

REDD Methodological Module

“Estimation of emissions from displacement of fuel wood” – LK-DFW

Version – April 2010

I. SCOPE, APPLICABILITY AND PARAMETERS

Scope

This module allows for estimating GHG emissions caused by the activity-shifting leakage for projects avoiding degradation from fuel wood collection and charcoal production.

Applicability

The module is applicable for estimating the leakage emissions due to activity shifting for projects avoiding degradation from fuel wood collection and charcoal production.

Where fuel wood is collected or charcoal is produced for sale in regional or national market the market effects leakage must be considered using Module LK-ME.

Required conditions¹

- Module BL-DFW must have been used to define the baseline

Exclusionary conditions²

- If degradation is caused by either illegal or legal tree extraction for timber, this module cannot be used, degradation shall only be caused by fuel wood collection / charcoal production
- If the individuals / households involved in collecting fuel wood / producing charcoal are not identifiable or are not willing to share information on fuel wood consumption and/or charcoal production then this module cannot be used

¹ Required conditions are full applicability criteria, non-compliance leads to non-applicability of the module and by extension non-applicability of the methodology

² Exclusionary conditions are full applicability criteria, non-compliance leads to non-applicability of the module and by extension non-applicability of the methodology

Parameters

This module provides procedures to determine the following parameter:

Parameter	SI Unit	Description
$\Delta C_{LK-AS, degrad-FW/C}$	t-CO ₂ -e	Net CO ₂ -e emissions due to activity-shifting leakage for degradation caused by extraction of wood for fuel

II. PROCEDURE

Demonstrably renewable woody biomass (DRB)

Biomass³ is “renewable” if one of the following five conditions applies:

1. The biomass is originating from land areas that are **forests** 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 harvest); and
 - c. Any national or regional forestry and nature conservation regulations are complied with.
2. The biomass is **woody biomass** and originates from **croplands and/or grasslands** where:
 - a. The land area remains cropland and/or grassland 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 not systematically decrease over time (carbon stocks may temporarily decrease due to harvest); and
 - c. Any national or regional forestry and nature conservation regulations are complied with.
3. The biomass is **non-woody biomass** and originates from **croplands and/or grasslands** where:
 - a. The land area remains cropland and/or grassland 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 not

³ This definition follows the CDM: EB 23, Annex 18

- systematically decrease over time (carbon stocks may temporarily decrease due to harvest); and
- c. Any national or regional forestry and nature conservation regulations are complied with.
 4. The biomass is **biomass residue**⁴ and the use of that biomass residue in the project activity does not involve a decrease of carbon pools, in particular dead wood, litter or soil organic carbon, on the land areas where the biomass residues are originating from. For example, if bagasse from sugar production would in the absence of a project be dumped or left to decay and is used for energy generation under a REDD-project scenario, it can be assumed that the use of the bagasse does not affect the sugar cane cultivation practices and hence the carbon pools of the respective soils. In contrast, where a REDD project involves the collection of dead wood from a forest, which would not be collected in the absence of the CDM, the extracted biomass cannot be regarded as renewable, since it would result in a decrease of carbon stocks.
 5. The biomass is the non-fossil fraction of an industrial or municipal waste.

Otherwise, where none of these conditions applies, the biomass is considered as “**non-renewable biomass**” (NRB).

Calculation of Emissions due to Activity Shifting Leakage

Step 1: For each monitoring period, estimate the average annual amount of demonstrably renewable biomass collected (in Mg) and the volume of fuel wood collected in the project area (if any). The baseline rate of fuel wood collection minus this with-project rate and the demonstrably renewable biomass gives an estimate of the non-renewable biomass harvested as a result of implementing the project activity. Estimates shall be obtained through a Participatory Rural Appraisal (PRA).

$$NRB_t = \left(\sum_{i=1}^{M_R} \frac{(FG_{BSL,i,t} - FG_{PA,i,t}) * D_{mn}}{0.9} \right) - DRB_t \quad (1)$$

Where:

NRB_t Non-renewable biomass gathered for fuel and/or charcoal production as a result of project implementation at time t ; Mg yr⁻¹

⁴ Biomass residue is defined as biomass by-products, residues and waste streams from agriculture, forestry and related industries

