# Fraction of Non-Renewable Biomass ($f_{NRB}$) Assessment for Peru

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# Contents



**About Microsol:**

*Microsol is a social business organization dedicated to associate institutions and NGO experts in projects that improve the life quality of people affected by poverty and climate change in rural areas of Latin America. Microsol specializes in projects that are capable to be sustained over time, guarantee outcomes and integrate all the actors involved in the process. Microsol developed the first ever voluntary Gold Standard Programme of activities (PoA), the Qori Q'oncha PoA (GS1005)[1] that certified more than 100,000 improved cook stoves implemented throughout Peru by several public and private local partners. It has been registered in 2010 and is currently undergoing its fifth verification.*

*Microsol builds programmes that replicate this experience and allow project developers of improved cook stoves and other appropriate technologies to benefit both from our knowledge transfer methodology and the resources from the international carbon market. In this framework Microsol developed the Utsil Naj PoA (GS1377)[2], a multi-country and multi-technology programme in Central America that certifies improved cook stoves and water filters project activities. It has been registered with Gold Standard in 2015 and is currently undergoing its first verification.*

[1] https://mer.markit.com/br-reg/public/master-project.jsp?project_id=103000000000012
[2] https://mer.markit.com/br-reg/public/master-project.jsp?project_id=103000000000039

# 1. Introduction

## 1.1. Context

The fraction of non-renewable biomass ($f_{NRB}$), that is to say the fraction of woody biomass saved by a project activity that can be established as non-renewable biomass, has a direct impact on GHGs emission reductions therefore its assessment is of significant importance. The project developer must calculate the $f_{NRB}$ corresponding to the project's geographical area, in order for the woody biomass project be certified for carbon credits. A project developer can calculate a project-specific $f_{NRB}$ value or apply the default $f_{NRB}$ value, if it has already been approved by the CDM Executive Board (CDM EB) and accepted by the designated national authority (DNA).

At its sixty-seventh meeting[3], the CDM EB approved the $f_{NRB}$ assessment approach for least developed countries, small island developing states and Parties with 10 or less registered CDM project activities, as of 31 December 2010. The national $f_{NRB}$ calculation must be approved by the CDM EB and accepted by the DNA. Once these qualifications are fulfilled, the $f_{NRB}$ default value can be applied in small-scale project activities and programme of activities located in the respective host country.

Nevertheless as of March 1st 2016, only thirty-four DNAs[4] have accepted their perspective $f_{NRB}$ values, and this includes only four countries from Latin America. Therefore the $f_{NRB}$ assessment must be conducted by the project developer on a case-by-case basis , in the remaining Latin America and the Caribbean countries.[5] They must follow the assessment approach provided in CDM methodology AMS-II.G[6] or the Gold Standard (GS) methodology: "Technologies and practices to displace decentralized thermal energy consumption" (TPDDTEC)[7] for GS projects. The $f_{NRB}$ assessment study usually involves extensive data collection. It can in fact be very challenging to access reliable, accurate, updated and exhaustive information in some countries. Determining the project-specific $f_{NRB}$ value is therefore systematically a source of uncertainty for the project proponent and can involve high cost and even represent a barrier to the project development.

The current situation leads to the duplication of efforts for $f_{NRB}$ assessments due to the absence of validated default $f_{NRB}$ values at national level for the majority of host countries. The project *'Financing efficient cookstoves for rural Andean communities'* funded by Inter-American Development Bank and World Vision Australia aims at promoting the use of clean cookstoves in Peruvian Andean communities. Its broader objective is to promote the development of improved cookstoves (ICS) activities by reducing the current complexity of project implementation and by benefiting from the experience of existing projects. This includes the assessment of $f_{NRB}$ value for Peru, Guatemala, Honduras, Colombia and Bolivia. In this context, this report is prepared for $f_{NRB}$

[3] Annex 22 to the report of the 67th meeting of the CDM EB: https://cdm.unfccc.int/filestorage/H/2/9/H29X6EKQMJU7RY85DIT4ZPFAL3O1GW/eb67_repan22.pdf?t=Z2p8bzN6bGVrfDB8-Qj9tm7Gp27TXP-YqX5Q

[4] Default values of fraction of non-renewable biomass: https://cdm.unfccc.int/DNA/fNRB/index.html

[5] Dominican Republic, Grenada, Republic of Haiti, Commonwealth of Jamaica

[6] Energy efficiency measures in thermal applications of non-renewable biomass (AMS-II.G): https://cdm.unfccc.int/methodologies/DB/KZ6FQOCEEHD1V02ARWTW1W2R9G45BX

[7] Technologies and practices to displace decentralized thermal energy consumption (TPDDTEC): http://www.goldstandard.org/sites/default/files/revised-tpddtec-methodology_april-2015_final-clean.pdf

assessment of Peru. On its approval by the GS Secretariat project developers can apply the $f_{NRB}$ value estimated in this report for activities located in Peru.

