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TYPE II - ENERGY EFFICIENCY IMPROVEMENT PROJECTS

Project participants shall apply the general guidelines to 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*. ~~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.~~

II.G. Energy efficiency measures in thermal applications of non-renewable biomass

Technology/measure

1. This category comprises appliances involving the efficiency improvements in the thermal applications of non-renewable biomass. Examples of these technologies and measures include the introduction of high efficiency[1] biomass fired cook stoves[2] or ovens or dryers and/or improvement of energy efficiency of existing biomass fired cook stoves or ovens or dryers.

~~2. If any similar registered CDM project activities exist in the same region as the proposed project activity then it must be ensured that the proposed project activity is not saving the non-renewable biomass accounted for by the already registered project activities.~~

2. Project participants are able to show that non-renewable biomass has been used since 31 December 1989, using survey methods or referring to published literature, official reports or statistics.

Boundary

3. The project boundary is the physical, geographical site of the efficient systems using biomass.

Baseline

4. It is assumed that in the absence of the project activity, the baseline scenario would be the use of fossil fuels for meeting similar thermal energy needs.

5. Emission reductions would be calculated as:

$$ER_y = B_{y,savings} * f_{NRB,y} * NCV_{biomass} * EF_{projected\_fossilfuel} \quad \textbf{(1)}$$

[1] The efficiency of the project systems as certified by a national standards body or an appropriate certifying agent recognized by it. Alternatively manufacturers' specifications may be used.

[2] Single pot or multi pot portable or in situ cook stoves with specified efficiency of at least 20%.

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II.G. Energy efficiency measures in thermal applications of non-renewable biomass (cont)

Where:

ER_y	Emission reductions during the year y in tCO_2e
$B_{y,savings}$	Quantity of woody biomass that is saved in tonnes
$f_{NRB,y}$	Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass
$NCV_{biomass}$	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne)
$EF_{projected\_fossilfuel}$	Emission factor for the substitution of non-renewable woody biomass by similar consumers ~~The substitution fuel likely to be used by similar consumers is taken: 71.5 tCO_2/TJ for Kerosene, 63.0 tCO_2/TJ for Liquefied Petroleum Gas (LPG) or the IPCC default value of other relevant fuel~~ Use a value of 81.6 tCO_2/TJ [3]

6. $B_{y,savings}$ is estimated using one the following methods:

Option 1:

$$B_{y,savings} = B_{old} - B_{y,new} \quad \textbf{(2)}$$

Where:

B_{old}	Quantity of woody biomass used in the absence of the project activity in tonnes
$B_{y,new}$	Annual quantity of woody biomass used during the project activity in tonnes, measured as per the Kitchen Performance Test (KPT) protocol. The KPT should be carried out in accordance with national standards (if available) or international standards or guidelines (e.g. the KPT procedures specified by the Partnership for Clean Indoor Air (PCIA) <http://www.pciaonline.org/node/1049)>

Option 2:

$$B_{y,savings} = B_{old} \cdot (1 - \frac{\eta_{old}}{\eta_{new}}) \quad \textbf{(3)}$$

[3] This value represents the emission factor of the substitution fuels likely to be used by similar users, on a weighted average basis. It is assumed that the mix of present and future fuels used would consist of a solid fossil fuel (lowest in the ladder of fuel choices), a liquid fossil fuel (represents a progression over solid fuel in the ladder of fuel use choices) and a gaseous fuel (represents a progression over liquid fuel in the ladder of fuel use choices). Thus a 50% weight is assigned to coal as the alternative solid fossil fuel (96 tCO_2/TJ) and a 25% weight is assigned to both liquid and gaseous fuels (71.5 tCO_2/TJ for Kerosene and 63.0 tCO_2/TJ for Liquefied Petroleum Gas (LPG).

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II.G. Energy efficiency measures in thermal applications of non-renewable biomass (cont)

Where:

$B_{y,old}$ Quantity of woody biomass used in the absence of the project activity in tonnes

η_{old}

1. Efficiency of the system being replaced, measured using representative sampling methods or based on referenced literature values (fraction), use weighted average values if more than one type of systems are is being encountered replaced;
2. A default value of 0.10 default value may be optionally used if the replaced system is the a three stone fire, or a conventional system lacking with no improved combustion air supply mechanism and or flue gas ventilation system, i.e. without a grate or as well as a chimney; for other types of the rest of the systems a default value of 0.2 default value may be optionally used

η_{new} Efficiency of the system being deployed as part of the project activity (fraction), as determined using the Water Boiling Test (WBT) protocol. Use weighted average values if more than one type of system is being introduced by the project activity

Option 3:

$$B_{y,savings} = B_{old} * (1 - \frac{SC_{new}}{SC_{old}}) \quad \textbf{(4)}$$

Where:

SC_{old} Specific fuel consumption or fuel consumption rate[4] of the baseline system/s i.e. fuel consumption per quantity of item/s processed (e.g. food cooked) or fuel consumption per hour, respectively. Use weighted average values if more than one type of system is being replaced

SC_{new} Specific fuel consumption or the fuel consumption rate of the system/s deployed as part of the project i.e. fuel consumption per quantity of item/s processed (e.g. food cooked) or fuel consumption per hour respectively. Use weighted average values if more than one type of system is being introduced by the project activity

7. $B_{y,old}$ is determined by using one of the two following two options:

   (a) Calculated as the product of the number of appliances systems multiplied by the estimated of average annual consumption of woody biomass per appliance (tonnes/year). This can be derived from historical data or a survey of local usage,

[4] Specific fuel Consumption or fuel consumption rate are to be determined using the Controlled Cooking Test (CCT) protocol carried out in accordance with national standards (if available) or international standards or guidelines (e.g. the CCT procedures specified by the Partnership for Clean Indoor Air (PCIA) <http://www.pciaonline.org/node/1050>).

OR

(b) Calculated from the thermal energy generated in the project activity as:

$$B_{old} = \frac{HG_{p,y}}{NCV_{biomass} * \eta_{old}} \quad \textbf{(5)}$$

Where:

$HG_{p,y}$ Amount of thermal energy generated by the ~~new~~ project technology ~~in the project~~ in year y (TJ)

Differentiation between non-renewable and renewable woody biomass

8. Project participants shall determine the shares of renewable and non-renewable woody biomass in $B_{~~y~~ old}$ (the quantity of woody biomass used in the absence of the project activity) the total biomass consumption using nationally approved methods (e.g. surveys or government data if available) and then determine $f_{NRB,y}$ as described below. The following principles shall be taken into account:

Demonstrably renewable woody biomass[5] (DRB)

9. Woody[6] biomass is "renewable" if ~~any~~ one of the following two conditions is satisfied:

I. The woody biomass is originating from land areas that are forests[7] where:

(a) The land area remains a forest; and

(b) Sustainable management practices are undertaken on these land areas to ensure, in particular, that the level of carbon stocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting); and

(c) Any national or regional forestry and nature conservation regulations are complied with.

II. The biomass is woody biomass and originates from non-forest areas (e.g., croplands, grasslands) where:

(a) The land area remains as non-forest or is reverted to forest; and

(b) Sustainable management practices are undertaken on these land areas to ensure in particular that the level of carbon stocks on these land areas does

[5] This definition uses elements of annex 18, EB 23.

[6] In cases of charcoal produced from woody biomass, the demonstration of renewability shall be done for the areas where the woody biomass is sourced.

[7] The forest definitions as established by the country in accordance with the decisions 11/CP.7 and 19/CP.9 should apply.

not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting); and

(c) Any national or regional forestry, agriculture and nature conservation regulations are complied with.

Non-renewable biomass:

10. Non-renewable woody biomass (*NRB*) is the quantity of woody biomass used in the absence of the project activity ($B_{y\ old}$) minus the *DRB* component, ~~so~~ as long as at least two of the following supporting indicators are shown to exist:

- A ~~T~~ trend showing an increase in time spent or distance travelled for gathering fuel-wood, by users (or fuel-wood suppliers) ~~for gathering fuel wood~~, or alternatively, a trend showing an increase in the ~~transportation~~ distance~~s for~~ the fuel-wood is transported ~~in~~to the project area;
- Survey results, national or local statistics, studies, maps or other sources of information, such as remote-sensing data, that show that carbon stocks are depleting in the project area;
- Increasing trends in fuel wood prices indicating a scarcity of fuel-wood;
- Trends in the types of cooking fuel collected by users that ~~suggesting~~ indicate a scarcity of woody biomass.

11. Thus the fraction of woody biomass saved by the project activity in year *y* that can be established as non-renewable is:

$$f_{NRB,y} = \frac{NRB}{NRB + DRB} \quad \textbf{(6)}$$

12. Project participants shall also provide evidence that the trends ~~seen~~ identified are not occurring due to ~~on account of~~ the enforcement of local/national regulations.

Leakage

13. Leakage relat~~in~~ged to the non-renewable woody biomass saved by the project activity shall be assessed based on ~~from~~ *ex post* surveys of users and the areas from wh~~ere~~ich this woody biomass is sourced (using 90/30 precision for a selection of samples). The following potential source of leakage shall be considered:

(a) The ~~U~~use/diversion of non-renewable woody biomass saved under the project activity by non-project households/users that previously used renewable energy sources. If this leakage assessment quantifies an increase in the use of non-renewable woody biomass used by the non-project households/users, that is attributable to the project activity, then $B_{y\ old}$ is adjusted to account for the

quantified leakage. Alternatively, B_{old} is multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required.

