

CDM-EB102-AA-A06

Concept note

Methodological approaches for calculating emission reductions from project activities, resulting in the reduced use of non-renewable biomass in households

Version 01.1



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1. Procedural background

1. The Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP), at its fourteenth session, encourages the CDM Executive Board (hereinafter referred to as the Board) to review methodological approaches for calculating emission reductions from project activities, resulting in the reduced use of non-renewable biomass (NRB) in households (decision -/CMP.14, para. 4).

2. Purpose

2. The purpose of this concept note is to present the following background to the issue for the Board to determine the appropriate course of action to respond to the above mandate from the CMP:
 - (a) An overview of past decisions and guidance provided by the CMP and the Board on methodologies for the reduced use of NRB for residential applications (e.g. project activities for clean cookstoves) and the status of CDM project activities and programmes of activities (PoAs) applying such methodologies;
 - (b) The status of the ongoing methodological work related to clean cookstoves.

3. Key issues and proposed solutions

3.1. Past decisions related to the reduced use of non-renewable biomass

3. An earlier version of the methodology “AMS-I.C. Thermal energy for the user”¹ stated that “This category comprises renewable energy technologies that supply individual households or users with thermal energy that displaces fossil fuels or non-renewable sources of biomass....For renewable energy technologies that displace non-renewable sources of biomass, the simplified baseline is the non-renewable sources of biomass consumption of the technologies times an emission coefficient for the non-renewable sources of biomass displaced. Intergovernmental Panel on Climate Change (IPCC) default values for emission coefficients may be used”, until the provision was revised at the twenty first meeting of the Board (September 2005) through a revision to its appendix B of the methodology. A few CDM project activities for clean cookstoves were registered by then, applying the methodology AMS-I.C, notably the two biogas project activities in Nepal².
4. Subsequently the Conference of the Parties (COP) decided that “... the eligibility of land use, land-use change and forestry project activities under the CDM is limited to

¹ As contained in appendix B of the “Simplified modalities and procedures for small-scale CDM project activities” (version 05 or older).

² <<http://cdm.unfccc.int/Projects/DB/DNV-CUK1132666829.52/view>>
<<http://cdm.unfccc.int/Projects/DB/DNV-CUK1132671435.09/view>>.

afforestation and reforestation” (decision 17/CP.7). In response, the Board at its twentieth meeting agreed that (see EB20 meeting report, annex 8, para. 3(b)):

- (a) Where a project activity, which does not seek to obtain temporary certified emission reductions (tCERs) or long-term certified emission reductions (ICERs) from afforestation or reforestation project activities, may directly or indirectly result in a **net increase of carbon pools** compared to what would occur in the absence of the project activity, this **increase should not be taken into account in the calculation of emission reductions**;
 - (b) Where a project activity, which does not seek to obtain tCERs or ICERs from afforestation or reforestation project activities, may directly or indirectly result in a **net decrease of carbon pools** compared to what would occur in the absence of the project activity, such changes **should be taken into account** in the calculation of emission reductions by subtracting the corresponding quantities from emission reductions.
5. This Board decision was translated in version 06 of appendix B of the methodology AMS-I.C. as “.... Combustion of any non-renewable biomass shall be accounted in the same way as combustion of fossil fuels. Emissions reductions due to the displacement of non-renewable biomass shall not be accounted”.
6. Subsequently, the CMP, by its decision 7/CMP.1, paragraphs 29 and 30 (December 2005):
- (a) “Welcomes the public call launched by the Executive Board for “alternative methods for calculating emission reductions for small-scale project activities that propose the switch from non-renewable to renewable biomass”;
 - (b) “Requests the Board to develop, as a priority, a simplified methodology “for calculating emission reductions for small-scale project activities that propose the switch from non-renewable to renewable biomass”.
7. Then the CMP, by its decision 1/CMP.2, paragraphs 29 and 30 (November 2006):
- (a) “Invites Parties, intergovernmental organizations and non-governmental organizations to submit to the Executive Board proposals for methodologies for small-scale clean development mechanism project activities that propose the switch from non-renewable biomass to renewable biomass, **addressing issues related to leakage, differentiation between renewable and non-renewable biomass and consistency with paragraph 7(a) of decision 17/CP.7**”;
 - (b) “Requests the Executive Board to make a recommendation to the CMP, at its third session, on a simplified methodology for calculating emission reductions for small-scale project activities that propose the switch from non-renewable to renewable biomass; **approval of such methodologies by the Executive Board for use for clean development mechanism project activities can occur only after concurrence of the CMP**”.
8. Furthermore, the CMP, by its decision 2/CMP.3, paragraph 24 (December 2007):
- (a) “Requests the Executive Board to approve, at its first meeting in 2008, the simplified methodologies for “Switch from non-renewable biomass for thermal application by the user” and “Energy efficiency measures in thermal applications

