Approved consolidated baseline and monitoring methodology ACM0005

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

I. SOURCE, DEFINITIONS AND APPLICABILITY

Sources

This consolidated baseline methodology is based on elements from the following proposed new methodologies:

- NM0045-rev2: "Birla Corporation Limited: CDM Project for "Optimal Utilization of Clinker", whose project design document, and baseline study, monitoring and verification plans were developed by Birla Corporation Limited;
- NM0047-rev: "Indocement's Sustainable Cement Production Project Blended Cement Component", whose project design document, and baseline study, monitoring and verification plans were developed by PT. Indocement Tunggal Perkasa;
- NM0095: "ACC New Wadi Blended Cement Project", whose project design document, and baseline study, monitoring and verification plans were developed by Agrinergy Ltd.;
- NM0106: "Baseline methodology for optimization of clinker use in the cement industry through investment in grinding technology", whose project design document, and baseline study, monitoring and verification plans were developed by Ecosecurities Ldt.

This methodology also refers to the latest approved versions of the following tools:

- Tool to calculate the emission factor for an electricity system;
- Tool for the demonstration and assessment of additionality.

For more information regarding the proposed new methodologies and the tools as well as their consideration by the Executive Board please refer to <http://cdm.unfccc.int/goto/MPappmeth>.

Definitions

Blended cement. For the purpose of this methodology, blended cement shall be defined as cement with clinker percentage lower than the highest allowable percentage of clinker in all types of blended cements as dictated by the national standards in the host country. Where such standards do not exist, blended cement shall be defined as cement with less than 95% clinker content.

Applicability

This methodology is applicable to projects that increase the share of additives (i.e. reduce the share of clinker) in the production of cement types beyond current practices in the country. Additives are defined as materials blended with clinker to produce blended cement types and include fly ash, gypsum, slag, etc. The methodology is applicable under the following conditions:

- There is no shortage of additives related to the lack of blending materials. Project participants should demonstrate that there is no alternative allocation or use for the additional amount of additives used in the project activity. If the surplus availability of additives is not substantiated the project emissions reductions (ERs) will be discounted as outlined below;
- This methodology is applicable to domestically sold output of the project activity plant and excludes export of blended cement;
- Adequate data are available on cement types in the market.

Project activity

The project activity is the increase in the share of blending materials used in the production of cement (i.e. a reduction of the amount of clinker per tonne of blended cement). The project activity accounts only for GHG emission reductions associated with the increased level of blending – other measures such as energy efficiency improvements should be considered as a separate project activity.

In order to estimate emission reductions in a conservative manner and to reflect the endogenous trends in the level of blending in the region, a benchmark approach is used to calculate emission reductions. The benchmark is defined in the "Baseline" section.

Approach

"Existing actual or historical emissions, as applicable".

Project Boundary

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

Project participants shall account for the following **emission sources:**

- 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 (i.e. calcium carbonate and magnesium carbonate, if present in the raw meal);
- 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 power grid or plant from which the cement plant purchases electricity and its losses will be considered in determining indirect emissions. Any transport related emissions for the delivery of additional additives will be 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.

Identification of the baseline scenario

Project participants shall identify the most plausible baseline scenario among all realistic and credible alternatives(s). Steps 2 and/or 3 of the latest approved version of the "Tool for the demonstration and assessment of additionality" should be used to assess which of these alternatives should be excluded from further consideration (e.g. alternatives where barriers are prohibitive or which are clearly economically unattractive). Where more than one credible and plausible alternative remains, project participants shall, as a conservative assumption, use the alternative baseline scenario that results in the lowest baseline emissions as the most likely baseline scenario.

In doing so, project proponents (PPs) shall consider all realistic and credible production scenarios for the relevant cement type that are consistent with current rules and regulations, including the existing practice of cement production, the proposed project activity, and practices in other manufacturing plants in the region using similar input/raw materials, and facing similar economic, market and technical circumstances. If only two scenarios, i.e. the existing practice of cement production and the proposed project activity, are realistic and credible alternatives, the most likely baseline scenario can be identified with the latest version of the "Tool for the demonstration and assessment of additionality".

Additionality

The additionality of the project activity shall be demonstrated and assessed using the latest version of the "Tool for the demonstration and assessment of additionality" agreed by the CDM Executive Board, which is available on the UNFCCC CDM web site.[1]

In applying the latest version of the "Tool for the demonstration and assessment of additionality", where investment analysis is used, project proponents shall apply Option II (investment comparison analysis) or Option III (benchmark analysis).

[1] Please refer to: < http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html>.

While calculating the financial indicator for Options II or III, project proponents should consider the following components in the analysis:

- Investments related to the equipment/modifications in production lines required for the increase in the share of additives in the production of blended cement e.g. pneumatic systems/conveyors/bucket elevators for transfer of the additives, feeding systems, bag dust collectors, additional laboratory equipment for quality control, Cement Vertical Roller Mills, storage silos, facilities for handling and proportioning of additive materials such as hoppers and feeders;
- Savings related to decrease in energy consumption and other savings as a result of decrease in clinker production due to the increased use of additives;
- Expenses related to the operation and maintenance of the cement production plant;
- Savings related to decrease in buying clinker from third parties, if applicable;
- Expenses related to development of in-house capacity and/or research to operate new blending technology and control the quality of blended cement;
- Expenses related to the sourcing of blending material and material cost for blending;
- If required, other expenses related to the marketing of the new blended cement, e.g. market awareness campaigns; and
- Revenues related to the increase in the share of additives in the production of blended cement.

