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:

ENERGY EFFICIENCY MEASURES AT CEMENT PRODUCTION PLANT

Date: 10/06/2008, Version: 07

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

Chittorgarh unit of Birla Corporation Limited (BCL) is one of the major cement production units in the state of Rajasthan, India. The BCL–Chittorgarh facility houses Chittor Cement Works (CCW) and Birla Cement Works (BCW) in the same premises. BCL-Chittorgarh unit mainly produces Ordinary Portland Cement (OPC) and Portland Pozzolona Cement (PPC).

BCL – Chittorgarh unit produces OPC grade and PPC grade cement. The process is energy intensive and consumes both thermal and electrical energy. With the growing concern of cleaner production, the company had focused on energy efficient technologies. The basic objective of the project is to reduce energy consumption per tonne of cement production through implementation of energy efficient technologies at BCL-Chittorgarh.

The company identified the possible areas where improvement can be done. The main thrust areas were identified as flow control and use of more efficient electrical drives.

Salient Features of the Project:

Project participant has installed various technologically advanced instruments at BCL-Chittorgarh under its programme for energy efficiency improvement initiative. The efficiency improvement programme consists of:

- Installation of Variable Frequency Drives
- Replacement of existing equipments with high efficiency equipments
- Technology up-gradation for selected applications

Project's contribution to sustainable development

The reduction in power demand owing to energy efficiency measures indirectly reduces fossil fuel combustion and corresponding greenhouse gas (GHG) emission. Moreover, these efforts save the use of fossil fuel, a primary resource for power generation. Reduction in generation from thermal sources helps in associated pollution abatement. Some of the other sustainability issues addressed by the project are:

Social Well Being: As an enlightened corporate citizen, Birla Corporation Limited is keenly aware of its social responsibilities too, and besides providing education and health care facilities for its employees, their families and the community at large, the Group is involved in a number of philanthropic activities.

Environmental Well Being: The energy efficiency measures directly reduce the power consumption by the facility and thereby reduce demand at the power generation end (which is enhanced by the T&D loss).

A.3. Project participants:

Name of party involved (host party)	Private and/or public entity (ies) project participants (as applicable	Kindly indicate if the Party involved wishes to be considred as project participant (Yes/ No)
Ministry of Environment and Forests, Government of India	Birla Corporation Limited; Unit: Chittorgarh	No

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

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

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A.4.1.1. Host Party(ies):

India

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

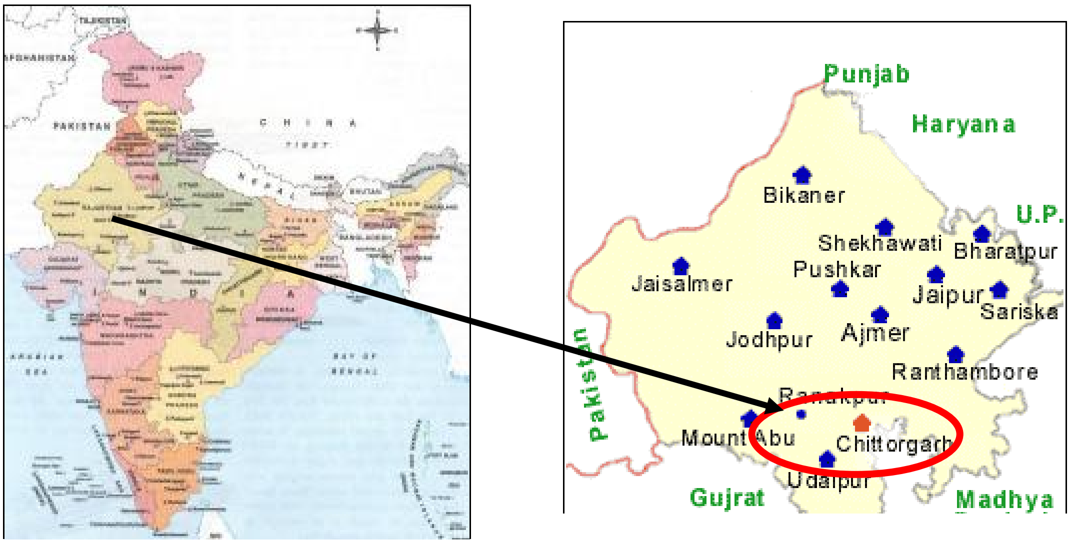
Rajasthan

A.4.1.3. City/Town/Community etc:

Chittorgarh

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

The project is implemented at BCL-Chittorgarh. The plant is located in the district of Chittorgarh which is around 600 km to the south–west of Delhi- the national capital and at the southern part of the state of Rajasthan in India. The coordinates of Chittorgarh is as follows: Latitude - 24.89N Longitude - 74.63E. The BCL plant is situated on the Chiitor-Bhilwara Road on NH-79 in Madhav Nagar, Sector-III in Chanderia, District-Chittorgarh. Postal Address: Madhav Nagar, P.O. Cement Factory, Chittorhgarh-312021, Rajasthan, India. The project is implemented by Birla Corporation Limited.



Map not to Scale

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

The project activity involving energy efficiency measures at a BCL-Chittorgarh, falls under Type II of small scale CDM project activity as defined by the United Nations Framework Convention on Climate Change (UNFCCC).

Main category **-ASM II - D [Energy efficiency and fuel switching measures for industrial facilities]**

As per the methodology, the aggregate energy savings from the project activity primarily aimed at energy efficiency measures, may not exceed the equivalent of 60 Giga-watt hour (GWh) per year, for the project to qualify as a small-scale CDM project under Category II.D.

The project consists of industrial energy efficiency improvement measures through technological up gradation and instrumentation. It reduces energy consumption on the demand side. As the net energy consumption reduction is less than 60 GWh /annum, project falls under **small-scale** Category II.D.

Project Activity with technology details

The project includes the Energy Efficiency and process improvement measures adopted in the form of technology upgradation and instrumentation in the plants.

The following measures are included under the project -

Activities implemented in the financial year (2000-01)

- Installation of Variable Frequency Drives in CCW
  - MEASURE 1: Provision of Variable Frequency Drive (VFD) in raw mill vent fan:

    Earlier raw mill vent fan damper was only 40% open for the required airflow. Since the damper opening was less, there was high-pressure loss across the damper resulting in higher power consumption. Keeping the damper opened fully and reducing the fan speed (rpm) could save on power consumption. Hence, VFD was proposed to be installed in raw mill vent fan which has resulted in power savings of 56 kW (0.41 kWh/t of clinker).

