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

TYPE III – OTHER PROJECT TYPES

Project participants shall apply the general guidelines for SSC CDM methodologies, information on additionality (attachment A to appendix B) and general guidance on leakage in biomass project activities (attachment C to appendix B) provided at <http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html> *mutatis mutandis*.

III.Z. Fuel Switch, process improvement and energy efficiency in brick manufacture

Technology/measure

1. The methodology comprises one or more technology/measures listed below in brick[1] production facilities:

- Shift to an alternative brick production technology/process; or
- Complete/Partial substitution of fossil fuels with renewable biomass[2] (including solid biomass residues such as sawdust and food industry organic liquid residues);[3] or
- Complete/partial substitution of high carbon fossil fuels with low carbon fossil fuels.[4]

2. Complete or partial fuel substitution and associated activities may also result in improved energy efficiency of existing facility; however project activities primarily aimed at emission reductions from energy efficiency measures shall apply AMS-II.D "Energy efficiency and fuel switching measures for industrial facilities". Thus, the methodology is applicable for the production of:

(a) Bricks that are the same in the project and baseline cases; or

(b) Bricks that are different in the project case versus the baseline case due to a change(s) in raw materials, use of different additives, and/or production process changes resulting in reduced use or avoidance of fossil fuels for forming, sintering (firing) or drying or other applications in the facility as long as it can be demonstrated that the service level of the project brick is comparable to that of the baseline brick (see paragraph 11). Examples include pressed mud blocks (soil

[1] Brick in the context of this methodology includes solid bricks and blocks as well as hollow blocks used in building construction.

[2] As per annex 18, EB 23.

[3] Fatty acids from oil extraction, waste oil and waste fat of biogenic origin (includes waste oil from restaurants, agro and food industry, slaughterhouses or related commercial sectors). The sources/origin of waste oil/fat and respective volumes must be identified and clearly documented in the PDD. No CERs from waste oil/fat can be claimed under this methodology if it is not produced from biogenic origin, biogenic shall mean the oils and/or fats originate from either vegetable or animal biomass, but not from mineral (fossil) sources.

[4] For example from anthracite coal to natural gas.

blocks) with cement or lime stabilization[5] and other 'unburned' bricks that attain strength due to fly ash, lime/cement and gypsum chemistry.

3. The measures may replace, modify, retrofit[6] ~~systems~~ or add capacity to systems in existing facilities or be installed in a new facility.

4. New facilities (Greenfield projects) and project activities involving capacity additions are only eligible if they comply with the requirements for Greenfield projects and capacity increase projects specified in the "General Guidelines for SSC CDM methodologies".

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

6. For existing facilities, -it shall be demonstrated, with historical data, that for at least three years immediately prior to the start date of the project implementation, only fossil fuels (no renewable biomass) were used in the brick production systems that are being modified or retrofitted. In cases where small quantities of biomass were used for experimental purposes this can be excluded.

7. The renewable biomass utilized by the project activity shall not be chemically processed (e.g. esterification to produce biodiesel, degumming and/or neutralization by chemical reagents) prior to the combustion but it may be processed mechanically (e.g. pressing, filtering)/thermally (e.g. gasification to produce syngas).[7]

8. In cases where the project activity uses crops from renewable biomass origin as fuel, the crops should be cultivated at dedicated plantations and the following conditions shall be met:

(a) The project activity does not lead to a shift of pre-project activities outside the project boundary, i.e. the land under the proposed project activity can continue to provide at least the same amount of goods and services as it would in the absence of the project;

(b) The plantations are established on land that:

(i) Was classified as degraded or degrading at the start of the project implementation, as per the "Tool for the identification of degraded or

[5] May involve mechanical and hydraulic systems for energy transmission to the soil block via a lever, toggle, cam, pivot, ball and socket joint, piston, etc.

[6] For example to, replace and/or modify an existing heating and/or firing facility(/-ies) to enable the use of biomass residues.

[7] The syngas shall be derived from gasification of renewable biomass only and no methane emissions are to be released to the atmosphere, thus demonstrating the complete use for combustion of the syngas in the project equipment.

degrading lands for consideration in implementing CDM A/R project activities"; or

(ii) Is included in the project boundary of one or several registered A/R CDM project activities;

(c) Plantations established on peatlands are not eligible even if qualifying under condition (i) or (ii) above.

