



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

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**Revision history of this document**

<b>Version Number</b>	<b>Date</b>	<b>Description and reason of revision</b>
01	21 January 2003	Initial adoption
02	8 July 2005	<ul style="list-style-type: none"><li>• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document.</li><li>• As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <a href="http://cdm.unfccc.int/Reference/Documents">http://cdm.unfccc.int/Reference/Documents</a>.</li></ul>

**SECTION A. General description of the small-scale project activity****A.1 Title of the small-scale project activity:**

>> Vikram Cement: Energy efficiency by up-gradation of clinker cooler in cement manufacturing.  
Version 03 dated 25<sup>th</sup> October 2006

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

>> Vikram Cement (VC) is the progressive Cement Manufacturing Company of India, operating since 1985. Vikram cements belong to well known Grasim industries Ltd. Aditya Birla group of companies. VC is manufacturing cement {ordinary portland cement (OPC), portland pozzolana cement (PPC)} & clinker. This project activity is applied to line III of VC out of three lines of production.

The project activity is to upgrade the clinker cooler for energy efficiency in the cement manufacturing process. VC line-III Plant was commissioned in 1991 with the best available technology by the KHD, Germany<sup>i</sup>. In the commissioning reciprocating grate cooler for clinker cooling was used.

The project is the redesigning of the grate system with IKN<sup>ii</sup> 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. 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.

GoI has stipulated the following indicators for sustainable development in the interim approval guidelines for CDM projects.

- Social well being
- Economic well being
- Environmental well being
- Technological well being

**Social well being:**

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<sup>i</sup> KHD Humboldt Wedag International Ltd.

<sup>ii</sup> IKN specializes in the design, fabrication and supply of Pendulum Coolers and clinker cooling related products such as roll crushers, heat shields and KIDS (Clinker Inlet Distribution System). Formed in 1982 and headquartered in Neustadt, Germany, IKN has subsidiaries in USA, France and India and is well represented in South America the Middle East and Asia.



The project has directly and indirectly improved the job opportunity for the people. The increased efficiency has resulted in a reduction in fuel consumption and thus reduced pollution in the area. Thus the project has improved the social condition of the local population.

**Economic well being:**

Economics is about the efficient use of resources, usually expressed in monetary terms. The investment made to improve the efficiency of the clinker cooler, an important stage of cement manufacturing stage, has improved the economics of the process as a whole. This has a potential to have a positive multiplying effect on the whole cement industry in terms of saving in fuel consumptions with more and more cement plants taking a lesson and implementing similar ‘clinker cooler efficiency improvement’ projects. The proverb ‘energy saved is energy generated’ fits here well. Further, the financial benefits due to issuance of carbon credits contribute to monetary gains for the company.

**Environmental well being:**

From an environmental perspective the project benefits the environment by saving precious non renewable fuel resources and reducing GHGs and particulate emission. In the absence of the project activity, equivalent amount of fuel savings and emission reduction would not have been possible. Apart from that, reduction in emissions improves the environment of the area as a whole. Therefore clinker cooler efficiency improvement activity taken up by Grasim industries has both local and global environmental benefits.

**Technological well being:**

In India VC has taken a pivotal role to implement clinker cooler efficiency improvements projects. VC is paving the way for other cement manufacturing companies to follow them in implementing such projects, thereby creating conducive scenarios to reinforce the sustainable development objectives of the country.

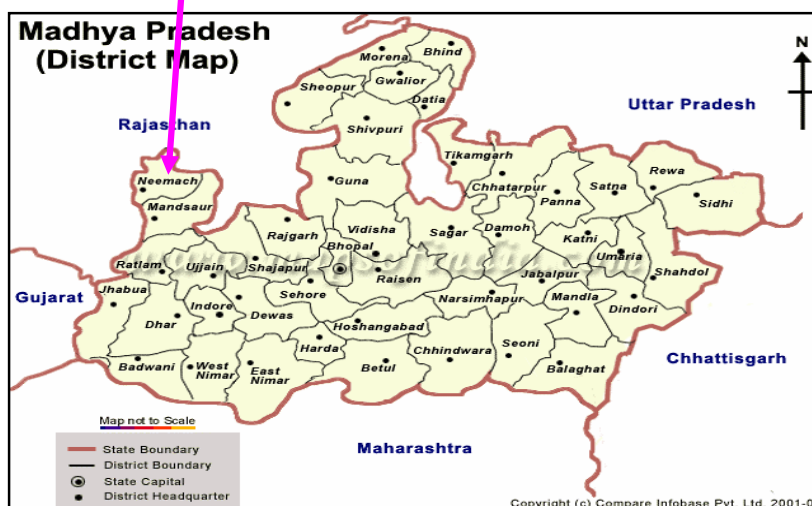
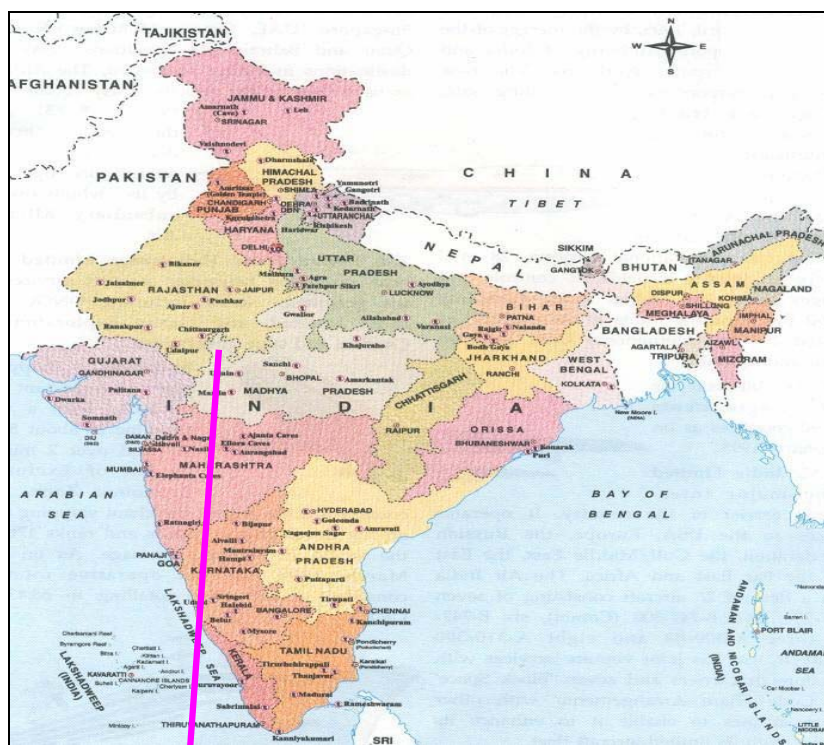
**A.3. Project participants:**