In applying the latest version of the "Tool for the demonstration and assessment of additionality", where project proponents use the barrier analysis, only the following barriers may be claimed:

First of its Kind. Only projects implementing blended cement projects for the first time are allowed to claim this barrier (i.e. project proponents which are increasing the percentage of additives from a historical value to a higher value are not allowed to use this barrier).

In order to demonstrate additionality using "First of its Kind" barrier, the methodology requires information concerning the market share for blended cement sold in the domestic market in the host country. The project participants should calculate the market share percentage of the amount of blended cement of the total amount of all cement types produced in the host country (tons blended cement type/total tons cement production *x* 100%) during the last three years prior to the implementation of the project activity. The market share value must be based on reliable and publicly available data sources (e.g. cement manufacturers associations or governmental agencies). Plants and grinding operations included in the analysis which have implemented blended cement projects should not have started the blended cement production for commercial operation prior to a) the start of commercial operation of the project activity or b) the start of validation, whatever is earlier. Other CDM projects should be included in this assessment.

If the market share for blended cement in the host country is below 5%, the project activity is deemed additional without further consideration. If the market share for blended cement in the host country is above 5%, the project activity cannot use this barrier to demonstrate additionality (investment analysis , investment barrier or market acceptability barriers may be used).

Investment barriers. In case that project proponents claim for investment barriers (in Sub-step 3a (1)(a) of the tool), they should demonstrate in the PDD that the financing of the project was only assured because of the benefit of the CDM, i.e. it should be demonstrated

that the loan approval by the lender (or other the financing decision) takes explicitly the CDM registration into account. Examples of a case where the financing of the project was only assured because of the benefit of the CDM are:

- In case the investment is done by a company which also purchases the CERs and the loan agreement mentions that, then this is a strong case that the CDM facilitated the lending;
- In case that it can be objectively demonstrated that a significant part of the project investment is provided upfront by a company as a pre-payment for expected CERs, then this is a strong case that the CDM actually enabled the financing of the project.

Market acceptability barriers, *inter alia*:

- Perception that high additive blended cement is of inferior quality;
- Lack of awareness of customers on the use high additive blended cement.

Claims on market acceptability barriers shall be supported by objective evidences using one or more of the following:

- Letters of complaints from customers, establishing the failure of blended cement to gain their confidence in the market. It should be demonstrated that such complaints is much higher than those received for any new similar product in the market;
- Circulars/notices or any other communication from public works department (Government Department) on the use of blended cement, clearly establishing their low/no preference for blended cement;
- Independent surveys conducted by third parties concluding that blended cement is not accepted in the market where the blended cement will be supplied.

Project proponents should demonstrate in an objective manner how the CDM alleviates the claimed barriers to the new blended cement produced under the project activity, to a level that the project is not prevented anymore from occurring by such barrier. The PP shall provide transparent and documented evidence as presented above and illustrated in the "Tool for the demonstration and assessment of additionality".

Baseline emissions

The benchmark for baseline emissions is defined as the lowest value among the following:

(i) The average (weighted by production) mass percentage of clinker for the 5 highest blend cement brands sold for the relevant cement type in the region; If the region comprises of less than 5 blend cement brands, the national market should be used as the default 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. If 20% falls on part capacity of a plant, that plant is included in the calculations; 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, if applicable (For Greenfield project activity this option may be excluded).

For (i) and (ii) above, the project proponents can choose between 2 options – either (1) to update the benchmark annually and incorporate only an increasing trend (a decreasing trend would require the baseline to remain constant); or (2) the benchmark incorporates a trend increase, specified ex-ante, in the share of additives in blended cement type based on general market trend or a minimum of an annual 2% increase in additives. For example, if the additives percentage is 15% at the start of the project activity (year 1), for the second year of the crediting period, the percentage of additives increases to 15.3% and is 15.6% for year 3 and so on, for the baseline.

For Option (iii) the highest percentage of additives used over the 3 most recent years and the highest percentage of additives is selected and an increasing trend of a minimum of 2% increase in additives over the percentage of additives at the start of the project activity is incorporated up to the limit of the regulatory/product norm in the region/national market.

At the renewal of the crediting period, the benchmark is recalculated. The basis (between the 3 options) of the benchmark may change from the option selected during the first crediting period.

To determine the benchmark for Option (i) and (ii), statistically significant random sampling is done for the high blend brands in the relevant cement type in the region. In other words, for the cement type under consideration and for high blend brands in the region, random and statistically significant samples are selected and analyzed for the percentage of clinker by an independent laboratory. The sampling of the relevant type of blended cement type produced in the region should exclude cement plants or output from cement plants that have registered blended cement CDM project activities. If reliable and up to date annual data are available from reputable and verifiable external sources (for example, industry manufacturers association or government agencies), these may be used to determine the benchmark.

