CDM-MP82-A01

Draft Large-scale Methodology

AM00XX: Emission reduction from partial switching of raw materials and increasing the share of additives in the production of blended cement

Version 02.0

Sectoral scope(s): 04

DRAFT

United Nations
Framework Convention on
Climate Change

COVER NOTE

1. Procedural background

1. The proposed new methodology (PNM) was submitted by the project participant on 05 Aug 2019 and deemed qualified on 15 Aug 2019.

2. The case was considered by the Methodologies Panel (MP) at MP80 and MP81, and clarification was requested on identified issues.

3. At MP82, the MP assessed the provided clarifications and agreed to recommend its approval by the Board.

2. Purpose

4. The purpose is to provide a new methodology that applies to project activities that switch to alternative raw materials that do not contain carbonates in the production of clinker in cement kilns and blend cement beyond current practices in the host country.

3. Key issues and proposed solutions

5. The methodology involves avoidance of CO_2 emissions by:

   (a) switching to carbonate free feedstock in the production of clinker; and

   (b) blending cement beyond current practices in the host country.

4. Impacts

6. The new methodology would be applicable to project activities that implement combined measures that are currently covered separately under the approved consolidated methodologies “ACM0005: Increasing the blend in cement production” and “ACM0015: Emission reductions from raw material switch in clinker production.”

5. Subsequent work and timelines

7. The methodology is recommended by the MP for consideration by the Board at its 107th meeting. No further work is envisaged.

6. Recommendations to the Board

8. The MP recommends the Board to approve the new methodology, to be made effective at the time of the Board’s approval.

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1. Introduction

1. The following table describes the key elements of the methodology.

Table 1. Methodology key elements

Typical projects	Partial or full switch to alternative raw materials that do not contain carbonates (AMC) in the production of clinker in cement kilns and production of blended cement (BC) beyond current practices in the host country.
Type of GHG emissions mitigation action	Avoidance of CO_2 emissions by switching to carbonate free feedstock in the production of clinker and blending cement (BC) beyond current practices in the host country.

2. Scope, applicability, and entry into force

2.1. Scope

2. This methodology applies to project activities that use alternative raw materials that do not contain carbonates for clinker production in cement kilns and increase the share of additives in the production of blended cement (BC).[1]

2.2. Applicability

3. This methodology is applicable to existing cement plants that replace conventional raw materials with alternative materials that do not contain carbonates for clinker production (AMC) in cement kilns and increase the share of additives in the production of blended cement (BC) beyond current practices in the host country.

4. This methodology is applicable under the following conditions:

   (a) Use of alternative materials shall not increase the installed clinker production capacity (tonnes clinker/year), nor the lifetime of equipment;

   (b) The AMC partially or fully substitutes raw materials that contain calcium and/or magnesium carbonates (e.g. limestone) that would otherwise be used in the kilns;

   (c) The implementation of the project activity does not reduce the quality[2] of the produced clinker, as compared to the baseline scenario;

[1] Project activities implementing only one of the two measures should refer to the approved consolidated methodologies ACM0005 or ACM0015.

[2] The quality of clinker (for example lime saturation factor, silica ratio, alumina ratio) should be defined as per the historical data for existing plant and as per the national/international standards for Greenfield plants during the PDD preparation. This parameter should be checked during the crediting period. 10 per cent variations in the specification based on historical data may be accepted during the crediting period.

(d) The alternative raw materials have not been used in the clinker production facility prior to the implementation of the project activity (except for any test trials not exceeding 90 days);

(e) The quantity of AMC available in the region shall be at least 1.5 times the quantity required for meeting the aggregate demand of the proposed project activity and all existing users, including other uses than in the cement industry, consuming the same AMC in the region. The project participants shall repeat this assessment during renewable of crediting period, for the project activity applying renewable crediting periods.

5. Project activities may implement fuel switching measures, but the generated emission reductions are not accounted for in this methodology.[3]

6. In case the project activity involves energy efficiency measures, this methodology is only eligible if these measures are deemed additional, as per sections 5.2 and 5.3 below.

7. This methodology is not applicable to produce blended cement to be exported beyond the boundaries of the host country.

8. In addition, the applicability conditions of the relevant methodological tools shall be applied.

2.3. Entry into force

9. The date of entry into force of the methodology is the date of the publication of the EB ### meeting report on DD Month YYYY.

2.4. Applicability of sectoral scopes

10. For validation and verification of CDM projects and programme of activities by a designated operational entity (DOE) using this methodology application of sectoral scope 04 is mandatory.

3. Normative references

11. This baseline and monitoring methodology is based on the following proposed new methodology and approved consolidated methodologies:

(a) “NM0379: Emission reduction from partial switching of raw materials and increasing the share of additives in the production of blended cement submitted by the Korea Research Institute on Climate Change (KRIC);”

(b) “ACM0003: Partial substitution of fossil fuels in cement or quicklime manufacture’’.

(c) “ACM0005 “Increasing the blend in cement production”;

(d) “ACM0015 “Reduction of emissions from raw material switch in clinker production”.

[3] Fuel switching project activities may use approved methodology “ACM0003: Partial substitution of fossil fuels in cement or quicklime manufacture’’.

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

(a) “TOOL02: Combined tool to identify the baseline scenario and demonstrate additionality.”

(b) “TOOL03: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion”

(c) “TOOL07: Tool to calculate the emission factor for an electricity system”;

(d) “TOOL11: Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period”;

(e) “TOOL12: Project and leakage emissions from transportation of freight”.

13. 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/methodologies/index.html>.

3.1. Selected approach from paragraph 48 of the CDM modalities and procedures

14. “Existing actual or historical emissions, as applicable”.

4. Definitions

15. The definitions contained in the Glossary of CDM terms shall apply.

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

(a) **Additives -** materials (e.g. fly ash, gypsum, slag, pozzolana etc) to be blended with clinker to produce different types of blended cement;

(b) **Alternative Raw Materials that do not Contain Carbonates for Clinker Production or AMC -** any mineral, synthetic substances or compounds that: do not contain carbonates in their chemical composition; are obtained from mining, transformation or as by-products of other industrial processes; and chemically react with raw materials commonly used for clinker production. These alternative raw materials could include, among others: waste ash from fuel combustion in thermal power plants, blast furnace slag, gypsum, anhydrite, fluoride etc. that are not used in conventional production conditions;

(c) **Blended Cement (BC)** - a mixture of clinker and additives containing less than 95% clinker;

(d) **Blended Cement Types** - as categorized by the national standard of the host country. Each blended cement type is a distinct product, based on different additives and varying shares of clinker, and used for different purposes (e.g. Portland Pozzolana Cement or Portland Blast Furnace Slag etc.);

(e) **Project Cement** - the blended cement produced with project clinker and the increased share of additives under CDM project activity;

(f) **Project Clinker** - the clinker produced from (partially) substituted raw materials by AMC under CDM project activity;

(g) **Raw Materials** - input material that is processed in the cement kiln for the production of clinker;