9. In cases where the project activity utilizes charcoal produced from renewable biomass as fuel, the methodology is applicable provided that:

(a) Charcoal is produced in kilns equipped with a methane recovery and destruction facility; or

(b) If charcoal is produced in kilns not equipped with a methane recovery and destruction facility, methane emissions from the production of charcoal shall be considered.

10. In the case of project activities involving changes in raw materials (including additives), it shall be demonstrated that additive materials are abundant in the country/region, according to the following procedures:

Step 1: using relevant literature and/or interviews with experts, a list of raw materials to be utilized is prepared based on the historic and/or present consumption of such raw materials.

Step 2: the current supply situation for each type of raw material to be utilized is assessed and their surplus availability is demonstrated using one of the approaches below:

- Approach 1: demonstrate that the raw materials to be utilized, in the region of the project activity, are not fully utilized. For this purpose, demonstrate that the quantity of material is at least 25% greater than the demand for such materials or the availability of alternative materials for at least one year prior to the project implementation;

- Approach 2: demonstrate that suppliers of the raw materials to be utilized, in the region of the project activity, are not able to sell all of their supply of these materials. For this purpose, project participants shall demonstrate that a representative sample of suppliers of the raw materials to be utilized, in the region, had a surplus of materials (e.g. at the end of the period during which the raw material is sold) that they could not sell and that is not utilized.

11. This methodology is applicable under the following conditions:

(a) The service level of project brick shall be comparable to or better than the baseline brick, i.e. the bricks produced in the brick production facility during the crediting period shall meet or exceed the performance level of the baseline bricks (in terms of, for example dry compressive strength, wet compressive strength, density). An appropriate national standard shall be used to identify the strength class of the

bricks; bricks that have compressive strengths lower than the lowest class bricks in the standard are not eligible under this methodology. Project bricks are tested in nationally approved laboratories at six-month intervals (at a minimum) and test certificates on compressive strength are made available for verification;

(b) The existing facilities involving modification and/or replacement shall not influence the production capacity beyond ±10% of the baseline capacity unless it is demonstrated that the baseline for the added capacity is the same as that for the existing capacity in accordance with paragraph 4 above;

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

12. This methodology is not applicable if local regulations require the use of the proposed technologies or raw materials for the manufacturing of bricks unless widespread non compliance (i.e. less than 50% of brick production activities in the country comply) of the local regulation evidenced.

Boundary

13. The project boundary is the physical, geographical site where the brick production takes place during both the baseline and crediting periods. It also includes all installations, processes or equipment affected by the switching. In cases where the renewable biomass is sourced from dedicated plantations it also includes the area of the plantations. In cases involving thermo-mechanical processing of the biomass (e.g. charcoal; briquettes; syngas) the sites where these processes are carried out shall be within the project boundary.

Baseline

14. The baseline emissions are the fossil fuel consumption related emissions (fossil fuel consumed multiplied by an emissions factor) associated with the system(s), which were or would have otherwise been used, in the brick production facility(ies) in the absence of the project activity.

(a) For projects that involve replacing, modifying or retrofitting systems in existing facilities, the average of the immediately prior three-year historical fossil fuel consumption data, for the existing facility, shall be used to determine an average annual baseline fossil fuel consumption value. Similarly, prior three-year historical production data (excluding abnormal years) for the existing facility, shall be used to determine an average annual historical baseline brick production rate in units of weight or volume. For calculating the emission factor for fossil fuel, reliable local or national data shall be used. IPCC default values shall be used only when country or project specific data are not available or demonstrably difficult to obtain;

(b) For projects involving the installation of systems in a new facility or a capacity addition in an existing system, the average annual baseline fossil fuel consumption value and the baseline brick production rate shall be determined as that which would have been consumed and produced, respectively, under an appropriate

baseline scenario. If the baseline scenario identification as per paragraph 4 above results in more than one alternative technologies with different levels of energy consumption, the alternative with the least emissions intensity should be chosen for determining the baseline emissions of the facility.

