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

CONTENTS

SECTION A. General description of project activity

A.1 Title of the project activity:

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Use of alternate fuels in the manufacturing of Portland cement at Binani Cement Limited, Rajasthan, India.
Version 01
11/12/2007

A.2. Description of the project activity:

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The project activity is the partial replacement of fossil fuels with alternate fuels, mainly biomass residues, (De oiled Cake (DOC), saw dust, mehandi, damaged wheat, rice husk, *etc*.) in cement manufacturing. The purpose of the project activity at Binani Cement Limited (BCL) is to reduce the CO_2 emission in the cement production by using the biomass residues, which has resulted in reduced green house gas emission into the atmosphere.

The conventional practice in cement industry is to use fossil fuels such as coal, lignite, pet coke, *etc*. as thermal energy for clinker production. The purpose of the project activity is to utilize climate neutral biomass residues in Portland cement manufacturing. The project activity has led to less consumption of fossil fuel per ton of clinker production that has led to reduction of greenhouse gas emissions into the atmosphere.

The project activity of BCL also leads to sustainable economic growth, conservation of natural resources and reduction in Greenhouse Gas (GHG) emission.

Project's Contribution to Sustainable Development

Social Well-being: - The project has generated employment opportunities in the supply chain of biomass residues– *i.e*. the collection, sorting, and transportation of biomass residues. The project has led to employment opportunities for skilled and unskilled workers of the rural region and therefore is contributing social well being of the people. The project has helped uplifting the standard of living of farmers in nearby regions by making available an added source of revenue, biomass residues, which were earlier mainly burnt in open grounds and fetched no value.

Economical Well-being: - The sourcing of biomass residues has led to business as well as employment opportunities for local people *i.e* farmers and small industries have got opportunity to supply the biomass residues to the project proponent and transportation opportunities have been made available to local logistics companies.

Environmental Well-being: - Biomass residues are climate neutral, *i.e.* the CO_2 generated by its combustion is sequestered by agriculture crops. Biomass residues are often wasted as there is hardly any other application. Utilization of biomass residues in calciner has helped project proponent reduce net GHG emissions related to cement production and also prevented uncontrolled burning of the same in the area. The project shows less dependence of project proponent on fossil fuels and better management of waste. This brings in related benefits for the company, the local community and the employees.

Technology Well-being: - The technology to use biomass residues in the calciner and kiln is indigenously developed by the project proponent (BCL). The project activity would contribute to a better quality environment to the employees and surrounding community. Thus the implementation of project activity is a demonstration of a clean technology and would promote the use of alternate fuels in similar industries in the region.

A.3. Project participants:

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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 (Host)	Binani Cement Limited (BCL) (Private entity)	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

>>


INDIA
States and Union Territories
N
JAMMU & KASHMIR
Srinagar
HIMACHAL PRADESH
Shimla
Chandigarh
PUNJAB
UTTARANCHAL
Dehradun
DELHI
HARYANA
PAKISTAN
CHINA (TIBET)
ARUNACHAL PRADESH
SIKKIM
NEPAL
Gangtok
BHUTAN
Itanagar
UTTAR PRADESH
RAJASTHAN
Jaipur
Lucknow
Patna
BIHAR
ASSAM
Dispur
NAGALAND
Kohima
Shillong
Imphal
MANIPUR
MEGHALAYA
Agartala
TRIPURA
Aizawl
MIZORAM
GUJARAT
Gandhinagar
Bhopal
MADHYA PRADESH
Ranchi
JHARKHAND
WEST BENGAL
Calcutta
MYANMAR
CHHATTISGARH
Raipur
DIU
DAMAN
DADAR & NAGAR HAVELI
MAHARASHTRA
Mumbai (Bombay)
ORISSA
Bhubaneshwar
BANGLADESH
ARABIAN SEA
Hyderabad
ANDHRA PRADESH
YANAM (Pondicherry)
BAY OF BENGAL
Panaji
GOA
KARNATAKA
Bangalore
Chennai (Madras)
PONDICHERRY (Puduchchery)
KARAIKAL (Pondicherry)
LAKSHADWEEP
MAHE (Pondicherry)
TAMILNADU
KERALA
Port Blair
ANDAMAN & NICOBAR ISLANDS
Thiruvananthapuram
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Map not to Scale


RAJASTHAN
Ganganagar
Hanumangarh
Bikaner
Churu
Jhunjhunun
Sikar
Alwar
Bharatpur
Nagaur
Jaisalmer
Jaipur
Dausa
Jodhpur
Dhaulpur
Karauli
Ajmer
Tonk
Sawai Madhopur
Barmer
A
Pali
Bhilwara
Bundi
Jalor
Rajsamand
Kota
Baran
Sirohi
Chittaurgarh
Jhalawar
Udaipur
Dungarpur
Banswara
A - Ajmer

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:

>>
Binanigram, Tehsil :Pindwara, District: Sirohi

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

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Binani Cement is strategically located at Binanigram, district Sirohi in the state of Rajasthan. The site is advantageous for its easy accessibility to biomass waste from Palanpur, Siddhpur and Ahmedabad region. The plant is located near NH-14 (Ahmedabad – Delhi highway). The nearest railway station is Sirohi Road. The coordinates of the site are as follows:

Latitude: 24°48' - 24°51' (North)
Longitude: 73°4' - 73°9' (East)

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

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The project activity is cement sector specific. The project activity may principally be categorized in Category 4: Manufacturing industries, according to sectoral scopes for accreditation of operational entities.

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

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The technology employed for using of alternate fuels in cement production is indigenously developed by BCL. The project is undertaken by BCL with the objective to partially replace non-renewable fossil fuel with biomass residues. The BCL developed the system for transporting biomass from storage yard through a separate system, consisting of a 3 way divertor, belt conveyors and a storage bin, under the bin a belt weigh feeder delivering the alternative fuel to a belt conveyor. As per the given set points the weigh feeder has the feature to work in control/loop with the reference to given feed rate. The BCL developed the system to feed the alternative fuel through mechanized system. The belt conveyor is installed below the belt weigh. Feed delivers the alternative fuel into a feed chute connected to feed box and finally alternative fuel is fed to calciner, to take care of air ingress into calciner, a double flap pneumatically operated are installed and take

care of fugitive dust emission at various transfer points. Jet pulse filter are installed and whole system is fully automatically operated from central control room through Distribution Control System (DCS).

There is separate covered storage for individual fuels, two separate handling systems and a common feeding system to calciner for the use of the alternate fuels.
The proposed fuel for project activity are DOC, saw dust, mehandi, damaged wheat, rice husk. All the fuels are directly fed into the process without any pre-processing at project site.

The technology used for the project activity is environmentally friendly and results in reduced GHG emissions to the atmosphere by using carbon neutral fuels in the calciner.

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

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Table 1: Emissions Reductions, tones CO_2

Year	Estimation of emission reductions (tones of CO_2e)
2008 (1st January to 31st December)	22232
2009	22232
2010	22232
2011	22232
2012	22232
2013	22232
2014	22232
2015	22232
2016	22232
2017	22232
Total estimated reductions (tCO_2e)	222320
Total no of Crediting Years	10 years
Annual average over the crediting period of estimated reductions (tones of CO_2e)	22232

A.4.5. Public funding of the project activity:

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There is no public funding for this project.

SECTION B. Application of a baseline and monitoring methodology

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

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Title: **"Emission reduction through partial substitution of fossil fuels with alternative fuels or less carbon intensive fuels in cement manufacture"**

Reference: **ACM003, Version 07**

The methodology also refers to latest approved versions of:

- "Combined tool to identify the baseline scenario and demonstrate additionality", version 2.1, (EB 28).
- "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site", (EB 35, Annex 10).
- "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" (EB32, Annex 09).
- "Tool to calculate project emissions from electricity consumption, version 01 (EB 32, annex 10).

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

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The project activity is the partial replacement of fossil fuels with biomass residues (De oiled Cake (DOC), saw dust, mehandi, damaged wheat, rice husk, *etc*.) in cement manufacturing. In the absence of the project activity, the current practice of using fossil fuels would have been followed for clinker production and the alternate fuels would have been burnt in an uncontrollable manner without utilizing its energy for useful purpose.