of non-renewable biomass”, as recommended by the Executive Board, for use for clean development mechanism project activities, as contained in annexes 3 and 4 to document FCCC/KP/CMP/2007/3 (Part II), incorporating the necessary changes to ensure that **the application of these methodologies introduces new or improves existing end-user technologies and that, in the case of the methodology “Energy efficiency measures in thermal applications of non-renewable biomass”, the baseline energy efficiency is measured or is based on referenced literature values”.**

9. The Board at its thirty seventh meeting (January–February 2008) approved the revised simplified methodologies “AMS-I.E. Switch from non-renewable biomass for thermal applications by the user” and “AMS-II.G. Energy efficiency measures in thermal applications of non-renewable biomass”.
10. The Board, through its 2017 “Annual Report of the Executive Board of the clean development mechanism to the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (FCCC/KP/CMP/2017/5)”, paragraph 60, requested guidance from the CMP as follows: “The Board, while considering the matter of eligibility under the CDM of a shift from non-renewable biomass to liquefied petroleum gas for end users, noted that the CMP decided that the Board may, if necessary, revise the methodologies called “Switch from non-renewable biomass for thermal application by the user” and “Energy efficiency measures in thermal applications of non-renewable biomass” without the need to make recommendations to the CMP (decision 2/CMP.3, paragraphs 24 and 25). The Board considered whether it may initiate the development of a methodology on shifting from non-renewable biomass to low-carbon intensive fossil fuels, such as liquefied petroleum gas, for end-users without going back to the CMP. The Board could not reach a consensus and seeks guidance from the CMP on whether the Board may develop this methodology”. The CMP considered the issue but did not provide guidance on the matter.

3.2. Status of project activities for the reduced use of non-renewable biomass in households

11. The Achievements of the Clean Development Mechanism³ highlighted the sustainable development benefits of the clean cookstove project activities by stating “One million efficient cookstoves have been installed under the CDM reducing emissions and improving health. The installation of the efficient cookstoves has had direct impact on the lives of the users in particular women and children with better air quality indoors”.
12. With 69 PoAs registered, clean cookstoves are by far the most popular PoA type. To date 303 component project activities (CPAs) have been included in these PoAs and, in addition, 42 project activities are registered. More than **47 4.7** million certified emission reductions (CERs) have been issued to date for clean cookstoves. Over nine PoAs for clean cookstoves are under validation by designated operational entities, making up more than 10 per cent of PoAs under validation.

³ Achievements of the Clean Development Mechanism. Harnessing Incentive for Climate Action. Available at <https://unfccc.int/sites/default/files/resource/UNFCCC_CDM_report_2018.pdf>.

13. As stated above, although AMS-I.C.⁴ included cookstoves in the past, AMS-II.G.⁵ and AMS-I.E.⁶ currently make up for the majority of the clean cookstove project activities and PoAs.

3.3. Ongoing activities and potential areas for further work for the reduced use of non-renewable biomass in households

14. In the table below, issues related to methodological approaches applicable to project activities and PoAs aimed at the reduced use of non-renewable biomass in households are listed based on literature review and recent stakeholders' submissions. Efforts were made to include information from multiple sources, however the issues included in the table are not necessarily exhaustive. Ongoing work related to this subject is also mentioned together with potential further work.

