

TOOL30

Methodological tool

Calculation of the fraction of non-renewable biomass

Version 02.0



United Nations
Framework Convention on
Climate Change

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1. Introduction

1. The methodological tool determines fraction of woody biomass that can be established as non-renewable biomass (fNRB).

2. Scope, applicability, and entry into force

2.1. Scope

2. This tool provides guidance and a step-wise procedure/method to calculate values of fNRB. The tool may be applied when calculating baseline emissions in applicable methodologies (e.g. AMS-I.E, AMS-II.G, AMS-III.Z, AMS-III.AV) for a project activity or a Programmes of Activities (PoA) that displaces the use of non-renewable biomass.

2.2. Applicability

3. This tool may be used by:
 - (a) DNAs to submit region/country-specific default fNRB values, following the procedures for development, revision, clarification and update of standardized baselines (SB procedures); or
 - (b) project proponents to calculate project or PoA-specific fNRB values.
4. For project or PoA specific fNRB values, project proponents shall assess the area where biomass is sourced and justify the selection of the area in CDM project design documents.

2.3. Entry into force

5. The date of entry into force is the date of the publication of the EB 102 meeting report on 28 March 2019.

3. Normative references

6. This methodology refers to the CDM methodological tool "Project and leakage emissions from biomass".

4. Procedure

7. The shares of renewable and non-renewable woody biomass in the quantity of woody biomass consumption shall be determined following the steps described below. Alternatively, a conservative default fNRB value of 0.3 may be used¹ as a country or sub-national value.

¹ The default fNRB value of 0.3 may be used irrespective of the versions of the applicable methodology (e.g., AMS-I.E, AMS-II.G, AMS-III.Z, AMS-III.AV).

8. The fraction of woody biomass that can be established as non-renewable, is:

$$f_{NRB} = \frac{NRB}{NRB + RB} \quad \text{Equation (1)}$$

Where:

- fNRB = Fraction of non-renewable biomass in the country/region or project area (fraction or %)
- NRB = Quantity of non-renewable biomass (t/yr) in the country/region or project area, determined as per paragraphs 10 and 11 below
- RB = Quantity of renewable biomass in the country/region or project area, determined as per section 4.2 below (t/yr)

9. On a country- or region-specific basis, quantity of NRB shall be determined by calculating the total consumption of wood (H) in the country or region and then deducting the quantity of renewable biomass (RB) from it.

$$NRB = H - RB \quad \text{Equation (2)}$$

Where:

- H = Total annual consumption of wood in the absence of the project activity in the country/region/project area, determined as per section 4.1 below (t/yr)

10. On a project-specific basis, a value of fNRB can be derived by calculating the total woody biomass consumption used in the absence of the project activity ($B_{old,total}$) and estimating the potential supply of renewable biomass (RB).

$$NRB = B_{old,total} - RB \quad \text{Equation (3)}$$

Where:

- $B_{old,total}$ = Total annual consumption of wood in the project area in the absence of the project activity, as determined using the step wise procedure provided in the section 4.1 below (t/yr)

4.1. Procedure to estimate consumption of woody biomass (H and $B_{old,total}$)

11. Estimate the overall consumption of woody biomass, using one of the following options:
- Official statistics or reports or peer-reviewed literature;
 - Based on the number of households and other consumers of woody biomass in the country or region (H) or project area ($B_{old,total}$) as per the procedure in paragraph 12 or 13 below.
12. H is calculated using equation (4), accounting for all consumption within the country/region (not only wood fuel but also timber and industrial consumption).

$$H = HW_{region} \times N_{region} + TI_{region} \quad \text{Equation (4)}$$

Where:

HW_{region}	=	Average household wood fuel consumption, including fuelwood and charcoal in the country or region (t/yr/household)
TI_{region}	=	Non-domestic woody biomass consumption for energy applications (e.g. commercial, industrial or institutional uses of wood in ovens, boilers etc.) and all woody biomass consumption for non-energy applications (e.g. construction, furniture) that are extracted from forests or land areas in the country/region for which the estimate of fNRB is to be made (t/yr)
N_{region}	=	Number of households consuming wood fuel for thermal applications within the country/region (households)

13. For a project-specific area, $B_{old,total}$ is estimated using equation (5), based on the overall wood consumption in the area where the project is proposed.

$$B_{old,total} = HW_{project} \times N_{project} + TI_{project} \quad \text{Equation (5)}$$

Where:

$HW_{project}$	=	Average household wood fuel consumption, including fuelwood and charcoal in the project area (t/yr/household)
$TI_{project}$	=	Non-domestic woody biomass consumption for energy applications (e.g. commercial, industrial or institutional uses of wood in ovens, boilers, etc.) and all woody biomass consumption for non-energy applications (construction, furniture) that are extracted from forests or land areas in the project area for which the estimate of fNRB is to be made (t/yr)
$N_{project}$	=	Number of households consuming wood fuel for thermal applications within the project area (households)

14. For the purpose of this tool, wherever charcoal is used for domestic or non-domestic applications, the corresponding quantity of woody biomass shall be determined using a default wood to charcoal conversion factor of 6 kg of firewood (wet basis) per kg of charcoal (dry basis)². Alternatively, credible local conversion factors (e.g. determined from a field study or literature) may be applied.