The applicability of methodology is justified as following:

Sr No	Applicability Criteria	
1.	A significant investment is required to enable the use of the alternative fuel(s) and/or the less carbon intensive fossil fuel(s)	Project proponent invested more than INR 13.233 million to proceed with the project activity.
2.	During the last three years prior to the start of the project activity, no alternative fuels have been used in the project plant	Project proponent has been using carbon intensive fuels such as coal, lignite, pet coke, *etc*. for clinker production since inception and no alternative fuels have been used in the last 3 years prior to the start of project activity.
3.	CO_2 emissions reduction relates to CO_2 emissions generated from fuel burning requirements only	For the estimation of CO_2 emissions reduction, the reduced emissions due to fuel burning requirements are taken into account. The reduction in CO_2 emissions of

	and is unrelated to the CO_2 emissions from decarbonisation of raw materials (*i.e.* $CaCO_3$ and $MgCO_3$ bearing minerals)	clinkerisation process due to use of alternative fuels are not taken into account.
4.	The methodology is applicable only for installed capacity (expressed in tonnes clinker/year) that exists by the time of validation of the project activity	The plant has consent for 2 MTPA clinker production. The project activity has not resulted in increasing the production and project proponent will not claim emission reduction based on production increase in excess of 2 MTPA (if any) in future. The emission reduction calculations are based on the clinker production capacity 1992762 tons clinker per year.
5.	In case of project activities using biomass residues or renewable biomass, the biomass is not chemically processed (*e.g.* esterification to produce bio diesel, production of alcohols from biomass, *etc*) prior to combustion in the project plant but it may be processed mechanically or dried at the project site. Moreover, any processing of biomass, occurring before use in the project activity, does not cause other significant GHG emissions (such as, for example, methane emissions from anaerobic treatment of waste water or from charcoal production.	The biomass residues are directly transported to the project site without any chemical processing at the alternate fuel supply site and project site, which will lead to emission of greenhouse gas emissions.
6.	Dedicated plantation for renewable biomass	The project proponent is not using any renewable biomass and dedicated plantation for the project activity. This condition is not relevant to the project activity.

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

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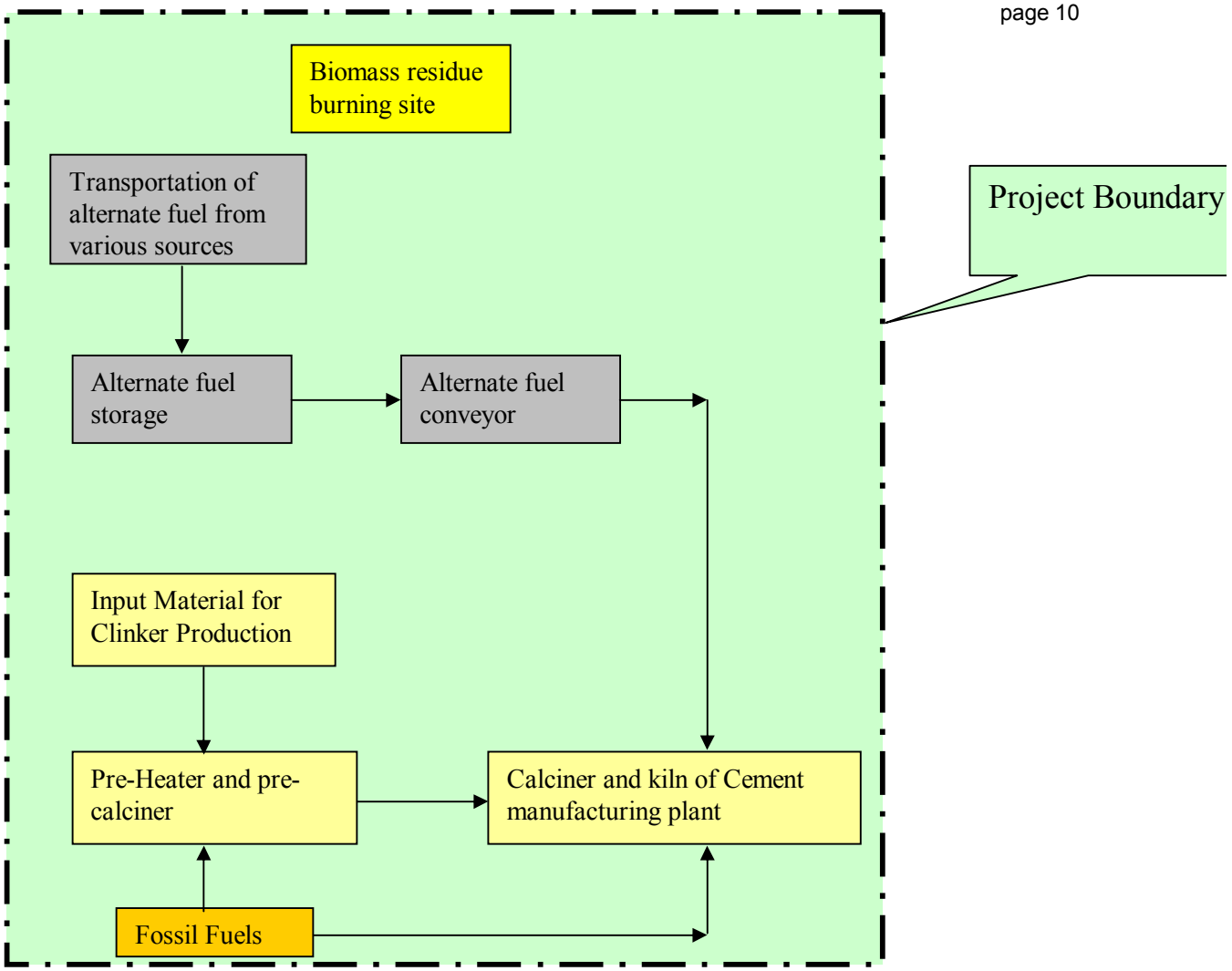
	Source	Gas		Justification/Explanation
Baseline	Emissions from fossil fuel displaced in the project plant ($BE_{FF,y}$)	CO_2	Yes	Main emission source
		CH_4	No	Minor source. Neglected for simplicity.
		N_2O	No	Minor source. Neglected for simplicity.
	Methane emissions avoided from preventing disposal or uncontrolled burning of biomass residues ($BE_{CH4,biomass,y}$)	CO_2	No	It is assumed that CO_2 emissions from surplus biomass residues do not lead to changes in carbon pools in the land use, land use change and forestry sector (LULUCF).
		CH_4	Yes	Included if leakage can be ruled out.
		N_2O	No	Minor source.
Project Activity	Emissions from the use of alternative fuels and/or less carbon intensive fuels ($PE_{k,y}$)	CO_2	Yes	Main emission source.
		CH_4	No	Minor source. Neglected for simplicity.
		N_2O	No	Minor source. Neglected for simplicity.
	Emissions from additional electricity and/or fossil fuel consumption as a result of the project activity ($PE_{FC,y}$ and $PE_{EC,y}$)	CO_2	Yes	Main source.
		CH_4	No	Minor source. Neglected for simplicity.
		N_2O	No	Minor source. Neglected for simplicity.
	Emissions from combustion of fossil fuels for transportation of alternative fuels to the project plant ($PE_{T,y}$)	CO_2	Yes	Main source.
		CH_4	No	Minor source. Neglected for simplicity.
		N_2O	No	Minor source. Neglected for simplicity.

The project boundary includes all production processes related to clinker production, including onsite storage, and on-site transportation and drying of alternative fuels. The project boundary also includes the vehicles used for transportation of biomass residues to the project site. The project boundary also includes the sites where the biomass residues would be dumped, left to decay or burnt in the absence of the project activity.



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

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As per the approved methodology, 'Combined tool to identify the baseline scenario and demonstrate additionality' version 2.1 (EB 28) is used.

