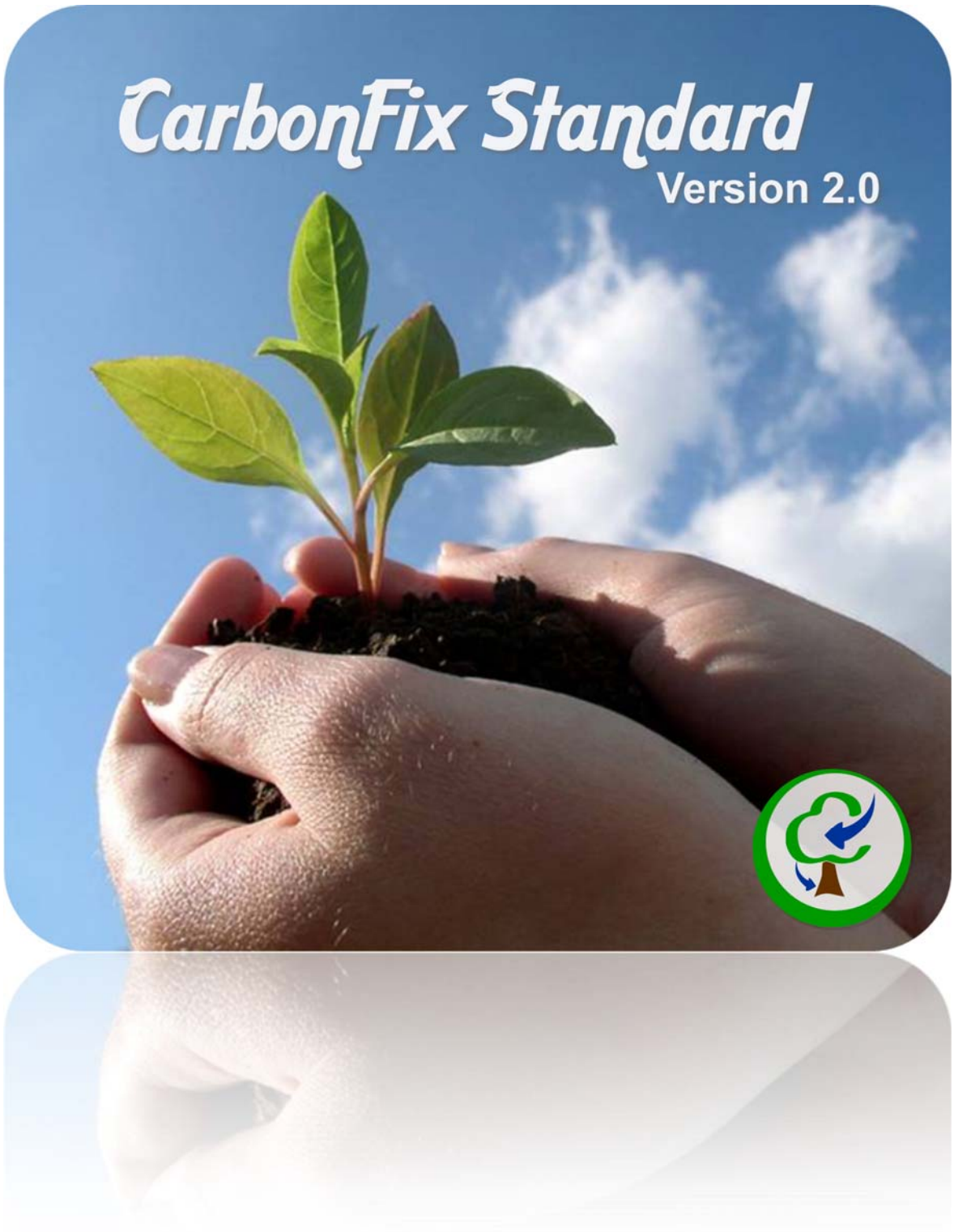
Criteria

Valid since: 26. May 2008



Content

Acknowledgment

The development of the CarbonFix Standard v2.0 has benefited by suggestions from over 30 feedbacks during its public review. We would like to thank all participants as well as the technical board of CarbonFix.

For the further improvement of the Standard we encourage all readers to inform the *technical board* about possible mistakes, unclear expressions or suggestions of new criteria.

The CarbonFix Standard is based on 4 parts: Terms, Criteria, Procedures and Labelling

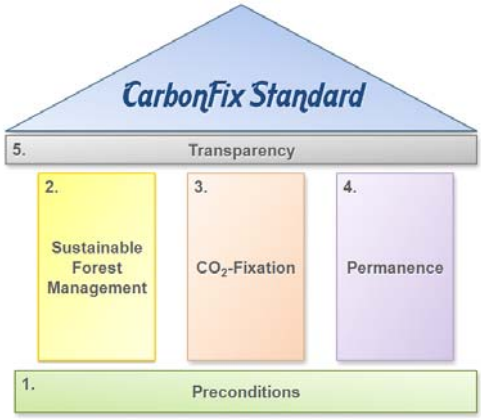
In the upper right corner of every document it is clearly visible which document you have opened.

The following description gives a short overview of the content of these documents.

Terms
This part of the Standard defines the technical wording. In all documents of the Standard, the defined words are written in *italic*. Furthermore, this part describes the functionality of the different icons (e.g.) used within the Standard.

This document is of particular interest to *project developers*, *project owners* and *certification bodies*.

Criteria
For many users this document represents the core of the Standard. It includes the different criteria a project has to successfully certify according. The criteria are clustered in 5 main chapters as represented by the graph.



Some of the criteria refer to 'guidelines' which assist the *project developer* with additional information on how to meet certain criteria.

Procedures
This document explains in detail how *project developers* can create their login account, upload their information and request for *validation*. Subsequently it describes how a *project* is certified and under which circumstances *projects* can be excluded.

The final chapters describe how the CarbonFix Standard is continuously being improved and what fees will be charged from the *project developer*.

The document is of specific value to *project developers*, *project owners* as well as for *certification bodies*.

Labelling
Here, it is explained under which conditions the *CO_2-buyer* will be able to use the 'CO2code.info' label to promote his climate-neutral products or services **and** how the *project developer* or *owner* can use the CFS label for advertising the quality of his Climate Forest Project.

1. Preconditions

1.1. Eligibility

1.1.1. *Sufficient evidence must be given to the certification body to be able to confirm that the planting area is eligible according to the requirements of CFS.*

Preconditions

and *Project areas* are only eligible:

a. If the area had not been a forest* for a minimum 10 years before the *project start* or since the 1st of January 1990.
b. If the area is not wetland* or protected area.

1.1.2. The criteria above mentioned must be evidenced by groundtruthed* satellite images*, aerial photographs, official maps or land-use records.

Sustainable Forest Management

1.1.3. The *project owner* must give evidence that his activity will lead to a forest according to the national forest definition.

1.1.4. or The *project* must establish its forests with 'trees'*.

1.1.5. or The *project owner* must give sufficient evidence that the *eligible planting area* has not been deforested in order to generate *CO_2-certificates* at a later time.

