Draft revision to the approved consolidated baseline and monitoring methodology ACM0005

"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";
- "Assessment of the validity of the original/current baseline and to update of the baseline at the renewal of the crediting period";
- "Project and leakage emissions from road transportation of freight".

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>.

Selected approach from paragraph 48 of the CDM modalities and procedures

"Existing actual or historical emissions, as applicable".

Definitions

For the purpose of this methodology, the following definitions apply:

Blended cement (BC). Blended cement is a mixture of clinker and additives containing less than 95% clinker.

Blended cement types. Blended cement types are defined by the national standard[1] of the host country. Blended cement types are distinct products with different uses that have different additives and different shares of clinker (for example, Portland Pozzolana Cement or Portland Blast Furnace Slag etc).

[1] In cases, where there is no national standard, revision to the methodology deem necessary.

Relevant cement type. Relevant cement type is the type of blended cement produced under the CDM project activity.

Additives. Additives are defined as materials (e.g. fly ash, gypsum, slag, pozzolana etc) to be blended with clinker to produce blended cement types.

Greenfield cement plant. Greenfield cement plant is defined as cement plant with no operational history at the start of the CDM project activity.

Applicability

This methodology is applicable to project activities that produce blended cement (BC) beyond current practices in the host country either (i) in Greenfield cement plant or (ii) in existing cement production plant by increasing the share of additives (i.e. reduce the share of clinker). 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~~ blended cement of the project activity plant and excludes export of blended cement;
- The methodology is not applicable if blending of cement outside the cement production plants is a common practice in the host country (e.g. localized blending in construction sites);
- ~~This methodology is not applicable for cement plants that do not produce clinker (e.g. grinding only plants)~~
- All clinker used in the project activity shall be produced by the cement plant that is included within the project boundary, hence, cement grinding only plants cannot use this methodology (e.g. no clinker manufacturing facility);
- Adequate data are available on cement types in the market.

II. BASELINE METHODOLOGY PROCEDURE

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).

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.

Table 1: Emissions sources included in or excluded from the project boundary

	Source	Gas	Included?	Justification / Explanation
Baseline	Calcinations of raw material in the kiln	CO_2	Yes	Direct emission from clinker kiln
		CH_4	Excluded	Emissions negligible, excluded for simplification
		N_2O	Excluded	Emissions negligible, excluded for simplification
	Use of fuel in the kiln including burner	CO_2	Yes	Direct emissions from clinker kiln
		CH_4	Excluded	Emissions negligible, excluded for simplification
		N_2O	Excluded	Emissions negligible, excluded for simplification
	Use of fuel for drying raw materials & kiln fuel	CO_2	Excluded	excluded for simplification
		CH_4	Excluded	Emissions negligible, excluded for simplification
		N_2O	Excluded	Emissions negligible, excluded for simplification
	Use of electricity (grid and self generated) for the preparation of fuels and raw materials for clinker, and for the operation of equipments related to the kiln (engines, compressors, fans etc)	CO_2	Yes	Direct emission from self generation sources and indirect emission from plants connected to the grid supplying the plant with electricity for feeding system, preparation of materials, and driving kiln
		CH_4	Excluded	Emissions negligible, excluded for simplification
		N_2O	Excluded	Emissions negligible, excluded for simplification
	Use of electricity (grid and self generated) for the preparation of Additives and for Grinding cement types	CO_2	Yes	Direct emission from self generation sources and indirect emission from plants connected to the grid supplying the plant with electricity for crushing and grinding Additives and grinding cement
		CH_4	Excluded	Emissions negligible, excluded for simplification
		N_2O	Excluded	Emissions negligible, excluded for simplification
Project activity	Calcinations of raw material in the kiln	CO_2	Yes	Direct emission from clinker kiln.
		CH_4	Excluded	Emissions negligible, excluded for simplification
		N_2O	Excluded	Emissions negligible, excluded for simplification
	Use of fuel in the kiln including burner	CO_2	Yes	Direct emission from clinker kiln.
		CH_4	Excluded	Emissions negligible, excluded for simplification
		N_2O	Excluded	Emissions negligible, excluded for simplification
	Use of fuel in driers for	CO_2	Excluded	Excluded for simplification

	Source	Gas	Included?	Justification / Explanation
	drying raw materials & kiln fuel	CH_4	Excluded	Emissions negligible, excluded for simplification
		N_2O	Excluded	Emissions negligible, excluded for simplification
	Use of electricity (grid and self generated) for the preparation of fuels and raw materials for clinker, and for the operation of equipments related to the kiln (engines, compressors, fans etc)	CO_2	Yes	Direct emission from self generation sources and indirect emission from plants connected to the grid supplying the plant with electricity for feeding system, preparation of materials, and driving kiln
		CH_4	Excluded	Emissions negligible, excluded for simplification
		N_2O	Excluded	Emissions negligible, excluded for simplification
	Use of electricity (grid and self generated) for the preparation of Additives and for Grinding cement types	CO_2	Yes	Direct emission from self generation sources and indirect emission from plants connected to the grid supplying the plant with electricity for crushing and grinding Additives and grinding cement
		CH_4	Excluded	Emissions negligible, excluded for simplification
		N_2O	Excluded	Emissions negligible, excluded for simplification

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 participants 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~~ approved by the CDM Executive Board~~, which is available on the UNFCCC CDM website~~.[2]

In applying the tool, where investment analysis is used, project participants shall apply Option II (investment comparison analysis) or Option III (benchmark analysis).

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

- ~~Investments~~ Capital expenditures 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~~ Costs 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~~ Costs related to the sourcing of blending material and material cost for blending;
- If required, other ~~expenses~~ costs related to the marketing of the new blended cement, e.g. market awareness campaigns; and
- Additional revenues related to the increased production of cement (due to the increased share of additives), if applicable. ~~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 participants 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 participants which are increasing the percentage of additives from a historical value to a higher value are not allowed to use this barrier).

~~A proposed project activity may be considered the first-of-its-kind in the applicable geographical area only if project participants selected a crediting period for the project activity that is a maximum of 10 years with no option of renewal.~~

In order to demonstrate additionality using "First of its Kind" barrier, the applicable geographical area shall include the entire domestic market in the host country and the methodology requires information concerning the market share for blended cement sold in the domestic market in the host country. The project activity shall be considered as the one that applies a technology that is different from any other technologies able to deliver the same output (blended cement) if the market share for blended cement in the host country is below 5%.

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

~~The project participants should calculate the market share~~ The market share shall be calculated as the percentage of the amount of blended cement ~~of~~ in the total amount of all cement types produced in the host country (tons blended cement/total tons cement production *x* 100%) during the last three years prior to: (a) the start date of the CDM project activity; or (b) the start of validation, whatever is earlier. ~~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~~ shall 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 participants claim for investment barriers, ~~(in Sub-step 3a (1)(a) of the tool),~~ they should follow the "Guidelines for objective demonstration and assessment of barriers" (EB 50, Annex 13). ~~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 participants 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 baseline emissions depend on two factors:

- The benchmark of share of clinker in the blended cement types produced in the host country; and
- The CO_2 emissions per tonne of clinker in the base year, 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.

This methodology requires data from the **base year** to calculate the baseline emissions (CO_2 emissions per tonne of clinker in the base year: $BE_{clinker,BSL}$).

In case of existing cement plants, the base year is defined as the year prior to the start of the CDM project activity. If data is available for multiple years prior to the start of the project activity, the average value of up to three years shall be taken in determining CO_2 emissions per tonne of clinker.

In case of Greenfield cement plants, the base year for determining CO_2 emissions per tonne of clinker is defined as first operational year. For ex-ante calculation for the preparation of PDD, project participants can use data from technology supplier information, quarry test results, latest feasibility study used for plant procurement and latest production plan to calculate the baseline emissions.