Table. Issues, ongoing work and potential areas for further work for the reduced use of NRB

Issues and source/reference for the issue	Ongoing work/measures	Potential further work
1. Uncertainty in estimates of emission reductions (e.g. in the estimates of fuel usage, emission factors and fraction of non-renewable biomass) for example using IPCC recommendations for uncertainty have not been included ⁹	Default values, surveying and other monitoring methods are being continuously improved by the Board.	Issue is not specific to stoves but applies to all CDM projects, in particular those using sampling methods. No specific measure is proposed for this issue.
2. The default factors for biomass consumption from baseline stoves at the household level has been developed only for a few countries ⁹	For some countries (e.g. CDM-underrepresented countries), conservative default values for baseline wood fuel consumption per household/person has been developed, using the procedure for development of top-down standardised baselines.	Where designated national authorities (DNAs) make request for top-down development of standardized baselines, the Board has developed a process to consider and approve them. No specific measure is proposed for this issue.

⁴ AMS-I.C. Thermal energy production with or without electricity.

⁵ AMS-II.G. Energy efficiency measures in thermal applications of non-renewable biomass.

⁶ AMS-I.E. Switch from non-renewable biomass for thermal applications by the user.

Issues and source/reference for the issue	Ongoing work/measures	Potential further work
3. CDM default factors for fNRB are not conservative. Regulators need to track the application and review the integrity ^{7,8,9}	The issue has been addressed. A conservative default value of 0.3 for fNRB is included in the newly approved TOOL30: Calculation of the fraction of non-renewable biomass. Further improvements to the tool is being carried out based on the experience gained, taking into account stakeholder feedback. Almost all of the previously approved national fNRB factors have expired and new submissions from DNAs to update national fNRB factors are being received.	No specific measure is proposed for this issue.
4. Monitoring of retention rates of stoves and stove stacking under the CDM is not fool proof. Refined approaches to incorporate the use of data loggers in project monitoring may be required ⁹	The Board has mandated work to Methodologies Panel (MP) to develop best practice examples in cookstove methodologies. The work is ongoing and should be concluded during 2019. One of the aspects being considered is improved monitoring using new technologies.	No specific measure is proposed for this issue.
5. The use of fossil fuel carbon dioxide (CO ₂) emission factors as surrogates for biomass combustion have no scientific basis ⁹	Currently no work is being carried out, which corresponds with the stakeholder inputs in the appendix.	The Board may wish to mandate the MP to further consider the issue and make recommendations.
6. Non-CO ₂ greenhouse gas emissions such as methane and nitrous oxide emissions are not considered ⁹	Currently no work is being carried out, which corresponds with the stakeholder inputs in the appendix.	This issue linked to item 5. The Board may wish to mandate the MP to further consider the issue and make recommendations.

⁷ The *Carbon Footprint of Traditional Woodfuels*: Article published in Nature Climate Change, Volume 5, pages 266–272, 2015 <<https://www.nature.com/articles/nclimate2491>>.

⁸ Report titled “*Vulnerability of CDM Projects for Discontinuation of Mitigation Activities: Assessment of Project Vulnerability and Options*”, NewClimate Institute for Climate Policy and Global Sustainability <<https://newclimate.org/publications/>>.

Issues and source/reference for the issue	Ongoing work/measures	Potential further work
7. Approaches to incorporate black carbon are not included ⁹	Currently no work is being carried out. IPCC 1.5 degrees report highlighted the benefits of addressing the mitigation of short-lived climate forcers.	Black carbon is not a Green House Gas (GHG) included under the Kyoto Protocol currently, hence may not be feasible to integrate in CDM GHG estimates.
8. CDM methodologies do not cite up to date harmonised standards for stove test (e.g. ISO has recently published a series of standards for harmonized lab and field tests of cookstoves (e.g. ISO 14064-1:2018) to determine emission performance and efficiency	The issue could possibly be addressed in the work for the existing mandates for best practice examples.	The Board may wish to mandate the MP to consider the issue and, if necessary, make recommendations to revise the related methodologies.

