CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 02 - in effect as of: 1 July 2004)

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

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ACEL Blended cement project at Sankrail grinding unit
Version 6, 15/12/06

A.2. Description of the project activity:

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The project activity consists of an increase in the blending of fly ash in the PPC cement produced by Ambuja Cements Eastern Ltd. (ACEL). The project was originally one of the Gujarat Ambuja Cements Limited (GACL) blended cements projects (these have already been submitted to the MoEF). However, due to corporate activity, the ACEL project has now been submitted as a separate project activity as the host company is different.

The current percentage blend of fly-ash in PPC produced by ACEL is 26%, and the project activity is expected to enable ACEL to increase this to 32% and above.

The current fly ash blend level represents a plateau for ACEL and to increase the blend above this level requires significant effort and investment and involves a number of barriers. To help overcome these barriers ACEL is utilising the CDM.

The project activity will displace clinker with fly ash in the production of PPC. This will reduce clinker production and the associated CO_2 emissions.

The project contributes to sustainable development in a number of ways. In terms of social well being, the cement plant is an important local employer. The project activity will directly increase employment in research and marketing personnel. In addition, ACEL provides education facilities for 1200 local students, local health facilities such as immunisation and HIV advice and rural infrastructure. In terms of economic well being, the project activity has resulted in additional investment in research and marketing, as well as in fly ash handling facilities. A major impact of the project activity is in terms of environmental well being – limestone is a finite resource, and the (open cast) mining of limestone can have adverse environmental effects. Fly ash is a by-product of electricity generation, and is a product for which disposal can be difficult. Replacing limestone-derived clinker with fly ash therefore provides two benefits. Moreover, clinker production is highly energy intensive. Reducing clinker production will therefore conserve energy and given the power shortages that are prevalent in many parts of India, will assist India's overall development process. The project will also reduce emissions of greenhouse gases. Finally, in terms of technological well being, the project activity involves the development of specific technologies to increase the fly ash content of PPC. The technology involved in blending fly ash has been developed indigenously by GACL and ACEL, and these organisations have referred of a number of scientific studies that have been carried out in Annex 1 countries on options available for increasing the blending of fly ash and on the properties of PPC. The project contributes to sustainable development in a number of ways. A key impact of the project activity is environmental – limestone is a finite resource, and the (open cast) mining of limestone can have adverse environmental effects. Fly ash is a by-product of electricity generation, and is a product for which disposal can be difficult. Replacing limestone-derived clinker with fly ash therefore provides two benefits. Moreover, clinker production is highly

energy intensive. Reducing clinker production will therefore conserve energy and given the power shortages that are prevalent in many parts of India, will assist India's overall development process.

A.3. Project participants:

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Name of Party involved	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as a project participant
India (host)	Private entity: Ambuja Cements Eastern Ltd.	No
United Kingdom	Private entity: Agrinergy Ltd.	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

>> The project takes place at the cement grinding plant owned and run by ACEL. The location of this cement plants is:

Sankrail Unit
P.O. Dhulagori
Village Sankrail
Howdah 711 302
W. Bengal

Latitude: 22o34'N
Longitude: 88o14'E

A.4.1.1. Host Party(ies):

>> India

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

>>
W. Bengal

A.4.1.3. City/Town/Community etc:

>>
Village Sankrail, Howrah

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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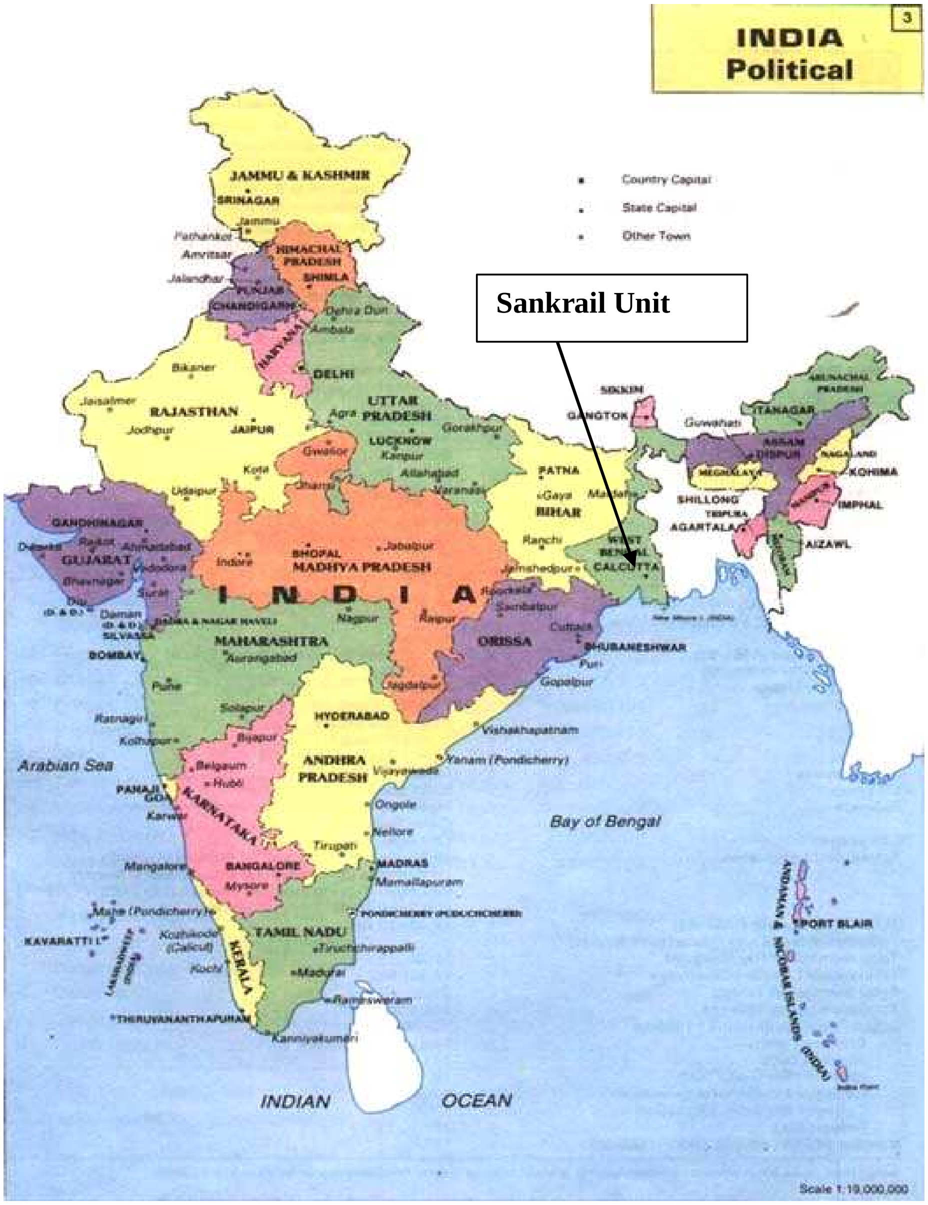
The details of the plant location are outlined above. The cement plant is easily visable and uniquely identifiable. Its location in the wider context of India is outlined in the map below.


3
INDIA
Political
Country Capital
State Capital
Other Town
Sankrail Unit
JAMMU & KASHMIR
SRINAGAR
HIMACHAL PRADESH
SHIMLA
PUNJAB
CHANDIGARH
HARYANA
DELHI
RAJASTHAN
JAIPUR
UTTAR PRADESH
LUCKNOW
BIHAR
PATNA
SIKKIM
GANGTOK
ASSAM
DISPUR
MEGHALAYA
SHILLONG
KOHIMA
IMPHAL
AGARTALA
AIZAWL
WEST BENGAL
CALCUTTA
GUJARAT
GANDHINAGAR
MADHYA PRADESH
BHOPAL
I N D I A
MAHARASHTRA
BOMBAY
ORISSA
BHUBANESHWAR
HYDERABAD
ANDHRA PRADESH
KARNATAKA
BANGALORE
TAMIL NADU
MADRAS
KERALA
THIRUVANANTHAPURAM
PANAJI
GOA
KAVARATTI
Arabian Sea
Bay of Bengal
PORT BLAIR
INDIAN
OCEAN
Scale 1:10,000,000

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

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Manufacturing industries

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

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The annual capacity of the Sankrail grinding unit is 1 million tonnes cement. The Sankrail grinding unit utilises clinker that is produced at the Bhatapara clinkerisation unit, also owned by ACEL. The Bhatapara unit is situated in Chhattisgarh and in 2003-4 produced 1.1 million tonnes of clinker, of which 0.6 million tonnes was utilised by the Sankrail unit.

The technology involved in blending fly ash has been developed indigenously by ACEL and GACL. However, ACEL and GACL have referred of a number of scientific studies that have been carried out in Annex 1 countries on options available for increasing the blending of fly ash and on the properties of PPC.

A.4.4. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed CDM project activity, including why the emission reductions would not occur in the absence of the proposed project activity, taking into account national and/or sectoral policies and circumstances:

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The project activity consists of increasing the blending of fly ash in PPC produced at the project site. This will reduce clinker production and associated GHG emissions (at Bhatapara). As outlined in the methodology, these emissions arise from the calcinations of limestone, fossil kiln fuel combustion and consumption of electrical energy.

The proposed project will take the additive blend to a level that is "first of its kind" and which will require a number of barriers to be overcome. A considerable R&D effort has been and will continue to be made to enable the increase in fly-ash blending associated with the project activity, whilst crucially maintaining the quality and reputation of Ambuja Eastern PPC. At the same time, considerable marketing and educational effort must be undertaken to ensure that customers are aware that the quality and properties of the brand remains the same, despite the increased fly ash content.