Baseline emissions are calculated as follows:

$$BE_y = BC_y \times \left(BE_{clinker,y} \times B_{Blend,y} + BE_{ele,ADD,BC}\right) \quad \textbf{(1)}$$

Where:

BE_y	=	Baseline emissions in year y (t CO_2)
BC_y	=	~~BC production~~ Blended cement produced and sold in the domestic market in year y (t BC)
$BE_{clinker,y}$	=	CO_2 emissions per tonne of clinker in year y (t CO_2/t clinker)
$B_{Blend,y}$	=	Baseline benchmark of share of clinker per tonne of BC updated for year y (t clinker/t BC) (see Step 2 below)
$BE_{ele,ADD,BC}$	=	Baseline electricity emissions for BC grinding and preparation of additives (t CO_2/t of BC)

Step 1: Determination of $BE_{clinker,y}$

CO_2 emissions per tonne of clinker in year y ($BE_{clinker,y}$~~t CO_2/tonne clinker)~~ ~~is~~ are calculated as:

$$BE_{clinker,y} = \min\left(BE_{clinker,BSL}, PE_{clinker,y}\right) \quad \textbf{(2)}$$

Where:

$BE_{clinker,y}$	=	CO_2 emissions per tonne of clinker in year y (t CO_2/t clinker)
$BE_{clinker,BSL}$	=	CO_2 emissions per tonne of clinker in the base year (t CO_2/t clinker)
$PE_{clinker,y}$	=	CO_2 emissions per tonne of clinker in the project activity plant in year y (t CO_2/t clinker) (See project emission section below)

Step 1.1: Determination of $BE_{clinker,BSL}$

CO_2 emissions per tonne of clinker in the base year ($BE_{clinker,BSL}$) ~~is~~ are calculated as:

$$BE_{clinker,BSL} = BE_{calcin} + BE_{fossl\ fuel} + BE_{ele,grid,CLNK} + BE_{ele,sg,CLNK} \quad \textbf{(3)}$$

Where:

$BE_{clinker,BSL}$	=	CO_2 emissions per tonne of clinker in the base year (t CO_2/t clinker)
BE_{calcin}	=	Baseline emissions per tonne of clinker due to calcinations of calcium carbonate and magnesium carbonate (t CO_2/t clinker)
$BE_{fossil\ fuel}$	=	Baseline emissions per tonne of clinker due to combustion of fossil fuels for clinker production (t CO_2/t clinker)
$BE_{ele,grid,CLNK}$	=	Baseline grid electricity emissions for clinker production per tonne of clinker (t CO_2/t clinker)
$BE_{ele,sg,CLNK}$	=	Baseline emissions from self generated electricity for clinker production per tonne of clinker (t CO_2/t clinker)

Step 1.1.1: Determination of BE_{calcin}

Baseline emissions per tonne of clinker due to calcinations of calcium carbonate and magnesium carbonate (BE_{calcin}) ~~is~~ are calculated as:

$$BE_{calcin} = \frac{0.785 \times (OutCaO - InCaO) + 1.092 \times (OutMgO - InMgO)}{CLNK_{BSL}} \quad \textbf{(4)}$$

Where:

BE_{calcin}	=	~~Emissions from the calcinations of limestone~~Baseline emissions per tonne of clinker due to calcinations of calcium carbonate and magnesium carbonate (t CO_2/t clinker)
0.785	=	Stoichiometric emission factor for CaO (t CO_2/t CaO)
1.092	=	Stoichiometric emission factor for MgO (t CO_2/t MgO)
InCaO	=	Baseline non-carbonated CaO content in the raw material (t CaO)
OutCaO	=	Baseline CaO content in the clinker produced (t CaO)
InMgO	=	Baseline non-carbonated MgO content in the raw material (t MgO)
OutMgO	=	Baseline MgO content in the clinker produced (t MgO)
$CLNK_{BSL}$	=	Annual production of clinker in the base year (t clinker)

Step 1.1.2: Determination of $BE_{fossil\ fuel}$

Baseline emissions per tonne of clinker due to combustion of fossil fuels for clinker production ($BE_{fossil\ fuel}$) are calculated as:

$$BE_{fossil\ fuel} = \frac{\sum FF_{i,BSL} \times EFF_i}{CLNK_{BSL}} \quad \textbf{(5)}$$

Where:

$BE_{fossil\ fuel}$	=	Baseline emissions per tonne of clinker due to combustion of fossil fuels for clinker production (t CO_2/t clinker)
$FF_{i,BSL}$	=	Fossil fuel of type *i* consumed for clinker production in the base year (t fuel)
EFF_i	=	Emission factor for fossil fuel *i* (t CO_2/t ~~of~~ fuel)
$CLNK_{BSL}$	=	Annual production of clinker in the base year (t clinker)

Step 1.1.3: Determination of $BE_{ele,grid,CLNK}$

Baseline grid electricity emissions for clinker production per tonne of clinker ($BE_{ele,grid,CLNK}$) are calculated as:

$$BE_{ele,grid,CLNK} = \frac{BELE_{grid,CLNK} \times EF_{grid,BSL}}{CLNK_{BSL}} \quad (6)$$

Where:

$BE_{ele,grid,CLNK}$	=	Baseline grid electricity emissions for clinker production per tonne of clinker (t CO_2/t clinker)
$BELE_{grid,CLNK}$	=	Grid electricity consumed for clinker production in base year (MWh)
$EF_{grid,BSL}$	=	Baseline grid emission factor (t CO_2/MWh) (See Step 6.1 below)
$CLNK_{BSL}$	=	Annual production of clinker in the base year (t clinker)

Step 1.1.4: Determination of $BE_{ele,sg,CLNK}$

Baseline emissions from self generated electricity for clinker production per tonne of clinker ($BE_{ele,sg,CLNK}$) are calculated as:

$$BE_{ele,sg,CLNK} = \frac{BELE_{sg,CLNK} \times EF_{sg,BSL}}{CLNK_{BSL}} \quad (7)$$

Where:

$BE_{ele,sg,CLNK}$	=	Baseline emissions from self generated electricity for clinker production per tonne of clinker (t CO_2/ t clinker)
$BELE_{sg,CLNK}$	=	Self generation of electricity for clinker production in the base year (MWh)
$EF_{sg,BSL}$	=	~~Baseline electricity self generation emission factor~~ Emission factor for self generated electricity in the base year (t CO_2/MWh) (See Step 6.3 below)
$CLNK_{BSL}$	=	Annual production of clinker in the base year (t clinker)

Step 2: Determination of $B_{Blend,y}$

The "Region" for the benchmark calculation needs to be clearly determined and justified by project participants. The default is the national market but project participants 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.

Step 2.1: Determination of baseline benchmark of share of clinker per tonne of BC at the start of the project activity ($B_{Blend,1}$)

Data concerning average blending ratio, annual production and import of the relevant cement type(s) in the region shall be collected for one year prior to the start date of CDM project activity.

Baseline benchmark of share of clinker per tonne of BC ~~updated for year y~~ at the start of the project activity ($B_{Blend,\sout{y}1}$), which shall be used in the calculation of emission reduction for the first year of each crediting period, is determined as the lowest value among the following approaches:

~~The benchmark of share of clinker per tonne of BC ($B_{Blend,y}$) for calculating baseline emissions is defined as the lowest value among the following, assessed after gathering available data concerning average blending~~

ratio, annual production and import of the relevant cement type (s) in the region, using one year data prior to the start date of CDM project activity

(a) Average (weighted by production) mass fraction of clinker (t clinker/t BC) for the 5 plants producing cement with the highest share of additives:

(i) Identify the amount of the relevant cement type produced forby each plant in the region;

(ii) Determine the average (weighted by production) mass percentagefraction of clinker (t clinker/t BC) for the 5 plants producing cement with the highest share of additives of the relevant cement type in the region;

(iii) If the region comprises of less than 5 plants producing the relevant cement type, the national market should be used as the default region.

