CLEAN DEVELOPMENT MECHANISM

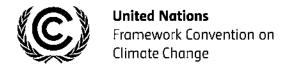**CDM-MP85-A07**

Concept note

Analysis and options regarding caps used in AMS-I.E, AMS-II.G and TOOL30

Version 01.0

United Nations
Framework Convention on
Climate Change

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1. Procedural background

1. The Executive Board of the clean development mechanism (CDM) (hereinafter referred to as the Board), at its 108th meeting (EB 108), approved the following revised methodologies and tool:

    (a) "AMS-I.E: Switch from non-renewable biomass for thermal application by the user";

    (b) "AMS-II.G: Energy-efficiency measures in thermal applications of non-renewable biomass"; and

    (c) "TOOL30: Calculation of the fraction of non-renewable biomass".

2. While approving the revision of the methodologies and tool in paragraph 1 above, the Board considered the caps recommended by the Methodologies Panel (MP), agreed that additional analysis would be required and asked the MP to explore alternative options. The Board requested the MP to prepare a concept note for consideration by the Board at a future meeting.

2. Purpose

3. The purpose of this concept note is to address the mandates provided at EB 108 and make a recommendation to the Board.

3. Key issues and proposed solutions

4. At EB 108, the Board considered the caps recommended by the MP (i.e. the wood-to-charcoal conversion factor of 8.0, the average annual consumption of woody biomass per person of 0.9 tonnes, and the fraction of non-renewable biomass of 0.6) and requested the MP to conduct additional analysis and explore alternative options to ensure that these parameters are not overestimated.

5. The sections below provide a summary of current provisions and some background information on these three parameters, and discuss the options for thresholds together with further guidance in the methodologies related to the data sources, data vintage and other characteristics to ensure the reliability of emission reduction estimates.

3.1. Wood-to-charcoal conversion factor

6. Paragraph 35 of AMS-I.E. and paragraph 35 of AMS-II.G. have the following provision:

    Where charcoal is used as the fuel by baseline (old) or project (new) devices, the quantity of woody biomass shall be determined by using a default wood to charcoal conversion factor of 6 kg of firewood (wet basis) per kg of charcoal (dry basis)[1]. Alternatively, credible local conversion factors determined from a field study or literature may be applied.

7. The Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, Reference Manual (Chapter 1: Energy) states "…the *wood-to-charcoal factor, is stated to be **between***

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1 Refer to:<http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch1ref3.pdf>.The term 'wet basis' assumes that the wood is 'air-dried' as is specified in the IPCC default table.

4 and 8. If no local information is available, 6 kg of wood input per kg of charcoal may be used as default (FAO, 1990)."

8. Based on the review of a sample of project design documents (PDDs), it is observed that occasionally there is not a direct reference to literature (i.e. there is only a citation for a study that refers to another study) to justify a high value above 6 (see below):

   (a) For example, in programme of activities (PoA) 7359: "PoA for the Reduction of emission from non-renewable fuel from cooking at household level", the World Bank report "Environmental Crisis or Sustainable Development Opportunity?" (2009) is quoted by the Forests Philanthropy Action Network (2011) to indicate a value of 10.

9. At its eighty-third meeting (MP 83), the MP recommended to the Board to include an additional safeguard by setting a cap on the value (i.e. the conversion factor applied should not be above 8).

10. Following the guidance from EB 108, additional analysis has been conducted as detailed in the **appendix.** On that basis, the following additional guidance is proposed for inclusion in the related methodologies to address the issue of reliability of data sources, data vintage and other data characteristics:

   (a) A *wood-to-charcoal factor* **higher than 8** may be proposed **only when** the following conditions are met:

      (i) The project participants have access to the primary source of data (i.e. study/survey directly conducted by them or a publication/report that directly provides a value for the parameter and is publicly available); and

      (ii) The underlying study/survey of the primary data source was conducted within the proposed geographical coverage of the project/PoA, following standard methods and practices to undertake such a study. Furthermore, the primary data source should not be older than five years from the date of publication of the PDD for global stakeholder consultation.

3.2. Average annual consumption of woody biomass per person

11. Data/parameter table 6 of the current version of AMS-I.E. and data/parameter table 2 of the current version of AMS-II.G. have the following requirements:

Data / Parameter table 6 of AMS-I.E.