15. The emissions are calculated as below:

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

Where:

BE_y	The annual baseline emissions from fossil fuels displaced by the project activity in t CO_2e in year *y* (of the crediting period)
EF_{BL}	The annual production specific emission factor for year *y*, in tCO_2/kg or m^3
$P_{PJ,y}$	The annual net production of the facility in year *y*, in kg or m^3

16. The annual production specific emission factor EF_{BL} shall be calculated ex ante for project activities that involve replacing, modifying or retrofitting systems in existing facilities as follows:

$$EF_{BL} = \sum_{j,i} (FC_{BL,i,j} * NCV_j * EF_{CO_2,j}) \div P_{Hy} \quad \textbf{(2)}$$

Where:

$FC_{BL,i,j}$	Average annual baseline fossil fuel consumption value for fuel type *j* combusted in the process *i*, using volume or weight units[8]
NCV_j	Average net calorific value of fuel type *j* combusted, TJ per unit volume or mass unit
$EF_{CO2,j}$	CO_2 emission factor of fuel type *j* combusted in the process *i* in tCO_2/TJ
P_{Hy}	Average annual historical baseline brick production rate in accordance with paragraph 14(a), in units of weight or volume, kg or m^3

17. Annual production specific emission factor (EF_{BL}) for installation of systems in a new facility or for capacity addition in an existing system shall be determined using one of the options below:

(a) Using manufacturers' specifications such as for brick production rate, energy consumption in the process;

[8] Volume or weight units will be used depending on which best defines the fuel consumption requirements of the brick making process(es).

(b) Using specifications of comparable units having similar techno-economic parameters;

(c) Using reference plant approach.[9]

Leakage

18. Leakage emissions on account of the diversion of biomass from other uses (competing uses) shall be calculated as per "General guidance on leakage in biomass project activities".

19. In the case of project activities involving a change in the production process or a change in the type or quantity of raw and/or additive materials as compared to the baseline, the incremental emissions associated with the production/consumption and transport of those raw and/or additive materials consumed as compared to baseline, shall be calculated as leakage.

Project activity emissions

20. The project emissions should be calculated as follows:

$$\mathrm{PE}_{\mathrm{y}} = PE_{elec,y} + PE_{fossilfuel,y} + PE_{transport,y} + PE_{cultivation,y} + PE_{CH4,y} \quad \textbf{(3)}$$

Where:

PE_y	Project emissions in year y (tCO_2)
$PE_{elec,y}$	Project emissions due to electricity consumption in year y (tCO_2)
$PE_{fossilfuel,y}$	Project emissions due to fossil fuel consumption in year y (tCO_2)
$PE_{transport,y}$	Project emissions from transportation of the renewable biomass from the places of their origin to the manufacturing facility site in year y (tCO_2)
$PE_{cultivation,y}$	Project emissions from renewable biomass cultivation in year y (tCO_2e)
$PE_{CH4,y}$	Project emissions due to the production of charcoal in kilns not equipped with a methane recovery and destruction facility in year y (tCO_2e)

Calculation of $PE_{elec,y}$

21. The emissions include electricity consumption (including auxiliary use) $PE_{elec,y}$ associated with the biomass treatment and processing, calculated as per the tool "Tool to calculate baseline, project and/or leakage emissions from electricity consumption".

[9] This shall be consistent with the definition of "baseline reference plant approach" provided in the approved small-scale methodologies such as AMS-II.H.

Calculation of $PE_{fossilfuel,y}$

22. The emissions include fossil fuel consumption (including auxiliary use) $PE_{fossilfuel,y}$ associated with the operation of the manufacturing process and the biomass treatment and processing, calculated as per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".

Calculation of $PE_{transport,y}$

23. Project emissions from the transportation of the renewable biomass from its source to the manufacturing production site shall be accounted for following the procedures in AMS-III.AK "Biodiesel production and use for transport applications" if the transportation distance is more than 200 km, otherwise they can be neglected.

Calculation of $PE_{cultivation,y}$

24. In cases where the project activity utilizes biomass sourced from dedicated plantations, the project emissions from renewable biomass cultivation shall be calculated as per the relevant provisions of AMS-III.AK "Biodiesel production and use for transport applications".

