CLEAN DEVELOPMENT MECHANISM
SIMPLIFIED PROJECT DESIGN DOCUMENT
FOR SMALL-SCALE PROJECT ACTIVITIES (SSC-CDM-PDD)
Version 02

CONTENTS

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.

SECTION A. General description of the small-scale project activity

A.1. Title of the small-scale project activity:

>> Modification of clinker cooler for energy efficiency improvement in cement manufacturing at Binani Cements Limited
Version 02
11/01/2006

A.2. Description of the small-scale project activity:

>> Binani cement limited is a public limited cement manufacturing company. BCL is manufacturing cement {Ordinary Portland cement (OPC), Portland Pozzolana Cement (PPC)} & clinker. BCL belongs to a well-known Binani industries ltd.

The project is the redesigning of the grate system with Controlled Impact System with Mechanical Flow Regulator (CIS-MFR) plate type system, which will increase the cooler recuperation efficiency i.e. utilise more heat in clinker cooler. The project activity is the retrofitting of the clinker cooler for effective trapping of the heat in the clinker cooler section. In this project activity new clinker inlet distribution system is used to distribute the clinker on the grate. Due to the benefits of the inlet grate system the proper cooling of inlet is taking place with additional benefit of high temperature tertiary air ducts.

The project activity contributes to sustainable development at the local, regional and global levels in the following ways:

Thermal energy conservation

The project activity reduces specific thermal consumption for cement production and conserves the energy. Indian economy is highly dependent on "Coal – a finite natural resource" as fuel to generate power and heat for production processes. Since, this project activity reduces its specific thermal energy consumption it has positively contributed towards conservation of coal, a non-renewable natural resource and making coal available for other important applications.

GHG emission reduction

The project activity is helping in the CO_2 emission reduction. Due to saving in fossil fuel (mainly coal, lignite, petcoke) the amount of emission from per unit of clinker is also reduced. This way this project activity is helping in sustainable development.

A.3. Project participants:

>>

Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants(as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India	***Private entity:*** Binani cement Limited, P.O. Binanigram 307025, Tehsil: Pindwara, Dist. Sirohi Rajasthan	No

A.4. Technical description of the small-scale project activity:

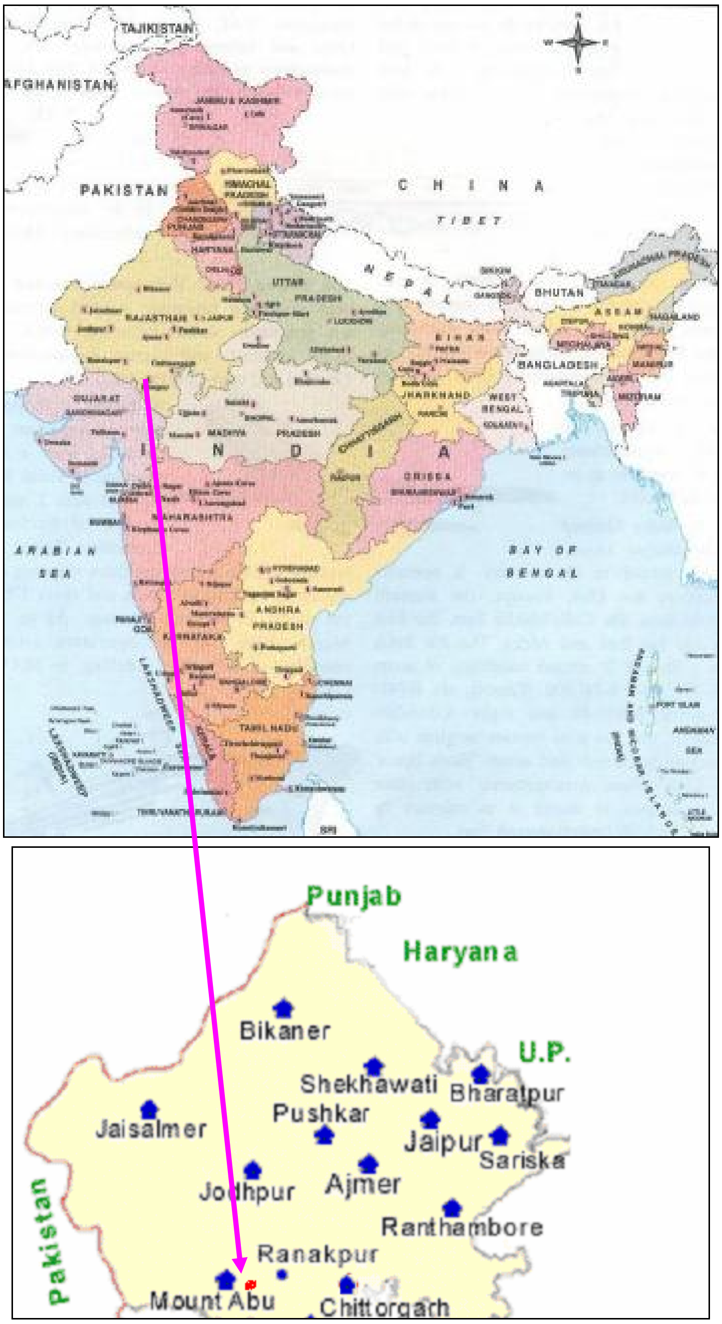
>>

A.4.1. Location of the small-scale project activity:

>>

The location of the site is shown in the map below.