Data/parameter:	$BC_{BL,PP}$
Data unit:	tonnes/person/year
Description:	Average annual consumption of woody biomass per person before the start of the project activity or at the renewal of each crediting period, whichever is later
Source of data:	-

Measurement procedures (if any):	Determined ex ante using one of the following options:
	(a) A default value of 0.5 tonnes/person per year[2]. If project proponents wish to use the default value for institutions (e.g. schools, prisons), the value should be adjusted, based on the number of meals cooked[3];
	(b) Historical data or a sample survey conducted as per the latest version of the "Standard: Sampling and surveys for CDM project activities and programme of activities";
	(c) Country or region specific values approved through the "procedure for development, revision, clarification and update of standardized baselines," which are available on the CDM website <http://cdm.unfccc.int/methodologies/standard_base/index.html >
Any comment:	When conducting the survey, project participants should take into account the following considerations: - Direct measurement of the use of each fuel in the field (e.g. weighing the amount of woody biomass, metering LPG) is more accurate and is the preferred option; In exceptional circumstances alternative less preferred method such as the one below based on number of meals cooked may be accepted subject to satisfactory justifications provided (e.g. fuel use varies according to season, price or availability of the respective fuel and reliable information on amount spent on fuel purchase is available); - Asking the number of meals cooked with each fuel or the number of times each fuel is used to cook in a certain period in a questionnaire-based survey may be used for estimating the proportion of the baseline fuels displaced. The project participants should demonstrate the actual implementation of sampling approach to estimate the proportion of baseline fuels displaced and its compliance with the reliability requirements (i.e. confidence/precision) according to "Standard: Sampling and surveys for CDM project activities and programme of activities"

Data / Parameter table 2 of AMS-II.G.

Data/parameter:	$B_{old,p}$
Data unit:	tonnes/person/year
Description:	Annual quantity of woody biomass that would have been used per person in the household in the absence of the project activity to generate thermal energy equivalent to that provided by the project devices

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[2] Refer to "Annex 5 - Information note on the rationale for default factors used in AMS-I.E. and AMS-II.G." of the SSC WG 42 meeting report.

[3] For example, in case of day schools, only one meal may be prepared by schools and provided to students and staff, except during school holidays when the use of fuel may be not significant.

Source of data:	Where applicable a value from a standardised baseline may be used as an alternative to the default value provided
Measurement procedures (if any):	Determined ex ante using one of the following options: (a) A default value of 0.5 tonnes/capita per year[4]. This option is limited to household project devices (not eligible for oven and dryers). If project proponents wish to use the default value for institutions (e.g. schools, prisons), the value should be adjusted, based on the number of meals cooked[5]; (b) Historical data or a sample survey conducted as per the latest version of the "Standard: Sampling and surveys for CDM project activities and programme of activities"; (c) Country or region specific values approved through the "procedure for development, revision, clarification and update of standardized baselines," which are available on the CDM website <http://cdm.unfccc.int/methodologies/standard_base/index.html>
Any comment:	-

12.   Based on the data from the United Nations[6] and Demographic and Health Surveys (DHS) Program[7], the values of average annual consumption of woody biomass per person were calculated for countries where most CDM project activities and PoAs have been implemented to date. One standard deviation was added to the average value to address the range of values encountered and ensure greater coverage. Thus, the average annual consumption of woody biomass per person was calculated as 0.9 tonnes/capita/year (= 0.52 + 0.38).

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[4] Refer to "Annex 5 - Information note on the rationale for default factors used in AMS-I.E. and AMS-II.G." of the SSC WG 42 meeting report.

[5] For example, in case of day schools, only one meal may be prepared by schools and provided to students and staff, except during school holidays when the use of fuel may not be significant.

[6] <https://data.un.org/>.

[7] <https://dhsprogram.com/>.

13. The table below shows a summary of averages by region based on values reported in the PDDs. It can be observed that 0.9 tonnes/capita/year is above the average consumption reported for most regions.[8]

Table 1.   Average consumption per household and per capita by region based on values reported in the PDDs

Region	Average consumption per household (tonnes/household)	Average household size (persons)	Average consumption per capita per year (tonnes/capita/ year)
Sub-Saharan Africa	5.15	6.9	0.75
Middle East & North Africa	5.15	6.2	0.83
Asia	3.73	5.0	0.75
Latin America	6.18	4.6	1.34

14. The majority (about 75 per cent) of the values proposed in standardized baselines are also under 0.9 tonnes/capita/year.

