

Proposal for the update of the standardized baseline “Fuel switch, technology switch and/or methane destruction in the charcoal sector of Uganda”

Table of Contents

Approaches	2
Elements to be standardized	3
Applicability of the proposed standardized baseline	3
Additionality standardization	4
Measure 1: Fuel and feed stock switch.....	4
Measure 2: Switch of technology with or without change of energy sources (including energy efficiency improvement)	5
Measure 3: Methane destruction	7
Baseline identification.....	8
Measure 1: Fuel and feed stock switch.....	8
Measure 2: Switch of technology with or without change of energy sources (including energy efficiency improvement)	8
Measure 3: Methane destruction	9
Baseline parameter standardization	10
Measure 1: Fuel and feed stock switch.....	10
Measure 2: Switch of technology with or without change of energy sources (including energy efficiency improvement)	10
Measure 3: Methane destruction	10
Use of the proposed standardized baseline with approved or proposed new or revised methodology(ies).....	12
Validity of the proposed standardized baseline.....	12
References and any other relevant information	12

Approaches

This proposal for the update of the standardized baseline “Fuel switch, technology switch and methane destruction in the charcoal sector of Uganda” refers to the approved standardized baseline ASB0002.

The applicability provisions of ASB0002 are valid for this update as follows.

- This standardized baseline is applicable to the Republic of Uganda.
- The standardized baseline can only be used in conjunction with the latest approved version of the small-scale methodology AMS-III.BG .Emission reduction through sustainable charcoal production and consumption. ”

This update adds another methodology for which the SB is applicable as follows: The latest approved version of the small-scale methodology AMS-III.K “Avoidance of methane release from charcoal production”. **This methodologies is applicable for the following technologies/measures and conditions:** This methodology is applicable to project activities that avoid release of methane from traditional open-ended charcoal production methods.¹ The following project activities are eligible under this methodology:

- (a) The replacement of existing traditional open-ended charcoal production facility(ies) with new facility(ies) equipped with recovery and flaring/combustion of gases containing methane generated in the production process;
 - (b) The upgrade or retrofit of existing traditional open-ended charcoal production facility(ies) to install equipment/systems for recovery and flaring/combustion of gases containing methane generated in the production process;
 - (c) Greenfield project, consisting of the installation of new kilns/charcoaling facilities equipped with recovery and flaring/combustion of gases containing methane generated in the production process, instead of the installation of conventional facilities without gas recovery.
2. The methodology is applicable under one of the following conditions:
- (a) Local regulations do not require controlling methane emissions in charcoal production;
 - (b) There is a widespread non-compliance² of the local regulation evidenced by:

¹ Traditional open-ended charcoaling methods are defined as non-industrial production processes where the gases produced by the wood pyrolysis are not destroyed or used for other purposes, therefore being released directly to the atmosphere. Traditional open-ended production units include, but are not limited to, open pits, hot-tail kilns and brick-based Missouri kilns.

² Less than 50% of charcoal production activities comply in the country.

- (i) Annually collected data from control groups set up by the project activity; or
 - (ii) Annually collected data on legal action and enforcement mechanisms implemented under the prevailing regulation; or
 - (iii) Official reports (e.g. annual reports of regulatory bodies for pollution control).
3. No relevant changes in greenhouse gas emissions other than methane occur as a consequence of the project activity and/or need to be accounted, except for the possibilities of leakage.
4. The implementation of the project activity shall not result in changes in the type and source of biomass raw material used for production of charcoal (e.g. if in the baseline charcoal was produced from coconut shells, the project activity will only produce charcoal from coconut shells).
5. Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO₂ equivalent annually.
6. If the combustion facility is used for heat and electricity generation that component of the project activity shall use a relevant methodology under Type I.

The standardized baseline was not developed using a methodological approach contained in an approved methodology or tool.

The standardized baseline was developed using the **Guidelines for the establishment of sector specific standardized baselines** in its version 2.0.

This update is based on the documentation provided in PSB0001. The rationale of PSB0001 is the documentation for this update and considered to be valid unless otherwise stated in this proposal. The documentation can be found under <http://cdm.unfccc.int/>.

Elements to be standardized

The standardized baseline is developed for:

- Additionality demonstration;
- Baseline identification;
- Baseline emission estimation.

