Approved baseline and monitoring methodology/ methodological tool revision recommendation form (Version 02.0)

INFORMATION TO BE COMPLETED BY PANEL/WG	
Date and number of Panel/WG meeting:	14–17 October 2013, SSC WG 42
Title/Subject of the request for revision:	Revision of AMS-II.G concerning sample size requirements for thermal efficiency testing
Reference number of the request for revision:	SSC_684
Exact reference (number, title and version) of the methodology or methodological tool to which the request for revision applies:	AMS-II.G – version 05 "Energy efficiency measures in thermal applications of non-renewable biomass"

Summary of the request for revision:

Original text from PP/CME:

The specific concern addressed here is the minimum sample size requirement of 30 outlined in paragraph 12 of the Standard for Sampling and Surveys in CDM Project Activities Version 03.0 (EB 69 Annex 4); and the annual monitoring of a sample of stoves of every year of usage after dissemination (here after referred to as "stove vintage(s)") outlined in paragraphs 12 and 23 of methodology AMS-II.G version 05.0. Each of these requirements places an undue burden on the monitoring of CDM cook stove projects.

As per methodology AMS-II.G, thermal efficiency of the devices shall be monitored annually (paragraphs 12 and 23 AMS-II.G version 05.0) using one of the 3 protocols: a) Kitchen Performance Test (KPT); b) Water Boiling Test (WBT); c) Controlled Cooking Test (CCT). The available thermal efficiency testing standards approved by methodology AMS-II.G, such as the latest Partnership for Clean Indoor Air (PCIA) standards, require significant levels of effort for the testing of a single sample. For instance, in the WBT Protocol (PCIA, version 4.1.2), conducting each test (excluding preparations) takes 2.25 to 2.75 hours, and these tests have to be repeated 3 times for each stove. Thus, each test would require a complete day of labour. In the same fashion, PCIA Controlled Cooking Test (version 2.0) requires the preparation of 3 meals per stove; which can again absorb a full working day. Extrapolating this level of effort to a program that continuously distributes stoves, and where stoves continue operating for 3-5 years after distribution, would result in a minimum of 90 to 150 days of effort per monitoring period just to monitor the thermal efficiency parameter under the minimum sample size requirement of 30.

Evidence from a diverse range of stove models (Echo Recho, Mirak, Prakti, StoveTec, Ghana Wood, Mud/Saw Dust, VITA and Justa, with data from the Lawrence Berkeley National Laboratory and the PCIA) suggests that thermal efficiencies using Water Boiling Tests have coefficients of variation in the range of 8.2% to 30.1% (WBT average). This variability would yield samples sizes of maximum 2 to 24 (using equations in paragraph 89 of the Guidelines for Sampling and Surveys in CDM Project Activities and Programme of Activities (EB 69 Annex 5) for a 90/10 confidence/precision), below the 30 required by EB 69 Annex 4 paragraph 12.

Third-party consultants charge between USD500 and USD2,000 to conduct one WBT on a single stove. Hence, the cost to project developers for a sample of 30 stoves would range between USD15,000 and USD60,000. This cost would have to be multiplied by the number of stoves vintages in existence during the monitoring period. For example, the costs of monitoring thermal efficiencies on a project with stoves from 4 vintages would cost anywhere between USD60,000 and USD240,000. Alternatively, C-Quest Capital, in its role as Coordinating Managing Entity or Project Participant in several AMS-II.G PoAs (PoA Reference Numbers (registered PoAs): 8480, 8521, 8060, 6283, 9007; and Improved Cookstoves Program for Malawi and cross-border regions of Mozambique (submitted for registration), Improved Cookstoves for Haiti (in validation)) estimates the cost of one WBT on a single at USD610 to USD730. These costs are split, on average, in the following manner: 66% salaries, 23% travel expenses to stove locations, and 11% other costs (including space rental to conduct WBTs, compensation to stove users for taking their stoves away for testing).

The minimum sample size requirement and yearly monitoring of every vintage is already affecting the timelines and feasibility of the verification of emissions reductions from 3 CPAs in the coming year.

Given the high cost and level of effort required for determining thermal efficiencies, the minimum sample size requirement of 30 for mean values and the annual monitoring of thermal efficiencies of every cook stove vintage would undercut the potential to monitor and verify the emissions reductions of project activities as well as the ability to disseminate energy-efficient devices under the CDM.