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.

The baseline emissions are a function of two factors:

- The percentage of additives and the related electricity consumption that is taken as the baseline benchmark; and
- The CO_2 emissions per tonne of clinker in the project activity plant, which in turn depends on:
    - Quantity and carbon intensity of the fuels used in clinker making;
    - Quantity and carbon intensity of electricity;
    - CO_2 emissions from calcinations.

Baseline emissions per tonne of blended cement type (BC) are determined below. BC is defined as distinct products with different uses that have different additives and different additive to clinker ratios (for example, Portland Pozzolana Cement or Portland Blast Furnace Slag). Consumption of fuel and electricity in the production of clinker and blended cement type are monitored for at least one year prior to the start of the CDM project activity. If

monitored data to determine specific energy consumption by type of fuels is available for two or three years prior to the start of the project activity, the average may be taken in determining baseline emissions.

The values to be used in the formulae below relating to clinker production, fossil fuel consumption and electricity consumption shall be obtained by monitoring the operation of the plant before the project activity is implemented.

$$BE_{BC,y} = [BE_{clinker} * B_{Blend,y}] + BE_{ele\_ADD\_BC} \quad \textbf{(1)}$$

Where:

$BE_{BC,y}$	=	Baseline CO_2 emissions per tonne of blended cement type (BC) (t CO_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:

$$BE_{clinker} = BE_{calcin} + BE_{fossil\_fuel} + BE_{ele\_grid\_CLNK} + BE_{ele\_sg\_CLNK} \quad \textbf{(1.1)}$$

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)

$$BE_{calcin} = [0.785*(OutCaO - InCaO) + 1.092*(OutMgO - InMgO)] / [CLNK_{BSL} * 1000] \quad \textbf{(1.1.1)}$$

Where:

BE_{calcin}	=	Emissions from the calcinations of limestone (tCO_2/tonne clinker)
0.785	=	Stoichiometric emission factor for CaO (tCO_2/t CaO)
1.092	=	Stoichiometric emission factor for MgO (tCO_2/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)

$$BE_{fossil\_fuel} = [\sum FF_{i\_BSL} * EFF_i] / [CLNK_{BSL} * 1000] \quad \textbf{(1.1.2)}$$

Where:

BE_{fossil_fuel} = Baseline emissions per tonne of clinker due to combustion of fossil fuels for clinker production (t CO_2/tonne clinker)

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)

$$BE_{ele\_grid\_CLNK} = [BELE_{grid\_CLNK} * EF_{grid\_BSL}] /CLNK_{BSL} * 1000 \quad \textbf{(1.1.3)}$$

Where:

$BE_{ele\_grid\_CLNK}$ = Baseline grid electricity emissions for clinker production per tonne of clinker (t CO_2/tonne clinker)

$BELE_{grid\_CLNK}$ = 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)

$$BE_{elec\_sg\_CLNK} = [BELE_{sg\_CLNK} * EF_{sg\_BSL}] /[CLNK_{BSL} * 1000] \quad \textbf{(1.1.4)}$$

Where:

$BE_{elec\_sg\_CLNK}$ = Baseline emissions from self generated electricity for clinker production per tonne of clinker (t CO_2/tonne clinker)

$BELE_{sg\_CLNK}$ = 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)

$$BE_{ele\_ADD\_BC} = BE_{ele\_grid\_BC} + BE_{ele\_sg\_BC} + BE_{ele\_grid\_ADD} + BE_{ele\_sg\_ADD} \quad \textbf{(1.2)}$$

Where:

$BE_{ele\_ADD\_BC}$ = Baseline electricity emissions for BC grinding and preparation of additives (tCO2/tonne of BC)

$BE_{ele\_grid\_BC}$ = 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)

$$BE_{ele\_grid\_BC} = [BELE_{grid\_BC} * EF_{grid\_BSL}] /[BC_{BSL} * 1000] \quad \textbf{(1.2.1)}$$

Where:

$BE_{ele\_grid\_BC}$ = Baseline grid electricity emissions for BC grinding (tCO_2/tonne of BC)

$BELE_{grid\_BC}$ = 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)

$BE_{elec\_sg\_BC} = [BELE_{sg\_BC} * EF_{sg\_BSL}] / [BC_{BSL} * 1000]$ **(1.2.2)**

Where:

$BE_{elec\_sg\_BC}$	=	Baseline self generated electricity emissions for BC grinding (tCO_2/tonne of BC)
$BELE_{sg\_BC}$	=	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)

$BE_{ele\_grid\_ADD} = [BELE_{grid\_ADD} * EF_{grid\_BSL}] /[BC_{BSL} * 1000]$ **(1.2.3)**

Where:

$BE_{ele\_grid\_ADD}$	=	Baseline grid electricity emissions for additive preparation (tCO_2/tonne of BC)
$BELE_{grid\_ADD}$	=	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 BC)

$BE_{elec\_sg\_ADD} = [BELE_{sg\_ADD} * EF_{sg\_BSL}] / [BC_{BSL} * 1000]$ **(1.2.4)**

Where:

$BE_{elec\_sg\_ADD}$	=	Baseline self generated electricity emissions for additive preparation (tCO_2/tonne of BC)
$BELE_{sg\_ADD}$	=	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 BC)

Leakage

Emissions due to fuel use for the transport of raw materials (e.g. limestone, gypsum), coal (or other fuels) and additives (blending materials) from offsite locations to the project plant will change due to the implementation of the project. The transport related emissions for raw materials and fuels are likely to decrease. To keep the methodology conservative this change shall not be included. In the project activity, emissions due to transportation of additives will increase. These emissions will be accounted as leakage. Transport related emissions for additives are calculated as below.