In the absence of the project activity, these actions would not be undertaken, and the fly ash blend of PPC produced by the Sankrail unit would remain at the current level. Under this (baseline) scenario, clinker production per tonne of cement and hence GHG emissions would also be higher.

A.4.4.1. Estimated amount of emission reductions over the chosen crediting period:

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Years	Annual estimation of emission reductions in tonnes of CO2e
Year 1	25061
Year 2	44270
Year 3	43487
Year 4	32221
Year 5	25999
Year 6	33030
Year 7	22151
Year 8	11054
Year 9	0
Year 10	0
Total estimated reductions (tonnes of CO2e)	237272
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO2 e)	23727

N.B. These emissions reductions are projections. The actual amount of emissions reductions generated will be dependant on the success ACEL achieves in overcoming the technical and market barriers to an increase in the fly ash blend.

A.4.5. Public funding of the project activity:

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The project activity has received no public funding.

SECTION B. Application of a baseline methodology

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

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ACM0005, version 3, 19th May 2006

"Consolidated Baseline Methodology for Increasing the Blend in Cement Production"

B.1.1. Justification of the choice of the methodology and why it is applicable to the project activity:

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The methodology used has been specifically designed for project activities of this kind. In terms of the specific applicability conditions:

- There is no shortage of additives to prevent leakage related to the lack of blending materials – The project activity will result in an increase in the percentage of fly ash blended in PPC produced at the ACEL cement plant. The ACEL plant is situated in India. Fly ash production in

India is estimated at around 90 million tonnes per year, whilst annual utilisation is estimated at 13 million tonnes[1]. Disposal of fly ash in India is considered an environmental problem. We can therefore conclude that there is sufficient supply of fly ash that the project activity will not lead other PPC producers to reduce their fly ash blend rate.

- The methodology is applicable to domestically sold output of the project activity sold plant and excludes export of blended cement types – This is the case.
- Adequate data are available on cement types in the market – This is the case. A database has been obtained from the Cement Manufacturers Association of India.

B.2. Description of how the methodology is applied in the context of the project activity:

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Baseline Scenarios

The first element of the methodology is to identify the baseline scenario. Production of fly ash based PPC in India is subject to the Bureau of Indian Standards specification IS: 1489 (Part 1). This specifies that the percentage of pozzolana material (i.e. fly ash) in PPC must fall between the ranges of 15% to 35%. The current blend level is 26%. This is an optimum level that has been reached based on the clinker and fly ash quality at the plant, and taking into account the views of PPC users. This level falls within the range specified by IS: 1489 (Part 1) and there is no requirement or need for this level to be increased. The likely baseline scenario is the continuation of the current blend level, although in Section B.3 we also evaluate the project activity as a potential baseline scenario.

In addition to the project activity and maintenance of the current blend level, other theoretically possible baseline scenarios consist of:

- A reduction in the blend level
- A switch to production of Ordinary Portland Cement (OPC)
- A switch to production of another type of cement (e.g. Portland Blast Furnace Slag Cement)

Given the barriers to increasing the blend of fly ash in PPC, and the continued prevalence of customer resistance to high fly-ash blended cements, there is a possibility that ACEL would reduce the fly-ash blend. However, demonstrating that this would occur is difficult and indeed this is an unlikely baseline scenario. We can exclude this course of action as doing so is a conservative assumption. A switch to PBFS is a potential possibility. However, PBFS production is limited to areas where there is availability of slag from steel plants. This is not the case at the project activity cement plant, and this option can therefore also be ruled out.

The realistic and credible alternatives can therefore be restricted to two – the existing practice of cement production and the proposed project activity – and therefore the tool for demonstration of additionality is used to determine the most likely baseline scenario (see Section B.3.).

Baselines Emissions

The first element in the calculation of baseline emissions is the baseline benchmark share of clinker in PPC. In line with the applied methodology this is calculated as the lowest value among the following:

[1] Source: http://www.tifac.org.in/news/flymgm.htm. TIFAC is an autonomous organisation under the Indian Department of Science and Technology

(i) The average (weighted by production) mass percentage of clinker for the 5 highest blend cement brands for the relevant cement type in the region; or

(ii) The production weighted average mass percentage of clinker in the top 20% (in terms of share of additives) of the total production of the blended cement type in the region; or

(iii) The mass percentage of clinker in the relevant cement type produced in the proposed project activity plant before the implementation of the CDM project activity.

The first step is to define the relevant region for each project. As outlined in the methodology:

Definition of Regions

"The "Region" for the benchmark calculation needs to be clearly determined and justified by project participants. The default is the national market but PPs can define a geographic region as the area where each of the following conditions are met: (i) at least 75% of project activity plant's cement production is sold (percentage of domestic sales only); (ii) includes at least 5 other plants with the required published data; and (iii) the production in the region is at least four times the project activity plant's output. Only domestically sold output is considered and any export of cement produced by the project activity plant are excluded in the estimation of emission reductions."

We choose not to define the region as the national market. This can be justified because India is a large country – the key elements which define the extent of additive blending (fly ash and clinker quality and market perceptions) vary greatly within the country. Moreover, the cost and time of moving cement around the country make this unfeasible. For these reasons, a state based approach is deemed most appropriate. The state in which the plant is located is also the state where most of the cement output of the plant is sold. We then extend the region to adjacent states that purchase the next most cement from the plant. We do this until the region accounts for at least 75% of the cement plant's sales (as required by ACM0005).

The region is defined as the area that meets the above three criteria for the project activity plant: W. Bengal, Jharkand, Orissa, and Chhattisgarh. An explanation of how this regional definition meets the three criteria outlined in the methodology is provided below.

The **first region definition condition** is that it is the area within which at least 75% of the project activity plant's cement production is sold (domestic sales only). The final row of the table below outlines the percentage of domestic sales occurring within the defined Region and illustrates that this criteria is met.

ACEL Plantwise Despatches to States - 2003-2004 (tonnes)

State	Sales
West Bengal	912,789
Assam	48,961
Orissa	-
Jharkhand	-
Bihar	-
Nepal(Export)	-
Andaman Niccobar	2,425
Mizoram	990
% of Total Domestic Sales in Region	**95%**

Source: ACEL

The **second region definition condition** is that the Region includes at least 5 other plants with the required published data. There are 12 cement plants in the region which produce PPC. However, 4 of these plants (Chaibasa, Singbhum, Rajgangpur and ACC Bargarh) produce a large volume of slag based cement (77%, 64%, 70% and 70% of total cement production respectively). This means that calculation from CMA data of the clinker content of PPC is unreliable, and the figures given for these 4 plants are outside of regulatorally allowed and/or feasible levels. The table below therefore outlines the other 7 cement plant in the identified Region with the required data, and also shows the percentage of clinker in PPC at each of these cement plants. As required, there are at least 5 plants in the region with the required data.

Idcol Bargarh	83%
Hirmi	77%
Jharsuguda	76%
Tilda	76%
Raipur	76%
Durgapur	74%
Bilaspur	68%

Source: CMA

The **third** and final **region definition condition** is that cement production in the region is at least four times the project activity plant's output. The table below shows the cement production of the region and of that of the project activity cement plant. As can be seen, the share of the project activity plant's output is well below 25% of the Region's production.

Cement plant output	923,960
Cement Production of Region	16,112,680
% of total	6%

Source: ACEL, CMA

Determination of benchmark

Having established the regions, the next step is to determine the benchmark clinker and additive content of PPC in each region. As outlined in the applied methodology, the benchmark for baseline emissions is defined as the lowest among the following:

(i) The average (weighted by production) mass percentage of clinker for the 5 highest blend cement brands for the relevant cement type in the region; or

(ii) The production weighted average mass percentage of clinker in the top 20% (in terms of share of additives) of the total production of the blended cement type in the region; or

(iii) The mass percentage of clinker in the relevant cement type produced in the proposed project activity plant before the implementation of the CDM project activity.

To determine (i) and (ii) above, the methodology stipulates either statistically significant random sampling or the use of reliable and up to date annual data from a reputable and verifiable source. Data on OPC and PPC production and on clinker production and grinding at cement plants in India is provided by the Cement Manufacturers Association of India (CMA). This data, which is from a reputable source and is verifiable, is used to derive the clinker content in PPC produced the above region. For consistency, the same data is used to determine (i).

Benchmark clinker content, 2003-4	
(i)	71.9%
(ii)	68.2%
(iii)	68.7%

Source: CMA data

The methodology stipulates that the lowest value among the three options be selected as the benchmark baseline for the base year (2003-4). This is 68.2%.

Trend increase in additive blend

As outlined in the methodology, we have selected to specify **ex-ante** an annual increase in the additive blend. The reason for this is to alleviate the monitoring burden and importantly to increase the certainty of CER volumes.

The large scale production of PPC in India is a recent phenomenon. PPC production has increased from 15.57 million tonnes in 1998-99 to 60.23 million tones in 2004-5. For this reason, the historical data on the blending of fly-ash is neither detailed nor reliable enough to base a trend analysis upon. Moreover, the level of fly-ash blending being considered as part of the project activity is qualitatively different to levels previously blended and therefore analysis of previous blending levels, even if feasible, would not provide a meaningful basis for estimating baseline emissions. For these reasons, we select the minimum

annual 2% increase in additives as outlined in the methodology. Incorporation of this trend increase is conservative as the likely baseline scenario is a continuation of the current blend level.