Fig 1 : Location of activity site



A.4.1.1. Host Party(ies):

>> India

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

>> Rajasthan

A.4.1.3. City/Town/Community etc:

>> Tehsil - Pindwara, District- Sirohi

A.4.1.4. Detail of physical location, including information allowing the unique identification of this small-scale project activity(ies):

>> BCL is strategically located at Binanigram, in Sirohi district of Rajasthan State in India. The site is advantageous for its easy accessibility to limestone mines from the Aravalli range of Pindwara belts. The plant is located near NH-14 (Ahmedabad-Delhi) highway. The coordinates of the site are as follows:

Latitude: 24°48'-24°51'

Longitude: 73°4'-73°9'

A.4.2. Type and category(ies) and technology of the small-scale project activity:

>> Type and Category of Project Activity

The project meets the applicability criteria of the small-scale CDM project activity category, Type-II: energy efficiency improvement projects (D: Energy efficiency and fuel switching measures for industrial facilities) of the 'Indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories'.

Main Category: ***Type II – Energy efficiency improvement project***

Sub Category: ***D. Energy efficiency and fuel switching measures for industrial facilities***

As per the provisions of appendix B of simplified modalities and procedures for small scale CDM project activities (version 07), Type II D "Comprises any energy efficiency and fuel switching measure implemented at a single industrial facility. This category covers project activities aimed primarily at energy efficiency; a project activity that involves primarily fuel switching falls into category III.B. Examples include energy efficiency measures (such as efficient motors), fuel switching measures (such as switching from steam or compressed air to electricity) and efficiency measures for specific industrial processes (such as steel furnaces, paper drying, tobacco curing, etc.). The measures may replace existing equipment or be installed in a new facility. The aggregate energy savings of a single project may not exceed the equivalent of 15 GWh_e per year. A total saving of 15 GWh_e per year is equivalent to a maximal saving of 45 GWh_{th} per year in fuel input."

As per paragraph 1 of II. D. of appendix B of the UNFCCC defined simplified modalities and procedures for small-scale CDM project activities, 'The aggregate energy savings of a single project may not exceed the equivalent of 15 GWh_e per year. A total saving of 15 GWh_e per year is equivalent to a maximal saving of 45 GWh_{th} per year in fuel input'. The project activity is energy efficiency project and saving depends on the cooler efficiency and clinker production. The efficiency increase will be almost constant (Reducing with the age) and the production may vary within the limit. After the 10% increase in production the project activity will be within the small scale category.

The baseline and emission reduction calculations from the project would be based on paragraphs 3 and 4 of appendix B (version 07, dated 28th November 2005) and the monitoring methodology would be based on guidance provided in paragraph 6, 7 and 8 of II D of the same appendix B.

Technology applied to the project activity

The technology used is CIS-MFR stationary grate inlet system. The CIS-MFR stationary grate inlet system consisting six rows has replaced eight rows of previous CFG grates for clinker inlet. This new system is a stationary; increasing reliability, ensuring longer life and reducing wear & tear losses. The inclination of these stationary rows allowing the formation of clinker layer in impact zone, causing clinker to slide upon clinker layers formed. This activity protects the continuous impact of clinker on grate plates as it was in moving grate. By this new design cooling of hot portion of clinker is taking place in stationary grate and then clinker moves to movable grate. This system eliminates the grate wear and ensuring high efficiency and easy maintenance.

In the new grate system, mechanical flow regulators (MFR) ensures the constant cooling air supply. These MFR are self regulating, non-electrical devices. MFR are variable orifice devices working on the principle of variable pressure drop corresponding to variable resistance of the clinker layer above each air distribution plate. Air blasts are provided in the back wall and sides of the cooler to prevent material build up.

A.4.3. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed small-scale project activity, including why the emission reductions would not occur in the absence of the proposed small-scale project activity, taking into account national and/or sectoral policies and circumstances:

>> The project activity would reduce the specific heat consumption in the clinker cooler section in the cement production. The project activity would thereby bring about a reduction in direct on-site emissions from reduced thermal energy consumption.

Though the Ministry of Environment and Forest (MoEF), Ministry of Power (MoP) and Ministry of Non conventional Energy Sources (MNES) in India encourage energy conservation on voluntary basis but do not compel cement industries to reduce their specific energy consumption to a prescribed standard. Further, the Department of Industries/The Bureau of Indian Standards/Cement Manufacturers Association/National Council for Building Materials also has not imposed any directives towards specific energy consumption in specific section in cement manufacturing. The project proponent has implemented the project activity over and above the national or sectoral requirements. The GHG reductions achieved by the project activity are additional to those directed by the governmental policies and regulations.

A.4.3.1 Estimated amount of emission reductions over the chosen crediting period:

>> The GHG emission reductions for a 10 year crediting period for Binani Cement are provided in Tables 1.

Table 1: Emission reductions at Binani Cement

Year	Annual estimation of emission reduction in tones of CO_2 e
2001 – 2002	7874
2002 – 2003	12411
2003 – 2004	13840
2004 – 2005	12918
2005 – 2006	12918
2006 – 2007	12918
2007 – 2008	12918
2008 – 2009	12918
2009 – 2010	12918
2010 – 2011	12918
Total estimated reductions (tones of CO_2 e)	**124551**
Total number of crediting years	**10 years**
Annual average over the crediting period of estimated reductions (tones of CO_2 e)	**12455**

A.4.4. Public funding of the small-scale project activity:

>> There is no public funding available in this project.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a larger project activity:

>> According to appendix C of simplified modalities and procedures for small-scale CDM project activities, '***debundling'*** is defined as the fragmentation of a large project activity into smaller parts. A small-scale project activity that is part of a large project activity is not eligible to use the simplified modalities and procedures for small-scale CDM project activities.