  - MEASURE 2: Provision of VFD in cooler fan 2R1 of grate cooler in CCW:

    Earlier damper of cooler fan *2R* was only 42% open for the required airflow. Since the damper opening was less, there was high-pressure loss across the damper resulting in higher power consumption. So keeping the damper opened fully and reducing the fan rpm could have saved power. Hence, VFD had been proposed to be installed in cooler fan *2R* and has resulted in a power savings of 10 kW (0.078 kWh/t of clinker).

- Technology up-gradation for selected applications
  - MEASURE 3: Modification of inlet duct of cooler fan V5A1 of grate cooler at CCW:

    Modification of inlet duct of cooler fan *V5A* was done resulting in power savings of 6 kW (0.048 kWh/t of clinker). The diameter of the inlet duct has been increased to reduce the friction loss and pressure loss during flow of air through the duct.

Activities implemented in the financial year (2001-02)

- Installation of Variable Frequency Drives
  - MEASURE 4: Provision of VFD in cooler fan 2L of grate cooler in CCW :

  Earlier vent fan damper was only 47% open for the required airflow. Since the damper opening was less, there was high-pressure loss across the damper resulting in higher power consumption. So keeping the damper opened fully and reducing the fan rpm could have saved power. Hence, VFD was proposed to be installed in cooler fan *2L* and has resulted in power savings of 23.83 kW (0.173 kWh/t of clinker).

  - MEASURE 5: Provision of VFD in cooler fan V5A in CCW:

  Earlier vent fan damper was only 46% open for the required airflow. Since the damper opening was less, there was high-pressure loss across the damper resulting in higher power consumption. So keeping the damper opened fully and reducing the fan rpm could have saved power. Hence, VFD was proposed to be installed in cooler fan *V5A* and has resulted in power savings of 14.73 kW (0.107 kWh/t of clinker).

  - MEASURE 6: Provision of VFD in cooler fan V5B of grate cooler in CCW:

  Earlier vent fan damper was only 46% open for the required airflow. Since the damper opening was less, there was high-pressure loss across the damper resulting in higher power consumption. So keeping the damper opened fully and reducing the fan rpm could have saved power. Hence, VFD was proposed to be installed in cooler fan 2R and has resulted in power savings of 6.12 kW (0.044 kWh/t of clinker).

  - MEASURE 7: VFD for Raw Mill # 1 & 2 vent fans in BCW:

  VFDs were installed in raw mill *1 & 2* vent fans resulting in the power savings of 20.54 kW (0.25 kWh/t of Clinker).

  - MEASURE 8: Installation of VFD & replacement of coal mill # 1 Bag Dust Collector (BDC) Fan in BCW:

  Modification of coal mill # *1* BDC was done and VFDs were installed in the same resulting in the power savings of 12.70 kW (0.11 kWh/t of clinker).

- Technology up-gradation for selected applications
  - MEASURE 9: Bucket Elevators for kiln feed of kiln # 1 & 2 in BCW:

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[1] This is an identification nomenclature for the particular cooler fan; all similar nomenclatures have been marked in italics

The pneumatic transport systems for kiln feed in kiln # *1 & 2* were replaced with mechanical transport system resulting in the power savings of 103.89 kW (1.24 kWh/t of clinker).

<u>Activities implemented in the financial year (2002-03)</u>

- Technology up-gradation for selected applications
  - MEASURE 10: Modification of pre heater cyclones, rise duct, down comer, pre-heater fan, Electrostatic Precipitator (ESP) fan & provision of tertiary crusher of raw mill in CCW:

Earlier CCW kiln was operating at 2800 tonnes per day (tpd) with conventional cyclones at pre heater. The operating capacity of CCW kiln was increased to 3300 tpd by replacing the pre-heater cyclones *2, 3 & 5* to low pressure type, replacing the ESP & pre-heater fans with high efficiency fans and modification of riser ducts. Also the capacity of the raw mill was increased by installation of tertiary crusher in the raw mill. All of these activities were clubbed together which resulted in energy savings of 3.41 kWh/ t of clinker.

  - MEASURE 11: Provision of six dip tubes in raw mill section in CCW:

The efficiency of *O-sepa* separator could be increased as well as substantial amount of power could be saved by installation of six dip tubes in multi cyclones. This activity has resulted in the power savings of 4 kW (0.026 kWh/t of clinker).

  - MEASURE 12: Bucket Elevators for raw mill transport from Raw Mill # 1 & 2 to homo silos in BCW:

The pneumatic transport system from raw mill # *1 & 2* to homo silos in kiln # *1 & 2* was replaced with mechanical transport system resulting in the power savings of 226 kW (2.35 kWh/t of clinker).

- Installation of Variable Frequency Drives
  - MEASURE 13: Installation of VFD & replacement of Coal Mill # 2 BDC fan in BCW:

Replacement of Coal Mill # *2* BDC fan was done and VFDs were installed in the same resulting in the power savings of 21.50 kW (0.21 kWh/t of clinker).

beside the respective items.

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 includes a host of energy efficiency measures in the form of modification in the present grinding system through technology up-gradation. All these improved technology measures had helped in reducing the direct demand of electricity and indirect demand of fossil fuel (coal) in view of the fact that in absence of these measures an equivalent amount of electricity would have been drawn from the Rajasthan state electricity grid dominated by supply from thermal power plants fed by coal.

The energy efficiency measures would reduce the indirect coal combustion. The reduction in specific electricity consumption for cement production reduces equivalent amount of carbon dioxide emissions into the atmosphere. The estimated emission reductions from the project activity would be around **43784 t of CO_2 equivalent during the 10 years crediting period.** (Refer to Enclosure 4 for detailed calculations)

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

Years	Estimation of annual emission reductions in tonnes of CO_2 e
2000-2001	152
2001-2002	716
2002-2003	3564
2003-2004	5658
2004-2005	5616
2005-2006	5616
2006-2007	5616
2007-2008	5616
2008-2009	5616
2009-2010	5616
Total estimated reductions (tonnes of CO_2 e)	**43784**
Total number of crediting years	**10**
Annual average over the crediting period of estimated reductions (tonnes of CO_2 e)	**4378**

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

No public funding from parties included in Annex – I of Kyoto Protocol is available so far to the 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 & 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.