15. Based on the above rationale, at MP 83, the MP recommended to the Board to include an additional safeguard by setting a cap (i.e. 0.9 tonnes/capita/year), implying that:

(a)   For option (b) from the data/parameter table 6 of AMS-I.E. and from the data/parameter table 2 of AMS-II.G, the value is capped at 0.9 if it is determined to be more than 0.9 tonnes/capita per year;

(b)   For option (c) from the data/parameter table 6 of AMS-I.E. and from the data/parameter table 2 of AMS-II.G, capping the value at 0.9 tonnes/capita per year was not applicable if the values were determined through the procedures to develop standardized baselines.

16. Following the guidance from EB 108, additional analysis has been conducted as detailed in the **appendix**. On that basis, additional guidance is proposed as below for inclusion in the related methodologies to address the issue of reliability of data sources, data vintage and other characteristics of the data:

(a)   A value **higher than 0.9** may be proposed **only when** the following conditions are met:

(i)   The project participants have access to the primary source of data (i.e. study/survey directly conducted by them or a publication/report that directly provides a value for the parameter and is publicly available); and

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8   The sample size in Latin America was small; therefore the value reported for the region may not be precise.

(ii) The underlying study/survey of the primary data source was conducted within the proposed geographical coverage of the project/PoA, following standard methods and practices to undertake such a study. Furthermore, the primary data source should not be older than five years from the date of publication of the PDD for global stakeholder consultation.

3.3. Fraction of non-renewable biomass

17. The Board has approved "TOOL30: Calculation of the fraction of non-renewable biomass" for estimating the fraction of non-renewable biomass (fNRB).

18. The project participants have three options when determining fNRB values:

    (a) Use a default value of 0.3 indicated in TOOL30; or

    (b) Use default country-specific values approved through the standardized baseline procedures, if available; or

    (c) Calculate fNRB values for their own project activities/PoAs using TOOL30.

19. To date, only four countries[9] have developed new default country-specific fNRB values using TOOL30, following the standardized baseline procedure.

20. A conservative default value of 0.3 for fNRB was included in TOOL30 as an alternative means to estimate country/region/project area-specific fNRB values. This had been proposed taking into account values reported in several studies, including 27–34 per cent estimated by Bailis, et al, (2015)[10] and 41–43 per cent estimated by Cashman, et al, (2016).[11]

21. At MP 83, the MP proposed the cap with a view to meeting the expectation of the Board to achieve conservative fNRB values (see EB 90 report, para. 58, and EB 97 report, para. 27).[12]

22. Following the guidance from EB 108, additional analysis has been conducted as detailed in the **appendix**. On that basis, additional guidance is proposed as below for inclusion in

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[9] Uganda (ASB0002-2017), Rwanda (ASB0041-2018), Ethiopia (ASB0044-2019) and Myanmar (ASB0049-2020).

[10] Bailis, R.; Drigo, R.; Ghilardi, A. & Masera, O. (2015). The carbon footprint of traditional woodfuels. Nature Climate Change, 5(3), pp. 266–272, accessed at <http://www.nature.com/nclimate/journal/v5/n3/full/nclimate2491.html>.

[11] Cashman S, Rodgers M, Huff M, Feraldi R, Morelli B. Life Cycle Assessment of cookstove fuels in India and China. Washington, DC U.S. Environmental Protection Agency; 2016.

