Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories

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TYPE III - OTHER PROJECT ACTIVITIES

Project participants shall take into account the general guidance to the methodologies, information on additionality, abbreviations and general guidance on leakage provided at http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html.

III.R Demand-side GHG emission reduction through reduction in cement consumption during concrete mix preparation

Technology/measure

1. This project category comprises concrete mix preparation technologies and activities using alternative cementitious materials and/or water reducing admixtures (high range water reducer, also known as superplasticizer), thereby reducing the consumption of cement in the concrete mix.

2. The technologies and activities usually referred to as lower cement concrete technology (LCCT) included under this category reduce cement use in existing sites or at new construction and/or concrete mix preparation sites.

3. Cement type that will be used in the absence of the project shall be established through a evaluation of historical concrete production data of at least three years and a market survey in the region on the type of cement used for similar construction projects during the last three years.

4. The quality and grade of the cement to be used in the project activity will be in compliance with the applicable relevant quality standards for concrete mix preparation in the country where the project activity will be executed.

5. This methodology is not applicable if cement used in the concrete production is imported from an annex I country.

6. A project activity using this methodology should demonstrate that there exists at least one barrier to its implementation as provided in "Appendix B of the simplified modalities and procedures for small-scale CDM project activities" and could in general include some barriers of the following nature though not limited to only these:

- Additional research and development (R&D) activities were needed at additional investments to establish reliability of the concrete mix technology in relation to the application where such concrete mix would be used.
- There could be need for additional skill development for researchers and/or operators of the new technology involving reduced use of cement in concrete mix.
- There could be perceptional barriers that available concrete mix designs involving proven concrete mix design technology and using prescribed concrete mix technologies provide better quality of concrete mix as compared with the concrete mix prepared in the CDM project activity.
- There could be lack of awareness in customers about the technologies on reduced use of cement in concrete mix.

- There could be lack of information available on reliable performance and duration of the technology if already used elsewhere with a similar concrete mix design and application.
- There could be lack of investments to such project activities due to perceived barriers and/or any attendant uncertainties.

7. The concrete mix in the project activity should not be a common practice in the market and region of its implementation for similar use and/or application. ‘Market and region’ refers to the baseline geographical boundary from which the host project participant could have or has procured cement for use in the project activity. ‘Similar use and/or application’ refers to any activity (i.e. involving concrete mix technologies with reduced cement use), which takes place in a comparable environment, inter alia, with respect to the regulatory framework (and standard concrete mix design guidelines) and is undertaken in the relevant geographical area of the ‘market and region’.

In order to demonstrate that the project activity is not a common practice, an analysis has to be provided on whether any similar activity to the proposed CDM project activity has been implemented previously or are currently underway. If any similar activity to the proposed project activity is identified, then compare the proposed project activity to such similar activity and assess whether there are essential distinctions between the proposed project activity and the similar activity.

8. Measures are limited to those that result in emission reduction of less than or equal to 60 ktCO_2e annually.

Boundary

9. The project boundary is the physical, geographical location(s) of concrete mix preparation site(s) included in a project activity, and with clear identification of the physical location(s) of the construction sites, e.g. building, road where the concrete mix is used/ application sites of the concrete mix, and cement production plants which would are likely to supply cement to the concrete mix preparation site(s). The project participant should identify the cement production plants that would have supplied cement in the absence of the project activity and include them in the project boundary. Verifiable evidences shall be provided to demonstrate that only these cement plants could have supplied cement to the concrete mix preparation site/location included in the project activity (e.g. invoices of cement procurement).

Baseline

10. The baseline ($BL_{CEM,i}$) is the quantity of cement per unit of concrete mix per concrete mix grade ‘i’ that would have been used in the absence of project activity.

11. The baseline cement per unit concrete mix for a concrete mix grade ‘i’ ($BL_{CEM,i}$) will be multiplied by annual requirement of ‘i’ grade of concrete mix ($Q_{conc,i,y}$) in year ‘y’ to calculate the aggregate quantity of baseline cement requirements ($Q_{BLCEM,y}$) during any year ‘y’ at a particular location(s).

$$Q_{BLCEM,y} = \sum_{i} (BL_{CEM,i} * Q_{conc,i,y}) \quad (1)$$

Where:

$Q_{BLCEM,y}$	Aggregated quantity of baseline cement requirements during year y at a particular location
$BL_{CEM,i}$	Baseline cement per unit concrete mix for a particular concrete mix grade
$Q_{conc,i,y}$	Annual requirement of 'i' grade concrete mix in year y

12. The emission factor ($EF_{CEM,y}$) per unit of cement production is calculated for a mix of cement producing plants that would have supplied cement to the concrete mix preparation location(s) as per the procedure elucidated below:

(a) In order to estimate the most conservative emission factor, the following procedure should be used to determine the mix of relevant cement producing plants 'j':

- Identify the group of cement producing plants located within the project boundary that could have supplied cement to the project activity concrete mix preparation location in the absence of the project activity. Historical concrete production data of at least three years and a market survey in the region on the type of cement used for similar construction projects during the last three years shall be used;
- Arrange the list of identified cement manufacturing plants in the descending order of emission per unit quantity of cement (tCO_2e/tonne cement);
- Select the least emitting (lower 50% in the list) of the identified cement plants, in case the group consists of a single cement producing plant then the same will be used as a default cement production plant for baseline emission factor estimation.