(b) Production weighted average mass fraction of clinker (t clinker/t BC) in the top 20% (in terms of share of additives) of the total production of the blended cement type:

(iv) Identify the amount of the relevant cement type produced forby each plant in the region;

(v) Determine the production weighted average mass percentagefraction of clinker (t clinker/t BC) in the top 20% (in terms of share of additives) of the total production of the blended cement type in the region;

(vi) If 20% falls on part capacity of a plant, that plant is included in the calculations.

(c) Mass fraction of clinker (t clinker/t BC) in the relevant cement type produced in the proposed project activity plant before the implementation of the CDM project activity:

(vii) Determine the mass percentagefraction of clinker (t clinker/t BC) in the relevant cement type produced in the proposed project activity plant before the implementation of the CDM project activity, if applicable (For Greenfield cement plant this option shall not be included in the analysis);

(viii) The project participants shall use the lowest share of clinker used over the 3 most recent years before the implementation of the CDM project activity.

In addition to cement production data, Note: If the average annual amount of the relevant cement type imported by the host country is more than 10% of the total production volume in the region, the weighted average mass percentagefraction of clinker in the relevant cement type of imported cement shall also be considered in the analysis under (i) and (ii) above as it would have beenbe produced in a virtual one plant located in the region. For example, if there are several companies importing the relevant cement type, the weighted average mass fraction of clinker in the imported cement from each company shall be considered as it would have been produced in a virtual one plant. In this case, the clinker share of the imported cement type may be obtained as specified on the cement bag or import document.

To determine the benchmark for Optionapproaches (i) and (ii) below, 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 sharepercentage 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.

Step 2.2: Updating of baseline benchmark of share of clinker per tonne of BC for year y within the crediting period

The project participants shall recalculate the benchmark value for each crediting year y within the crediting period, starting from second year.

Baseline benchmark of share of clinker per tonne of BC updated for year y ($B_{Blend,y}$) is determined as follows:

For approaches (i) and (ii) above, the project participants ~~can~~shall choose between 2 options to update the benchmark of share of clinker per tonne of BC:

~~– either~~ Option ~~(~~1~~)~~: ~~to~~ update the benchmark annually and incorporate only an ~~increasing~~ decreasing trend of clinker share (a ~~ncreasing~~ decreasing trend would require the baseline to remain constant);~~ or~~

Data concerning average blending ratio, annual production and import of the relevant cement type(s) in the region shall be collected. To calculate the benchmark value for year y, data should be collected for the year prior to the year y.

If the benchmark value calculated at year y is higher than previous year (y-1), the project participants shall use the benchmark value of the previous year (y-1).

$B_{Blend,y}$ replaces $B_{Blend,y-1}$ if $B_{Blend,y} > B_{Blend,y-1}$

Otherwise, $B_{Blend,y}$ remains unchanged.

Option ~~(~~2: ~~)~~ update the benchmark annually based on 2% default increase in the share of additives (i.e. decreasing share of clinker) up to the limit of the regulatory/product norm in the region/national market. ~~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.~~

$B_{Blend,y}=B_{Blend,1} \times (1-0.02)^y$ till $B_{Blend,y}$ reaches the limit of the regulatory/product norm in the region/national market for the share of clinker in the cement type.

For ~~Option~~ approach (iii) update the benchmark annually based on 2% default increase in the share of additives (i.e. decreasing share of clinker) up to the limit of the regulatory/product norm in the region/national market.~~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.~~

$B_{Blend,y}=B_{Blend,1} \times (1-0.02)^y$ till $B_{Blend,y}$ reaches the limit of the regulatory/product norm in the region/national market for the share of clinker in the cement type.

Step 2.3: Updating of baseline benchmark of share of clinker per tonne of BC at the renewal of the crediting period

At the renewal of the crediting period, the benchmark is recalculated following the Step 2.1 above. The basis (~~between~~ among the 3 options contained in the Step 2.1 above) of the benchmark may change from the ~~option~~ approach selected during the ~~first~~ previous crediting period.

Step 3: Determination of $BE_{ele,ADD,BC}$

Baseline electricity emissions for BC grinding and preparation of additives ($BE_{ele,ADD,BC}$) are calculated as:

$$BE_{ele,ADD,BC} = BE_{ele,grid,BC} + BE_{ele,sg,BC} + BE_{ele,grid,ADD} + BE_{ele,sg,ADD} \quad (8)$$

Where:

$BE_{ele,ADD,BC}$	=	Baseline electricity emissions for BC grinding and preparation of additives (t CO_2/t BC)
$BE_{ele,grid,BC}$	=	Baseline grid electricity emissions for BC grinding (t CO_2/t BC)
$BE_{ele,sg,BC}$	=	Baseline self generated electricity emissions for BC grinding (t CO_2/t BC)
$BE_{ele,grid,ADD}$	=	Baseline grid electricity emissions for additive preparation (t CO_2/t BC)
$BE_{ele,sg,ADD}$	=	Baseline self generated electricity emissions for additive preparation (t CO_2/t BC)

Step 3.1: Determination of $BE_{ele,grid,BC}$

Baseline grid electricity emissions for BC grinding ($BE_{ele,grid,BC}$) are calculated as:

$$BE_{ele,grid,BC} = \frac{BELE_{grid,BC} \times EF_{grid,BSL}}{BC_{BSL}} \quad (9)$$

Where:

$BE_{ele,grid,BC}$	=	Baseline grid electricity emissions for BC grinding (t CO_2/t BC)
$BELE_{grid,BC}$	=	Baseline grid electricity for grinding BC (MWh)
$EF_{grid,BSL}$	=	Baseline grid emission factor (t CO_2/MWh) (See Step 6.1 below)
BC_{BSL}	=	Annual production of BC in the base year (t BC)

Step 3.2: Determination of $BE_{ele,sg,BC}$

Baseline self generated electricity emissions for BC grinding ($BE_{ele,sg,BC}$) are calculated as:

$$BE_{ele,sg,BC} = \frac{BELE_{sg,BC} \times EF_{sg,BSL}}{BC_{BSL}} \quad (10)$$

Where:

$BE_{ele,sg,BC}$	=	Baseline self generated electricity emissions for BC grinding (t CO_2/t BC)
$BELE_{sg,BC}$	=	Baseline self generation electricity for grinding BC (MWh)
$EF_{sg,BSL}$	=	~~Baseline electricity self generation emission factor~~Emission factor for self generated electricity in the base year (t CO_2/MWh) (See Step 6.3 below)
BC_{BSL}	=	Annual production of BC in the base year (t BC)

Step 3.3: Determination of $BE_{ele,grid,ADD}$

Baseline grid electricity emissions for additive preparation ($BE_{ele,grid,ADD}$) are calculated as:

$$BE_{ele,grid,ADD} = \frac{BELE_{grid,ADD} \times EF_{grid,BSL}}{BC_{BSL}} \quad (11)$$

Where:

$BE_{ele,grid,ADD}$	=	Baseline grid electricity emissions for additive preparation (t CO_2/t BC)
$BELE_{grid,ADD}$	=	Baseline grid electricity for grinding additives (MWh)
$EF_{grid,BSL}$	=	Baseline grid emission factor (t CO_2/MWh) (See Step 6.1 below)
BC_{BSL}	=	Annual production of BC in the base year (t BC)

Step 3.4: Determination of $BE_{ele,sg,ADD}$

Baseline self generated electricity emissions for additive preparation ($BE_{ele,sg,ADD}$) are calculated as:

$$BE_{ele,sg,ADD} = \frac{BELE_{sg,ADD} \times EF_{sg,BSL}}{BC_{BSL}} \quad \textbf{(12)}$$

Where:

$BE_{ele,sg,ADD}$	=	Baseline self generated electricity emissions for additive preparation (t CO_2/t BC)
$BELE_{sg,ADD}$	=	Baseline self generation electricity for grinding additives (MWh)
$EF_{sg,BSL}$	=	~~Baseline electricity self generation emission factor~~ Emission factor for self generated electricity in the base year (t CO_2/MWh) (See Step 6.3 below)
BC_{BSL}	=	Annual production of BC in the base year (t BC)

Project Emissions

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.