15. With reference to the discussion above, only issues 5, 6 and 8 appear to be suitable for further work. With regard to issue 5, a hypothetical emission factor ($EF_{\text{projected_fossilfuel}}$) was introduced in methodologies AMS-I.E. and AMS-II.G. in addition to the fNRB factor, to address the guidance from the Board's twentieth meeting, as referred to in paragraph 4 above. In that regard and with reference to equation 1 below, literature and stakeholder inputs seem to suggest that $EF_{\text{projected_fossilfuel}}$ (with a default value of 63.7 t CO₂/TJ) will be an additional and unnecessary discount on top of the fNRB factor. The latter (fNRB factor) was meant to determine the portion of the biomass used in the cookstoves that would not regrow in the source (e.g. forest land) allowing it to be treated on par with fossil fuels. If that is correctly determined, applying the $EF_{\text{projected_fossilfuel}}$ factor, which is significantly lower than the wood emission factor (i.e. 112 t CO₂/TJ), would amount to arbitrary discounting without a scientific basis to do so according to these sources. The Board may therefore wish to consider mandating further work to the MP to assess the issue and make recommendations.

$$ER_{y,i,j} = B_{y,savings,i,j} \times N_{y,i,j} \times \mu_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{\text{projected_fossil fuel}} \quad \text{Equation (1)}$$

Where:

- $ER_{y,i,j}$ = Emission reductions by project device of type *i* and batch *j* during year *y* in t CO₂e
- $B_{y,savings,i,j}$ = Quantity of woody biomass that is saved in tonnes per cookstove device of type *i* and batch *j* during year *y*

⁹ *Assessing the Climate Impacts of Cookstove Projects*: Report published in Challenges in Sustainability, Volume 1, Issue 2, Pages 53–71, 2013 <<https://www.sei.org/publications/assessing-the-climate-impacts-of-cookstove-projects-issues-in-emissions-accounting/>>.

$f_{NRB,y}$	=	Fraction of woody biomass that can be established as non-renewable biomass (fNRB)
$NCV_{biomass}$	=	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.0156 TJ/tonne, based on the gross weight of the wood that is 'air-dried')
$EF_{projected_fossilfuel}$	=	Emission factor for the fossil fuels projected to be used for substitution of non-renewable woody biomass by similar consumers. Use a value of 63.7 t CO ₂ /TJ ¹⁰
$N_{y,i,j}$	=	Number of project devices of type <i>i</i> and batch <i>j</i> operating during year <i>y</i>
μ_y	=	Adjustment to account for any continued use of pre-project devices during the year <i>y</i> when applying equations 6 and 8 (fraction). Use 1.0 in other cases

4. Impacts

16. Improvement in methodological approaches to the calculation of emission reductions for reduced use of non-renewable biomass in households will facilitate the implementation of CDM project activities and PoAs in the household cookstove sector, which have strong relevance for least developed countries and other regions that are underrepresented in the CDM.

5. Subsequent work and timelines

17. Subject to the mandate from the Board, the MP will prepare a concept note for the consideration of the Board. Work will be carried out, keeping in mind the timelines to allow the Board to report on the matter in its annual report to the CMP (i.e. well before September 2019).

6. Budget and costs

18. This work to be done for this mandate could be undertaken under the existing activity on "Simplification of methodologies" under objective 1(c): "Develop simplified and user-friendly standards and procedures that increase efficiency and ensure environmental integrity" with a resource allocation as referred to in table 5 on page 16 of the CDM two-year business and management plan 2018–2019 (EB97, annex 1).

7. Recommendations to the Board

19. The secretariat recommends that the Board request the MP to prepare a concept note for its consideration at a future meeting, addressing issues 5, 6 and 8 in the 'Table. Issues, ongoing work and potential areas for further work for the reduced use of NRB'.