Baseline Scenario Selection

Step 1: Identification of alternative scenarios

Step 1a: Define alternative scenarios to the proposed CDM project activity

Scenario	Description of the baseline scenario	Applicability of the scenario
F1	The proposed project activity not	The use of alternate fuels not undertaken as a

Scenario	Description of the baseline scenario	Applicability of the scenario
	undertaken as a CDM project activity (*i.e.* use of alternative fuels and/or less carbon intensive fossil fuels).	CDM project activity can be a baseline scenario. The scenario is discussed in detail below.
F2	Define a continuation of current practice scenario, *i.e.*, a scenario in which the company continues cement production using the existing technology, materials and fuel mix. Quantify the amount of fossil fuel(s) that would be used for clinker production over the project period.	The project proponent has been successfully using the existing technology and fuel mix from the inception of the plant. In the absence of the proposed project activity, the project proponent would have continued the existing practice of coal, lignite and pet coke usage in the kiln, for clinker production without investing into alternative fuel firing system. This scenario can be a baseline scenario. The scenario is discussed in detail below.
F3	Define scenario(s) reflecting the likely evolving fuel mix portfolios, and relative prices of fuels available. The scenario(s) may be based on one fuel or a different mixes of fuels. Quantify the amount of fossil fuel(s) that is expected to be used for clinker production over the project period.	The evolving fuel mix scenarios in Indian industry include use of fuels like Natural gas, Oil, *etc.* Although use of different fuel is evolving, cement industry in particular does not use alternatives to fossil fuel as evident from Cement Manufacturer's Association (CMA) statistics. Unavailability of gas in the region and lack of infrastructure like pipeline for transporting gas makes natural gas as not an obvious choice for firing in kilns. Recent trends in global oil prices shows large upward variations in the prices hence cannot be considered an economical alternative in absence of the project activity.
F4	The currently used fuels are partially substituted with alternative fuels and/or less carbon intensive fossil fuels other than those used in the CDM project activity and/or any other fuel types, without using the CDM. If relevant, develop different scenarios with	Project proponent is using biomass residues like DOC, saw dust, mehandi, damaged wheat, rice husk, *etc.* as alternate fuels. Other alternate fuels which are presently used in the cement industry are waste tires and municipal solid waste (MSW). The plants using waste tires or MSW as alternate fuels have also applied for CDM

Scenario	Description of the baseline scenario	Applicability of the scenario
	different mixes of alternative fuels or less carbon intensive fuels and varying degrees of fuel-switch from traditional to alternative fuels or less carbon intensive fuels.	registration, implying that the use of such fuels cannot be a baseline scenario. Moreover BCL also faces the issues of quality and availability with the use of these fuels.
F5	The construction and operation of a new cement plant.	This scenario is practically not possible therefore this is not applicable.
Waste originating from fossil sources as an alternative fuel		
The project proponent is not using any wastes from fossil sources as alternative fuel, so this scenario is not relevant.		
Biomass used as an alternate fuel		
B1	The biomass residues are dumped or left to decay under mainly aerobic conditions. This applies, for example, to dumping and decay of biomass residues on fields.	In the absence of project activity the biomass residues might have been dumped or left to decay under mainly aerobic conditions, so this can be a possible alternate to the use of biomass residues for the project activity.
B2	The biomass residues are dumped or left to decay under clearly anaerobic conditions. This applies, for example, to deep landfills with more than 5 meters. This does not apply to biomass residues that are stock-piled or left to decay on fields.	In the absence of project activity the biomass residues might have been dumped or left to decay under clearly anaerobic conditions, so this can be a possible alternate to the use of biomass residues for the project activity.
B3	The biomass residues are burnt in an uncontrolled manner without utilizing them for energy purposes.	In the absence of the project activity, the biomass might be burnt in an uncontrolled manner without utilizing energy for useful purpose, so this can be a possible alternate to the project activity.
B4	The biomass residues are sold to other consumers in the market and used by these consumers, such as for heat and/or electricity generation, for the generation of biofuels, as feedstock in processes (*e.g.* the pulp and paper	As such there is no established market for biomass residues, and they are mainly not used for any useful applications. A small percentage of these biomass residues might have been used for heat or electricity generation or as a feedstock, but this cannot be called a common

Scenario	Description of the baseline scenario	Applicability of the scenario
	industry), as fertilizer, *etc*.	practice in the region. So this cannot be an alternate to the project activity.
B5	The biomass residues are used for other purposes at the project site, such as for heat and/or electricity generation, for the generation of biofuels, as feedstock in processes (*e.g*. the pulp and paper industry), as fertilizer, *etc*.	The project proponent is not using biomass residues at the project site for any of the applications listed, except for use in kiln *i.e* the project activity. So this is not an alternative to the project activity.
B6	The proposed project activity, not undertaken as a CDM project activity, *i.e*. the use of the biomass residue in the project plant.	The proposed project activity cannot be taken without taken CDM, as this project activity facing barriers which is explained in barrier analysis.
Renewable biomass plantation		No biomass is being planted for this project activity
R1	No establishment of a dedicated plantation and thus no generation of renewable biomass	There is no establishment of a dedicated plantation for this activity. Therefore other scenarios are not applicable. Only this scenario can be the plausible baseline scenario.

As discussed above, the plausible baseline scenarios for the project activity are,

Scenario F1: Proposed project activity not undertaken as a CDM project activity
Scenario F2: Continuation of current practice scenario

and the plausible alternatives for the use of biomass residues are B1, B2 & B3.
Being conservative, alternative B2 *i.e*. "the biomass residues are dumped or left to decay under clearly anaerobic conditions. This applies, for example, to deep landfills with more than 5 meters. This does not apply to biomass residues that are stock-piled or left to decay on fields", is ruled out as this alternative will give highest baseline emissions for the project activity. As per the methodology, baseline emissions for the alternate B1 & B3 would be calculated assuming that the biomass residues would be burnt in an uncontrolled manner without utilizing them for energy purposes, so the plausible alternatives chosen are B1 and/or B3.

Scenario Description:

Scenario F1: Proposed project activity not undertaken as a CDM project activity

This project is BCL's voluntary initiative for green house gas reduction through utilization of biomass residues by taking into account relevant policies and regulations. There is no regulation or policies to use the alternative fuels in the cement manufacturing in the host country. The premier cement industry associations in India, such as Cement Manufacturers Association (CMA) and National Council for Cement and Building Materials (NCCBM) have not made it compulsory for cement industries in India to use biomass residue as fuel in cement kilns. The project proponent has proposed to implement the project over and above the national and sectoral requirements.
The fuel mix expected during the crediting period is given below:

Table 2: Fossil fuel and alternative fuel proportion during the project period

Year	Coal	Pet coke	Lignite	Alternate Fuel
2008-09	85.6%	3.0%	3.4%	8.0%
2009-10	85.6%	3.0%	3.4%	8.0%
2010-11	85.6%	3.0%	3.4%	8.0%
2011-12	85.6%	3.0%	3.4%	8.0%
2012-13	85.6%	3.0%	3.4%	8.0%
2013-14	85.6%	3.0%	3.4%	8.0%
2014-15	85.6%	3.0%	3.4%	8.0%
2015-16	85.6%	3.0%	3.4%	8.0%
2016-17	85.6%	3.0%	3.4%	8.0%
2017-18	85.6%	3.0%	3.4%	8.0%

The expected fuel mix has been estimated using actual fuel consumption in the plant for the past 2 years i.e 2004-05 & 2005-06.

Baseline scenario F2: Continuation of current practice scenario

BCL was using the coal, lignite and pet coke in the cement manufacturing process before the project activity. The fuel feeding and clinker manufacturing system in the BCL was only capable to use fossil fuel. The BCL fuel consumption mix before the activity is provided below:

Table 3: Fuel mix in the Binani cement before the project activity

Year	2003-2004

Coal used (ton)	199118
% Coal used	90.30%
Lignite used (ton)	1200
% Lignite used	0.5%
Pet coke used (ton)	20195
% Pet coke used	9.2%

In the absence of the project activity the BCL plant will consume the same fuel mix as in baseline scenario. The fuel mix projections in the crediting period are shown in table 4.

Table 4: Expected fossil fuel use in Binani cement during the crediting period

Year	Coal	Lignite	Pet coke
2008-09	90.30%	0.5%	9.2%
2009-10	90.30%	0.5%	9.2%
2010-11	90.30%	0.5%	9.2%
2011-12	90.30%	0.5%	9.2%
2012-13	90.30%	0.5%	9.2%
2013-14	90.30%	0.5%	9.2%
2014-15	90.30%	0.5%	9.2%
2015-16	90.30%	0.5%	9.2%
2016-17	90.30%	0.5%	9.2%
2017-18	90.30%	0.5%	9.2%

Sub Step 1b: Consistency with mandatory applicable laws and regulations

All the above alternatives are in line with the applicable legal and regulatory requirements.

