi Building Material Industry Administration Office, the coordinating/managing entity.

2. Policy/measure or stated goal of the PoA

The goal of the PoA is to promote reduction of power consumption in Shanxi Province, leading to cut CO₂ emissions from power generation, by means of recovering unused waste heat that has been vented to the atmosphere at cement production stage and using it for power generation within the same plant.

The coordinating/managing entity will work to achieve dissemination of waste heat recovery for power generation in cement industry within the area by implementing promotion activities such as organizing seminars on technology and CDM, in addition to implementation of CPA, for the purpose of expand the knowledge on benefits of CPA to cement plants.

This PoA will make a substantial contribution to sustainable development, as described below:

Environmental sustainability

Clinker production generally consumes massive coal and electricity.

Coal is transported with trucks from coal mine with pieces of coal dropping onto the roads, which are then crushed into smaller pieces in the traffic of trucks. Eventually, due to the weather condition in the region with little rainfall, black particles pile up on the road and finer ones are blown up by wind and floating in the air.



Moreover, North China Power Grid that distributes electricity to Shanxi Province heavily relies on coal as a source for power generation and emits SO₂ and NO_x in its activities which cause acid rain and health problem. China is one of the world's major SO₂ emitters with emission of 25.94 million tons in 2006. In the 5-year program, Chinese Government set a legally binding target that reduces major air pollutants by 10% for five years. However, the measures to achieve the goal are consisted mainly with desulfurization at coal use stage, and therefore do not lead to control coal use itself at all.

This PoA will lead to reduce air pollutants (particles, SO₂, NO_x) through reduction of power consumption, (indirect) reduction of coal use at power generation stage and direct reduction of coal use.

Economic sustainability

Each CPA will directly lead to disseminate high energy saving facilities: it allows initial investment under CDM in a short term while reducing operational costs in a mid to long term.

In addition, this PoA will substantially contribute to disseminate a technology for use of recovered waste heat. Moreover, this program provides an opportunity for the coordinating/managing entity and the cement plants that implement CPA included in the PoA to do capacity building regarding utilization of CDM as a framework.

Social sustainability

Coal mining process generates highly ignitable methane gas as associate gas. It is no harm as long as it takes basic safety measures. In Shanxi Province, coal is abundant resource covering approx. 40% (57,000 km²) of its whole area: Coal stratum lie near the surface in many places which allows smaller operators join coal mining business. Such small-scale coal mines often conduct no safety measures at production stage so that fatal explosions occur quite frequently. The recent example is the gas explosion in a coal mine in Shanxi Province on February 22nd, 2009, with more than 70 casualties.

If output of coal is indirectly reduced through this PoA, the number of workers exposed to such dangerous conditions may also be reduced.

3. Confirmation that the proposed PoA is a voluntary action by the coordinating/managing entity.

In China as well as Shanxi Province, there is no regulation to require companies for power savings. China's 5-year program sets a target to reduce energy intensity by 20% for five years, which is actually no more than a basic framework. For each CPA under this PoA, introduction of facilities to recover and use waste heat is a voluntary activity.

A.3. <u>Coordinating/managing entity and participants of POA:</u>
--

>> Here the following information shall be included

1. Coordinating or managing entity of PoA as the entity which communicates with the Board

Shanxi Building Material Industry Administration Office

2. Project participants being registered in relation to the PoA. Project participants may or may not be involved in one of the CPAs related to the PoA.



Shanxi Building Material Industry Administration Office
Shanxi Jigang Cement

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Party involved wishes to be considered as project participant (Yes/No)
China (host)	Shanxi Jigang Cement	No
China (host)	Shanxi Building Material Industry Administration Office	No

A.4. Technical description of the programme of activities:

A.4.1. Location of the programme of activities:

>>

Shanxi Province, China

A.4.1.1. Host Party(ies):

>>

Shanxi Building Material Industry Administration Office

A.4.1.2. Physical/ Geographical boundary:

>> Definition of the boundary for the PoA in terms of a geographical area (e.g., municipality, region within a country, country or several countries) within which all CDM programme activities (CPAs) included in the PoA will be implemented, taking into consideration the requirement that all applicable national and/or sectoral policies and regulations of each host country within that chosen boundary;

Geographical boundary of this PoA covers whole area of Shanxi Province, China.



Figure 1 Location of Shanxi District

A.4.2. Description of a typical CDM programme activity (CPA):

>>

Each CPA implements waste heat recovery and utilization in cement plants. Operators to implement the CPA will introduce facilities to recover and use waste heat, and all electricity generated in this project activity will be used in the same plants. This amount of electricity used in the plant can be reduced from consumption of electricity supplied from the grid, which will consequently reduce CO2 emissions from the grid power generation.

A.4.2.1. Technology or measures to be employed by the CPA:

>>

In cement production process, crushed cement materials are pre-heated and pre-baked in a suspension preheater (SP), transferred to kiln, and then baked and quenched in air quenching cooler (AQC). Waste heat at high temperature is generated in both processes of SP and AQC.

Before implementation of each CPA, waste heat generated from before and after cement kiln process (i.e. SP and AQC) is all unused and directly vented to the atmosphere. The baseline scenario of each CPA (a case without implementation of PoA) is that operators of the CPA-covered cement plants continue to vent waste heat to the atmosphere and its purchase of electricity from North China Power Grid will be continued. (See A.4.3.)

Each CPA will install facilities to recover and use waste heat, as listed below:

- Suspension Preheater Boiler (SP Boiler)
- Air Quenching Chamber boiler (AQC Boiler)
- Steam Turbine Generator
- Transformer
- Water Circulation System
- Controlling System
- Monitoring System etc.

Waste heat is supplied to SP boiler and AQC boiler to generate steam. The steam is supplied to steam turbine generator for power generation. The electricity generated will be used in the same plant or sold to North China Power Grid. For selling electricity to the grid, it may require operators to raise electric voltage in accordance with condition of grid connection condition by using transformers.

The outline of waste heat recovery and utilization system is as shown in Figure 2.

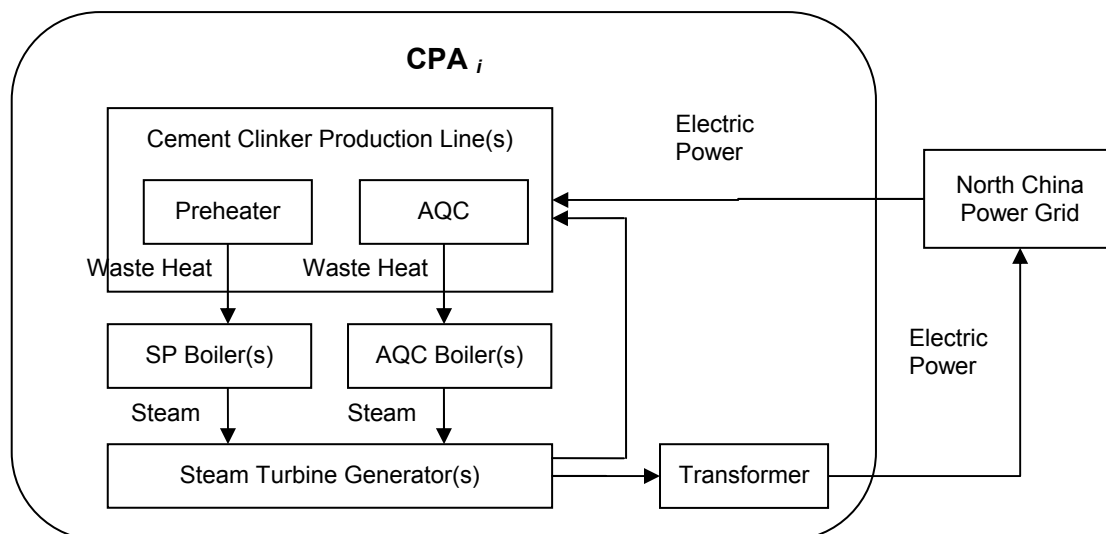


Figure 2 Waste Heat Recovery System

Each CPA will submit components of waste heat recovery and utilization along with evidences to the coordinating/managing entity.