$L_{add\_trans} = [(TF_{cons} * D_{add\_source} * TEF)* 1/Q_{add}*1/1000 + (ELE_{conveyor\_ADD} * EF_{grid,y})*1/ADD_y]$ **(2)**

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)
$ELE_{conveyor\_ADD}$	=	Annual Electricity consumption for conveyor system for additives (MWh)
$EF_{grid\ y}$	=	Grid emission factor in year *y* (t 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:

$$L_y = L_{add\_trans} * [A_{blend,y} - P_{blend,y}] * BC_y \quad \textbf{(2.1)}$$

Where:

L_y	=	Leakage emissions for transport of additives (kilotonnes of CO_2)
L_{add_trans}	=	Transport related emissions per tonne of additives (t CO_2/tonne of additive)
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)

Another possible leakage is due to the diversion of additives from existing uses. The PPs shall demonstrate that additional amounts of additives used are surplus. If the PPs do not substantiate x tonnes of additives used in the project activity are surplus, the project emissions reductions are reduced by the factor α, which is defined as:

$$\alpha_y = \text{x tonnes of additives in year } y \text{ / total additional additives used in year } y \quad \textbf{(3)}$$

Emission Reductions

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*. The emissions reductions are discounted for the percentage of additives for which surplus availability is not substantiated.

$$ER_y = \{ \; [BE_{BC,y} - PE_{BC,y}] * BC_y + L_y \; \} * (1 - \alpha_y) \quad \textbf{(4)}$$

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)
α_y	=	Reduction factor

Project Activity Emissions

Project emissions ($PE_{BC,y}$) 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 ($PE_{Clinker,y} > BE_{Clinker}$).

As this methodology is restricted to increase in percentage of blend only and not to efficiency improvements or fuel switching, 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. The choice of the lower value aims at avoiding potential perverse incentives for project participants to increase the emissions intensity of clinker production as a result of the project activity (e.g. by switching from less carbon-intensive energy sources to more carbon-intensive energy sources).

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.)

$$PE_{BC,y} = [PE_{clinker,y} * P_{Blend,y}] + PE_{ele\_ADD\_BC,y} \quad \textbf{(5)}$$

Where:

$PE_{BC,y}$	=	CO_2 emissions per tonne of BC in the project activity plant in year *y* (t CO_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:

$$PE_{clinker,y} = PE_{calcin,y} + PE_{fossil\_fuel,y} + PE_{ele\_grid\_CLNK,y} + PE_{ele\_sg\_CLNK,y} \quad \textbf{(5.1)}$$

Where:

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

$PE_{calcin,y} = 0.785*(OutCaO_y - InCaO_y) + 1.092*(OutMgO_y - InMgO_y) / [CLNK_y * 1000]$ **(5.1.1)**

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)

$PE_{fossil\_fuel, y} = [\sum FF_{i\_,y} * EFF_i] / CLNK_{,y} * 1000$ **(5.1.2)**

Where:

$PE_{fossil\_fuel,y}$	=	Emissions per tonne of clinker due to combustion of fossil fuels for clinker production in year *y* (t CO_2/tonne clinker)
$FF_{i\_,y}$	=	Fossil fuel of type i consumed for clinker production in year *y* (tonnes of fuel *i*)
EFF_i	=	Emission factor for fossil fuel i (tCO_2/tonne of fuel)
$CLNK_y$	=	Annual production of clinker in year *y* (kilotonnes of clinker)

$PE_{ele\_grid\_CLNK,y} = [PELE_{grid\_CLNK,y} * EF_{grid\_y}] / [CLNK_y * 1000]$ **(5.1.3)**

Where:

$PE_{ele\_grid\_CLNK,y}$	=	Grid electricity emissions for clinker production per tonne of clinker in year *y* (t CO_2/tonne clinker)
$PELE_{grid\_CLNK,y}$	=	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)

$PE_{elec\_sg\_CLNK,y} = [PELE_{sg\_CLNK\ ,y} * EF_{sg\_y}] / [CLNK_y * 1000]$ **(5.1.4)**

Where:

$PE_{elec\_sg\_CLNK,y}$	=	Emissions from self-generated electricity per tonne of clinker production in year *y* (t CO_2/tonne clinker)
$PELE_{sg\_CLNK,y}$	=	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)

$PE_{ele\_ADD\_BC,y} = PE_{ele\_grid\_BC,y} + PE_{ele\_sg\_BC,y} + PE_{ele\_grid\_ADD,y} + PE_{ele\_sg\_ADD,y}$ **(5.2)**