According to para 2 of appendix C[1]

A proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

- With the same project participants;
- In the same project category and technology/measure;
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small- scale activity at the closest point

In view of above-mentioned points of de-bundling, Binani Cement's project activity is not a part of any of the above, therefore, considered as small scale CDM project activity.

[1] Appendix C to the simplified M&P for the small-scale CDM project activities, http://cdm.unfccc.int/Projects/pac/howto/SmallScalePA/sscdebund.pdf

SECTION B. Application of a baseline methodology:

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

>> Main Category: **Type II – Energy efficiency improvement projects**

Sub Category: **II. D-Energy efficiency and fuel switching measures for industrial facilities**

The reference has been taken from the list of the small-scale CDM project activity categories contained in 'Appendix B of the simplified M&P for small-scale CDM project activities-Version 7 (28th November 2005)'.

B.2 Project category applicable to the small-scale project activity:

>> The project activity fits under Type II.D – Energy efficiency and fuel switching measures for industrial facilities under Appendix B. The project activity is the retrofit in cooler for energy efficiency. The project activity is reducing the use of energy in cement manufacturing and will fall under the category II. D. of the appendix B.

The project activity is applied in a part of clinker manufacturing process i.e. cooler. The cooler used for cooling the clinker and waste heat recovery to the clinker manufacturing process. Since the cooler is not a direct energy user; it takes heat from the fuel applied to the preheater and kiln, efficiency before and after project activity is used for the estimation of heat saving.

All types of fuel use in the cement manufacturing will be monitored and the average emission factor will be calculated based on the fuel mix for the emission reduction calculations. The information regarding baseline and project data are presented in the table below:

Table 2: Baseline and project activity data requirement and data source

S. No.	Parameter	Data source
Baseline Scenario		
1	Cooler efficiency	Plant
2	Fuel used in clinker manufacturing	Plant
3	Calorific value of the fuel used	Plant
Project Scenario		
4	Cooler efficiency	Plant
5	Fuel used in clinker manufacturing	Plant

6	Calorific value of the fuel used	Plant
7	Emission factor of the fuel used	Default emission factor from IPCC

B.3. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

>> In accordance with paragraph 3 of the simplified modalities and procedures for small-scale CDM project activities, a simplified baseline and monitoring methodology listed in Appendix B may be used for a small-scale CDM project activity if project participants are able to demonstrate to a designated operational entity that the project activity would otherwise not be implemented due to the existence of one or more barrier(s) listed in Attachment A of Appendix. B. These barriers are:

- Investment barrier
- Technological barrier
- Barrier due to prevailing practice
- Other barriers

The implementation of the energy efficiency project activity in cooler is a voluntary step undertaken by no direct or indirect mandate by law. The main driving force to this 'Climate change initiative' is:

- GHG reduction
- Fossil fuel conservation

However, the project proponent was aware of the various barriers associated to project implementation. But it is felt that the availability of carbon financing against a sale consideration of carbon credits generated due to project activity would help to overcome these barriers. Some of the key barriers are discussed below:

Investment Barrier

The project activity is energy efficiency in clinker cooler. The project is saving the fossil fuel heat input in the clinker manufacturing. The project activity is a retrofit measure in the clinker manufacturing. The project activity involves a huge capital investment and low returns. The average rate of risk-free interest on bank deposit in India is 5.5% (financial benchmark). This shows that any project should yield returns more than 5.5%, to consider it for implementation.

The financial analysis- internal rate of return (IRR) is calculated for the project. The calculations can be seen in worksheet attached as Enclosure-1 to the PDD. The summary of IRR is given below.

	IRR (%) without CDM fund	**IRR (%) with CDM funds**
IRR of Cooler	2.1	6.1

Upgradation project		

Following are the assumptions while conducting IRR analysis of the project.

1. The average energy price is Rs. 391.77/Million Kcal with 5% escalation in price.
2. Operation and Maintenance cost (1% of capital cost) is assumed to increase at 5% p.a..
3. Life of project is considered as 15 years.
4. CDM funds are available at the rate of 5 Euro/CER.

The IRR calculations of all plants show that the IRR of the project (2.1%) is below minimum rate of risk-free return (5.5%) that can be achieved without CDM funds. It improves to 6.1% with CDM funds availed against CERs, which is more than minimum rate of risk free return.

Technical Barriers

While crossing the well-established barriers of technology and going ahead with this project, BCL had took a lot of risk in terms technological unfamiliarity, risk of stoppages and quality problems. Other barriers associated were plant shutdown for retrofitting, resulting into production loss. Following is the brief explanation of barriers associated with it. The main technological barrier was the mindset of the operators operating on the well established system for so long. Skilled and experienced engineers/ operators to operate and maintain the technology were not available, which could have lead to equipment disrepair and malfunctioning.

Barriers due to prevailing practice

The 'CIS-MFR cooler energy efficiency project', when implemented in year 2001 as retrofit measure, was one of the first early initiative for such type of projects, due to low penetration of this technology, in Indian cement industries. Cooler is very critical part of the cement process, and general belief in Indian cement industry is that 'tempering with it may lead to production stoppages and quality problems'. Therefore, this technology, due to its 'state-of-the-art' features, risk potential and complexity, is still scarcely implemented in Indian cement industry.