Applicability of the proposed standardized baseline

Reference to the Guidelines (1): Level of aggregation
Step 1: Identify host country(ies), sectors, output(s) and measures

The applicability has not been changed for the update proposal.

- Host country(ies) or region(s) within a host country to which the standardized baseline is applicable:
 - Applicability of the standardized baseline is requested for Uganda.

- Sector(s) to which the standardized baselines is applied:
 - The production of charcoal products as a fuel for households and small and medium industries (SME).
- Output(s) to which the standardized baseline is applied:
 - Charcoal, as defined in the methodologies

Charcoal is a solid biofuel obtained from biomass by means of a thermo-chemical process known as “pyrolysis” or “carbonization process”, which consists of the thermal decomposition of biomass. Charcoal may be in the form of blocks or can take the form of charcoal briquettes (agglomeration of small carbonized particles or agglomeration of particles that are carbonised).
- The measures to which the proposed standardized baseline is applicable are:
 - **Measure 1: Fuel and feed stock switch**
 - **Measure 2: Switch of technology with or without change of energy sources (including energy efficiency improvement)**
 - **Measure 3: Methane destruction**

The measures may be all applied for a project or only one or two of the measures may fit to a project. For example, an improved kiln reduces emissions without fuel switch and methane destruction.

Measure 1 is not applicable for AMS-III.K because according to §4 of this methodology the implementation of the project activity shall not result in changes in the type and source of biomass raw material used for production of charcoal (e.g. if in the baseline charcoal was produced from coconut shells, the project activity will only produce charcoal from coconut shells).

The level of aggregation remains the same for all measures as described in the documentation submitted for the approved standardized baseline ASB0002. The documentation PSB0001 can be found under <http://cdm.unfccc.int/>.

Additionality standardization

Reference to the Guidelines (1): Additionality demonstration
Step 2: Establish additionality criteria for the identified measures
(e.g. positive lists of fuels /feed stocks and technologies)

Measure 1: Fuel and feed stock switch

The baseline fuel for charcoal production is either non-renewable woody biomass or renewable biomass from wood or residues. Biomass residues are defined as follows in the methodology: *Biomass residue – it is a by-product, residue or waste stream from agriculture, forestry and related industries. This shall not include mixed municipal waste or other wastes that contain fossilized and/or non-biodegradable material (however, small fractions of inert inorganic material like soil or sands may be included).*

As the fuel switch is mandatory according to the applicable methodology, additionality standardization is not needed for measure 1.

Reference is made to the following paragraph of AMS-III.BG:

This methodology is applicable to project activities that displace the use of non-renewable biomass in the production of charcoal supplied to identified consumers for thermal applications included in the project boundary.

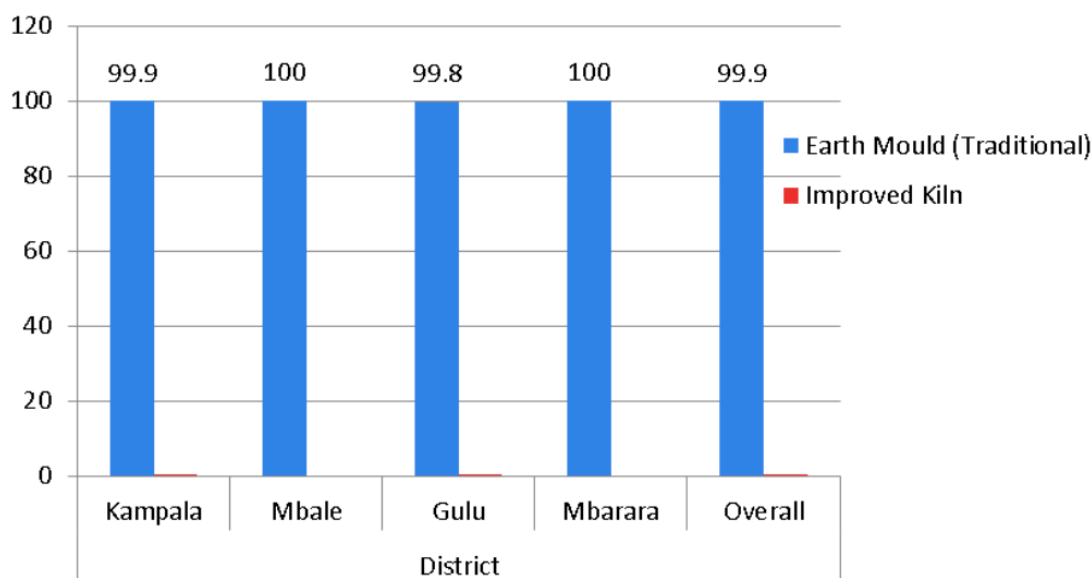
Measure 2: Switch of technology with or without change of energy sources (including energy efficiency improvement)