1.1.6. or A *project* is not eligible, if more than 10% of its foreseen *planting area* is agriculture area for food production at the *project* start.

CO_2-Fixation

1.1.7. and Projects must not be agroforestry* projects. Excepted are sustainable silvopasture* projects, which contribute to the aim of creating a forest.

> *Up to today there is no sufficient scientific evidence that proves the long-term stability of agroforestry projects.*

1.1.8. and or The project start must be after the 11th of December 1997 (adoption of the Kyoto Protocol).

Permanence

* Satellite pictures shall be **groundthruthed** according to the methodology described in the 'Inventory' guideline.
* Cost free **satellite images** are available from the Global Land Cover Facility webpage: http://glcfapp.umiacs.umd.edu:8080/esdi/index.jsp
* Definition of **trees**: Trees are perennial, woody plants with one dominant sprout that increases its circumference due to secondary growth.
* Definition of **agroforestry** according to ICRAF: 'Agroforestry is a collective name for land use systems and practices in which woody perennials are deliberately integrated with crops and/or animals on the same land management unit. The integration can be either in a spatial mixture or in a temporal sequence. There are normally both ecological and economic interactions between woody and non-woody components in agroforestry."
* **Silvopasture** projects use livestock such as cows or sheep to maintain the non-woody biomass in the understorey of the forest and may also create additional revenue streams.

Transparency

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1.2. Additionality

1.2.1. *Sufficient evidence must be given to the certification body to be able to confirm that the project is additional according to the requirements of CFS.*

Preconditions

1.2.2. To prove the additionality of the project, the *project owner* can choose between the following options:

Option 1 - An official statement of a bank* which gives evidence that the *project* would not be feasible without the additional financial means from the sale of $VER_{futures}$. The statement must
1.2.3. be based on a realistic cash-flow which must be attached to the document.

1.2.4. and ***Option 2*** - An analysis of 'Additionality' according to the UNFCCC guideline. GUIDELINE: Additionality

Sustainable Forest Management

1.2.5. Option 2 must be applied if a *project* is set-up with the intention to be non-profitable.

A responsible state authority must approve that the forestation on the *planting area* is not mandatory by any law or regulation **or** if it is mandatory evidence must be given that these laws or
1.2.6. regulations are systematically not enforced.

or Evidence must be given that a forest would not establish itself on the *planting*
1.2.7. *area* under the foreseeable land-use, and without the *project* activities.

CO_2-Fixation

If parts of the project are planted without generating $VER_{futures}$ (e.g. because the land is not
1.2.8. eligible), it must be assured that the additionality of the entire project remains valid.

Permanence

Transparency

* The **bank** must be one of the 50 biggest banks worldwide: http://www.gfmag.com/c_aw/0510_03.php

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2. Sustainable Forest Management

2.1. Environmental Aspects

2.1.1. *Sufficient evidence must be given to the certification body to be able to confirm the long-term* net positive ecological impact of the project.*

Preconditions

The *project owner* must describe the following parameters of the *project*:

a. **Soil**	b. **Water**	c. **Biodiversity**	d. **Climate**
• Nutrients	• Quality	• Plants	• Temperatures
• Erosion	• Quantity	• Animals	• Rain

2.1.2.

Evidence must be given that positive impacts are enhanced and negative impacts are mitigated - respectively avoided, if they are not essential for the *project* activities.

2.1.3. For point d. no description of impacts must be given.

Sustainable Forest Management

2.1.4. Pests must be managed in an environmental friendly way and preferably without the use of chemical products.

2.1.5. The use of herbicides and insecticides must be documented. A list of applied products must be given.

2.1.6. When chemicals are used there must be sufficient training and proper equipment to minimize environmental impacts.

CO_2-fixation

2.1.7. Waste must be disposed in an environmentally appropriate way.

2.1.8. 15 meter wide buffer strips along permanent or temporary watercourses (streams, rivers, wetlands, etc.) shall be implemented. These buffer areas are part of the *nature conservation area*.

2.1.9. No flooding irrigation, regular irrigation or drainage is allowed to be executed.

2.1.10. For the planting of trees no area-wide ploughing is allowed. Mechanized ploughing must be limited to the purpose of planting.

Permanence

2.1.11. and Genetically modified* tree species are not allowed.

Native species in mixed stands with a selective harvesting method shall be used preferably.

Otherwise, the *project owner* must justify his

- choice of tree species, and/or
- silvicultural system, and/or
- harvesting method.

2.1.12.

Transparency

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* **Long-term** is considered as a time-period of minimum 20 years.
* **Genetically modified** trees species are defined according to the FSC guideline: FSC-POL-30-602

2.1.13. All species must be site-adapted, also under changing climate conditions – considering the latest IPCC report*.

Two signed statements of
a. a responsible forestry, wildlife or environmental authority, and
b. a registered NGO in the environmental sector
must confirm:
- that the *project* operates according to national environmental laws,
- that no native endangered (EN) and critically endangered (CR) species from the 'IUCN Red list'* are being threatened due to *project* activities, and
2.1.14. - that the *project* has a net positive impact on the environment.

Preconditions

2.2. Socioeconomic Aspects

2.2.1. *Sufficient evidence must be given to the certification body to be able to confirm the long-term net positive socioeconomic impact.*

Sustainable Forest Management

The *project owner* must describe the current situation of the following parameter, together with the possible impacts caused by the *project*.

a. **Creation of employment**
- *management*
- *employees*
- *contractors*
- *workers*

b. **Capacity building**
- *management*
- *employees*
- *contractors*
- *workers*

c. ***Neighbourhood***
- displacement of people
- welfare activities

2.2.2. Evidence must be given that positive impacts are enhanced and negative impacts are mitigated - respectively avoided, if they are not essential for the *project* activities.

CO_2-fixation

2.2.3. A first aid kit must be reasonably accessible for all *workers*.

2.2.4. *Workers* must be able to organize themselves and voluntarily negotiate with their employers.

2.2.5. All equipment (tools, machines, substrates, etc.), including those of the *contractors*, shall be in safe working mode.

2.2.6. Proper protective equipment and training of the *workers* must be implemented - especially when chemicals are used.

Permanence

2.2.7. Children under the age of 16 are not allowed to work for the *project*.

Contracts must clearly define the following parameters:

For *employees*
a. working hours and leave (holiday, sickness and pregnancy)
b. duties
c. salary
d. modalities on health insurance
2.2.8. e. modalities on the termination of the contract

For *contractors*
a. tasks (quantity, quality, time)
b. payment
c. modalities on the termination of the contract

Transparency

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* Latest **IPCC report**: http://www.grida.no/climate/ipcc_tar – Report 'The Scientific Basis' – Chapter 10

* **IUCN Red list**: http://www.iucnredlist.org/search/search-expert

2.2.9. *Workers* shall preferably be from the area around the *project*.

2.2.10. Spiritual, religious, or other socially important places within the *project area* must be treated in consensus with the concerned people.

2.2.11. *Neighbours* must be able to address their concerns to the *project owner*.

Preconditions

It must be clearly defined:

a. How decisions which are solving concerns are undertaken.

2.2.12. b. How results of these decisions are implemented in a cooperative way.