### 1.2. Methodologies for assessment of $f_{NRB}$

The GS guidelines for $f_{NRB}$ assessment are included in the latest methodology TPDDTEC version 2.0. The methodology Annex 1 presents the guidelines to be followed in order to conduct the NRB assessment, including in total three options:

1) Quantitative NRB assessment,

2) Qualitative NRB assessment and

3) NRB assessment similar to the CDM approach as provided in the methodology AMS-II.G.

As part of the Qori Q'oncha PoA, Microsol has worked for many years on the NRB assessment of Peru. Microsol developed the $f_{NRB}$ assessment following the **NRB assessment approach provided in CDM methodology AMS-II.G**. This option is based on the concept of Demonstrably Renewable woody Biomass (DRB). The applicable equation is:

$$f_{NRB} = NRB / (NRB + DRB)$$

The DRB has been defined as follows: "Renewability must be demonstrated by providing incontrovertible evidence of biomass resources management and evidence of likely continuation of management. Project proponents should not designate DRB if there is contrary evidence or cause to doubt reliability of records."

In the following section we present the latest NRB assessment for Peru that has been developed by Microsol following the **CDM EB Report 67, Annex 22**[8] ("Default values of fraction of non-renewable biomass for least developed countries and small island developing states") that provides assessment approach to estimate $f_{NRB}$ values at national level. The $f_{NRB}$ assessment following CDM methodology will enable project developers from Peru who are seeking GS and/or CDM certification to apply the estimated $f_{NRB}$ value for their emission reductions calculation.

## 2. $f_{NRB}$ assessment based on CDM EB Report 67, Annex 22

### 2.1. Methodological framework

The CDM EB 67 Annex 22 proposes an NRB assessment approach following the CDM methodology AMS-II.G requirements. The following equations apply:

$$fNRB = \frac{NRB}{NRB + DRB} \quad (1)$$

Where:

[8] Annex 22 to the report of the 67th meeting of the CDM EB: https://cdm.unfccc.int/filestorage/H/2/9/H29X6EKQMJU7RY85DIT4ZPFAL3O1GW/eb67_repan22.pdf?t=Z2p8bzN6bGVrfDB8-Qj9tm7Gp27TXP-YqX5Q

| | |
|---|---|
| *fNRB* | *Fraction of non-renewable biomass (fraction or %)* |
| *NRB* | *Non-renewable biomass (t/yr)* |
| *DRB* | *Demonstrably renewable biomass (t/yr)* |

Since the available data on forests and wood consumption are the most accessible, complete and accurate at national level, the $f_{NRB}$ is estimated at national level. Using the concept of DRB at national-level, the value of NRB can be derived from:

- The Total Annual Biomass Removals (R), approximated by the quantity of woody biomass used annually in the country in the absence of the project activity;
- The proportion of R that is demonstrably renewable (DRB) and non-renewable (NRB).

$$NRB = R - DRB \quad (2)$$

Where:

| | |
|---|---|
| *R* | *Total annual biomass removals (t/yr)* |

The Total Annual Biomass Removals for a country is inferred by calculating the sum of the Mean Annual Increment in biomass growth (MAI) and the Annual Change in Living Forest Biomass stocks ($\Delta F$). As far as biomass growth (MAI) and change in stock ($\Delta F$) are both known, the balancing removals (R) can be calculated as the sum of the two:

$$R = MAI + \Delta F \quad (3)$$

Where:

| | |
|---|---|
| *MAI* | *Mean Annual Increment of biomass growth (t/yr)* |
| $\Delta F$ | *Annual change in living forest biomass (t/yr)* |

The Mean Annual Increment of biomass growth (MAI) is calculated as the product of the Extent of Forest (F) in hectares and the country-specific Growth Rate (GR) of the Mean Annual Increment:

$$MAI = F \times GR \quad (4)$$

Where:

| | |
|---|---|
| *F* | *Extent of forest (ha)* |
| *GR* | *Annual Growth rate of biomass (t/ha-yr)* |

The Demonstrably renewable biomass (DRB) is calculated as the product of Protected Area Extent of Forest (PA) in hectares and the country-specific Growth Rate (GR) of the Mean Annual Increment:

$$DRB = PA \times GR \quad (5)$$

Where:

| | |
|---|---|
| *PA* | Protected Area Extent of Forest (ha) |

National statistics are presented to demonstrate the reduction of forest area, the continuous deforestation trend and the carbon stock depletion over time in Peru. All data come from the latest FAO Global Forest Resources Assessment[9]:

*Table 1. Forestry trends in Peru*

| Year | Forest area | Change in total forest area | Deforestation | Carbon in above-ground biomass - forest |
|---|---|---|---|---|
| | 1 000 ha | 1 000 ha | ha/yr | Mill. tonnes (t) |
| **1990** | 77,921 | | 177 | 7,122 |
| **2000** | 76,147 | -1,774 | 143 | 7,027 |
| **2005** | 75,528 | -619 | 126 | 6,979 |
| **2010** | 74,811 | -717 | 165 | 6,903 |
| **2015** | 73,973 | -838 | | |