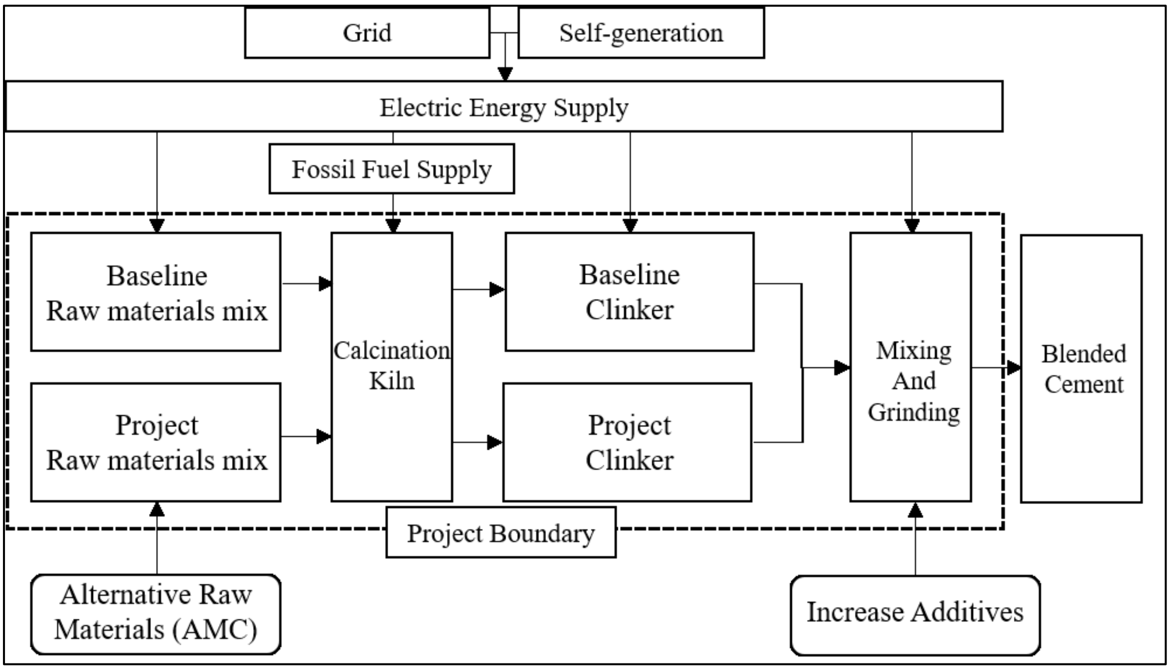
(h) **Region** - the geographical area around the project activity defined by a radius of at least 200 km.

5. Baseline methodology

5.1. Project boundary

17. The spatial extent of project boundary includes all process units related to the production of clinker and blending of cement, from reception of raw materials, additives and fuels to the delivery of blended cement.

Figure 2: Project boundary



18. The greenhouse gases included in or excluded from the project boundary are shown in Table 3.

Table 3. Emission sources included in or excluded from the project boundary

	Source	Gas	Included	Justification/Explanation
Baseline	Calcination of raw material in the kiln	CO_2	Yes	Direct emission from clinker kiln.
		CH_4	No	Emissions negligible, excluded for simplification
		N_2O	No	Emissions negligible, excluded for simplification
	Use of fuel in the kiln including burner and pre-calcinator	CO_2	Yes	Direct emissions from clinker kiln
		CH_4	No	Emissions negligible, excluded for simplification
		N_2O	No	Emissions negligible, excluded for simplification
	Use of fuels for the preparation of raw materials and fuels (e.g. drying of materials or fuels using external dryers)	CO_2	Yes	Only if the preparation of raw materials or fuels leads to an additional consumption of fuels.
		CH_4	No	Emissions negligible, excluded for simplification
		N_2O	No	Emissions negligible, excluded for simplification
	Use of electricity (grid and self-generated) for the preparation of fuels and raw materials, kiln operation, preparation of additives and cement grinding	CO_2	Yes	Direct emission from self-generation sources and indirect emission from plants connected to the grid supplying the plant with electricity
		CH_4	No	Emissions negligible, excluded for simplification
		N_2O	No	Emissions negligible, excluded for simplification
Project activity	Calcination of raw material in the kiln	CO_2	Yes	Direct emission from clinker kiln.
		CH_4	No	Emissions negligible, excluded for simplification
		N_2O	No	Emissions negligible, excluded for simplification
	Use of fuel in the kiln including burner	CO_2	Yes	Direct emission from clinker kiln.
		CH_4	No	Emissions negligible, excluded for simplification
		N_2O	No	Emissions negligible, excluded for simplification
	Use of fuels for the preparation of alternative raw materials and fuels (e.g. drying of materials or fuels using external dryers)	CO_2	Yes	Only if the new material requires a specific fuel consuming process.
		CH_4	No	Emissions negligible, excluded for simplification
		N_2O	No	Emissions negligible, excluded for simplification

Source		Gas	Included	Justification/Explanation
	Use of electricity (grid and self-generated) for the preparation of fuels the preparation of fuels and raw materials, kiln operation, preparation of additives and cement grinding	CO_2	Yes	Direct emission from self-generation sources and indirect emission from plants connected to the grid supplying the plant with electricity
		CH_4	No	Emissions negligible, excluded for simplification
		N_2O	No	Emissions negligible, excluded for simplification

5.2. Identification of the baseline scenario

19. Project participants shall identify alternative scenarios following the step-wise approach included in "TOOL02: Combined tool to identify the baseline scenario and demonstrate additionality."

20. Project participants shall assess all relevant alternative scenarios for the switching of raw materials and any further efficiency measures, and the increase of the share of additives including, but not limited to:

(a) The proposed project activity not undertaken as a CDM project activity;

(b) The continuation of clinker production at the project site where the existing plants would be operated at the same conditions (e.g. raw materials, additives, fuel mixes, and equipment configuration) as those observed in the most recent three years prior to the starting date of the project activity (R1 scenario);

(c) Clinker production according to the cement production standards of the host country (R2 scenario);

(d) Switch to production of a different type of clinker from the one involved in the project activity) (R3 scenario);

(e) The continuation of the ratio of additives for cement blending at the project site, which would be operated at the same conditions (e.g. raw materials, additives, fuel mixes, and equipment configuration) as those observed in the most recent three years prior to the starting date of the project activity (A1 scenario);

(f) If applicable, input ratio of additives according to the cement production standards of the host country (A2 scenario);

(g) Switch to ratios of additives for the production of types of cement different from the project cement (A3 scenario).

5.3. Demonstration of additionality

21. The demonstration of additionality shall be conducted for the project activity as a whole, following the step-wise approach included in "TOOL02: Combined tool to identify the baseline scenario and demonstrate additionality." Project activities may be deemed additional when each individual measure is additional.

22. If applicable, when conducting the barrier analysis, project participants may take into account market acceptability barriers[4], such as:

(a) Perception that blended cement with higher ratio of additives is of inferior quality;

(b) Lack of consumer awareness on the use blended cement with higher ratio of additives.

5.4. Baseline emissions

23. The baseline emissions depend on two factors:

(a) The benchmark share of clinker in the blended cement types produced in the region; and

(b) The CO_2 emissions per tonne of clinker in the base year, which in turn depends on:

(i) Quantity and carbon intensity of the fuels used in clinker production;

(ii) Quantity and carbon intensity of electricity; and

(iii) CO_2 emissions from calcination.