The project emissions are calculated as:

$$PE_y = BC_y \times \left(PE_{clinker,y} \times P_{Blend,y} + PE_{ele,ADD,BC,y} \right) \quad \textbf{(13)}$$

Where:

PE_y	=	Project emissions in year *y* (t CO_2)
BC_y	=	~~BC production~~ Blended cement produced and sold in the domestic market in year *y* (t BC)
$PE_{clinker,y}$	=	CO_2 emissions per tonne of clinker in the project activity plant in year *y* (t CO_2/t clinker)
$P_{Blend,y}$	=	Share of clinker per tonne of BC in year *y* (t clinker/t BC)
$PE_{ele,ADD,BC,y}$	=	Electricity emissions for BC grinding and preparation of additives in year *y* (t CO_2/t BC)

Step 4: Determination of $PE_{clinker,y}$

CO_2 emissions per tonne of clinker in the project activity plant in year *y* ($PE_{clinker,y}$) ~~is~~ are calculated as~~below~~:

$$PE_{clinker,y} = PE_{calcin,y} + PE_{fossil\ fuel,y} + PE_{ele,grid,CLNK,y} + PE_{ele,sg,CLNK,y} \quad \textbf{(14)}$$

Where:

$PE_{clinker,y}$	=	~~Emissions of~~ CO_2 emissions per tonne of clinker in the project activity plant in year *y* (t CO_2/t clinker)
$PE_{calcin,y}$	=	Emissions per tonne of clinker due to calcinations of calcium carbonate and magnesium carbonate in year *y* (t CO_2/t 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/t clinker)
$PE_{ele,grid,CLNK,y}$	=	Grid electricity emissions for clinker production per tonne of clinker in year *y* (t CO_2/t clinker)
$PE_{ele,sg,CLNK,y}$	=	Emissions from self-generated electricity per tonne of clinker production in year *y* (t CO_2/t clinker)

Step 4.1: Determination of $PE_{calcin,y}$

Emissions per tonne of clinker due to calcinations of calcium carbonate and magnesium carbonate in year *y* ($PE_{calcin,y}$) are calculated as:

$$PE_{calcin,y} = \frac{0.785 \times (OutCaO_y - InCaO_y) + 1.092 \times (OutMgO_y - InMgO_y)}{CLNK_y} \quad (15)$$

Where:

$PE_{calcin,y}$	=	Emissions from the calcinations of limestone (t CO_2/t clinker)
0.785	=	Stoichiometric emission factor for CaO (t CO_2/t CaO)
1.092	=	Stoichiometric emission factor for MgO (t CO_2/t MgO)
$InCaO_y$	=	Non-carbonated CaO content in the raw material in year *y* (t CaO) ~~(%) of the raw material * raw material quantity (t)~~
$OutCaO_y$	=	CaO content in the clinker produced in year *y* (t CaO) ~~(%) of the clinker * clinker produced (t)~~
$InMgO_y$	=	Non-carbonated MgO content in the raw material in year *y* (t MgO) ~~(%) of the raw material * raw material quantity (t)~~
$OutMgO_y$	=	MgO content in the clinker produced in year *y* (t MgO) ~~(%) of the clinker * clinker produced (t)~~
$CLNK_y$	=	Clinker production in year *y* (t clinker)

Step 4.2: Determination of $PE_{fossil\ fuel,y}$

Emissions per tonne of clinker due to combustion of fossil fuels for clinker production in year *y* ($PE_{fossil\ fuel,y}$) are calculated as:

$$PE_{fossil\ fuel,y} = \frac{\sum FF_{i,y} \times EFF_i}{CLNK_y} \quad (16)$$

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/t clinker)
$FF_{i,y}$	=	Fossil fuel of type *i* consumed for clinker production in year *y* (t fuel)
EFF_i	=	Emission factor for fossil fuel *i* (t CO_2/ t fuel)
$CLNK_y$	=	Clinker production in year *y* (t clinker)

Step 4.3: Determination of $PE_{ele,grid,CLNK,y}$

Grid electricity emissions for clinker production per tonne of clinker in year *y* ($PE_{ele,grid,CLNK,y}$) are calculated as:

$$PE_{ele,grid,CLNK,y} = \frac{PELE_{grid,CLNK,y} \times EF_{grid,y}}{CLNK_y} \quad (17)$$

Where:

$PE_{ele,grid,CLNK,y}$	=	Grid electricity emissions for clinker production per tonne of clinker in year *y* (t CO_2/t 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) (See Step 6.1 below)
$CLNK_y$	=	Clinker production in year *y* (t clinker)

Step 4.4: Determination of $PE_{ele,sg,CLNK,y}$

Emissions from self-generated electricity per tonne of clinker production in year *y* ($PE_{ele,sg,CLNK,y}$) are calculated as:

$$PE_{ele,sg,CLNK,y} = \frac{PELE_{sg,CLNK,y} \times EF_{sg,y}}{CLNK_y} \quad (18)$$

Where:

$PE_{ele,sg,CLNK,y}$	=	Emissions from self-generated electricity per tonne of clinker production in year *y* (t CO_2/t 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) (See Step 6.2 below)
$CLNK_y$	=	Clinker production in year *y* (t clinker)

Step 5: Determination of $PE_{ele,ADD,BC,y}$

Electricity emissions for BC grinding and preparation of additives in year *y* ($PE_{ele,ADD,BC,y}$) are calculated as:

$$PE_{ele,ADD,BC,y} = PE_{ele,grid,BC,y} + PE_{ele,sg,BC,y} + PE_{ele,grid,ADD,y} + PE_{ele,sg,ADD,y} \quad (19)$$

Where:

$PE_{ele,ADD,BC,y}$	=	Electricity emissions for BC grinding and preparation of additives in year *y* (t CO_2/t BC)
$PE_{ele,grid,BC,y}$	=	Grid electricity emissions for BC grinding in year *y* (t CO_2/t BC)
$PE_{ele,sg,BC,y}$	=	Emissions from self generated electricity for BC grinding in year *y* (t CO_2/t BC)
$PE_{ele,grid,ADD,y}$	=	Grid electricity emissions for additive preparation in year *y* (t CO_2/t BC)
$PE_{ele,sg,ADD,y}$	=	Emissions from self generated electricity additive preparation in year *y* (t CO_2/t BC)

Step 5.1: Determination of $PE_{ele,grid,BC,y}$

Grid electricity emissions for BC grinding in year *y* ($PE_{ele,grid,BC,y}$) are calculated as:

$$PE_{ele,grid,BC,y} = \frac{PELE_{grid,BC,y} \times EF_{grid,y}}{BC_y} \quad (20)$$

Where:

$PE_{ele,grid,BC,y}$	=	Grid electricity emissions for BC grinding in year *y* (t CO_2/ t BC)
$PELE_{grid,BC,y}$	=	~~Baseline~~ Grid electricity for grinding BC in year *y* (MWh)
$EF_{grid,y}$	=	Grid emission factor in year *y* (t CO_2/MWh) (See Step 6.1 below)
BC_y	=	~~BC production~~ Blended cement produced and sold in the domestic market in year *y* (t BC)

Step 5.2: Determination of $PE_{ele,sg,BC,y}$

Emissions from self generated electricity for BC grinding in year *y* ($PE_{ele,sg,BC,y}$) are calculated as:

$$PE_{ele,sg,BC,y} = \frac{PELE_{sg,BC,y} \times EF_{sg,y}}{BC_y} \quad (21)$$

Where:

$PE_{ele,sg,BC,y}$	=	Emissions from self generated electricity for BC grinding in year *y* (t CO_2/t 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) (See Step 6.2 below)
BC_y	=	~~BC production~~ Blended cement produced and sold in the domestic market in year *y* (t BC)

Step 5.3: Determination of $PE_{ele,grid,ADD,y}$

Grid electricity emissions for additive preparation in year *y* ($PE_{ele,grid,ADD,y}$) are calculated as:

$$PE_{ele,grid,ADD,y} = \frac{PELE_{grid,ADD,y} \times EF_{grid,y}}{BC_y} \quad (22)$$

~~$$PE_{ele,grid,ADD,y} = \frac{PELE_{grid,ADD} \times EF_{grid,y}}{BC_y} \quad (22)$$~~

Where:

$PE_{ele,grid,ADD,y}$	=	Grid electricity emissions for additive preparation in year *y* (t CO_2/t BC)
$PELE_{grid,ADD,y}$	=	~~Baseline~~ Grid electricity for grinding additives in year *y* (MWh)
$EF_{grid,y}$	=	Grid emission factor in year *y* (t CO_2/MWh) (See Step 6.1 below)
BC_y	=	~~BC production~~Blended cement produced and sold in the domestic market in year *y* (t BC)

Step 5.4: Determination of $PE_{ele,sg,ADD,y}$

Emissions from self generated electricity additive preparation in year *y* ($PE_{ele,sg,ADD,y}$) are calculated as:

$$PE_{ele,sg,ADD,y} = \frac{PELE_{sg,ADD,y} \times EF_{sg,y}}{BC_y} \quad (23)$$

Where:

$PE_{ele,sg,ADD,y}$	=	Emissions from self generated electricity additive preparation in year *y* (t CO_2/t BC)
$PELE_{sg,ADD,y}$	=	~~Baseline~~ Self generation electricity for grinding additives in year *y* (MWh)
$EF_{sg,y}$	=	Emission factor for self generated electricity in year *y* (t CO_2/MWh) (See Step 6.2 below)
BC_y	=	~~BC production~~ Blended cement produced and sold in the domestic market in year *y* (t BC)

Step 6: Determination of Electricity Emission Factors (**$EF_{grid,BSL}$, $EF_{grid,y}$, $EF_{sg,y}$ and $EF_{sg,BSL}$**)

Step 6.1: Determination of $EF_{grid,BSL}$ and $EF_{grid,y}$

Baseline grid emission factor ($EF_{grid,BSL}$) and grid emission factor in year *y* ($EF_{grid,y}$) shall be calculated using the latest version of the "Tool to calculate the emission factor for an electricity system".

~~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.[3]~~

Step 6.2: Determination of $EF_{sg,y}$

~~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~~ generated electricity in year *y* ($EF_{sg,y}$) is calculated as the generation-weighted average emissions per electricity unit (t CO_2/MWh) of all self-generating sources in the project boundary serving the system in year *y*.

$$EF_{sg,y} = \frac{\sum_{i,j} F_{i,j,y} \times COEF_i}{\sum_j GEN_{j,y}} \quad (24)$$

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* (mass or volume unit)
j	=	On-site power sources
$COEF_i$	=	CO_2 emission coefficient of fuel *i* ~~(t CO_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* (t CO_2/mass or volume unit)
$GEN_{j,y}$	=	Electricity generated by the source *j* in year *y* (MWh)

~~[3] Please refer to: <http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html>.~~

~~The~~ CO_2 emission coefficient of fuel *i* ($COEF_i$) is obtained as:

$$COEF_i = NCV_i \times EF_{CO2,i} \times OXID_i \quad (25)$$

Where:

$COEF_i$	=	CO_2 emission coefficient of fuel *i* ~~(t CO_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* (t CO_2/mass or volume unit)
NCV_i	=	Net calorific value ~~(energy content)~~ per mass or volume unit of a fuel *i* (GJ/ mass or volume unit)
$OXID_i$	=	Oxidation factor of the fuel *i* (see page 1.29 in the 1996 Revised IPCC Guidelines for default values)
$EF_{CO2,i}$	=	CO_2 emission factor per unit of energy of the fuel *i* (t CO_2/~~unit of energy~~GJ)

Step 6.3: Determination of $EF_{sg,BSL}$

Emission factor for self generated electricity in the base year ($EF_{sg,BSL}$) is calculated as the generation-weighted average emissions per electricity unit (t CO_2/MWh) of all self-generating sources in the project boundary serving the system in the base year.

$$EF_{sg,BSL} = \frac{\sum_{m,n} F_{m,n,BSL} \times COEF_m}{\sum_n GEN_{n,BSL}} \quad (26)$$

Where:

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

~~The~~ CO_2 emission coefficient of fuel ~~*i*~~ *m* ($COEF_{m}$) is obtained as:

$$COEF_m = NCV_m \times EF_{CO2,m} \times OXID_m \quad (27)$$

Where:

$COEF_m$	=	CO_2 emission coefficient of fuel *m* ~~(t CO_2/mass or volume unit of the fuel)~~, taking into account the carbon content of the fuels used by relevant power sources *n* and the percent oxidation of the fuel in the base year (t CO_2/mass or volume unit)
NCV_m	=	Net calorific value ~~(energy content)~~ per mass or volume unit of a fuel *m* (GJ/ mass or volume unit)
$OXID_m$	=	Oxidation factor of the fuel *m*
$EF_{CO2,m}$	=	CO_2 emission factor per unit of energy of the fuel *m* (t CO_2/~~unit of energy~~GJ)

Leakage

Leakage emissions consist of:

- Leakage emissions due to transport of additional additives; and
- Leakage emissions due to the diversion of additives from existing uses.

$$LE_y = LE_{TR,y} + LE_{ADD,y} \quad (28)$$

Where,

LE_y	=	Leakage emissions in year *y* (t CO_2)
$LE_{TR,y}$	=	Leakage emissions due to transport of additional additives in year y (t CO_2)
$LE_{ADD,y}$	=	Leakage emissions due to the diversion of additives from existing uses in year *y* (t CO_2)

Step 7: Determination of leakage emissions due to transport of additional additives

~~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.~~

Leakage emissions due to transport of additional additives in year y ($LE_{TR,y}$) are calculated applying the latest approved version of the methodological tool "Project and leakage emissions from road transportation of freight" where $LE_{TR,y}$ corresponds to $LE_{TR,m}$ in the tool, and $Q_{ADD,y}$ corresponds to $FR_{f,m}$ in the tool.

$$\sout{L_{add,trans} = \frac{TF_{cons} \times D_{add,source} \times TEF}{Q_{add} \times 1000} + \frac{ELE_{conveyor,ADD} \times EF_{grid,y}}{ADD_y} \quad 28}$$