Baseline Emissions Factors

Having determined the benchmark for baseline emissions, specific baseline emissions factors must be calculated. As outlined in the methodology, baseline emissions per tonne of blended cement type are:

$$BE_{BC,y} = \lfloor BE_{clin\,\mathrm{ker}} * B_{Blend,y} \rfloor + BE_{ele\_ADD\_BC}$$

where

$BE_{BC,y}$ = Baseline CO_2 emissions per tonne of blended cement type (BC) (tCO_2/tonne BC)

$BE_{clin\,\mathrm{ker}}$ = CO_2 emissions per tonne of clinker in the baseline in the project activity plant (tCO_2/tonne clinker)

$BE_{Blend,y}$ = Baseline benchmark of share of clinker per tonne of BC updated for year y (tonne of clinker/tonne BC)

$BE_{ele\_ADD\_BC}$ = Baseline electricity emissions for BC grinding and preparation of additives (tCO_2/tonne of BC)

Calculation of $BE_{clin\,\mathrm{ker}}$ *:*

$$BE_{clin\,\mathrm{ker}} = BE_{calcin} + BE_{fossil\_fuel} + BE_{ele\_grid\_CLNK} + BE_{ele\_sg\_CLNK}$$

BE_{calcin} is the baseline emissions per tonne of clinker due to calcinations of calcium carbonate and magnesium carbonate (tCO_2/tonne clinker). The table below outlines BE_{calcin} for the year 2003-4, calculated from actual company data. (This data is based on the Bhatapara clinkerisation unit).

BE_{calcin} **(tCO_2/tonne clinker)**
0.525

BE_{fossil_fuel} is the baseline emissions per tonne of clinker due to combustion of fossil fuels for clinker production (tCO_2/tonne clinker). The table below outlines BE_{fossil_fuel} for the year 2003-4, calculated from actual company data.

BE_{fossil_fuel} **(tCO_2/tonne clinker)**
0.321

$BE_{ele\_grid\_CLNK}$ are the baseline grid electricity emissions for clinker production per tonne of clinker (tCO_2/tonne clinker). The table below outlines $BE_{ele\_grid\_CLNK}$ for the year 2003-4, calculated from actual company data.

$BE_{ele\_grid\_CLNK}$ **(tCO_2/tonne clinker)**
0.050

$BE_{ele\_sg\_CLNK}$ are the baseline emissions from self generated electricity for clinker production per tonne of clinker (tCO_2/tonne clinker). The table below outlines $BE_{ele\_sg\_CLNK}$ for the year 2003-4, calculated from actual company data.

$BE_{ele\_sg\_CLNK}$ **(tCO_2/tonne clinker)**
0.012

Calculation of $BE_{ele\_ADD\_BC}$ *:*

$$BE_{ele\_ADD\_BC} = BE_{ele\_grid\_BC} + BE_{ele\_sg\_BC} + BE_{ele\_grid\_ADD} + BE_{ele\_sg\_ADD}$$

$BE_{ele\_grid\_BC}$ are the baseline grid electricity emissions for BC grinding (tCO_2/tonne of BC). The table below outlines $BE_{ele\_grid\_BC}$ for the year 2003-4, calculated from actual company data.

$BE_{ele\_grid\_BC}$ **(tCO_2/tonne BC)**
0.0

$BE_{ele\_sg\_BC}$ are baseline self generated emissions for BC grinding (tCO_2/tonne of BC). The table below outlines $BE_{ele\_sg\_BC}$ for the year 2003-4, calculated from actual company data.

$BE_{ele\_sg\_BC}$ **(tCO_2/tonne BC)**
0.0316

ACEL do carry out separate grinding of preparation of fly ash and hence $BE_{ele\_grid\_ADD}$ (baseline grid emissions for additive preparation) and $BE_{ele\_sg\_ADD}$ (baseline self generated electricity emissions for additive preparation) are calculated as outlined below:

$BE_{ele\_grid\_ADD}$ **(tCO_2/tonne BC)**
0.0

$BE_{ele\_sg\_ADD}$ **(tCO_2/tonne BC)**
0.0002

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 CDM project activity:

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As outlined in the methodology, we use the additionality tool developed by the EB, modified for the specifics of the project type, to evaluate additionality of the project activity. ACEL, as far as marketing, technical services and strategy, is part of Gujarat Ambuja Cements Ltd. (GACL). For this reason, additionality is determined based on decisions and resources of both GACL and ACEL.

Step 0: Preliminary screening of projects started after 1 January 2000 and prior to December 2005

The project activity started (i.e. real action began) in November 2003. This falls between 1 January 2000 and the first registration of a CDM project activity (18^{th} November 2004). There is a wealth of evidence demonstrating that ACEL, as part of GACL, seriously considered the CDM at the time it was taken to proceed with the project activity. Specifically:

- A proposal was submitted by consultants to the GACL in July 2002. This was titled "Harnessing Opportunities CDM/Carbon Credits".
- GACL Officials attended a Workshop on Opportunities of CDM Projects organised by the Environmental Protection Training & Research Institute in December 2002.
- GACL Officials participated in the Workshop organised in Oct.2003 by the British High Commission on Indian Industrial Sector: CDM Capacity Building Project-Cement. A PIN was submitted subsequent to this workshop.
- PIN Produced in November 2003
- GACL Officials attended the South Asian Forum organised by TERI in Feb. 2004 covering CDM
- Under the Indo German technical collaboration GACL submitted a PIN to CDM-India Jan.2004

In addition to the above, extensive discussions were held between GACL, ACEL and Agrinergy Ltd prior to the start of the project activity, and Agrinergy proceeded with the CDM aspects of the project activity alongside the ACC blended cement project (which is one of the methodology submissions upon which the consolidated methodology is based).

We can therefore provide evidence that the CDM was seriously considered at the time the decision was taken to proceed with the project activity and may move to additionality Step 1.

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

As outlined in Section B2., the available alternatives are:

- The project activity not carried out as a CDM project activity
- The continuation of current practice

Sub-step 1b. Enforcement of applicable laws and regulations:

Production of fly ash based PPC in India is subject to the Bureau of Indian Standards specification IS: 1489 (Part 1). This specifies that the percentage of pozzolana material (i.e. fly ash) in PPC must fall between the ranges of 15% to 35%. Both of the above alternatives will meet this requirement.

The Ministry of Environment and Forests requires coal and lignite power plants subject to environmental clearance conditions to submit an action plan showing how they will achieve full utilisation of fly ash. However there are no regulatory requirements on cement plants to assist in accomplishing this.

From the above discussion, we conclude that both alternatives are in compliance with applicable laws and regulations.

Step 2. Investment analysis OR

Step 3. Barrier analysis.

Barrier analysis is selected.

Sub-step 3a. Identify barriers that would prevent the implementation of type of the proposed project activity:

As has been highlighted, the increase in fly ash blending that will occur as a result of the project activities will take the blend to a level that exceeds that which represents the best common practice within each project activity plant's region.

Blending targets for each GACL and ACEL cement plant producing PPC are set at a central level, based on marketing and research advice and taking account of plant specific factors, including limestone, clinker and additive quality. As a result of the project activity, ACEL has increased the target blend rate at Sankrail. However there are a number of important barriers preventing implementation of the target rate. These barriers can be characterised as:

1. Technical barriers

It is very difficult to increase the percentage of fly ash in PPC to the levels anticipated as part of the project activity whilst maintaining the quality of the cement. Early strength at 1^{st} and 3^{rd} days is a very important element of cement quality, and increasing the fly-ash content will *a priori* reduce early strength. This is the key barrier to increasing the share of fly ash (it should be noted that as the blend level increases, incremental increases in the fly ash content are harder to obtain).

The quality and hydraulic potential of clinker acts as a barrier to increasing the fly ash blend as does the fineness of high fly ash PPC and the distribution of fly ash components in coarse fractions of cement.

It is absolutely vital that the quality of ACEL PPC is maintained as otherwise its reputation and hence sales will suffer. Maintaining the quality of the cement, whilst increasing the blending of fly ash additives represents a major technical barrier to implementation of the project activity.

There are also technical barriers relating to the use of high fly ash PPC. Builders must be educated on the use of high fly ash PPC as well as reassured as to its quality (see below).

2. Market resistance to high fly ash blended cement.

It is crucial that the increased blending of fly ash neither reduces the quality of ACEL PPC produced, nor results in a customer perception that the cement is of a lower quality.

In India there is still a general perception that the quality of blended cements is inferior to that of OPC, and therefore that PPC with a higher fly ash blend is undesirable. PPC acceptance is in particular low in some government agencies – the Central Public Works Department has imposed a ban on the use of blended cements in bridges and other concrete works and constructions. The majority of sales of ACEL PPC are to Bengal Ambuja and through dealers and retailers, and are hence outside of the public sector demand sphere. Nonetheless, the impact of the CPWD ban on the perceptions of the private sector on high fly ash PPC is real and negative. The CPWD ban therefore does act as a barrier to demand for high fly ash PPC, through both direct and indirect routes.

Moreover, there is a general perception that fly ash reduces cement strength and increases setting time. Early strength at first and third days is particularly important to the customers of ACEL and the ability to increase the blend whilst maintaining early strength, and then convincing customers this is the case, represent major barriers to implementation of the project activity. The a-priori assumption of customers is that a high fly ash PPC is of an inferior quality and therefore they will tend not to purchase such cement. Moreover, there is the potential that the brand name could be negatively impacted by the blend increase.

There is documented evidence that customers raise questions and have concerns with high fly ash PPC. Concerns raised include complaints that: the compressive strength of high fly ash cement is low, it requires more water and the corrosion protection of concrete with high fly ash cement is low.

Sub-step 3b. Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the project activity):

The alternative to the project activity is the continuation of current practice. This would face none of the barriers outlined above.

Implementation of the alternative of the project activity not carried out as a CDM project activity is prevented by the identified barriers.

Step 4. Common Practice Analysis
As outlined in Section B.2., the baseline level from which the project activity will increase the fly ash blend in PPC exceeds common practice in the relevant system boundary.