2.3. Forest Management

2.3.1. *Sufficient evidence must be given to the certification body to be able to confirm that the project bases itself on the principles of sustainable forest management.*

Sustainable Forest Management

2.3.2. The objectives of the *project* must be described.

and The following key figures must be given:

a. Area (ha) of the *project area*
b. Area (ha) of foreseen *planting area*
c. Area (ha) of foreseen *eligible planting area*

2.3.3. d. Area (ha) of *nature conservation area*

2.3.4. The borders of the *project area*, *planting area(s)*, *management units* and *nature conservation area(s)* must be clearly visible in the field.

CO_2-fixation

Management of Nature Conservation Area

For the *nature conservation area(s)* a description of the selected IUCN management category(ies) and its (their) implementation must be given. One or several of following categories can be selected: I, II, III, IV or V - see guideline 'IUCNcategories'. GUIDELINE: IUCNcategories

2.3.5. The *nature conservation area(s)* can consist of different ecotypes (bush, grassland, swamp, etc.).

and If patches of the *non-eligible area* are forests, wetlands or protected areas larger

2.3.6. than 1 hectare at the *project* start, they become part of the *nature conservation area*.

Permanence

Management of Planting Area

and The *project owner* must describe the following characteristics about the tree species planted on the *eligible planting area*:

a. Origin and distribution of the tree species (indicate if the species is native or not)
b. Provenance of the seeds
c. Main purpose / use of trees
d. Possible pests and diseases
e. Time when forest products are foreseen to be used

2.3.7.

Transparency

The *project* must describe the following steps of its technical implementation:

a. Nursery
b. Land preparation (incl. lining out / spacing)
c. Planting
d. Beating up (replacing of the seedlings)
e. Maintenance
f. Pruning
g. Thinning
h. Harvesting

2.3.8.

Management Units

2.3.9. The following information must be submitted for each *management unit*. The information is partly derived from other chapters:

- Start of the planting, or start of protection (in case of natural regeneration)
- Tree species used
- Area (ha)
- Foreseen *eligible planting area* (ha)
- GPS coordinates of a point within the *management unit*
- Future quantity of stored CO_2 (tCO_2/ha) *Chapter 'Future CO_2-fixation'*
- Fertilizer application (kg of N/ha) *Chapter 'Project Emissions'*
- Baseline CO_2 (tCO_2/ha) *Chapter 'Baseline'*
- Leakage (tCO_2/ha) *Chapter 'Leakage'*

Preconditions

Maps & Locations

2.3.10. The following maps must be uploaded as JPG. They must show:

a. The location of the *project's* country.

b. and The location of the *project* area(s) within the country.

Sustainable Forest Management

c. and The *nature conservation area(s).*

d. and The foreseen *planting area(s).* (eligible and not eligible areas must be differentiated)

e. and The *management units.* (eligible and not eligible areas must be differentiated)

f. and The *neighbours* around the *project* area.

g. and The topography of the *project* area. (optional)

h. and The soil properties of the *project* area. (optional)

CO_2-fixation

For each point also several maps can be uploaded. Each map has the option to attach an additional picture.

2.3.11. Maps of point c. to h. must be GIS-maps*. They must be:

- Georeferenced, and
- Visibly include the following information:
  - Name of the *project*
  - Printing date
  - Scale
  - Direction of North
  - Legend
  - Used GPS coordinate system
  - Infrastructure (roads, houses, etc.), and rivers

Permanence

If required, the GIS-shapefiles must be made available to the *certification body*.

Transparency

* **GIS-maps** are digitally generated maps, produced by programs such as ArcGIS or FreeGIS.

3. CO_2-fixation

3.1.1. *Sufficient evidence must be given to the certification body to be able to confirm that the variables used for the calculation follow a conservative approach and that the amount of $VER_{futures}$ has been accurately calculated according to the CFS formulas.*

For detailed information on the background of the CFS methodology, the file 'CFS methodology' can be downloaded from the CarbonFix website.

3.2. Calculation of VERfutures

3.2.1. To determine the amount of $VER_{futures}$ the following formula will be used:

$$VER_{futures} = \text{Eligible planting area} * (\oplus \text{Future } CO_2\text{-fixation} \ominus \text{Project emissions} \ominus \text{Baseline} \ominus \text{Leakage})$$

3.2.2. The formula is used individually for every *management unit*.

3.2.3. The CFS online system will automatically multiply the foreseen *eligible planting area* times the net CO_2-fixation.

3.2.4. As the *eligible planting area* has already been determined (see chapter 'Management Unit'), the following paragraphs describe how the remaining variables are calculated.

3.2.5. The unit for all of the following variables is tons of CO_2 per hectare (tCO_2/ha).

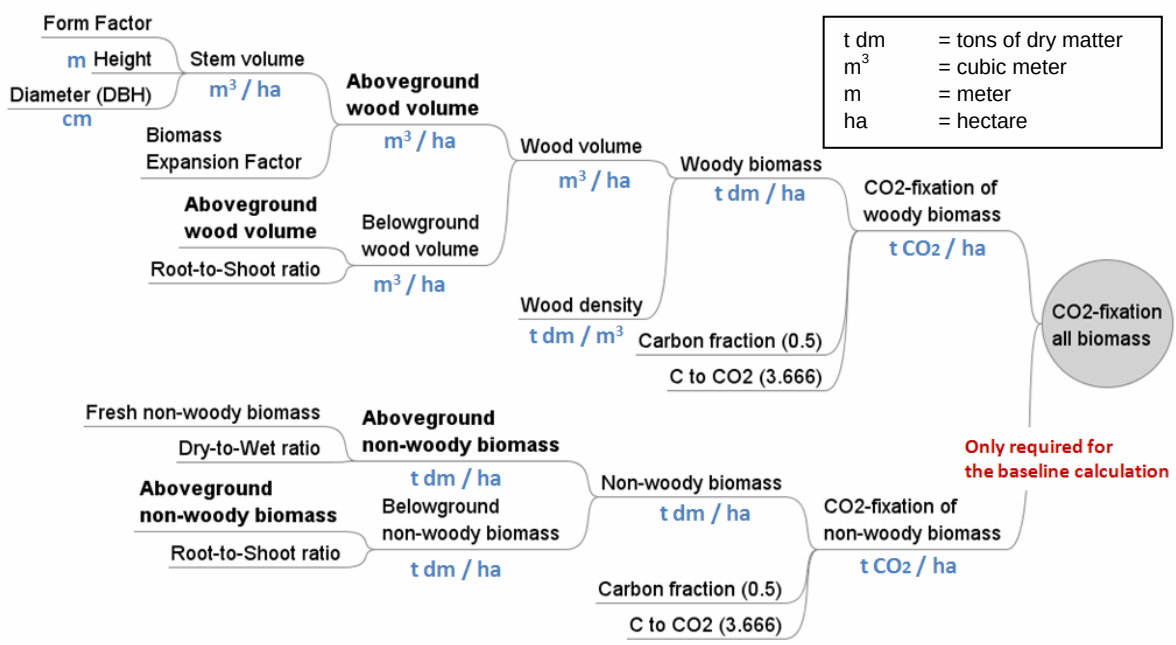
3.2.6. For the calculation of the different variables (Future CO_2-fixation, Baseline and Leakage) the following of carbon pools are selected:

Carbon Pools			*Examples*	Future CO_2 fixation	Baseline	Leakage
Aboveground	Woody	Living Biomass	*Stem, bark, foliage and branches*	Selected	Selected	Selected
		Dead Biomass	*Dead trees or branches*			
	Non-woody	Living Biomass	*Grass*		Selected	
		Dead Biomass	*Dead grass, litter and seeds*			
Belowground	Woody	Living Biomass	*Roots*	Selected	Selected	
		Dead Biomass	*Died off roots*			
	Non-woody	Living Biomass	*Grassroots*		Selected	
		Dead Biomass	*Died off grassroots and organic soil*			
Wood products			*Construction timber or furniture*			
Wood as renewable energy			*Replacement of oil or coal*			

Conversion procedures

Most of the variables used in forestry appear in a different unit than tCO_2. Therefore, they need to be converted. During this 'conversion process' different factors have to be considered.

The following graph shows where parameters may be derived from and which factors need to be considered to obtain accurate conversion to tCO_2. For examples see Annexe.



The different parameters can be influenced by one or several of the following attributes:

- Some *Biomass Expansion Factors (BEF)* already include the *Root-to-Shoot* ratio.
- Is the Stem volume calculated over-bark or under-bark? The *BEF* must thus consider this.
- The Stem volume is based on a specific cut diameter (x cm). In this case the *BEF* must relate on this cut diameter (x cm).
- Most *Root-to-Shoot* ratios and Dry-to-Wet ratios are written as a relative figure (0.4). Most *BEFs* are written in a calculation figure (1.4).
- Most *Root-to-Shoot* ratios are calculated from the Aboveground wood volume, but some are based on the Stem volume.

The following figures are fixed for all conversions:

- 0.5 as factor for the Carbon fraction of biomass
- 3.666 for the conversion of C to CO_2.

Conservative Approach

All parameters used must be derived from best available scientific sources. In their synergy, they must lead to a conservative calculation approach. This means that

a. the future CO_2-fixation must unlikely to be overestimated, and
b. the project emissions baseline, and leakage must unlikely to be underestimated.

In case no scientific parameters are available, the following values can be used to calculate conservatively the baseline or leakage:

- 0.6 as *Form factor*
- 0.7 as Factor for Wood density
- 0.5 as Wet-to-Dry ratio (relative figure)
- 4.0 as *Biomass Expansion Factor* (calculation figure)
- 0.8 as *Root-to-Shoot* ratio for woody biomass (relative figure)
- 4.0 as *Root-to-Shoot* ratio for non-woody biomass (relative f.)

For the future CO_2-fixation the following values can be used as a conservative approach:

- 0.4 as *Form factor*
- 0.3 as Factor for Wood density
- 1.1 as *Biomass Expansion Factor* (calculation figure)
- 0.1 as *Root-to-Shoot* ratio for woody biomass (relative figure)

3.3. Future CO_2-fixation

$VER_{futures}$ = Eligible planting area * (+ Future CO_2-fixation − Project emissions − Baseline − Leakage)

Preconditions

Selected Carbon Pools			*Examples*
Aboveground	Woody	Living Biomass	*Stem, bark, foliage and branches*
Belowground	Woody	Living Biomass	*Roots*

and To determine the future CO_2-fixation, a *management unit* specific and scientifically based growth-model must be used. A description of this growth-model must be given.

The growth-model must cover,

- in case of selective harvesting or conservation forest, at least the time period up to the forest reaches its equilibrium Stem volume.
- in case of rotation forestry, at least the time period of the first rotation.

Sustainable Forest Management

3.3.1.

and As soon as forest inventories can be conducted, the growth-model must be adapted corresponding to its results. These inventories must be executed before every *certification* process according to the 'Inventory' guideline. GUIDELINE: Inventory

3.3.2.

and As forest growth-models most often only determine the m^3 of Stem volume, additional scientifically based parameters are necessary.

CO_2-Fixation

For the conversion to tons of CO_2 the chapter 'Conversion Procedure' and 'Conservative Approach' must be followed.

3.3.3.

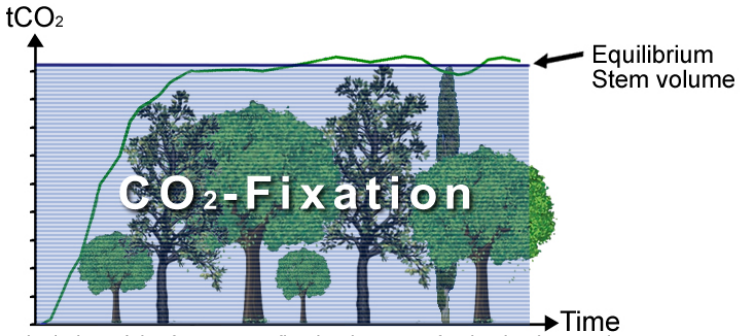
3.3.4. The *project owner* must choose one of the following methods to determine the future CO_2-fixation.

Option 1 - <u>Selective harvesting</u>* or Conservation Forest

In case of selective harvesting or conservation forest the future CO_2-fixation is based on the equilibrium Stem volume. If the equilibrium Stem volume is not reached by year 50, the future CO_2-fixation is calculated by the maximum Stem volume within this first 50 years.

Permanence

3.3.5.



Calculation of the future CO_2-fixation in case of selective harvesting or conservation forest.

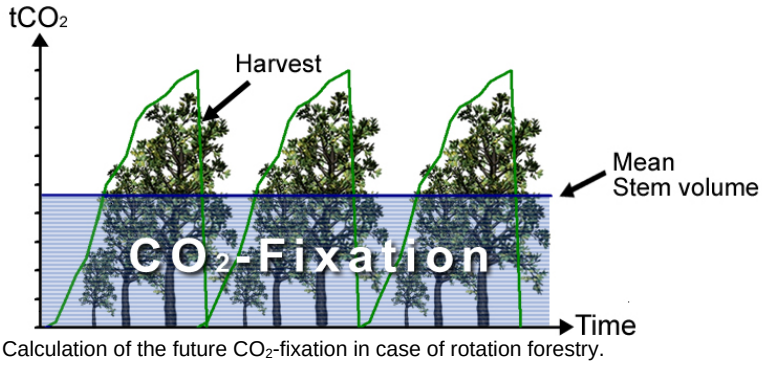
Transparency

* **Selective harvesting** is done by the continuous harvest of single trees or groups of trees without lowering the forest stock significantly.

3.3.6. Calculating the future CO_2-fixation with this option can only be done if the *project owner* gives evidence with all aspects of its *project* (tree species, composition of tree species, history of the *project owner* etc.) that the aim of the project is to use the forest with a selective harvesting regime or to establish a conservation forest.

Option 2 - Rotation Forestry

3.3.7. In case of rotation forestry, the future CO_2-fixation is based on the mean Stem volume during the first rotation period. If the first rotation period takes longer than 50 years, the future CO_2-fixation is calculated by the mean Stem volume within this first 50 years.