&gt;&gt;

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	<i>Private entity:</i> Vikram cement	No

**A.4. Technical description of the small-scale project activity:****A.4.1 Location of the small-scale project activity:**

&gt;&gt;

**Fig A 4 (a) : Country Map depicting activity site****A.4.1.1. Host Party(ies):**

&gt;&gt; India

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

&gt;&gt; Madhya Pradesh

**A.4.1.3.City/Town/Community etc:**

>> P.O. Khor; district Neemuch (MP).

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

>> VC is located at P.O. Khor; district Neemuch (MP). Neemuch lies between the parallels of latitude 24° 15' - 24° 35' North, and between the meridians of longitude 74° 45' - 75° 37' East. The plant is well connected by railway and road transport.

**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<sub>e</sub> per year. A total saving of 15 GWh<sub>e</sub> per year is equivalent to a maximal saving of 45 GWh<sub>th</sub> 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<sub>e</sub> per year. A total saving of 15 GWh<sub>e</sub> per year is equivalent to a maximal saving of 45 GWh<sub>th</sub> per year in fuel input’. The project activity will reduce the thermal energy in tune of 29 GWh<sub>th</sub>, which is well within the limit of small scale project activity of this category. 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.



The baseline and emission reduction calculations from the project would be based on paragraphs 3 and 4 of appendix B (version 07, dated 28<sup>th</sup> 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 to be employed by the project activity***

VC Line-III Plant was commissioned in 1991. The technology provider was KHD, Germany. They supplied reciprocating grate cooler for clinker cooling with original plant. The reciprocating grate system comprises rows of alternately fixed and movable grate plates, secured by means of T-bolts to grate support girders. The plates of various grades of steel are used along with the cooler corresponding to the different thermal and mechanical loading conditions. The holes in the rear part of the plate's acts as nozzles, directing the cooling air flow vertically upwards. Air is forced horizontally into the bed of clinker through the gaps between the fixed and the movable plate rows and through the holes in the end faces of the plates. The cooling stream and the continual agitation of the clinker by the grate movements ensures that the clinker particles come into intimate contact with the air.

The project is the redesigning of the grate system with IKN plate type system, which will increase the cooler recuperation efficiency. This technology is the retrofitting of the existing system. It uses the new clinker inlet distribution system to distributor the clinker on the grate. The inlet area consists of 7 fixed rows. This IKN type system works on the principle of coanda effect. The coanda nozzles turn the cooling air strong horizontal air jets with high velocity into clinker bed. The narrow slots inclined in the direction of transport produce sharp air jets with high dynamic pressure. This pressure keeps the jets adjacent to surface of coanda nozzles. The air velocity at nozzle is 40 m/Sec. The technology employed is advanced with only few such applications in cement plants of India.



**Fig A.4.2 b: Coanda Effect<sup>iii</sup>**

The clinker is transported by inclination of the inlet and by the cooling air. IKN type system works on the principle of coanda effect. The coanda nozzles turn the cooling air strong horizontal air jets with high velocity into clinker bed. The narrow slots inclined in the direction of transport produce sharp air jets with high dynamic pressure.

This pressure keeps the jets adjacent to surface of coanda nozzles. As a result of the coanda effect the aeration of the grate of 1 m/s is converted by the grate floor with an open grate area of 2.5% into 40 m/s air jets close to grate surface. The surface of the coanda nozzles is completely swept by air and is very effectively cooled. With the application of this technology, proper cooling of the clinker is taking place as well as the heat transfer from the clinker to cooling air is also increased, which reduces the fuel consumption.

**A.4.3. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed CDM project activity, including why the emission reductions would not occur in the absence of the proposed 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, they do not force cement industries to reduce their specific energy consumption to a prescribed standard. Nor do the Department of Industries/ the Bureau of Indian Standards/ Cement Manufacturers Association/ National Council for Building Materials have 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. The other “additionality” criteria of the project activity are dealt with in section B.