Table 1 Main parameter of the equipments

Name	Species	Technical Parameters
Electricity meter	$i = 1, 2, \dots$	<ul style="list-style-type: none"> ■ Manufacturer ■ Number
Steam Turbine	$i = 1, 2, \dots$	<ul style="list-style-type: none"> ■ Nominal capacity (MW) ■ Nominal rotational speed (r/min) ■ Pressure of main gas (MPa) ■ Temperature of main gas (degC) ■ Discharge pressure (MPa) ■ Efficiency (%) ■ Lifespan (years) ■ Manufacturer ■ Number
Generator	$i = 1, 2, \dots$	<ul style="list-style-type: none"> ■ Nominal capacity (MW) ■ Nominal rotational speed (r/min) ■ Nominal rotational voltage (kV) ■ Efficiency (%) ■ Lifespan (years) ■ Manufacturer ■ Number
AQC Boiler	$i = 1, 2, \dots$	<ul style="list-style-type: none"> ■ Inlet waste gas quantity (Nm³/h) ■ Inlet waste gas temperature (degC) ■ Outlet waste gas temperature (degC) ■ Main steam parameter (t/h-MPa-degC) ■ Inlet waste gas parameter (t/h-MPa-degC) ■ Efficiency (%) ■ Lifespan (years) ■ Manufacturer



Name	Species	Technical Parameters
SP Boiler	i = 1,2,...	■ Number
		■ Inlet waste gas quantity (Nm ³ /h)
		■ Inlet waste gas temperature (degC)
		■ Outlet waste gas temperature (degC)
		■ Main steam parameter (t/h-MPa-degC)
		■ Inlet waste gas parameter (t/h-MPa-degC)
		■ Efficiency (%)
		■ Lifespan (years)
		■ Manufacturer
Transformer	i = 1,2,...	■ Number
		■ Type
		■ Nominal capacity (kVA)
		■ Nominal Primary Voltage (V)
		■ Nominal Secondary Voltage (V)
		■ Phase Number (-)
		■ Frequency (Hz)
		■ Lifespan (years)
		■ Manufacturer
		■ Number

A.4.2.2. Eligibility criteria for inclusion of a CPA in the PoA:

>> Here only a description of criteria for enrolling the CPA shall be described, the criteria for demonstrating additionality of CPA shall be described in section E.5

Eligibility Criteria:

- (i) Each CPA must be implemented in cement plants located within the geographical boundary of Shanxi Province, China.
- (ii) Each CPA must implement the baseline and monitoring methodology ACM0012 “Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects,” Version 3.2.
- (iii) The coordinating/managing entity will ensure that all CPAs under its PoA are neither registered as an individual CDM project activity nor included in another registered PoA, and that inclusion of the CPA into the PoA has been applied.
- (iv) Each CPA shall be uniquely identified and defined in an unambiguous manner by providing geographic information on and facilities within the cement plant, and the exact start date and end date of the crediting period.
- (v) Each CPA must ensure that leakage, additionality, establishment of the baseline scenario and baseline emissions are unambiguously defined.
- (vi) Each CPA must be approved by the coordinating/managing entity and DOE prior to its incorporation into the PoA.

With regard to (ii) of the eligibility condition, applicability of methodology ACM0012 (Version 3.2) is described in E.2.

A.4.3. Description of how the anthropogenic emissions of GHG by sources are reduced by a CPA below those that would have occurred in the absence of the registered PoA (assessment and demonstration of additionality):



>> Here the following shall be demonstrated:

- (i) The proposed PoA is a voluntary coordinated action;
- (ii) If the PoA is implementing a voluntary coordinated action, it would not be implemented in the absence of the PoA;
- (iii) If the PoA is implementing a mandatory policy/regulation, this would/is not enforced;
- (iv) If mandatory a policy/regulation are enforced, the PoA will lead to a greater level of enforcement of the existing mandatory policy/regulation.

The information provided in this document will contribute to prove additionality of the PoA.

(i) The proposed PoA is a voluntary coordinated action;

Within the geographical boundary of this PoA, i.e., Shanxi Province, China, there is no law and regulation to require electricity users to implement energy saving or power consumption reduction. Moreover, no law and regulation exist for implementation of waste heat recovery and utilization. Therefore, this proposed PoA is a voluntary coordinated action.

(ii) If the PoA is implementing a voluntary coordinated action, it would not be implemented in the absence of the PoA;

In order to prove that such activity would not be implemented in the absence of this PoA, the latest version of “Tool for the demonstration and assessment of Additionality” is used as the UNFCCC additionality tool.

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

Candidate for each CPA is defined each of the following facilities in accordance with “Identification of the baseline scenario” in ACM0012 Version 3.2.

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

- Industrial facility where the waste energy is generated
- Facility where the energy is produced
- Facility where the energy is consumed

Industrial facility where the waste energy is generated

Suspension preheater (SP) and Air Quenching Cooler (AQC) are in this category. Among realistic and plausible options provided in ACM0012 Version 3.2, the following W1 and W6 are identified. Nevertheless, option is defined once again in each CPA-DD.

- W1: WECM Waste Energy Carrying Medium is directly vented to atmosphere without incineration or waste heat is released to the atmosphere or waste pressure energy is not utilized.
- W6: All the waste gas produced at the industrial facility is captured and used for export electricity generation.

Facility where the energy is produced



Steam Turbine Generator is in this category. Among realistic and plausible options provided in ACM0012 Version 3.2, the following P1 and P6 are identified. Nevertheless, option is defined once again in each CPA-DD.

- P1: Proposed project activity not undertaken as a CDM project activity;
P6: Sourced Grid-connected power plants;

Possible scenarios for the combination of facilities are as follows:

Table 2 Possible alternative project activity combinations

	P1	P6
W1 (W2)	Not applicable. This scenario is not internally consistent – if the waste heat is released in the atmosphere, it is not available for power generation.	Alternatives combination I Applicable. This scenario corresponds to the current practice at cement production facilities in the project area: power supply by the grid, and non-utilization of the waste heat
W6	Alternatives combination II Applicable. This scenario uses the waste heat to generate power to substitute power that would have been supplied by the grid, without the support of CDM.	Not applicable. This scenario is not internally consistent – there would be no energy use for the waste heat.

Facility where the energy is consumed

Cement Clinker Production Line(s) is in this category.

Sub-Step 1b. Identify the fuel for the baseline choice of energy source taking into account the national and/or sectoral policies as applicable.

For option of P1 in Step 1, energy source is waste heat. As for the option P6, energy source is fuels for power generation at power plants providing electricity to North Power Grid.

Sub-Step 1c: Use Step 2 and/or step 3 of the latest approved version of the “Tool for the demonstration and assessment of additionality” to identify the most plausible baseline scenarios by eliminating non-feasible options

For each CPA-DD, “Step 2. Investment Analysis” in the latest version of “Tool for the demonstration and assessment of Additionality” is used.

Step 2. Investment Analysis

Sub-step 2a: Determine appropriate analysis method

For each CPA-DD, benchmark analysis (Option III) is used.

The “Tool for the Demonstration and Assessment of Additionality” recommends three investment analysis methods including simple cost analysis (option I), investment comparison analysis (option II) and benchmark analysis (option III). The analysis will be analyzed through Option III of the additionality tool, i.e. benchmark analysis.



This method is applicable because:

Option I: Simple cost analysis is not applicable, because the project generates economic returns through cost savings from the displacement of power purchased from the grid.

Option II: Investment comparison analysis is not applicable, because the identified alternative (non-use of the waste heat and purchase of the power from the grid) does not involve investments.

Option III: Benchmark analysis is applicable, because there is one investment decision for which an IRR can be calculated and compared against a company benchmark.

Sub-step 2b: Option III: Apply benchmark analysis

Sub-step 2c: Option III: Calculation and comparison of financial indicators

Sub-step 2d: Sensitivity analysis

Most appropriate benchmark is defined for each CPA-DD to obtain results of investment analysis by comparing to the benchmark.

Step 4. Common practice analysis

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

Common option for electric power supply for cement production facilities in Shanxi District is from the public electricity grid (the North China Power Grid). Activities similar to the project activity are considered to be any project at a cement production facility that utilizes waste heat from either the pre-heater stage or clinker cooling stage for the generation of electric power.

The Chinese power grid is divided into several large regional power grids, and therefore conditions of power plant to connect a relevant grid are different. China's DNA reviews CO₂ emission factors by grid on a regular basis and releases them in both forms of operation margin and build margin, allowing operators for preparing CDM PDD. All cement plants in Shanxi Province purchase their electricity from North China Power Grid, a major grid in the country, which means that all cement plants in the province shares the same characteristics such as emission factor.

So far, several cement plants in Shanxi Province implement electricity generation using waste heat recovered in the plants, as with each CPA assumed in this PoA, which could be a similar activity to each CPA proposed under this PoA. Among them, CPA site or CDM site are not included in PoA other than this PoA.

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

As shown in Sub-step 4a, activities similar to the CPA under this PoA exist. However, no general practice exists to implement same kind of project and, as mentioned above, there is no law and regulation to promote implementation of this PoA.

With regard to existing projects similar to this project activity, investment has been determined based on various conditions that are different from current ones. Therefore, whether to implement similar project will be determined by each CPA based on Step 2 (investment analysis). Conditions for investment analysis change at any time. Today, the conditions that North China Power Grid offers to



cement plants for electricity sales & purchase agreement are rather stricter than they used to be to cement plants, making them difficult in comparison with the existing similar activities.¹

With regard to sales & purchase agreement with the grid, which could give considerable impacts on investment analysis, it should be noted that conditions and unit prices are determined after negotiations on contracts between the public electricity grid (the North China Power Grid) and cement companies, using the information by National Development and Reform Commission. Therefore, general practice analysis should be implemented within Shanxi Province as the boundary, not in supplying area of a single grid.

(iii) If the PoA is implementing a mandatory policy/regulation, this would/is not enforced;

As described in (i), there is no law and regulation to promote implementation of this PoA.