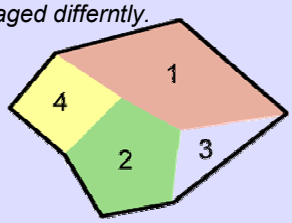


Calculation of the future CO_2-fixation in case of rotation forestry.

Note that the graph above only shows the rotation system within one management unit. Projects normally consist of multiple management units. Therefore, for the environmental aspects the size of such management units is most decisive.

Furthermore, it is possible that different management units are managed differntly.
Example:

Manag. Unit	***Silvicultural method***	***Planting year***
1	*Conservation forest*	*2008*
2	*Selective logging*	*2008*
3	*Rotation forestry*	*2010*
4	*Conservation forest*	*2011*

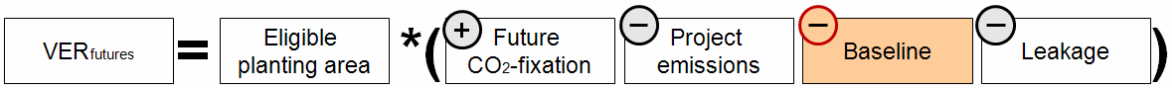


3.4. Project emissions

3.4.1. To account for *project* emissions, 0.5% of the *projects* CO_2-fixation will be deducted due to the use of fossil energy within the *project* (machines, flights, etc.).

3.4.2. and In case fertilizer is used, 0.4 tCO_2 per kg of nitrogen (N) must be deducted.

3.5. Baseline



Selected Carbon Pools			*Examples*
Aboveground	Woody	Living Biomass	*Stem, bark, foliage and branches*
	Non-woody	Living Biomass	*Grass*
Belowground	Woody	Living Biomass	*Roots*
	Non-woody	Living Biomass	*Grassroots*

Preconditions

3.5.1. The sum of baseline emissions is determined by the amount of CO_2 stored in the woody and non-woody biomass on the foreseen and *eligible planting area* at the *project* start.

The baseline emissions are determined by using the following formula:

Baseline$_{total}$	***= (Baseline$_{wood}$***	***+ Baseline$_{non-wood}$)***	***/ Foreseen and eligible planting area***
tCO_2/ ha	*= (tCO_2*	*+ tCO_2*	*) / ha*

Baseline$_{total}$ *= Total baseline emissions*
Baseline$_{wood}$ *= Emissions caused by woody living biomass on the eligible planting area*
Baseline$_{non-wood}$ *= Emissions caused by non-woody living biomass on the eligible planting area*

Sustainable Forest Management

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and The woody and non-woody living biomass must be determined by the best available scientific references.

- Here, local default values* shall be used preferably.
- National default values* shall only be used if local default values are not available.

3.5.2. • The same approach counts for international default values*.

CO_2-Fixation

and As the above mentioned default values are most often only determine in m^3 of Stem volume or tons of Fresh non-woody biomass, additional scientifically based parameters are necessary.

3.5.3. For the conversion to tons of CO_2 the chapter 'Conversion Procedure' and 'Conservative Approach' must be followed.

Examples can be found in the Annexe of this document.

Permanence

3.5.4. and In case the baseline biomass is burned on the field for the purpose of land preparation, an increase of 10% of the baseline emissions must be calculated.

CFS does not require a business-as-usual scenario as the additionality test confirms that no natural regeneration of a forest is possible.

Therefore, the most likely scenario is that biomass on the planting area will continue to reduce or stay in an equilibrium. Consequently, considering the CO_2 stored in the existing biomass at the time of project start as baseline emissions leads to a conservative approach.

Transparency

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* **Local default values** are generated by an inventory of woody and non-woody biomass according to the 'Inventory' guideline. GUIDELINE: Inventory

* The IPCC Good Practice Guide and FAO provide many different **national and international default values**:
http://www.ipcc-nggip.iges.or.jp/public/gpgluluc f/gpglulucf_contents.htm - Chapter 3, Annex 3A.1
http://www.fao.org/docrep/W4095E/w4095e00.htm

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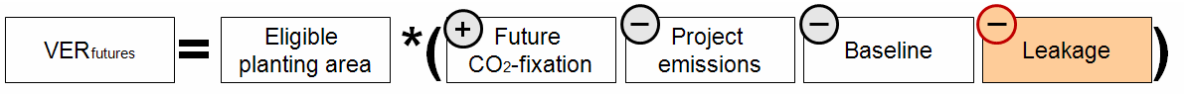
3.6. Leakage



Selected Carbon Pools			*Examples*
Aboveground	Woody	Living Biomass	*Stem, bark, foliage and branches*

Preconditions

3.6.1. The sum of leakage emissions is determined by the amount of CO_2 which
- occurs after the *project* start, and
- is due to displacement of activities from the *project area* to other areas, and
- is caused by the *project* activities.

3.6.2. The amount of leakage emissions is deducted once for the *project* lifetime.

3.6.3. Positive leakage* cannot be accounted as long as there is no broad scientific consensus on how to accredit it.

Sustainable Forest Management

The leakage emissions are determined by using the following formula:

***Leakage**total*	***= (Leakage**wood*	***+ Leakage**non-wood)*	***/ Foreseen and eligible planting area***
tCO_2/ ha	*= (tCO_2*	*+ tCO_2*	*) / ha*

***Leakage**total* = *Total leakage emissions*
***Leakage**wood* = *Emissions caused by the displacement of wood-use activities from the project area*
***Leakage**non-wood* = *Emissions caused by the displacement of non-wood activities from the project area*

CO_2-Fixation

and The project owner must justify his selection of leakage emissions from the following categories:

Leakage$_{wood}$	a.	fuelwood use	**Leakage$_{non\text{-}wood}$**	d.	agricultural farming
	b.	charcoal burning		e.	resettlement
	c.	timber harvesting		f.	livestock grazing

3.6.4.

and As default values for the Aboveground woody living biomass are most often only determine in m^3 of Stem volume, additional scientifically based parameters are necessary.

Permanence

For the conversion to tons of CO_2 the chapter 'Conversion Procedure' and 'Conservative Approach' must be followed.

3.6.5.

Examples can be found in the Annexe of this document.

Transparency

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* **Positive leakage** is defined as an increase of CO_2-fixation due to the displacement of activities outwards of the *project area*.