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

>> The GHG emission reductions for a 10 year crediting period are provided in table A.4:

**Table A 4: Emission Reductions Calculations**

Years	Annual estimation of emission reductions in
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<sup>iii</sup> <http://jnaudin.free.fr/html/coanda.htm>





	tonnes of CO <sub>2</sub> e
2001 – 2002 (August 01 to March 02)	6234
2002 – 2003	9858
2003 – 2004	10118
2004 – 2005	10412
2005 – 2006	10076
2006 – 2007	10076
2007 – 2008	10076
2008 – 2009	10076
2009 – 2010	10076
2010 – 2011	10076
2011 (April 2011 to July 2011)	3359
<b>Total estimated reductions</b> (tones of CO <sub>2</sub> e)	<b>100,437</b>
<b>Total number of crediting years</b>	<b>10</b>
<b>Annual average over the crediting period of estimated reductions</b> (tones of CO <sub>2</sub> e)	<b>10,044</b>

The cumulative GHG emission reductions for a 10 year crediting period are estimated as 100,044 tCO<sub>2</sub>-e.

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

>>

No public funding for the project activity is available till date.

#### **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<sup>iv</sup>

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



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

According to above-mentioned points of de-bundling, project activity is not a part of any of the above, therefore, considered as small scale CDM project activity.

**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 (28<sup>th</sup> 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 B 2 (a): Baseline and project activity data requirement and data source**

S. No.	Parameter	Data source
<b>Baseline Scenario</b>		
1	Cooler efficiency	Plant
2	Fuel used in clinker manufacturing	Plant
3	Calorific value of the fuel used	Plant
<b>Project Scenario</b>		
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 main driving force to this ‘Climate change initiative’ is GHG reduction and 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 IRR below opportunity cost of capital 18% (financial benchmark)<sup>v</sup> is not acceptable for any project in the Grasim Industries. This shows that any project should yield returns more than 18% (Medium term lending rate in 1999 was 14%<sup>vi</sup>), to consider it for implementation.

The financial analysis- internal rate of return (IRR) is calculated for the project.

**Table B 3.: IRR (%) figures with and without CDM funds**

	IRR (%) without CDM fund	IRR (%) with CDM funds
IRR of cooler up-gradation project	12.1%	21.1%

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

<sup>v</sup> The corporate communication on the same is submitted.

<sup>vi</sup> <http://indiabudget.nic.in/es98-99/chap33.pdf#search=%22prime%20lending%20rate%2C%20india%2C%202000%22>



1. The average fuel price is Rs. 2497/MT
2. Operation and Maintenance cost is considered as 3% of capital cost.
3. Life of project is considered as 15 years.
4. CDM funds are available at the rate of 5 USDollar/CER.

The IRR calculations of all plants show that the IRR of the project (12.1%) is below minimum required rate of return 18% (The IRR (12.1%) is even lower than the medium term lending rate in 1999 also) that can be achieved without CDM funds. It improves to 21.1% with CDM funds availed against CERs, which is more than minimum required internal rate of return.