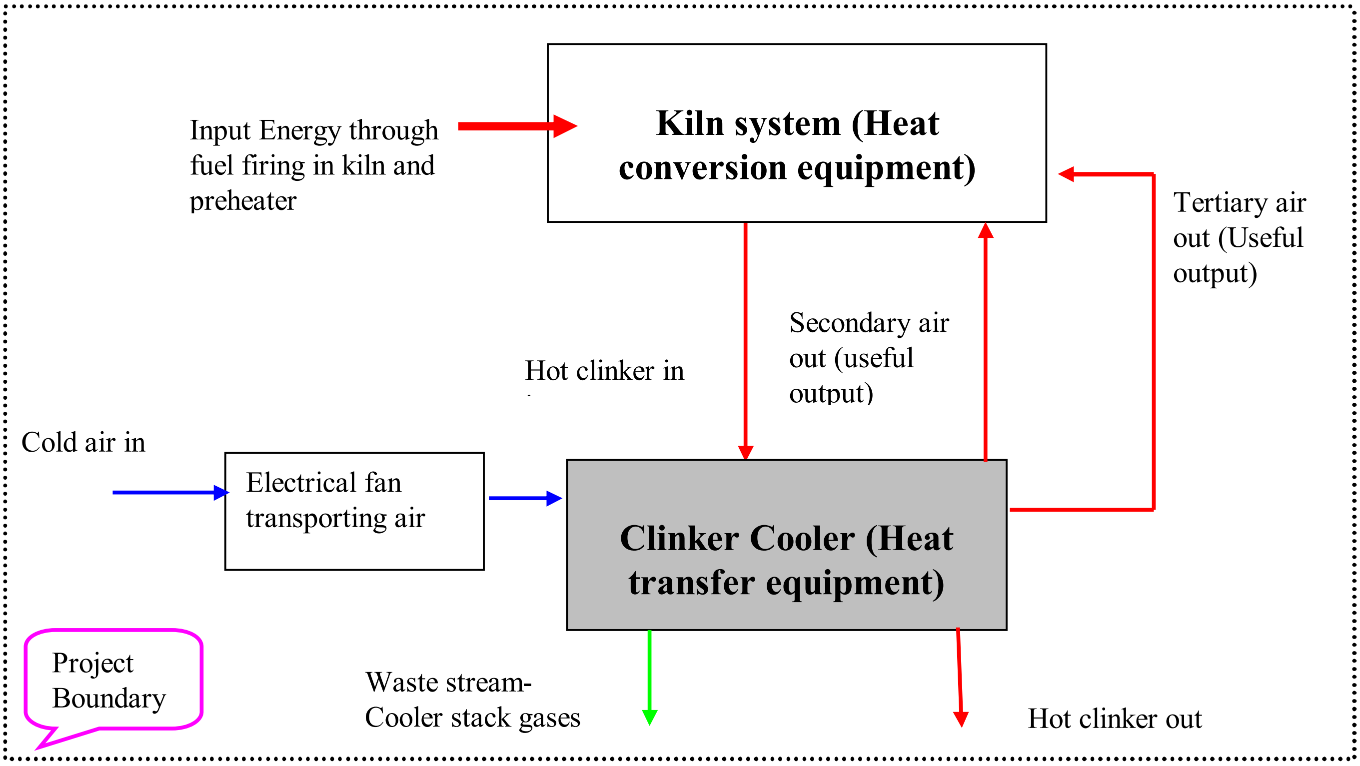
Other barriers

The project required shutdown of 20 days and therefore lead to a loss of INR 93.8 Million to BCL. The prolonged production shutdown may lead to reduced market supply and permanent loss of market to some extent.

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the small-scale project activity:

>> Based on baseline methodology, 'the project boundary is the physical, geographical site of the industrial facility, processes or equipment that are affected by the project activity'. The project boundary selected is the clinker cooler (heat transfer equipment directly associated with heat conversion equipment *i.e.* kiln) and kiln system (heat conversion equipment), including preheater section because these all equipments are effecting from the project activity. The pictorial presentation of the project boundary is given below:

Project Boundary



B.5. Details of the baseline and its development:

>> **Date of completing the baseline:** 29/12/2005

Name of person/entity determining the baseline: Binani Cement Ltd. And their consultants

SECTION C. Duration of the project activity / Crediting period:

C.1. Duration of the small-scale project activity:

>>

C.1.1. Starting date of the small-scale project activity:

>> 31/01/2001

C.1.2. Expected operational lifetime of the small-scale project activity:

>> 20 years 0 months

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

>>

C.2.1. Renewable crediting period:

>> Not Applicable

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

>> Not Applicable

C.2.1.2. Length of the first crediting period:

>> Not Applicable

C.2.2. Fixed crediting period:

>>

C.2.2.1. Starting date:

>> 01/08/2001

C.2.2.2. Length:

>> 10 Years

SECTION D. Application of a monitoring methodology and plan:

>>

D.1. Name and reference of approved monitoring methodology applied to the small-scale project activity:

>> **Title:** Monitoring Methodology for the category II D – Energy efficiency and fuel switching measures for industrial facilities.

Reference: 'Paragraph 6 to 8' as provided in Type II.D. of Appendix B of the simplified modalities and procedures for small-scale CDM project activities - Indicative Simplified Baseline and Monitoring Methodologies for Selected Small-Scale CDM Project Activity Categories.

D.2. Justification of the choice of the methodology and why it is applicable to the small-scale project activity:

>> As established in Section B.2 the project activity falls under Category II.D. Energy efficient power and steam generation leads to mitigation of GHG emissions that would have been produced by the inefficient operation. In order to monitor the mitigation of GHG due to the project activity, the fuel used and efficiency need to be measured. The project activity is the retrofit to cooler for energy efficiency. In the monitoring all the parameters related with fuel use and efficiency of cooler is monitored.