~~Where:~~

~~$L_{add,trans}$~~	=	~~Transport related emissions per tonne of additives (t CO_2/t additives)~~
~~TF_{cons}~~	=	~~Fuel consumption for the vehicle per kilometre (kg fuel/kilometre)~~
~~$D_{add,source}$~~	=	~~Distance between the source of additives and the project activity plant (km)~~
~~TEF~~	=	~~Emission factor for transport fuel (kg CO_2/kg 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 additives carried in one trip per vehicle (t additives)~~
~~ADD_y~~	=	~~Annual consumption of additives in year *y* (t additives)~~

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

Step 7.1: Determination of $Q_{ADD,y}$

$$Q_{ADD,y} = \left(A_{PJ,blend,y} - A_{BSL,blend,y}\right) \times BC_y \quad (29)$$

$$\sout{LE_y = L_{add,trans} \times \left(A_{blend,y} - P_{blend,y}\right) \times BC_y \quad (29)}$$

Where:

LE_y	=	Leakage emissions due to transport of additives in year y (t CO_2)
$Q_{ADD,y}$	=	Quantify of additional additives transported in year y (t additives). This parameter shall be used in stead of $FR_{f,m}$ in the tool "Project and leakage emissions from road transportation of freight"
$L_{add,trans}$	=	Transport related emissions per tonne of additives (t CO_2/t additives)
BC_y	=	BC production Blended cement produced and sold in the domestic market in year y (t BC)
$P_{blend,y}A_{PJ,blend,y}$	=	Share of additives per tonne of BC in year y (t additives /t BC)
$A_{BSL,blend,y}$	=	Baseline benchmark share of additives per tonne of BC updated for year y (t additives /t BC)

Step 8: Determination of leakage emissions due to the diversion of additives from existing uses

Another possible leakage is due to the diversion of additives from existing uses. The project participants shall demonstrate that additional amounts of additives used are surplus. If the project participants 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:

α_y = x tonnes of additives in year y / total additional additives used in year y **(31)**

Where:

α_y	=	Reduction factor

In this case, project participants shall demonstrate that the use of the additives do not result in increased emissions elsewhere. For this purpose, project participants shall assess as part of the monitoring the supply situation for the additives used in the project activity. The following options shall be used to demonstrate that the additives used in the project activity did not increase emissions elsewhere:

L_1 Demonstrate that at the sites from where the project activity is receiving additives, the additives have not been collected or utilized but have been dumped, land-filled, not excavated or burnt prior to the implementation of the project activity. Demonstrate that this practice would continue in the absence of the CDM project activity, e.g. by showing that in the monitored period no market has emerged for the additives considered, no price has been allocated for the additives other than transport, excavation and/or processing or by showing that it would still not be feasible to utilize the additives for any purposes (e.g. due to the remote location where the additives are generated). At the renewal of crediting period, the project participants shall re-demonstrate this requirement. This approach is applicable to situations where project participants use only additives from specific sites and do not purchase additives from the market. During each verification, DOE shall check that the additives are sourced from the same sites as indicated in the PDD.

L_2 Demonstrate that there is an abundant surplus of the additives in the country from where the additives are sourced from. For this purpose, demonstrate that the quantity of available additives in the country is at least 25% larger than the quantity of additives that are utilized, including the project activity. This shall be demonstrated during each crediting year.

Where project participants wish to use approach L1 and did not meet the above condition in L1, the leakage emissions due to the diversion of additives from existing uses in year y shall be calculated as follows:

$$LE_{ADD,y} = (BE_y - PE_y) \times \alpha_y \quad \textbf{(30)}$$

Where:

$LE_{ADD,y}$	=	Leakage emissions due to the diversion of additives from existing uses in year *y* (t CO_2)
BE_y	=	Baseline emissions in year y (t CO_2)
PE_y	=	Project emissions in year y (t CO_2)
α_y	=	Leakage penalty factor in year y (fraction)

Step 8.1: Determination of α_y

$$\alpha_y = \frac{ADD_{NS,y}}{ADD_y} \qquad \textbf{(31)}$$

Where:

α_y	=	Leakage penalty factor in year y (fraction)
$ADD_{NS,y}$	=	Amount of additives used for BC production in project plant for which the project participants could not substantiate that they are surplus in year y (t additives)
ADD_y	=	Amount of additives used for BC production in project plant in year y (t additives)

Where project participants wish to use approach L2 and did not meet the above condition in L2 in any of the crediting year, emission reductions for that crediting year shall be regarded as zero.

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.~~

The emission reductions are calculated as:

~~$ER_y = (BE_y - PE_y - LE_y) \times (1 - \alpha_y)$ **(32)**~~

$$ER_y = BE_y - PE_y - LE_y \qquad \textbf{(32)}$$

Where:

ER_y	=	Emissions reductions in year *y* due to project activity in year *y* (t CO_2)
BE_y	=	Baseline emissions in year *y* (t CO_2)
PE_y	=	Project emissions in year *y* (t CO_2)
LE_y	=	Leakage emissions ~~due to transport of additives~~ in year *y* (t CO_2)
~~α_y~~	~~=~~	~~Reduction factor~~

In the case that overall negative emission reductions arise in a year, emission reductions 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 t CO_2e occur in the year t and positive emission reductions of 100 t CO_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.)

In case the project activity consists of production of more than one cement type, the emission reduction shall be calculated ~~following equation 1 to 9~~ above for each cement type *i* produced. The total emission reduction from the project activity shall be calculated as the sum of emission reductions for all cement types *i* produced.

Changes required for methodology implementation in 2nd and 3rd crediting periods

Refer to the latest approved version of the Methodological tool "Assessment of the validity of the original/current baseline and to update of the baseline at the renewal of the crediting period".

While applying the Step 1.4 of the tool, the benchmark value $B_{Blend,y}$ is recalculated following Step 2.1 above.

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:	t CO_2/t fuel
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 *i*
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:	t CO_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 non-carbonated CaO content in the raw material
Source of data:	On-site measurements in plant records. In case of existing plants, historical data and in case of Greenfield cement plants, the data from first operational year.
Measurement procedures (if any):	This parameter is calculated as the non-carbonated CaO content (%) of the raw material times the raw material quantity [Q_{rm}]

Any comment:	In case of existing plants, this parameter shall be based of historical records of the plant for the year prior to the start of the CDM project activity. If data is available for multiple years prior to the start of the project activity, the average value of up to three years shall be taken In case of Greenfield cement plants, this parameter shall be determined based on the monitoring value of first operational year. For ex-ante calculation, project participants can use data from technology supplier information, quarry test results, latest feasibility study used for plant procurement and latest production plan to calculate the baseline emissions Non-carbonated CaO content (%) shall be calculated as the percentage of CaO in the total raw material

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 is calculated as the CaO content (%) of the clinker times clinker produced [$CLNK_{BSL}$]
Any comment:	In case of existing plants, this parameter shall be based of historical records of the plant for the year prior to the start of the CDM project activity. If data is available for multiple years prior to the start of the project activity, the average value of up to three years shall be taken In case of Greenfield cement plants, this parameter shall be determined based on the monitoring value of first operational year. For ex-ante calculation, project participants can use data from technology supplier information, quarry test results, latest feasibility study used for plant procurement and latest production plan to calculate the baseline emissions

Parameter:	InMgO
Data unit:	t MgO
Description:	Baseline non-carbonated 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 non-carbonated MgO content (%) of the raw material times the raw material quantity [Q_{rm}]
Any comment:	In case of existing plants, this parameter shall be based of historical records of the plant for the year prior to the start of the CDM project activity. If data is available for multiple years prior to the start of the project activity, the average value of up to three years shall be taken In case of Greenfield cement plants, this parameter shall be determined based on the monitoring value of first operational year. For ex-ante calculation, project participants can use data from technology supplier information, quarry test results, latest feasibility study used for plant procurement and latest production plan to calculate the baseline emissions Non-carbonated MgO content (%) shall be calculated as the percentage of MgO in the total raw material