Step 2: Barrier Analysis

Sub Step 2a: Identify barriers that would prevent the implementation of alternative scenarios

The barrier identified for the alternatives are as below:

Table 5: Barrier analysis

Alternative scenario	Investment barriers	Technological barriers	Barriers due to prevailing practices	Other barriers
Scenario F1	High capital investment.	A no of trials are required to streamline the project activity, loss of production.	The mindset of operators is a problem. The operators are not familiar with the alternate fuel feeding system and hence there are inhibitions to operate the plant. This scenario will also face the barriers due to prevailing practices.	No
Scenario F2	No initial capital investment required. In the absence of the project activity this is a most likely scenario.	No technological barriers. The plant will operate with this scenario in absence of the project activity.	This is the prevailing practice. No barriers.	No

Sub Step 2b: Eliminate alternative scenarios which are prevented by the identified barriers

As discussed above, there are barriers to scenario F1, although not prohibitive in nature, and scenario F2 doesn't face any barriers.

Step3: Investment Analysis

Identification of financial indicator: For conducting the investment analysis unit cost of service *i.e* cost per unit of energy supplied is chosen as the financial indicator. Both the alternatives don't generate any

revenue and one of the alternatives *i.e.* scenario F1 involves additional expenditure, so a simple fuel cost analysis has been done as per the guidance provided by the "combined tool to identify baseline scenario and demonstrate additionality". The cost per unit of energy supplied will be calculated for fuel mix for current practice scenario and the proposed project activity, based on the calorific value and price per ton of fuel. Though the project proponent has incurred additional costs in terms of capital investment, administration expenses, *etc.* the same have not been included in the analysis. The average landed price of the fuel for 3 years i.e 2004-05 & 2005-06 have been used for the analysis. Similarly the calorific values used for analysis are the average for the same years.
The simple cost analysis is shown as below:

Scenario F1:

Particulars	**Units**	**Value**
Fuel Mix		
Coal	%	85.60%
Lignite	%	3.40%
Pet Coke	%	3.00%
Alternate fuel	%	8.00%
Calorific Value		
Coal	Kcal/kg	6091
Lignite	Kcal/kg	3605
Pet coke	Kcal/kg	7931
Alternate fuel	Kcal/kg	4032
Cost	Rs/ton	
Coal	Rs/ton	3298
Lignite	Rs/ton	1301
Pet Coke	Rs/ton	3154
Alternate fuel	Rs/ton	2185
Total Heat Supplied	GJ/ton	24.7
Total Cost of Fuel	Rs./ton	3137.0
Unit Cost of Energy	Rs./GJ	127.1

Scenario F2:

Particulars	**Units**	**2003-04**
Coal consumed for clinker production	Tons	199118
Lignite consumed for clinker production	Tons	1200

Petcoke consumed for clinker production	Tons	20195
Fuel Mix		
Coal	%	90.3%
Lignite	%	0.5%
Pet Coke	%	9.2%
Calorific Value		
Coal	Kcal/kg	6091
Lignite	Kcal/kg	3605
Pet coke	Kcal/kg	7931
Cost	Rs/ton	
Coal	Rs/ton	3298
Lignite	Rs/ton	1301
Pet Coke	Rs/ton	3154
Total Heat Supplied	GJ	5765793
Total Cost of fuel	Rs.	722012886
Unit cost of energy	Rs./GJ	125.2

As evident from above the unit cost of energy in scenario F1 is Rs. 127.1 per GJ as compared to Rs. 125.2 per GJ in case of scenario F2 *i.e* approximately 1.5% higher than scenario F2. Apart from incurring higher operational costs, the project proponent has incurred an expense of INR 13.23 million to install and commission alternate fuel feeding system. The project proponent also plans to build a storage shed for alternate fuel at a cost of approx INR 10 million. NPV (Net Present Value) analysis of the project activity will show a negative NPV, as compared to the current practice scenario, which will have zero capital investment and zero additional operating cost and hence zero NPV.
Hence, scenario F2, *i.e* continuation of current practice scenario is the most economically attractive scenario and is chosen as the baseline scenario.

The parameters and data source for the baseline scenario estimation is given in the table 6 below:

Table 6: Parameters required for baseline scenario

S. No.	Parameter	Data Source
1	Clinker production	Manufacturing plant (BCL)
2	Fossil fuel consumption in the baseline year	Manufacturing plant (BCL)
3	Fuel mix in baseline	Calculated

The last step *i.e.* common practice analysis, to demonstrate additionality of the project is being addressed in the following section.

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

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Step 4: Common Practice Analysis

As already indicated in analysis that the use of biomass residues as alternate fuels is not the most common in Indian cement industry due to several reasons, there is less likelihood of getting such examples. The project is not a common practice in Indian Cement industry. Based on the CMA[1] data currently no cement industry is using the alternative fuel. The cement industries which have started using alternate fuel have already applied for CDM registration. BCL is one of the few cement companies which has started the use of the alternate fuels.

It is evident that due to capital and operating additional costs, investment and technical barrier associated with the project activity, the project activity has less likelihood to happen without CDM registration. There is no incentive available from any association to use the alternative fuels in cement industry. BCL is one of the pioneers in cement industry to start the project activity. Therefore the project activity is not a common practice and is hence additional.

B.6. Emission reductions:

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B.6.1. Explanation of methodological choices:

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1. Baseline emissions

The baseline emission of the project activity is calculated as follows:

$$BE_y = BE_{FF,y} + BE_{CH4,biomass,y}$$

BE_y	=	Baseline emissions in year *y* (tCO_2)
$BE_{FF,y}$	=	Baseline emission from fossil fuels displaced by alternative fuels or less carbon intensive fossil fuels in year *y* (tCO_2)
$BE_{CH4,biomass,y}$	=	Baseline methane emissions avoided during the year *y* from preventing disposal or uncontrolled burning of biomass residues (tCO_2e)

Baseline emissions are determined in the following steps:

[1] Cement Statistics 2005, Cement manufacturing association, India

Step 1: Estimate the project specific "fuel penalty"

Step 2: Calculate baseline emissions from the fossil fuels displaced by the alternative or less carbon intensive fuel(s)

Step 3: Calculate baseline emissions from decay, dumping or burning of biomass residues

Step 1: Estimation of project specific moisture penalty

The project specific moisture will be calculated as follows:

$$FP_y = P_{clin\,ker,y} \times (SEC_{clin\,ker,PJ,y} - SEC_{Clin\,ker,BL})$$

FP_y = Fuel penalty in year *y* (GJ)

$P_{clinker,y}$ = Production of clinker in year *y* (tons)

$SEC_{clinker,PJ,y}$ = Specific energy consumption of the project plant in year *y* (GJ/t clinker)

$SEC_{clinker,BL}$ = Specific energy consumption of the project plant in the absence of the project activity (GJ/t clinker)

The specific energy consumption of the project plant is calculated as follows:

$$SEC_{Clin\,ker,PJ,y} = \frac{(\sum_i (FC_{PJ,i,y} \times NCV_{i,y}) + \sum_k (FC_{PJ,k,y} \times NCV_{k,j})}{P_{clin\,ker,y}}$$

Where:

$SEC_{clinker,PJ,y}$ = Specific energy consumption of the project plant in year *y* (GJ/t clinker)

$FC_{PJ,i,y}$ = Quantity of fossil fuel type *i* fired in the project plant in year *y* (tons)

$NCV_{i,y}$ = Net calorific value of the fossil fuel type *i* in year y (GJ/ton)

$FC_{PJ,k,y}$ = Quantity of alternative fuel or less carbon intensive fossil fuel type *k* used in the project plant in year *y* (tons)

$NCV_{k,y}$ = Net calorific value of the alternative or less carbon intensive fuel type *k* in year y (GJ/tonne)

$P_{clinker,y}$ = Production of clinker in year *y* (tons)

k = Alternative fuel types and less carbon intensive fossil fuel types used in the project plant in year *y*

i = Fossil fuel types used in the project plant in year *y* that are not less carbon intensive fossil fuel types

On conservative basis, the baseline will be calculated by taking the least value of the annual average specific energy consumption for the last three years

$$SEC_{clinker,BL} = MIN\left[\frac{HG_x}{P_{clinker,x}}, \frac{HG_{x-1}}{P_{clinker,x-1}}, \frac{HG_{x-2}}{P_{clinker,x-2}}\right]$$

$$HG_X = \sum_i FC_{i,x} \times NCV_i$$

Where:

$SEC_{clinker,BL}$	=	Specific energy consumption of the project plant in the absence of the project activity (GJ/t clinker)
HG_x	=	Heat generated from fuel combustion in the project plant in the historical year *x* (GJ)
$FCi_{,x}$	=	Quantity of fossil fuel type *i* used in the project plant in year *x* (tons)
NCV_i	=	Net calorific value of the fossil fuel type *i* (GJ/ton)
$P_{clinker,x}$	=	Production of clinker in year *x* (tons)
x	=	Year prior to the start of the project activity
i	=	Fossil fuel types used in the project plant in the last three years prior to the start of the project activity

Step 2: Calculation of baseline emissions from the fossil fuels displaced by the alternative or less carbon intensive fuel(s)

$$BE_{FF,y} = \left[\sum_k (FC_{PJ,k,y} \times NCV_{k,y}) - FPy\right] \times EF_{CO2,BL,y}$$

Where:

$BE_{FF,y}$	=	Baseline emission from fossil fuels displaced by alternative fuels or less carbon intensive fossil fuels in year *y* (tCO_2)
$FC_{PJ,k,y}$	=	Quantity of alternative fuel or less carbon intensive fossil fuel type *k* used in the project plant in year *y* (tons)
$NCV_{k,y}$	=	Net calorific value of the alternative or less carbon intensive fuel type *k* in year y (GJ/tonne)
FP_y	=	Fuel penalty in year *y* (GJ)

$EF_{CO2,BL,y}$ = Carbon dioxide emissions factor for the fossil fuels displaced by the use of alternative fuels or less carbon intensive fossil fuels in the project plant in year *y* (tCO_2/GJ)

k = Alternative fuel types and less carbon intensive fossil fuel types used in the project plant in year *y*

The emission factor will be calculated using the following two equations and lowest value will be considered for the calculation.

Equation no: 1

$$EF_{BL,CO2,y} = \frac{(\sum_i (FC_{i,x-2} + FC_{i,x-1} + FC_{i,x}) \times NCV_i \times EF_{CO2,FF,i}}{\sum_i (FC_{i,x-2} + FC_{i,x-1} + FC_{i,x}) \times NCV_i}$$

$EF_{CO2,BL,y}$ = Carbon dioxide emissions factor for the fossil fuels displaced by the use of alternative fuels or less carbon intensive fossil fuels in the project plant in year *y* (tCO_2/GJ)

$FC_{i,x}$ = Quantity of fossil fuel type *i* used in the project plant in year *x* (tons)

NCV_i = Net calorific value of the fossil fuel type *i* (GJ/ton)

$EF_{CO2,FF,i}$ CO_2 emission factor for fossil fuel type *i* (tCO_2/GJ)

x = Year prior to the start of the project activity

i = Fossil fuel types used in the project plant in the last three years prior to the start of the project activity

Equation no: 2

$$EF_{BL,CO2,y} = \frac{\sum_i (FC_{PJ,i,y} \times NCV_i \times EF_{CO2,FF,i}}{\sum_i FC_{PJ,i,y} \times NCV_i}$$

Where:

$EF_{CO2,BL,y}$ = Carbon dioxide emissions factor for the fossil fuels displaced by the use of alternative fuels or less carbon intensive fossil fuels in the project plant in year *y* (tCO_2/GJ)

$FC_{PJ,i,y}$ = Quantity of fossil fuel type *i* fired in the project plant in year *y* (tons)

$NCV_{i,y}$ = Net calorific value of the fossil fuel type *i* in year y (GJ/ton)

$EF_{CO2,FF,i,y}$ = Carbon dioxide emission factor for fossil fuel type *i* in year *y* (tCO_2/GJ)

i = Fossil fuel types used in the project plant in year *y* that are not less carbon intensive fossil fuel types

Step 3: Calculation of baseline emission from decay, dumping or burning of biomass residues

The baseline methane emission will be calculated as follows:

$$BE_{CH4,biomass,y} = BE_{CH4,B1/B3,y} + BE_{CH4,B2,y}$$

$BE_{CH4,biomass,y}$ = Baseline methane emissions avoided during the year *y* from preventing disposal or uncontrolled burning of biomass residues (tCO_2e)

$BE_{CH4,B1/B3,y}$ = Baseline methane emissions avoided during the year *y* from aerobic decay and/or uncontrolled burning of biomass residues (tCO_2e)

$BE_{CH4,B2,y}$ = Baseline methane emissions avoided during the year *y* from anaerobic decay of biomass residues at a solid waste disposal site (tCO_2e)

Emission due to uncontrolled burning will be calculated using the following calculation

$$BE_{CH4,B1/B3,y} = GWP_{CH4} \times \sum_{k} FC_{PJ,k,y} \times EF_{burning,CH4,k,y}$$

$BE_{CH4,B1/B3,y}$ = Baseline methane emissions avoided during the year *y* from aerobic decay and/or uncontrolled burning of biomass residues (tCO_2e)

GWP_{CH4} = Global Warming Potential of methane valid for the commitment period (tCO_2e/tCH_4)

$FC_{PJ,k,y}$ = Quantity of alternative fuel or less carbon intensive fossil fuel type *k* used in the project plant in year *y* (tons)

$EF_{burning,CH4,k,y}$ = CH4 emission factor for uncontrolled burning of the biomass residue type *k* during the year *y* (tCH_4/tonne)

K = Types of biomass residues used as alternative fuel in the project plant in year *y* for which the identified baseline scenario is B1 or B3 and for which leakage effects could be ruled out with one of the approaches L1, L2 or L3 described in the leakage section

Anaerobic decay of the biomass residues is not considered for the project activity since it is not applicable.

Project Emissions

$$PE_y = PE_{k,y} + PE_{FC,y} + PE_{EC,y} + PE_{T,y} + PE_{BC,y}$$

PE_y = Project emissions during the year *y* (tCO_2e)

$PE_{k,y}$ = Project emissions from combustion of alternative fuels and/or less carbon intensive fossil fuels in the project plant in year *y* (tCO_2)

$PE_{FC,y}$ = Project emissions from additional fossil fuel combustion as a result of the project activity in year *y* (tCO_2)

$PE_{EC,y}$ = Project emissions from additional electricity consumption as a result of the project activity in year *y* (tCO_2)

$PE_{T,y}$ = CO_2 emissions during the year *y* due to transport of alternative fuels to the project plant (tCO_2)

$PE_{BC,y}$ = Project emissions from the cultivation of renewable biomass at the dedicated plantation in year *y* (tCO_2e)

Step1: Project emissions due to the burning of alternate fuels

$$PE_{k,y} = \left[\sum_k FC_{PJ,k,y} \times NCV_{k,y} \right] \times EF_{CO2,k,y}$$

$PE_{k,y}$ = Project emissions from combustion of alternative fuels and/or less carbon intensive fossil fuels in the project plant in year *y* (tCO_2)

$FC_{PJ,k,y}$ = Quantity of alternative fuel or less carbon intensive fossil fuel type *k* used in the project plant in year *y* (tons)

$EF_{CO2,k,y}$ = Carbon dioxide emissions factor for alternative or less carbon intensive fossil fuels type *k* in year *y* (tCO_2/GJ)

$NCV_{k,y}$ = Net calorific value of the alternative or less carbon intensive fossil fuel type *k* in year *y* (GJ/tonne)

k = Alternative fuel types and less carbon intensive fossil fuel types used in the project plant in year *y*

Step 2: Project emissions due to additional electricity consumption/fossil fuel consumption

The emissions will be calculated based on the additional electricity consumption and fossil fuel consumption in the plant multiplied with corresponding emission factor.