14. If equipment currently being utilised is transferred from outside the boundary to the project activity, leakage is to be considered.

Monitoring

15. Monitoring shall consist of ~~an annual~~ checking ~~of~~ the efficiency of all appliances or a representative sample thereof, at least once every two years (biennial) to ensure that they are still operating at the specified efficiency (η_{new}) or replaced by an equivalent in service appliance. Where replacements are made, monitoring shall also ensure that the efficiency of the new appliances is similar to the appliances being replaced.

16. Monitoring shall also consist of checking of all appliances or a representative sample thereof, at least once every two years (biennial) to determine if they are still operating or are replaced by an equivalent in service appliance.

17. If the quantity of fuel saved is determined using the Kitchen Performance Test (i.e. paragraph 6, Option 1), monitoring shall ensure that fuel consumption during the period of the project activity is monitored annually.

18. If option (b) in paragraph 7 is chosen for determining B_{old}, monitoring shall include the amount of thermal energy generated by the project technology *t* in year *y*.

19. In order to assess the leakage ~~specified~~ described above, monitoring shall include data on the amount of woody biomass saved under the project activity that is used by non-project households/users (who previously used renewable energy sources). Other data on non-renewable woody biomass use required for leakage assessment shall also be collected.

20. Monitoring shall ensure that:

(a) Either the replaced low efficiency appliances are disposed of~~f~~ and not used within the boundary or within the region; or

(b) If ~~the~~ baseline stoves ~~usage~~ continue~~s~~ to be used, monitoring shall ensure that the fuel-wood ~~fuel~~ consumption of those stoves is excluded from $B_{y\ old}$.

21. If~~n case~~ option (b) in paragraph ~~8~~ 7 is chosen for determining B_{old} ~~baseline calculations~~, monitoring shall include the amount of thermal energy generated by the project ~~new renewable energy~~ technology ~~in the project~~ in year *y*~~, where applicable~~.

Representative sampling methods

~~18. Sample size shall be chosen for a 90/10 precision (90% confidence interval and 10% margin of error) for parameter values used to determine emission reductions and project proponents shall make all reasonable efforts to achieve this specified level of confidence/precision; in cases where~~

~~survey results indicate that 90/10 precision is not achieved the lower bound of a 90% confidence interval of the parameter value may be chosen as an alternative to repeating the survey efforts to achieve the 90/10 precision~~.

22. A statistically valid sample of the locations where the systems are deployed, with consideration, in the sampling design, of occupancy and demographics differences can be used to determine parameter values used to determine emission reductions, as per the relevant requirements for sampling in the "General guidelines for sampling and surveys for small-scale CDM project activities". When biennial inspection is chosen a 95% confidence interval and 5% margin of error requirement shall be achieved for the sampling parameter. On the other hand when the project proponent chooses to inspect annually, a 90% confidence interval and 10% margin of error requirement shall be achieved for the sampled parameters. In cases where survey results indicate that 90/10 precision or 95/5 precision as the case may be is not achieved the lower bound of a 90% or 95% confidence interval of the parameter value may be chosen as an alternative to repeating the survey efforts to achieve the 90/10 or 95/5 precision.

Project activity under a programme of activities

23. The use of this methodology in a project activity under a programme of activities is legitimate if the following leakages are estimated accounted for, if required on a sample basis using a 90/30 precision for the selection of samples, and accounted for:

(a) Use of non-renewable woody biomass saved under the project activity to justify the baseline of other CDM project activities can also be a potential source of leakage. If this leakage assessment quantifies a portion of non-renewable woody biomass saved under the project activity that is then used as the baseline of other CDM project activit~~y~~ies then $B_{~~y~~ old}$ is adjusted to account for the quantified leakage;

(b) Increase in the use of non-renewable woody biomass outside the project boundary to create non-renewable woody biomass baselines can also be a potential source of leakage. If this leakage assessment quantifies an increase in the use of non-renewable woody biomass outside the project boundary then $B_{~~y~~ old}$ is adjusted to account for the quantified leakage;

(c) As an alternative to subparagraphs (a) and (b), B_{old} can be multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required.

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History of the document

Version	Date	Nature of revision
03	EB 60, Annex # 15 April 2011	To clarify and include further options for stove performance testing, to simplify leakage calculations by providing gross adjustment factor and to revise the emission factor for project fossil fuel.
02	EB 51, Annex 18 04 December 2009	To include: (a) Default efficiency factors for baseline cook stoves; (b) Procedures for sampling, (c) Revised procedures for determination of quantity of woody biomass that can be considered as non-renewable; and (d) Clarifications as to which leakage requirements are appropriate for projects versus PoAs.
01	EB 37, Annex 7 01 February 2008	Initial adoption.
Decision Class: Regulatory **Document Type**: Standard **Business Function**: Methodology		