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 is calculated as the MgO content (%) of the clinker times clinker produced [$CLNK_{BSL}$]
Any comment:	In case of existing plants, this parameter shall be based of historical records of the plant for the year prior to the start of the CDM project activity. If data is available for multiple years prior to the start of the project activity, the average value of up to three years shall be taken In case of Greenfield cement plants, this parameter shall be determined based on the monitoring value of first operational year. For ex-ante calculation, project participants can use data from technology supplier information, quarry test results, latest feasibility study used for plant procurement and latest production plan to calculate the baseline emissions

Parameter:	Q_{rm}
Data unit:	t raw materials
Description:	Quantity of clinker raw material used in the base year
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	Weight meters
Any comment:	In case of existing plants, this parameter shall be based of historical records of the plant for the year prior to the start of the CDM project activity. If data is available for multiple years prior to the start of the project activity, the average value of up to three years shall be taken In case of Greenfield cement plants, this parameter shall be determined based on the monitoring value of first operational year. For ex-ante calculation, project participants can use data from technology supplier information, quarry test results, latest feasibility study used for plant procurement and latest production plan to calculate the baseline emissions This parameter is used to calculate InCaO and InMgO

Parameter:	$CLNK_{BSL}$
Data unit:	t clinker
Description:	Annual production of clinker in the base year
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	Weight meters

Any comment:	In case of existing plants, this parameter shall be based of historical records of the plant for the year prior to the start of the CDM project activity. If data is available for multiple years prior to the start of the project activity, the average value of up to three years shall be taken In case of Greenfield cement plants, this parameter shall be determined based on the monitoring value of first operational year. For ex-ante calculation, project participants can use data from technology supplier information, quarry test results, latest feasibility study used for plant procurement and latest production plan to calculate the baseline emissions

Parameter:	$FF_{i,BSL}$
Data unit:	t fuel
Description:	Fossil fuel of type i consumed for clinker production in the base year
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	Weight meters
Any comment:	In case of existing plants, this parameter shall be based of historical records of the plant for the year prior to the start of the CDM project activity. If data is available for multiple years prior to the start of the project activity, the average value of up to three years shall be taken In case of Greenfield cement plants, this parameter shall be determined based on the monitoring value of first operational year. For ex-ante calculation, project participants can use data from technology supplier information, quarry test results, latest feasibility study used for plant procurement and latest production plan to calculate the baseline emissions

Parameter:	$BELE_{grid,CLNK}$
Data unit:	MWh
Description:	Grid electricity consumed for clinker production in base year
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	Electricity meter
Any comment:	In case of existing plants, this parameter shall be based of historical records of the plant for the year prior to the start of the CDM project activity. If data is available for multiple years prior to the start of the project activity, the average value of up to three years shall be taken In case of Greenfield cement plants, this parameter shall be determined based on the monitoring value of first operational year. For ex-ante calculation, project participants can use data from technology supplier information, quarry test results, latest feasibility study used for plant procurement and latest production plan to calculate the baseline emissions

Parameter:	$BELE_{sg,CLNK}$
Data unit:	MWh
Description:	Self generation of electricity for clinker production in the base year
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	Electricity meter
Any comment:	In case of existing plants, this parameter shall be based of historical records of the plant for the year prior to the start of the CDM project activity. If data is available for multiple years prior to the start of the project activity, the average value of up to three years shall be taken In case of Greenfield cement plants, this parameter shall be determined based on the monitoring value of first operational year. For ex-ante calculation, project participants can use data from technology supplier information, quarry test results, latest feasibility study used for plant procurement and latest production plan to calculate the baseline emissions

Parameter:	~~$EF_{sg,BSL}$~~
Data unit:	~~t CO_2/MWh~~
Description:	~~Baseline electricity self generation emission factor (t CO_2/MWh)~~
Source of data:	~~On-site measurements in plant records~~
Measurement procedures (if any):	~~This parameter shall be calculated as per equation (8) above. In doing so, the data should be from the base year. Please see comment below~~
Any comment:	~~In case of existing plants, this parameter shall be based of historical records of the plant for the year prior to the start of the CDM project activity. If data is available for multiple years prior to the start of the project activity, the average value of up to three years shall be taken~~ ~~In case of Greenfield cement plants, this parameter shall be determined based on the monitoring value of first operational year. For ex-ante calculation, project participants can use data from technology supplier information, quarry test results, latest feasibility study used for plant procurement and latest production plan to calculate the baseline emissions~~

Parameter:	BC_{BSL}
Data unit:	t BC
Description:	Annual production of BC in the base year
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	Weight meters
Any comment:	In case of existing plants, this parameter shall be based of historical records of the plant for the year prior to the start of the CDM project activity. If data is available for multiple years prior to the start of the project activity, the average value of up to three years shall be taken In case of Greenfield cement plants, this parameter shall be determined based on the monitoring value of first operational year. For ex-ante calculation, project participants can use data from technology supplier information, quarry test results, latest feasibility study used for plant procurement and latest production plan to calculate the 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):	Electricity meters
Any comment:	In case of existing plants, this parameter shall be based of historical records of the plant for the year prior to the start of the CDM project activity. If data is available for multiple years prior to the start of the project activity, the average value of up to three years shall be taken In case of Greenfield cement plants, this parameter shall be determined based on the monitoring value of first operational year. For ex-ante calculation, project participants can use data from technology supplier information, quarry test results, latest feasibility study used for plant procurement and latest production plan to calculate the 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):	Electricity meters
Any comment:	In case of existing plants, this parameter shall be based of historical records of the plant for the year prior to the start of the CDM project activity. If data is available for multiple years prior to the start of the project activity, the average value of up to three years shall be taken In case of Greenfield cement plants, this parameter shall be determined based on the monitoring value of first operational year. For ex-ante calculation, project participants can use data from technology supplier information, quarry test results, latest feasibility study used for plant procurement and latest production plan to calculate the 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):	Electricity meters
Any comment:	In case of existing plants, this parameter shall be based of historical records of the plant for the year prior to the start of the CDM project activity. If data is available for multiple years prior to the start of the project activity, the average value of up to three years shall be taken In case of Greenfield cement plants, this parameter shall be determined based on the monitoring value of first operational year. For ex-ante calculation, project participants can use data from technology supplier information, quarry test results, latest feasibility study used for plant procurement and latest production plan to calculate the 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):	Electricity meters
Any comment:	In case of existing plants, this parameter shall be based of historical records of the plant for the year prior to the start of the CDM project activity. If data is available for multiple years prior to the start of the project activity, the average value of up to three years shall be taken In case of Greenfield cement plants, this parameter shall be determined based on the monitoring value of first operational year. For ex-ante calculation, project participants can use data from technology supplier information, quarry test results, latest feasibility study used for plant procurement and latest production plan to calculate the baseline emissions

Parameter:	$F_{m,n,BSL}$
Data unit:	~~In a~~ mass or volume unit
Description:	Amount of fuel *m* consumed by relevant power sources *n* in the base year
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	Use weight or volume meters
Any comment:	In case of existing plants, this parameter shall be based of historical records of the plant for the year prior to the start of the CDM project activity. If data is available for multiple years prior to the start of the project activity, the average value of up to three years shall be taken In case of Greenfield cement plants, this parameter shall be determined based on the monitoring value of first operational year. For ex-ante calculation, project participants can use data from technology supplier information, quarry test results, latest feasibility study used for plant procurement and latest production plan to calculate the baseline emissions