24. This methodology requires data from the **base year** to calculate the baseline emissions.

25. 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.

26. Baseline emissions are calculated as follows:

$$BE_y = BC_y \times \left(BE_{Clinker,BSL} \times B_{Blend,y} + BE_{ele,ADD,BC}\right)$$ Equation (1)

Where:

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

[4] Supporting evidences may include higher levels of complaints from customers, official communications from public agencies on the use of blended cement, independent surveys on the acceptability of blended cement.

5.4.1. Baseline emissions per tonne of clinker in base year (***BE*** *clinker,BSL*)

$$BE_{Clinker,BSL} = BE_{calcin} + BE_{FC} + BE_{ele,grid,CLNK} + BE_{ele,sg,CLNK} + BE_{Dust} + BE_{FC\_Dry} \quad \text{Equation (2)}$$

Where:

$BE_{Clinker,BSL}$	=	Baseline emissions per tonne of clinker in base year (t CO_2/t clinker)
BE_{calcin}	=	Baseline emissions per tonne of clinker due to calcination of calcium carbonate and magnesium carbonate (t CO_2/t clinker)
BE_{FC}	=	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)
BE_{Dust}	=	Baseline emissions due to dust discarded through bypass and dedusting units (CKD) (t CO_2/t clinker)
BE_{FC_Dry}	=	Baseline emissions due to fuel consumption for preparation of raw materials or fuels (t CO_2/t clinker)

5.4.1.1. Baseline emissions per tonne of clinker due to calcination of calcium carbonate and magnesium carbonate (***BE*** *calcin*)

$$BE_{calcin} = \frac{0.785 \times (OutCaO - InCaO) + 1.092 \times (OutMgO - InMgO)}{CLNK_{BSL}} \quad \text{Equation (3)}$$

Where:

BE_{calcin}	=	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)

5.4.1.2. Baseline emissions per tonne of clinker due to combustion of fossil fuels for clinker production (***BE**FC*)

$$BE_{fossil\ fuel} = \frac{\sum_{i} FC_{l,BSL} \times NCV_{l} \times EF_{CO2,l}}{CLNK_{BSL}}$$ Equation (4)

Where:

BE_{FC}	=	Baseline emissions per tonne of clinker due to combustion of fossil fuels for clinker production (t CO_2/t clinker)
$FC_{l,BSL}$	=	Quantity of fossil fuel of type *l* consumed for clinker production in the base year (t fuel)[5]
$EF_{CO2,l}$	=	CO_2 emission factor for fuel type *l* (t CO_2/GJ)
NCV_{l}	=	Net calorific value of the fuel type *l* (GJ/mass or volume)

5.4.1.3. Baseline grid electricity emissions for clinker production per tonne of clinker (***BE**ele,grid,CLNK*)

$$BE_{ele,grid,CLNK} = \frac{BELE_{grid,CLNK} \times EF_{grid,BSL}}{CLNK_{BSL}}$$ Equation (5)

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)
$CLNK_{BSL}$	=	Annual production of clinker in the base year (t clinker)

5.4.1.4. Baseline emissions from self-generated electricity for clinker production per tonne of clinker (***BE**ele,sg,CLNK*)

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

Where:

$BE_{ele,sg,CLNK}$	=	Baseline emissions from self-generated electricity for clinker production per tonne of clinker (t CO_2/ t clinker)

[5] Any fuel switching is assumed to have occurred anyway in the baseline. Therefore, the types of fuel used during year y of the project activity are used to estimate $BE_{fossilfuel}$.

$BELE_{sg,CLNK}$	=	Self-generation of electricity for clinker production in the base year (MWh)
$EF_{sg,BSL}$	=	Emission factor for self-generated electricity in the base year (t CO_2/MWh)
$CLNK_{BSL}$	=	Annual production of clinker in the base year (t clinker)

5.4.1.5. Baseline emissions due to dust discarded through bypass and dedusting units *(BE_{Dust})*

27. If there is any discarded dust leaving the kiln through the bypass and dedusting unit (*CKD*), the baseline emissions due to discarded dust leaving the kiln system shall be determined as follows:

$$BE_{Dust} = \frac{\left\{(C_{BSL} \times ByPass_{BSL}) + \frac{C_{BSL} \times d_{BSL}}{[C_{BSL} \times (1 - d_{BSL}) + 1]} \times CKD_{BSL}\right\}}{CLNK_{BSL}}$$ Equation (7)

Where:

BE_{Dust}	=	Baseline CO_2 emissions due to dust discarded through bypass and dedusting units (CKD) (t CO_2/t clinker)
C_{BSL}	=	Baseline calcination emissions factor due to both de-carbonization reaction and fuel consumption in clinker production (t CO_2/t clinker)
$ByPass_{BSL}$	=	Annual production of bypass dust leaving kiln system
CKD_{BSL}	=	Annual production of CKD dust leaving kiln system in the baseline (t)
d_{BSL}	=	CKD calcination rate (released CO_2 expressed as a fraction of the total carbonate CO_2 in the raw materials)
$CLNK_{BSL}$	=	Annual production of clinker in the baseline (t)

28. The parameter C_{BSL} should be calculated as follows:

$$C_{BSL} = BE_{Calcin} + BE_{FC}$$ Equation (8)

Where:

C_{BSL}	=	Baseline calcination factor due to both de-carbonization reaction and fuel consumption in clinker production (t CO_2/t clinker)
BE_{calcin}	=	Baseline CO_2 emissions from calcination of calcium carbonate and magnesium carbonate (t CO_2/t clinker)
BE_{FC}	=	Baseline CO_2 emissions from fuel consumption in clinker production (t CO_2/t clinker)

5.4.1.6. Baseline emissions from fuel consumption for preparation of raw materials or fuels (***BE_{FC_Dry}***)

$$BE_{FC\_Dry} = \frac{\sum(FC_{Dry,l} \times EF_{CO2,l} \times NCV_l)}{CLNK_{BSL}}$$ Equation (9)

Where:

BE_{FC_Dry}	=	Baseline emissions due to fuel consumption for preparation of raw materials or fuels (t CO_2)
$FC_{Dry,l}$	=	Quantity of fossil fuel *l* consumed for preparation of raw materials or fuels in the baseline (tonne or volume of fuel)
$EF_{CO2,l}$	=	CO_2 emission factor for fuel type *l* (t CO_2/GJ)
NCV_l	=	Net calorific value of the fuel type *l* (GJ/mass or volume)
$CLNK_{BSL}$	=	Annual production of clinker in the baseline (t)

5.4.2. Baseline benchmark share of clinker per tonne of BC (***$B_{Blend,y}$***)

29. The project participant should clearly determine the 'region' to be used in the applicable benchmarks. The default is the entire nation, but the project participant can define the geographical region that satisfies the following conditions:

(a) At least 75% of production amount of cement by the project plant shall be sold in the region (Domestic sale ratio);

(b) The data necessary to calculate $B_{Blend,y}$ includes at least 5 other plants(for the calculation of $B_{Blend,y}$ including the data from at least 5 other plants within the region);

(c) The production amount within the region is at least four times more than that of the project plant.