¹⁰ This value represents the emission factor of the substitution fuels likely to be used by similar users, on a weighted average basis. The value is calculated, based on the global average ratio of cooking fuels (the normalized ratio of kerosene and liquefied petroleum gas (LPG) excluding coal), i.e. 9 per cent for kerosene (71.5 t CO₂/TJ) and 91 per cent for LPG (63.0 t CO₂/TJ).

Appendix. Recent inputs from stakeholders in relation to projects reducing non-renewable biomass in households

1. Input received on 5 July 2018 from PD Forum:

Emissions Factor (EF): the emission factor as applied to all cookstoves from the first version of AMS IIG onwards has been a political construct not based on credible science and analysis in field conditions of rural communities. This has been an especially egregious burden on rural cookstoves in SSA and Asian LDCs where, quite obviously, the baseline is firewood and woody biomass consumption and not some concocted mix of LPG, kerosene and coal. If these are used at all, they are consumed in urban areas, and coal mostly in China and Mongolia. Even in rural areas, firewood and charcoal dominate across almost all SSA countries. The origin of this artificial emissions factor, of course, was the Kyoto Protocol which could not recognize avoided deforestation and hence, nor could the CDM, as its market-based instrument, admit to avoiding deforestation. The appropriate emissions factor has been established by the IPCC as 112 tCO₂/TJ for woody biomass burned. Previous versions of AMS IIG have varied this factor somewhat and version 3 to 8 applied 81.6 tCO₂/TJ. Version 9 however, reduced this powerful factor even more to 63.7 tCO₂/TJ arguing that coal is now less used and LPG more used in developing countries, hence justifying, in absurdum, the downward shift in carbon intensity of the factor, further punishing projects seeking to use carbon finance to provide more efficient cookstoves in rural areas. In the post Kyoto era of the Paris Agreement, the UNFCCC should use its own scientific body's default factor for woody biomass of 112 tCO₂/TJ removing the politically driven analytical gymnastics to accommodate a no longer applicable Protocol. In contrast, the Gold Standard Foundation's methodologies¹⁷ that are applied to improved cookstove projects apply either the IPCC default of 112 tCO₂/TJ for woody biomass or a default CO₂ emissions of firewood that is substituted or reduced at 1.747 tCO₂/ton of wood¹⁸, which is based on the IPCC default of 112 tCO₂/TJ for woody biomass.

Footnote 17: (1) Gold Standard Methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption and (2) The Gold Standard Simplified Methodology for Efficient Cookstoves.

Footnote 18: 1 ton of woody biomass x 0.0156 TJ/ton net calorific value of woody biomass x 112 tCO₂/TJ emissions factor of woody biomass = 1.747 tCO₂/ton of woody biomass.

2. Input received on 26 September 2018 from PD Forum:

In addition – whilst not directly related to TOOL30, but certainly relevant to those CDM methodologies that apply it – PD Forum members recommend to allow for the application of the true emissions factor for woodfuel (112 tCO₂e/TJ). This is due to the fact that:

- *The value of 112 tCO₂e/TJ is the internationally accepted correct emissions factor for woodfuel, as approved by the Intergovernmental Panel on Climate Change. The current value of 63.7 tCO₂e/TJ adopted in AMS-II.G. (version 10.0) is reportedly “based on the global average ratio of cooking fuels (the normalized ratio of kerosene and liquified petroleum gas (LPG) excluding coal”.¹⁰ However, these two fossil fuels have no relationship to woodfuel, and in many countries – especially on the African continent where most registered cookstove CDM PoAs are located – firewood and charcoal are primarily used for cooking in the baseline, not kerosene and LPG.*
- *Any reduction in demand is a permanent reduction (as opposed to reforestation that can be considered temporary).*

- *This emission factor is already accepted by other carbon standards, including the Gold Standard and Verra's Verified Carbon Standard.*

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