Step 5. Impact of CDM Registration
The CDM will allow ACEL to overcome the barriers to increased fly ash absorption. CDM status provides two key benefits to GACL and ACEL; the first is the prospect of CDM revenue. The second benefit, which should not be underestimated, is a desire to gain experience in the CDM and to provide demonstrable evidence that the company is making serious and concerted efforts to reduce GHG emissions. The cement industry is acutely aware of the high emissions associated with cement production and is keen to utilise the CDM to reduce these.

Both of the above factors crucially have and will continue to allow the company to dedicate research and marketing effort to overcoming the barriers outlined in Step 2. It is the prospect of the CDM that allows these actions to be undertaken. In the absence of the CDM, ACEL would not undertake these activities and thus the project activity not carried out as a CDM project activity is not a realistic scenario.

The Marketing Division and Technical Services Division are responsible for overcoming the technical and market related barriers to the blend increase.

Research
Research is carried out at the GACL Research Centre located in Ambujanagar. This is part of the Technical Services Department, which is based in Ahmenabad. The Research Centre has had to utilise sophisticated equipment and techniques to allow for an increase in the fly ash blend. These include Microscopy, use of a Particle Size Analyser, an Atomic Absorption Spectrometer, a High Temperature Furnace and Laboratory separator and Ball mills for characterization of fly ash, clinker, raw mix design and gypsum.

Key elements of Research and process:
- Hydration of OPC liberates lime - Ca(OH)2
- Active silica in PPC reacts with liberated Ca(OH)2
- The reaction makes silicate gel
- This blocks voids and capillary pores and thus, lowers permeability and increases durability.
- Improving the reactivity of fly-ash

The following studies have been undertaken by the Technical Services Department:

- Evaluation of fly ash from captive TPS of Nirma Chemicals, Bhavanagar
- Fly ash study from TPS Gandhinagar
- Quality and Optimisation of OPC fineness for producing PPC by Blending with fly ash from TPS, Ukai
- Report on Dadri Fly ash

In addition to these studies, a global fly ash supply and clinker compatibility study has been undertaken.

A team of 15 are working at the Research Centre on how to increase the fly ash blend. These personnel are complemented by staff from each individual plant's laboratory. Approximately 3,800 samples of concrete and mortar have been analysed as part of the process of increasing the blend.

Marketing
The Technical Services Division works closely with marketing teams. In each state Technical Services has employed engineers to deal with customer concerns over the quality and usability of PPC. A total of

145 engineers are employed by Technical Services across the country. Since the inception of the CDM project activity, these personnel have had to be trained in the benefits and use of high fly ash PPC.

Technical Services have run a series of workshops, seminars and programs for customers on a town-to-town basis advising on the use of PPC and convincing users that high fly-ash PPC is of an acceptable quality.

A key target of the marketing and technical advice is cement dealers. The marketing department is in constant contact with cement dealers and are able to call in Technical Services when dealers have concerns over the use and quality of high fly-ash PPC. As outlined in the methodology, we use the additionality tool developed by the EB, modified for the specifics of the project type, to evaluate additionality of the project activity.

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

>>

The project boundary includes the cement production plant, any onsite power generation and the power generation in the grid.

Emissions from the following emission sources are accounted for:

- Direct emissions at the cement plant due to fuel combustion for:
  - Firing the kiln (including supplemental fuels used in the precalciner);
  - Processing (including drying) of solid fuels, raw materials, and additives;
  - On-site generation of electricity (if applicable).

- Direct emissions due to calcination of limestone
- Indirect emissions from fossil fuel combustion in power plants in the grid due to electricity use at the cement plant, including electricity consumption for:
  - Crushing and grinding the raw materials used for clinker production;
  - Driving the kiln and kiln fans;
  - Finish grinding of cement;
  - Processing of additives.

The (regional) power grids or plants from which the cement plant purchases electricity and its losses are considered in determining indirect emissions. Transport related emissions from the delivery of additional additives are included in the emissions related to the project activity as leakage. Emissions reductions from transport of raw materials for clinker production are not taken into account as a conservative simplification.

Gases included: CO_2 only. Changes in CH_4 and N_2O emissions from combustion processes are considered to be negligible and excluded because the differences in the baseline and project activity are not substantial. This assumption simplifies the methodology and is conservative.

The system boundary for the project covers the cement cluster or areas outlined in Section B.2.

Because the Sankrail unit is a clinkerisation unit and utilises clinker produced at the nearby sister Bhatapara unit, the Bhatapara unit is included within the project boundary.

The Sankrail unit is in the Eastern regional grid whilst the Bhatapara unit is in the Western regional grid. Electricity related emissions for clinker production are therefore subject to the calculated Western grid emission factor and electricity emissions from additive grinding and transport and blended cement grinding are subject to the calculated Eastern regional grid emission factor.

B.5. Details of baseline information, including the date of completion of the baseline study and the name of person (s)/entity (ies) determining the baseline:

>>

15/12/2006

Ben Atkinson, Agrinergy Ltd, project participant, contact details as outlined in Annex I.

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:

>>
1 November 2003

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

>>
20 years

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

The project activity has chosen a fixed ten-year crediting period.

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:

>>
1 January 2004

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 project activity:

>>
ACM0005, version 3, 19th May 2006
"Consolidated Monitoring Methodology for Increasing the Blend in Cement Production"

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

>>

The monitoring methodology is applicable to projects using the allied baseline methodology. In terms of the applicability conditions:

- There is no shortage of additives to prevent leakage related to the lack of blending materials – The project activity will result in an increase in the percentage of fly ash blended in PPC produced at the ACEL cement plant. The ACEL plant is situated in India. Fly ash production in India is estimated at around 90 million tonnes per year, whilst annual utilisation is estimated at 13 million tonnes[2]. Disposal of fly ash in India is considered an environmental problem. We can therefore conclude that there is sufficient supply of fly ash that the project activity will not lead other PPC producers to reduce their fly ash blend rate.
- The methodology is applicable to domestically sold output of the project activity sold plant and excludes export of blended cement types – This is the case.
- Adequate data are available on cement types in the market – This is the case. A database has been obtained from the Cement Manufacturers Association of India.

[2] Source: http://www.tifac.org.in/news/flymgm.htm. TIFAC is an autonomous organisation under the Indian Department of Science and Technology

D.2. 1. Option 1: Monitoring of the emissions in the project scenario and the baseline scenario

This option is selected and is specified in the monitoring methodology followed.

D.2.1.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
1	$InCaO_y$	*Plant records*	*%*	*M,C*	*Daily*	*100%*	*Electronic*	*Will be calculated/measured as part of normal operations*
2	$OutCaO_y$	*Plant records*	*%*	*M,C*	*Daily*	*100%*	*Electronic*	*Will be calculated/measured as part of normal operations*
3	$InMgO_y$	*Plant records*	*%*	*M,C*	*Daily*	*100%*	*Electronic*	*Will be calculated/measured as part of normal operations*
4	$OutMgO_y$	*Plant records*	*%*	*M,C*	*Daily*	*100%*	*Electronic*	*Will be calculated/measured as part of normal operations*
5	*Quantity of clinker raw material*	*Plant records*	*Kilo tonnes*	*M*	*Annually*	*100%*	*Electronic*	
6	*CLNKy*	*Plant records*	*Kilo tonnes of clinker*	*M*	*Annually*	*100%*	*Electronic*	
7	FF_{i_y}	*Plant records*	*Tonnes of fuel i*	*M*	*Monthly*	*100%*	*Electronic*	
8	EFF_i	*IPCC/ Plant records*	*tCO2/tonne of fuel i*	*C/M*	*Annually*	*100%*	*Electronic*	
9	$PELE_{grid\_CLNK,y}$	*Plant records*	*MWh*	*M*	*Monthly*	*100%*	*Electronic*	
10	$EF_{grid,BSL}$	*Calculated ex-ante*	tCO_2/MWh	*N/a*	*N/a*	*100%*	*Electronic*	*Calculated ex-ante as per ACM0002*
11	$PELE_{sg\_CLNK,y}$	*Plant*	*MWh*	*M*	*Monthly*	*100%*	*Electronic*	

		records						
12	$EF_{sg,y}$	*Plant records*	tCO_2*/MWh*	*C*	*Monthly*	*100%*	*Electronic*	*IPCC factors*
13	*ADDy*	*Plant records*	*Kilo tonnes*	*M*	*Monthly*	*100%*	*Electronic*	
14	$PELE_{grid,BC,y}$	*Plant records*	*MWh*	*M*	*Monthly*	*100%*	*Electronic*	
15	$PELE_{sg,BC,y}$	*Plant records*	*MWh*	*M*	*Monthly*	*100%*	*Electronic*	
16	$PELE_{grid,ADD,y}$	*Plant records*	*MWh*	*M*	*Monthly*	*100%*	*Electronic*	
17	$PELE_{sg,ADD,y}$	*Plant records*	*MWh*	*M*	*Monthly*	*100%*	*Electronic*	
18	$F_{i,j,y}$	*Plant records*	*Tonnes of fuel i*	*M*	*Monthly*	*100%*	*Electronic*	
19	$COEF_{i,j,y}$	*IPCC/ Plant records*	tCO_2*/tonne of fuel i*	*C/M*	*Annually*	*100%*	*Electronic*	
20	$GEN_{j,y}$	*Plant records*	*MWh*	*M*	*Annually*	*100%*	*Electronic*	
21	$PE_{calcin,y}$	*Plant records*	tCO_2*/tonne clinker*	*C*	*Annually*	*100%*	*Electronic*	
22	$PE_{fossil\_fuel,y}$	*Plant records*	tCO_2*/tonne clinker*	*C*	*Annually*	*100%*	*Electronic*	
23	$PE_{ele\_grid\_CLNK,y}$	*Plant records*	tCO_2*/tonne clinker*	*C*	*Annually*	*100%*	*Electronic*	
24	$PE_{ele\_sg\_CLNK,y}$	*Plant records*	tCO_2*/tonne clinker*	*C*	*Annually*	*100%*	*Electronic*	
25	$PE_{ele\_grid\_BC,y}$	*Plant records*	tCO_2*/tonne blended cement*	*C*	*Annually*	*100%*	*Electronic*	
26	$PE_{ele\_sg\_BC,y}$	*Plant records*	tCO_2*/tonne blended cement*	*C*	*Annually*	*100%*	*Electronic*	
27	$PE_{ele\_grid\_ADD,y}$	*Plant records*	tCO_2*/tonne blended cement*	*C*	*Annually*	*100%*	*Electronic*	

28	$PE_{ele\_sg\_ADD,y}$	*Plant records*	*tCO_2/tonne blended cement*	*C*	*Annually*	*100%*	*Electronic*	
29	$P_{blend,y}$	*Plant records*	*Tonne of clinker/ tonne blended cement*	*C*	*Annually*	*100%*	*Electronic*	

D.2.1.2. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

>>

$PE_{BC,y}$ are estimated as below. In the project activity plant emissions are determined per unit of clinker or per unit of BC accounting for

(i) Emissions from calcinations of limestone;
(ii) Emissions from combustion of fossil fuel and electricity for clinker production and processing of raw material;
(iii) Emissions from electricity used for additives preparation and grinding of cement.