26. The cumulative percent of output O_i , produced based on technologies is arranged in descending order of carbon intensity of the technologies. (1)

The text in the box is quoted from the guidelines (1) including the number.

The output O_i is charcoal. The technologies are either earth mould (traditional) or improved kilns.

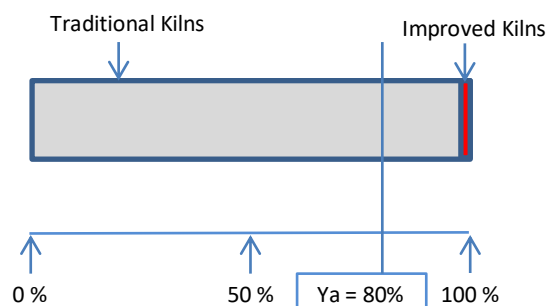
The National Charcoal Survey for Uganda 2015 (2) provides comprehensive data about the charcoal sector. The chapter 'Charcoal Production Technologies used' describes that charcoal burners reported that they use the traditional earth kiln for their charcoal burning. This was also reported during the charcoal burners key informant interviews. It was similarly reported by transporters during the traffic surveys. The figure below shows that the predominant charcoal production technology for the charcoal supplied in Kampala, Mbale, Gulu, and Mbarara is reported to be the traditional earth mould.



According to the Global Environment Facility proposal (4) the 0.1% improved kilns are of the type called casamance kiln.

27. Technologies that have lower greenhouse gas intensity than any of the technologies used to produce aggregately more than Y_a % of the output(s) O_i of the sector and are less commercially attractive than any of these technologies, are deemed additional. (1)

The interim value stipulated by the Guidelines (1) for households is 80% for Y_a . This translates into the following threshold diagram:



Furthermore, the following conditions apply to qualify a technology as additional.

28. Technologies are deemed less commercially attractive if their cost per unit of output is higher than that of all technologies used to produce aggregately more than Y_a % of the output(s) O_i of the sector, and
- (a) There is no national or sub-national enforced regulation mandating the use of these technologies;
 - (b) The Board clarifications on the consideration of national and or sectoral policies and circumstances in baseline scenarios is taken into account. (1)

All improved kilns are less commercially attractive than an earth mould kiln as they require additional hardware even if only drums or bricks.

The indicative cost of some improved technologies is 150 USD for Casamance Kiln and 1,000 USD for Sam 1 Kiln . The Adam Retort Kiln costs 1,200 USD for construction plus license fee of 2,000 USD per year (4) whereas the cost of traditional kilns are zero if the labour to operate is not taking into account. However, the above cost for improved kilns is without operating cost, as well.

Conclusion

Thus, all improved kilns are deemed additional.

As the term 'improved kilns' is not defined, a positive list of improved kiln types was included in the ASB0002.

The positive list of automatically additional kilns as published in ASB0002 is amended by other improved kiln technologies as follows.

Positive list of ASB0002

Name of the technology	Description
Casamance kiln	The Casamance kiln is an earth mound kiln equipped with a chimney. The chimney allows a better control of air flow. The hot flue gas is partly redirected into the kiln which enhances pyrolysis.
Adam retort sedimentary kiln	The Adam retort sedimentary kiln is a retort kiln. It redirects the flue gases back to the carbonization chamber. It burns the volatiles and the tar components almost completely. The retort is suitable for semi-industrial production.

Carbo twin retort	This kiln is a semi-continuous production module. It consists of two carbonization chambers. The pyrolysis vapours from one chamber are combusted to heat the other chamber.
Pyro 7 retort sedimentary kiln with or without briquetting process	This kiln is also a retort kiln. It uses two chambers: one for pre-combustion, one for the production of charcoal. It is usually made of metal. It also incorporates air flow control and a chimney.