Step 3: Project emission due to transportation of alternative fuels

$$PE_{T,y} = N_y \times AVD_y \times EF_{CO2,FF,i,y}$$

$PE_{T,y}$	=	CO_2 emissions during the year *y* due to transport of alternative fuels to the project plant (tCO_2/yr)
N_y	=	No. of truck trips
AVD_y	=	Average return trip distance of the alternate fuel site to the project site (km)
$EF_{CO2,FF,i,y}$	=	CO_2 emission factor for fossil fuel type *i* in year *y* (tCO_2/km)
i	=	Fossil fuel types used for transportation of alternative fuels to the project plant in year *y*

Step 4: Project emission due to dedicated plantations

This is not applicable to the project activity. Hence the same is not considered for project emission calculation

3. Leakage Emissions

The project proponent will use one of the approaches (L1, L2 & L3), mentioned in the leakage section of the chosen methodology, to rule out leakage. In case the leakage cannot be ruled out the emission due to leakage will be calculated as

$$LE_y = PE_{BR,y} + LE_{FF,y}$$

LE_y	=	Leakage emissions during the year *y* (tCO_2e/yr)
$LE_{BR,y}$	=	Leakage emissions related to the use of biomass residues during the year *y* (tCO_2)
$LE_{FF,upstream,y}$	=	Upstream leakage emissions from fossil fuel use in year *y* (tCO_2e)

Where

$$LE_{BR,y} = EF_{CO2,LE} \times \sum_{k} FC_{PJ,k,y} \times NCV_{k,y}$$

$LE_{BR,y}$ = Leakage emissions during the year *y* (tCO_2/yr)

$EF_{CO2,LE}$ = CO_2 emission factor of the most carbon intensive fuel used in the country (tCO_2/GJ)

$FC_{PJ,k,y}$ = Quantity of biomass residue type *k* used in the project plant in year *y* (tons)

$NCV_{k,y}$ = Net calorific value of the biomass residue type *k* in year y (GJ/ton of dry matter)

k = Types of biomass residues for which leakage effects could not be ruled out with one of the approaches L1, L2 or L3 above

Leakage due to upstream emissions is not applicable to this project activity, therefore it is not considered for emission reduction calculation.

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

Data / Parameter:	**$FC_{i,x}$, $FC_{i,x-1}$ and $FC_{i,x-2}$**
Data unit:	Tons
Description:	Quantity of fossil fuel of type *I* used in the project plant in year *x*, *x-1* and *x-2* where *x* is the year prior to the start of the project activity and *i* are the fossil fuel types used in the project plant in the last three years prior to the start of the project activity
Source of data used:	Three years data from fuel consumption data logs at the project site
Value applied:	See table below
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data is based on online measurements & cross checked with fuel purchase records & stock changes.
Any comment:	-

Particulars	Units	2001-02	2002-03	2003-04
Coal	Tons	207046	215585	199118
Lignite	Tons	5309	5756	1200
Pet coke	Tons	0	0	20195

Data / Parameter:	**$P_{clinker,x}$, $P_{clinker,x-1}$, $P_{clinker,x-2}$**
Data unit:	Tons
Description:	Production of clinker in year x, x-1, and x-2 where x is the year prior to the start of the project activity

Source of data used:	Three years data from fuel consumption data logs at the project site
Value applied:	**Particulars** / **Units** / **2001-02** / **2002-03** / **2003-04** Clinker production / Tons / 1816335 / 1918305 / 1997400
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data is based on online measurements & cross checked with annual reports.
Any comment:	-

Data / Parameter:	**NCV_i**
Data unit:	GJ/ton
Description:	Net Calorific value of the fossil fuel type i where *i* are the fossil fuel types used in the project plant in the last three years prior to the start of the project activity
Source of data used:	Plant Records
Value applied:	**Fuel** / **Net Calorific Value (GJ/ton)** Coal / 25.78 Lignite / 15.71 Pet coke / 33.48
Justification of the choice of data or description of measurement methods and procedures actually applied :	Analysis by project proponent GCV is monitored by project proponent, and it has been converted to NCV as per IPCC 2006 guidelines.
Any comment:	-

Data / Parameter:	**$EF_{CO2,FF,i}$**
Data unit:	tCO_2/GJ
Description:	Weighted average CO_2 emission factor for fossil fuel type *i* where *i* are the fossil fuel types used in the project plant in the last three years prior to the start of the project activity
Source of data used:	IPCC
Value applied:	**Fuel** / **Emission Factor (tCO_2/GJ)**

	Coal	0.096	
	Lignite	0.101	
	Pet coke	0.975	
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value from IPCC used for calculation of weighted average for the fossil fuels.		
Any comment:	-		

B.6.3 Ex-ante calculation of emission reductions:

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Baseline Information

Fuel	Net Calorific value (GJ/tonne)	Emission Factor (tCO2/GJ)	Baseline emission factor (tCO2/GJ)
Coal	25.78	0.096	
Lignite	15.71	0.101	
Pet coke	33.48	0.098	0.09621

S. No.	Parameter	Unit	2003-04	2002-03	2001-02
1	Clinker Production	Ton	1997400	1918305	1816335
2	Fossil fuel used				
	Coal	Ton	199118	215585	207046
	Lignite	Ton	1200	5756	5309
	Pet coke	Ton	20195	0	0
	Total	Ton	220513	221341	212355
3	Heat generated	GJ	5827623	5647523	5420387
4	Specific energy consumption	GJ/t clinker	2.92	2.94	2.98
5	Specific energy consumption	GJ/t clinker	**2.92**		

Emission Reduction Calculations

Parameter	Unit	
Clinker production	Tonnes/yr	1992762

Baseline Emissions	tCO_2/yr	23352
Monitoring of emissions related to the use of alternative fuels in kilns during the crediting period (for each type of fuels)		
Quantity of alternative fuel used		
Biomass residue consumption	Tonnes/yr	24000
NCV alternate fuel	GJ/ton	16.89
NCV alternate fuel	Kcal/kg	4034
Specific heat consumption using i% alternative fuel	GJ/ton	3.00
Specific heat consumption using fossil fuel only	GJ/ton	2.92
Total fuel penalty	GJ/yr	172882
Baseline GHG emissions from fossil fuels displaced by the alternative fuels	**tCO_2/yr**	**22359**
Monitoring of emissions due to burning of biomass in the field in the baseline scenario		
Biomass fuel which would have been burnt in absence of the project	Tonnes/yr	24000
Carbon released as CH_4 in open air burning	tCH_4/tonne	0.001971
GHG emissions due to biomass that would be burnt in the absence of the project	**tCO_2/yr**	**993**

Project Emissions	tCO2/yr	1121
Monitoring of emissions related additional fossil fuel & electricity consumption (on-site transportation and drying of alternative fuels)		
Transportation of fuel used on-site	kg	NA
Emission factor	g CO_2/kg	NA
Emission factor	g CH_4/kg	NA
Emission factor	g N_2O/kg	NA
Electricity used for transportation of alternative fuel	kWh	256680
Emission factor of electricity used	kg CO_2/kwh	0.75
Fuel used for any drying of alternative fuels	Kg	NA
Heating value for fuel used for drying alt. fuels	TJ/tonne	NA
Emission factor for the fuel used for drying	tCO_2/TJ	NA

Emissions from onsite transportation and drying	**tCO2/yr**	**194**
Monitoring of emissions due to off-site transport of fuels		
No of truck trips	No	2400
Average distance for transport of alternative fuels	Km/truck	352
Emission factor	tCO_2 eq/ km	0.001097
Leakage resulting from transport of alternative fuels (tCO2/yr)	tCO_2/yr	927
Leakage from transport of alternative fuel less leakage due to reduced transport of fossil fuel	**tCO_2/yr**	**927**
Emission reduction	**tCO_2/yr**	**22232**

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

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Year	Baseline Emissions (tCO_2)	Project Emissions (tCO_2)	Emission Reductions (tCO_2)
2008	23353	1121	22232
2009	23353	1121	22232
2010	23353	1121	22232
2011	23353	1121	22232
2012	23353	1121	22232
2013	23353	1121	22232
2014	23353	1121	22232
2015	23353	1121	22232
2016	23353	1121	22232
2017	23353	1121	22232
Total	233530	11210	222320
Total No of Crediting Years	**10**		
Average Annual Emission Reduction (tCO_2)	**22232**		

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

B.7.1 Data and parameters monitored:

Data / Parameter:	$FC_{PJ,k,y}$, $FC_{PJ,i,y}$
Data unit:	Ton
Description:	Type & quantity of alternative fuels of type k and fossil fuels of type i used in the project plant in year y
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	**Particulars** / **Units**: Coal – Tons – 256800; Lignite – Tons – 10200; Pet coke – Tons – 9000; Alternate fuel – Tons – 24000
Description of measurement methods and procedures to be applied:	Data type: Measured Recording frequency: Monitored daily & reported monthly Data archiving policy: Paper/ Electronic Monitoring procedure: Online Flow meter and cross checked with purchase records & stock changes, third party audited records. Calibration frequency: annually
QA/QC procedures to be applied:	As per ISO 9001 or similar quality systems
Any comment:	-