In determining the emissions reduction there are 3 possibilities:

(i) emissions per tonne of clinker during the crediting period are less than baseline emissions per tonne of clinker ($PE_{Clinker,y} < BE_{Clinker}$); or
(ii) baseline and year y emissions per tonne of clinker are equal ($PE_{Clinker,y} = BE_{Clinker}$);
or
(iii) emissions per tonne of clinker in year y are greater than the baseline emissions per tonne of clinker ($PE_{Clinker,y} > BE_{Clinker}$).

In case (i), the baseline value is substituted by the project activity value. That is, if emissions per tonne of clinker are lower during the crediting period, then the lower value is taken for the baseline.

In case (iii) the emissions per tonne of clinker are higher during the crediting period than the baseline. This could be due to declining efficiency or a fuel switch or some other reason. In this case, there is a possibility that project activity emissions exceed the baseline emissions for some years in the crediting period. In this case, the project does not get new credits for emissions reduction till the net balance for the project is positive. In the case that overall negative emission reductions arise in a year, ERs are not issued to project participants for the year concerned and in subsequent years, until emission reductions from subsequent years have compensated the quantity of negative emission reductions from the year concerned. (For example: if negative emission reductions of 30 tCO_2e occur in the year t and positive emission reductions of 100 tCO_2e occur in the year t+1, 0 CERs are issued for year t and only 70 CERs are issued for the year t+1.)

$PE_{BC,y} = [PE_{clinker,y} * P_{Blend,y}] + PE_{ele\_ADD\_BC,y}$

where:

$PE_{BC,y}$ = CO_2 emissions per tonne of BC in the project activity plant in year y(tCO_2/tonne BC)
$PE_{clinker,y}$ = CO_2 emissions per tonne of clinker in the project activity plant in year y (t CO_2/tonne clinker) and defined below

$P_{Blend,y}$ = Share of clinker per tonne of BC in year y (tonne of clinker/tonne of BC)

$PE_{ele\_AD,D\_BC,y}$ = Electricity emissions for BC grinding and preparation of additives in year y (tCO2/tonne of BC)

CO_2 per tonne of clinker in the project activity plant in year y is calculated as below:

$PE_{clinker,y} = PE_{calcin,y} + PE_{fossil\_fuel,y} + PE_{ele\_grid\_CLNK,y} + PE_{ele\_sg\_CLNK,y}$

where:

$PE_{clinker,y}$ = Emissions of CO_2 per tonne of clinker in the project activity plant in year y (tCO_2/tonne clinker)
$PE_{calcin,y}$ = Emissions per tonne of clinker due to calcinations of calcium carbonate and magnesium carbonate in year y (tCO_2/tonne clinker)
$PE_{fossil\_fuel,y}$ = Emissions per tonne of clinker due to combustion of fossil fuels for clinker production in year y (tCO_2/tonne clinker)
$PE_{ele\_grid\_CLNK,y}$ = Grid electricity emissions for clinker production per tonne of clinker in year y (tCO_2/tonne clinker)
$PE_{ele\_sg\_CLNK,y}$ = Emissions from self-generated electricity per tonne of clinker production in year y (tCO_2/tonne clinker)

$PE_{calcin,y} = 0.785*(OutCaO_y - InCaO_y) + 1.092*(OutMgO_y - InMgO_y) / [CLNK_y * 1000]$

where:

$PE_{calcin,y}$ = Emissions from the calcinations of limestone (tCO2/tonne clinker)
0.785 = Stoichiometric emission factor for CaO (tCO2/t CaO)
1.092 = Stoichiometric emission factor for MgO (tCO2/t MgO)
$InCaO_{,y}$ = CaO content (%) of the raw material * raw material quantity (tonnes)
$OutCaO_{,y}$ = CaO content (%) of the clinker * clinker produced (tonnes)
$InMgO_{,y}$ = MgO content (%) of the raw material * raw material quantity (tonnes)
$OutMgO_{,y}$ = MgO content (%) of the clinker * clinker produced (tonnes)

$PE_{fossil\_fuel,\ y} = [\sum FF_{i\_,y} * EFF_i] / CLNK_{,y} * 1000$

where:

$FF_{i\_,y}$ = Fossil fuel of type i consumed for clinker production in year y (tonnes of fuel i)
EFF_i = Emission factor for fossil fuel i (tCO2/tonne of fuel)

$CLNK_y$ = Annual production of clinker in year y (kilotonnes of clinker)

$PE_{ele\_grid\_CLNK,y} = [PELE_{grid\_CLNK,y} * EF_{grid\_y}] / [CLNK_y * 1000]$
where:

$PELE_{grid\_CLNK,y}$ = Grid electricity for clinker production in year y (MWh)
EF_{grid_y} = Grid emission factor in year y(t CO_2/MWh)
$CLNK_y$ = Annual production of clinker in year y (kilotonnes of clinker)

$PE_{elec\_sg\_CLNK,y} = [PELE_{sg\_CLNK ,y} * EF_{sg\_y}] /[CLNK_y * 1000]$
where:

$PELE_{sg\_CLNK,y}$ = Self generation of electricity for clinker production in year y (MWh)
EF_{sg_y} = Emission factor for self generated electricity in year y (t CO_2/MWh)
$CLNK_y$ = Annual production of clinker in year y (kilotonnes of clinker)

$PE_{ele\_ADD\_BC,y} = PE_{ele\_grid\_BC,y} + PE_{ele\_sg\_BC,y} + PE_{ele\_grid\_ADD,y} + PE_{ele\_sg\_ADD,y}$
where:

$PE_{ele\_grid\_BC}$ = Grid electricity emissions for BC grinding in year y (tCO2/tonne of BC)
$PE_{ele\_sg\_BC}$ = Emissions from self generated electricity for BC grinding in year y (tCO2/tonne of BC)
$PE_{ele\_grid\_ADD}$ = Grid electricity emissions for additive preparation in year y (tCO2/tonne of BC)
$PE_{ele\_sg\_ADD}$ = Emissions from self generated electricity additive preparation in year y (tCO2/tonne of BC)

$PE_{ele\_grid\_BC,y} = [PELE_{grid\_BC,y} * EF_{grid\_BSL,y}] /[BC_y * 1000]$

$PELE_{grid\_BC,y}$ = Baseline grid electricity for grinding BC (MWh)
EF_{grid_y} = Grid emission factor in year y(t CO_2/MWh)
BC_y = Annual production of BC in year y (kilotonnes of BC)

$PE_{elec\_sg\_BC,y} = [PELE_{sg\_BC,y} * EF_{sg\_y}] / [BC_y * 1000]$

$PELE_{sg\_BC,y}$ = Self generated electricity for grinding BC in year y (MWh)

EF_{sg_y} = Emission factor for self generated electricity in year y (t CO_2/MWh)
BC_y = Annual production of BC in year y (kilotonnes of BC)

$$PE_{ele\_grid\_ADD} = [\ PELE_{grid\_ADD} * EF_{grid\_y}] / [BC_y * 1000]$$

$BELE_{grid\_ADD}$ = Baseline grid electricity for grinding additives (MWh)
EF_{grid_y} = Grid emission factor in year y(t CO_2/MWh)
BC_y = Annual production of BC in year y (kilotonnes of BC)

$$PE_{elec\_sg\_ADD,y} = [PELE_{sg\_ADD,y} * EF_{sg\_y}] / [BC_y * 1000]$$

$PELE_{sg\_ADD,y}$ = Baseline self generation electricity for grinding additives (MWh)
EF_{sg_y} = Emission factor for self generated electricity in year y (t CO_2/MWh)
BC_y = Annual production of BC in year y (kilotonnes of BC)