(iv) If mandatory a policy/regulation are enforced, the PoA will lead to a greater level of enforcement of the existing mandatory policy/regulation.

As described in (i), there is no law and regulation to promote implementation of this PoA.

A.4.4. Operational, management and monitoring plan for the programme of activities:

A.4.4.1. Operational and management plan:

>> Description of the operational and management arrangements established by the coordinating/managing entity for the implementation of the PoA, including:

- (i) a record keeping system for each CPA under the PoA,
- (ii) a system/procedure to avoid double accounting e.g. to avoid the case of including a new CPA that has been already registered either as CDM project activity or as a CPA of another PoA,
- (iii) the provisions to ensure that those operating the CPA are aware and have agreed that their activity is being subscribed to the PoA;

This PoA includes operational activities to implement and manage each CPA in an efficient manner, as shown in the following table.

Table 3 Operational Categories and Management Responsibilities for the PoA

Operational Category	Management Responsibility & Arrangements
Cement production	<ul style="list-style-type: none"> - Electricity sales and purchase agreement with the grid. - Management of waste heat generator (suspension preheater) or air quenching cooler (AQC).
Waste heat recovery and power generation	<ul style="list-style-type: none"> - Introduction of installation of waste heat recovery and power generation - Operation of waste heat recovery and power generation
Operation as PoA and CPA	<ul style="list-style-type: none"> - Contact and information sharing between coordinating/managing entity and CPA sites. - Responses to validation process as the CPA. - Contact and information sharing with China's DNA.

¹ Learned from the hearing session with Shanxi Building Material Industry Administration Office



	- Emission reduction credits and contract agreement with buyers.
Monitoring Emission Reductions	- Periodic collection of monitoring data - Preparation of monitoring reports for emission reduction verification

(i) a record keeping system for each CPA under the PoA,

Each CPA follows monitoring methodology and data saving method as provided ACM0012 Version 3.2. Coordinating/managing entity confirms that each CPA manages appropriate data including the following items.

- Geographical location of each CPA name and address of cement plant
- Information that helps identify facilities installed for waste heat recovery and utilization.
- Elements of facility for waste heat recovery and utilization

Coordinating managing entity is responsible for record and data management for each CPA.

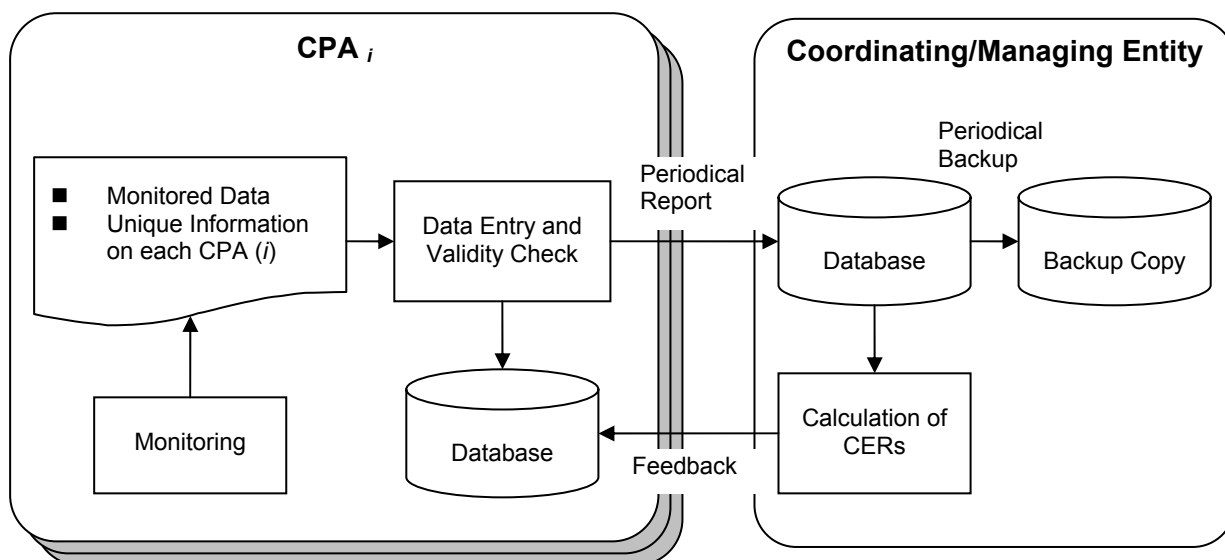


Figure 3 Data collection and record keeping procedure

(ii) a system/procedure to avoid double accounting e.g. to avoid the case of including a new CPA that has been already registered either as CDM project activity or as a CPA of another PoA,

Prior to registration of a new CPA to this proposed PoA, the coordinating/managing entity checks CDM database to make sure that the new CPA has not been registered as a CDM project or in other PoAs. This search process covers project activities and PoAs that are registered, application for registration, under review and review or correction request. The same checking is also implemented by the DoE that conducts scrutiny for addition of CPA to the PoA.

Prior to registration of a new CPA to this proposed PoA, the coordinating/managing entity checks CDM database to make sure that the new CPA has not been registered as a CDM project or in other PoAs. This search process covers project activities and PoAs that are registered, application for



registration, under review and review or correction request. The same checking is also implemented by the DoE that conducts scrutiny for addition of CPA to the PoA.

- (iii) **the provisions to ensure that those operating the CPA are aware and have agreed that their activity is being subscribed to the PoA;**

The coordinating/managing entity is responsible to identify, develop, register and manage all CPA included in this proposed PoA. In other words, each CPA shall recognize and agree that its activity is to be registered in the proposed PoA. To do so, coordinating/managing entity and each CPA shall complete a legal agreement.

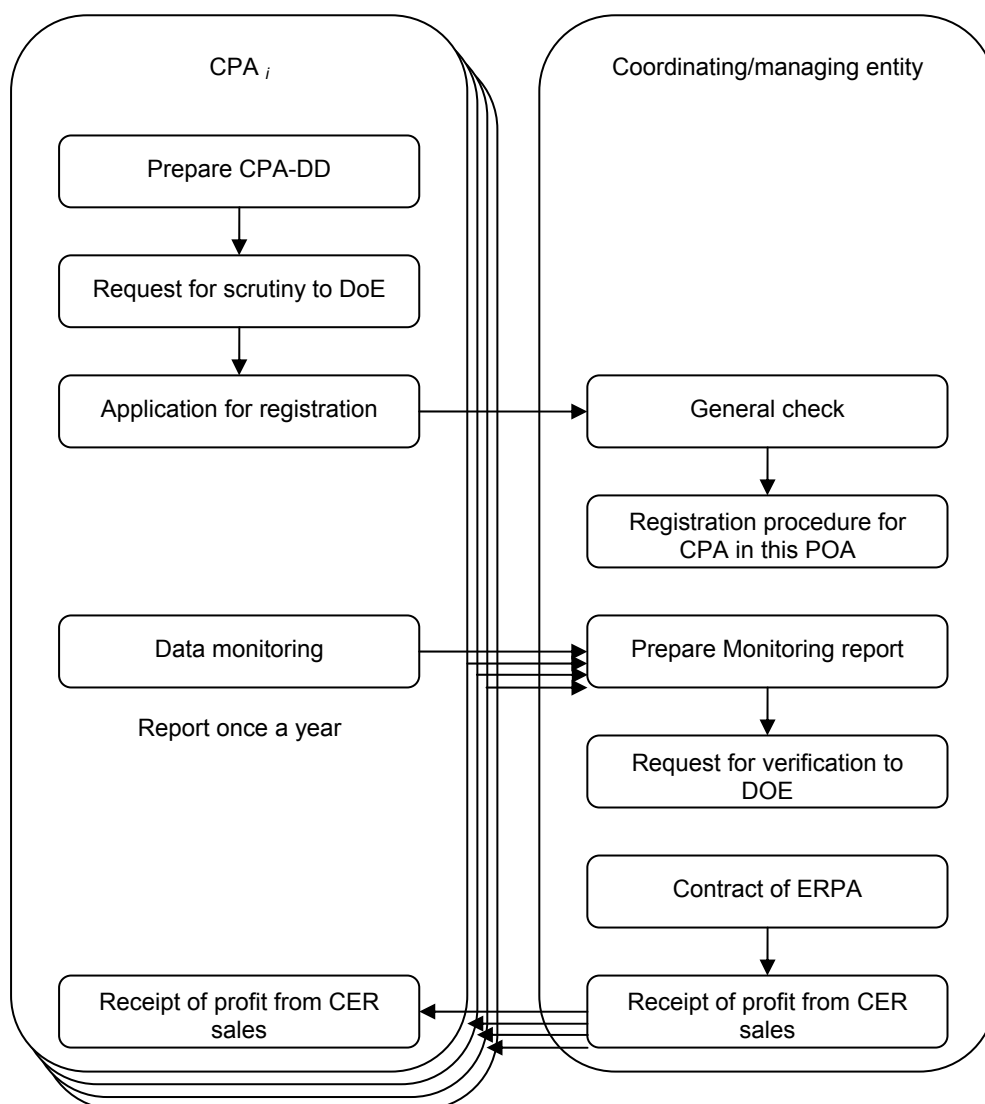


Figure 4 Responsibilities in PoA and CPA

A.4.4.2. Monitoring plan:

>> Here the following information will be provided:



- (i) Description of the proposed statistically sound sampling method/procedure to be used by DOEs for verification of the amount of reductions of anthropogenic emissions by sources or removals by sinks of greenhouse gases achieved by CPAs under the PoA.
- (ii) In case the coordinating/managing entity opts for a verification method that does not use sampling but verifies each CPA (whether in groups or not, with different or identical verification periods) a transparent system is to be defined and described that ensures that no double accounting occurs and that the status of verification can be determined anytime for each CPA;

The coordinating/managing entity chooses (ii) and adopts a method in which DOE verifies each CPA.