A proposed small-scale project activity shall be deemed to be a de-bundled 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; and
- 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 BCL-Chittorgarh's case, it clearly does not fall under the debundled category and qualifies as a small scale CDM project. The different components of the energy efficiency project activity under consideration are not actually parts of a bigger project activity. These components belong to the same category (energy efficiency) but all these are individual and independent projects taken in different units of the same manufacturing facility of BCL-Chittorgarh. It is the single such project of the promoters. The conditions in paragraph 2 of Appendix C confirm that the small-scale project activity is not a debundled component of a larger 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:

Title: ENERGY EFFICIENCY IMPROVEMENT PROJECTS – Energy Efficiency measures for industrial facilities – ASM II.D

Reference: *UNFCCC website*[2], *http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_FCPCJVQYJG7WVBPQB75TO25HGTJONS* 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; Version 08: 23 December 2006

This appendix has been developed in accordance with the simplified modalities and procedures for small-scale CDM project activities (contained in Annex II to decision 21/CP.8, see document FCCC/CP/2002/7/Add.3) & subsequent & Decision -/CMP.2 Further guidance relating to the clean development mechanism[3]
Baseline Methodology specified for ASM II.D project activities in this Appendix has been followed for BCL's project at Chittorgarh.

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

Appendix B of the simplified M&P for small-scale CDM project activities of the UNFCCC CDM website, provides guidelines for preparation of Project Design Document (PDD) including baseline calculations.

The project activity conforms to "ASM II.D" in Appendix B. The project activity includes measures to improve the energy efficiency of cement production processes that reduces electrical energy consumption on the demand side. The reduction is within the upper cap of the small scale CDM project activity under ASMII.D (i.e., up to the equivalent of 60 GWh per year). Annual average reduction in electrical energy consumption is of the order of 5.78 GWh. Thus the baseline methodology prescribed by the UNFCCC

[2] http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html
[3] http://unfccc.int/files/meetings/cop_12/application/pdf/cmp_8.pdf

in Appendix B to Simplified M&P for small scale CDM projects activities belonging to Category II.D, is justifiably applicable for the project activity.

A complete analysis of Northern regional electricity grid has been cited for preparation of baseline scenario and calculation of baseline emission factor of the grid. [4]

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:

As per the decision 17/CP.7 paragraph 43 and Decision -/CMP.2 Further guidance relating to the clean development mechanism5, a CDM project activity is additional if anthropogenic emissions of GHGs by sources are reduced below those that would have occurred in the absence of the registered CDM project activity. The project activity includes energy efficiency improvement measures with net CO_2 emission reductions due to reduced specific electricity consumption patterns in the cement plant.

BCL-Chittorgarh decided to take up the project execution, in phases as a step towards climate change activity after Kyoto Protocol came into existence. The project activity was initiated to reduce the carbon dioxide emissions by sources and would otherwise not have been implemented due to the existence of the operational barrier(s) discussed below. The continued investment in phases has been influenced by the Clean Development Mechanism (CDM) related development at the United Nations Framework Convention on Climate Change.

Additionality test based on barriers to the project activity

Barriers to the project activity

The BCL-Chittorgarh unit was one of the first cement industries of its type in the same social, economic and regional class in the cluster, to identify the areas where the improvement in cement grinding could be adopted and electrical energy consumption and its associated emissions could be reduced. The measures adopted were a proactive step towards GHG emission reductions. The barriers to the project activity would be dealt in following two steps. In first steps, the general barriers are discussed and in step two, how CCW has overcome these barriers to avail CDM benefits.

Step I: General barrier to Energy Efficiency projects in India[6]:

[4] http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm
[5] http://unfccc.int/files/meetings/cop_12/application/pdf/cmp_8.pdf
[6] www.bee-india.org (Bureau of Energy Efficiency, Government of India)

Status of Energy Efficiency in India

As per Bureau of Energy Efficiency (BEE), under Ministry of Power Govt. of India (the nodal body responsible for energy efficiency improvement in India and empowered for implementation of Energy Conservation Act 2001), there are several barriers present in Indian energy and industry sector that needs to be removed. India's energy intensity per unit of GDP is higher by 3.7 times of Japan, 1.4 times of Asia and 1.5 times of USA, indicating not only a very high energy wastage but also potential of substantial energy saving.

Industrial sector in India is a major energy user, accounting for about 48% of the commercial energy consumption. Energy saving potential is up to 30% through retrofitting in this sector. Some of the estimates made by different study reports for energy conservation in energy intensive industries are given in table below.

Table- : Scope for Energy Conservation in Energy – Intensive Industries

Data	Aluminum	Textile	Chlor Alkali	Petro chemicals	Fertilizer	Sugar	Paper	Cement
Energy Consumption (million Gcal)	30.1	52.5	20.0	5.8	112	100	26	67
Energy cost as a % of manufacturing Cost	40	13	30-35	7	60	12	25	40
Scope of energy conservation (%)	15-20	20-25	15	15	10	20	20	10

Barriers to Energy Efficiency

Considerable untapped potential exists for curbing waste of energy estimated to be of the order nearly 30 per cent of the total consumption of commercial energy. BEE observes that in spite of many efforts and benefits of energy efficiency several technical financial market and policy barriers have constrained the implementation of energy efficiency projects.

(a) Lack of Awareness: The main barrier to energy conservation is the lack of awareness of industry managers of the potential gains from improved efficiency. Industries as well as the Government and customers, are yet to take into consideration factors such as tax credits, depreciation benefits, electricity price escalation, and life cycle savings of the investment.

(b) Lack of Widespread Education and Training: Shortage of widespread educational opportunities in energy management and conservation and appropriate facilities; lack of trainers and auditors.
(c)Economic and Market Distortions: Irrational response to conservation measures because of inappropriate pricing and other market distortions, or socio-economic factors.

(d) Lack of Standardization and Labeling of Equipment / devices: Slow rate of progress in achieving higher standards of energy consumption in equipment and appliances.

(e) Lack of financing: The lack of credit and the inability to obtain financing for projects are strong deterrents to investments in energy efficiency in India.

(f) Lack of Effective Co-ordination: In India, the lack of effective national-level coordination and promotion of energy conservation activities have been a major constraint to achieving energy efficiency.

In spite of having a large potential for the net energy efficiency improvement has not happened owing to the above mentioned barriers. The market potential for investments in energy efficiency measures is very large and presently only captured by about 20% in India[7].

Step II: Barriers for BCL-Chittorgarh
BCL-Chittorgarh, has been producing cements in the Chanderia cluster of Rajasthan, India over last three decades. The company was subjected to the **above said barriers** like all other Indian cement companies and in absence of any dedicated energy managers, or specific energy management plans the company was not been able to take up major energy efficiency improvement initiatives. The organization had taken up only small energy efficiency initiatives in the early 2000 as a part of process efficiency improvements. However, the concept of Clean Development Mechanism in the late nineties has acted as an additional motivator for taking up additional risks with energy efficiency projects that influenced BCL in deciding on implementation of energy efficiency projects.. .

Till the time of project conception, only four major cement plants were there in the cluster. Out of these, BCL –Chittorgarh is one of the oldest plants with similar technology and Aditya Cement was the latest one established in the year 1995. The energy performances of the cement industries in the cluster are provided below[8]. This is to mention that no retrofit project has been carried out as ‘end of life replacement’. The retroft projects are upgradation projects aiming at higher energy efficiency.