In the monitoring plan mainly these data is monitored:

1. Fuel used in clinker manufacturing
2. Calorific value of the fuel
3. Parameters related with the cooler efficiency

Based on the monitored data and the IPCC emission factors the baseline emissions and project activity emissions are calculated.

There is no technology transfer in the project activity therefore the project activity doesn't lead to any leakage emissions. The difference between the baseline and project emissions is reported as emission reductions from the project activity.

D.3 Data to be monitored:

>>

Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
P.1	Clinker production (Clk)	Plant	Tons /month	Measured and calculated	Recorded continuously and reported monthly	100%	Electronic	Weigh bridge
P.2	Quantity of fuel consumed (Q_{Fuel})	Plant	Tons/month	Measured and calculated	Recorded continuously and reported monthly	100%	Electronic	Weigh bridge
P.3	Emission factor of fuel (EF_{Fuel})	IPCC	TCO_2/TJ	Fixed	Fixed	100%	Electronic	Fixed
P.4	Calorific value of fuel consumed (CV_{Fuel})	Plant	Kcal/kg	Measured	Recorded continuously and reported monthly	100%	Electronic	Bomb calorimeter

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
P.5	Average emission factor ($EF_{average}$)	Plant	TCO_2/TJ	Calculated	Monthly	100%	Electronic	
Clinker cooler Efficiency calculations (Base temperature 0°C, 1 kg clinker)								
P.6	Inlet temperature of clinker in cooler ($T_{Clk\ In}$)	Plant	°C	Estimated	Weekly	100%	Electronic	Efficiency will be calculated once in a week. The cement manufacturing is almost constant operation in normal conditions.
P.7	Specific heat of clinker ($S_{Clk\ In}$)	Data Book	Kcal/kg°C	Calculated	Fixed	100%	Electronic	
P.8	Inlet temperature of dust in cooler (T_{Dust})	Plant	°C	Estimated	Weekly	100%	Electronic	
P.9	Mass of dust in cooler (M_{Dust})	Plant	Kg /kg Clk	Estimated	Weekly	100%	Electronic	

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
P.10	Specific heat of Dust (S_{Dust})	Data Book	Kcal/kg°C	Calculated	Fixed	100%	Electronic	
P.11	Inlet temperature of cooling air in cooler ($T_{Cooling\ Air}$)	Plant	°C	Measured	Weekly	100%	Electronic	
P.12	Mass of cooling air in cooler ($M_{Cooling\ Air}$)	Plant	NM^3/ kg Clk	Measured & Calculated	Weekly	100%	Electronic	
P.13	Specific heat of cooling air ($S_{Cooling\ Air}$)	Data Book	Kcal/ Nm3°C	Calculated	Fixed	100%	Electronic	
P.14	Inlet temperature of false air in cooler ($T_{False\ Air}$)	Plant	°C	Measured	Weekly			
P.15	Mass of false air in	Plant	NM^3/ kg Clk	Measured & Calculated	Weekly	100%	Electronic	

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
	cooler ($M_{False\ Air}$)							
P.16	Specific heat of false air ($S_{False\ Air}$)	Data Book	Kcal/ Nm3°C	Calculated	Fixed	100%	Electronic	
P.17	Inlet temperature of water cooler (T_{Water})	Plant	°C	Measured	Weekly	100%	Electronic	
P.18	Mass of water in cooler (M_{Water})	Plant	Kg /kg Clk	Estimated	Weekly	100%	Electronic	
P.19	Specific heat of Water (S_{Water})	Data Book	Kcal/kg°C	Calculated	Fixed	100%	Electronic	
P.20	Power delivered by cooling air fans (P	Instrument	KWh /kg Clk	Measured & Calculated	Monitored continuously and reported weekly			

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
	Fan)							
P.21	Inlet temperature of exhaust air from cooler ($T_{Exhaust\ Air}$)	Plant	°C	Measured	Weekly			
P.22	Mass of Exhaust air from cooler ($M_{Exhaust\ Air}$)	Plant	NM^3/ kg Clk	Measured & Calculated	Weekly	100%	Electronic	
P.23	Specific heat of Exhaust air ($S_{Exhaust\ Air}$)	Data Book	Kcal/ Nm3°C	Calculated	Fixed	100%	Electronic	
P.24	Outlet temperature of dust from cooler ($T_{Dust\ Exhaust}$)	Plant	°C	Estimated	Weekly	100%	Electronic	
P.25	Mass of	Plant	Kg /kg Clk	Estimated	Weekly	100%	Electronic	

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
	dust from cooler ($M_{Dust\ Exhaust}$)							
P.26	Specific heat of Dust ($S_{Dust\ Exhaust}$)	Data Book	Kcal/kg°C	Calculated	Fixed	100%	Electronic	
P.27	Outlet temperature of clinker from cooler ($T_{Clk\ Out}$)	Plant	°C	Estimated	Weekly	100%	Electronic	
P.28	Mass of clinker out from cooler ($M_{Clk\ Out}$)	Plant	Kg/kg Clk in	Measured and Calculated	Weekly	100%	Electronic	
P.29	Specific heat of clinker ($S_{Clk\ Out}$)	Data Book	Kcal/kg°C	Calculated	Fixed	100%	Electronic	
P.30	Radiation losses from cooler (R	Fixed (Manufacture Catalogue)	Kcal/kg Clk	calculated	Fixed	100%	Electronic	

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
	$_{Loss}$)							
P.31	Cooler Efficiency (Eff $_{Cooler}$)	Plant	%	Calculated	Weekly	100%	Electronic	