Each CPA implements monitoring in accordance with ACM0012 “Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects” Version 3.2, and regularly reports the data to the coordinating/managing entity after cross-checking on data validation. The unit duration for monitoring should be the same across all CPAs.

The coordinating/managing entity prepares monitoring report that integrates all CPA included in PoA, for allowing DOE to implement verification on each CPA. In the monitoring report, primary monitoring data and calculation on CERs are described in a transparent manner for each CPA included PoA. Data-set relevant to each CPA is completely exclusive to other data-set included in the same PoA, and because of this, double-counting is avoided.

The monitoring data collected and organized in each CPA are reported to project database which is managed by the coordinating/managing entity for calculation of CERs from each CPA and PoA as a whole. Primary monitoring data is managed so as to allow attribution to each CPA.

Primary monitoring data are saved in each CPA and the coordinating/managing entity for a certain period of time. With regard to calculation results, the coordinating/managing entity will save them for a certain period of time: especially for CER, feedback will be made after preparing monitoring report to each CPA from which the data was provided.

A.4.5. Public funding of the <u>programme of activities</u>:

>>

No public funding or ODA is used to implement this CDM Programme of Activity (CPA)



SECTION B. Duration of the programme of activities

B.1. Starting date of the programme of activities:

>>

January 2011

In line with guidance provided in EB 41, this start date has been chosen as it is estimated that at this time registration by the CDM Executive Board will be completed. It is only after registration that implementation of CPAs will occur constituting “real action” as defined by the Executive Board guidance. Hence the date of registration is considered an appropriate start date for the PoA.

B.2. Length of the programme of activities:

>>

28 years.



SECTION C. Environmental Analysis

C.1. Please indicate the level at which environmental analysis as per requirements of the CDM modalities and procedures is undertaken. Justify the choice of level at which the environmental analysis is undertaken:

>>

1. Environmental Analysis is done at PoA level ☐
2. Environmental Analysis is done at CPA level ☒

With regard to cement plant as a whole where each CPA belongs to, a premise is that an EIA report is prepared prior to construction and start of operation. When installing facilities to recover and utilize waste heat to some facilities in the report, as a part of CPA, it is deemed not as “Type 1” (requiring EIA report) but as a modest “Type 2” and needs to prepare “EI Table” each to be approved.

C.2. Documentation on the analysis of the environmental impacts, including transboundary impacts:

>>

In each CPA site, analysis of the environmental impacts provided in C.1. are conducted. Standards and criteria that needs to be satisfied are shown below:

Table 4 Standards to be satisfied for analysis of the environmental impacts

Standard	Code
"Environmental Quality Standard for Air"	GB3095-1996
"Emission Standard of Air Pollutants for Cement Industry"	GB4915-2004
"Emission Standard of Air Pollutants for Coal-burning Oil-burning Gas-fired Boiler"	GB13271-2001
"Standard for Noise of Industrial Enterprises"	GB12348-1990
"Standard of Environmental Noise in the Urban Area"	GB3096-1993
"Integrated Wastewater Discharge Standards"	GB8978-1996
"Environmental Quality Standards for Surface Water"	GB3838-2002

Air pollution

Waste air from cement production line includes pollutants such as particles, NO₂ and SO₂ and is one of the reasons to cause air pollution. This PoA intends to introduce facilities of waste heat recovery and utilization in each CPA to mitigate air pollution caused by power generation of the Grid. According to the Standard in China, “Emission standard of waste pollutants in GB13223-200x”, emission standards of particles, NO₂ and SO₂ for thermal power plants constructed on or after January 1st, 2010, in Shanxi Province are as shown below.

Table 5 “Emission standard of waste pollutants in GB13223-200x” [mg/m³]

Air pollutants	Emission standard
Particle	30
NO ₂	200
SO ₂	400



Water contamination

This PoA assumes waste water discharged from each CPA site is mainly facility cooling water with some domestic waste water. For the standard in this field, the 1st class standard of “Integrated Wastewater Discharge Standards” (GB8978-1996) is applied.

Table 6 1st class standard of “Integrated Wastewater Discharge Standards” (GB8978-1996)

Evaluation item	1st class standard
pH	6 – 9
Degree of colour (dilution rate)	50
Petroleum	5.0 mg/l
SS	70 mg/l
BOD ₅	20 mg/l
COD _{cr}	100 mg/l

In each CPA, water for production is well recycled and discharges small volume of wastewater. For reference, wastewater is discharged at different timings: after receiving a treatment approval for facility cooling water, and after satisfying standards of biochemical treatment for domestic wastewater.

Noise

In this PoA, for handling noise pollution in each CPA site, the Category III standard of “Standard for Noise of Industrial Enterprises” (GB12348-1990) is applied.

Table 7 Category III standard of “Standard for Noise of Industrial Enterprises” (GB12348-1990)

Category	Scope	dB – daytime (A)	dB – nighttime (A)
III	Industrial areas	65	55

Each CPA refers to relevant standards in “Design Standards for the Control of Noise of Industrial Enterprises” (GBJ87-85), setting noise limitation at 90 db (A) for production plants and workplaces (duration of exposure to noise for employees: 8 hours).

Greening

Greening has positive effects in such as preventing pollution, controlling temperature/humidity, improving climate and mitigating noise pollution.

In this PoA, greening will be implemented in plants and its neighbourhood at construction stage at each CPA site.

Environmental management

In this PoA, after launching each CPA, environmental managers in plants will grasp facilities for environmental protection and occupational safety management. In production sites, some concurrent caretakers for environmental protection will be placed to work with the environmental managers.



C.3. Please state whether in accordance with the host Party laws/regulations, an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA):

>>

As mentioned above, relevant environmental standards will be satisfied in typical CPA



SECTION D. Stakeholders' comments

>>

D.1. Please indicate the level at which local stakeholder comments are invited. Justify the choice:

1. Local stakeholder consultation is done at PoA level ☐
2. Local stakeholder consultation is done at CPA level ☒

Note: If local stakeholder comments are invited at the PoA level, include information on how comments by local stakeholders were invited, a summary of the comments received and how due account was taken of any comments received, as applicable.

D.2. Brief description how comments by local stakeholders have been invited and compiled:

>>

In order to collect comments at PoA level, the following sessions were held:

- Shanxi Building Material Industry Administration Office (coordinating/managing entity) organized a seminar on the environment for cement business operators in Shanxi. (April 23rd, 2009)
- Visited Environment Protection Department of Lvliang City where CPA sites are located and held a meeting to exchange views on this PoA. (December 17th, 2009)
- Visited National Development and Reform Commission (NDRC) and held a meeting to exchange views on this PoA together with Tsinghua University. (January 27th, 2010)
- Visited Development and Reform Commission (DRC) of Lvliang City and held a meeting to exchange views on this PoA together with DRC of Shanxi District. (January 29th, 2010)

D.3. Summary of the comments received:

>>

Seminar on the environment (April 23rd, 2009)

- A lot of cement business operators gave comments, saying that they expect waste heat recovery and power generation to be registered as CDM in order to promote projects which are under tough situation to proceed.

View-exchange meeting in Lvliang City (December 17th, 2009)

- Several CDM projects are at development stage in Lvliang City: no project has been registered by the CDM EB.
- Under the initiative of National Development and Reform Committee, CDM Exchange Centre has recently been established in Beijing. No actual exchange has been made. Lvliang City is expected to establish such facility.
- Environment Protection Department of Lvliang City supports this PoA and is willing to provide information as necessary.

View-exchange meeting in NDRC (January 27th, 2010)

- Additionality of each CPA should be demonstrated by IRRs, using cheap electricity tariff which is approved by the government.



- There has been no PoA in China, and NDRC supports this PoA.
- If this PoA aims to get EB's approval within a short term period, it should be simplified using a small-scale methodology.

View-exchange meeting in DRC of Lvliang City (January 29th, 2010)

- DRC of Shanxi District and Lvliang City support this PoA.

D.4. Report on how due account was taken of any comments received:

>>

N.A.

SECTION E. Application of a baseline and monitoring methodology

This section shall demonstrate the application of the baseline and monitoring methodology to a typical -CPA. The information defines the PoA specific elements that shall be included in preparing the PoA specific form used to define and include a CPA in this PoA (PoA specific CDM-CPA-DD).