4.2. Procedure to estimate RB

15. Renewable biomass (RB) in the country/region/project area is estimated using the equation below.

$$RB = \sum (MAI_{forest,i} \times (F_{forest,i} - P_{forest})) + \sum (MAI_{other,i} \times (F_{other,i} - P_{other})) \quad \text{Equation (6)}$$

² 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.

Where:

$MAI_{forest,i}$	=	Mean Annual Increment of woody biomass growth per hectare in sub-category i of forest areas (t/ha/yr)
$MAI_{other,i}$	=	Mean Annual Increment of woody biomass growth per hectare in sub-category i of other wooded land areas (t/ha/yr)
$F_{forest,i}$	=	Extent of forest in sub-category i (ha) ³
$F_{other,i}$	=	Extent of other wooded land in sub-category i (ha) ²
P_{forest}	=	Extent of non-accessible area (e.g. protected area where extraction of wood is prohibited, geographically remote area) within forest areas (ha)
P_{other}	=	Extent of non-accessible area (e.g. protected area where extraction of wood is prohibited, geographically remote area) within other wooded land areas (ha)
i	=	Sub-category i of forest areas and other wooded land areas ⁴

5. Monitoring methodology

16. The value of fNRB for the country/region or project area shall be calculated using either of the two following options:
- Ex ante:** the fNRB value is determined once at the validation stage, thus no monitoring and recalculation of the fNRB value during the crediting period is required;
 - Ex post:** the fNRB_y value is determined for the year “y” in the crediting period, requiring the fNRB value to be updated annually, following a consistent calculation procedure throughout the crediting period.
17. Cubic meters (m³) instead of tonnes (t) of wood may be used for estimation of fNRB values, as long as the same unit and the same conversion factor (e.g. wood density, moisture content) are consistently used for estimation of both consumption (i.e. *HWregion* and *TIregion* or *HWproject* and *TIproject*) and mean annual increment (i.e. $MAI_{forest,i}$ and $MAI_{other,i}$).
18. In the case of ex-ante calculation of fNRB, the parameter fNRB shall be estimated using the most recent historical year for which data is available. In the case of ex-post calculation of fNRB, the parameter fNRB shall be estimated for the applicable year y of the crediting period. Where available, the same vintage of data should be used for all parameters applied in this tool to calculate fNRB. Where data for one single vintage is not available for all parameters, different vintages may be used for parameters, as long as it can be justified (e.g. the use of different vintages leads to a conservative estimate of fNRB).

³ Forest and non-forest areas for which products or by-products are not available for meeting thermal uses as per AMS-I.E and AMS-II.G (e.g. commercial forests for plywood or for industrial use, or dedicated pastures or agricultural areas not accessible to woody biomass collection) may be excluded in this estimate, as long as the products and by-products of these areas are also not accounted for in the estimation of the consumption of biomass in Section 4.1.

⁴ Besides woody biomass from forest areas and other wooded land areas, DNAs or PPs shall also include woody biomass from other land areas that do not fall under the category of forest areas and other wooded land areas. Where any of potential sources of supply are not taken into account, it shall be justified.

Table 1. Data / Parameter

Data / Parameter:	<i>HW_{region}, HW_{project}</i>
Data unit:	t/yr/household
Description:	Average household wood fuel consumption, including fuelwood and charcoal in the country or region. Average household wood fuel consumption, including fuelwood and charcoal in the project area.
Source of data:	Use one of the following options: a) Approved standardized baselines valid for the country/region/area; or b) Official statistics or reports or peer-reviewed literature; or c) Results of a sampling survey conducted as per the latest version of “sampling and surveys for CDM project activities and programme of activities”; or d) Default values adopted within CDM framework valid for the country/region/area (e.g. a default value of 0.5 tonnes/capita per year under AMS-II.G). The most recent available historical data shall be used. However, the vintage of the above data shall not be before year 2000.
Measurement procedures (if any):	-
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Table 2. Data / Parameter

Data / Parameter:	<i>TI_{region}, TI_{project}</i>
Data unit:	t/yr
Description:	Non-domestic woody biomass consumption for energy applications (e.g. commercial, industrial or institutional uses of wood in ovens, boilers etc.) and all woody biomass consumption for non-energy applications (e.g. construction, furniture) that are extracted from forests or land areas in the country/region for which the estimate of fNRB is to be made. Non-domestic woody biomass consumption for energy applications (e.g. commercial, industrial or institutional uses of wood in ovens, boilers, etc.) and all woody biomass consumption for non-energy applications (construction, furniture) that are extracted from forests or land areas in the project area for which the estimate of fNRB is to be made.
Source of data:	For country or region, it may be determined through existing studies or government data or surveys. For the project area, it may be determined through surveys. The most recent available historical data shall be used.
Measurement procedures (if any):	-
Monitoring frequency:	-
QA/QC procedures:	-