[12] "…*for future submissions related to standardized baselines on the values for fNRB, the Board requested the MP and the secretariat to compare and analyse the values proposed by the designated national authority and relevant scientific literature available on values for fNRB….*"

TOOL30 to address the issue of reliability of data sources, data vintage and other characteristics of the data:

(a) A value **higher than 0.6** may be proposed **only when** the following condition is met:

(i) The project participants have compared and analysed the values proposed by them against the values for fNRB reported in relevant scientific literature and credibly justified any differences. This analysis shall be included in the appropriate section of the PDD. The relevant scientific literature includes at least:

- *Bailis, R.; Drigo, R.; Ghilardi, A. & Masera, O. (2015). The carbon footprint of traditional woodfuels. Nature Climate Change, 5(3), pp. 266–272; and*

- *Cashman S, Rodgers M, Huff M, Feraldi R, Morelli B. Life Cycle Assessment of cookstove fuels in India and China. Washington, DC U.S. Environmental Protection Agency; 2016.*

4. Impacts

23. The proposed improvement of the methodological approaches in AMS-I.E, AMS-II.G and TOOL30 will ensure the reliability of calculating emission reductions and facilitate the implementation of CDM project activities and PoAs in the household cookstove sector.

5. Subsequent work and timelines

24. Based on guidance from the Board, the draft revision to the methodologies and tools AMS-I.E., AMS-II.G and TOOL30 will be prepared by the MP.

6. Recommendations to the Board

25. The MP recommends that the Board consider the concept note and provide further guidance.

Appendix.   Review of project data and literature

1.   This appendix provides a summary of the analysis conducted to review the values for the three parameters of interest to estimate emission reductions from cookstove projects (i.e. the wood-to-charcoal conversion factor, the average annual consumption of woody biomass per person, and the fraction of non-renewable biomass) as reported in CDM project documentation (e.g. project design documents, programme of activities design documents and monitoring reports).

1.   Wood-to-charcoal conversion factor

2.   Main observations from a review of a sample of 49 registered project activities and programmes of activities (PoAs) for cook stoves, with regard to the wood-to-charcoal conversion factor applied, are as follows:

   (a)   The values of the conversion factors used range from 6 to 12;

   (b)   32 project activities and PoAs have not indicated a conversion factor since they do not include charcoal stoves;

   (c)   14 project activities and PoAs use a default factor of 6;

   (d)   5 PoAs have used values based on literature. References are listed below:

      (i)   **PoA 9981 (Mozambique) used a value of 7.14,** based on *Brouwer, R. and Falcão, M.P.: Wood fuel consumption in Maputo, Mozambique. Biomass Bioenergy. 2004, Volume 27, Pages 233–245*:

         a.   The PoA used a secondary source (i.e. a scientific publication dated September 2004);

         b.   The source used is approximately 10 years older than the PoA registration date.

      (ii)   **PoA 9666 (Togo) used a value of 7,** based on *HED Consulting: Togo Baseline Report, 2011*:

         a.   The PoA used primary data from a baseline survey undertaken by an independent third-party consulting firm (i.e. HED Consulting). The baseline report is dated July 2011;

         b.   The source is two years older than the date of registration of the PoA.

      (iii)   **PoA 7359 (Kenya) used a value of 10,** based on *Forests Philanthropy Action Network: Protecting and restoring forest carbon in tropical Africa, 2011, Chapter 6*:

         a.   For Kenya, this PoA used the source published in March 2011 by the Forests Philanthropy Action Network;

         b.   The source is publicly available and it is approximately 2 years older than the PoA registration date.

(iv) **PoA 7359 (Madagascar) used a value of 12,** based on *Ministry of Energy: Diagnostic Du Secteur Energie a Madagascar, 2012, page 21*:

a. The PoA used a government report from the Ministry of Energy of Madagascar;

b. The source is one year and five months older than the PoA registration date.

(v) **PoA 6207 (Rwanda) used a value of 9,** based on the *United States Agency for International Development (USAID): Implementation Plan for increasing the adoption and use of efficient charcoal stoves in Kigali, 2007*:

a. The PoA used the source published by USAID in 2007.

2. Average annual consumption of woody biomass per person

3. Out of the 186 monitoring reports evaluated, 35 have indicated baseline woody biomass consumption per person, while 167 have indicated baseline woody consumption per household or per device. The table below summarizes the reports analysed.