D.2.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived :								
ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
30	$InCaO_{BSL}$	*Plant records*	*%*	*M,C*	*Daily*	*100%*	*Electronic*	*Will be calculated/measured as part of normal operations*
31	$OutCaO_{BSL}$	*Plant records*	*%*	*M,C*	*Daily*	*100%*	*Electronic*	*Will be calculated/measured as part of normal operations*
32	$InMgO_{BSL}$	*Plant records*	*%*	*M,C*	*Daily*	*100%*	*Electronic*	*Will be calculated/measured as part of normal operations*
33	$OutMgO_{BSL}$	*Plant records*	*%*	*M,C*	*Daily*	*100%*	*Electronic*	*Will be calculated/measured as part of normal operations*
34	*Quantity of clinker raw material*	*Plant records*	*Kilo tonnes*	*M*	*Annually*	*100%*	*Electronic*	
35	$CLNK_{BSL}$	*Plant records*	*Kilo tonnes of clinker*	*M*	*Annually*	*100%*	*Electronic*	
36	FF_{iBSLy}	*Plant records*	*Tonnes of fuel i*	*M*	*Monthly*	*100%*	*Electronic*	
37	EFF_i	*IPCC/ Plant records*	*tCO2/tonne of fuel i*	*C/M*	*Annually*	*100%*	*Electronic*	
38	$BELE_{grid\_CLNK,BSL}$	*Plant records*	*MWh*	*M*	*Monthly*	*100%*	*Electronic*	
39	$EF_{grid,BSL}$	*Calculated ex-ante*	tCO_2/MWh	*N/a*	*N/a*	*100%*	*Electronic*	*Calculated ex-ante as per ACM0002*
40	$BELE_{sg\_CLNK,BSL}$	*Plant records*	*MWh*	*M*	*Monthly*	*100%*	*Electronic*	
41	$EF_{sg,BSL}$	*Plant records*	tCO_2/MWh	*C*	*Monthly*	*100%*	*Electronic*	*IPCC factors*
42	ADD_{BSL}	*Plant records*	*Kilo tonnes*	*M*	*Monthly*	*100%*	*Electronic*	
43	$BELE_{grid,BC,BSL}$	*Plant records*	*MWh*	*M*	*Monthly*	*100%*	*Electronic*	

44	$BELE_{sg,BC,BSL}$	*Plant records*	*MWh*	*M*	*Monthly*	*100%*	*Electronic*	
45	$BELE_{grid,ADD}$	*Plant records*	*MWh*	*M*	*Monthly*	*100%*	*Electronic*	
46	$BELE_{sg,ADD,BSL}$	*Plant records*	*MWh*	*M*	*Monthly*	*100%*	*Electronic*	
47	$F_{i,j,BSL}$	*Plant records*	*Tonnes of fuel i*	*M*	*Monthly*	*100%*	*Electronic*	
48	$COEF_{i,j,BSL}$	*IPCC/ Plant records*	*tCO_2/tonne of fuel i*	*C/M*	*Annually*	*100%*	*Electronic*	
49	$GEN_{j,BSL}$	*Plant records*	*MWh*	*M*	*Annually*	*100%*	*Electronic*	
50	$BE_{calcin,BSL}$	*Plant records*	*tCO_2/tonne clinker*	*C*	*Annually*	*100%*	*Electronic*	
51	$BE_{fossil\_fuel,BSL}$	*Plant records*	*tCO_2/tonne clinker*	*C*	*Annually*	*100%*	*Electronic*	
52	$BE_{ele\_grid\_CLNK,BSL}$	*Plant records*	*tCO_2/tonne clinker*	*C*	*Annually*	*100%*	*Electronic*	
53	$BE_{ele\_sg\_CLNK,BSL}$	*Plant records*	*tCO_2/tonne clinker*	*C*	*Annually*	*100%*	*Electronic*	
54	$BE_{ele\_grid\_BC,BSL}$	*Plant records*	*tCO_2/tonne blended cement*	*C*	*Annually*	*100%*	*Electronic*	
55	$BE_{ele\_sg\_BC,BSL}$	*Plant records*	*tCO_2/tonne blended cement*	*C*	*Annually*	*100%*	*Electronic*	
56	$PE_{ele\_grid\_ADD,BSL}$	*Plant records*	*tCO_2/tonne blended cement*	*C*	*Annually*	*100%*	*Electronic*	
57	$BE_{ele\_sg\_ADD,BSL}$	*Plant records*	*tCO_2/tonne blended cement*	*C*	*Annually*	*100%*	*Electronic*	
58	$B_{blend,y}$	*Plant records*	*Tonne of clinker/tonne blended cement*	*C*	*Annually*	*100%*	*Electronic*	

D.2.1.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

>>

$BE_{BC,y} = [BE_{clinker} * B_{Blend,y}] + BE_{ele\_ADD\_BC}$

where:

$BE_{BC,y}$ = Baseline CO_2 emissions per tonne of blended cement type (BC) (tCO_2/tonne BC)
$BE_{clinker}$ = CO_2 emissions per tonne of clinker in the baseline in the project activity plant (t CO_2/tonne clinker) and defined below
$B_{Blend,y}$ = Baseline benchmark of share of clinker per tonne of BC updated for year y (tonne of clinker/tonne of BC)
$BE_{ele\_ADD\_BC}$ = Baseline electricity emissions for BC grinding and preparation of additives (tCO2/tonne of BC)

CO_2 per tonne of clinker in the project activity plant in the baseline is calculated as below:

$BE_{clinker} = BE_{calcin} + BE_{fossil\_fuel} + BE_{ele\_grid\_CLNK} + BE_{ele\_sg\_CLNK}$

where:

$BE_{clinker}$ = Baseline emissions of CO_2 per tonne of clinker in the project activity plant (t CO_2/tonne clinker)
BE_{calcin} = Baseline emissions per tonne of clinker due to calcinations of calcium carbonate and magnesium carbonate (t CO_2/tonne clinker)
BE_{fossil_fuel} = Baseline emissions per tonne of clinker due to combustion of fossil fuels for clinker production (t CO_2/tonne clinker)
$BE_{ele\_grid\_CLNK}$ = Baseline grid electricity emissions for clinker production per tonne of clinker (t CO_2/tonne clinker)
$BE_{ele\_sg\_CLNK}$ = Baseline emissions from self generated electricity for clinker production per tonne of clinker (t CO_2/tonne clinker)

$BE_{calcin} = [0.785*(OutCaO - InCaO) + 1.092*(OutMgO - InMgO)] / [CLNK_{BSL} * 1000]$

where:

BE_{calcin} = Emissions from the calcinations of limestone (tCO2/tonne clinker)
0.785 = Stoichiometric emission factor for CaO (tCO2/t CaO)
1.092 = Stoichiometric emission factor for MgO (tCO2/t MgO)
InCaO = CaO content (%) of the raw material * raw material quantity (tonnes)
OutCaO = CaO content (%) of the clinker * clinker produced (tonnes)
InMgO = MgO content (%) of the raw material * raw material quantity (tonnes)
OutMgO = MgO content (%) of the clinker * clinker produced (tonnes)
$CLNK_{BSL}$ = Annual production of clinker in the base year (kilotonnes of clinker)

$BE_{fossil\_fuel} = [\sum FF_{i\_BSL} * EFF_i] /[CLNK_{BSL} * 1000]$
FF_{i_BSL} = Fossil fuel of type i consumed for clinker production in the baseline (tonnes of fuel i)
EFF_i = Emission factor for fossil fuel i (t CO_2/tonne of fuel)
$CLNK_{BSL}$ = Annual production of clinker in the base year (kilotonnes of clinker)

$BE_{ele\_grid\_CLNK} = [BELE_{grid\_CLNK} * EF_{grid\_BSL}] /CLNK_{BSL} * 1000$
$BELE_{grid\_CLNK}$ = Baseline grid electricity for clinker production (MWh)
EF_{grid_BSL} = Baseline grid emission factor (t CO_2/MWh)
$CLNK_{BSL}$ = Annual production of clinker in the base year (kilotonnes of clinker)

$BE_{elec\_sg\_CLNK} = [BELE_{sg\_CLNK} * EF_{sg\_BSL}] /[CLNK_{BSL} * 1000]$

$BELE_{sg\_CLNK}$ = Baseline self generation of electricity for clinker production (MWh)
EF_{sg_BSL} = Baseline electricity self generation emission factor (t CO_2/MWh)
$CLNK_{BSL}$ = Annual production of clinker in the base year (kilotonnes of clinker)

$BE_{ele\_ADD\_BC} = BE_{ele\_grid\_BC} + BE_{ele\_sg\_BC} + BE_{ele\_grid\_ADD} + BE_{ele\_sg\_ADD}$

where:
$BE_{ele\_grid\_BC}$ = Baseline grid electricity emissions for BC grinding (tCO2/tonne of BC)
$BE_{ele\_sg\_BC}$ = Baseline self generated electricity emissions for BC grinding (tCO2/tonne of BC)
$BE_{ele\_grid\_ADD}$ = Baseline grid electricity emissions for additive preparation (tCO2/tonne of BC)
$BE_{ele\_sg\_ADD}$ = Baseline self generated electricity emissions for additive preparation (tCO2/tonne of BC)

$BE_{ele\_grid\_BC} = [BELE_{grid\_BC} * EF_{grid\_BSL}] /[BC_{BSL} * 1000]$
$BELE_{grid\_BC}$ = Baseline grid electricity for grinding BC (MWh)
EF_{grid_BSL} = Baseline grid emission factor (t CO_2/MWh)
BC_{BSL} = Annual production of BC in the base year (kilotonnes of BC)

$BE_{elec\_sg\_BC} = [BELE_{sg\_BC} * EF_{sg\_BSL}] / [BC_{BSL} * 1000]$
$BELE_{sg\_BC}$ = Baseline self generation electricity for grinding BC (MWh)
EF_{sg_BSL} = Baseline electricity self generation emission factor (t CO_2/MWh)
BC_{BSL} = Annual production of BC in the base year (kilotonnes of BC)

$BE_{ele\_grid\_ADD} = [BELE_{grid\_ADD} * EF_{grid\_BSL}] /[BC_{BSL}* 1000]$

$BELE_{grid\_ADD}$ = Baseline grid electricity for grinding additives (MWh)
EF_{grid_BSL} = Baseline grid emission factor (t CO_2/MWh)
BC_{BSL} = Annual production of BC in the base year (kilotonnes of additives)

$BE_{elec\_sg\_ADD} = [BELE_{sg\_ADD} * EF_{sg\_BSL}] / [BC_{BSL}* 1000]$

$BELE_{sg\_BC}$ = Baseline self generation electricity for grinding additives (MWh)
EF_{sg_BSL} = Baseline electricity self generation emission factor (t CO_2/MWh)
BC_{BSL} = Annual production of BC in the base year (kilotonnes of additives)

D. 2.2. Option 2: Direct monitoring of emission reductions from the project activity (values should be consistent with those in section E).