Any comment:	The determination of mass or volume of “woody biomass” may be based on the above ground biomass within trunks and branches. Below ground biomass, twigs and leaves may be excluded in the calculations.
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Table 3. Data / Parameter

Data / Parameter:	N_{region}, $N_{project}$
Data unit:	Number of households
Description:	Number of households consuming wood fuel for thermal applications within the country/region. Number of households consuming wood fuel for thermal applications within the project area.
Source of data:	For country or region, it may be determined through existing studies or government data or surveys. For the project area, it may be determined through surveys. If the most recent available data for N_{region} or $N_{project}$ is only available for an earlier year than the year for which the estimation of fNRB value is done, then the historical annual population growth rate may be used to estimate the population value for the year for which the fNRB value is established. For example, if the latest available historical population data is 2015, it may be extrapolated, taking into account the historical annual population growth rate to calculate the population in 2018 (year in which the estimation of fNRB is being done).
Measurement procedures (if any):	-
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Table 4. Data / Parameter

Data / Parameter:	$MAI_{forest,i}$, $MAI_{other,i}$
Data unit:	t/ha/yr
Description:	Mean Annual Increment of woody biomass growth per hectare in sub-category i of forest areas. Mean Annual Increment of woody biomass growth per hectare in sub-category i of other wooded land areas.

Source of data:	The following data source may be used: a) Global Forest Resources Assessment 2000 by the FAO for “Distribution of total forest area by ecological zone” (Table 14); and/or b) 2006 IPCC Guidelines for National Greenhouse Gas Inventories for “Above-ground biomass growth rates (t/ha-yr) for different ecological zones” (Chapter 4, Table 4.9). Use a weighted average based on the forest area of two different age categories (i.e. above and below 20 years), if such data is available. Otherwise, use a simple average of the two age categories; c) National studies or government data or official statistics. The most recent available data shall be used. However, the vintage of the above data shall not be before year 2000.
Measurement procedures (if any):	-
Monitoring frequency:	-
QA/QC procedures:	If national studies or government data or official statistics are used, compare values with FAO and IPCC defaults and provide justification of differences.
Any comment:	-

Table 5. Data / Parameter

Data / Parameter:	$F_{forest,i}$, $F_{other,i}$
Data unit:	ha
Description:	Extent of forest in sub-category i Extent of other wooded land in sub-category i
Source of data:	The following data source may be used: a) Global Forest Resources Assessment 2015 by the Food and Agriculture Organization of the United Nations (FAO); b) Official statistics; c) Project-specific survey data. If the value of fNRB is calculated for a project area for the year “y”, and during this year a decrease in the forest area is projected to occur, the extent of the forest area available to provide woody biomass to the users can correspond to the forest area (hectares) at the beginning of the year “y”, or the average of the values of the forest area at the beginning and at the end of the year “y”.
Measurement procedures (if any):	-
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Table 6. Data / Parameter

Data / Parameter:	P_{forest}, P_{other}
Data unit:	ha
Description:	Extent of non-accessible area (e.g. protected area where extraction of wood is prohibited, geographically remote area) within forest areas. Extent of non-accessible area (e.g. protected area where extraction of wood is prohibited, geographically remote area) within other wooded land areas.
Source of data:	The following data source may be used for the data on protected area: a) Global Forest Resources Assessment 2015 by the Food and Agriculture Organization of the United Nations (FAO) b) National studies or government data or official statistics. The most recent available data shall be used. To define “geographically remote area”, DNAs/PPs may consider proximity to roads or rivers. For example, forests/other wooded lands that are beyond the average distance travelled to collect firewood can be considered non-accessible. The information of the average travel distance may be sourced from national studies or peer-reviewed literature, or surveys in the project area.
Measurement procedures (if any):	-
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	Consideration of this parameter is optional. If DNAs or PPs wish to consider non-accessible areas, they shall provide justification.

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Document information

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02.0	28 March 2019	EB 102, Annex 7 Revision to: <ul style="list-style-type: none"> • Provide options of data sources for parameters, which could be used by DNAs and project participants to establish an fNRB value; • Clarify the requirements on the data vintage for parameters used in the calculation of fNRB values.

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Methodological tool: Calculation of the fraction of non-renewable biomass

Version 02.0

<i>Version</i>	<i>Date</i>	<i>Description</i>
01.0	1 November 2017	EB 97, Annex 9 Initial adoption.

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