Leakage Formulas

3.6.6. The following formula must be used to ascertain the leakage emissions from:

a. Use of fuelwood
b. Production of charcoal
c. Production of timber

Leakage$_{wood}$	***= % of displacement***	**** CO_2-stock***	**** Area***
tCO_2	*= %*	** tCO_2/ha*	** ha*

The project owner must determine the following parameters:

% of displacement *which will have impacts on the Aboveground woody living biomass outside the project area. The parameter is determined by:*
1. estimations of the project owner
(only possibilities: increase or constant = 100%, decrease = 75%)
or
2. a representative survey

CO_2-stock *= average CO_2-stock per hectare on the area where the displaced activity **will** take place.*

If it is not known where the activity will be displaced to, it is possible to take:
For category a. (Use of fuelwood) and b. (Production of charcoal)
- *the CO_2-stock of the area where the activity **took** place.*

For category c. (Production of timber)
- *the CO_2-stock of a natural forest*

Area *= land within the project area affected by the activity*

3.6.7. The following formula must be used to ascertain the leakage emissions from:

d. Agriculture farming
e. Resettlement

Leakage$_{non\text{-}wood}$	***= % of displacement***	**** CO_2-stock***	**** Area***
tCO_2	*= %*	** tCO_2/ha*	** ha*

The project owner must determine the following parameters:

% of displacement *which will have impacts on the Aboveground woody living biomass outside the project area. The parameters are determined by:*
1. estimations of the project owner
(only possibilities: increase or constant = 100%, decrease =75%)
(decrease can only be used for category d.)
or
2. a representative survey

CO_2-stock *= average CO_2-stock per hectare on the area where the displaced activity **will** take place.*

If it is not known where the activity will be displaced to, it is possible to take:
- *the CO_2-stock of a natural forest*

Area *= land within the project area affected by the activity*

3.6.8. The following formula must be used to ascertain the leakage emissions from:

f. Livestock farming

$Leakage_{non\text{-}wood}$	= % of displacement	* CO_2-stock	* Heads	* Capacity
tCO_2	= %	* tCO_2/ha	* head	* ha/head

The project owner must determine the following parameters:

% of displacement *which will have impacts on the Aboveground woody living biomass outside the project area. The parameter is determined by:*
1. estimations of the project owner
(only possibilities: increase or constant = 100%, decrease =75%)
or
2. a representative survey

CO_2-stock *= average CO_2-stock per hectare of the land where the activity **will** take place.*

If it is not known where the activity will be displaced to, it is possible to take:
- *the CO_2-stock of a natural forest*

Heads *= number of livestock within the project area. The parameter is determined:*
- *a representative survey*

Capacity *= average grazing capacity*

Example of default values for average grazing capacities[*]*:*

Tropical dry climates[*]*:*	*0,5 head of cattle/ha*	*= 2*	*ha/cow*
	2,3 head of sheep/ha	*= 0,43*	*ha/sheep*
Tropical wet climates[*]*:*	*1,0 head of cattle/ha*	*= 1*	*ha/cow*
	4,9 head of sheep/ha	*= 0,20*	*ha/sheep*

[*] Source of **grazing capacities**: CDM-EB "Revised simplified baseline and monitoring methodologies for selected small-scale afforestation and reforestation project activities under the clean development mechanism" AR-AMS0001-version 03. http://cdm.unfccc.int/methodologies

[*] **Dry climates**: Mean annual precipitation = < 1.500 mm/a

[*] **Wet climates**: Mean annual precipitation = 1.500-4.000 mm/a

4. Permanence

4.1.1. *Sufficient evidence must be given to the certification body to be able to confirm that adequate resources are available to implement and maintain the project, that secured land tenure is given for the projects long-term implementation, and that necessary compensations have been executed.*

Preconditions

4.1. Management Capacity

A list of the *management* staff must include the following information:

- Educational level
- Work experience
- Duties
- Type of employment
- Title

4.1.1. - GPS and GIS know-how

Sustainable Forest Management

The *management* structure must be sufficient to the extent of the work. The description
4.1.2. must include an organizational chart.

The general decisions-making process must be described. Decisions shall be taken in an
4.1.3. open and cooperative way.

Within this *management* structure, work shall be executed according to the four-eye
4.1.4. principle. This means that at least more than one person double-checks the work of another person.

CO_2-Fixation

Adapted to the extent of the work, the *management* shall work with Standard Operational
4.1.5. Procedures*.

or The *project* shall collaboratively cooperate with other organizations or individuals to
4.1.6. expand capacities of the *management*.

The *management* of the *project* shall be able to continuously extend their knowledge and
4.1.7. skills within their working field.

Permanence

4.2. Financial Capacity

4.2.1. With the cash-flow of the chapter 'Additionality' the *project owner* must give evidence that sufficient financial means are and will be available to finance the establishment and maintenance of the *project*.

The *project owner* must give evidence of his financial health. For example by:

- financial reports from the past 3 years, or

4.2.2. - an official accountant's opinion

Transparency

* **Standard Optional Procedures** are a step-by-step 'best current practice' guideline. They aim to reduce the variability of the technical implementation.

4.3. Technical Capacity

A list must describe the equipment used for the following activities:

a. Nursery
b. and preparation (incl. lining out /spacing)
c. Planting
d. Beating up (replacing of dead seedlings)
e. Maintenance
f. Pruning
g. Thinning
h. Harvesting
i. Security (fire, animals, etc.)

4.3.1.

Preconditions

4.4. Protective Capacity

The mitigation of pests (listed in chapter 'Management of Planting Areas') and other possible risks (such as fire, browsing of animals, etc.) shall be described.

4.4.1.

Projects that are situated in areas with a high fire risk must have a 'Fire Management Plan'. This plan must consider the actions for:

a. Fire awareness
b. Fire prevention
c. Fire equipment
d. Fire detection
e. Fire suppression
f. Fire damage rehabilitation

Sustainable Forest Management

The fire risk can be calculated according to the 'Fire risk' guideline GUIDELINE: ... (still under development)

4.4.2.

4.5. Secured Land Tenure

Official documentations must confirm that the *project owner* is the

- land owner, or
- long-term leaseholder, or
- owner of the timber and CO_2-rights, or
- owner of the CO_2-rights

of the *project area*.

4.5.1.

CO_2-Fixation

In case the *project owner* is the land owner or long-term leaseholder, evidence must be given that he also owns the CO_2-rights.

4.5.2.

or If the *project owner* is not the land owner, evidence must be given that land owner agrees with the foreseen *project* activities.

4.5.3.

If any relocation of people is required, it must be done on a voluntary basis or help to resolve land tenure problems.

4.5.4.

Permanence

If there is encroachment or a possibility of it, it must be described and mitigated in a cooperative way.

Transparency

4.6. Compensation Activities

4.6.1. Compensation activities must be implemented, if
a. an adaptation of the growth-model*, or
b. the destruction of the forest*
lead to a shortage of calculated $VER_{futures}$ within a *management unit*.

4.6.2. The shortage must be compensated by the *project owner* within 12 months. It must be compensated by:
a. Replanted the *management unit(s)*, and/or
b. Allocating $VER_{futures}$ from other *management units*, and/or
c. Purchasing $VER_{futures}$ from other CFS certified *projects*.

All possibilities of compensation must lead to the initially calculated amount of $VER_{futures}$.

Preconditions

4.7. Buffer Fund

4.7.1. The CFS buffer fund provides additional security for CO_2-*buyers* in case a *project* is excluded from the Standard.

Sustainable Forest Management

4.7.2. With the *certification* of a *project* 30% of its $VER_{futures}$ are allocated to the CFS buffer fund.

4.7.3. The CFS buffer fund only guarantees a disbursement worth 75% of the amount of $VER_{futures}$ available in the fund. 25% of the initial deposit is used by CarbonFix to build up a counterinsurance.