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

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
Clinker cooler Efficiency calculations (Base temperature 0°C, 1 kg clinker)								
B.1	Inlet temperature of clinker in cooler (T $_{Clk\ In}$)	Plant	°C	Estimated	Weekly	100%	Electronic	Efficiency will be calculated once in a week. The cement manufacturing is almost constant operation in normal conditions.
B.2	Specific heat of clinker (S	Data Book	Kcal/kg°C	Calculated	Fixed	100%	Electronic	

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
	$_{Clk\ In}$)							
B.3	Inlet temperature of dust in cooler (T_{Dust})	Plant	°C	Estimated	Weekly	100%	Electronic	
B.4	Mass of dust in cooler (M_{Dust})	Plant	Kg /kg Clk	Estimated	Weekly	100%	Electronic	
B.5	Specific heat of Dust (S_{Dust})	Data Book	Kcal/kg°C	Calculated	Fixed	100%	Electronic	
B.6	Inlet temperature of cooling air in cooler ($T_{Cooling\ Air}$)	Plant	°C	Measured	Weekly	100%	Electronic	
B.7	Mass of cooling air in cooler ($M_{Cooling\ Air}$)	Plant	NM^3/ kg Clk	Measured & Calculated	Weekly	100%	Electronic	
B.8	Specific	Data Book	Kcal/	Calculated	Fixed	100%	Electronic	

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
	heat of cooling air ($S_{Cooling\ Air}$)		Nm3°C					
B.9	Inlet temperature of false air in cooler ($T_{False\ Air}$)	Plant	°C	Measured	Weekly			
B.10	Mass of false air in cooler ($M_{False\ Air}$)	Plant	NM^3/ kg Clk	Measured & Calculated	Weekly	100%	Electronic	
B.11	Specific heat of false air ($S_{False\ Air}$)	Data Book	Kcal/ Nm3°C	Calculated	Fixed	100%	Electronic	
B.12	Inlet temperature of water cooler (T_{Water})	Plant	°C	Measured	Weekly	100%	Electronic	
B.13	Mass of water in	Plant	Kg /kg Clk	Estimated	Weekly	100%	Electronic	

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
	cooler (M_{Water})							
B.14	Specific heat of Water (S_{Water})	Data Book	Kcal/kg°C	Calculated	Fixed	100%	Electronic	
B.15	Power delivered by cooling air fans (P_{Fan})	Instrument	KWh /kg Clk	Measured & Calculated	Monitored continuously and reported weekly			
B.16	Inlet temperature of exhaust air from cooler ($T_{Exhaust\ Air}$)	Plant	°C	Measured	Weekly			
B.17	Mass of Exhaust air from cooler ($M_{Exhaust\ Air}$)	Plant	NM^3/ kg Clk	Measured & Calculated	Weekly	100%	Electronic	
B.18	Specific	Data Book	Kcal/	Calculated	Fixed	100%	Electronic	

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
	heat of Exhaust air ($S_{Exhaust\ Air}$)		Nm3°C					
B.19	Outlet temperature of dust from cooler ($T_{Dust\ Exhaust}$)	Plant	°C	Estimated	Weekly	100%	Electronic	
B.20	Mass of dust from cooler ($M_{Dust\ Exhaust}$)	Plant	Kg /kg Clk	Estimated	Weekly	100%	Electronic	
B.21	Specific heat of Dust ($S_{Dust\ Exhaust}$)	Data Book	Kcal/kg°C	Calculated	Fixed	100%	Electronic	
B.22	Outlet temperature of clinker from cooler ($T_{Clk\ Out}$)	Plant	°C	Estimated	Weekly	100%	Electronic	
B.23	Mass of	Plant	Kg/kg Clk	Measured and	Weekly	100%	Electronic	

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
	clinker out from cooler ($M_{Clk\ Out}$)		in	Calculated				
B.24	Specific heat of clinker ($S_{Clk\ Out}$)	Data Book	Kcal/kg°C	Calculated	Fixed	100%	Electronic	
B.25	Radiation losses from cooler (R_{Loss})	Fixed (Manufacture Catalogue)	Kcal/kg Clk	calculated	Fixed	100%	Electronic	
B.26	Cooler Efficiency (Eff_{Cooler})	Plant	%	Calculated	Weekly	100%	Electronic	

D.4. Qualitative explanation of how quality control (QC) and quality assurance (QA) procedures are undertaken:

>>

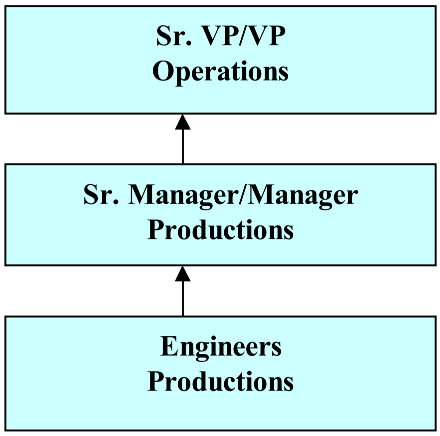
D.3. Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored

Data *(Indicate table and ID number e.g. 3.-1.; 3.2.)*	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
P.3, P.5, P.7, P.10, P.13, P.16, P.19, P.23, P.26, P.29, B.2, B.5, B.8, B.11, B.14, B.18, B.21, B.24	*Low*	IPCC values/ Values from Data books
P.1, P.2, P.4, P.6, P.8, P.9, P.11, P.12, P.14, P.15, P.17, P.18, P.20, P.21, P.22, P.24, P.25, P.27, P.28, P.31, B.1, B.3, B.4, B.6, B.7, B.9, B.10, B.12, B.13, B.15, B.16, B.17, B.19, B.20, B.22, B.23, B.26	*Low*	ISO-9001 procedure is in place.
P.30, B.25	*Medium*	Estimations based on technology supplier.