[7] http://www.energymanagertraining.com/new_kaupp.php
[8] http://www.bee-india.com/presentations/cement/Targets.zip

Plant Name	Electrical Energy (kWh/t Cement) (2001-2002)
Vikram Cement, Grasim Industries	94
Birla Corporation Ltd- Chittorgarh	91
J.K.Cement, Nimbaheda	101
Aditya Cement, Chittorgarh	84

In spite of operating in the same cluster (i.e. with similar raw materials and environmental conditions), it is clear that the specific energy consumption of BCL-Chittorgarh is better than other two large cement plants (Aditya Cement being a new plant, installed almost 10 years later that enjoys the benefit of present technological development). BCL-Chittorgarh on the other hand being the oldest plant of the rest lot has been able to reduce the specific consumption level due to its initiatives above common practices followed. The initiatives taken by them indirectly reflect the additional efforts put in behind the project activity. The project proponent had taken risks in investing in the projects that were new to them and were not sure about the success of the retrofit measures.

Technological Barrier:

The activity involves high risk of failure as the plants are originally designed in 1980's and the technology chosen for up-gradation are of late ninety's. The basic design of cement plants, the quality of raw material, clinker and the mill characteristics have changed over the years. The technologies adopted under the project activity and the investment made involved higher risks in comparison with capacity expansion plans to meet the demand and avail the benefit of economy of scale. The retrofit measures always have performance risks as the benefits in most cases are assumed rather than depending on accurate calculations.

For VFD projects, the reduction in electrical supply frequency (below 50 Hz) is associated with lower RPM of drive motor resulting into lower pressure head development and associated flow. As the cement plat's equipment are basically air based transport of granular/micro granules of cement, raw meal, and air delivery for cooler fans/coal mill, the change in flow affects on the dynamics of the thermal system and material transport. The retrofit measures in other aspects like change in physical configuration like that of riser duct or pre heater cyclones were experimental basis and they effect the entire draft system was predicted. This depend on the actual dust load on the system and change in the profile can cause

hindrances in the fluid flow system. However, the project proponent had gone ahead with the implementation risking the net production and market share.

The above said barriers cover the reasons why the energy efficiency in Indian Industries has not geared up. They are very difficult to categorically segregate as for which particular barrier the efficiency improvement has not happened. Energy efficiency initiatives traditionally has been a less priority than production processes for the management as benefit from such small energy efficiency initiatives practically does not make any impact on company balance sheets**. CDM has contributed or motivated higher management to give priority towards energy efficiency considering the green image and global face/image that carries with. The CDM benefit is one of the drivers, but the satisfaction of contributing towards global partner of climate change has deeply motivated the BCL management for going ahead with energy efficiency projects.**

Additionality test for Regulatory/Legal requirements

There was no legal binding on BCL-Chittorgarh to take up the project activity.

From the above analysis of barriers for the project activity we can conclude that the project activity is not a baseline scenario and without the project activity the pre-project phase would have continued with no reduction in the electrical energy consumption and its associated GHG emission reductions. The CDM project activity is additional and will help to reduce 43784 tonnes of CO_2 in 10 years of crediting period, calculated as per the approved baseline and monitoring methodologies of the Simplified Modalities and Procedures for Small Scale CDM Project Activities [details provided in section E].

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:

As per the Appendix B of simplified M&P for small-scale CDM project activities “the project boundary is the physical, geographical site of the industrial facility, processes or equipment that is affected by the project activity.”

In BCL-Chittorgarh, the project boundary covers the cement and clinker production units. The boundary starts from raw material input to the plant to final cement despatch. It also includes all energy inputs in the system

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

Since the project activity is feeding power to Northern Regional Grid, the baseline for this project activity is the function of the generation mix of northern regional grid. Using the methodology available for small-scale project activities, the combined margin (in kgCO_2 equ/kWh) of northern regional grid is used for the calculation of baseline. Actual CO_2 emission factors are used for the purpose.
The baseline study is a two-step study conducted to determine the baseline emissions over the crediting period in absence of project activity.

Step – I: Determination of Energy Baseline
Step – II (a): Choice of the grid - The current delivery system is studied for selection of a realistic grid representing the factual scenario associated with the project activity
Step – II (b): Determination of carbon intensity of the chosen grid – Rajasthan's power generation, present generation mix, sector wise installed capacities, emission co-efficient, station heat rate and generation efficiencies are used to arrive at the net carbon intensity/baseline factor of the chosen grid.

The baseline emissions and the emission reductions from project activity are estimated based on the carbon intensity of the chosen grid and the quantum of reduced electricity consumption due to implementation of the project activity.

STEP – I: Determination of the Energy Baseline (before implementation of project activity)

Power Savings by Project Activity

The project activity will save 5.78 million units of electricity per annum on an average. Therefore, a conventional energy equivalent of 57.8 million kWh for a period of 10 years would be conserved by the project activity. Without the project activity, the same energy load would have been taken up by power plants in the grid and emission of CO_2 would have occurred due to coal combustion (proportional to the share of thermal power in generation mix).

Energy Baseline

The annual energy baseline values (annual energy consumption in absence of project activity) for the crediting years are calculated by monitoring the "power that would be consumed" and "operating hours" of the devices installed based on the guidance provided in ASM II.D projects under Appendix B.

The "power that would be consumed" by the device(s)/process in absence of the project activity is recorded from the nameplate data or equipment's purchase details and the "operating hours" of device are recorded using run time metering.

STEP – II (A): Choice of the Grid

Indian power grid system (or the National Grid) is divided into five regional grids namely Northern, North Eastern, Eastern, Southern and Northern Region Grids. The Northern Regional Grid consists of Delhi, Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan, Uttar Pradesh, Uttaranchal, Chandigarh state sector grids. These state grids have independent Regional Load Dispatch Centres (RLDCs) that manage the flow of power in their jurisdiction. That is, the Regionl load dispatch centres along with Regional Electricity Regulatory Commission, solely determines the grid mix and grid discipline. Therefore any addition/alteration of demand is to affect the functioning of the grid that is controlled by Regional Regulatory Commission. We may therefore conclude that Northern Regional Grid is the most representative system boundary for the project activity.

Central Electricity Authority (CEA), a Government of India body has come up with all regional grid emission factor and that has been used in this PDD for calculation of emission reduction[9].

STEP–II (b): Determination of carbon intensity of the chosen grid

Carbon emission factor of grid

The details of CEA analysis has been provided in enclosure 4. Carbon Emission Factor of grid as per CM is 0.75 kg CO_2/kWh electricity generation for the year 2004-05. This will be updated every year as per CEA publications.