4.7.4. The fund only disburses $VER_{futures}$ in case a *project* is excluded.
1. Here, it first uses the $VER_{futures}$ of the fund to compensate possible deficits within *management units* of other *projects* that have purchased $VER_{futures}$ from the excluded *project* in order to compensate their own shortfalls, and only
2. second, it compensates the CO_2-*buyers* who have purchased $VER_{futures}$ from the excluded *project*.

CO_2-Fixation

4.7.5. The compensation will depend on the date of purchase. First purchases are served first.

4.7.6. The counterinsurance shall provide the security to compensate all purchases from this project.

4.7.7. The compensation is limited to 20 years after the *project start*.

The percentage of $VER_{futures}$ that must be deposited by the project owner will be adapted over time according to the experiences gained.

In case of a decrease, the surplus of $VER_{futures}$ will be given back to the project owner. In case of an increase, already certified projects must not upgrade their amount of $VER_{futures}$.

Permanence

4.7.8. If an adaptation of the CFS leads to a decrease of the initially calculated amount of $VER_{futures}$, the difference will be compensated by the fund.

4.7.9. CO_2-*certificates* of CFS certified *project* that have not been sold as $VER_{futures}$ or with the intention of becoming $VER_{futures}$ will not be compensated by the buffer fund.

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* An **adaptation** of the growth-model can have several reasons. Amongst others,
- due to new information of the speed of growth (assessed by inventories), or
- due to a change of forest management (e.g. prolonged rotation periods, or thinning regimes)

* The **destruction of the forest** can be a result of:
- Natural catastrophes (wind, droughts, flooding, erosion, earthquakes, etc.)
- Diseases
- Mismanagement (poor establishment, maintenance, etc.)
- Force majeure (condemnation, war, etc.)
- The lack of protection (browsing, encroachment, fires, etc.)

Transparency

5. Transparency

5.1.1. *Sufficient evidence must be given to the certification body to be able to confirm that the projects transparency is according to the requirements of CFS.*

5.1.2. To provide transparency, the following information must be uploaded within the login area of the *project owner*:

a. A short description of the *project*.

b. A description of the *project*.

c. and Pictures of the *project* (minimum 10 pictures).

d. and The history and logo of the *project owner*.

e. and The CV and a picture of the *project owners* representative.

f. and A description of the *project area's* history (including the historical land-use).

g. A description of how the *project* can be visited.

5.1.3. All sales of $VER_{futures}$ must be registered.

> *Names of CO2-buyers as well as sales prices are not published - unless the CO2-buyers choose to.*

5.1.4. All comments, published and unpublished must be assessed by the *certification body* and are part of the certification process.

> *Comments submitted through the project specific website are forwarded to the project owner and technical board. The project owner is free to decide about the publication of the comment. In case a comment includes information which indicates any non-compliance to the criteria of CFS, the technical board will take appropriate actions.*

5.1.5. The status of *validation*, *certification*, and exclusion of a *project* will be published on the CarbonFix website.

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6. Annexe

6.1. Conversion Procedure - Example

The following examples of conversion procedure are calculated with default values of the conservative approach for the calculation of the baseline or leakage.

1 m^3 of Stem volume converts to 9.2 tons of CO_2

Stem volume	** BEF*	** (1+ Root-to-Shoot)*	** Wood density*	** Carbon fraction*	** C-to-CO_2*
= 1	** 4.0*	** (1+ 0.8)*	** 0.7*	** 0.5*	** 3.666*

= 9.2 tCO_2

1 tons of Fresh non-woody biomass converts to 4.6 tons of CO_2

Fresh non-woody biomass	** Dry-to-Wet*	** (1+ Root-to-Shoot)*	** Carbon fraction*	** C-to-CO_2*
= 1	** 0.5*	** (1+ 4.0)*	** 0.5*	** 3.666*

= 4.6 tCO_2

The following example of conversion procedure is calculated with default values of the conservative approach to determine the future CO_2-fixation.

1 m^3 of Stem volume converts to 0.7 tons of CO_2

Stem volume	** BEF*	** (1+ Root-to-Shoot)*	** Wood density*	** Carbon fraction*	** C-to-CO_2*
= 1	** 1.1*	** (1+ 0.1)*	** 0.3*	** 0.5*	** 3.666*

= 0.7 tCO_2

6.2. Baseline Calculation - Example

Baseline$_{wood}$

The total eligible planting area of a project has the size of 450 ha and consists of two strata. The 1st stratum is bushland and has according to a national default value 17.4 m³ of wood standing on its hectare (stem volume). The size of this stratum is 350 ha. The 2nd stratum is 100 ha of grassland and therefore will be treated as the non-wood baseline (see next example).

The foreseen and eligible planting area of this stratum is 350 ha.

International default values are use for the Biomass Expansion Factor (BEF =1.3) and the Root-to-Shoot ratio (0.2 – relative figure).

For the wood density no scientific rigorous figure was found, therefore the conservative default value of 0.7 is used for the calculation.

0.5 = the carbon fraction of biomass
3.666 = the factor to convert from C to CO_2

*Aboveg. wood volume = Stem volume (over bark, 7 cm of cut diameter) * BEF*
*= 17.4 * 1.3*
= 22.6 m³/ha

*Belowg. wood volume = Aboveg. wood volume * Root-to-Shoot ratio*
*= 22.6 * 0.2*
= 4.5 m³/ha

*Baseline$_{wood}$ = (Aboveg. wood v. + Belowg. wood v.) * Wood density * Carbon fraction * C-to-CO_2 * Area*
*= (22.6 + 4.5) * 0.7 * 0.5 * 3.666 * 350*
= 12,141 tCO_2

Baseline$_{non\text{-}wood}$

As mentioned above the 2nd stratum of this project consists of grassland. Here, measurements determined a local default value of 3.9 tons of dry biomass (grass, herbs and scattered leaves) per hectare.

The stratum covers the foreseen and eligible planting area of 100 ha.

For the Root-to-Shoot ratio the international default value of 1.58 is used (relative figure).

0.5 = the carbon fraction of biomass
3.666 = the ratio to convert from C to CO_2

Abo. non-w. biomass = 3.9 t dm/ha

*Belg. non-w. biomass = Abo. non-w. biomass * Root-to-Shoot ratio*
*= 3.9 *1.58*
= 6.2 t dm/ha

*Baseline$_{non\text{-}wood}$ = (Aboveg. non-w. biom. + Belowg. non-w. biom.) * Carbon fraction * C-to-CO_2 * Area*
*= (3.9 + 6.2) * 0.5 * 3.666 * 100*
= 1,818 tCO_2

Baseline$_{total}$

Baseline$_{total}$ = (Baseline$_{wood}$ + Baseline$_{non\text{-}wood}$) / Foreseen and eligible planting area
= (14,470 + 1,818) / (350 +100)
= 36 tCO_2/ha

Note that the baseline emissions must be rounded off to a full ton.

6.3. Leakage Calculation - Example

Leakage$_{total}$

A project has a project area of 750 hectares. According to the project owner, 450 ha of this area are eligible under CFS and are foreseen to be planted.