New kiln technologies to be added to the positive list of technologies

Name of the technology	Description	Efficiency	PE _{y,flaring}
Sam 1 retort kiln	The Sam1 Brick Retort operates much in the same way as the Adam Retort. The major difference is that the fire box is within the retort as opposed to the external fire box. The heat losses to the walls of the fire box are minimized. The result is that it takes a shorter time and less fire wood to be fired. (4)	Average yield of 350 to 400 kg of charcoal from 1000kg of wood (dry basis), this is equivalent to 35 – 40 % efficiency (4)	0 as per definition in AMS-III.BG
Namibian metallic retort kiln	This kiln is a retort kiln made from a metallic drum. It redirects the flue gases back to the carbonization chamber. It burns the volatiles and the tar components almost completely. The volume is 1 m ³ with a load of 119 kg. The 26% mass yield produces high charcoal quality within 1	Average yield of 119 kg of charcoal per cycle. Estimated efficiency is 26%. Reference 8	0 as per definition in AMS-III.BG
Collapsible casamance kiln	The Casamance kiln is an earth mound kiln equipped with a chimney. The chimney allows a better control of air flow. The hot flue gas is partly redirected into the kiln which enhances pyrolysis. This type of kiln is designed with a chimney set up from several parts Thus this chimney can be easily transported.	Average yield of 200kg to 250 kg of charcoal from 1000kg of wood giving an efficiency of 20% to 25% (4)	

Measure 3: Methane destruction

Not any law or regulation in Uganda entered into force which requires destruction of methane. Thus any methane destruction is additional.

This result of literature search was double checked by an interview of the person in charge at the Ministry of Energy (MEMD): The climate change policy of Uganda addresses the GHG including methane but no regulation entered into force yet.

Baseline identification

Reference to the Guidelines (1): Baseline identification
Step 3: Identify the baseline for the measures
(e.g. baseline fuel, technology, level of GHG destruction)

Measure 1: Fuel and feed stock switch

As the fuel switch is mandatory according to the applicable methodology AMS III BG, the baseline is stipulated in the methodology for measure 1 as follows.

Baseline scenario

For the charcoal portion produced from non-renewable biomass in the baseline, it is assumed that in the absence of the project activity, the baseline scenario would be the future use of fossil fuels for meeting similar thermal energy needs.

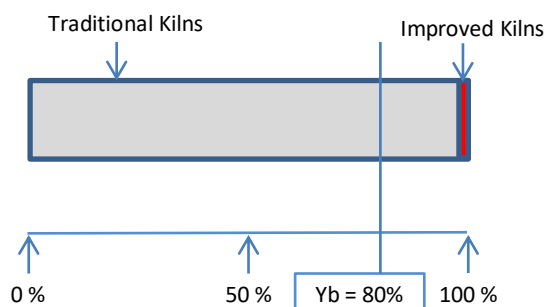
For the charcoal portion produced from renewable biomass in the baseline, traditional open-ended methods resulting in methane emitted to the atmosphere forms the baseline scenario.

Furthermore, the project document **Addressing Barriers to Adoption of Improved Charcoal Production** (4) stated that all biomass used in charcoal production is non-renewable BAU practices. Following the justification of the document submitted as PSB0001 the baseline is 99.9% use of natural forests equivalent to non-renewable biomass (1).

Measure 2: Switch of technology with or without change of energy sources (including energy efficiency improvement)

29. Identify the technologies with the highest emission factors and contributing to produce in aggregate $Y_b\%$ of the output O_i produced in the sector. The technology with the lowest carbon emission factor among them is the baseline technology. (1)

As demonstrated in the chapter Additionality standardization above the traditional kiln is used for 99.9% of the charcoal production. Thus, the following threshold defines the baseline technology:



Conclusion

The baseline identification for the measures is still valid as demonstrated in the proposal PSB0001. The baseline is the

Production of charcoal in unimproved traditional kilns by the informal sector by use of non-renewable biomass.