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[9] http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

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:

02/02/ 2000

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

15 years

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

C.2.1. Renewable crediting period:

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

C.2.1.2. Length of the first crediting period:

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

01/04/2000

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:

As per Appendix B of the simplified M&P for small-scale CDM project activities for Industrial energy efficiency projects,

In the case of retrofit measures, monitoring shall consist of:

(a) Metering the energy use of the industrial facility, processes or the equipment affected by the project activity;

(b) Calculating the energy savings using the metered energy obtained from sub-paragraph '(b)'

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

The Project activity includes the whole BCL-Chittorgarh production plants where installation of energy efficient equipment and technological up gradation have resulted in substantial amount of reduction in specific energy consumption thereby resulting in GHG reductions. Hence, emission reductions quantity totally depends on the units of energy (kWh) saved at the grid by the project activity undertaken in the plant.

Description of Monitoring Plan

BCL-Chittorgarh made a voluntary commitment for reducing green house gas emissions. A proper Monitoring & Verification (M&V) Plan has been developed by BCL-Chittorgarh for proper monitoring and verification of actual emission reduction.

The Monitoring and Verification (M&V) procedures define a project-specific standard against which the project's performance (i.e. GHG reductions) and conformance with all relevant criteria will be monitored and verified. It includes developing suitable data collection methods and data interpretation techniques for monitoring and verification of GHG emissions with specific focus on technical / efficiency / performance parameters. It also allows scope for review, scrutinize and benchmark all these information against reports pertaining to M&V protocols.

The project activity's revenue is based on the units (kWh) saved in comparison to the units (kWh) consumed before the implementation of the project, measured by power meters at plant. The monitoring and verification system would mainly comprise of these meters as far as power import and savings of energy are concerned.

The other project specific parameter and performance indicators are: -

- Electrical energy consumption by the equipment
- Operating hours of the particular equipment under project activity.

Monitoring and verification of raw material characteristics (physical characteristics)/ quality is also required to be monitored as it could influence change in efficiency of the equipment and hence the quantum of emission reductions in tonnes of CO_2 equivalent.

The project employs the state of art monitoring and control equipment that measure, record, report, monitor and control mentioned key parameters. The instrumentation systems for monitoring of the project mostly comprise microprocessor-based instruments of reputed make with desired level of accuracy. All instruments are calibrated and marked at regular intervals so that the accuracy of measurement can be ensured all the time.

Justification of choice of methodology

Project activity includes installation of modernized energy efficient equipment, replacing the old ones consuming more electricity

The project monitoring includes:

- Monitoring of new installed equipment,
- Metering the electrical energy consumption by the specified equipment and
- Savings in electrical energy consumption after and before project implementation, which is equivalent to total energy saved at the grid.

According to UNFCCC released document for choice of monitoring methodology - Appendix B of the simplified M&P for small-scale CDM project activities also suggest the same for similar Project to BCL-Chittorgarh in the ASM II.D projects..

The quantity of emission reduction unit claimed by the project will be based on the total electrical energy saved by the project. Therefore it is justified to check the total consumption of power by the individual

project activity of BCL-Chittorgarh and comparing the specific units consumed with pre-project stage historical data of electricity consumption of the said boundary.

Project Parameters affecting Emission Reduction: -

The parameters that affect project emission are as follows:

a) Quality of material input that the equipment handle

b) Quality of energy input to the equipment

c) Operating parameter and product quality.

GHG Sources

There is no direct onsite emission from the project activity. Also there had been no additional construction work involved for project specific requirement resulting in no indirect onsite emission. The indirect off-site GHG source is the emission of GHG's that are involved in the process of transportation for procurement of equipment. However, considering the life cycle assessment of the total power saved and the emissions to be avoided in the life span of 15 years; emissions from the above-mentioned source are too small and hence neglected. Project positively reduces GHGs at the thermal power unit connected to the Northern Regional grid and at captive generation unit as direct off -site reduction.

D.3 Data to be monitored:

ID number	Data Type	Data variable	Data Unit	Measured (M)/ Calculated (C)/ Estimated (E)	Recording frequency	How is data archived? (electronic/ paper)	For how long is data archived to be kept?	Comment
Data and Parameters required for the Baseline Scenario								

ID number	Data Type	Data variable	Data Unit	Measured (M)/ Calculated (C)/ Estimated (E)	Recording frequency	How is data archived? (electronic/ paper)	For how long is data archived to be kept?	Comment
1	Electrical Energy Consumption	Electrical Energy Consumption of the test of the equipment (**a_i**) in each of the measures: Measure 1: • RMV fan motor (CCW) Measure 2: • Cooler fan *2R* (CCW) Measure 3 and Measure 5: • Cooler fan *V5A* (CCW) Measure 4: • Cooler fan *2L* (CCW) Measure 6: • Cooler fan *V5B* (CCW) Measure 10: • PH cyclones, duct, DC, PH fan & ESP fan at Raw Mill (CCW) Measure 11: • O - Sepa Fan (CCW) Measure 7: • RMV fan 1 (BCW) • RMV fan 2 (BCW) Measure 8: • Coal Mill No.1 BDC fan (BCW) Measure 9: • Airlift Vacuum Pump 1 (BCW) • Airlift Vacuum Pump 2 (BCW) • PH fan – Kiln 1 (BCW) • PH fan – Kiln 2 (BCW) Measure 12: • Raw mill transport Vacuum Pump 1 (BCW) • Raw mill transport Vacuum Pump 2 (BCW) Measure 13: • Coal Mill #2 BDC fan (BCW)	kWh	M	Once, at the start of the crediting period	Paper/ Electronic	Crediting period + 2 years	Energy consumption of the equipment will be tested with energy meter and recorded. Source of data: Test Records Parameter to be fixed ex-ante for the entire duration of the crediting period of the project activity.