Data / Parameter:	$EF_{CO2,k,,y}$ **and** $EF_{CO2,FF,i,y}$
Data unit:	tCO_2/GJ
Description:	Weighted average CO_2 emission factor for alternative fuel of type k and fossil fuel type i in year y
Source of data to be used:	Local available data/ IPCC
Value of data applied for the purpose of calculating expected emission reductions in section B.5	**Fuel** / **Emission Factor (tCO_2/GJ)**: Coal – 0.096; Lignite – 0.101; Pet coke – 0.975; Alternate fuel – 0
Description of measurement methods and procedures to be	Data type: Calculated Recording frequency: Annually Data archiving policy: Paper/ Electronic

applied:	Monitoring procedure: The weighted average will be calculated based on the individual emission factors and the quantity of fuels consumed in the year. Individual emission factors will be obtained from published sources.
QA/QC procedures to be applied:	As per ISO 9001 or similar quality system.
Any comment:	-

Data / Parameter:	**$NCV_{k,,y}$, $NCV_{i,,y}$**
Data unit:	GJ/ton
Description:	Net calorific value of the alternate fuels of type k & fossil fuels of type i in year y
Source of data to be used:	Local available data/ IPCC
Value of data applied for the purpose of calculating expected emission reductions in section B.5	**Fuel** / **Net Calorific value (GJ/ton)** Coal: 25.78 Lignite: 15.71 Pet coke: 33.48 Alternate Fuel: 16.89
Description of measurement methods and procedures to be applied:	Data type: Measured/ Estimated Recording frequency: Annually Data archiving policy: Paper/ Electronic Monitoring procedure: The data will be obtained from Government authorised laboratory. In case the data is not available IPCC values will be used.
QA/QC procedures to be applied:	NABL certified laboratory will do the analysis.
Any comment:	-

Data / Parameter:	**$PE_{FC,y}$**
Data unit:	tCO_2
Description:	Project emissions from additional fossil fuel combustion as a result of the project activity in year *y*
Source of data to be used:	Calculated
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods	Data type: Calculated Recording frequency: Annually

and procedures to be applied:	Data archiving policy: Paper/ Electronic Monitoring procedure: The parameter will be calculated from additional fossil fuel consumption, NCV & emission factor of the fossil fuel used.
QA/QC procedures to be applied:	As per ISO 9001 or similar quality system
Any comment:	-

Data / Parameter:	**$PE_{EC,y}$**
Data unit:	tCO_2
Description:	Project emissions from additional electricity consumption as a result of the project activity in year *y*.
Source of data to be used:	Calculated
Value of data applied for the purpose of calculating expected emission reductions in section B.5	194
Description of measurement methods and procedures to be applied:	Data type: Calculated Recording frequency: Annually Data archiving policy: Paper/ Electronic Monitoring procedure: The parameter will be calculated as per 'Tool to calculate project emissions from electricity consumption'.
QA/QC procedures to be applied:	As per ISO 9001 or similar quality system.
Any comment:	-

Data / Parameter:	**$E_{Elect,y}$**
Data unit:	kWh
Description:	Additional electricity consumption as a result of project activity for on site transportation, drying, *etc*. in year *y*
Source of data to be used:	Plant Records & electricity bill
Value of data applied for the purpose of calculating expected emission reductions in section B.5	256680
Description of measurement methods and procedures to be applied:	Data type: Measured/ Estimated Recording frequency: Continuously and reported annually. Data archiving policy: Paper/ Electronic Monitoring procedure: Online measurements for the equipments involved. In case direct monitoring is not possible the value will be estimated based on the equipment rating & operating hours.

	Calibration frequency: annually
QA/QC procedures to be applied:	As per ISO 9001 or similar quality system
Any comment:	-

Data / Parameter:	$\mathbf{EF_{Elect,y}}$
Data unit:	$kgCO_2/kWh$
Description:	Electricity combined emission factor
Source of data to be used:	Published data
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.75
Description of measurement methods and procedures to be applied:	Data type: Estimated Recording frequency: Annually. Data archiving policy: Paper/ Electronic Monitoring procedure: Published literature by a third party like Central Electricity Agency, *etc*. will be used.
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	$\mathbf{N_y}$
Data unit:	Dimensionless
Description:	Number of truck trips during the year *y*
Source of data to be used:	Transportation data logs
Value of data applied for the purpose of calculating expected emission reductions in section B.5	2400
Description of measurement methods and procedures to be applied:	Data type: Measured/ Estimated Recording frequency: Continuously and summarized annually. Data archiving policy: Paper/ Electronic Monitoring procedure: As per transportation logs
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	$\mathbf{AVD_y}$

Data unit:	Km
Description:	Average round trip distance (from and to) between the alternative fuel supply sites and the site of the project plant during the year *y*.
Source of data to be used:	Transportation data logs
Value of data applied for the purpose of calculating expected emission reductions in section B.5	352
Description of measurement methods and procedures to be applied:	Data type: Measured/ Estimated Recording frequency: Continuously and summarized annually. Data archiving policy: Paper/ Electronic Monitoring procedure: Calculated based on distance provided by individual supplier and transportation logs.
QA/QC procedures to be applied:	Consistency of distance records provided by the truckers will be compared with recorded distances with other information from other sources (*e.g.* maps).
Any comment:	-

Data / Parameter:	$\mathbf{EF_{km,CO2,,y}}$
Data unit:	tCO_2/km
Description:	Average CO_2 emission factor for the truck measured during year y
Source of data to be used:	Calculated using sample measurement of the fuel type, fuel consumption by the trucks and distance travelled by the trucks. National/ IPCC default values for NCV and emission factor for fuel type will be used. Alternatively, emission factors applicable for the truck types used from the literature in a conservative manner (*i.e.* the higher end within a plausible range) will be used.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.001097
Description of measurement methods and procedures to be applied:	Data type: Estimated Recording frequency: Annually. Data archiving policy: Paper/ Electronic Monitoring procedure: As per above.
QA/QC procedures to be applied:	Cross check with published literature.
Any comment:	-

Data / Parameter:	$\mathbf{AF_{T,k,,y}}$
Data unit:	Ton/year

Description:	Quantity of alternative fuel type *k* that has been transported to the project site during the year *y*.
Source of data to be used:	Transportation data logs
Value of data applied for the purpose of calculating expected emission reductions in section B.5	24000
Description of measurement methods and procedures to be applied:	Data type: Measured/ Estimated Recording frequency: Continuously and summarized annually. Data archiving policy: Paper/ Electronic Monitoring procedure: Base on online measurements and cross checked with purchase records and stock changes.
QA/QC procedures to be applied:	As per ISO 9001 or similar quality system.
Any comment:	-

Data / Parameter:	$\mathbf{P_{clinker,y}}$
Data unit:	Ton/year
Description:	Production of clinker in year y
Source of data to be used:	Production data logs at the project site.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1992762
Description of measurement methods and procedures to be applied:	Data type: Measured/ Estimated Recording frequency: Continuously and summarized annually. Data archiving policy: Paper/ Electronic Monitoring procedure: Online measurement from weighing feeders & cross checked with annual reports. Calibration frequency: Annually
QA/QC procedures to be applied:	As per ISO 9001 or similar quality system.
Any comment:	-

Data / Parameter:	$\mathbf{EF_{CO2,BL,y}}$
Data unit:	tCO_2/GJ
Description:	Carbon dioxide emissions factor for the fossil fuels displaced by the use of alternative fuels or less carbon intensive fossil fuels in the project plant
Source of data to be used:	Calculated as follows as the lowest of the following CO_2 emission factors: - the weighted average annual CO_2 emission factor for the fossil fuel(s) consumed and

	monitored ex ante during the most recent three years before the start of the project activity; - the weighted average annual CO_2 emission factor of the fossil fuel(s) consumed in the project plant in year *y* that are not less carbon intensive fossil fuels, -the weighted average annual CO_2 emission factor for the fossil fuel(s) that would have been consumed according to fuel mix determined in "Procedure for the selection of the most plausible baseline scenario" above.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.09621
Description of measurement methods and procedures to be applied:	Data type: Calculated Recording frequency: Annually. Data archiving policy: Paper/ Electronic Monitoring procedure: As per the procedure mentioned above.
QA/QC procedures to be applied:	As per ISO 9001 or similar quality system.
Any comment:	-

Data / Parameter:	**$EFC_{CO2,LE}$**
Data unit:	tCO_2/GJ
Description:	Carbon dioxide emission factor of the most carbon intensive fuel used in the country.
Source of data to be used:	National Communication/ literature sources/ IPCC
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Reviewed annually.
QA/QC procedures to be applied:	Data type: Measured/ Estimated Recording frequency: Continuously and summarized annually. Data archiving policy: Paper/ Electronic Monitoring procedure: As per published literature
Any comment:	Will be monitored in case leakage is not ruled out by any of the scenarios L1, L2 or L3.

