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

TYPE III - OTHER PROJECT ACTIVITIES

Project participants shall apply the general guidelines to the SSC CDM methodologies, information on additionality, abbreviations and general guidance on leakage provided at: <http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html> *mutatis mutandis*.

III.AN Fossil fuel switch in existing manufacturing industries

Technology/measure

1. The methodology is applicable to project activities that involve switching from a fossil fuel to either: (a) A lower carbon content fossil fuel; or (b) A lower carbon intensive electric grid energy source[1] in existing manufacturing industries. Applicable projects may also result in improved energy efficiency. However, this methodology does not provide any emissions reduction credits for energy efficiency improvement.

2. The methodology is applicable if the following requirements are met:

   (a) The baseline fossil fuel and the project low carbon energy source are consumed in thermal energy conversion equipment (e.g. furnaces, kilns, dryers) that are used in the manufacture of products[2] (e.g. steel, ceramics, aluminium). This is referred to as an element process[3] in this methodology;

   (b) Fossil fuel switch may be implemented for multiple element processes within the industrial facility, where the project is implemented. However, switching multiple fossil fuels in (single) element process is not applicable under this methodology;

   (c) The baseline is the continued use of existing system and where the system must have been in operation for at least the immediately prior three years to the start date of the project activity. This requirement is in order to ensure that adequate baseline performance data are available;

   (d) Regulations do not require the use of project low carbon energy source (e.g. natural gas, electricity or any other fuel) or restrict the use of the baseline fuel;

   (e) Each element process should have a distinct energy input (i.e. specific fuel or electricity) and distinct output (i.e. intermediate or finished product). The output of each element process shall be an output for which an appropriate international/national standard or industrial norm exists;

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[1] Within the methodology, the term fuel switching refers to projects that involve switching from either a fossil fuel to a lower carbon content fossil fuel or a lower carbon intensive electric grid referred to as a low carbon energy source.

[2] The fuel switch in manufacture of bricks is not covered by the methodology. The project proponents shall explore applying AMS-III.Z.

[3] An element process is a process, with associated equipment, in which an energy source (e.g. fuel or electricity) is used for production purposes to convert raw materials into intermediate or finished product using heat.

(f) The product(s) (e.g. ceramic insulators, tiles, steel ingots, aluminium cookware) produced in the industrial facility throughout the crediting period shall be equivalent to the product(s) produced in the baseline. For the purposes of this methodology, equivalent products are defined as products having the same use, the same general physical properties, and which function in a similar manner. In addition, products produced in the industrial facility throughout the crediting period shall provide the same level of service, or better, and be of the same level of quality, or better than the product(s) produced in the baseline. When national or international product standards apply to the product(s), product quality shall be as defined in such standards, otherwise the relevant industrial norms are to be followed;

(g) The type of input materials used in the project shall be homogeneous and similar to the input material that was used in the baseline and any deviation during the crediting period of input material type, composition, or amount used per unit of product output shall be within the range of +/- 10% of the baseline characteristics and values;

(h) For each element process, the ratio of energy input to product output in the project activity shall be equal to or less than the ratio of energy input to product output in the baseline.

3. This methodology is not applicable to:

(a) Project activities that propose switch from fossil fuel use in the baseline to renewable biomass, biofuel or other renewable energy;

(b) Switching from a carbon intensive electricity grid to a low carbon intensive grid for industrial processes;[4]

(c) Situations in which, whether as a result of the project activity or not, there are changes during the project implementation or during the crediting period, either in the elemental process associated with the project activity or other down stream or upstream processes related to the project elemental processes. The purpose is to exclude complex project activities where the impact of the measures implemented (fossil fuel switch) by the project activity can not be clearly distinguished from changes in energy use due to other variables not influenced by the project activity (signal to noise ratio);

(d) Project activities involving the use of waste gas or energy.

4. In case the fuel switch project involves more than one element process, the historical data used for the baseline emission determination and the project activity monitoring will be based on the fuel use and output of each element process separately.

[4] Cases involving shift from high carbon intensive grid to low carbon fossil fuel may be submitted through the request for revision.

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5. The requirements concerning demonstration of the remaining lifetime of any baseline equipment that is replaced equipment shall be as described in the "General Guidelines to SSC CDM methodologies". If the remaining lifetime of the element processes increases due to the project activity, the crediting period shall be limited to the estimated remaining lifetime of the baseline equipment, i.e. the time when the affected element processes would have been replaced in the absence of the project activity.

6. It can be demonstrated that the difference between the specific energy consumption of the fuel handling and other auxiliary systems of the project system is less than, or equal to, or not significantly higher than the baseline facility's specific energy consumption for fuel handling and other auxiliary systems (within the variation of 10% on annual basis, i.e. project auxiliary energy consumption per project output is no more than 110% of baseline auxiliary energy consumption per baseline output). Specific energy consumption is energy input of the auxiliary system per unit product output.