Measure 3: Methane destruction

34. This measure may include methane destruction in landfill, biogas digesters to treat manure or wastewater including recovery, flaring, and use of methane captured.
37. The baseline level of destruction in the area defined under paragraph 34 above is the percentage of methane formed that is mandated and enforced for destruction. (1)

No law or regulation in Uganda entered into force which requires destruction of methane. Thus, the baseline is zero methane destruction. Refer to step 2 for reference.

Baseline parameter standardization

Reference to the Guidelines (1): **Baseline emission factor**

Step 4: Determine the baseline emission factor where relevant.

Measure 1: Fuel and feed stock switch

The approved standardized parameters as of ASB0002 are as follows:

Table 1 Standardized values for fuel switch

Parameter	Unit	Description	Standardized values	Source
<i>f_{NRB,BL,wood}</i>	Fraction	Fraction of biomass of type <i>i</i> used in the absence of the project activity that can be established as non-renewable biomass	0.82	Default values of fraction of non-renewable biomass can be retrieved at: < http://cdm.unfccc.int/DNA/fNRB/

Table 2 Update of the standardized values

Parameter	Unit	Stand. values	Source	Comments to the update
<i>f_{NRB,BL,wood}</i>	Fraction	0.82	Default values of fraction of non-renewable biomass can be retrieved at: < http://cdm.unfccc.int/DNA/fNRB/index.html	Default value is still valid until 1. April 2017

Measure 2: Switch of technology with or without change of energy sources (including energy efficiency improvement)

The standardized parameter for the technologies is $PE_{y,flaring}$ which can be found in the positive list above if available.

Measure 3: Methane destruction

The approved standardized parameters as of ASB0002 are as follows:

Table 3 Standardized values for methane

Parameter	Unit	Description	Standardized values	Source
Md	tonne of CH ₄ /tonne of raw material	Factor to account for any legal requirement for capture and destruction of methane in the charcoal production facility	0	Based on the data provided in PSB0001
SMGy,b	tonnes CH ₄ /t charcoal product	Specific methane generation for the baseline charcoal generation process in the year y	0.030	Based on the data provided in PSB0001 and AMS-III.BG

Table 4 Update of the standardized values for methane

Parameter	Unit	Stand. values	Source	Comments to the update
<i>Md</i>	tonne of CH ₄ /tonne of raw material	0	Based on the data provided in PSB0001	Still valid as elaborated in step 2.
<i>SMGy,b</i>	tonnes CH ₄ /t charcoal product	0.030	Based on the data provided in PSB0001 and AMS-III.BG.	There are no recent data available which prove this figure as reliable. Thus, no change applies
SMGb	tonnes CH ₄ /t Raw Material	0.011	Specific methane generation for the baseline charcoal generation process in the year y if AMS III	Based on the data provided in PSB0001. Reference 9

Use of the proposed standardized baseline with approved or proposed new or revised methodology(ies)

The standardized baseline has to be used in conjunction with the most recent version of AMS-III.BG.

Fuel switch is mandatory if a project proponent uses this SB in conjunction with AMS-III.BG. Alternatively, in cases where fuel switch is not intended the most recent version of AMS-III.K can be used.

Validity of the proposed standardized baseline

The provisions stipulated in the **Standard for determining coverage of data and validity of standardized baselines** (version 01.0) are mandatory for this standardized baseline.

References and any other relevant information

- (1) Guidelines for the establishment of sector specific standardized baselines (version 02.0)
- (2) National charcoal survey for Uganda 2015, final report, published June 2016
- (3) Perspectives: Nicolas Müller, Axel Michaelowa, and Michael Eschman (2011). Proposal for a New Standardized Baseline for Charcoal Projects in the Clean Development Mechanism to be Considered by the Executive Board of the Clean Development Mechanism. Prepared by Perspectives GmbH. Zurich, Switzerland.
- (4) Project document of Republic of Uganda, United Nations Development Programme, Global Environment Facility: Addressing Barriers to Adoption of Improved Charcoal Production Technologies and Sustainable Land Management Practices through an Integrated Approach (not dated)
- (5) Standard for determining coverage of data and validity of standardized baselines (version 01.0)
- (6) AMS_III.BG
- (7) AMS_III.K
- (8) Kiln Technology Report (12.10.2016) Part 3
- (9) GHDdatabase_update.xls