ID number	Data Type	Data variable	Data Unit	Measured (M)/ Calculated (C)/ Estimated (E)	Recording frequency	How is data archived? (electronic/ paper)	For how long is data archived to be kept?	Comment
2	Time	Reasonable hours (duration) of the test of the equipment (***b_i***) in each of the measures: Measure 1: • RMV fan motor (CCW) Measure 2: • Cooler fan *2R* (CCW) Measure 3 and Measure 5: • Cooler fan *V5A* (CCW) Measure 4: • Cooler fan *2L* (CCW) Measure 6: • Cooler fan *V5B* (CCW) Measure 10: • PH cyclones, duct, DC, PH fan & ESP fan at Raw Mill (CCW) Measure 11: • O - Sepa Fan (CCW) Measure 7: • RMV fan 1 (BCW) • RMV fan 2 (BCW) Measure 8: • Coal Mill No.1 BDC fan (BCW) Measure 9: • Airlift Vacuum Pump 1 (BCW) • Airlift Vacuum Pump 2 (BCW) • PH fan – Kiln 1 (BCW) • PH fan – Kiln 2 (BCW) Measure 12: • Raw mill transport Vacuum Pump 1 (BCW) • Raw mill transport Vacuum Pump 2 (BCW) Measure 13: • Coal Mill #2 BDC fan (BCW)	Hours	M	Once, at the start of the crediting period	Paper/ Electronic	Crediting period + 2 years	Source of data: Test Records Parameter to be fixed ex-ante for the entire duration of the crediting period of the project activity

ID number	Data Type	Data variable	Data Unit	Measured (M)/ Calculated (C)/ Estimated (E)	Recording frequency	How is data archived? (electronic/ paper)	For how long is data archived to be kept?	Comment
3	Time	Running hours of the clinker kiln (in CCW and BCW) in the baseline year (h_{BL})	Hours	C	Once, at the start of the crediting period	Paper/ Electronic	Crediting period + 2 years	Source of data: Plant Records (CCW and BCW) Parameter to be fixed ex-ante for the entire duration of the crediting period of the project activity
4	Production	Clinker production of the plant (BCW and CCW) in the baseline year (C_{BL})	Tonne	M	Once, at the start of the crediting period	Paper/ Electronic	Crediting period + 2 years	Source of data: Plant Records (CCW and BCW) Parameter to be fixed ex-ante for the entire duration of the crediting period of the project activity

ID number	Data Type	Data variable	Data Unit	Measured (M)/ Calculated (C)/ Estimated (E)	Recording frequency	How is data archived? (electronic/ paper)	For how long is data archived to be kept?	Comment
5	Specific Electrical Energy Consumption	Specific Electrical Energy Consumption of the baseline scenario (***SEC_{BL}***)	kWh/ Tonne	C	Once, at the start of the crediting period	Paper/ Electronic	Crediting period + 2 years	Calculated from the Equation (2) provided in Section E.1.2.4. Parameter to be fixed ex-ante for the entire duration of the crediting period of the project activity
Data and Parameters required for the Project Scenario								

ID number	Data Type	Data variable	Data Unit	Measured (M)/ Calculated (C)/ Estimated (E)	Recording frequency	How is data archived? (electronic/ paper)	For how long is data archived to be kept?	Comment
6	Electrical Energy Consumption	Electrical Energy Consumption of the equipments ($E_{i,y}$) in each of the measures: Measure 1: • RMV fan motor (CCW) Measure 2: • Cooler fan *2R* (CCW) Measure 3 and Measure 5: • Cooler fan *V5A* (CCW) Measure 4: • Cooler fan *2L* (CCW) Measure 6: • Cooler fan *V5B* (CCW) Measure 10: • PH cyclones, duct, DC, PH fan & ESP fan at Raw Mill (CCW) Measure 11: • O - Sepa Fan (CCW) Measure 7: • RMV fan 1 (BCW) • RMV fan 2 (BCW) Measure 8: • Coal Mill No.1 BDC fan (BCW) Measure 9: • Bucket elevator – Kiln 1 (BCW) • Bucket elevator – Kiln 2 (BCW) • PH fan – Kiln 1 (BCW) • PH fan – Kiln 2 (BCW) • Bucket Elevator Kiln 1 Air Slide (BCW) • Bucket Elevator Kiln 1 Air Sluice (BCW) • Bucket Elevator Kiln 2 Air Slide (BCW) • Bucket Elevator Kiln 2 Air Sluice (BCW)	kWh	M	Measured and recorded monthly Archived annually	Paper/ Electronic	Crediting period + 2 years	Source of data: Plant Records Parameter to be monitored ex-post and used for the estimation of emission reductions.

ID number	Data Type	Data variable	Data Unit	Measured (M)/ Calculated (C)/ Estimated (E)	Recording frequency	How is data archived? (electronic/ paper)	For how long is data archived to be kept?	Comment
		Measure 12: • Common tandem bucket Elevators for Raw mills 1 & 2: R-25 (BCW) • Common tandem bucket Elevators for Raw mills 1 & 2: R-23 (BCW) Measure 13: • Coal Mill #2 BDC fan (BCW)						
7	Power Consumption	Power Consumption of the equipments in each of the measures	kW	M	Yearly	Paper/ Electronic	Crediting period + 2 years	Source of data: Plant Records Parameter to be tested and recorded by tong testers once anually.
8	Time	Running hours of the clinker kiln (in CCW and BCW) in the Project year	hrs	C	Parameter recorded daily Archived yearly	Paper/ Electronic	Crediting period + 2 years	Source of data: Plant Records

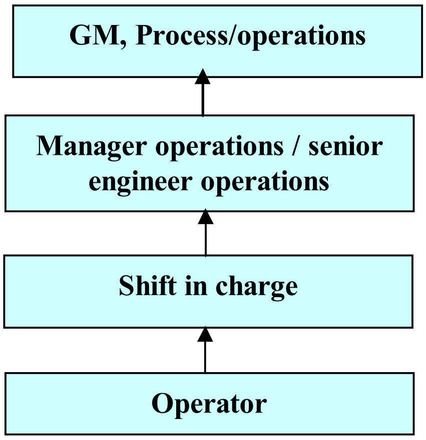
ID number	Data Type	Data variable	Data Unit	Measured (M)/ Calculated (C)/ Estimated (E)	Recording frequency	How is data archived? (electronic/ paper)	For how long is data archived to be kept?	Comment
9	Production	Clinker production of the plant (BCW and CCW) in the baseline year (C_y)	Tonne	M	Measured and recorded monthly Archived annually	Paper/ Electronic	Crediting period + 2 years	Source of data: Plant Records Parameter to be monitored ex-post and used for the estimation of emission reductions.
10	Specific Electrical Energy Consumption	Specific Electrical Energy Consumption of the project scenario ($SEC_{P,y}$)	kWh/ Tonne	C	Yearly	Paper/ Electronic	Crediting period + 2 years	Calculated from the measured values of $E_{i,y}$ and C_y by Equation (3) provided in Section E.1.2.4. Parameter to be calculated ex-post and used for the estimation of emission reductions

ID number	Data Type	Data variable	Data Unit	Measured (M)/ Calculated (C)/ Estimated (E)	Recording frequency	How is data archived? (electronic/ paper)	For how long is data archived to be kept?	Comment
11	Emission Factor	Emission Factor of the Northern Regional Electricity Grid (***EF_y***)	tCO_2/ MWh	C	Yearly	Paper/ Electronic	Crediting period + 2 years	The parameter is calculated as a combined margin emission factor of the Northern Regional Grid based on the generation values for 2002-03, 2003-04 and 2004-05. The same factor will be used from the start of the crediting period upto 2005 (*i.e.*, from 2000 to 2005). Afterwards the parameter will be updated on an annual basis based on published records.

