

ID of C-Sink Certificate

cs000018

Carbon Sink Certificate – for CO₂e Potential

Sonnenerde GmbH
Oberwarter Strasse 100
7422 Riedlingsdorf
Austria

Operator ID: 458488

GPS of production Latitude: 47.3300432692775
Longitude: 16.153561287932853

The Carbon Sink Potential of the mentioned batch is certified according to the following standard:



BIOCHAR BASED CARBON SINKS

Data of batch

Batch ID	ba000018
Amount of produced biochar (dry matter)	800 t DM
C-sink potential of biochar (dry matter)	49.2 %
C-sink potential per ton of biochar (dry matter)	1.806 t CO ₂ e
C-sink potential of total amount of produced biochar (dry matter)	1444.8 t CO ₂ e

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Hans Matzenberger
President of board of
directors

Franziska Staubli
Director

Certification details of Carbon Sink Potential

Feedstock		
Type of feedstock	Ag-05 Harvest residues, R-07 Residues from industrial biomass processing	
Total amount of feedstock (dry matter) used for the batch	2000 t	
Emissions due to fertilization of feedstock	0.0	
Emissions due to transportation of feedstock to pyrolysis site	5.184 t CO ₂ e	
Emissions due to feedstock preparation	27.0 t CO ₂ e	
Emissions for drying of feedstock	0.0	
Emissions due to feedstock storage (CH ₄)	0	
Total feedstock related GHG emissions without CH₄ per batch	32.184 t CO₂e	
Pyrolysis		
Source of electric energy	Countrymix	
Emissions due to electricity consumption for entire batch (factory gate)	0.0	
Emissions due to LPG and other external fuel for reactor heating		
Emissions due to carrier gas	0	
CH ₄ emissions of pyrolysis unit	0.2 t CH ₄	
Total pyrolysis related GHG emissions without CH₄ per batch	0.0	
Methane		
Total methane emissions (CH ₄ emissions of pyrolysis + storage)	0.2 t CH ₄	

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How many t CO ₂ e did you reduce or sequester to offset CH ₄ -emissions?	0 t CO ₂ e
Type of methane offset (e.g. reforestation or none)	deducted from C-Sink Potential
Total non offset CH ₄ emissions per batch	17.2 t CO ₂ e
Total CH ₄ emissions to be offset in CO ₂ e per batch (@ GWP ₂₀ of 86)	17.2 t CO ₂ e
Total CH ₄ emissions to be offset in CO ₂ e per ton of biochar to be expected to be produced (dry matter)	0.021 t CO ₂ e
Margin of Security	
Margin of security 10% of total GHG emissions (incl. GWP ₂₀ of CH ₄) per batch	4.938 t CO ₂ e
Total emissions	
Total GHG emissions to be offset in CO₂e per batch	54.322 t CO₂e
Total GHG emissions to be offset in C per ton of biochar (dry matter)	0.019 t C
Energy	
Produced quantity of heat per batch	1000 MWh
Produced quantity of electricity per batch	0 MWh
Biochar	
Total biochar production of batch (expected) in t dry matter	800 t DM
H/Corg ratio	0.19
Organic carbon content Corg	51.1 %
C-sink potential	49.2 %
Data per ton of biochar	
Total GHG emissions per t biochar (dry matter)	0.068 t CO ₂ e
CO ₂ e-content per t of biochar (dry matter) [gross C-sink]	1.874 t CO ₂ e
C-sink potential in tCO ₂ e per t of biochar (dry matter) [net C-sink]	1.806 t CO ₂ e

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C-sink potential of total amount of produced
biochar (dry matter)

1444.8 t CO₂e

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The biochar batch ba000018 produced by Sonnenerde GmbH has carbon sink potential of 49.2 %. Each ton of biochar from the certified batch has a carbon sink potential of 1.806 t CO_{2e}.

The carbon sink potential of 49.2 % provides the percentage of a mass unit of biochar that, on a dry matter base, can be considered as a temporal carbon sink. For example, a big bag containing 131 kg biochar (dry matter) has a carbon sink potential of (131 kg * 49.2 %) = [131* 49.2 %] kg C which is the equivalent of [131* 49.2 %*44/12] kg CO_{2e} per big bag.

The production of 1 t of biochar (dry matter) caused emissions of [0.019 t C*44/12] t CO_{2e} (0.019 t C) due to feedstock production, transportation, storage, preparation and operation of the pyrolysis plant and methane emissions during both biomass storage and the combustion of the pyrolysis gases. These emissions were deduced from the carbon sink value of the biochar.

The CO₂ emissions of the combustions of the pyrolysis gases used for energy production are considered as carbon neutral as the feedstock for the pyrolysis originated from harvest and industrials biomass processing residues.

The CH₄ emissions were measured once during regular operation. The methane values are thus subject to some uncertainty regarding start-up and shut down of the process or possible problems during regular operation. For this reason, a margin of 50 % was added to the measured CH₄ emissions. It was guaranteed that the feedstock is never stored longer than 30 days before drying to below 20% water content, therefore no CH₄-emissions due to self-heating were considered. All electricity used for the production was provided as renewable, carbon neutral energy.

Neither the carbon expenditures necessary to transport the biochar from the production site to the location of the final C-sink (via a merchant and/or processor) nor the carbon expenditures when manufacturing or blending the biochar into a carbon sink product are considered so far. These emissions must be deducted as soon as a C-sink certificate or an offset service is generated for an end customer based on this C-sink potential certificate. Equally, when applied to soil, only the carbon fraction that is persistent after 100 years (C_{sink100}) or any other EBC-defined sequestration period should be traded as C-sink certificate.

During the biochar production, 1000 MWh thermal and 0 MWh electric energy were produced. As all GHG emissions of the entire process were deduced from the biochar carbon sink potential, this thermal energy is completely carbon neutral. The total certified amount of carbon neutral heat will be provided at the end of the batch.

The present EBC carbon sink certificate for CO_{2eq} potential at factory gate is valid for the biochar batch ba000018 and can be used for carbon sink certification and trade procedures.