The mix of relevant cement producing plants 'j' will be monitored ex-post each year of the crediting period and the baseline emission factor for each cement producing plant ($EF_{CEM,j,y}$) available in the public domain shall be used. In situations where energy consumption data of cement plants is not available in the public domain, $EF_{CEM,j,y}$ shall be calculated as per the guidance under baseline emissions section of ACM0005 (equations 1 through 1.2.4).

(b) Calculate the characteristic emission factor per unit of cement production, which will be used for baseline emission calculation using the formula below:

$$EF_{CEM,y} = \sum_{j} (EF_{CEM,j,y} * Q_{CEM,j,y}) / \sum_{j} Q_{CEM,j,y} \quad (2)$$

Where:

$Q_{CEM,j,y}$	The total quantity of cement produced (as per publicly available information) at a plant 'j' during any year 'y' (tons)

$EF_{CEM, j,y}$	The emission factor per unit of cement production at a plant 'j' during any year 'y'. (tCO_2e/ton of cement)
$EF_{CEM,y}$	The emission factor per unit of cement production (tCO_2e/ton of cement)

13. Baseline emissions relevant to the project activity in year 'y' will be calculated as follows:

$$BE_y = EF_{CEM,y} * Q_{BLCEM,y} \quad (3)$$

Where:

BE_y	Baseline emission in year 'y' (tCO_2e)

Project Activity Emissions

14. The project emissions (PE_y) are due to the production of the actual quantity of cement ($QP_{CEM,y}$) required in the CDM project activity. This quantity will be less than the baseline cement needed ($<BL_{CEM,i}$) as the concrete mix in the project will require less cement in the concrete mix. The quantity of cement needed in the project activity is estimated using the following equation:

$$Q\mathbf{P}_{\mathbf{CEM,y}} = \sum\nolimits_{\mathbf{i}} (P_{\mathbf{CEM,i}} * Q_{\mathbf{conc,i,y}}) \quad (4)$$

Where:

$P_{CEM,I}$	The quantity of cement required to produce a unit of concrete mix of type 'i'; the optimum amount of that type of cement that can be replaced with supplementary cementing materials such as flyash (SCM) cannot be theoretically calculated. It shall be experimentally determined using the same aggregate and cement that will be used in a particular project and reported in the PDD.[1]
$Q_{conc,i,y}$	The annual quantity of concrete mix of type 'i' required in a year, which should be the same as the quantity considered under equation (1) of baseline emission calculations (tons)
$Q\mathbf{P}_{\mathbf{CEM,y}}$	Actual quantity of cement required in the CDM project activity (tons)

15. The project emissions shall be calculated using the following equation:

$$PE_{\mathbf{y}} = EF_{\mathbf{CEM,y}} * QP_{\mathbf{CEM,y}} \quad (5)$$

$PE_{\mathbf{y}}$	Project emissions in year 'y' ($tcCO_2e$)

During the project activity, no additional on-site energy or transport energy use is expected as compared to the baseline as the same processes for mixing ingredients for concrete preparation is employed.

[1] The materials used for the experimental determination of the optimum cement reduction possible should not lead to a reduction in the strength and other properties of the concrete.

Leakage

16. Leakage emissions (LEy) include:

- additional transportation requirements for alternative cementitious material(s) and/or water reducing admixtures if such is more than that required for transportation of quantity of cement replaced/ reduced due to the project activity,
- emissions related to energy use in the processing of the alternative cementitious material(s) and/or water reducing admixtures.

The transport leakage emissions (LE_{TRy}) shall be calculated using equations 2 through 2.1 of ACM0005.

The leakage potential due to energy use (LE_{ENy}) in the processing of any of the alternative cementitious material(s) and/or water reducing admixtures should be estimated based on the life-cycle emissions. In case the alternative cementitious material(s) used in a project activity is a waste material (e.g., industrial slag, fly ash from power plants, etc.) for which there is no relevant life-cycle energy usage, the leakage potential will be considered as zero.

17. The total leakage emissions (LE_y) will be a summation of LE_{TRy} and LE_{ENy}.

$$LE_y = LE_{TRy} + LE_{ENy} \qquad (6)$$

Where:

LE_y	Total leakage emissions
LE_{TRy}	Leakage emissions from incremental transportation of alternative cementitious material(s) and/or water reducing admixtures
LE_{ENy}	Emissions related to energy use in the processing of the alternative cementitious material(s) and/or water reducing admixtures.

Monitoring

18. The monitoring shall include identifying during each year of the crediting period, the cement producing plants that would have provided cement to the concrete mix preparation location(s)/ site(s).

19. In addition, it shall include all parameters required for baseline estimation as detailed in paragraph 12 i.e. $BL_{CEM,i}$, $Q_{conc,I,y}$, $EF_{CEM,j,y}$, $Q_{CEM,j,y}$ and $P_{CEM,,i}$, $EF_{CEM,y}$, BE_y, PE_y and LE_y.

20. The use of alternative cementitious materials and/or water reducing admixtures should be verified.

21. The emission reduction shall be calculated using the following equation:

$$ER_y = BE_y – PE_y - LE_y \qquad (7)$$

ER_y	Emission reduction in the year "y" (tCO_2e)

Project activity under a programme of activities

22. The following conditions apply for use of this methodology in a project activity under a programme of activities:

23. In case the project activity involves the replacement of equipment, and the leakage effect of the use of the replaced equipment in another activity is neglected, because the replaced equipment is scrapped, an independent monitoring of scrapping of replaced equipment needs to be implemented. The monitoring should include a check if the number of project activity equipment distributed by the project and the number of scrapped equipment correspond with each other. For this purpose scrapped equipment should be stored until such correspondence has been checked. The scrapping of replaced equipment should be documented and independently verified.