E.1. Title and reference of the approved baseline and monitoring methodology applied to each CPA included in the PoA:

>>

Baseline/monitoring methodology:

Approved methodology ACM0012 "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects" Version 3.2

In PoA and each of CPA, the latest versions of the following tools are used:

- Tool to calculate the emission factor for an electricity system
- Tool for the Demonstration and Assessment of Additionality

Baseline and monitoring methodology:

Approved consolidated baseline and monitoring methodology ACM0012 (Version 03.1):

"Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects"

The methodology draws upon:

- Tool to calculate the emission factor for an electricity system
- Tool for the Demonstration and Assessment of Additionality

Reference: UNFCCC website: <http://cdm.unfccc.int/methodologies/PAMethodologies/approved.html>

Note: For application of this approved baseline/monitoring methodology to this PoA, approval by the CDM Executive Board will be required.

E.2. Justification of the choice of the methodology and why it is applicable to each CPA:

>>



This PoA is applicable to both Type-1 and Type-2, with limitations that form of WECM stream² is waste gas and utilization method is power generation.

Type-1: All the waste energy in identified WECM stream/s, that will be utilized in the project activity, is, or would be flared or released to atmosphere in the absence of the project activity at the existing or new facility. The waste energy is an energy source for:

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

Type-2: An existing industrial facility, where the project activity is implemented, that captures and utilizes a portion of the waste gas stream(s) considered in the project activity, and meet the following criteria:

- The project activity is to increase the capture and utilization of waste gas for generation of electricity that is flared or vented in the absence of the project activity, and not only the replacement/modification/expansion of existing generation equipment with or to a more efficient equipment;
- The portion of waste gas captured prior to implementation of the project activity is used for generation of captive electricity. The use of a portion of the waste gas in the baseline for the purpose of heat generation or other use prior to implementation of the project activity is also permitted under this methodology provided the generation of heat or other use in the crediting period remain same as that in the baseline;
- If the project participant uses a part of the electricity generated in the project activity onsite and exports the remainder, both shall be monitored. In such situations it shall be demonstrated that the electricity generated for own consumption from waste gas is not reduced in the project activity;
- Emission reductions generated in the project activity are attributable to the amount of waste gas captured and utilized in the project activity that was flared or vented in the absence of the project activity and to the increase in energy efficiency of the new power generating facility;

No auxiliary fossil fuel (except start-up fuel) is used in the waste gas boiler for the generation of captive electricity in the absence of the project.

Conditions

The methodology is applicable under the following conditions:

Condition	Situation of project activity
If the project activity is based on the use of waste pressure to generate electricity, electricity generated using waste pressure should be measurable;	No CPA site uses waste pressure.
Energy generated in the project activity may be used within the industrial facility or exported from the industrial facility;	Equivalent volume of electricity generated in the project activity is used within the industrial facility.
The electricity generated in the project activity may be exported to the grid or used for captive purposes;	Equivalent volume of electricity generated in the project activity is used within the

² Waste Energy Carrying Medium: The medium carrying the waste energy in form of heat, chemical energy or pressure. Examples of WECM include gas, air, steam etc.



Condition	Situation of project activity
	industrial facility.
Energy in the project activity can be generated by the owner of the industrial facility producing the waste energy or by a third party (e.g. ESCO) within the industrial facility;	Energy in the project activity generate is generated by the owner of the cement plants (CPA sites) producing waste energy.
Regulations do not constrain the industrial facility that generates waste energy from using fossil fuels prior to the implementation of the project activity;	No laws and regulations exist to require the cement plants (CPA sites) to use fossil fuel prior to the implementation of the project activity.
The methodology covers both new and existing facilities. For existing facilities, the methodology applies to existing capacity. If capacity expansion is planned, the added capacity must be treated as a new facility;	CPA site may include both new and existing facilities.
The emission reductions are claimed by the generator of energy using waste energy;	The emission reductions are claimed by the cement plants (CPA sites).
In cases where the energy is exported to other facilities, an official agreement exists between the owners of the project energy generation plant with the recipient plant(s) that the emission reductions would not be claimed by the recipient plant(s) for using a zero-emission energy source;	In case where electricity is exported to the grid from energy generating facility, the equivalent volume of electricity will be received by the energy generating facility. Therefore, an official agreement is not necessary in each CPA.
For those facilities and recipients included in the project boundary, that prior to implementation of the project activity (current situation) generated energy on-site (sources of energy in the baseline), the credits can be claimed for minimum of the following time periods: <ul style="list-style-type: none"> — The remaining lifetime of equipments currently being used; and — Credit period. 	Each CPA determines either of which time period is to be adopted.
Waste energy that is released under abnormal operation (for example, emergencies, shut down) of the plant shall not be accounted for.	In all CPA, waste energy that is released under abnormal operation (for example, emergencies, shut down) of the plant shall not be accounted for.
This methodology is not applicable to projects where the waste gas/heat recovery project is implemented in a single-cycle power plant (e.g. gas turbine or diesel generator) to generate power. However, the projects recovering waste energy from such power plants for the purpose of generation of heat only can apply this methodology.	The CPA sites of this project activity are facilities in cement plants: therefore, this project can apply this methodology.

E.3. Description of the sources and gases included in the CPA boundary

>>

	Source	Gases	Included?	Justification/Explanation
e	Electricity generation from	CO ₂	Included	The main emissions



	Source	Gases	Included?	Justification/Explanation
Project		CH ₄	Excluded	Excluded f Eastern China Power Grid or simplification, it's conservative
		N ₂ O	Excluded	Excluded for simplification, it's conservative
	Fossil fuel consumption in boiler for thermal energy	CO ₂	Excluded	There is no fossil fuel direct utilization in boiler
		CH ₄	Excluded	There is no fossil fuel direct utilization in boiler
		N ₂ O	Excluded	There is no fossil fuel direct utilization in boiler
	Fossil fuel consumption in cogeneration plant in the project cogeneration plant	CO ₂	Excluded	There is no cogeneration plant in the project
		CH ₄	Excluded	There is no cogeneration plant in the project
		N ₂ O	Excluded	There is no cogeneration plant in the project
	Baseline emissions from generation of steam used in the flaring process, if any	CO ₂	Excluded	There is no such process in the project
		CH ₄	Excluded	There is no such process in the project
		N ₂ O	Excluded	There is no such process in the project
	Supplemental fossil fuel consumption	CO ₂	Excluded	There is no supplemental fossil fuel in project
		CH ₄	Excluded	There is no supplemental fossil fuel in project
		N ₂ O	Excluded	There is no supplemental fossil fuel in project
	Supplemental electricity consumption	CO ₂	Included	The main emissions.
		CH ₄	Excluded	Excluded for simplification, it's conservative
		N ₂ O	Excluded	Excluded for simplification, it's conservative
	Electricity import to replace captive electricity, which was generated using waste gas in absence of project activity	CO ₂	Excluded	There is no captive electricity generated in the absence of the proposed project.
		CH ₄	Excluded	There is no captive electricity generated in the absence of the proposed project.
		N ₂ O	Excluded	There is no captive electricity generated in the absence of the proposed project.
	Project emissions from cleaning of gas	CO ₂	Excluded	There is no such process in the project
		CH ₄	Excluded	There is no such process in the project
		N ₂ O	Excluded	There is no such process in the project

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

>>

Baseline scenario for each CPA is in conformity to the baseline methodology of ACM0012 (“Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects”). In order to prove that the activity would not be implemented in the absence of this PoA, the latest version of “Tool for the demonstration and assessment of Additionality” is to be used as the UNFCCC additionality tool.

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

The baseline candidates should be considered for the following facilities, in accordance with “Identification of the baseline scenario” in the methodology ACM0012 Version 3.2:

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



- For the industrial facility where the waste energy is generated; and
- For the facility where the energy is produced; and
- For the facility where the energy is consumed

Industrial facility where the waste energy is generated

Suspension preheater (SP) and Air Quenching Cooler (AQC) are in this category. Among the realistic and plausible options provided in ACM0012 Version 3.2, the following W1 and W6 are identified.

- W1: WECM is directly vented to the atmosphere without incineration or waste heat is released to the atmosphere or waste pressure energy is not utilized.
- W6: All the waste gas produced at the industrial facility is captured and used for export electricity generation.

For the process to narrow all the option (W1-W6) down to W1 and W6, see E.5.1.

Facility where the energy is produced

Steam Turbine Generator is in this category. Among the realistic and plausible options provided in ACM0012 Version 3.2, the following P1 and P6 are identified.

- P1: Proposed project activity not undertaken as a CDM project activity;
- P6: Sourced Grid-connected power plants;

In addition, as described below, this project activity is not attractive for operators without profits from CDM, and P1 is excluded from Baseline.

For the process to narrow all the option (P1-P11) down to P1 and P6, see E.5.1.