This section is left blank on purpose

D.2.2.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.):

>>

D.2.3. Treatment of leakage in the monitoring plan

Leakage is restricted to any transport emissions that arise from the increased use of additive. The methodology does require consideration of whether additives used are surplus. As outlined in Sections B.1.1 and D.2., fly ash utilisation in India is at best 14%. Disposal of fly ash is an environmental problem, with the vast majority of fly ash disposed of via land filling. Some 65,000 acres of land is devoted to ash ponds in the country. As highlighted, annual fly ash production in India is currently 90 million tonnes of which only 13 million tonnes are used. Fly ash production in India is forecast to increase to 180 million tonnes by 2015. Based on data for fly ash generation of 4 tonnes per day of MW capacity, the annual fly ash production in W. Bengal is estimated at 10.4 million tonnes. The only significant use of fly ash is in PPC. PPC production in W. Bengal is 2003-4 was 6.3 million tonnes. The maximum percentage of fly ash allowed in PPC is 35%, which would amount to 2.2 million tonnes of fly ash. This is well below availability, showing that there is a major excess of fly ash availability. The project activity will thus use 100% surplus additives and no discounting is required ($\alpha = 0$).

D.2.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project activity

ID number	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
59	TF_{cons}	*Plant records*	*Kg of fuel/kilometre*	*C*	*Annually*	*100%*	*Electronic*	*Will be cross referenced with transporters' records and manufacturers' data. Transporters will be provided with questionnaires prior to verification.*
60	D_{add_source}	*Plant records*	*Km*	*M*	*Per trip*	*100%*	*Electronic*	*Will be cross referenced with transporters' records and map references. Transporters will be provided with questionnaires prior to verification.*
61	*TEF*	*IPCC*	*Kg CO2/kg of fuel*	*E*	*Annually*	*100%*	*Electronic*	
62	Q_{add}	*Plant records*	*Tonnes of additive/vehicle*	*M*	*Per trip*	*100%*	*Electronic*	
63	$ELE_{conveyor\_ADD}$	*Plant records*	*MWh*	*M*	*Monthly*	*100%*	*Electronic*	
64	EF_{grid}	*Ex-ante*	*Tonnes of*	*C*	*At*	*100%*	*Electronic*	

		grid factor or on-site fuel	*CO2/MWh*		*validation*			
65	*BCy*	*Blended cement produced at project site and sold to domestic market*	*Tonnes of PPC*	*C*	*Annually*	*100%*	*Paper and Electronic*	*Any volume of PPC exported will be deducted from PPC production to arrive at BCy. Documented evidence of any export volumes will be provided in the form of invoices and receipts from the sales office of ACEL.*

D.2.3.2. Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

>>

L_{add_trans} = [(TF_{cons} * D_{add_source} * TEF) * 1/Q_{add} * 1/1000 + ($ELE_{conveyor\_ADD}$ * EF_{grid}) *1/ADD_y]

where:

L_{add_trans} = Transport related emissions per tonne of additives (t CO_2/tonne of additive)
TF_{cons} = Fuel consumption for the vehicle per kilometre (kg of fuel/kilometre)
D_{add_source} = Distance between the source of additive and the project activity plant (km)
TEF = Emission factor for transport fuel (kg CO_2/kg of fuel)
$ELE_{conveyor\_ADD}$ = Electricity consumption for conveyor system for additives (MWh)
EF_{grid} = Grid electricity emission factor (tonnes of CO_2/MWh)
Q_{add} = Quantity of additive carried in one trip per vehicle (tonnes of additive)
ADD_y = Annual consumption of additives in year y (t of additives)

And leakage emissions per tonne of BC due to additional additives are determined by

L_y = L_{add_trans} * [$B_{blend,y}$ – $P_{blend,y}$] * BC_y

where:

L_y = Leakage emissions for transport of additives (kilotonnes of CO_2)
BC_y = Production of BC in year y (kilotonnes of BC)
$P_{blend,y}$ = Share of clinker per tonne of BC in year y (tonne of clinker/tonne of BC)

D.2.4. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

>>

The project activity mainly reduces CO_2 emissions through substitution of clinker in cement by blending materials. Emissions reductions in year y are the difference in the CO_2 emissions per tonne of BC in the baseline and in the project activity multiplied by the production of BC in year y.

There is no need to discount for the percentage of additives for which surplus availability is not substantiated as there exists in India a clear surplus of fly ash.

$ER_y = [BE_{BC,y} – PE_{BC,y}] * BC_y + L_y$

where:

ER_y = Emissions reductions in year y due to project activity (thousand tonnes of CO_2)
$BE_{BC,y}$ = Baseline emissions per tonne of BC (t CO_2/tonnes of BC)
$PE_{BC,y}$ = Project emissions per tonne of BC in year y (t CO_2/tonnes of BC)
BC_y = BC production in year y (thousand tonnes) (Any volume of PPC exported will be deducted from PPC production to arrive at BCy)

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

Data *(Indicate table and ID number e.g. 3.-1.; 3.2.)*	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.

TableD.2.1.1, ID numbers 1-29	*Low-Medium*	*These data will be collected as part of normal plant level operations. QA/QC requirements consist of cross – checking these with other internal company reports. Local data and where applicable IPCC data will be used. Independent agency verification will also be used.* *Both Sankrail and Bhatapara units have ISO9001 certification. The ACEL ISO9001 systems include procedures for:* - *Training and monitoring of personnel* - *Calibration and maintenance of monitoring equipment* - *Emergency procedures* - *Record and data handling* - *Uncertainty data adjustment* - *Internal Audit* *Grid electricity meters are provided by electricity authorities and cannot be tampered with. Internal electricity meters will be subject to calibration. Laboratory test equipment for MgO and CaO contents is subject to regular calibration*
TableD.2.1.3, ID numbers 30-58	*Low-Medium*	*These data will be collected as part of normal plant level operations. QA/QC requirements consist of cross – checking these with other internal company reports. Local data and where applicable IPCC data will be used. Independent agency verification will also be used.* *Both Sankrail and Bhatapara units have ISO9001 certification. The ACEL ISO9001 systems include procedures for:* - *Training and monitoring of personnel* - *Calibration and maintenance of monitoring equipment* - *Emergency procedures* - *Record and data handling* - *Uncertainty data adjustment* - *Internal Audit* *Grid electricity meters are provided by electricity authorities and cannot be tampered with. Internal electricity meters will be subject to calibration. Laboratory test equipment for MgO and CaO contents is subject to regular calibration*

TableD.2.3, ID numbers 59-64	*Low*	*Round trip distance will be cross-checked with evidence of origin and map references. Truck capacity and Fuel consumption data will originate from vehicle manufacturers and transporters.* *In the case that fly ash is obtained from different locations, the weighted average round trip distance will be calculated (weighted by volume of fly ash transported).* *In the case that different sized fly ash transporters are used, the fuel efficiency will be calculated as the weighted average fuel efficiency of transporters (weighted by the volume of fly ash transported by each size of transporter).*

D.4 Please describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects, generated by the project activity

>>

A specific employee at each of Sankrail and Bhatapara sites has been designated as be responsible for collating and archiving data at that plant. All data required is collected as part of normal operations. Records for both plants will be archived at Sankrail for 12 years and will be available at the time of verification. Project management at will fall under the responsibility of the designated employee, whilst central management and coordination of the project activities will fall under the responsibility of Mr. S.K. Sadhu, Unit Head, Sankrail.

The collated data will be transmitted in electronic format to the ACEL office at Sankrail (Mr. S.K. Sadhu). A specific spreadsheet has been designed for this purpose. Mr Sadhu and Ben Atkinson of Agrinergy Ltd. will then perform the data calculations and transformations as required as part of the monitoring methodology.

D.5 Name of person/entity determining the monitoring methodology:

>>

Ben Atkinson, Agrinergy Ltd, project participant, contact details as listed in Annex I.