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

Regular calibration of energy meter has been undertaken by third party. The amount of material ground is measured. Same can be verified from silo measurement which is subjected to financial audit also. The company is ISO certified and the energy consumption figures are reflected in statutory audit report and also furnished with Cement Manufacturing association, India.

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:



The operator ensures the operation od projects under project activity, Shift in charge logs the data which is verified by senior engineers. Senior engineer also prepares the emission reduction estimates which is verified by Manager operations. GM process overseas the entire process and communicates with Validator/verifier/UNFCCC

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

Plant professionals and Consultants of BCL- Chittorgarh

SECTION E. Estimation of GHG emissions by sources:

E.1. Formulae used:

E.1.1 Selected formulae as provided in appendix B:

No specific formula has been provided in Appendix B of the simplified M&P for small-scale CDM project activities for the said project category.

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

The project activity draws power from the Northern Regional Grid and the net effect of the project activity is reflected wholly on it. Therefore the grid scenario is analysed and the net baseline factor based on the combined margin approach is calculated considering all the plant contributing to the grid and the build margin of the most recent power plants are taken into consideration in a most conservative manner as per ACM0002 by CEA.

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:

The project activity does not result in any GHG emissions within or beyond the project boundary.

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

There is no leakage from the project activity. However the performance of the system may degrade over time and the efficiency may drop down which has to be taken into due account at the time of verification. This would be reflected in the specific kWh consumption across project boundary.

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

Nil.

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:

In accordance with the applicable project category - category II.D of appendix B of the simplified modalities and procedures for small scale CDM project activities, the baseline consists of the energy baseline of the existing facility or sub-system that is replaced, modified or retrofitted. Hence for the energy efficiency measures that are part of the project activity under consideration, the baseline consists of the energy use of the pre-project equipments *i.e.* equipments being replaced.

For each energy efficiency measure that is a part of the project activity the following algorithm is used to calculate the energy savings and the emission reductions.

Formulae used for calculation of energy savings and emission reductions for the equipments involved in each energy efficiency measure:

The emission reduction from the project activity for the year *y* would be calculated as:

$$ER_y = (SEC_{BL} - SEC_{P,y}) \times C_y \times EF_y \quad \text{………} (1)$$

Where,

ER_y = Emission Reduction from the project activity for the year *y* (tCO_2)

SEC_{BL} = Specific Energy Consumption of the baseline scenario (kWh/ tonne clinker)

$SEC_{P,y}$ = Specific Energy Consumption of the project scenario for the year *y* (kWh/ tonne clinker)

C_y = Clinker production in the project year *y* (tonnes)

EF_y = Emission Factor of the Northern Regional Electricity Grid in the project year *y* (tCO_2/MWh)

Here, the Specific Energy Consumption of the baseline scenario is determined on the basis of results of tests conducted prior to the replacement of the equipments are as follows:

$$SEC_{BL} = \left(\sum_{i=1}^{n} \frac{a_i}{b_i}\right) \times \frac{h_{BL}}{C_{BL}} \quad \text{………} (2)$$

Where,

a_i = Energy consumption of the pre-project equipment *i* during the test duration (kWh)

b_i = Reasonable hours of test of the pre-project equipment *i* (hrs)

h_{BL} = Annual running hours of the clinker kiln in the baseline year (hrs)

C_{BL} = Baseline Annual clinker production (tonnes)

n = Number of equipments involved in the energy efficiency measures

The Specific Energy Consumption of the project scenario for the year *y*

$$SEC_{P,y} = \sum_{i=1}^{n} \frac{E_{i,y}}{C_y} \text{ ……… (3)}$$

E_i = Energy consumption by the equipment *i* for the project year *y* (kWh)

C_{BL} = Annual clinker production of the project year *y* (tonnes)

Estimation of energy savings and emission reductions for the equipments involved in each energy efficiency measure

For the purpose of ex-ante estimation of Emission Reductions from the project activity, the energy savings have been computed on the basis of the results of the tests conducted as follows:

- Prior to the replacement of the equipments
- Post the replacement of the equipments

$$ER_{ExAnte} = (\frac{a_i}{b_i} - \frac{x_i}{y_i}) \times \frac{h}{C} \text{ ……… (4)}$$

Where,

a_i and b_i are the results of the pre-project test results, as mentioned in equation (1). Furthermore, x_i and y_i are the results of the post-project tests conducted after the

x_i = Energy consumption of the post-project equipment *i* during the test duration (kWh)

y_i = Reasonable hours of test of the post-project equipment *i* (hrs)

h = Annual running hours of the clinker kiln in the project year (hrs)

C = Annual clinker production in the project year (tonnes)

Calculation of CERs

- The phase wise implementation of technological up-gradation and instrumentation during the period of 2000 – 2001, 2001 – 2002 and 2002-2003 are considered under the project.
- Data sheet for equipment performance provides information on kWh, respective kWh / t, mill running hours, clinker production [Total]
- kWh /unit of output is considered the key indicator keeping the property and quality of cement unchanged.

Determination of project energy savings:

Unit – CCW

Project Detail CCW	**Saving kWh /T Clinker**	**Clinker (MT)**	**Total Savings (kWh)**
2000-01			
Provision of variable frequency drive in Raw mill vent fan	0.410		
Provision of variable frequency drive in cooler fan 2R	0.078		
Modification of inlet duct of cooler fan V5A	0.048		
2000 – 01**Total**	**0.536**	**912412**	**201491**
2001-02			
Provision of variable frequency drive in cooler fan 2L	0.173		
Provision of variable frequency drive in cooler fan V5A	0.107		
Provision of variable frequency drive in cooler fan V5B	0.044		
2001 – 02 **Total**	**0.324**	**943184**	**632876**
2002-03			
Modification of pre heater cyclones, rise duct, down comer, Pre-heater fan, ESP fan & provision of Tertiary crusher of Raw mill	3.410		
Provision of 6 Nos. dip tubes in Raw mill section	0.026		
2002 – 03 **Total**	**3.436**	**1101460.8**	**2054683**

Unit – BCW

Project Detail BCW	**Saving kWh /T Clinker**	**Clinker (MT)**	**Total Savings(kWh)**
2001-02			
VFD for Raw Mill No. 1 & 2 vent fans	0.25		
VFD & replacement of Coal Mill No. 1 BDC Fan	0.11		
Bucket Elevators for Kiln feed of Kiln No. 1 & 2	1.24		
2001 – 02 **Total**	**1.60**	**622234**	**314747**
2002-03			
Bucket Elevators for raw mill transport from Raw Mill No. 1 & 2 to homosilos	2.35		
VFD & replacement of Coal Mill No. 2 BDC fan	0.21		
2002 – 03 **Total**	**2.56**	**631713.6**	**2594764**

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:

$$ER_y = BE_y - PE_y$$

Where ,

ER_y = Emission reduction for the project activity in the year y, tCO_2/yr

PE_y = Project Emissions for the project activity in the year y, tCO_2/yr.