Possible scenarios for the combination of facilities are as follows:

Table 8 Possible alternative project activity combinations

	P1	P6
W1 (W2)	Not applicable. This scenario is not internally consistent – if the waste heat is released in the atmosphere, it is not available for power generation.	Alternatives combination I Applicable. This scenario corresponds to the current practice at cement production facilities in the project area: power supply by the grid, and non-utilization of the waste heat
W6	Alternatives combination II Applicable. This scenario uses the waste heat to generate power to substitute power that would have been supplied by the grid, without the support of CDM.	Not applicable. This scenario is not internally consistent – there would be no energy use for the waste heat.

Facility where the energy is consumed

Cement Clinker Production Line(s) is in this category.



E.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the CPA being included as registered PoA (assessment and demonstration of additionality of CPA): >>

>>

E.5.1. Assessment and demonstration of additionality for a typical CPA:

>> Here the PPs shall demonstrate, using the procedure provided in the baseline and monitoring methodology applied, additionality of a typical CPA.

Additionality for a typical CPA is demonstrated by using the latest version of “Tool for the demonstration and assessment of Additionality.”

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

With regard to the candidates of baseline for each CPA, alternatives are selected for each of the following facilities, in accordance with “Identification of the baseline scenario” in the methodology ACM0012 Version 3.2.

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

- Industrial facility where the waste energy is generated
- Facility where the energy is produced
- Facility where the energy is consumed

Industrial facility where the waste energy is generated

Suspension preheater (SP) and Air Quenching Cooler (AQC) are in this category. Among realistic and plausible options provided in ACM0012 Version 3.2, the following W1 and W6 are identified.

- W1: WECM is directly vented to the atmosphere without incineration or waste heat is released to the atmosphere or waste pressure energy is not utilized.
- W6: All the waste gas produced at the industrial facility is captured and used for export electricity generation.

	Utilization of waste gas, waste heat and waste pressure (Baseline)	Typical CPA
W1	WECM is directly vented to the atmosphere without incineration or waste heat is released to the atmosphere or waste pressure energy is not utilized;	Common practice in Shanxi Province and can be a high-probable baseline scenario. (Baseline)
W2	WECM is released to the atmosphere (for example after incineration) or waste heat is released to the atmosphere or waste pressure energy is not utilized;	Not realistic, since no relevant regulations exist in Shanxi Province, and waste gas is not incinerated in general.
W3	Waste energy is sold as an energy source;	Not realistic, since there is no demand of waste gas/heat around the project sites.
W4	Waste energy is used for meeting energy	Not realistic, since there is no additional



	Utilization of waste gas, waste heat and waste pressure (Baseline)	Typical CPA
	demand;	demand for heat in cement plants.
W5	A portion of the waste gas produced at the facility is captured and used for captive electricity generation, while the rest of the waste gas produced at the facility is vented/flared;	This project is to use waste heat and does not use waste pressure to generate electricity.
W6	All the waste gas produced at the industrial facility is captured and used for export electricity generation.	W6 are applicable. The proposed project activity utilizes waste gas for power generation.

Facility where the energy is produced

Steam Turbine Generator is in this category. Among realistic and plausible options provided in ACM0012 Version 3.2, the following P1 and P6 are identified.

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

P6: Sourced Grid-connected power plants;

	Power generation (Baseline)	Typical CPA
P1	Proposed project activity not undertaken as a CDM project activity;	Can be a high-probable alternative, however, not attractive as a project. (to be proved with financial analysis)
P2	On-site or off-site existing/new fossil fuel fired cogeneration plant;	Not realistic, since small-scale thermal power plants (below 135MW) are not approved.
P3	On-site or off-site existing/new renewable energy based cogeneration plant;	Not realistic, due to the high rate of unit price of electricity generated from renewable energies in Shanxi Province.
P4	On-site or off-site existing/new fossil fuel based existing captive or identified plant;	As with P2
P5	On-site or off-site existing/new renewable energy or other waste energy based existing captive or identified plant;	As with P2
P6	Sourced Grid-connected power plants;	Can be a high-probable alternative (Baseline)
P7	Captive Electricity generation using waste energy (if project activity is captive generation using waste energy, this scenario represents captive generation with lower efficiency than the project activity);	This PoA considers power generation using waste energy with high efficiency: the technology with lower efficiency is not realistic.
P8	Cogeneration using waste energy (if project activity is cogeneration with waste energy, this scenario represents cogeneration with lower efficiency than the project activity);	As with P7
P9	Existing power generating equipment (used previous to implementation of project activity for captive electricity generation	Not realistic, since there is no existing facilities to generate electricity.



	Power generation (Baseline)	Typical CPA
	from a captured portion of waste gas) is either decommissioned to build new more efficient and larger capacity plant or modified or expanded (by installing new equipment), and resulting in higher efficiency, to produce and only export electricity generated from waste gas. The electricity generated by existing equipment for captive consumption is now imported from the grid;	
P10	Existing power generating equipment (used previous to implementation of project activity for captive electricity generation from a captured portion of waste gas) is either decommissioned to build a new more efficient and larger capacity plant or modified or expanded (by installing new equipment), and resulting in higher efficiency, to produce electricity from waste gas (already utilized portion plus the portion flared/vented) for own consumption and for export;	Not realistic, since there is no existing facilities to generate electricity.
P11	Existing power generating equipment is maintained and additional electricity generated by grid connected power plants.	Not realistic, since there is no existing facilities to generate electricity.

Possible scenarios for the combination of facilities are as follows:

Table 9 Possible alternative project activity combinations

	P1	P6
W1 (W2)	Not applicable. This scenario is not internally consistent – if the waste heat is released in the atmosphere, it is not available for power generation.	Alternatives combination I Applicable. This scenario corresponds to the current practice at cement production facilities in the project area: power supply by the grid, and non-utilization of the waste heat
W6	Alternatives combination II Applicable. This scenario uses the waste heat to generate power to substitute power that would have been supplied by the grid, without the support of CDM.	Not applicable. This scenario is not internally consistent – there would be no energy use for the waste heat.

Facility where the energy is consumed

Cement Clinker Production Line(s) is in this category.



Sub-Step 1b. Identify the fuel for the baseline choice of energy source taking into account the national and/or sectoral policies as applicable.

Energy source of P1, one of the options for Step 1, is waste heat, and that of P6 is fuel to generate electricity at power plants from which electricity is supplied to North China Power Grid.

Sub-Step 1c: Use Step 2 and/or step 3 of the latest approved version of the “Tool for the demonstration and assessment of additionality” to identify the most plausible baseline scenarios by eliminating non-feasible options

Each CPA-DD specifies that “Step 2. Investment Analysis” in the latest version of “Tool for the demonstration and assessment of Additionality” should be used.

Step 2. Investment Analysis

Sub-step 2a: Determine appropriate analysis method

In each CPA-DD, benchmark analysis (Option III) is used.

The “Tool for the Demonstration and Assessment of Additionality” recommends three investment analysis methods including simple cost analysis (option I), investment comparison analysis (option II) and benchmark analysis (option III). The analysis will be analyzed through Option III of the additionality tool, i.e. benchmark analysis.

This method is applicable because:

Option I: Simple cost analysis, does not apply, because the project generates economic returns through cost savings from the displacement of power purchased from the grid.

Option II: Investment comparison analysis is not used, because the identified alternative (non-use of the waste heat and purchase of the power from the grid) does not involve investments.

Option III: Benchmark analysis is applicable, because there is one investment decision for which an IRR can be calculated and compared against a company benchmark.

Sub-step 2b: Option III: Apply benchmark analysis

For the benchmark as criteria, 11% of the project IRR for cement industry given in China’s “Economic Assessment method and parameter of construction projects by SDPC and MOC”. Currently, for cement projects in China, evaluation based on internal rate of return is conducted in general.

Sub-step 2c: option III: Calculation and comparison of financial indicators

As most appropriate benchmark in each CPA-DD, evaluation based on IRR is used, which is in common in cement projects in China. Then a result of investment analysis is obtained by comparing with IRR.

1) Financial indicators



The financial data provided in the Feasibility Study Report of the Project is as follows:

Table 6 Financial indicators

Installed capacity	9 MW
Net electricity supply	48,093 MWh
Lifetime of the Project	21 years
Total investment	RMB 67,853,900 Yuan
Annual O&M cost	RMB 5,250,000 Yuan/year
Expected tariff	RMB 0.237 Yuan/KWh (excluding VAT)
Income tax rate	25%
Tax rate of city construction	7%
Tax rate of education	3%
Crediting period	10 years
Expected price of CERs	8.5 Euro/tCO ₂ e (exchange rate of Euro and RMB is 1:10)

2) Comparison of IRR for the Project and the financial benchmark

In benchmark analysis, a project is determined as less attractive in economic aspect when internal rate of return (IRR) of the project is below benchmark. Below table shows IRRs for this project activity with/without CDM.

Table 7 IRR

	Project IRR (Before tax) Benchmark=11%
Without CDM	6.50 %
With CDM	11.44 %

Sub-step 2d: Sensitivity analysis

In each CPA-DD, sensitivity analysis is conducted by using the following parameters as unspecified elements.

- Total Investment
- Annual O&M Cost
- Tariff

Taking no account of CERs revenue, the impacts of tariff, annual O&M cost, total investment of the project on IRR are analyzed, and the results of sensitive analysis of three indicators are shown below table.