The total leakage calculated for the project is 7,800 tCO_2.

Leakage$_{total}$ = (Leakage$_{wood}$ + Leakage$_{non\text{-}wood}$) / Foreseen and eligible planting area
= 7,800 tCO_2 / 450ha
= 17 tCO_2/ha

Note that the leakage emissions must be rounded off to a full ton.

Leakage$_{wood}$ – a. Use of fuelwood

People neighbouring the project area used to collect fuelwood on the project area. The foreseen planting area of the project has the size of 450 ha (Area). The nature conservation area of the project is natural forest and has the size of 300 ha (Area).

The project owner expects that all people (% of displacement) have to find other places to collect their fuelwood from, because the planting area will be planted and the nature conservation area will be protected.

According to a representative survey, 80 % of the fuel-wood collected is dead-wood. Therefore, it is considered that only on 20 % of the area aboveground woody living biomass is affected.

All fuelwood is collected from the 450 ha of foreseen planting area. The nature conservation area with its natural forest is too dense for the people to collect their fuelwood from.

According to the project owner it is not known where exactly the activities will be shifted to. Therefore, the CO_2-stock of the area where the activities took place can be used – see formula. This CO_2-stock was already determined by the baseline analysis. The carbon stock of the aboveground woody living biomass was calculated to be 35 tCO_2/ha (CO_2-stock).

*Leakage$_{wood}$ = % of displacement * CO_2-stock * Area*
*= 100% * 35 * 450 * 20%*
= 3,150 tCO_2

Leakage$_{wood}$ – b. Production of charcoal

Villagers of surrounding settlements used to burn charcoal on the 450 ha planting area (Area). Due to the tree planting activities the villagers will have to find other bushland to cut their living biomass from.

A representative survey determined that 25% (% of displacement) of the people would continue their work outside the project area as soon as the project starts. Others could be employed to plant trees or would find other jobs.

The baseline on this area was calculated to be 35 tCO_2/ha (CO_2-stock).

*Leakage$_{wood}$ = % of displacement * CO_2-stock * Area*
*= 25% * 35 * 450*
= 3'938 tCO_2

Leakage$_{wood}$ – c. Production of timber

Villagers of surrounding settlements used to cut timber on 300ha (Area) on the natural conservation area within the project. Due to the tree planting activities the villagers will have to find other places to harvest timber or change jobs.

The estimation of the project owner is that most of the timber cutters will need to find different employment, since other land for cutting timber is not available in the vicinity and most of them have family and land within the area. Therefore, it is estimated that the amount of timber being cut will decrease (% of displacement).

The average stem volume of these 300 ha is 100 m^3/ha according to a national default value. According to an international default value the Biomass Expansion Factor is 2. For all other parameters, the default values of the 'conservative approach' are taken: Root-to-Shoot ratio = 0.8 and Wood density = 0.7.

0.5 = the carbon fraction of biomass
3.666 = the factor to convert from C to CO_2

CO_2-stock	*= Stem volume*	** BEF*	** (1+ Root-to-Shoot)*	** Wood density*	** Carbon fraction*	** C-to-CO_2*
	= 100	** 2.0*	** (1+ 0.8)*	** 0.7*	** 0.5*	** 3.666*
	= 462 tCO_2/ha					

Leakage$_{wood}$	*= % of displacement*	** CO_2-stock*	** Area*
	= 75%	** 462*	** 300*
	= 103,950 tCO_2		

Leakage$_{non\text{-}wood}$ – d. Agricultural activities

A family has sold its property to the project owner to be able to move closer to their elderly parents. On their 700 ha farm they were planting 50ha (Area) of maize and weed.

The family confirms to the project owner that the farming land will stay the same (% of displacement) on the property they are moving to.

As it is not known where exactly the family will move to, the national default value of a natural forest is taken. It is 250 m^3 of wood per hectare.

According to a national default value the Biomass Expansion Factor for natural forests is 1.5 and the average Wood density is 0.5. The Root-to-Shoot ratio has been taken from default values of the 'conservative approach' = 0.8.

0.5 = the carbon fraction of biomass
3.666 = the factor to convert from C to CO_2

CO_2-stock	*= Stem volume*	** BEF*	** (1+ Root-to-Shoot)*	** Wood density*	** Carbon fraction*	** C-to-CO_2*
	= 250	** 1.5*	** (1+ 0.8)*	** 0.5*	** 0.5*	** 3.666*
	= 619 tCO_2/ha					

Leakage$_{non\text{-}wood}$	*= % of displacement*	** CO_2-stock*	** Area*
	= 100%	** 619*	** 50*
	= 30,950 tCO_2		

Leakage$_{non\text{-}wood}$ – e. Resettlements

Due to the tree planting activities, one village of 10 people within the project area must be resettled. All villagers have agreed to this and will get a financial compensation to buy new houses and land. According to the amount of financial compensation, the project owner expects the people to buy more land that they had before. Within the project area, the community lived on 3 hectares (Area) of land.

A survey determined that 90% (% of displacement) of the people will buy land close to the project area, since they are used to the region. As the type of vegetation inside and outside the project area is very similar, the information of the baseline analysis is taken to determine carbon stock of the aboveground woody living biomass. It is calculated to be 15 tCO_2/ha (CO_2-stock).

10% (% of displacement) of the people are expected to move elsewhere. Here, the national default value for forest is taken. It is 230 tCO_2 per ha (CO_2-stock).

Leakage$_{non\text{-}wood\text{-}1}$	*= % of displacement*	** CO_2-stock*	** Area*
	= 90%	** 15*	** 3*
	= 40 tCO_2		
Leakage$_{non\text{-}wood\text{-}2}$	*= % of displacement*	** CO_2-stock*	** Area*
	= 10%	** 230*	** 3*
	= 69 tCO_2		
Sum	*= 40 + 69 tCO_2*		
	= 109 tCO_2		

Leakage$_{non\text{-}wood}$ – f. Livestock grazing

A survey has determined that 500 heads of cattle (Heads) are grazing within the project area of 700ha. The project is situated in a tropical dry climate. Therefore, the sustainable grazing capacity is 0.5 cows per hectare. This equals to 2 hectares per cow (Capacity).

A survey with the cattle keepers resulted that 20% of them will move to other land which impacts woody living biomass (% of displacement). The remaining 80% will find other jobs or move to land where woody biomass is not impacted.

The CO_2-stock where the displacement will take place is expected to be a combination of bush- and grassland with an average woody carbon stock of 20 tCO_2 per hectare (CO_2-stock).

Leakage$_{non\text{-}wood}$	*= % of displacement*	** CO_2-stock*	** Heads*	** Capacity*
	= 20%	** 20*	** 500*	** 2*
	= 4,000 tCO_2			

Legal Notice

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The German Law is applicable for any legal disputes with the association CarbonFix. The place of jurisdiction is Staufen, Germany. (Registrar of Association: Amtsgericht Staufen No. VR 429)

CarbonFix is not responsible for legal disputes amongst *project developers, project owners*, *CO_2-buyers* or *certification bodies*.

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