7. In cases where product output (e.g. hot/fused metal) cannot be measured, the input material used in the element process can be used as a proxy for determining baseline/project emissions.

8. Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO_2 equivalent annually.

Boundary

9. The project boundary is the physical, geographical site where the switching of energy source takes place. It includes all installations, processes or equipment affected by the switching.

Baseline Emissions

10. The baseline emissions are the historic fossil fuel consumption related emissions associated with the element processes, affected by the project activity that would continue to occur in the absence of the project activity.

The baseline fuel consumption ($FC_{FF,BL,i}$), product output ($P_{BL,i}$) and/or input material ($I_{BL,i}$) as relevant shall be available for the immediate three years prior to the start date of validation for the purpose of baseline emissions calculation. For element processes operating for less than three years, all historical data shall be available (a minimum of one year data would be required).

11. The baseline emissions are calculated as below:

$$BE_y = \sum_i \{SEF_{BL,i} * P_{PJ,i,y}\} \quad \textbf{(1)}$$

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Where:

BE_y	The annual baseline emissions from fossil fuel displaced by the project activity in tCO_2e in year *y* (tCO_2e/year)
$SEF_{BL,i}$	Specific baseline emission factor for the element process *i* (tCO_2e/tonne)
$P_{PJ,i,y}$	The annual net production of the element process *i* in year *y* (tonnes)

12. The specific baseline emission factor ($SEF_{BL,i}$) shall be calculated as the minimum of the *ex ante* ($SEF_{CO2,BL,i\ (ex\text{-}ante)}$) and *ex post* ($SEF_{CO2,BL,i\ (ex\text{-}post)}$) values determined as per the equations 3 and 4 below.

$$SEF_{BL,i} = MIN\ \{SEF_{CO2,BL,i(ex-ante)}; SEF_{CO2,BL,i(ex-post)}\} \quad \textbf{(2)}$$

The $SEF_{CO2,BL,i\ (ex\text{-}ante)}$ and $SEF_{CO2,BL,i\ (ex\text{-}post)}$ are calculated as follows:

$$SEF_{CO2,BL,i(ex-ante)} = (FC_{FF,BL,i} * NCV_{FF,BL} * EF_{FF,CO2,BL}) / P_{BL,i} \quad \textbf{(3)}$$

$$SEF_{CO2,BL,i(ex-post)} = (FC_{FF,PJ,i,y} * NCV_{FF,PJ} * EF_{FF,CO2,BL}) / P_{PJ,i,y} \quad \textbf{(4)}$$

Where:

$FC_{FF,BL,i}$	Baseline fossil fuel consumption in element process *i* (mass or volume units)
$NCV_{FF,BL}$	Net calorific value[5] for the baseline fossil fuel (MJ per unit mass or volume)
$EF_{FF,CO2,BL}$	CO_2 emission factor[5] of the baseline fossil fuel
$P_{BL,i}$	Baseline production in element process *i* (tonnes)
$FC_{FF,PJ,i,y}$	Fossil fuel consumption in element process *i* during the year *y* (mass or volume units)

[5] For the determination of emission factors and net calorific values, the 2006 IPCC Guidelines for National Greenhouse Gas Inventories shall be followed where appropriate. Project participants may either conduct measurements or they may use accurate and reliable local or national data where available. In the case of coal, the data shall be based on test results for periodic samples of the coal purchased if such tests are part of the normal practice for coal purchases. Where such data is not available, IPCC default emission factors (country-specific, if available) may be used if they are deemed to reasonably represent local circumstances. All values shall be chosen in a conservative manner (i.e. lower values for the baseline and higher values for the project should be chosen within a plausible range) and the choice shall be justified and documented in the SSC CDM-PDD. Where measurements are undertaken, project participants shall document the measurement results and the calculated average values of the emission factor or net calorific value for the ex ante determination of the baseline emissions.

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$NCV_{FF,PJ}$	Net calorific value for the fossil fuel during the year *y*. (MJ/mass or volume)
$P_{PJ,i,y}$	Production during the year *y* in element process *i* (tonnes)

13. Where it can be demonstrated that the product output cannot be directly measured as per paragraph 7, the $P_{PJ,i,y}$ shall be substituted with input material $I_{PJ,i,y}$ and $P_{BL,i}$ shall be substituted with input material $I_{BL,i}$.