30. The production amount sold in host country shall be considered, and the export of cement produced in the project plant shall be excluded from the estimation of emission reduction.

5.4.2.1. Baseline benchmark share clinker per tonne of BC at the start of the project activity (***$B_{Blend,1}$***)

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

32. The baseline benchmark share of clinker per tonne of BC at the start of the project activity ($B_{Blend,1}$), 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:

(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 amounts of the relevant cement type(s) produced by each plant in the region;

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

(iii) If the region comprises of less than 5 plants producing the relevant cement type(s), 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:

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

(ii) Determine the 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 in the region;

(iii) 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:

(i) Determine the 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, if applicable;

(ii) 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.

Note: If the average annual amount of the relevant cement type imported by the region is more than 10% of the total production volume in the region, the weighted average mass fraction of clinker in the relevant type of imported cement shall be considered in the analysis under approach (a) and (b) above as it would have been produced in a virtual 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.

33. To determine the benchmark for approaches (a) and (b) above, 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 share 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.

5.4.2.2. Updating of baseline benchmark share of clinker per tonne of BC for year *y* within the crediting period

34. The benchmark share of clinker per tonne of BC shall be updated for year *y* within the crediting period, starting from the second year.

35. For approaches (a) and (b) in paragraph 32, the project participants shall choose between the following options:

(a) **<u>Option 1</u>:** Update the benchmark annually and incorporate only a decreasing trend of clinker share:

(i) 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 year *y*.

(ii) 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.

(b) **<u>Option 2</u>:** 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.

(i) $B_{Blend,y} = B_{Blend,1} \times (1 - 0.02)^y$ 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.

36. For approach (c) in paragraph 32, 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.

(a) $B_{Blend,y} = B_{Blend,1} \times (1 - 0.02)^y$ 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.

5.4.2.3. Updating of baseline benchmark share of clinker per tonne of BC at the renewal of the crediting period

37. At the renewal of the crediting period, the benchmark shall be recalculated following the procedure in section 5.4.2 above, including the re-assessment of the benchmark approach.

5.4.3. Baseline electricity emissions for BC grinding and preparation of additives ($BE_{ele,ADD,BC}$)

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

$$BE_{ele,ADD,BC} = BE_{ele,grid,BC} + BE_{ele,sg,BC} + BE_{ele,grid,ADD} + BE_{ele,sg,ADD} \quad \text{Equation (10)}$$

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)

5.4.3.1. Baseline grid electricity emissions for BC grinding ($BE_{ele,grid,BC}$)

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

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

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)
BC_{BSL}	=	Annual production of BC in the base year (t BC)

5.4.3.2. Baseline self-generated electricity emissions for BC grinding ($BE_{ele,sg,BC}$)

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

$$BE_{ele,sg,BC} = \frac{BELE_{sg,BC} \times EF_{sg,BSL}}{BC_{BSL}} \quad \text{Equation (12)}$$

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)
$EF_{sg,BSL}$	=	Emission factor for self-generated electricity in the base year (t CO_2/MWh)
BC_{BSL}	=	Annual production of BC in the base year (t BC)

5.4.3.3. Baseline grid electricity emissions for additive preparation (*$BE_{ele,grid,ADD}$*)

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

$$BE_{ele,grid,ADD} = \frac{BELE_{grid,ADD} \times EF_{grid,BSL}}{BC_{BSL}} \quad \text{Equation (13)}$$

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)
BC_{BSL}	=	Annual production of BC in the base year (t BC)

5.4.3.4. Baseline emissions from self-generated electricity for the preparation of additives (*$BE_{ele,sg,ADD}$*)

42. The following equation shows the calculation for the amount of emission generated from the self-generated baseline electricity for the preparation of additives (*$BE_{ele,sg,ADD}$*) are calculated as:

$$BE_{ele,sg,ADD} = \frac{BELE_{sg,ADD} \times EF_{sg,BSL}}{BC_{BSL}} \quad \text{Equation (14)}$$

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)
$EF_{sg,BSL}$	=	Emission factor for self-generated electricity in the base year (t CO_2/MWh)

5.5. Project emissions

43. The project emissions are calculated as:

$$PE_y = BC_y \times \left(PE_{Clinker,y} \times P_{Blend,y} + PE_{ele,ADD,BC,y}\right) \quad \text{Equation (15)}$$

Where:

PE_y	=	Project emissions in year *y* (t CO_2)
BC_y	=	Blended cement produced and sold in the domestic market in year *y* (t BC)
$PE_{Clinker,y}$	=	Project 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 alternative raw material and additives in year *y* (t CO_2/(t BC)

5.5.1. Project emissions per tonne of clinker (*$PE_{clinker,y}$*)

$$PE_{clinker,y} = \sum_i \left\{\left(PE_{calcin,i,y} + PE_{FC,i,y} + PE_{ele,grid,CLNK,i,y} + PE_{ele,sg,CLNK,i,y} + PE_{Dust,i,y} + PE_{FC\_Dry,i,y}\right)\right\} \times P_{CLNK,i,y} \quad \text{Equation (16)}$$

Where:

$PE_{clinker,y}$	=	Project emissions per tonne of clinker in the project activity plant in year *y* (t CO_2/t clinker)
$PE_{calcin,i,y}$	=	Project emissions per tonne of clinker *i* due to calcination of calcium carbonate and magnesium carbonate in year *y* (t CO_2/t clinker)
$PE_{FC,i,y}$	=	Project emissions per tonne of clinker *i* due to combustion of fossil fuels for clinker production in year *y* (t CO_2/t clinker)
$PE_{ele,grid,CLNK,i,y}$	=	Project emissions from grid electricity for clinker production per tonne of clinker *i* in year *y* (t CO_2/ t clinker)
$PE_{ele,sg,CLNK,i,y}$	=	Emissions from self-generated electricity per tonne of clinker *i* production in year *y* (t CO_2/t clinker)
$PE_{Dust,i,y}$	=	Project emissions due to discarded dust from bypass and dedusting units (CKD) per tonne of clinker *i* in year *y* (t CO_2)
$PE_{FC\_Dry,i,y}$	=	Project emissions due to fuel consumption for preparation of raw materials or fuels per tonne of clinker *i* in year *y* (t CO_2)
$P_{CLNK,i,y}$	=	Ratio of clinker *i* for total production of clinker in year *y* (t clinker /t clinker)

5.5.1.1. Project emissions per tonne of clinker *i* due to calcination of calcium carbonate and magnesium carbonate (*$PE_{calcin,i,y}$*)

$$PE_{calcin,i,y} = \frac{0.785 \times (OutCaO_{i,y} - InCaO_{i,y}) + 1.092 \times (OutMgO_{i,y} - InMgO_{i,y})}{CLNK_{i,y}}$$ Equation (17)

Where:

$PE_{calcin,i,y}$	=	Project emissions per tonne of clinker *i* due to calcinations of calcium carbonate and magnesium carbonate in year *y* (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)
$InCaO_{i,y}$	=	Non-carbonated CaO content of clinker *i* in the raw material in year *y* (t CaO)
$OutCaO_{i,y}$	=	CaO content in the clinker *i* produced in year *y* (t CaO)
$InMgO_{i,y}$	=	Non-carbonated MgO content of clinker *i* in the raw material in year *y* (t MgO)
$OutMgO_{i,y}$	=	MgO content in the clinker *i* produced in year *y* (t MgO)
$CLNK_{i,y}$	=	Production of clinker *i* in year *y* (t clinker)

5.5.1.2. Project emissions per tonne of clinker due to combustion of fossil fuels for production of clinker *i* (*$PE_{fossilfuel,i,y}$*)

$$PE_{FC,i,y} = \frac{\sum_l (FC_{i,y} \times NCV_l \times EF_{CO2,l})}{CLNK_{i,y}}$$ Equation (18)

Where:

$PE_{FC,i,y}$	=	Project emissions per tonne of clinker *i* due to combustion of fossil fuels for clinker production in year *y* (t CO_2/t clinker)
$FC_{l,i,y}$	=	Quantity of fossil fuel of type *l* consumed for clinker *i* production in year *y* (tonnes or volume of fuel)
$EF_{CO2,l}$	=	CO_2 emission factor for fuel type *l* (t CO_2/GJ)
NCV_l	=	Net calorific value of the fuel type *l* (GJ/mass or volume)

5.5.1.3. Project emission from grid electricity for clinker production (*$PE_{ele,grid,CLNK,i,y}$*)

$$PE_{ele,grid,CLNK,i,y} = \frac{PELE_{grid,CLNK,i,y} \times EF_{grid,i,y}}{CLNK_{i,y}}$$ Equation (19)

Where:

$PE_{ele,grid,CLNK,i,y}$	=	Project emissions from grid electricity for clinker production per tonne of clinker *i* in year *y* (t CO_2/ t clinker)
$PELE_{grid,CLNK,i,y}$	=	Grid electricity for clinker *i* production in year *y* (MWh)
$EF_{grid,i,y}$	=	Grid emission factor in year *y* for the production of clinker *i* (t CO_2/MWh)
$CLNK_{i,y}$	=	Production of clinker *i* in year *y* (t clinker)

5.5.1.4. Project emissions from self-generated electricity per tonne of clinker *i* production (*$PE_{ele,sg,CLNK,i,y}$*)

$$PE_{ele,sg,CLNK,i,y} = \frac{PELE_{sg,CLNK,i,y} \times EF_{sg,i,y}}{CLNK_{i,y}} \quad \text{Equation (20)}$$

Where:

$PE_{ele,sg,CLNK,i,y}$	=	Project emissions from self-generated electricity per tonne of clinker *i* production in year *y* (t CO_2/t clinker)
$PELE_{sg,CLNK,i,y}$	=	Self-generation of electricity for clinker *i* production in year *y* (MWh)
$EF_{sg,i,y}$	=	Emission factor for self-generated electricity in year *y* for the production of clinker *i* (t CO_2/MWh)
$CLNK_{i,y}$	=	Production of clinker *i* in year *y* (t clinker)

5.5.1.5. Project emissions due to discarded dust from bypass and dedusting units per tonne of clinker *i* (*$PE_{Dust,i,y}$*)

44. If there is any dust discarded through the bypass and dedusting unit (*CKD*), the associated emissions shall be determined as follows:

$$PE_{Dust,i,y} = \left(C_{i,y} \times ByPass_{i,y}\right) + \frac{C_{i,y} \times d_{i,y}}{\left[C_{i,y} \times \left(1 - d_{i,y}\right) + 1\right]} \times CDK_{i,y}/CLNK_{i,y} \quad \text{Equation (21)}$$

Where:

$PE_{Dust,i,y}$	=	Project emissions factor due to discarded dust from bypass and dedusting units (CKD) per tonne of clinker *I* in year y (t CO_2)
$C_{i,y}$	=	Project calcination factor due to both de-carbonization reaction and fuel consumption in clinker production (t CO_2/t clinker)
$ByPass_{i,y}$	=	Annual production of bypass dust leaving kiln system (t)
$CDK_{i,y}$	=	Annual production of *CKD* dust leaving kiln system (t)
$d_{i,y}$	=	*CKD* calcination rate (released CO_2 expressed as a fraction of the total carbonate CO_2 in the raw materials)

$CLNK_{i,y}$	=	Production of clinker *i* in year *y* (t clinker)

45. The parameter C_y should be calculated as follows:

$$C_{i,y} = PE_{Calcin,i,y} + PE_{FC,i,y}$$ Equation (22)

Where:

$C_{i,y}$	=	Project calcination factor due to both de-carbonization reaction and fuel consumption in clinker production (t CO_2/t clinker)
$PE_{Calcin,i,y}$	=	Project emissions per tonne of clinker *i* due to calcination of calcium carbonate and magnesium carbonate in year *y* (t CO_2/t clinker)
$PE_{FC,i,y}$	=	Project emissions per tonne of clinker *i* due to fuel consumption in clinker production in year *y* (t CO_2/t clinker)

5.5.1.6. Project emissions from fuel consumption for preparation of raw materials or fuels (*$PE_{FC\_Dry,y}$*)

$$PE_{FC\_Dry,i,y} = \sum \left(FC_{Dry\_Addl,l,y} \times EF_{CO2,l} \times NCV_l \right)$$ Equation (23)

Where:

$PE_{FC\_Dry,i,y}$	=	Project CO_2 emissions due to fuel consumption for preparation of raw materials or fuels in year *y* (t CO_2)
$FC_{Dry\_Addl,l,y}$	=	Quantity of fossil fuel *l* consumed for preparation of raw materials or fuels in year *y* (mass or volume)
$EF_{CO2,l}$	=	CO_2 emission factor for fuel type *l* (t CO_2/GJ)
NCV_l	=	Net calorific value of the fuel type *l* (GJ/mass or volume)

5.5.1.7. Ratio of clinker *i* used for total production of clinker in year *y* (*$P_{CLNK,i,y}$*)

$$P_{CLNK,i,y} = \frac{CLNK_{i,y}}{\sum_i CLNK_{i,y}}$$ Equation (24)

Where:

$P_{CLNK,i,y}$	=	Ratio of clinker *i* used for total production of clinker in year *y* (t clinker/t clinker)
$CLNK_{i,y}$	=	Production of clinker *i* in year *y* (t clinker)

5.5.2. Project emissions from electricity for BC grinding and preparation of alternative raw material and additives (*$PE_{ele,ADD,BC,i,y}$*)

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

$$PE_{ele,ADD,BC,y} = PE_{ele,grid,BC,y} + PE_{ele,sg,BC,y} + PE_{ele,grid,ADD,y} + PE_{ele,sg,ADD,y} \quad \text{Equation (25)}$$

Where:

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

5.5.2.1. Project emissions from grid electricity for BC grinding (*$PE_{ele,grid,BC,y}$*)

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

$$PE_{ele,grid,BC,y} = \frac{PELE_{grid,BC,y} \times EF_{grid,y}}{BC_y} \quad \text{Equation (26)}$$

Where:

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

5.5.2.2. Project emissions from self-generated electricity for BC grinding (*$PE_{ele,sg,BC,y}$*)

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

$$PE_{ele,sg,BC,y} = \frac{PELE_{sg,BC,y} \times EF_{sg,y}}{BC_y} \quad \text{Equation (27)}$$

Where:

$PE_{ele,sg,BC,y}$	=	Project 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)
BC_y	=	Blended cement produced and sold in the domestic market in year *y* (t BC)

5.5.2.3. Project emissions from grid electricity for alternative raw material and additive preparation (*$PE_{ele,grid,ADD,y}$*)

49. Grid electricity emissions for alternative raw material and additive preparation in year *y* are calculated as:

$$PE_{ele,grid,ADD,y} = \frac{PELE_{grid,ADD,y} \times EF_{grid,y}}{BC_y} \quad \text{Equation (28)}$$

Where:

$PE_{ele,grid,ADD,y}$	=	Grid electricity emissions for alternative raw material and additive preparation in year *y* (t CO_2/t BC)
$PELE_{grid,ADD,y}$	=	Grid electricity for alternative raw material and additive preparation in year *y* (MWh)
$EF_{grid,y}$	=	Grid emission factor in year *y* (t CO_2/MWh)
BC_y	=	Blended cement produced and sold in the domestic market in year *y* (t BC)

5.5.2.4. Project emissions from self-generated electricity for alternative raw material and additive preparation (*$PE_{ele,sg,ADD,y}$*)

50. Emissions from self-generated electricity alternative raw material and additive preparation in year *y* (*$PE_{ele,sg,ADD,y}$*) are calculated as:

$$PE_{ele,sg,ADD,y} = \frac{PELE_{sg,ADD,y} \times EF_{sg,y}}{BC_y} \quad \text{Equation (29)}$$

Where:

$PE_{ele,sg,ADD,y}$	=	Project emissions from self-generated electricity for alternative raw material and additive preparation in year *y* (t CO_2/t BC)
$PELE_{sg,ADD,y}$	=	Self-generation electricity for alternative raw material and additive preparation additives in year *y* (MWh)
$EF_{sg,y}$	=	Emission factor for self-generated electricity in year *y* (t CO_2/MWh)

BC_y	=	Blended cement produced and sold in the domestic market in year *y* (t BC)

5.5.3. Electricity Emission Factors ($EF_{grid,BSL}$, $EF_{grid,y}$, $EF_{sg,y}$ and $EF_{sg,BSL}$)

5.5.3.1. Baseline grid emission factor ($EF_{grid,BSL}$) and ($EF_{grid,y}$)

51. 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 “TOOL07: Tool to calculate the emission factor for an electricity system”.

5.5.3.2. Emission factor for self-generated electricity ($EF_{sg,y}$)

52. The emission factor for self-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*.

$$EF_{sg,y} = \frac{\sum_{k,j} FC_{k,j,y} \times COEF_k}{\sum_j GEN_{j,y}} \quad \text{Equation (30)}$$

Where:

$EF_{sg,y}$	=	Emission factor for self-generated electricity in year *y* (t CO_2/MWh)
$FC_{k,j,y}$	=	Quantity of fuel *k* consumed by relevant power sources *j* in year *y* (mass or volume unit)
j	=	On-site power sources
$COEF_k$	=	CO_2 emission coefficient of fuel *k* (t CO_2/mass or volume unit)
$GEN_{j,y}$	=	Electricity generated by the source *j* in year *y* (MWh)

53. The CO_2 emission coefficient of fuel *k* ($COEF_k$) shall be determined as per “TOOL03: Tool to calculate project or leakage CO2 emissions from fossil fuel combustion”.

5.5.3.3. Emission factor for self-generated electricity ($EF_{sg,BSL}$)

54. The 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 CO2/MWh) of all self-generating sources in the project boundary serving the system in the base year.

$$EF_{sg,BSL} = \frac{\sum_{m,n} FC_{m,n,BSL} \times COEF_m}{\sum_n GEN_{n,BSL}} \quad \text{Equation (31)}$$

Where:

$EF_{sg,BSL}$	=	Emission factor for self-generated electricity in the base year (t CO_2/MWh)
$FC_{m,n,BSL}$	=	Quantity of fuel m 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)
$GEN_{n,BSL}$	=	Electricity generated by the source *n* in year *y* (MWh)

55. The CO_2 emission coefficient of fuel *m* ($COEF_m$) shall be determined as per "TOOL03: Tool to calculate project or leakage CO2 emissions from fossil fuel combustion".

5.6. Leakage

56. Leakage emissions consist of:

(a) Leakage emissions due to transport of alternative raw material and additives; and

(b) Leakage emissions due to the diversion of alternative raw material and additives from existing uses.

$$LE_y = LE_{TR,y} + LE_{ADD,y}$$ Equation (32)

Where:

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

5.6.1. Leakage emissions due to transport of alternative raw material and additional additives

57. Leakage emissions due to transport of alternative raw material and additional additives in year *y* ($LE_{TR,y}$) are calculated as per "TOOL12: Project and leakage emissions from transportation of freight", where $Q_{ADD,y}$ corresponds to $FR_{f,m}$.

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

$$Q_{ADD,y} = (A_{PJ,Blend,y} - A_{BSL,Blend,y}) \times BC_y$$ Equation (33)

Where:

$Q_{ADD,y}$	=	Quantify of additional additives transported in year *y* (t additives). This parameter shall be used instead of $FR_{f,m}$ in the tool "Project and leakage emissions from road transportation of freight"
BC_y	=	Blended cement produced and sold in the domestic market in year *y* (t BC)
$A_{PJ,Blend,y}$	=	Share of additives per tonne of BC in year *y* (t additives/t BC)

$A_{BSL,Blend,y}$	=	Baseline share of additives per tonne of BC updated for year *y* (t additives/t BC)

5.6.2. Step 8 Determination of leakage emissions due to the diversion of alternative raw material and additives from existing uses

58. In this case, the project participant should prove that additional use of raw material will not cause increased emission in other areas. For this purpose, the project participant should evaluate the supply status of alternative raw material and additives used for the project activity as a part of monitoring. The following options shall be used to prove that use of alternative raw material and additives has not increased the emission:

(a) L1 Demonstrate that at the sites from where the project activity is receiving alternative raw material and/or additives, these 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 alternative raw material and/or 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 alternative raw material and/or additives from the market. During each verification, DOE shall check that the alternative raw material and/or additives are sourced from the same sites as indicated in the PDD.

(b) L2 Demonstrate that there is an abundant surplus of the alternative raw material and/or additives in the zone from where the additives are sourced. For this purpose, demonstrate that the quantity of available alternative raw material and/or additives in the zone is at least 25% larger than the quantities that are utilized within the zone and the project activity. The zone for the purpose of demonstration of abundant surplus of the alternative raw material and/or additives shall be considered as either (i) the entire country from where these are sourced from, or (ii) the area defined by the project participants, with a radius of at least 200 km from the source. This shall be demonstrated during each crediting year. In case, the source of additives changes during the crediting year and the zone has to be redefined, then the project participants shall follow the relevant procedures for such changes.