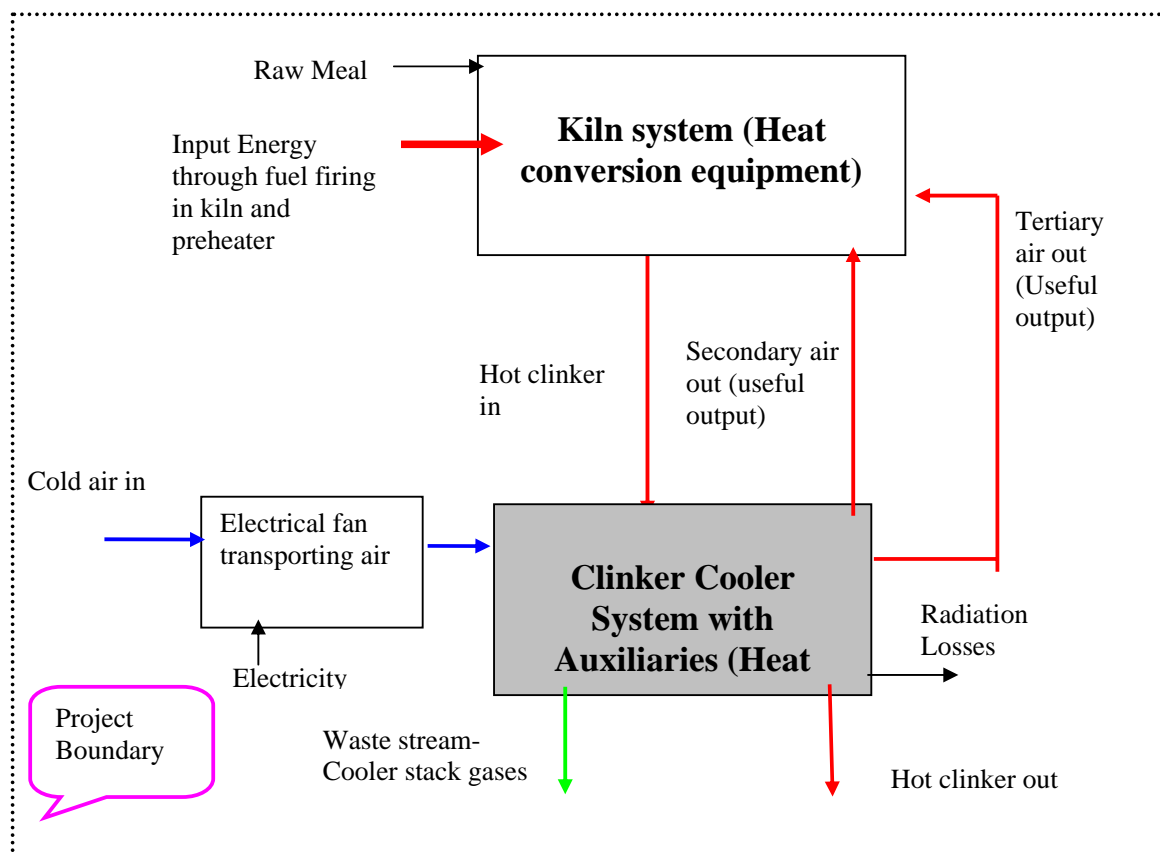
### Technical Barriers

While crossing the well-established barriers of technology and going ahead with this project, Vikram cement 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. Skilled and experienced engineers/ operators to operate and maintain the technology were not available, which could have lead to equipment disrepair and malfunctioning.

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

**Figure B 4: Project Boundary**



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

>> Detailed baseline information provided in Annex 1.

Date of completing the baseline: 25/12/2005

Name of person/entity determining the baseline: Vikram Cement 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:**

&gt;&gt; 08/08/2000

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

&gt;&gt; 20 years

**C.2 Choice of the crediting period and related information:****C.2.1. Renewable crediting period:****C.2.1.1. Starting date of the first crediting period:**

&gt;&gt; Not Applicable

**C.2.1.2. Length of the first crediting period:**

&gt;&gt; Not Applicable

**C.2.2. Fixed crediting period:****C.2.2.1. Starting date:**

&gt;&gt; 01/08/2001

**C.2.2.2. Length:**

&gt;&gt; 10 years 0 months

**SECTION D. Application of a monitoring methodology and plan:**

&gt;&gt;

**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:

Fuel used in clinker manufacturing

Calorific value of the fuel

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/day	Measured and calculated	Recorded continuously	100%	Electronic	<p>The clinker production will be calculated from the raw meal consumption and the kiln feed to clinker conversion factor.</p> <p>Raw meal consumption: Raw meal supplied at Kiln inlet is measured by Solid Flow Meter.</p> <p>Conversion factor: The conversion factor is given by the government agency national council for concrete and building materials.(NCCBM).</p> <p>Calibration: by office of Standard Weights &amp; Measurement Control, MP (Inspector of Weight &amp; Measurement, Indore.),</p> <p>Loss in weight of kiln feed system is checked through "Microcount" controller and the procedure is inbuilt and the programmed in the chip.</p> <p>Frequency : Annual</p> <p>Tag No: SFF H29 SFF H30</p> <p>Related ISO document no: INT-WI-28</p>



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
								INT-WI-30 INT-SP-01 Data retention period: Crediting period + 2 years
P.2	Quantity of fuel consumed ( $Q_{\text{Fuel}}$ )	Plant	Tons/month	Measured and calculated	Recorded continuously and reported monthly	100%	Electronic	Quantity of alternative fuel used at VC site is measured by Weigh Feeder. Coal measurement with the help of Poldos, Load Cell and loss of weight and also with the help of test weight. Calibration: by office of Standard Weights & Measurement Control, MP (Inspector of Weight & Measurement, Indore.), Frequency: Annual Tag No: 300WF1 300WF2 300WF3 Three poldos S64, S65, & S66 ISO document No: ISO Doc number: INT-WI-33 INT-SP-01 Data retention period: Crediting period + 2 years .
P.3	Emission factor of fuel ( $EF_{\text{Fuel}}$ )	IPCC	$\text{TCO}_2/\text{TJ}$	Fixed	Fixed	100%	Electronic	IPCC default values, Fixed



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.4	Gross Calorific value of fuel consumed (CV <sub>Fuel</sub> )	Plant	KCal/kg	Measured	Recorded continuously and reported monthly	100%	Electronic	By Bomb Calorimeter with standard procedure as given by the OEM. Calibration: By Benzoic acid powder/ tablet test. Make : Merc GR grade Frequency: Annual Tag no: SI.No.1815 Related ISO document: QCD-WI-05 Data retention period: Crediting period + 2 years
P.5	Average emission factor (EF <sub>average</sub> )	Plant	TCO <sub>2</sub> /TJ	Calculated	Monthly	100%	Electronic	Calculated. Data retention period: Crediting period + 2 years
<b>Clinker cooler Efficiency calculations</b>								
P.6	Inlet temperature of clinker in cooler (T <sub>Clk In</sub> )	Plant	°C	Estimated	Fixed	100%	Electronic	The inlet temperature of clinker in cooler is estimated constant in pre and post project scenario. Data retention period: Crediting period + 2 years
P.7	Specific heat of clinker (S <sub>Clk In</sub> )	Formulae provided by technology supplier	KCal/kg°C	Calculated	Weekly	100%	Electronic	Calculated as per eq 2 in project calculation section. Data retention period: Crediting period + 2 years