Project Emissions

14. Project emissions due to consumption of fossil fuels and grid electricity can be calculated as follows:

$$PE_y = \sum_i \{(FC_{FF,i,y} * NCV_{FF,PJ} * EF_{FF,CO2,PJ}) + [EC_{elec,i,y} * (1 + TD_y) * EF_{Elec,CO2,y}]\} \quad (5)$$

Where:

PE_y	Project emissions in the project activity in year *y* in tCO_{2e}
$FC_{FF,i,y}$	Amount of the fossil fuel consumed in element process *i* in the project activity in year *y* (mass or volume unit)
$EF_{FF,CO2,PJ}$	CO_2 emission factor for the fossil fuel (tCO_2/MJ)
$EC_{elec,i,y}$	Quantity of grid electricity consumed by the project activity in element process *i* in year *y* (MWh)
TD_y	Average annual technical grid losses (transmission and distribution) during year *y* for the grid serving the facility (fraction)
$EF_{Elec,CO2,y}$	Emission factor of grid electricity in year *y* calculated in accordance with the provisions in AMS-I.D (tCO_2/MWh)

Leakage

15. If the energy generating equipment is transferred from another activity, leakage is to be considered.

Emission reductions

16. Emission reductions in year y (ER_y) are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad (6)$$

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Where:

PE_y Project emissions in year y (t CO_2/y)

LE_y Leakage emissions in year y (t CO_2/y)

Monitoring

17. Monitoring shall include the compliance of the performance level of the product to the appropriate national/international standard or industrial norms shall be proven by one of the following options:

(a) The project proponent shall have a quality management system to ensure the performance level of the product. The scope of quality management system shall cover all processes, materials and skills required to manufacture products which meet the national or international standard or relevant industrial norms. The documentation of the quality management system shall be made available to the DOE for validation and verification;

(b) The DOE shall conduct a site check of the testing facilities and procedures implemented to ensure the performance level of the product;

(c) The products shall be tested in nationally approved laboratories and test certificates on the performance level of the products shall be made available for verification.

18. Relevant parameters shall be monitored as indicated in the Table 1 below. The applicable requirements specified in the "General guidelines to SSC CDM Methodologies" (e.g. calibration requirements, sampling requirements) are also an integral part of the monitoring guidelines specified below and therefore shall be referred by the project participants.

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Table 1: Parameters to be monitored

No.	Parameter	Description	Unit	Monitoring/recording Frequency	Measurement Methods and Procedures
1.	$I_{PJ,i,y}$	The annual net project raw material consumption in the element process *i* in year *y*	tonnes/year	As per the established industrial practice	Raw material shall be weighed using calibrated scales or other measuring equipment before entering the processing facility (e.g. reheating furnace). Measurement results shall be cross checked with records for purchased raw materials (e.g. invoices/receipts), inventory records and by performing a mass-balance.
2.	$P_{PJ.i,y}$	The annual net project production of the element process *i* in year *y*	tonnes/year	As per the established industrial practice	Measurements are undertaken using calibrated meters. Measurement results shall be cross checked with records for sold production (e.g. invoices/receipts), inventory records and by performing mass-balance.
3.	$EF_{FF,CO2,PJ}$	CO2 emission factor for the fossil fuel	tCO_2e/MJ	As per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion"	As per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion"
4.	$EF_{ELEC,CO2,y}$	CO_2 emission factor of the grid electricity in year *y*	tCO_2e/kWh	Annually	As per the provisions of AMS-I.D
5.	$FC_{FF,i,y}$	Quantity of fossil fuel combusted in year *y*	Mass or volume unit	As per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"	As per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"

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No.	Parameter	Description	Unit	Monitoring/recording Frequency	Measurement Methods and Procedures
6.	$EC_{eler,i,y}$	Quantity of grid electricity consumed in year *y*	MWh/y	Continuous monitoring, integrated hourly and at least monthly recording	Measurements are undertaken using calibrated energy meters
7.	$NCV_{FF,PJ}$	Net calorific value of fossil fuel	MJ/mass or volume unit	Annually	As per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion"
8.	TD_y	Average annual technical grid losses (transmission and distribution) during year y for the grid	fraction	Annually	This value shall be determined in accordance with the procedures described in the most recent version of AMS-II.J

Project activity under a programme of activities

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

19. Leakage emissions resulting from fuel extraction, processing, liquefaction, transportation, re-gasification and distribution of fossil fuels outside of the project boundary shall be considered, as per the guidance provided in the leakage section of ACM0009. In case leakage emissions in the baseline situation are higher than leakage emissions in the project situation, leakage emissions will be set to zero.

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History of the document

Version	Date	Nature of revision
01	EB 56, Annex # 17 September 2010	To be considered at EB 56.
Decision Class: Regulatory **Document Type**: Standard **Business Function**: Methodology		