Calculation of $PE_{CH4,y}$

25. The project methane emissions from the charcoal produced in kilns not equipped with a methane recovery and destruction facility and methane emissions from the production of charcoal shall be accounted for as per the relevant procedures of AMS-III.K "Avoidance of methane release from charcoal production by shifting from traditional open-ended methods to mechanized charcoaling process". Alternatively, conservative emission factor values from peer reviewed literature or from a registered CDM project activity can be used, provided that it can be demonstrated that the parameters from these are comparable, e.g. the source of biomass, characteristics of biomass such as moisture, carbon content, type of kiln and operating conditions such as ambient temperature.

Emission reductions

26. Emission reductions (ER_y) achieved by the project activity will be calculated as the difference between the baseline emissions and the sum of project emissions and leakage as follows:

$$ER_y = BE_y - PE_y - Leakage \quad \textbf{(4)}$$

Where:

ER_y	Emission reductions in year y (tCO_2e/yr)
BE_y	Baseline emissions in year y (tCO_2e/yr)

PE_y Project emissions in year y (tCO_2/yr)

LE_y Leakage emissions in year y (tCO_2/yr)

Monitoring

27. The applicable requirements specified in the "General Guidelines for SSC CDM methodologies" and the "Standard on sampling and surveys for CDM project activities and PoAs" are also an integral part of the monitoring guidelines specified below and therefore shall be referred to by the project participant.

28. Monitoring during the crediting period shall include:

(a) Production output (kg or m^3 per day);

(b) Principal raw and additive material purchases on monthly basis;

(c) Tests to validate that the project bricks meet the performance requirements and specifications at six-month intervals;

(d) Project emissions associated with the electricity use shall be monitored as per the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption";

(e) Project emissions due to the fossil fuels consumption shall be monitored as per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion";

(f) Daily consumption of biomass of the production facility. Each type of solid/liquid biomass shall be monitored separately. Cross-checking with purchase invoice, delivery notes and the stock is required;

(g) In order to assess the compliance with the applicability conditions concerning organic liquid residues as defined in footnote 3, monitoring shall include data on the origin of organic residue liquids;

(h) The calorific value of each fossil fuel type and the density, mass fraction and carbon content of each biomass fuel type used;

(i) Parameters for determining project emissions from renewable biomass cultivation and from transportation of renewable biomass over distances of 200 km shall be monitored as per the relevant provisions of AMS-III.AK;

(j) Parameters for determining methane emissions from the charcoal produced in kilns not equipped with a methane recovery and destruction facility shall be monitored as per the relevant procedures of AMS-III.K.

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III.Z. Fuel Switch, process improvement and energy efficiency in brick manufacture (cont)

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:

29. 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 "Consolidated baseline and monitoring methodology for fuel switching from coal or petroleum fuel to natural gas". If leakage emissions in the baseline scenario are higher than leakage emissions in the project scenario, leakage emissions may be set to zero.

30. In the specific case of biomass project activities, the multiple types of biomass, i.e. biomass residues and biomass from dedicated plantations can be used for a PoA, provided all the other requirements in the methodology such as: (a) leakage emissions in case of biomass residues following the general guidance for leakage in small-scale biomass project activities (attachment C of appendix B;[10] and (b) consistency with AM0042 "Grid-connected electricity generation using biomass from newly developed dedicated plantations" are satisfied.

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History of the document

Version	Date	Nature of revision(s)
04.0	11 May 2012	EB 67, Annex 21 To expand its applicability for a complete switch from fossil fuel to renewable biomass and provide further guidelines to determine baseline emissions for Greenfield and capacity-addition project activity.
03	EB 54, Annex 10 28 May 2010	To include project activities involving complete/partial substitution of high carbon fossil fuels with low carbon fossil fuels.
02	EB 47, Annex 25 28 May 2009	To simplify the requirements to establish the comparability level of service (e.g. comparability of compressive strength) of baseline bricks and the project bricks.
01	EB 46, Annex 20 25 March 2009	Initial adoption.
Decision Class: Regulatory **Document Type**: Standard **Business Function**: Methodology		

[10] Available on <http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html>.