Where:

$PE_{ele\_ADD\_BC,y}$	=	Electricity emissions for BC grinding and preparation of additives in year *y* (tCO2/tonne of BC)
$PE_{ele\_grid\_BC,y}$	=	Grid electricity emissions for BC grinding in year *y* (tCO_2/tonne of BC)
$PE_{ele\_sg\_BC,y}$	=	Emissions from self generated electricity for BC grinding in year *y* (tCO_2/tonne of BC)
$PE_{ele\_grid\_ADD,y}$	=	Grid electricity emissions for additive preparation in year *y* (tCO_2/tonne of BC)
$PE_{ele\_sg\_ADD,y}$	=	Emissions from self generated electricity additive preparation in year *y* (tCO_2/tonne of BC)

$$PE_{ele\_grid\_BC,y} = [PELE_{grid\_BC,y} * EF_{grid,y}] /[BC_y * 1000] \quad \textbf{(5.2.1)}$$

Where:

$PE_{ele\_grid\_BC,y}$	=	Grid electricity emissions for BC grinding in year *y* (tCO_2/tonne of BC)
$PELE_{grid\_BC,y}$	=	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)

$$PE_{elec\_sg\_BC,y} = [PELE_{sg\_BC,y} * EF_{sg\_y}] / [BC_y * 1000] \quad \textbf{(5.2.2)}$$

Where:

$PE_{elec\_sg\_BC,y}$	=	Emissions from self generated electricity for BC grinding in year *y* (tCO_2/tonne of BC)
$PELE_{sg\_BC,y}$	=	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)

$$PE_{ele\_grid\_ADD,y} = [PELE_{grid\_ADD} * EF_{grid\_y}] /[BC_y * 1000] \quad \textbf{(5.2.3)}$$

Where:

$PE_{ele\_grid\_ADD,y}$	=	Grid electricity emissions for additive preparation in year *y* (tCO_2/tonne of BC)
$PELE_{grid\_ADD,y}$	=	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)

$$PE_{elec\_sg\_ADD,y} = [PELE_{sg\_ADD,y} * EF_{sg\_y}] / [BC_y * 1000] \quad \textbf{(5.2.4)}$$

Where:

$PE_{elec\_sg\_ADD,y}$	=	Emissions from self generated electricity additive preparation in year *y* (tCO_2/tonne of BC)
$PELE_{sg\_ADD,y}$	=	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)

All fuel uses are expressed in net calorific values (NCV) or lower heating value (LHV). All units use the metric system, unless specified otherwise. In determining emission coefficients, emission factors or net calorific values in this methodology, guidance by the 2000 IPCC Good Practice Guidance should be followed where appropriate. Project participants may either conduct regular measurements or they may use accurate and reliable local or national data where available. Where such data is not available, IPCC default emission factors (country-specific, if available) may be used if they are deemed to reasonably represent local circumstances. All values should be chosen in a conservative manner and the choice should be justified.

Electricity Emission Factor

For the calculation of the specific emissions from power generation from the grid

(EF_{grid_BSL} or $EF_{grid\ y}$) the "Tool to calculate the emission factor for an electricity system" is applied.[2]

For cement plants that self-generate power, the average annual emission factor of the self-generated power can be substituted by the emission factor calculated below.

The emission factor for self generation ($EF_{sg,y}$) is calculated as the generation-weighted average emissions per electricity unit (tCO_2/MWh) of all self-generating sources in the project boundary serving the system.

$$EF_{sg,y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j}}{\sum_{j} GEN_{j,y}} \quad (6)$$

Where:

$EF_{sg,y}$	=	Emission factor for self generated electricity in year *y* (t CO_2/MWh)
$F_{i,j,y}$	=	Amount of fuel *i* (in a mass or volume unit) consumed by relevant power sources *j* in year(s) *y*
j	=	On-site power sources
$COEF_{i,j\,y}$	=	CO_2 emission coefficient of fuel *i* (tCO_2 / mass or volume unit of the fuel), taking into account the carbon content of the fuels used by relevant power sources *j* and the percent oxidation of the fuel in year(s) y
$GEN_{j,y}$	=	Electricity (MWh) generated by the source *j*

The CO_2 emission coefficient $COEF_i$ is obtained as:

$$COEF_i = NCV_i \cdot EF_{CO2,i} \cdot OXID_i \quad (7)$$

Where:

$COEF_i$	=	CO_2 emission coefficient of fuel *i* (tCO_2 / mass or volume unit of the fuel), taking into account the carbon content of the fuels used by relevant power sources j and the percent oxidation of the fuel in year(s) *y*
NCV_i	=	Net calorific value (energy content) per mass or volume unit of a fuel *i*
$OXID_i$	=	Oxidation factor of the fuel (see page 1.29 in the 1996 Revised IPCC Guidelines for default values)
$EF_{CO2,i}$	=	CO2 emission factor per unit of energy of the fuel *i*

[2] Please refer to: < http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html >.

Data and parameters not monitored

In addition to the data and parameters listed below, the guidance on all tools to which this methodology refers applies.