Suggested modifications to the Standard for Sampling and Surveys in CDM Project Activities Version 03.0 and AMS-II.G version 05.0 are attached to this document. These include:

1. The minimum sample size of 30 should be restrained to parameters which are proportions or percentages. For numeric mean values, the Student's t-distribution could be used. This distribution is appropriate for small sample sizes and can be used to ensure the minimum reliability requirements are still met, even if the sample does not follow a normal distributing due to its reduced size. In fact, using the t-distribution would increase sample sizes to achieve the required reliability levels. As compared to a normal distribution, and using coefficients of variation of 8.2% and 30.1%, the sample sizes with increase from 2 to 4 and from 24 to 27 respectively when applying the t-distribution. This change is proposed in the Standard for Sampling and Surveys in CDM Project Activities

2. The use of thermal efficiency values from previous monitoring periods. The use of these values would only be applicable when data for the same stove vintage is available. For example, during the first annual monitoring period, a sample of stoves that had been in use for 1 year is sampled (stoves that had been in use for more than a year do not exist in this hypothetical scenario). In the next monitoring period (X+1), the project has stoves that have been in use for 2 years and stoves that have been in use for 1 year (recently disseminated stoves). Project proponents may use the thermal efficiency values from stoves tested during monitoring period X and apply that value only to stoves that have been in use for 1 year in monitoring period X+1. In this case, project proponents would have to test stoves that have been in use for 2 years and obtain a new thermal efficiency value for this stove vintage.

3. Usage of regression models to model thermal efficiency decreases. Project proponents could establish models that relate thermal efficiency with stove usage time. The models would be based on actual data from the field and each regression model can be only applicable for a single stove model. Two conditions would be imposed on the models. The first is the random sampling of appliances tested for thermal efficiency and from which the regression model is constructed. Secondly, the regression model would have to comply with the reliability requirements established in EB69 Annex 4 and AMS-II.G Version 05.0. Such regression models would provide accurate and reliable data for decreases in thermal efficiency across time. Project participants may interpolate with the regression model when data is not available (e.g. when data for one vintage is not available). This change is proposed to methodology AMS-II.G.

4. Usage of pre-approved models. The model would establish de-facto reductions in thermal efficiencies with respect to the original efficiencies and the period since cook stove deployment. For instance, the Gold Standard Foundation has proposed such a model in its new cook stoves methodology. The Gold Standard proposed model accounts for a default thermal efficiency loss of 1% every year with respect to previous year's efficiency. This model also considers a 0.94 adjustment factor to the original efficiency to account for uncertainty related to the cook stove efficiency tests.

The last three changes are proposed to methodology AMS-II.G.

Recommended decision to the Board on the request for revision

☐ Approve the proposed revised methodology or methodological tool ("A case")
☒ Reject the proposed revised methodology or methodological tool ("C case")

Type of the revision if the recommendation is A case

☐ The revision is a major revision
☐ The revision is a minor revision

Reasons for rejection if the recommendation is C case

The small-scale working group (SSC WG) of the Executive Board (hereinafter referred to as the Board) would like to thank the author for the submission.

Proposal 1

The SSC WG would like to inform that the suggested modifications to the sampling standard have been approved by the Board at its seventy-fourth meeting. See the extract below:

Paragraph 12 of the sampling standard: "If the sample size calculation returns a value of less than 30 samples, a minimum sample size of 30 shall be chosen when the parameter of interest is a proportion. If the parameter of interest is a numeric mean value (i.e. not a proportion or percentage) the Student's t-distribution shall be used if the resulting sample size is less than 30."

Proposal 2 and 3 and 4

The SSC WG noted the concern on the transaction cost for undertaking separate sample surveys for different vintages and types of stoves. The SSC WG agreed to incorporate some elements of the request SSC_684 in the on-going top-down work to revise the methodology. Please note that the SSC WG prepared the draft revision to "AMS-II.G: Energy efficiency measures in thermal applications of non-renewable biomass", which includes further simplification on the determination of thermal efficiency, as contained in annex 4 to the 42nd meeting report of the SSC WG. The SSC WG recommended that the Board launch a call for public inputs on the draft revision to AMS-II.G. Therefore, the submitter may wish to provide inputs accordingly.

With regard to the use of pre-approved models in proposal 4, the SSC WG agreed to request the submitter to provide justification on the proposed default thermal efficiency loss of 1 per cent every year.

Any other issues arising from the request for revision

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Document information

Version	*Date*	*Description*
02.0	18 July 2013	Revised to remove the row "Date and signature of the chair and vice chair of Panel/WG"
01.0	4 July 2013	Initial publication. This document supersedes and replaces the following documents: • Recommendation form for Small Scale Methodologies (F-CDM-SSCwg) (Version 01.1); • Recommendation Form for Small Scale A/R Methodologies and Procedures (F-CDM-SSC-AR) (Version 01.1).

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