D.5. Please describe briefly the operational and management structure that the project participant(s) will implement in order to monitor emission reductions and any leakage effects generated by the project activity:

>> Emission monitoring and calculation procedure will follow the following organisational structure. All data and calculation formula required to proceed is given in the section D in PDD.

Organisational structure for monitoring plan



Monitoring and calculation activities and responsibility

Monitoring and calculation activities	**Procedure and responsibility**
Data source and collection	Data is taken from the purchase, materials and accounting system. Most of the data is available in ISO 9001 quality management system.
Frequency	Monitoring frequency should be as per section D of PDD.
Review	All received data is reviewed by the engineers in the production.
Data compilation	All the data is compiled and stored in production department.
Emission calculation	Emission reduction calculations will be done annual based on the data collected. Engineers of production department will do the calculations
Review	Sr. Manager/ Manager, Production will review the calculation.
Emission data review	Final calculations is reviewed and approved by VP/EVP Operations.
Record keeping	All calculation and data record will be kept with the Production.

D.6. Name of person/entity determining the monitoring methodology:

>> Binani cement limited and associated consultants

SECTION E.: Estimation of GHG emissions by sources:

E.1. Formulae used:

>>

E.1.1 Selected formulae as provided in appendix B:

>> No formulae for GHG emission reduction is specified for Category I.D of Appendix B of the Simplified Modalities and Procedures for Small-scale CDM Project Activities.

E.1.2 Description of formulae when not provided in appendix B:

>>

E.1.2.1 Describe the formulae used to estimate anthropogenic emissions by sources of GHGs due to the project activity within the project boundary:

>>

Cooler efficiency calculation (Base temperature 0 °C)

1. **Heat input by any incoming streams**

$$Heat\ Input = \sum_{i=1.....n} Mass \times Specific\ Heat \times Temperature$$

2. **Heat Loss from outgoing streams**

$$Heat\ Loss = \sum_{i=1.....n} (Mass \times Specific\ Heat \times Temperature) + Radiation\ Losses$$

3. **Efficiency of the clinker cooler**

$$Efficiency_{Project} = (Heat\ Input - Losses) / Heat\ Input$$

Average emission factor

1. Total heat supplied to the system

$$Average\ Emission\ factor = \frac{\sum_{i=1.....n} (Quantity\ of\ fuel \times Calorific\ Value \times Emission\ Factor)}{\sum_{i=1.....n} (Quantity\ of\ fuel \times Calorific\ Value)}$$

E.1.2.2 Describe the formulae used to estimate leakage due to the project activity, where required, for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities

>> Not Applicable

E.1.2.3 The sum of E.1.2.1 and E.1.2.2 represents the small-scale project activity emissions:

>> Same as E.1.2.1

E.1.2.4 Describe the formulae used to estimate the anthropogenic emissions by sources of GHGs in the baseline using the baseline methodology for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities:

>>

Cooler efficiency calculation (Base temperature 0 °C)

1. **Heat input by any incoming streams**

$$Heat\ Input = \sum_{i=1.....n} Mass \times Specific\ Heat \times Temperature$$

2. **Heat Loss from outgoing streams**

$$Heat\ Loss = \sum_{i=1.....n} (Mass \times Specific\ Heat \times Temperature) + Radiation\ Losses$$

3. **Efficiency of the clinker cooler**

$$Efficiency_{Baseline} = {(Heat\ Input - Losses)} \big/ {Heat\ Input}$$

E.1.2.5 Difference between E.1.2.4 and E.1.2.3 represents the emission reductions due to the project activity during a given period:

>>

Emission Reduction Calculations

Step 1: Increase in efficiency

$$Increase\ in\ Efficiency = (Efficiency\ in\ project\ activity - Baseline\ efficiency)$$

Step 2: Saving in heat input due to increase in efficiency

$$Saving\ in\ Heat\ Input = \left({Increase\ in\ efficiency} \big/ {Efficiency\ in\ project\ case} \right) \times Heat\ input\ in\ project\ activity$$

Step 3: Emission reduction

$$Emission\ \mathrm{Re}duction = (Saving\ in\ heat\ input) \times\ Average\ Emission\ factor$$

E.2 Table providing values obtained when applying formulae above:

>>

Year	Annual estimation of emission reduction in tones of CO_2 e
2001 – 2002	7874
2002 – 2003	12411
2003 – 2004	13840
2004 – 2005	12918
2005 – 2006	12918
2006 – 2007	12918
2007 – 2008	12918
2008 – 2009	12918
2009 – 2010	12918
2010 – 2011	12918
Total estimated reductions (tones of CO_2 e)	**124551**
Total number of crediting years	**10 years**
Annual average over the crediting period of estimated reductions (tones of CO_2 e)	**12455**

SECTION F.: Environmental impacts:

F.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

>> The Ministry of Environment and Forests (MoEF), Government of India, under the Environment Impact Assessment Notification vide S.O. 60(E) dated 27/01/94 has listed a set of industrial activities in Schedule I[2] of the notification which for setting up new projects or modernization/ expansion will require environmental clearance and will have to conduct an Environment Impact Assessment (EIA) study. However, the project under consideration does not require any EIA to be conducted.