Parameter:	EFF_i
Data unit:	tCO_2/tonne of fuel *i*
Description:	Emission factor for fossil fuel *i*
Source of data:	Actual measured or local data is to be used. If not available, regional data should be used and, in its absence, IPCC defaults can be used from the most recent version of IPCC Guidelines for National Greenhouse Gas Inventories
Measurement procedures (if any):	-
Any comment:	-

Parameter:	$OXID_i$
Data unit:	-
Description:	oxidation factor of the fuel
Source of data:	see page 1.29 in the 1996 Revised IPCC Guidelines for default values
Measurement procedures (if any):	-
Any comment:	-

Parameter:	$EF_{CO2,i}$
Data unit:	tCO_2/unit of energy
Description:	CO_2 emission factor per unit of energy of the fuel *i*
Source of data:	Actual measured or local data is to be used. If not available, regional data should be used and, in its absence, IPCC defaults can be used from the most recent version of IPCC Guidelines for National Greenhouse Gas Inventories
Measurement procedures (if any):	-
Any comment:	-

Parameter:	InCaO
Data unit:	t CaO
Description:	Baseline CaO content in the raw material
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	This parameter shall be obtained by monitoring the operation of the plant before the project activity is implemented. This is calculated as the CaO content (%) of the raw material times the raw material quantity [Q_{rm}] (tonnes)
Any comment:	This parameter must be monitored for at least one year prior to the start of the CDM project activity. If monitored data is available for two or three years prior to the start of the project activity, the average may be taken in determining baseline emissions

Parameter:	OutCaO
Data unit:	t CaO
Description:	Baseline CaO content in the clinker produced
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	This parameter shall be obtained by monitoring the operation of the plant before the project activity is implemented. This is calculated as the CaO content (%) of the clinker times clinker produced [$CLNK_{BSL}$] (tonnes)
Any comment:	This parameter must be monitored for at least one year prior to the start of the CDM project activity. If monitored data is available for two or three years prior to the start of the project activity, the average may be taken in determining baseline emissions

Parameter:	InMgO
Data unit:	t MgO
Description:	Baseline MgO content in the raw material
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	This parameter shall be obtained by monitoring the operation of the plant before the project activity is implemented. This is calculated as the MgO content (%) of the raw material times the raw material quantity [Q_{rm}] (tonnes)
Any comment:	This parameter must be monitored for at least one year prior to the start of the CDM project activity. If monitored data is available for two or three years prior to the start of the project activity, the average may be taken in determining baseline emissions

Parameter:	OutMgO
Data unit:	t MgO
Description:	Baseline MgO content in the clinker produced
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	This parameter shall be obtained by monitoring the operation of the plant before the project activity is implemented. This is calculated as the MgO content (%) of the clinker times clinker produced [$CLNK_{BSL}$] (tonnes)
Any comment:	This parameter must be monitored for at least one year prior to the start of the CDM project activity. If monitored data is available for two or three years prior to the start of the project activity, the average may be taken in determining baseline emissions

Parameter:	Q_{rm}
Data unit:	tonnes of raw materials
Description:	Baseline Quantity of clinker raw material used in baseline year
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	This parameter shall be obtained by monitoring the operation of the plant before the project activity is implemented
Any comment:	This parameter must be monitored for at least one year prior to the start of the CDM project activity. If monitored data is available for two or three years prior to the start of the project activity, the average may be taken in determining baseline emissions

Parameter:	$CLNK_{BSL}$
Data unit:	kilo tonnes of clinker
Description:	Annual production of clinker in the base year
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	This parameter shall be obtained by monitoring the operation of the plant before the project activity is implemented
Any comment:	This parameter must be monitored for at least one year prior to the start of the CDM project activity. If monitored data is available for two or three years prior to the start of the project activity, the average may be taken in determining baseline emissions

Parameter:	$FF_{i\ ,BSL}$
Data unit:	Tonnes of fuel *i*
Description:	Fossil fuel of type i consumed for clinker production in the baseline
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	This parameter shall be obtained by monitoring the operation of the plant before the project activity is implemented
Any comment:	This parameter must be monitored for at least one year prior to the start of the CDM project activity. If monitored data is available for two or three years prior to the start of the project activity, the average may be taken in determining baseline emissions

Parameter:	$BELE_{grid\ CLNK}$
Data unit:	Tonnes of fuel *i*
Description:	Baseline grid electricity for clinker production
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	This parameter shall be obtained by monitoring the operation of the plant before the project activity is implemented
Any comment:	This parameter must be monitored for at least one year prior to the start of the CDM project activity. If monitored data is available for two or three years prior to the start of the project activity, the average may be taken in determining baseline emissions

Parameter:	$BELE_{sg\ CLNK}$
Data unit:	MWh
Description:	Baseline self generation of electricity for clinker production
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	This parameter shall be obtained by monitoring the operation of the plant before the project activity is implemented
Any comment:	This parameter must be monitored for at least one year prior to the start of the CDM project activity. If monitored data is available for two or three years prior to the start of the project activity, the average may be taken in determining baseline emissions