$FG_{BSL,i,t}$	Average projected annual volume of wood gathered in the project area for fuel and/or charcoal production in the baseline scenario in stratum i at time t ; $m^3 \text{ yr}^{-1}$ (from Module BL-DFW)
$FG_{PA,i,t}$	Volume of fuel-wood gathered in the project area from stratum i at time t ; $m^3 \text{ yr}^{-1}$
DRB_t	Demonstrably biomass collected at time t ; Mg yr^{-1}
D_{mn}	Mean wood density of commercially harvested species; t d.m.m^{-3}
CF	Carbon fraction of dry matter; t C t. d.m.^{-1}
i	1, 2, 3 ... M_B strata in the baseline scenario
t	1, 2, 3, ... t^* years elapsed since the projected start of the REDD project activity

Step 2:

Leakage due to displacement of fuel wood collection shall be estimated as follows:

$$\Delta C_{LK-AS, \text{degrad-FW/C}} = \sum_{i=1}^{i^*} NRB_i * CF * \frac{44}{12} \quad (2)$$

Where:

$\Delta C_{LK-AS, \text{degrad-FW/C}}$	$\text{CO}_2\text{-e}$ emissions due to activity shifting leakage for degradation caused by extraction of wood for fuel up to year t^* ; $\text{t CO}_2\text{-e}$
NRB_t	Non-renewable biomass gathered for fuel and/or charcoal production as a result of project implementation at time t ; Mg yr^{-1}
CF	Carbon fraction of dry matter; t C t. d.m.^{-1}
t	1, 2, 3, ... t^* years elapsed since the projected start of the REDD project activity

III. DATA AND PARAMETERS NOT MONITORED (DEFAULT OR MEASURED ONE TIME)

Data / parameter:	CF
Data unit:	t C t d.m.^{-1}
Used in equations:	2

Description:	Carbon fraction of dry matter
Source of data:	Default value $0.47 \text{ t C t}^{-1} \text{ d.m.}$ can be used, or species specific values from the literature (e.g. IPCC 2006 INV GLs AFOLU Chapter 4 Table 4.3)
Measurement procedures (if any):	
Any comment:	

Data / parameter:	D_{mn}
Data unit:	t d.m.m^{-3}
Used in equations:	1
Description:	Mean wood density of commercially harvested species
Source of data:	<p>The source of data shall be chosen with priority from higher to lower preference as follows:</p> <ul style="list-style-type: none"> (a) Averaged national and commercial species-specific (e.g. from National GHG inventory or site specific measurements); (b) Averaged commercial species-specific from neighboring countries with similar conditions. Sometimes (b) may be preferable to (a). (c) Averaged regional commercial species-specific (e.g. Table 4.13 IPCC National Guidance for Greenhouse Gas Inventories AFOLU Section). (d) Regional average ($0.58 \text{ t d.m.m}^{-3}$- tropical Africa; $0.60 \text{ t d.m.m}^{-3}$- tropical America; 0.57 d.m.m^{-3}- tropical Asia) from Brown, S. 1997. Estimating Biomass and Biomass Change of Tropical Forests: a Primer. For the Food and Agriculture Organization of the United Nations. Rome, 1997. FAO Forestry Paper - 134. ISBN 92-5-103955-0.
Measurement procedures (if any):	
Any comment:	

IV. DATA AND PARAMETERS MONITORED

Data / parameter:	DRB_t
Data unit:	Mg yr^{-1}
Used in equations:	1
Description:	Demonstrably renewable biomass
Source of data:	PRA
Measurement procedures (if any):	PRA shall be conducted through interviews and questionnaires
Monitoring frequency:	Must be reexamined at least every 5 years
QA/QC procedures:	
Any comment:	Ex-ante a justifiable estimate shall be made of proportion of fuelwood that is demonstrably renewable

Data / parameter:	$FG_{PA,i,t}$
Data unit:	$\text{m}^3 \text{yr}^{-1}$
Used in equations:	1
Description:	Volume of fuel-wood gathered in stratum i of the project area according to monitoring results
Source of data:	Interviews / Participatory Rural Appraisals, field measurement and literature data. Monitoring should be conducted in communities within the project boundary and in communities outside the boundary but potentially collecting fuelwood or producing charcoal from within the boundaries
Measurement procedures (if any):	
Monitoring frequency:	Must be reexamined at least every 5 years
QA/QC procedures:	
Any comment:	Ex-ante a justifiable estimate shall be made of fuelwood that can be sustainably harvested from the project area

V. PARAMETERS ORIGINATING IN OTHER MODULES

Data / parameter:	$FG_{BSL,i,t}$
Data unit:	$m^3 \text{ yr}^{-1}$
Used in equations:	1
Description:	Average projected annual volume of wood gathered in the project area for fuel and/or charcoal production in the baseline scenario in stratum i at time t
Module parameter originates in:	BL-DFW
Any comment:	Updated at every baseline renewal