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

Following tables indicate the baseline emission factors and emission reductions of each year, for Combined Margin.

Table E.2 – CO_2 emission reductions due to project activity

Year	Estimation of project activity emission reductions (tonnes of CO_2 e)	Estimation of baseline emission reductions (tonnes of CO_2 e)	Estimation of leakage (tonnes of CO_2 e)	Estimation of emission reductions (tonnes of CO_2 e)
2000-01	**Nil**	152	**Nil**	152
2001-02	**Nil**	716	**Nil**	716
2002-03	**Nil**	3564	**Nil**	3564
2003-04	**Nil**	5658	**Nil**	5658
2004-05	**Nil**	5616	**Nil**	5616
2005-06	**Nil**	5616	**Nil**	5616
2006-07	**Nil**	5616	**Nil**	5616
2007-08	**Nil**	5616	**Nil**	5616
2008-09	**Nil**	5616	**Nil**	5616
2009-10	**Nil**	5616	**Nil**	5616
Total (tonnes of CO_2 e)	**43784**			

SECTION F. Environmental impacts:

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

There are no negative environmental impacts from the installation of technologically upgraded energy efficiency equipment and instrumentation work. The technologies are easily transportable and installation does not require any major construction equipment. Only emissions that take place during the whole project execution are the transportation of the implemented machineries and instruments. However considering the life cycle of the project and the beneficial aspects such emissions is negligible.

Summary on Environmental Impact

The project does not have any major environmental impacts nor is the execution of an Environmental Impact Assessment required. However the beneficial aspects of the project are as follows:

The project activity results in

1) Green House Gas Abatement

2) Primary Resource Conservation and facilitating sustainable development

3) Pollution abatement in thermal power plant and its upward linkages.

SECTION G. Stakeholders' comments:

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

The main stakeholders of the project activity are the management representatives who were actively a part of decision-making. The other stakeholders are the employees of the organization who work in the plant and the family members who live in the plant campus. Although such in-house energy efficiency measures adopted by a plant does not demand an elaborate stakeholder consultation process the project proponent has involved its employees at all levels in order to ensure proper understanding of the effects of such initiatives being adopted. The benefits from such activity have also been transparently shared with the supply chain and shareholders.

G.2. Summary of the comments received:

The energy efficiency project does not have any negative impact. The projects also improved the working environment and resulted in better control of operation with reduced hazards. The emission from the captive power plant has also been reduced and local environment has been improved.

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

The relevant comments and important clauses mentioned in the project documents / clearances like Feasibility Report, local clearances *etc.* were considered while preparing the CDM Project Design Document.

As per UNFCCC requirement the PDD will be published at the validator's web site for public comments.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

(Please repeat table as needed)

Organization:	Birla Corporation Limited, Unit- Chittor Cement Works
Street/P.O.Box:	9/1 R. N. Mukherjee Road
Building:	Birla Building
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State/Region:	West Bengal
Postcode/ZIP:	Pin – 700 001
Country:	India
Telephone:	+91 – (033) 2213 1680 / 1688 / 1689
FAX:	+91 – (033) 2248 3239
E-Mail:	vspanwar@birlacorp.com
URL:	www.birlacorporation.com/cementframe.html
Represented by:	
Title:	Associate Vice President - Projects
Salutation:	Mr.
Last Name:	Panwar
Middle Name:	S
First Name:	V
Department:	Projects – Birla Corporation Limited
Mobile:	
Direct FAX:	+91 – (033) 2248 3239
Direct tel:	+91 – (033) 2213 1680 / 1688 / 1689
Personal E-Mail:	vspanwar@birlacorp.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Till now funding from any Annex I party is not available.

Annex 3

BASELINE INFORMATION

Enclosure 1 : Abbreviations

BCL	Birla Corporation Limited
BM	Build Margin
BCW	Birla Cement Works
CCW	Chittor Cement Work
CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CER	Certified Emission Reduction
CM	Combined Margin
CO_2	Carbon di Oxide
kgCO_2 equ/kWh	Carbon di Oxide Equivalent per Kilo Watt Hour
ESP	Electro Static Precipitator
GHG	Greenhouse Gases
Hz	Hertz
IPCC	Intergovernmental Panel on Climate Change
kV	Kilo Volt
kW	Kilo Watt
kWh	Kilo Watt Hour
kWh / t	Kilo Watt Hour per Tonne
LDC	Load Dispatch Centre
M & P	Modalities and Procedures
M & V	Monitoring and Verification
MoEF	Ministry of Environment and Forests
RSEB	Rajasthan State Electricity Board
MW	Mega Watt
NHPC	National Hydroelectric Power Corporation
NTPC	National Thermal Power Corporation
OM	Operating Margin
PGCIL	Power Grid Corporation of India Limited
tpd	Tonnes per day
T & D	Transmission and Distribution
tCO_2/TJ	Tonnes of Carbon di Oxide per Trillion Joule
PS	Thermal Power Station
UNFCCC	United Nations Framework Convention on Climate Change

Enclosure 2: List of References

Sl..No.	Particulars of the references
1.	Kyoto Protocol to the United Nations Framework Convention on Climate Change
2.	Website of United Nations Framework Convention on Climate Change (UNFCCC), **http://unfccc.int**
3.	UNFCCC Decision 17/CP.7: Modalities and procedures for a clean development mechanism as defined in article 12 of the Kyoto Protocol.
4.	UNFCCC, Clean Development Mechanism Simplified Project Design Document For Small Scale Project Activities (SSC-PDD) *[Version 01: 21 January, 2003]*
5.	UNFCCC document: Appendix B (contained in Annex-II to decision 21/CP8, see document FCCC/CP/2002/7/Add.3) Indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories [Version 05: 25 February 2005]
6.	http://www.energymanagertraining.com/kaupp/Article25.pdf
7.	http://www.bee-india.com
8.	http://cea.nic.in/

Enclosure 3: Baseline Data

Attached 3A and 3B

Enclosure 4: CER Calculation and grid emission factor

Attached excel sheet