Parameter:	EF_{sg_BSL}
Data unit:	t CO_2/MWh
Description:	Baseline electricity self generation emission factor
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	This parameter shall be obtained by monitoring the operation of the plant before the project activity is implemented. This parameter must be calculated as per equation (6) in the baseline methodology
Any comment:	This parameter must be monitored for at least one year prior to the start of the CDM project activity. If monitored data is available for two or three years prior to the start of the project activity, the average may be taken in determining baseline emissions

Parameter:	BC_{BSL}
Data unit:	kilotonnes of BC
Description:	Annual production of BC in the baseline year
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	This parameter shall be obtained by monitoring the operation of the plant before the project activity is implemented
Any comment:	This parameter must be monitored for at least one year prior to the start of the CDM project activity. If monitored data is available for two or three years prior to the start of the project activity, the average may be taken in determining baseline emissions

Parameter:	ADD_{BSL}
Data unit:	tonnes of additive
Description:	Amount of additive used for BC production in baseline year
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	This parameter shall be obtained by monitoring the operation of the plant before the project activity is implemented
Any comment:	This parameter must be monitored for at least one year prior to the start of the CDM project activity. If monitored data is available for two or three years prior to the start of the project activity, the average may be taken in determining baseline emissions

Parameter:	$BELE_{sg\_BC}$
Data unit:	MWh
Description:	Baseline self generation electricity for grinding BC
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	This parameter shall be obtained by monitoring the operation of the plant before the project activity is implemented
Any comment:	This parameter must be monitored for at least one year prior to the start of the CDM project activity. If monitored data is available for two or three years prior to the start of the project activity, the average may be taken in determining baseline emissions

Parameter:	$BELE_{grid\_BC}$
Data unit:	MWh
Description:	Baseline grid electricity for grinding BC
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	This parameter shall be obtained by monitoring the operation of the plant before the project activity is implemented
Any comment:	This parameter must be monitored for at least one year prior to the start of the CDM project activity. If monitored data is available for two or three years prior to the start of the project activity, the average may be taken in determining baseline emissions

Parameter:	$BELE_{grid\_ADD}$
Data unit:	MWh
Description:	Baseline grid electricity for grinding additives
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	This parameter shall be obtained by monitoring the operation of the plant before the project activity is implemented
Any comment:	This parameter must be monitored for at least one year prior to the start of the CDM project activity. If monitored data is available for two or three years prior to the start of the project activity, the average may be taken in determining baseline emissions

Parameter:	$BELE_{sg\_ADD}$
Data unit:	MWh
Description:	Baseline self generation electricity for grinding additives
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	This parameter shall be obtained by monitoring the operation of the plant before the project activity is implemented
Any comment:	This parameter must be monitored for at least one year prior to the start of the CDM project activity. If monitored data is available for two or three years prior to the start of the project activity, the average may be taken in determining baseline emissions

III. MONITORING METHODOLOGY

Monitoring procedures

All data collected as part of monitoring should be archived electronically and be kept at least for 2 years after the end of the last crediting period. 100% of the data should be monitored if not indicated otherwise in the tables below. All measurements should be conducted with calibrated measurement equipment according to relevant industry standards.

In addition, the monitoring provisions in the tools referred to in this methodology apply.

Data and parameters monitored

Data / Parameter:	BC_y
Data unit:	kilotonnes of BC
Description:	BC production in year *y*
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	This will be calculated and measured as part of normal operations
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	$InCaO_y$
Data unit:	t CaO
Description:	CaO content in the raw material
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	This parameter is calculated as the CaO content (%) of the raw material times the raw material quantity [$Q_{rm,y}$] (tonnes). This will be calculated and measured as part of normal operations
Monitoring frequency:	Daily
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	$OutCaO_y$
Data unit:	t CaO
Description:	CaO content in the clinker produced
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	This parameter is calculated as the CaO content (%) of the clinker times clinker produced [$CLNK_y$] (tonnes). This will be calculated and measured as part of normal operations
Monitoring frequency:	Daily
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	$InMgO_y$
Data unit:	t MgO
Description:	MgO content in the raw material
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	This parameter is calculated as the MgO content (%) of the raw material times the raw material quantity [$Q_{rm,y}$] (tonnes). This will be calculated and measured as part of normal operations
Monitoring frequency:	Daily
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	$OutMgO_y$
Data unit:	t MgO
Description:	MgO content in the clinker produced
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	This parameter is calculated as the MgO content (%) of the clinker times clinker produced [$CLNK_y$] (tonnes). This will be calculated and measured as part of normal operations
Monitoring frequency:	Daily
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	$Q_{rm,y}$
Data unit:	tonnes of raw materials
Description:	Quantity of clinker raw material used in year *y*
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	-
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	Parameter required to calculate $InCaO_y$ and $InMgO_y$