## 2.2. Data sources

*Table 2. Description of the parameters and relevant data sources*

| Parameter | Unit | Description | Source | Considerations |
|---|---|---|---|---|
| **NRB** | t/yr | Non-renewable biomass | Equation 2 | Proportion of Total Annual Biomass Removals (R) that is not demonstrably renewable. |
| **DRB** | t/yr | Demonstrably renewable biomass | Equation 5 | Calculated as equivalent to the total annual biomass growth in protected areas. |
| **R** | t/yr | Total annual biomass removals | Equation 3 | Used as a national-level proxy for By. Accounts for all removals (not only woodfuels), which is equivalent to the sum of MAI and the Annual change in living forest biomass. |
| **MAI** | t/yr | Mean Annual Increment in biomass growth | Equation 4 | Country-specific MAI calculated from extent of forest and its growth rate. |
| **GR** | t/ha-yr | Growth rate of biomass | - Distribution of total forest area by ecological zone: FAO Global Forest Resources Assessment 2000[10], Table 14<br>- Above-ground biomass growth rates by ecological zone: 2006 IPCC Guidelines for National Greenhouse Gas Inventories[11], Chapter 4, Table 4.9 | Country-specific growth rate calculated as a weighted average based on FAO reporting on distribution of total forest area by ecological zone and IPCC above-ground biomass growth rates for different ecological zones. |

[9] FAO FRA 2015, http://www.fao.org/forest-resources-assessment/explore-data/flude/en/

[10] http://www.fao.org/docrep/004/Y1997E/y1997e21.htm#bm73

[11] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_04_Ch4_Forest_Land.pdf

| | | | | |
|---|---|---|---|---|
| **F** | ha | Forest extension | FAO Global Forest Resources Assessment 2015[12], Topic "Forest area and characteristics", column "P" | |
| **PA** | ha | Protected areas | FAO Global Forest Resources Assessment 2015[13], Topic "Biodiversity and Conservation", column "S" | |
| **ΔF** | t/yr | Annual change in living forest biomass | - Annual Change in Carbon Stock in Living Forest Biomass 2005-2010: FAO Global Forest Resources Assessment 2010[14], Table 11, column "I".<br>- Carbon stock/Biomass Conversion rate: 2003 IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry[15] | Calculated by converting:<br>Annual Change in Carbon Stock in Living Forest Biomass 2005-2010 (tcarbon/yr)<br><br>to Annual Change in Living Forest Biomass 2005-2010 (t/yr)<br><br>using Carbon stock/Biomass Conversion rate (0.5 is used as a default for the carbon fraction of dry matter) |

## 2.3. Calculations

The $f_{NRB}$ result obtained at national level is 76.43% as described in the below table[16]:

*Table 3. National $f_{NRB}$ result for Peru*

| Parameter | | Value | Unit |
|---|---|---|---|
| **F** | Forest extension | 73,973,000 | ha |
| **GR** | Growth rate of biomass | 6.36 | t/ha-yr |
| **MAI** | Mean Annual Increment in biomass growth | 470,764,172 | t/yr |
| **ΔF** | Annual change in living forest biomass | -38,000,000 | t/yr |
| **R** | Total annual biomass removals | 508,764,172 | t/yr |

[12] http://www.fao.org/forest-resources-assessment/explore-data/flude/en/
[13] Ibidem
[14] http://www.fao.org/forestry/fra/fra2010/en/
[15] http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_contents.html
[16] Please refer to Excel sheet "Peru fNRB assessment based on CDM EB Report 67, Annex 22" for detailed calculations.

| | | | |
|---|---|---|---|
| **PA** | Protected areas | 18,843,620 | ha |
| **DRB** | Demonstrably renewable biomass | 119,920,798 | t/yr |
| **NRB** | Non-renewable biomass | 388,843,374 | t/yr |
| **$f_{NRB}$** | **Fraction of non-renewable biomass** | **76.43%** | |

## 3. Conclusion

The $f_{NRB}$ assessment based on CDM EB 67, Annex 22 provides a single $f_{NRB}$ value at national level based on international data sources (FAO, IPCC). Other $f_{NRB}$ assessments could be considered as more robust if they are based on local data sources and are calculated at project specific levels. However developing project specific $f_{NRB}$ assessment requires collection of consistent and reliable data, which is not always available in developing countries.

The project "*Financing efficient cookstoves for rural Andean communities*" aims at promoting the development of ICS activities by reducing the current complexity of project implementation. Validating a single and simple methodology to calculate national $f_{NRB}$ values based on internationally available data would enable to streamline the certification process of future project activities and to account for the same values among projects located in the same host country.