SECTION E. Estimation of GHG emissions by sources

E.1. Estimate of GHG emissions by sources:

>>
Project emissions per tonne of blended cement are calculated as:

$PE_{BC,y} = [PE_{clinker,y} * P_{Blend,y}] + PE_{ele\_ADD\_BC,y}$
where:

$PE_{BC,y}$ = CO_2 emissions per tonne of BC in the project activity plant in year y(tCO_2/tonne BC)
$PE_{clinker,y}$ = CO_2 emissions per tonne of clinker in the project activity plant in year y (t CO_2/tonne clinker) and defined below
$P_{Blend,y}$ = Share of clinker per tonne of BC in year y (tonne of clinker/tonne of BC)
$PE_{ele\_AD,D\_BC,y}$ = Electricity emissions for BC grinding and preparation of additives in year y (tCO2/tonne of BC)

The following table outlines the projected decrease in the clinker content at the cement plants carrying out the project activity over the crediting period:

2004-5	2005-6	2006-7	2007-8	2008-9	2009-10	2010-11	2011-12	2012-13	2013-14
65.1%	62.9%	62.5%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%

Based on a these additive blend projections, we forecast the following values for $PE_{BC,y}$ over the crediting period:

2004-5	2005-6	2006-7	2007-8	2008-9	2009-10	2010-11	2011-12	2012-13	2013-14
0.623	0.604	0.600	0.604	0.604	0.604	0.604	0.604	0.604	0.604

E.2. Estimated leakage:

>>
Leakage is calculated as:

L_{add_trans} = $[(TF_{cons} * D_{add\_source} * TEF) * 1/Q_{add} * 1/1000 + (ELE_{conveyor\_ADD} * EF_{grid}) * 1/ADD_y]$

where:
L_{add_trans} = Transport related emissions per tonne of additives (t CO_2/tonne of additive)
TF_{cons} = Fuel consumption for the vehicle per kilometre (kg of fuel/kilometre)
D_{add_source} = Distance between the source of additive and the project activity plant (km)
TEF = Emission factor for transport fuel (kg CO_2/kg of fuel)
$ELE_{conveyor\_ADD}$ = Electricity consumption for conveyor system for additives (MWh)
EF_{grid} = Grid electricity emission factor (tonnes of CO_2/MWh)
Q_{add} = Quantity of additive carried in one trip per vehicle (tonnes of additive)
ADD_y = Annual consumption of additives in year y (t of additives)

And leakage emissions per tonne of BC due to additional additives are determined by

$L_y = L_{add\_trans} * [A_{blend,y} – P_{blend,y}] * BC_y$

where:
L_y = Leakage emissions for transport of additives (kilotonnes of CO_2)
BC_y = Production of BC in year y (kilotonnes of BC)
$A_{blend,y}$ = Baseline benchmark share of additives per tonne of BC updated for year y (tonne of additives/tonne of BC)
$P_{blend,y}$ = Share of additives per tonne of BC in year y (tonne of additives/tonne of BC)

Leakage over the crediting period at each project activity plant is estimated as follows (tCO2e):

2004-5	2005-6	2006-7	2007-8	2008-9	2009-10	2010-11	2011-12	2012-13	2013-14
197	349	343	254	205	260	175	87	0	0

E.3. The sum of E.1 and E.2 representing the project activity emissions:

>>
The following table shows project figures for BCy (blended cement production in year y, kt):

2004-5	2005-6	2006-7	2007-8	2008-9	2009-10	2010-11	2011-12	2012-13	2013-14
1070	1165	1190	1190	1190	2000	2000	2000	2000	2000

And based on this project activity emissions are calculated as (million tonnes CO_2):

2004-5	2005-6	2006-7	2007-8	2008-9	2009-10	2010-11	2011-12	2012-13	2013-14
0.667	0.703	0.714	0.719	0.719	1.209	1.209	1.209	1.209	1.209

E.4. Estimated anthropogenic emissions by sources of greenhouse gases of the baseline:

>>
Baseline emissions per tonne of blended cement are calculated as:

$BE_{BC,y} = [BE_{clinker} * B_{Blend,y}] + BE_{ele\_ADD\_BC}$

where:
$BE_{BC,y}$ = Baseline CO_2 emissions per tonne of blended cement type (BC) (tCO_2/tonne BC)
$BE_{clinker}$ = CO_2 emissions per tonne of clinker in the baseline in the project activity plant (t CO_2/tonne clinker) and defined below
$B_{Blend,y}$ = Baseline benchmark of share of clinker per tonne of BC updated for year y (tonne of clinker/tonne of BC)
$BE_{ele\_ADD\_BC}$ = Baseline electricity emissions for BC grinding and preparation of additives (tCO2/tonne of BC)

The following table outlines the baseline clinker content for the project activity cement plants over the crediting period:

2004-5	2005-6	2006-7	2007-8	2008-9	2009-10	2010-11	2011-12	2012-13	2013-14
67.7%	67.1%	66.6%	66.0%	65.4%	64.8%	64.2%	63.6%	63.0%	62.3%

Based on these baseline clinker contents, the following values for $BE_{BC,y}$ are arrived at over the crediting period:

2004-5	2005-6	2006-7	2007-8	2008-9	2009-10	2010-11	2011-12	2012-13	2013-14
0.650	0.645	0.640	0.635	0.629	0.624	0.618	0.613	0.607	0.601

And based on this baseline emissions are calculated as (million tonnes CO_2):

2004-5	2005-6	2006-7	2007-8	2008-9	2009-10	2010-11	2011-12	2012-13	2013-14
0.695	0.751	0.761	0.755	0.749	1.248	1.237	1.226	1.214	1.202

E.5. Difference between E.4 and E.3 representing the emission reductions of the project activity:

>>

kt CO_2

2004-5	2005-6	2006-7	2007-8	2008-9	2009-10	2010-11	2011-12	2012-13	2013-14
25.1	44.3	43.5	32.2	26.0	33.0	22.2	11.1	0.0	0.0

E.6. Table providing values obtained when applying formulae above:

>>

Million tonnes CO_2e

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emission reductions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of emission reductions (tonnes of CO_2e)
2004-5	666833	692091	197.5	25061
2005-6	703091	747711	348.8	44270
2006-7	713899	757729	342.6	43487
2007-8	719106	751581	253.9	32221
2008-9	719106	745310	204.8	25999
2009-10	1208582	1241872	260.2	33030
2010-11	1208582	1230907	174.5	22151
2011-12	1208582	1219723	87.1	11054
2012-13	1208582	1208315	0.0	0
2013-14	1208582	1196679	0.0	0
Total	**9564947**	**9791919**	**1869**	**237272**

SECTION F. Environmental impacts

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

>>
The environmental impacts of the project are minimal – the project activity represents an increase in a current activity rather than an entirely new activity. Increased fly ash consumption will result in additional transportation which may involve some environmental impact (the GHG emissions from this transportation are deducted from the amount of CERs generated by the project activity). Increased dust from the fly ash blending operation is also a potential environmental impact. However, ACEL has taken measures to minimise these adverse environmental effects:

- Air pollution control systems are in operation efficiently and the stack/ambient air quality norms are better than the standards laid down by Pollution Control Boards.
- The fly-ash is transported in closed bulkers so as to eliminate dust pollution.
- All the unloading points are covered and provided with dust collection systems for maintaining the AAQ as per norms.
- Ambient air quality - Fly ash is pneumatically conveyed with flow control system with "dedusting systems" installed to remove fugitive emissions.

F.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:

>>
An environmental impact assessment is not required for the project activity. The cement plant has undergone an EIA at the time of construction and each year must obtain consent to operate from the relevant state pollution control boards.

SECTION G. Stakeholders' comments

>>

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

>>
Stakeholders have been identified and comments invited through six routes:

- National stakeholder: The project has applied for approval from the Ministry of Environment and Forests. As part of this application, the PDD and PCN have been submitted to the MoEF and a presentation on the project provided.
- The projects have also received stakeholder approval through the application and obtaining of consents to operate from the state pollution control boards.

- Cement customers are key stakeholders in the project activity. Through its outreach and information activities on the benefits of PPC, these stakeholders have been informed of the project activity.

- Employees have been identified as key stakeholders – they both live and work in the cement plant environment. All employees have been sent an email message outlining the CDM project activity and their comments invited.

- The PDD has been posted on the UNFCCC website for 30 days and comments from international stakeholders invited.

- There is no change to the local environment from the project activities, and the project activities provide wider environmental benefits – conserving limestone and utilising an industrial waste product. However as part of its local relationship activities, ACEL has placed notices in the local language in the local outlining the project activity and inviting comments.

G.2. Summary of the comments received:

>>
The only comments received were questions raised by local stakeholders regarding the potential for fly ash dusting on crop lands. The management of the Sankrail unit outlined that the air quality surrounding the unit is very high, and that ACEL had made every effort to ensure that the ambient air quality remains high. As outlined in Section F.1:

- Air pollution control systems are in operation efficiently and the stack/ambient air quality norms are better than the standards laid down by Pollution Control Boards.

- The fly-ash is transported in closed bulkers so as to eliminate dust pollution.

- All the unloading points are covered and provided with dust collection systems for maintaining the AAQ as per norms.

- Ambient air quality - Fly ash is pneumatically conveyed with flow control system with “dedusting systems” installed to remove fugitive emissions.

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

>>
Given no issues were raised no action was required. As highlighted in Section F, ACEL have carried out measures to mitigate any negative environmental effects of blending fly ash. Moreover the project activity provides substantial positive environmental effects through the disposal of fly ash and conservation of limestone.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The project activity has received no public funding.

Annex 3

BASELINE INFORMATION

Data type	Source
Data on cement plant locations, capacities and productions	CMA
Additive blend if cement plants in system boundary	CMA, company publications, pollution control board reports.
CaO and MgO contents of limestone and clinker	Plant data
HC (Heat Consumption)	Plant data
EFf (emission factor)	IPCC
EC (Electrical energy consumption) in clinker production	Plant data
P_{grid} and $P_{captive}$	Plant data
EF_{grid}	SEBs, CEA, IPCC
$EF_{captive}$	IPCC
EC (Electrical energy consumption) in additive preparation	Plant data

Annex 4

MONITORING PLAN

A specific employee at each of Sankrail and Bhatapara sites has been designated as be responsible for collating and archiving data at that plant. All data required is collected as part of normal operations. Records for both plants will be archived at Sankrail for 12 years and will be available at the time of verification. Project management at will fall under the responsibility of the designated employee, whilst central management and coordination of the project activities will fall under the responsibility of Mr. S.K. Sadhu, Unit Head, Sankrail.

The collated data will be transmitted in electronic format to the ACEL office at Sankrail (Mr. S.K. Sadhu). A specific spreadsheet has been designed for this purpose. Mr Sadhu and Ben Atkinson of Agrinergy Ltd. will then perform the data calculations and transformations as required as part of the monitoring methodology.

Agrinergy Ltd will produce on an annual basis a formatted report outlining the data, sources and calculations underlying emission reduction generation. This will be presented to the DOE carrying out verification. Verification will be carried out on an annual basis.

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