Parameter:	$GEN_{n,BSL}$
Data unit:	MWh
Description:	Electricity generated by the source *n* in year *y*
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	Use electricity meters
Any comment:	In case of existing plants, this parameter shall be based of historical records of the plant for the year prior to the start of the CDM project activity. If data is available for multiple years prior to the start of the project activity, the average value of up to three years shall be taken In case of Greenfield cement plants, this parameter shall be determined based on the monitoring value of first operational year. For ex-ante calculation, project participants can use data from technology supplier information, quarry test results, latest feasibility study used for plant procurement and latest production plan to calculate the baseline emissions

Parameter:	NCV_m
Data unit:	GJ/mass or volume unit
Description:	Net calorific value ~~(energy content)~~ per mass or volume unit of a fuel *m*
Source of data:	The following data sources may be used if the relevant conditions apply: **Data source** – **Conditions for using the data source** a) Values provided by the fuel supplier in invoices – This is the preferred source b) Measurements by the project participants – If a) is not available c) Regional or national default values – If b) 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 c) is not available
Measurement procedures (if any):	For a) and b): Measurements should be undertaken in line with national or international fuel standards
Any comment:	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 In case of existing plants, this parameter shall be based of historical records of the plant for the year prior to the start of the CDM project activity. If data is available for multiple years prior to the start of the project activity, the average value of up to three years shall be taken. In case of Greenfield cement plants, this parameter shall be determined based on the monitoring value of first operational year. For ex-ante calculation, project participants can use data from technology supplier information, quarry test results, latest feasibility study used for plant procurement and latest production plan to calculate the baseline emissions

Parameter:	$OXID_m$
Data unit:	-
Description:	Oxidation factor of the fuel *m*
Source of data:	Refer to the latest version of the IPCC Guidelines for default values

Measurement procedures (if any):	-
Any comment:	-

Parameter:	$EF_{CO2,m}$
Data unit:	t CO_2/~~unit of energy~~GJ
Description:	CO_2 emission factor per unit of energy of the fuel *m*
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:	In case of existing plants, this parameter shall be based of historical records of the plant for the year prior to the start of the CDM project activity. If data is available for multiple years prior to the start of the project activity, the average value of up to three years shall be taken In case of Greenfield cement plants, this parameter shall be determined based on the monitoring value of first operational year. For ex-ante calculation, project participants can use data from technology supplier information, quarry test results, latest feasibility study used for plant procurement and latest production plan to calculate the 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:	t BC
Description:	~~BC production~~ Blended cement produced and sold in the domestic market in year *y* (t BC)
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	This will be calculated and measured as part of normal operations Use weight meter
Monitoring frequency:	Annually
QA/QC procedures:	Cross check measurement results with records (i.e. invoices) for sold blended cement
Any comment:	-

Data / Parameter:	$P_{Blend,y}$
Data unit:	t clinker/t BC
Description:	Share of clinker 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:	$InCaO_y$
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 [$Q_{rm,y}$]. 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 [$CLNK_y$]. 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 [$Q_{rm,y}$]. 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 [$CLNK_y$]. 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:	t 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):	Use weight meter
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	Parameter required to calculate $InCaO_y$ and $InMgO_y$

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

Data / Parameter:	$FF_{i,y}$
Data unit:	t fuel
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):	Use weight meter
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):	Use electricity meter
Monitoring frequency:	Monthly
QA/QC procedures:	-
Any comment:	-

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

Data / Parameter:	ADD_y
Data unit:	t additives
Description:	Amount of additives used for BC production in project plant in year *y*
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	Use weight meter
Monitoring frequency:	Monthly and aggregated yearly
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	$ADD_{NS,y}$
Data unit:	t additives
Description:	Amount of additives for which the project participants could not substantiate that they are surplus in year *y*
Source of data:	National data or data collected by the project participants
Measurement procedures (if any):	Demonstrate using the L1 approach in step 8
Monitoring frequency:	Yearly
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):	Use electricity meter
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):	Use electricity meter
Monitoring frequency:	Monthly
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	$PELE_{grid,ADD,y}$
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):	Use electricity meter
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):	Use electricity meter
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):	Use weight or volume meter
Monitoring frequency:	Monthly
QA/QC procedures:	-
Any comment:	-

<table>
<tr><td>Data / Parameter:</td><td>NCV_i</td></tr>
<tr><td>Data unit:</td><td>GJ/~~N~~mass or volume unit</td></tr>
<tr><td>Description:</td><td>Net calorific value ~~(energy content)~~ per mass or volume unit of a fuel i</td></tr>
<tr><td>Source of data:</td><td>The following data sources may be used if the relevant conditions apply:
<table>
<tr><td>Data source</td><td>Conditions for using the data source</td></tr>
<tr><td>a) Values provided by the fuel supplier in invoices</td><td>This is the preferred source if the carbon fraction of the fuel is not provided (Option A)</td></tr>
<tr><td>b) Measurements by the project participants</td><td>If a) is not available</td></tr>
<tr><td>c) Regional or national default values</td><td>If b) 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)</td></tr>
<tr><td>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</td><td>If c) is not available</td></tr>
</table></td></tr>
<tr><td>Measurement procedures (if any):</td><td>For a) and b): Measurements should be undertaken in line with national or international fuel standards</td></tr>
<tr><td>Monitoring frequency:</td><td>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</td></tr>
<tr><td>QA/QC procedures:</td><td>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</td></tr>
<tr><td>Any comment:</td><td>-</td></tr>
</table>

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

Data / Parameter:	~~$P_{blend,y}$~~ $A_{PJ,blend,y}$
Data unit:	t additives/t 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:	$A_{BSL,blend,y}$
Data unit:	t additives/t 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):	In case of existing plants, the value of $A_{BL,blend,y}$ is 1- mass fraction of clinker in the relevant cement type produced in the proposed project activity plant before the implementation of the CDM project activity, as determined in Step 2, approach (iii) In case of Greenfield cement plants, the value of $A_{BL,blend,y}$ is 1-$B_{Blend,y}$.
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter:	TF_{cons}
Data unit:	kg 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 additives 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 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:	t additives
Description:	Quantity of additives carried in one trip per vehicle
Source of data:	From plant records
Measurement procedures (if any):	Use weight meter
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):	Use electricity meter
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:	~~-~~

IV. REFERENCES AND ANY OTHER INFORMATION

Not applicable.

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History of the document

Version	Date	Nature of revision(s)
07.0.0	EB 66, Annex # 2 March 2012	Revision to: • Align the first of its kind barrier and investment barrier analysis with the latest guidelines on first of its kind barrier and objective demonstration and assessment of barriers; • Improve and reorganize the procedure to determine the baseline benchmark of share of clinker and its updation; • Correct the calculation of leakage emissions due to transport of additives and improve the procedure to calculate leakage from diversion of additives; • Delete the leakage emissions due to electricity consumption for conveyor system for additives; • Correct and reorganize the calculation of emission reductions; • Correct the description of parameters to make them consistent within the methodology; • Improve the clarity of the language; and • Add a reference to methodological tools “Assessment of the validity of the original/current baseline and to update of the baseline at the renewal of the crediting period” and “Project and leakage emissions from road transportation of freight”.
06.0.0	EB 65, Annex 17 25 November 2011	Revision to: • Provide an approach to determine the data to calculate baseline emissions in case of Greenfield cement plants; • Improve the methodology so as to increase its readability, consistency and simplicity; • Clarify that the methodology is not applicable to situations where cement blending is common at the construction site; and • Provide an approach to determine the blending benchmark taking into account the imported cement. • Change of title from “Consolidated Baseline Methodology for Increasing the Blend in Cement Production” to “Increasing the Blend in Cement Production”

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.
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