59. 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 alternative raw material and additives from existing uses in year *y* shall be calculated as follows:

$$LE_{ADD,y} = \left(BE_y - PE_y\right) \times \alpha_y \quad \text{Equation (34)}$$

Where:

$LE_{ADD,y}$	=	Leakage emissions due to the diversion of alternative raw material and 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)

5.6.2.1. Step 8.1: Determination of α_y

$$\alpha_y = \frac{ADD_{NS,y}}{ADD_y}$$ Equation (35)

Where:

α_y	=	Leakage penalty factor in year *y* (fraction)
$ADD_{NS,y}$	=	Amount of alternative raw material and/or 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 alternative raw material and additives used for BC production in project plant in year *y* (t additives)

60. 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.

5.7. Emission reductions

61. Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$ Equation (36)

Where:

ER_y	=	Emission reductions in year *y* (t CO_2/yr)
BE_y	=	Baseline emissions in year *y* (t CO_2/yr)
PE_y	=	Project emissions in year *y* (t CO_2/yr)
LE_y	=	Leakage emissions in year *y* (t CO_2/yr)

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

62. Refer to the latest approved version of methodology tool, "Assessment of the Validity of the Original/Current Baseline to Update the Baseline at the Renewal of the Crediting Period".

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

5.9. Data and parameters not monitored

64. In addition to the parameters listed in the tables below, the provisions on data and parameters not monitored in the tools referred to in this methodology apply.

Data / Parameter table 1.

Data / Parameter:	$EF_{CO2,l}$
Data unit:	t CO_2/t fuel
Description:	Emission factor for fossil fuel *l* (t CO_2/t fuel)
Source of data:	As per “TOOL03: Tool to calculate project or leakage CO2 emissions from fossil fuel combustion”.
Measurement procedures (if any):	-
Any comment:	Use default emission factor for fossil fuel *l* (t CO_2/t fuel)

Data / Parameter table 2.

Data / Parameter:	$EF_{CO2,m}$
Data unit:	t CO_2/ GJ
Description:	CO_2 emission factor per unit of energy of the fuel *m* (t CO_2/GJ)
Source of data:	As per “TOOL03: Tool to calculate project or leakage CO2 emissions from fossil fuel combustion”.
Measurement procedures (if any):	-
Any comment:	-

Data / Parameter table 3.

Data / 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.

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}]. Project participants can use a conservative default value of 2% for the non-carbonated CaO content of the raw material if they can demonstrate that they were not using non-carbonated raw materials, for example, gypsum, anhydrite, and fluorite etc
Any comment:	This parameter shall be based on 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. Non-carbonated CaO content (%) shall be calculated as the percentage of CaO in the total raw material

Data / Parameter table 4.

Data / 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:	This parameter shall be based on 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.

Data / Parameter table 5.

Data / 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:	This parameter shall be based on 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. Non-carbonated MgO content (%) shall be calculated as the percentage of MgO in the total raw material

Data / Parameter table 6.

Data / 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:	This parameter shall be based on 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.

Data / Parameter table 7.

Data / 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:	This parameter shall be based on 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. This parameter is used to calculate InCaO and InMgO

Data / Parameter table 8.

Data / 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:	This parameter shall be based on 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.

Data / Parameter table 2.

Data / Parameter:	$FC_{l,BSL}$
Data unit:	t fuel
Description:	Quantity of fossil fuel of type *l* 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:	This parameter shall be based on 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.

Data / Parameter table 3.

Data / 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:	This parameter shall be based on 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.

Data / Parameter table 11.

Data / 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:	This parameter shall be based on 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.

Data / Parameter table 12

Data / 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:	This parameter shall be based on 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.

Data / Parameter table 13.

Data / 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:	This parameter shall be based on 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.

Data / Parameter table 14.

Data / 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:	This parameter shall be based on 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.

Data / Parameter table 4.

Data / 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:	This parameter shall be based on 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.

Data / Parameter table 5.

Data / 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:	This parameter shall be based on 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.

Data / Parameter table 17.

Data / Parameter:	$FC_{m,n,BSL}$
Data unit:	mass or volume unit
Description:	Quantity 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:	This parameter shall be based on 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.

Data / Parameter table 18.

Data / 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:	This parameter shall be based on 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.

Data / Parameter table 19.

Data / Parameter:	***NCV_m***
Data unit:	GJ/mass or volume unit
Description:	Net calorific value per mass or volume unit of a fuel *m*
Source of data:	The following data sources may be used if the relevant conditions apply: <table><tr><th>Data source</th><th>Conditions for using the data source</th></tr><tr><td>(a) Values provided by the fuel supplier in invoices</td><td>This is the preferred source</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>
Measurement procedures (if any):	For a) and b): Measurements should be undertaken in line with national or international fuel standards

Data / Parameter table 20.

Data / Parameter:	***$EF_{CO2,m}$***
Data unit:	t CO2/GJ
Description:	CO2 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:	This parameter shall be based on 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.

Data / Parameter table 21.

Data / Parameter:	$TEMP_{CLNK}$
Data unit:	℃
Description:	Calcination temperature of kiln when producing baseline clinker
Source of data:	On-site measurements
Measurement procedures (if any):	-
Any comment:	Cross check for reduction of fossil fuel consumption due to lower calcination temperature

Data / Parameter table 62.

Data / Parameter:	$ByPass_{BSL}$
Data unit:	t
Description:	Annual production of bypass dust leaving kiln system
Source of data:	It is determined based on historical data for previous three years as part of production control procedures
Measurement procedures (if any):	Weighfeeders/Weighbridge at previous three years
Any comment:	These data will be collected as part of normal plant level operations. QA/QC requirements according to ISO 9000 or similar quality systems

Data / Parameter table 7.

Data / Parameter:	CKD_{BSL}
1,352 m/s²	1,352 m/s²
Description:	Annual production of CKD dust leaving kiln system in the baseline
Source of data:	It is determined based on historical data for at least three years preceding the start of the project activity. The data is sourced from production control procedures
Measurement procedures (if any):	Weighfeeders/Weighbridge at previous three years
Any comment:	-

Data / Parameter table 84.

Data / Parameter:	d_{BSL}
Data unit:	Fraction
Description:	CKD calcination rate (released CO_2 expressed as a fraction of the total carbonate CO_2 in the raw materials)
Source of data:	It is determined based on historical data for at least three years preceding the start of the project activity. The data is sourced from production control procedures

Measurement procedures (if any):	Sampling at previous three years
Any comment:	Data will be collected as part of normal plant level operations. QA/QC requirements according to ISO 9000 or similar quality systems.

Data / Parameter table 95.

Data / Parameter:	***di,y***
Data unit:	Fraction
Description:	CKD calcination rate (released CO2 expressed as a fraction of the total carbonate CO2 in the raw materials)
Source of data:	It will be measured as part of normal operations
Measurement procedures (if any):	Representative sampling
Any comment:	These data will be collected as part of normal plant level operations. QA/QC requirements according to ISO 9000 or similar quality systems

Data / Parameter table 26.

