

Carbon Footprint

CO₂ uptake Miscanthus

Page 1/2

Version 01

Issue date : 03-04-2020

Revision date : 03-04-2020

Note:

vibers™ develops advanced technology and materials with local Miscanthus (Elephant grass).

Flyers, Technical Data Sheets and further information about our vibers™ bioplastic, vibers™ paper & cardboard and vibers™ bio-concrete are available on request.

Carbon dioxide uptake Miscanthus

1 kg of Miscanthus giganteus captures >1.5kg CO₂/kg.

- >30 ton CO₂ per hectare per year yielding up to 20 ton dry mass per hectare per year (4 times more than trees).
- This is an under-estimation of the real CO₂ capture since this calculation only takes into consideration the biomass produced above the ground and excludes the CO₂ capture under ground (roots).
- Real capture is estimated to be around 1.76 kg CO₂ /kg.

All of the carbon (C) of the CO₂ is sequestered for conversion into Miscanthus biomass via photosynthesis. Part of the oxygen (O) is released back into the air as oxygen (O₂). Hence the difference between the total CO₂ uptake and the yield.

- The chemical reaction of the photosynthesis process is netto:
 - $6 \text{ H}_2\text{O} + 6 \text{ CO}_2 \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{ O}_2$
- The molecular weight of CO₂ is 44 and of CH₂O is 30.
- A yield of 20 ton dry mass, requires $44/30 * 20\text{t} = 29.3 \text{ ton CO}_2$

Life Cycle Analysis

The issue of how to consider carbon uptake in biobased materials in the context of LCA is not always simple.

- It depends, from a global life cycle perspective, of the duration of the sequestration. If the sequestration period is considered long enough, then you can be allowed to let a credit appear. If not, then carbon neutrality may appear (absorbed CO₂ can be released).
- Eco-profiles are cradle-to-gate results, and the lifetime of the application is not known.
- This has not always been the case. In former versions of the impact calculation methods, the CO₂ absorption from air was considered with a "-1" characterization factor, meaning that whatever the scope of the study a credit would appear. But this characterization factor was removed about 10 years ago with scientific consensus. You can find however some impact calculation methods that were not updated and still include it, but a study using this would currently not be approved by critical review. Of course, if you compare these results with ancient publications, you may find a disappointing difference. The fact is that LCA is (mostly) a scientific and therefore evolving tool.

For more information please contact:

vibers™
Jupiter 410
2675LX Honselersdijk
The Netherlands
+31 (0)174 - 725812
hallo@vibers.nl
www.vibers.nl

CFP CO₂ uptake Miscanthus

EcolInvent

Impact category	Unit	Miscanthus chopped	Miscanthus vibers TM *
IPCC GWP 100a	kg CO ₂ eq	0.065	0.023

* excluding fertilizer and pesticides use

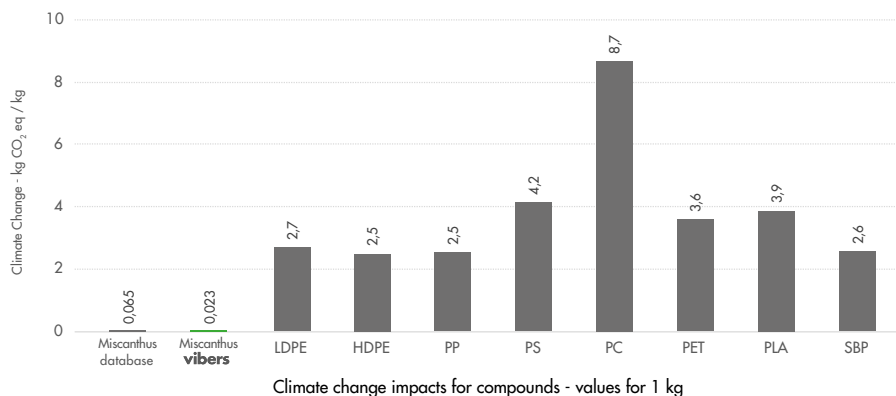
This dataset represents the production of 1 kg of Miscanthus (dry matter) on a plantation with a lifetime of 20 years. The moisture content at storage is 14% (= 15% water on a dry mass basis). Miscanthus is harvested annually from the second year on. Dry matter yield at first harvest is 6.000 kg/ha, from second harvest onwards 17.000 kg/ha.

Production volume: 31.200.000 kg

Included activities start: This activity assumes Miscanthus production on a plantation with a lifetime of 20 years and represents the average operation expenditures on the production of 1 kg of Miscanthus averaged across the whole lifetime including establishment, operation and clearing of the plantation. The inputs of seed, mineral fertilisers and pesticides are considered.

Included activities end: The dataset includes all machine operations and corresponding inputs of machine infrastructure and sheds. Machine operations are: soil cultivation, planting, fertilisation, weed control, pest and pathogen control, harvest and chopping of Miscanthus and transport from field to farm (2 km) and clearing of the plantation by rotary tiller including growing of oil radish (not harvested) for shading the field and inhibiting regrowth of miscanthus. Further, direct field emissions are included. This activity ends after mulching of the oil radish and with provision of chopped Miscanthus at the farm gate.

Evaluation of cradle-to-gate climate change impacts of various compounds compared to Miscanthus



For more information please contact:

This study was ordered by vibersTM to Materia Nova within the context of the BioBase4SME project.

vibersTM
Jupiter 410
2675LX Honselersdijk
The Netherlands
+31 (0)174 - 725812
hallo@vibers.nl
www.vibers.nl