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.8	Temperature of clinker dust from kiln to cooler (T <sub>Dust</sub> )	Plant	°C	Estimated	Fixed	100%	Electronic	Same as clinker temperature. Data retention period: Crediting period + 2 years
P.9	Clinker dust from kiln to cooler (M <sub>Dust</sub> )	Plant	TPD	Estimated	Fixed	100%	Electronic	Mass of recirculation dust is 2% of the clinker produced. Data retention period: Crediting period + 2 years
P.10	Specific heat of clinker Dust from kiln to cooler (S <sub>Dust</sub> )	Formulae provided by technology supplier	KCal/kg°C	Calculated	Weekly	100%	Electronic	The specific heat is calculated based on eq 2 in the project calculation section. Data retention period: Crediting period + 2 years
P.11	Inlet temperature of cooling air in cooler (T <sub>Cooling Air</sub> )	Plant	°C	Measured	Daily	100%	Electronic	Temperature at the time of efficiency measurement. The mercury thermometer is used for the same. Data retention period: Crediting period + 2 years
P.12	Density of air (Da)	Data book	Kg/m <sup>3</sup>	Calculated	Weekly	100%	Electronic	Calculated as per eq 3 in the project calculation section.



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
								Data retention period: Crediting period + 2 years
P.13	Flow rate of cooling air in cooler (M <sub>Cooling Air</sub> )	Plant	m <sup>3</sup> /min	Measured	Weekly	100%	Electronic	Measured as per the piezometer reading in the control room. Data retention period: Crediting period + 2 years
P.14	Specific heat of cooling air (S <sub>Cooling Air</sub> )	Formulae provided by technology supplier	KCal/kg/°C	Calculated	Fixed	100%	Electronic	Calculated as per eq 2 in the project calculation section. Data retention period: Crediting period + 2 years
P.15	Power consumed by cooler fans (P <sub>Fan</sub> )	Plant	KWh /day	Measured	Monitored continuously and reported weekly	100%	Electronic	Instrument used: Energy meter including auxiliaries Class: 0.5 S Make: Enercon Data retention period: Crediting period + 2 years
P.16	Exhaust air temperature from ESP (T <sub>Exhaust Air ESP</sub> )	Plant	°C	Measured	Weekly	100%	Electronic	Instrument used: K type Thermocouple. Calibration: Internal Frequency: 6 months Data retention period: Crediting period + 2 years
P.17	Static Pressure from ESP	Plant	Mm water gauge	Measured	Weekly	100%	Electronic	Instrument used: Pitot Tube with digital /mercury manometer. Calibration: External



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
	exhaust (StPr <sub>ESP Exhaust</sub> )							Frequency: Annual Data retention period: Crediting period + 2 years
P.18	Dynamic Pressure from ESP exhaust (DyPr <sub>ESP Exhaust</sub> )	Plant	Mm water gauge	Measured	Weekly	100%	Electronic	Instrument used: Pitot Tube with digital /mercury manometer. Calibration: External Frequency: Annual Data retention period: Crediting period + 2 years
P.19	Mass flow rate of cooler exhaust gas (M <sub>Exhaust gas</sub> )	Plant	kg/hr	Measured & Calculated	Weekly	100%	Electronic	Calculated based on the equation no 5. in project emissions. Data retention period: Crediting period + 2 years
P.20	Specific heat of cooler Exhaust gas (S <sub>Exhaust gas</sub> )	Formulae provided by technology supplier	KCal/ kg / °C	Calculated	Fixed	100%	Electronic	Calculated based on the equation no 2. in project calculation section. Data retention period: Crediting period + 2 years
P.21	Temperature of clinker dust from cooler (T <sub>Dust cooler</sub> )	Plant	°C	Estimated	Weekly	100%	Electronic	Temperature of dust will be same as exhaust air temperature from cooler.



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.22	Specific heat of clinker Dust from cooler ( $S_{\text{Dust cooler}}$ )	Formulae provided by technology supplier	KCal/kg°C	Calculated	Fixed	100%	Electronic	Calculated based on the equation no 2. in project calculation section. Data retention period: Crediting period + 2 years
P.23	Temperature of clinker from cooler ( $T_{\text{Clk Out}}$ )	Plant	°C	Calculated	Weekly	100%	Electronic	Instrument used: K type Thermocouple. Calibration: Internal Frequency: 6 months Data retention period: Crediting period + 2 years
P.24	Clinker from cooler ( $M_{\text{Clk Out}}$ )	Plant	TPD	Measured and Calculated	Daily	100%	Electronic	Difference of clinker inlet and clinker dust.
P.25	Specific heat of clinker from cooler ( $S_{\text{Clk Out}}$ )	Formulae provided by technology supplier	Kcal/kg°C	Calculated	Fixed	100%	Electronic	Calculated based on the equation no 2. in project calculation section. Data retention period: Crediting period + 2 years
P.26	Radiation losses from cooler ( $R_{\text{Loss}}$ )	Data book	Kcal/hr	Calculated	Weekly	100%	Electronic	Considered fixed as 5 KCal/kg clinker.
P.27	Kiln running	Plant	Hrs	Monitored	Daily	100%	Electronic	Monitored daily from control room. Data retention period: Crediting period + 2



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
	hours (K hrs)							years
P.28	Cooler Efficiency (Eff <sub>Cooler</sub> )	Plant	%	Calculated	Weekly	100%	Electronic	Calculated as per cooler efficiency calculation. Data retention period: Crediting period + 2 years

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

&gt;&gt;

**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.12 P.14, P.20, P.22, P.24, P.25, P.28,	Low	IPCC values/ Values from Data books/ formulae from technology supplier/calculation