Data / Parameter:	$FC_{Dry,i}$
Data unit:	t
Description:	Quantity of fossil fuel *i* consumed for preparation of raw materials or fuels in the baseline
Source of data:	It is determined based on historical data for at least three years preceding the start of the project activity. The data is sourced from production control procedures
Measurement procedures (if any):	Weighfeeders/Weighbridge/Stockpile control at previous year
Monitoring frequency:	Monthly (recorded)
QA/QC procedures:	These data will be collected as part of normal plant level operations. QA/QC requirements according to ISO 9000 or similar quality systems
Any comment:	-

6. Monitoring methodology

65. 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.

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

6.1. Data and parameters monitored

Data / Parameter table 27.

Data / Parameter:	***BC_y***
Data unit:	t BC
Description:	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 table 28.

Data / Parameter:	***Pblend,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 table 29.

Data / Parameter:	***$InCaO_{i,y}$***
Data unit:	t CaO
Description:	Non-carbonated CaO content of clinker *i* in the raw material in year *y*
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 in year *y* times the raw material quantity used in year *y* [$Q_{rm,y}$]. Project participants can use a conservative default value of 0% for the non-carbonated CaO content of the raw material in year *y*
Monitoring frequency:	Daily
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 30

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

Data / Parameter table 31.

Data / Parameter:	***InMgOi,y***
Data unit:	t MgO
Description:	Non-carbonated MgO content of clinker *i* in the raw material in year *y*
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 in year *y* times the raw material quantity in year *y* [Qrm,y]. This will be calculated and measured as part of normal operations
Monitoring frequency:	Daily
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 32.

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

Data / Parameter table 33.

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 $InCaO_{i,y}$ and $InMgO_{i,y}$

Data / Parameter table 34.

Data / Parameter:	$CLNK_{i,y}$
Data unit:	t clinker
Description:	Production of clinker *i* 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 table 35.

Data / Parameter:	$FC_{l,i,y}$
Data unit:	t fuel
Description:	Quantity of fossil fuel of type *l* consumed for clinker *i* 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 table 108.

Data / Parameter:	$EF_{CO2l,i}$
Data unit:	t CO_2/t fuel
Description:	CO2 emission factor for fossil fuel *l* for the production of clinker *i* (t CO2/GJ)
Source of data:	As per “TOOL03: Tool to calculate project or leakage CO2 emissions from fossil fuel combustion”.
Measurement procedures (if any):	-
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 36.

Data / Parameter:	$PELE_{grid,CLNK,i,y}$
Data unit:	MWh
Description:	Grid electricity for clinker *i* 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 table 37.

Data / Parameter:	$PELE_{sg,CLNK,i,y}$
Data unit:	MWh
Description:	Self-generation of electricity for clinker *i* 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 table 38.

Data / Parameter:	ADD_y
Data unit:	t additives
Description:	Amount of alternative raw material and 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 table 39.

Data / Parameter:	$ADD_{NS,y}$
Data unit:	t additives
Description:	Amount of alternative raw material and additives used for BC production in project plant 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 table 40.

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 table 41.

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 table 42.

Data / Parameter:	$PELE_{grid,ADD,y}$
Data unit:	MWh
Description:	Grid electricity emissions for alternative raw material and additive preparation 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 table 43.

Data / Parameter:	***$PELE_{sg,ADD,y}$***
Data unit:	MWh
Description:	Self-generation electricity for alternative raw material and additive preparation 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 table 44.

Data / Parameter:	***$FC_{k,j,y}$***
Data unit:	mass or volume unit
Description:	Quantity of fuel *k* 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:	-

Data / Parameter table 45.

<table>
<tr><td>Data / Parameter:</td><td>NCV_k</td></tr>
<tr><td>Data unit:</td><td>GJ/mass or volume unit</td></tr>
<tr><td>Description:</td><td>Net calorific value per mass or volume unit of a fuel k</td></tr>
<tr><td>Source of data:</td><td>The following data sources may be used if the relevant conditions apply:
<table>
<tr><th>Data source</th><th>Conditions for using the data source</th></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>
</table></td></tr>
</table>

	(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	

Monitoring frequency:	For (a) and (b): The NCV should be obtained for each fuel delivery, from which weighted average annual values should be calculated.
	For (c): Review appropriateness of the values annually.
	For (d): Any future revision of the IPCC Guidelines should be taken into account	

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

Data / Parameter table 46.

Data / Parameter:	***$GEN_{j,y}$***
Data unit:	MWh
Description:	Electricity generated by the source *j* in 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 table 117.

Data / Parameter:	***$A_{PJ,blend,y}$***
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 table 12.

Data / Parameter:	$A_{BSL,blend,y}$
Data unit:	t additives/t BC
Description:	Baseline share of additives per tonne of BC updated for year *y*
Source of data:	On-site measurements in plant records
Measurement procedures (if any):	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, paragraph (29(c)).
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 49.

Data / Parameter:	$TEMP_{CLNK,i}$
Data unit:	℃
Description:	Calcination temperature of kiln when producing baseline clinker
Source of data:	On-site measurements
Measurement procedures (if any):	-
Monitoring frequency:	Daily
QA/QC procedures:	-
Any comment:	Cross check for reduction of fossil fuel consumption due to lower calcination temperature

Data / Parameter table 130.

Data / Parameter:	$ByPass_y$
Data unit:	t
Description:	Annual production of bypass dust leaving kiln system in year *y*
Source of data:	It will be measured as part of normal operations
Measurement procedures (if any):	Weighfeeders/Weighbridge
Monitoring frequency:	Monthly

QA/QC procedures:	These data will be collected as part of normal plant level operations. QA/QC requirements according to ISO 9000 or similar quality systems
Any comment:	-

Data / Parameter table 141.

Data / Parameter:	**CKD_y**
Data unit:	t
Description:	Annual production of CKD dust leaving kiln system
Source of data:	It will be measured as part of normal operations
Measurement procedures (if any):	Weighfeeders/Weighbridge
Monitoring frequency:	Monthly
QA/QC procedures:	These data will be collected as part of normal plant level operations. QA/QC requirements according to ISO 9000 or similar quality systems
Any comment:	-

Data / Parameter table 152.

Data / Parameter:	**d_y**
Data unit:	Fraction
Description:	CKD calcination rate (released CO_2 expressed as a fraction of the total carbonate CO_2 in the raw materials)
Source of data:	It will be measured as part of normal operations
Measurement procedures (if any):	Sampling
Monitoring frequency:	Monthly
QA/QC procedures:	These data will be collected as part of normal plant level operations. QA/QC requirements according to ISO 9000 or similar quality systems
Any comment:	This parameter could be estimated

Data / Parameter table 53.

Data / Parameter:	$FC_{Dry\_addl,i,y}$
Data unit:	mass or volume
Description:	Quantity of fossil fuel *i* consumed for preparation of raw materials or fuels in year *y*
Source of data:	It will be measured with field instruments and checked with inventories control procedure
Measurement procedures (if any):	Weighfeeders/Weighbridge/Stockpile control
Monitoring frequency:	Monthly

QA/QC procedures:	These data will be collected as part of normal plant level operations. QA/QC requirements according to ISO 9000 or similar quality systems
Any comment:	-

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Document information

Version	*Date*	*Description*
02.0	17 August 2020	Revision to include cover note.
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