Table 1.   Summary of the reported analysed for average annual consumption of woody biomass

Baseline wood consumption parameters reported		Number of monitoring reports
Average consumption per capita per year (tonnes/capita/year)	Per person (mix)	17
	Per person (rural)	10
	Per person (urban)	2
	Per person (day)	2
	Per person (boarding school)	2
	Per person (institution)	2
Average consumption per household (tonnes/household)	Per household (mix)	99
	Per household (rural)	60
	Per household (urban)	8

4. Out of the 167 monitoring reports that have indicated woody biomass consumption per household/device:

(a) 2 monitoring reports used a default value of 0.5 (tonnes/capita/year) (available in the methodology);

(b) 107 calculated the value based on primary data from their own baseline surveys and/or historical data;

(c) The remaining 57 used secondary data derived from a range of literature, a small sample of which is included below:

(i) Forest Survey of India, 1996 Ranganathan, Subba Rao and G.S. Prabhu, 1993;

(ii) Chidumayo, E. N., Masialeti, I., Ntalasha, H., Kalumiana, O.S. CHAPOSA, Charcoal Potential in Southern Africa, Final Report for Zambia;

(iii) International Bank for Reconstruction and Development 2009 Restoring Balance: Bangladesh's Rural Energy Realities. For non-domestic kitchens: Bangladesh Stoves Kitchen Survey August 2008 HED Consulting, and Bangladesh Stoves Kitchen Tests 2008-9 HED Consulting;

(iv) Ministry of Energy of Kenya (2002): Study on Kenya's Energy Demand, Supply and Policy Strategy for Households, Small Scale Industries and Service Establishments. Produced by the company KAMFOR, Nairobi;

(v) Final Report on Baseline Fuel Consumption in Households in Uganda, by the Center for Integrated Research and Community Development Uganda.

5. To calculate the average **household** baseline biomass woody consumption, the analysis focused on values indicated for firewood stoves. In cases where PoAs are implemented in more than one country, the study considered more than one value per component project activity (CPA) monitored. The global average value is 3.87, with a standard deviation of 1.64. The analysis also assessed the average value per region; the results are summarized in the table below.

Table 2. **Average consumption per household and per capita by region based on values reported in the monitoring reports**

Region	Average consumption per household (tonnes/household)	Average consumption per capita per year (tonnes/capita/year)
Sub-Saharan Africa	4.26 (n = 45)	0.65 (n = 17)
Middle East and North Africa	-	-
Asia	2.5 (n = 16)	0.5 (n = 2)
Latin America	5.99 (n=2)	-
Central America	3.1 (n = 1)	-

6. Out of the 35 monitoring reports that indicated baseline biomass consumption per person, 6 used approved SB values, 10 used a default value of 0.5 tonnes/capita/year, while the remaining 19 reports used secondary data. In cases where PoAs are implemented in more than one country, the study considered more than one value per CPA monitored. The average calculated baseline woody biomass consumption per person is **0.63**, and the standard deviation is **0.26**.

3. Fraction of non-renewable biomass (fNRB)

7. A total of 97 PoAs in the pipeline that apply clean cookstoves were reviewed to assess fNRB values being used in different clean development mechanism (CDM) projects and CPAs. Of the 97 PoAs, only 3 use fNRB values below 0.6, and the vast majority (more than 85) use fNRB values above 0.8. In most cases, project participants and coordinating/managing entities (CMEs) undertake the calculations of fNRB for their own project activities and PoAs. For many of these cases, the fNRB values which the CMEs applied for projects or CPAs will be assessed by the designated operational entities and the secretariat only at the time issuance requests are made.

8. A total of 186 monitoring reports from 10 project activities and 39 PoAs were also reviewed. A vast majority of the registered project activities and CPAs use fNRB values

above 0.8, with the highest value being 1.0 (Bangladesh). None of the fNRB values are below 0.6. Of the analysed reports, only one PoA has used an approved standardized baseline value, while 51 per cent of the reports analysed use Executive Board/Small-Scale Working Group default values (e.g. annex 22 of the report of the sixty-seventh meeting of the Board), and the remaining percentage calculated the values based on international/national reports/statistics. Examples of reports used for these calculations include:

(a) Food and Agriculture Organization of the United Nations (FAO) (2003): Experience of Implementing National Forestry Programmes in Nigeria;

(b) FAO (2010): Global Forest Resources Assessment 2010, Country Tables Lesotho, Table 3b – Special designation and management categories: <http://www.fao.org/forestry/20262-1-27.pdf>;

(c) 2003 IPCC Good Practice Guidance for Land-Use Change and Forestry, Chapter 3;

(d) 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 4, Table 4.9.

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Document information

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