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

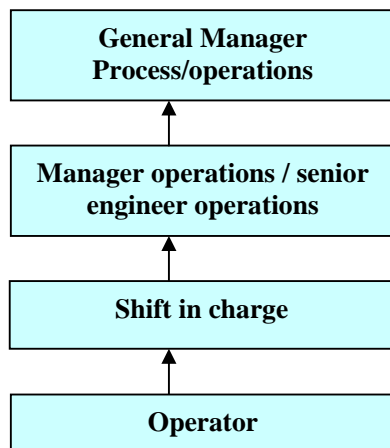
<i>P.1, P.2, P.4, P.6, P.8, P.11, P.13, P.15, P.16, P.19, P.21, P.23, P.26, P.27,</i>	<i>Low</i>	ISO-9001 procedure is in place.
<i>P.9, P.17, P.18,</i>	<i>Medium</i>	Standard measurement procedure is defined./ values from technology supply.



**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 General Manager process / Operations.
Record keeping	All calculation and data record will be kept with the Production.

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

>> Vikram Cement and associated consultants

**SECTION E.: Estimation of GHG emissions by sources:****E.1. Formulae used:**

&gt;&gt;

**E.1.1 Selected formulae as provided in appendix B:**

>> No formulae for GHG emission reduction is specified for Category II.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:**

&gt;&gt;

**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:**

&gt;&gt;

**1. Clinker Production**

Clinker production, Clk, (TPD) = (Raw meal feed to Kiln (TPD)/Raw meal to clinker conversion factor<sup>vii</sup>)

**2. Specific Heats of all materials**

Specific heat (Kcal/kg/C) =  $a + b T + c T^2 + d T^3 + e T^4$

Heat Capacity Coefficients					
Gas/Mat	$a \cdot T^0$	$B \cdot T^1$	$c \cdot T^2$	$d \cdot T^3$	$e \cdot T^4$
O <sub>2</sub>	0.2130	7.796E-05	-7.563E-08	4.074E-11	-8.183E-15
CO <sub>2</sub>	0.1906	1.771E-04	-1.733E-07	9.315E-11	-1.894E-14
N <sub>2</sub> +Ar	0.2465	-3.284E-06	4.366E-08	-2.750E-11	5.504E-15
H <sub>2</sub> O,steam	0.4445	2.910E-05	6.887E-08	-3.726E-11	6.472E-15
H <sub>2</sub> O, liq.	1.0000				
Raw meal	0.2060	1.014E-04	-3.673E-08		
Clinker	0.1742	1.414E-04	-1.283E-07	5.074E-11	

**3. Density of cooling air****3.1 Density of Air**

Density of air (Da) (kg/m<sup>3</sup>) =  $[1.293^{\text{viii}} \times 273^{\text{ix}} \times 9827^{\text{x}}] / [10336^{\text{xi}} \times (273 + \text{air temp.})]$

<sup>vii</sup> Conversion factor is calculated by the National council for building and materials, India.

<sup>viii</sup> Density of air at normal temp and pressure (NTP) = 1.293 kg/Nm<sup>3</sup>

<sup>ix</sup> Temperature in Kelvin

<sup>x</sup> Atmospheric pressure at 402 meter latitude (Latitude of plant, mm water gauge)

**4. Heat delivered by cooler fan**

Heat delivered by cooler fans (Kcal/hr) = (Power consumed by cooler fans (kWh/day) x 860<sup>xii</sup> / operating hours)

**5. Flow rate of cooler exhaust gas**

$$M_{\text{Exhaust gas}} \text{ m}^3/\text{hr} = \left[ \sqrt{(2 * g * DyPr) * Density} \right] \times Area \times 3600$$

Where

g = Acceleration due to gravity (9.8 m/s<sup>2</sup>)

DyPr = Dynamic pressure of exhaust gas (mm water gauge)

**5.1 Density of exhaust gas**

$$\text{Density of gas (kg/m}^3\text{)} = [1.293 \times 273 \times 9827] / [10336 \times (273 + \text{gas temp.})]$$

**6. Radiation losses**

Radiation losses (Kcal/hr) =  $(80.33 * ((T^{\text{xiii}} + t^{\text{xiv}})/2)^{-0.724} \times ((T-t)^{1.33}) + (4 \times 10^{-8} \times ((T)^4 - (t)^4)) * \text{cooler surface area (m}^2\text{)}$

**Cooler efficiency calculation****1. Heat input by any incoming streams**

$$\text{Heat Input} = \sum_{i=1, \dots, n} \text{Mass} \times \text{Specific Heat} \times \text{Temperature}$$

**2. Heat Loss from outgoing streams**

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

**3. Efficiency of the clinker cooler**

$$\text{Efficiency}_{\text{Project}} = \frac{(\text{Heat Input} - \text{Losses})}{\text{Heat Input}}$$

**Average emission factor****1. Total heat supplied to the system**

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

<sup>xi</sup> Atmospheric pressure at 0 meter latitude (mm water gauge)

<sup>xii</sup> Thermal equivalent of electricity 1 kWh = 860 Kcal

<sup>xiii</sup> Cooler average surface temperature in kelvin, 393 K



**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:**

>>

### 1. Clinker Production

Clinker production, Clk, (TPD) = (Raw meal feed to Kiln (TPD)/Raw meal to clinker conversion factor<sup>xv</sup>)