Table 8 IRR sensitive analysis

Item	-10%	-5%	0%	5%	10%
Tariff	7.82%	7.13%	6.50%	5.92%	5.38%
Annual O&M Cost	7.48%	6.99%	6.50%	5.98%	5.46%
Total investment	4.16%	5.36%	6.50%	7.60%	8.66%

As shown in above table, both 6.50% for the case without credit and the IRR in the sensitivity analysis are below the benchmark (11%). Therefore return rate of this project activity without CDM will remain low, which means less attractive for investors. On the other hand, in the case of with



credits, return rate of this project activity is considerably high enough to be attractive. As such, it clears that profits from CER sales through this project activity will improve cost effectiveness of this project.

Step 4. Common practice analysis

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

Common option for electric power supply for cement production facilities in Shanxi District is from the public electricity grid (the North China Power Grid). Activities similar to the project activity are considered to be any project at a cement production facility that utilizes waste heat from either the pre-heater stage or clinker cooling stage for the generation of electric power.

The Chinese power grid is divided into several large regional power grids, and therefore conditions of power plant to connect a relevant grid are different. China's DNA reviews CO₂ emission factors by grid on a regular basis and releases them in both form of operation margin and build margin, allowing operators for preparing CDM PDD. All cement plants in Shanxi Province purchase their electricity from North China Power Grid, a major grid in the country, which means that all cement plants in the province shares the same characteristics such as emission factor.

So far, several cement plants in Shanxi Province implement electricity generation using waste heat recovered in the plants, as with each CPA assumed in this PoA, which could be a similar activity to each CPA proposed under this PoA. Among them, CPA site or CDM site are not included in PoA other than this PoA.

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

As shown in Sub-step 4a, activities similar to the CPA under this PoA exist. However, no general practice exists to implement same kind of project and, as mentioned in (i), there is no laws and regulations to impose promote implementation of this PoA. With regard to existing projects similar to this project activity, investment has been determined based on various conditions that are different from current ones. Therefore, whether to implement similar project will be determined by each CPA based on Step 2 (investment analysis). Conditions for investment analysis change at any time.³

Today, the conditions that North China Power Grid offers to cement plants for electricity sales & purchase agreement are rather stricter than they used to be to cement plants. In Shanxi Province electricity is in a state of excess-supply due to economic downturn: sales price of electricity generated from waste heat recovery (from Shanxi Jigang Cement to the grid) is set at a low level enough to constrain it from attracting investment for the project to recover waste heat and generate electricity. This is therefore a huge hurdle for the project in comparison with the existing similar activities.

With regard to sales & purchase agreement with the grid, which could give considerable impacts on investment analysis, it should be noted that conditions and unit prices are determined after negotiations on contracts between the public electricity grid (the North China Power Grid) and cement companies, using the information by National Development and Reform Commission. Therefore, general practice analysis should be implemented within Shanxi Province as the boundary, not in supplying area of a single grid.

³ Learned from the hearing session with Shanxi Building Material Industry Administration Office



- (v) **If the PoA is implementing a mandatory policy/regulation, this would/is not enforced;**

As described in (i), there is no laws and regulations to promote implementation of this PoA.

- (vi) **If mandatory a policy/regulation are enforced, the PoA will lead to a greater level of enforcement of the existing mandatory policy/regulation.**

As described in (i), there is no laws and regulations to promote implementation of this PoA.

E.5.2. Key criteria and data for assessing additionality of a CPA:

>> Here the PPs shall provide the key criteria for assessing additionality of a CPA when proposed to be included in the registered PoA. The criteria shall be based on additionality assessment undertaken in E.5.1 above. The project participants shall justify the choice of criteria based on analysis in above section. It shall be demonstrated how these criteria would be applied to the additionality of a typical CPA at the time of inclusion.

NOTE: Information provided here shall be incorporated into the CDM-CPA-DD that has been specified for this PoA and shall be included in documentation submitted by project participants at registration of PoA.

E.6. Estimation of Emission reductions of a CPA:

E.6.1. Explanation of methodological choices, provided in the approved baseline and monitoring methodology applied, selected for a typical CPA:

>>

In each CPA, ACM0012 is applied.

E.6.2. Equations, including fixed parametric values, to be used for calculation of emission reductions of a CPA:

>>

As shown below, emission factor and emission reductions are calculated.

(1) Emissions from the project activity

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

Where:

PE_y = Project emissions due to project activity.

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

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

$PE_{EL,Import,y}$ = Project activity emissions from import of electricity replacing captive electricity generated in the absence of the project activity for Type-2 project activities

For the proposed project, there are no auxiliary fossil fuels consumption on-site, and there is no electricity consumption for gas cleaning, there is no captive electricity in the absence of baseline scenario,
so $PE_y = 0$.



(2) Baseline emissions

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

Where:

BE_y = The total baseline emissions during the year y in tons of CO₂

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

$BE_{flst,y}$ = Baseline emissions from steam generation, if any, using fossil fuel that would have been used for flaring the waste gas in absence of the project activity (tCO₂e per year), calculated as per equation 1c. This is relevant for those project activities where in the baseline steam is used to flare the waste gas

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

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

For the proposed project, $BE_{En,y}$ is divided into two components.

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

Where:

$BE_{Elec,y}$ = Baseline emissions from electricity during the year y in tons of CO₂

$BE_{Ther,y}$ = Baseline emissions from thermal energy (due to heat generation by element process) during the year y in tons of CO₂

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

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

According to ACM0012,

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

Where:

$BE_{elec,y}$ = Baseline emissions due to displacement of electricity during the year y in tons of CO₂.

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

$EF_{elec,i,j,y}$ = The CO₂ emission factor for the electricity source i (i=gr (grid) or i=is (identified source)), displaced due to the project activity, during the year y in tons CO₂/MWh

f_{wg} = Fraction of total electricity generated by the project activity using waste gas. This fraction is 1 if the electricity generation is purely from use of waste gas.

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

For emission factor of the grid is calculated based on “Tool to calculate the emission factor for an electricity system”.

The formula is as shown below:

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

Where:



$EF_{grid,OM,y}$ = Operating margin CO₂ emission factor in year y (tCO₂/MWh)
 $EF_{grid,BM,y}$ = Build margin CO₂ emission factor in year y (tCO₂/MWh)
 W_{OM} = Weighting of operating margin emissions factor (%)
 W_{BM} = Weighting of building margin emissions factor (%)

The emission factor of North China Power Grid released in 2009 is as follows:

$EF_{grid,OM,y} = 1.0069 \text{ tCO}_2/\text{MWh}$
 $EF_{grid,BM,y} = 0.7802 \text{ tCO}_2/\text{MWh}$

In addition, since this project activity is not power generation using renewable energies, the proportion of OM and BM is as follows:

$W_{OM} = 0.5$
 $W_{BM} = 0.5$

For the proposed project, the combined margin emissions factor is calculated as follows:
 $EF_y = 0.89355 \text{ tCO}_2/\text{MWh}$.

In this project activity, power is generated with waste heat only, and volume of waste heat generation remains the same as the baseline. Therefore, f_{wg} and f_{cap} is 1.

(3) Leakage emissions

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

(4) Emission reductions

$ER_y = BE_y - PE_y - LE_y$

E.6.3. Data and parameters that are to be reported in CDM-CPA-DD form:

(Copy this table for each data and parameter)

Data / Parameter:	1. OXID_i
Data unit:	%
Description:	Carbon Oxygenation Rate of fuel i
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 Energy
Value applied:	-
Justification of the choice of data or description of measurement methods and procedures actually applied:	-
Any comment:	2006 IPCC's Data is adopted because the real data is unavailable.

Data / Parameter:	2. EF_{elec,i,j,v}
Data unit:	tc/TJ
Description:	Carbon Emissions Factor of fuel i



**PROGRAMME OF ACTIVITIES DESIGN DOCUMENT FORM
(CDM-PoA-DD) - Version 01**



CDM – Executive Board

page 34

Source of data:	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Energy
Value applied:	-
Justification of the choice of data or description of measurement methods and procedures actually applied:	-
Any comment:	2006 IPCC's Data is adopted because the real data is unavailable.

Data / Parameter:	3.NCV_i
Data unit:	MJ/t,km ³
Description:	Net Caloric Value of fuel i
Source of data used:	China Energy Statistical Yearbook 2006
Value applied:	-
Justification of the choice of data or description of measurement methods and procedures actually applied:	Refer to annex 3
Any comment:	-

Data / Parameter:	4.EF_{OM}
Data unit:	tCO ₂ /MWh
Description:	Operation Marginal Emission Factor
Source of data:	China Electric Power Yearbook (2009); China Energy Statistical Yearbook (2009) 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 Energy; Value applied: 1.0069
Value applied:	-
Justification of the choice of data or description of measurement methods and procedures actually applied:	Refer to annex 3
Any comment:	It is updated according to China DNA.