Article 12 of the Kyoto Protocol requires that a CDM project activity contribute to the sustainable development of the host country. Assessing the project activity's positive and negative impacts on the local environment and on society is thus a key element for each CDM project.

BCL being an ISO 14001, OHSAS 18001 organisations has specialized environmental management systems & consistent evaluation of the impacts, key parameters have ensured that the company meets the environmental targets. The project activity is one such voluntary measure, which has positive long-term environmental impact. The nature of the impacts that are evident during the operational phase is discussed in detail given below. The environmental impact during the construction phase is regarded as temporary or short term and hence does not affect the environment significantly.

Project activity does not lead to any significant negative impact. Neither does the host country require EIA study to be conducted for this kind of projects. As stated above project activities not included under Schedule I of Environment Impact Assessment Notification of MoEF for environmental clearance of new projects or modification of old ones needn't conduct the EIA. Environmental impacts from project activity are discussed in the table below:

SL. NO.	ENVIRONMENTAL IMPACTS & BENEFITS	REMARKS
A	CATEGORY: ENVIRONMENTAL – RESOURCE CONSERVATION	

[2] http://envfor.nic.in/legis/legis.html#H

SL. NO.	ENVIRONMENTAL IMPACTS & BENEFITS	REMARKS
1	**Coal / Petcoke conservation:** The project activity reduces specific thermal energy consumption for cement production and conserves the energy. By reducing the specific thermal energy, the project activity reduces an equivalent amount of coal / petcoke consumption per unit of cement produced that would have been required to cater to the baseline project option.	The project activity is a step towards and coal/ petcoke conservation.
B	CATEGORY: ENVIRONMENTAL – AIR QUALITY	
	By reducing the thermal energy content of the cement manufacturing, the project activity reduces CO_2 emissions.	The project activity reduces emission of CO_2 -a global entity.
C	CATEGORY: ENVIRONMENTAL –WATER	
1	The project activity does not contribute to water pollution.	No impact
D	CATEGORY: ENVIRONMENTAL – LAND	
1	Reduction in specific consumption demand further reduces quarry/coal mining; which leads to loss of biodiversity, land destruction and erosions arising from such activities. **There is no possible soil or land pollution arising due to project activity.**	The project activity leads to positive impact on Land environment.
E	CATEGORY: ENVIRONMENTAL – NOISE GENERATION	
1	**The project activity does not contribute to noise pollution.**	-
F	CATEGORY: SOCIAL	
1	**Mining Risks:** Quarry mining of coal experiences landslides and destruction in the history of mining. Thus by less consumption of coal project activity would indirectly reduce chances of landslides and landscape destruction at mining sites. The adverse heath impacts caused from quarrying of materials on the mining persons, nearby habitats and ecosystem, would therefore be avoided.	The project is expected to bring positive changes in the life style and quality of life and reduce mining risks.
G	CATEGORY: ECOLOGY	

1	By reducing the coal, the project activity has a beneficial impact on the flora, fauna in the vicinity of the mining sites.	-

SECTION G. Stakeholders' comments:

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

>> Stakeholder consultation is an important matter for an esteemed organisation, where comments on the project activity are invited from identified stakeholders with a view to maintain transparency in the activities of the project promoter and also assist to comply with applicable regulations. Representatives of Binani cement have already identified the relevant stakeholders and they have been consulting with them looking for their comments and approvals for the project activity. The necessary consultation is the form of the oral and written documents. The Binani cement has communicated to identified stakeholders about the project activity and ask for the comments on the activity. This is a continuous process from the project proponent.

The project activity occurred at Binani cement's cement plant in Binanigram, Rajasthan. The project activity will reduce the use of thermal energy *i.e.* fossil fuel.

The various stakeholders identified for the project are as under.

- State Pollution Control Board
- Ministry of Environment & Forest (MoEF), Government of India
- Local population
- Consultants
- Equipment Suppliers

Stakeholders list includes the government and non-government parties, which are involved in the project at various stages. At the appropriate stage of the project development, stakeholders/ relevant bodies were involved to get the project clearance.

G.2. Summary of the comments received:

>> The project activity is energy efficiency in clinker cooler. Due to this project proponent will use less quantities of fossil fuels in clinker manufacturing. The project activity has positive environmental impact in term of emissions. RSPCB has prescribed standards of environmental compliance and monitors the adherence to the standards. The cement plant received the Consent to Establish (or No Objection Certificate (NOC)) and the Consent to Operate from RSPCB during the commissioning of the plant. The project activity reduces the environmental impacts on the local ambient quality and meets all the statutory requirements. Binani cement submits an annual Environmental Statement to RPCB and also describes the Environmental aspects of the plant in its annual report .As discussed in chapter F, the project activity has many positive environmental impacts and does not violate the environmental norms.

The project is being implemented at existing facility of Binani cement thus project does not require any displacement of the local population. This implies that the project will not cause any adverse social impacts on the local population but helps in improving the quality of life for them. The project proponent has received no negative comment for the project activity.

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

>> The project proponent has not received any negative comment for the project activity.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Binani cement
Street/P.O.Box:	Binanigram
Building:	
City:	Sirohi
State/Region:	Rajasthan
Postfix/ZIP:	307025
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Telephone:	02971-228280
FAX:	02971225020
E-Mail:	
URL:	
Represented by:	
Title:	Vice President (Operations)
Salutation:	Mr.
Last Name:	Lal
Middle Name:	
First Name:	Darshan
Department:	Operations
Mobile:	
Direct FAX:	
Direct tel:	
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding received for this project.