Data / Parameter:	$CLNK_y$
Data unit:	kilo tonnes of clinker
Description:	Annual production of clinker in year *y*
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	-
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	$FF_{i,y}$
Data unit:	Tonnes of fuel *i*
Description:	Fossil fuel of type i consumed for clinker production in year *y*
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	-
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	$PELE_{grid\_CLNK,y}$
Data unit:	MWh
Description:	Grid electricity for clinker production in year *y*
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	-
Monitoring frequency:	Monthly
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	$PELE_{sg\_CLNK,y}$
Data unit:	MWh
Description:	Annual consumption of additives in year *y*
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	-
Monitoring frequency:	Monthly
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	ADD_y
Data unit:	tonnes of additive
Description:	Amount of additive used for BC production in year *y*
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	-
Monitoring frequency:	Monthly
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	$PELE_{grid\_BC,y}$
Data unit:	MWh
Description:	Grid electricity for grinding BC in year *y*
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	-
Monitoring frequency:	Monthly
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	$PELE_{sg\_BC,y}$
Data unit:	MWh
Description:	Self generated electricity for grinding BC in year *y*
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	-
Monitoring frequency:	Monthly
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	$PELE_{grid\_ADD}$
Data unit:	MWh
Description:	Grid electricity for grinding additives in year *y*
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	-
Monitoring frequency:	Monthly
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	$PELE_{sg\_ADD,y}$
Data unit:	MWh
Description:	Self generation electricity for grinding additives in year *y*
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	-
Monitoring frequency:	Monthly
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	$F_{i,j,y}$
Data unit:	mass or volume unit
Description:	amount of fuel *i* (in a mass or volume unit) consumed by relevant power sources *j* in year *y*
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	-
Monitoring frequency:	Monthly
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	NCV_i
Data unit:	mass or volume unit
Description:	net calorific value (energy content) per mass or volume unit of a fuel *i*
Source of data:	The following data sources may be used if the relevant conditions apply:
Measurement procedures (if any):	For a) and b): Measurements should be undertaken in line with national or international fuel standards
Monitoring frequency:	For a) and b): The NCV should be obtained for each fuel delivery, from which weighted average annual values should be calculated For c): Review appropriateness of the values annually For d): Any future revision of the IPCC Guidelines should be taken into account

Data source	Conditions for using the data source
a) Values provided by the fuel supplier in invoices	This is the preferred source if the carbon fraction of the fuel is not provided (Option A)
b) Measurements by the project participants	If a) is not available
c) Regional or national default values	If a) is not available These sources can only be used for liquid fuels and should be based on well documented, reliable sources (such as national energy balances)
d) IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories	If a) is not available

QA/QC procedures:	Verify if the values under a), b) and c) are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range collect additional information from the testing laboratory to justify the outcome or conduct additional measurements. The laboratories in a), b) or c) should have ISO17025 accreditation or justify that they can comply with similar quality standards
Any comment:	-

Data / Parameter:	$GEN_{j,y}$
Data unit:	MWh
Description:	electricity generated by the source *j*
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	-
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	$P_{blend,y}$
Data unit:	tonne of additives/tonne of BC
Description:	Share of additives per tonne of BC in year *y*
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	-
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	$A_{blend,y}$
Data unit:	tonne of additives/tonne of BC
Description:	Baseline benchmark share of additives per tonne of BC updated for year *y*
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	-
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	TF_{cons}
Data unit:	kg of fuel/kilometre
Description:	Fuel consumption for the vehicle per kilometre
Source of data:	From plant records
Measurement procedures (if any):	-
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	D_{add_source}
Data unit:	km
Description:	Distance between the source of additive and the project activity plant
Source of data:	From plant records
Measurement procedures (if any):	-
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	TEF
Data unit:	kg CO_2/kg of fuel
Description:	Emission factor for transport fuel
Source of data:	Actual measured or local data is to be used. If not available, regional data should be used and, in its absence, IPCC defaults can be used from the most recent version of IPCC Guidelines for National Greenhouse Gas Inventories.
Measurement procedures (if any):	-
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	Q_{add}
Data unit:	tonnes of additive
Description:	Quantity of additive carried in one trip per vehicle
Source of data:	From plant records
Measurement procedures (if any):	-
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	$ELE_{conveyor\_ADD}$
Data unit:	MWh
Description:	Annual Electricity consumption for conveyor system for additives
Source of data:	From plant records
Measurement procedures (if any):	-
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	α_y
Data unit:	-
Description:	Reduction factor
Source of data:	From plant records
Measurement procedures (if any):	If *x* tonnes of additives used in the project activity are not substantiated as surplus, the factor α_y is: α_y = *x tonnes of additives in year y / total additional additives used in year y*
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

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History of the document

Version	Date	Nature of revision(s)
05	EB 50, Annex 10 16 October 2009	Revision to include: • Guidance on applying the “Tool for the demonstration and assessment of additionality”; • Updated monitoring tables; and • Editorial changes to improve the clarity of the methodology text.
04	EB 35, Paragraph 24 19 October 2007	Revision to include the Tool to calculate the emission factor for an electricity system.
03	EB 24, Annex 2 19 May 2006	Revision to amend the three options for selecting the benchmark for baseline emissions.
02	EB 22, Annex 7 28 November 2005	Revision to correct some of the formulae relating to leakage and references to the blend content in formulae.
01	EB 21, Annex 12 30 September 2005	Initial adoption.
Decision Class: Regulatory **Document Type**: Standard **Business Function**: Methodology		