### 2. Specific Heats of all materials

Specific heat (Kcal/kg/C) =  $a + b T + c T^2 + d T^3 + e T^4$

Heat Capacity Coefficients					
Gas/Mat	$a \cdot T^0$	$B \cdot T^1$	$c \cdot T^2$	$d \cdot T^3$	$e \cdot T^4$
O2	0.2130	7.796E-05	-7.563E-08	4.074E-11	-8.183E-15
CO2	0.1906	1.771E-04	-1.733E-07	9.315E-11	-1.894E-14
N2+Ar	0.2465	-3.284E-06	4.366E-08	-2.750E-11	5.504E-15
H2O,steam	0.4445	2.910E-05	6.887E-08	-3.726E-11	6.472E-15
H2O, liq.	1.0000				
Raw meal	0.2060	1.014E-04	-3.673E-08		
Clinker	0.1742	1.414E-04	-1.283E-07	5.074E-11	

### 3. Density of cooling air

#### a. Density of Air

Density of air (Da) (kg/m<sup>3</sup>) =  $[1.293^{xvi} \times 273^{xvii} \times 9827^{xviii}] / [10336^{xix} \times (273 + \text{air temp.})]$

<sup>xiv</sup> Ambient temperature in kelvin

<sup>xv</sup> Conversion factor is calculated by the National council for building and materials, India.

<sup>xvi</sup> Density of air at Normal temp and pressure (NTP) = 1.293 kg/Nm<sup>3</sup>

<sup>xvii</sup> Temperature in Kelvin

<sup>xviii</sup> Atmospheric pressure at 402 meter latitude (Latitude of plant, mm water gauge)

**4. Heat delivered by cooler fan**

Heat delivered by cooler fans (Kcal/hr) = (Power consumed by cooler fans (kWh/day) x 860<sup>xx</sup> / operating hours)

**5. Flow rate of cooler exhaust gas**

$$M_{\text{Exhaust gas}} \text{ m}^3/\text{hr} = \left[ \sqrt{(2 * g * DyPr) * Density} \right] \times Area \times 3600$$

Where

g = Acceleration due to gravity (9.8 m/s<sup>2</sup>)

DyPr = Dynamic pressure of exhaust gas (mm water guage)

**5.1 Density of exhaust gas**

$$\text{Density of gas (kg/m}^3\text{)} = [1.293 \times 273 \times 9827] / [10336 \times (273 + \text{gas temp.})]$$

**6. Radiation losses**

$$\text{Radiation losses (Kcal/hr)} = (80.33 * ((T^{\text{xxi}} + t^{\text{xxii}}) / 2)^{-0.724} \times ((T - t)^{1.33}) + (4 \times 10^{-8} \times ((T)^4 - (t)^4)) * \text{cooler surface area (m}^2\text{)})$$

**Cooler efficiency calculation****1. Heat input by any incoming streams**

$$\text{Heat Input} = \sum_{i=1, \dots, n} \text{Mass} \times \text{Specific Heat} \times \text{Temperature}$$

**2. Heat Loss from outgoing streams**

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

**3. Efficiency of the clinker cooler**

$$\text{Efficiency}_{\text{Baseline}} = \frac{(\text{Heat Input} - \text{Losses})}{\text{Heat Input}}$$

**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**

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

---

<sup>xix</sup> Atmospheric pressure at 0 meter latitude (mm water gauge)

<sup>xx</sup> Thermal equivalent of electricity 1 kWh = 860 Kcal

<sup>xxi</sup> Cooler average surface temperature in kelvin, 393 K

<sup>xxii</sup> Ambient temperature in kelvin

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

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

**Step 3: Emission reduction**

$$\text{Emission Reduction} = (\text{Saving in heat input}) \times \text{Average Emission factor}$$

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

&gt;&gt;

The individual GHG emission reductions for a 10 year crediting period for Vikram cement are provided in table E.2:

**Table E.2.: Emission reductions at Vikram cement**

<b>Years</b>	<b>Annual estimation of emission reductions in tonnes of CO<sub>2</sub> e</b>
2001 – 2002 (August 01 to March 02)	6234
2002 – 2003	9858
2003 – 2004	10118
2004 – 2005	10412
2005 – 2006	10076
2006 – 2007	10076
2007 – 2008	10076
2008 – 2009	10076
2009 – 2010	10076
2010 – 2011	10076
2011 (April 2011 to July 2011)	3359
<b>Total estimated reductions (tones of CO<sub>2</sub> e)</b>	<b>100,437</b>
<b>Total number of crediting years</b>	<b>10</b>
<b>Annual average over the crediting period of estimated reductions (tones of CO<sub>2</sub> e)</b>	<b>10,044</b>

The GHG emission reductions for a 10 year crediting period for Vikram cement is estimated as 100,437 tCO<sub>2</sub>-equ.

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

&gt;&gt;

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 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, as the activity is not included in Schedule I.

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.

VC being an ISO 14001, OHSAS 18001 organization 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.