Data / Parameter:	5.EF_{BM}
Data unit:	tCO ₂ /MWh
Description:	Build Marginal Emission Factor
Source of data:	China Electric Power Yearbook (2009); China Energy Statistical Yearbook (2009) 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 Energy;



**PROGRAMME OF ACTIVITIES DESIGN DOCUMENT FORM
(CDM-PoA-DD) - Version 01**



CDM – Executive Board

page 35

	Value applied: 0.7802
Value applied:	-
Justification of the choice of data or description of measurement methods and procedures actually applied:	Make the ex-ante estimation according to the weighted emission factor of 20% recently constructed power plants
Any comment:	It is updated according to China DNA.

Data / Parameter:	6. $q_{WCM,product}$
Data unit:	kg
Description:	Specific waste energy production per unit of product (departmental or plant product which most logically relates to waste energy generation) generated
Source of data:	Method-2 , source of data is from external expert.
Value applied:	-
Justification of the choice of data or description of measurement methods and procedures actually applied:	Estimated based on information provided by the external expert on the waste gas/heat/pressure generation per unit of product and volume or quantity of production.
Any comment:	-

Data / Parameter:	7. $Q_{BL,product}$
Data unit:	Tons/yr
Description:	The annual output for the cement clinker
Source of data:	weighing-appliance Keep monitoring
Value applied:	-
Justification of the choice of data or description of measurement methods and procedures actually applied:	Based on audited production records, balance sheets etc. Data for three years prior to project implementation.
Any comment:	Prove-reading according to the state regulations.



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

D.7.1. Data and parameters to be monitored by each CPA:

(Copy this table for each data and parameter)

Data / Parameter:	3.NCV_i
Data unit:	MJ/t,km ³
Description:	Net Caloric Value of fuel i
Source of data to be used:	China Energy Statistical Yearbook (published annually)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	-
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	4.EF_{OM}
Data unit:	tCO ₂ /MWh
Description:	Operation Marginal Emission Factor
Source of data to be used:	National Development and Reform Commission (NDRC), People's Republic of China
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Value applied: 1.0069
Description of measurement methods and procedures to be applied:	-
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	5.EF_{BM}
Data unit:	tCO ₂ /MWh
Description:	Build Marginal Emission Factor
Source of data to be used:	National Development and Reform Commission (NDRC), People's Republic of China



Value of data applied for the purpose of calculating expected emission reductions in section B.5	Value applied: 0.7802
Description of measurement methods and procedures to be applied:	Make the ex- ante estimation according to the weighted emission factor of 20% recently constructed power plants
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	7. $Q_{BL,product}$
Data unit:	Tons/yr
Description:	The annual output for the cement clinker
Source of data to be used:	weighing-appliance Keep monitoring
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	-
Any comment:	-

E.7.2. Description of the monitoring plan for a CPA:

>>

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

(1) Monitoring organization

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

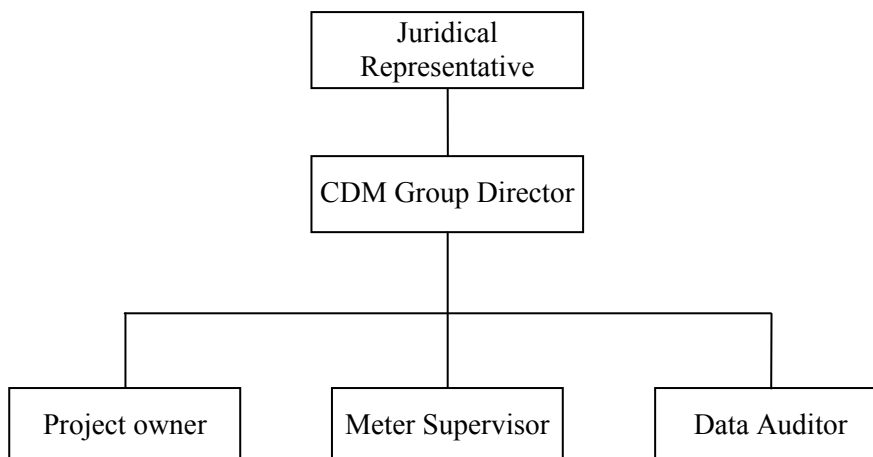


Figure 5. Monitoring organization

- CDM Group Director: Responsible for developing, operating, monitoring, maintaining and communicating for all the tasks related to the CDM project.
- Data Keeper: Responsible for recording monitored data and to compile periodically.
- Meter Supervisor: Responsible for examination and maintenance of monitored meters, inspection and lead sealing of meters with third party (power grid company).
- Data Auditor: Responsible for supervising and verifying monitored data with power grid company.

(2) Data to be Monitored

The baseline emission factor is ex-ante calculated, electricity supplied and waste heat generated by power station of the project need to be monitored.

- For baseline emission factor, emission factor of North China Power Grid for 2009 (released by National Development and Reform Commission) is used.
- Waste heat volume in cement production line is measured in accordance with China's national standards.
- Electricity supplied from electricity plant is measured by monitoring.

(3) Monitoring equipment and installation

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

Three electricity ammeters shall be installed for the project. The first electricity ammeter (M1) shall be installed to measure electricity generated from the unit, which is managed by the project owner; the second electricity ammeter (M2) shall be installed to measure electricity used by the power station, which is managed by the project owner; the third electricity ammeter (M3) shall be installed to measure the net electricity supplied to cement production line. So, for the proposed project, the electricity supplied should read on M3, while data from M1 and M2 shall be used for cross-check.

Simplified electrical diagram is demonstrated in the following figure:

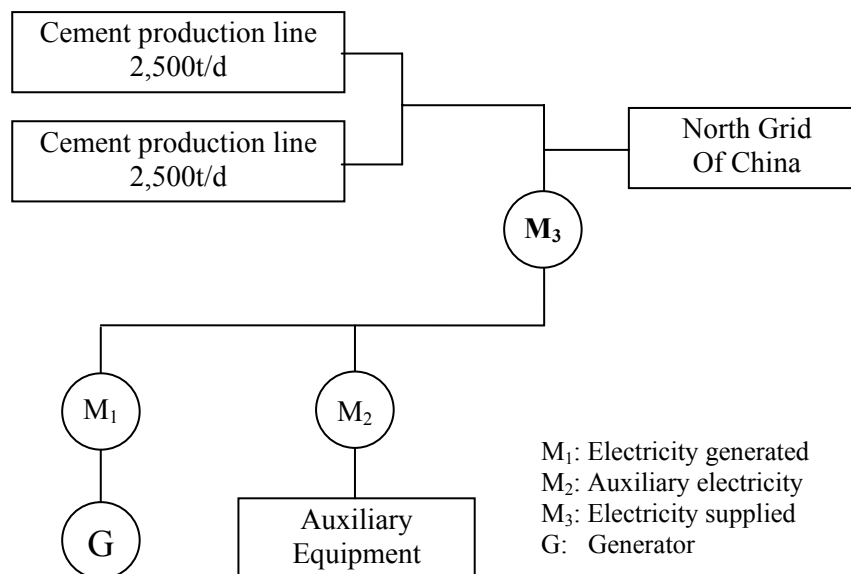


Figure 6. Schematic Monitoring organization

The monitoring of waste heat generated shall be according to the national standards.

(4) Data collection

The project owner should read and record the data from M3 on daily basis in the forms of paper and electronic devices;

(5) QC

The electricity ammeter inspection and on-the-spot check should be implemented according to standard and regulations of state electric power industry. After inspection and on-the-spot check, electricity ammeters must be sealed. The project owner and power grid company should inspect and seal the electricity ammeter together, no one can remove the seal or modify the electricity ammeter when one party (or its representative) is absent.

(6) Data management

Monitoring data which is taken by CDM group should be kept periodically in the paper and electronic devices by oneself. These data are provided periodically to Shanxi Building Material Industry Administration Office, which is the coordinating entity, and they make monitoring report periodically based on these data. They also keep backup data of monitoring data provided by all CPA. All of the data shall be saved after 2 years of crediting period.

Correspondence to the verification by DOE should basically be implemented by Shanxi Building Material Industry Administration Office, which is coordinating entity, and project owner provides additional documents and accepts the site visit.

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

>>



Annex 1

**CONTACT INFORMATION ON COORDINATING/MANAGING ENTITY and PARTICIPANTS
IN THE PROGRAMME of ACTIVITIES**

Organization:	Association of Shanxi Construction Materials Industry
Street/P.O.Box:	129,HongGou
Building:	—
City:	Taiyuan City
State/Region:	Shanxi Province
Postfix/ZIP:	030013
Country:	P.R.China
Telephone:	0351-4425718
FAX:	0351-4425718
E-Mail:	Dcx888@sina.com
URL:	—
Represented by:	Dang Chaoxu
Title:	Chairperson
Salutation:	Mr
Last Name:	Dang
Middle Name:	—
First Name:	Chaoxu
Department:	—
Mobile:	—
Direct FAX:	0351-4425718
Direct tel:	0351-4425718
Personal E-Mail:	Dcx888@sina.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Annex 3

BASELINE INFORMATION

Annex 4

MONITORING INFORMATION