Data / Parameter:	**$FC_{BL,I,y}$**
Data unit:	Ton

Description:	Quantity of fossil fuel type *i* displaced in the project plant as a result of the project activity in year y.
Source of data to be used:	The quantities and types of fossil fuels *i* that are displaced as a result of the project activity ($FC_{BL,i,y}$) will be determined consistent with the guidance on the determination of the baseline CO_2 emission factor ($EF_{CO2,BL,y}$).
Value of data applied for the purpose of calculating expected emission reductions in section B.5	16957
Description of measurement methods and procedures to be applied:	Data type: Measured/ Estimated Recording frequency: Annually. Data archiving policy: Paper/ Electronic Monitoring procedure: As per the guidance provided by the methodology.
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	**-**
Data unit:	-
Description:	Demonstration that the biomass residue type *k* from a specific source would continue not to be collected or utilized, *e.g.* by an assessment whether a market has emerged for that type of biomass residue (if yes, leakage is assumed not be ruled out) or by showing that it would still not be feasible to utilize the biomass residues for any purposes.
Source of data to be used:	Information from the site where the biomass is generated
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Data type: Estimated Recording frequency: Annually. Data archiving policy: Paper/ Electronic Monitoring procedure: Independent surveys
QA/QC procedures to be applied:	-
Any comment:	Monitoring of this parameter is applicable if approach L_1 is used to rule out leakage

Data / Parameter:	**-**
Data unit:	Ton
Description:	Quantity of biomass residues of type *k* that are utilized (*e.g.* for energy generation or as feedstock) in the defined geographical region
Source of data to be	Surveys or statistics

used:	
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Data type: Estimated Recording frequency: Annually. Data archiving policy: Paper/ Electronic Monitoring procedure: Based on independent survey or published statistics
QA/QC procedures to be applied:	-
Any comment:	Monitoring of this parameter is applicable if approach L2 is used to rule out leakage

Data / Parameter:	-
Data unit:	Ton
Description:	Quantity of available biomass residues of type *k* in the region
Source of data to be used:	Surveys or statistics
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Data type: Estimated Recording frequency: Annually. Data archiving policy: Paper/ Electronic Monitoring procedure: Based on independent survey or published statistics
QA/QC procedures to be applied:	-
Any comment:	Monitoring of this parameter is applicable if approach L2 is used to rule out leakage

Data / Parameter:	-
Data unit:	-
Description:	Availability of a surplus of biomass residue type *k* (which can not be sold or utilized) at the ultimate supplier to the project and a representative sample of other suppliers in the defined geographical region.
Source of data to be used:	Surveys
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-

Description of measurement methods and procedures to be applied:	Data type: Estimated Recording frequency: Annually. Data archiving policy: Paper/ Electronic Monitoring procedure: Based on independent surveys.
QA/QC procedures to be applied:	-
Any comment:	Monitoring of this parameter is applicable if approach L_3 is used to rule out leakage

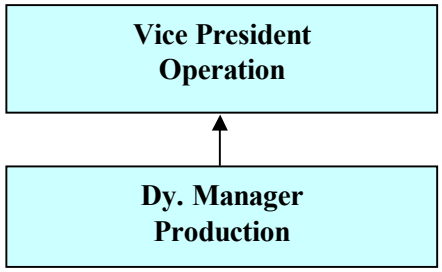
Data / Parameter:	**$EF_{burning,CH4,k,y}$**
Data unit:	tCH_4/ton of biomass
Description:	CH_4 emission factor for uncontrolled burning of the biomass residue type *k* during the year *y*
Source of data to be used:	Measurements or referenced and reliable default values (*e.g.* IPCC)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.0027
Description of measurement methods and procedures to be applied:	Data type: Estimated Recording frequency: Annually. Data archiving policy: Paper/ Electronic Monitoring procedure: As per the methodology.
QA/QC procedures to be applied:	Cross-check the results of any measurements with IPCC default values. If there is a significant difference, check the measurement method and increase the number of measurements in order to verify the results.
Any comment:	-

B.7.2 Description of the monitoring plan:

>>

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

Organisational structure for monitoring plan



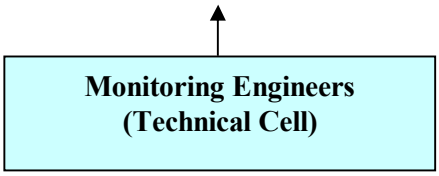


Table 7: Monitoring and calculation activities and responsibility

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 B.7 of PDD.
Review	All received data is reviewed by the engineers in the technical cell.
Data compilation	All the data is compiled and stored in technical cell.
Emission calculation	Emission reduction calculations will be done annual based on the data collected. Engineers of technical cell will do the calculations
Review	Dy. Manager will review the calculation.
Emission data review	Final calculations is reviewed and approved by VP operation.
Record keeping	All calculation and data record will be kept with the technical cell.

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

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Date of completing the final draft of this baseline and monitoring methodology:

11/12/07

Name of person/entity determining the baseline:

Binani Cement Limited and its associated consultants.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>
20/02/2004

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

>>
20 years 0 months

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

C.2.1. Renewable crediting period

>>
Not applicable

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

>>
Not applicable

C.2.1.2. Length of the first crediting period:

>>
Not applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
The starting date of crediting period will be the date of registration of the project activity. For calculation purposes 01/01/2008 is taken as date of starting of crediting period.

C.2.2.2. Length:

>>
10 years 0 months

SECTION D. Environmental impacts

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

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As per the Ministry of Environment and Forests (MoEF), Government of India, under the Environment Impact Assessment Notification (EIA) vide S.O. 1533 dated 14/09/06[2], the project under consideration does not require any EIA to be conducted.

The BCL's CDM project activity ensures maximum global and local benefits in relation to certain environmental and social issues and is a small step towards sustainable development. The project activity does not have any significant negative environmental impact at the site. The GHG emission reduction from project activity benefits the global environment.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

>>

Project activity does not lead to any significant negative environmental impact. Neither does the host country require EIA study to be conducted for this kind of projects.

Unmanaged use of alternative fuel may lead to some dust emissions. BCL has installed proper fuel handling system for avoiding the dust emissions. The materials department ensures that the alternative fuel is transported in closed trucks or bags. The fuel transportation system is automated and covered and there is no chance for emissions. To ensure dust free operation, BCL has already installed bag filter in transfer point of alternate fuel feeding system and hence project activity has considered safeguards for environment and doesn't cause any significant environmental impacts.

[2] http://envfor.nic.in/legis/eia/so1533.pdf

SECTION E. Stakeholders' comments

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

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The project activity by BCL is at their cement plant in Rajasthan. The project activity will use eco- friendly biomass residue as fuel.

The various stakeholders identified for the project are as under.

- Body of representatives administering the local area
- Alternate fuel suppliers
- Consultants
- Plant employees
- Equipment suppliers

BCL involved the concerned stakeholders and sought their comments for the project activity during the meeting held on 15.01.05 and minutes of meeting were duly recorded by the project proponent.

E.2. Summary of the comments received:

>>

The project activity is environment friendly and creates business opportunity. The project activity has provided the proper waste utilisation system in developing country like India. The project proponent has not received any negative comment from any stakeholder. Local population stressed on the closed transportation of the alternate fuel from outside.

The detailed minutes of meeting will be provided to the DOE at the time of validation.

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

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There is no negative comment on the project activity.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Binani Cement Limited
Street/P.O.Box:	Binanigram
Building:	
City:	Sirohi
State/Region:	Rajasthan
Postfix/ZIP:	307025
Country:	India
Telephone:	02971-228280
FAX:	02971-225020
E-Mail:	
URL:	
Represented by:	
Title:	Vice-President (Operations)
Salutation:	Mr
Last Name:	Lal
Middle Name:	
First Name:	Darshan
Department:	Operations
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	Darshan@binanicement.co.in

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding including ODA is available in this project.

Annex 3

BASELINE INFORMATION

The baseline information is attached as separate excel sheet with enclosure 1: CER calculation.

Annex 4

MONITORING INFORMATION

Monitoring will be done as per section B.7.2.

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