SL. NO.	ENVIRONMENTAL IMPACTS & BENEFITS	REMARKS
A	CATEGORY: ENVIRONMENTAL – RESOURCE CONSERVATION	
1	<p><b>Coal / Petcoke conservation:</b></p> <p>The project activity reduces specific thermal energy consumption for cement production and conserves the energy.</p> <p>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.</p> <p>“Coal is a finite natural resource” used as fuel to generate power and for production processes. Since this project activity reduces its thermal energy demand it positively contributes towards conservation of coal and making coal available for other important applications.</p>	The project activity is a step towards limestone and coal/ petcoke conservation.
B	CATEGORY: ENVIRONMENTAL – AIR QUALITY	
	By reducing the thermal energy content of the cement manufacturing, the project activity reduces CO <sub>2</sub> emissions.	The project activity reduces emission of CO <sub>2</sub> -a global entity.
C	CATEGORY: ENVIRONMENTAL – WATER	
1	The project activity does not contribute to water pollution.	No impact
D	CATEGORY: ENVIRONMENTAL – LAND	
1	<p>Reduction in specific consumption demand further reduces quarry/coal mining; which leads to loss of biodiversity, land destruction and erosions arising from such activities.</p> <p>There is no possible soil or land pollution arising due to project activity.</p>	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	<b>Mining Risks:</b> 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 health 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:**

&gt;&gt;

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 Vikram 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. Vikram cement has communicated to identify stakeholders about the project activity and asked for the comments on the activity.

The project activity occurred at Grasim industries cement plant namely Vikram cement at MP. The project activity will reduce the use of thermal energy *i.e.* fossil fuel. The project activity is in the plant boundary and does not involve any direct interferences other than the employees of the plant. The employees were considered as the main stakeholder of the project activity. The various stakeholders identified for the project are as under.

- State Pollution Control Board
- Employees of the plant
- Ministry of Environment & Forest (MoEF), Government of India
- Consultants and 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 used in cement manufacturing. Due to this project activity project proponent will use less quantity of fossil fuels in clinker manufacturing. The project activity has positive environmental impact in term of emissions. Madhya Pradesh state pollution control board (MPPCB) has prescribed standards of environmental compliance and monitors the adherence to the standards. The cement plant received the Consent to Establish (CTE)) and the Consent to Operate (CTO) from MPPCB during the commissioning of the plant. The project activity reduces the environmental impacts on the local ambient quality and meets all the statutory requirements. VC submits an annual Environmental Statement to MPPCB and also describes the Environmental aspects of the plant in its annual report.

The project is being implemented at existing facility of VC 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 positive comments from the employees that the project activity has reduced maintenance problems and given good working environment at the area. The letters received from the stakeholder is already submitted to validators.

The project has not received any comments from international stakeholders.

<b>G.3. Report on how due account was taken of any comments received:</b>
---

>>

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

**Annex 1****CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY**

Organization:	Vikram cement
Street/P.O.Box:	Vikramnagar, P. O. Khor
Building:	
City:	Neemuch
State/Region:	Madhya Pradesh
Postfix/ZIP:	458 470
Country:	India
Telephone:	07420 230830
FAX:	07420 235524
E-Mail:	<a href="mailto:rmgupta@adityabirla.com">rmgupta@adityabirla.com</a>
URL:	<a href="http://www.adityabirla.com">www.adityabirla.com</a>
Represented by:	
Title:	Senior Executive President
Salutation:	Mr.
Last Name:	Gupta
Middle Name:	M
First Name:	R
Department:	Unit head
Mobile:	-
Direct FAX:	91-7420-235524
Direct tel:	91- 7420-235568
Personal E-Mail:	<a href="mailto:rmgupta@adityabirla.com">rmgupta@adityabirla.com</a>

**Annex 2**



### **INFORMATION REGARDING PUBLIC FUNDING**

No public funding is available for the project.



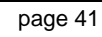
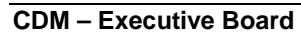
### IRR calculations for Cooler Upgradation in Vikram Cement

[illegible]



every year																
Income Tax on Fuel Cost Saving		4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15
Total cashflow out (A)	11.50	30.56	13.39	9.96	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81
<b>Income</b>																
WDV		11.50	8.63	6.47	4.85	3.64	2.73	2.05	1.54	1.15	0.86	0.65	0.49	0.36	0.27	0.20
Depreciation		2.88	2.16	1.62	1.21	0.91	0.68	0.51	0.38	0.29	0.22	0.16	0.12	0.09	0.07	0.05
Saving in income tax due to depreciation		1.1	0.8	0.6	0.5	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
Fuel Cost saving based on following Average cost Rs. 2497/MT with Average calorific value 5500 Kcal/kg	0	11.02	11.02	11.02	11.02	11.02	11.02	11.02	11.02	11.02	11.02	11.02	11.02	11.02	11.02	11.02
CER credits	0	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.81	0.00	0.00	0.00	0.00	0.00
Total project income without considering CER credits(B)	0	12.10	11.83	11.63	11.48	11.36	11.28	11.21	11.17	11.13	11.10	11.08	11.07	11.06	11.05	11.04
Total project income with considering CER credits(C)	0	14.91	14.64	14.44	14.29	14.17	14.09	14.03	13.98	13.94	13.91	11.08	11.07	11.06	11.05	11.04
Net cash flow without considering CER Credits (B-A)	-11.50	-18.46	-1.56	1.67	6.67	6.56	6.47	6.41	6.36	6.32	6.30	6.28	6.26	6.25	6.24	6.23





Net cash flow with considering CER Credits (C-A)	-11.50	-15.65	1.25	4.48	9.48	9.37	9.28	9.22	9.17	9.13	9.11	6.28	6.26	6.25	6.24	6.23
IRR of the project without considering CER credits	12.1%															
IRR of the project with considering CER credits	21.1%															