Rule Update: Diffuse C-Sinks

Preamble

From October 15, 2025, biochar no longer needs to be tracked all the way to the end-point if it has been blended into an approved C-sink matrix. All matrices for which end-point tracking becomes optional are marked as "Diffuse C-sink authorized" in the positive list of matrices. The list also provides information about which documents are required depending on the type of matrix. End-point tracking remains possible at any time – and is strongly recommended.

Aim of the document

This document aims to point out all sections of the Global Biochar C-Sink Standard V3.1 that are affected by the rule update and provide the content/interpretation that is valid instead. Changes are highlighted in green.

All references to the 1tCO2e limit for diffuse C-sinks will be removed. However, the concept of diffuse C-sinks remains unchanged and refers to sinks that are well-distributed quantities in terms of spatial and temporal distribution and the remaining rules will remain in place. Specifically, this means the changes presented in the following chapters.

1. Glossary

The entry Diffuse C-sink is replaced by:

Diffuse C-sink: Biochar ~~[...]~~ that was mixed to a C-sink matrix preventing the oxidation of biochar and which, due to the nature of the matrix, will be applied in small, well-distributed quantities in terms of spatial and temporal distribution.

2. 2.1 Calculation of Biochar C-Sinks

The third-to-last paragraph is replaced by:

As long as biochar materials are not applied to soil or another long-lasting matrix, total or partial losses of biochar-carbon are possible. Fire could destroy biochar, or a customer could buy it for co-firing in a biomass power plant or use it as a reducing agent for steel production. Therefore, biochar must not only be tracked from the production site to the final C-sink site, but the final C-sink site must be monitored for as long as the biochar or biochar-material is not applied to soil ~~(i.e., for all C-sinks > 1 t CO2e).~~ There are exceptions to this rule for diffuse C-sinks where the biochar is incorporated into a matrix eligible for diffuse C-sinks at a ratio of less than 1:1 (v/v). This prevents biochar from burning unintentionally or being recovered for use in a way that could result in carbon emissions. For some matrices, additional evidence must be provided, especially if there are several conceivable uses for the biochar-matrix mixture.

3. 5.3.8 Manure and agricultural digestate

The chapter is replaced by:

Manure and manure digestate are secondary products of animal farming. The storage and application of animal manure and its digestate cause significant quantities of GHG emissions that can be reduced when manure or manure digestate is pyrolyzed (Rathnayake et al., 2023). The feed that animals transform into manure is made from biomass that has removed its carbon from the atmosphere. As animal growth and production is the operation's main objective, the feed production's carbon footprint is not accounted for in the manure. Manure and its digestate is thus considered as climate-neutral feedstock. Only transport emissions must be accounted for.

Biochar that was mixed with manure before anaerobic digestion or with anaerobic digestate before the digestate gets pyrolyzed cannot be accounted for as a C-sink. The same applies to biochar that is added to manure intended for pyrolysis. Animal feed may contain biochar that is already registered as a diffuse carbon sink (see Chapter 12.2). In such cases, however, additional evidence had to be provided as a precautionary measure to show that the matrix ultimately ends up in a soil-based application and that pyrolytic treatment can be ruled out.

The time of CO2 removal is set to the year of pyrolysis

4. 10.1

Only the 5th paragraph is replaced by:

Once the biochar leaves the producers' premises, further emissions must be tracked. For this purpose, every packaging ~~unit containing more than 1 t CO2e of biochar~~ must be labeled with a scannable identification code (i.e., usually a QR code, cf. Carbon Standards

design manual). The label accompanies the product on all transports and must provide the following information:

5. 10.2 Biochar Processor

Only the last paragraph is replaced by:

If the biochar was mixed into a C-sink matrix eligible for diffuse C-sinks (marked as "Diffuse C-sink authorized" in the matrix positive list for Biochar C-sink) it can be registered as a diffuse C-sink. This must be made visible by printing the following Carbon Standards registered seal: "Registered C-Sink" and a QR-Code with the web link to more detailed information about the C-sink registration and use. Further details can be found in Carbon Standard's Design Manual.

6. 10.3 Biochar Trader

The chapter is replaced by:

Generally, all biochar traders that trade C-sink units must be registered at Carbon Standards and receive their company ID and access to the MRV tool for trader. Biochar traders that only sell diffuse C-sinks do not need to register.

Biochar traders who do not repack the packaging units only need to scan the ID and add the storage location and date of arrival to the registered data. Once it leaves the premises again, the date of departure must be registered.

If the biochar is repackaged, the new packaging units must be registered and linked to the former registered packaging unit and all material and transportation data. ~~If the new packaging units contain less biochar carbon than 1 t CO2e, they cannot be registered as C-sink units except when grouped to a new unit (e.g., a palette) of > 1 t CO2e. If the biochar is mixed into a C-sink matrix establishing a new C-sink unit containing > 1 t CO2e, the trader must register as biochar processor with Carbon Standards.~~

7. Chapter 11.2 Diffuse C-sink

The chapter is replaced by:

If the biochar was mixed into a C-sink matrix eligible for diffuse C-sinks (marked as "Diffuse C-sink authorized" in the matrix positive list for Biochar C-sink) it can be registered as a diffuse C-sink.

The C-sink matrix positive list (see Carbon Standards' website) classifies and specifies all permissible C-sink materials and applications that can be used to establish diffuse C-sinks. Only matrices for diffuse matrices are permitted in which the final C-sinks are highly spatially distributed. For example, when about 0.5 % biochar is mixed into slurry, and applied at 40 m³ per hectare per year, this equals approximately 0.2 tonnes of biochar per hectare annually. Furthermore, sufficient knowledge about the matrix must be available to reliably model the degradation of the semi-permanent carbon fraction in biochar. These models, expressed as persistence curves, form the basis for calculating long-term storage.

A distinction is made between biochar-containing products that will eventually be applied to soil (e.g., compost, liquid fertilizers, manure additives, potting soil, feed) and industrial or consumer materials where waste treatment or disposal is the expected end-of-life scenario. If biochar was mixed at a volume ratio of at least 1 to 1 with compost, manure, feed, liquid fertilizer, rock powder, clay, lime, or ash, the spontaneous combustion or

decomposition of the biochar and, thus, the loss of carbon (risk of reversal) can be practically excluded. Given the biochar-containing product is labeled and marketed as a soil amendment, feed product, potting soil, or manure additive, an eventual soil application can be expected, and the resulting C-sink may be registered as a geological C-sink. Some matrices require additional evidence to ensure that they are used for soil application.

~~If an agricultural biochar-based product contains, e.g., 20 m3 compost and 1 tCO2e biochar for a total volume of 22 m3 biochar-compost, it must be registered with geographic localization and the signed consent of the landowner or tenant. If the total volume of the biochar-compost is, e.g., 6 m3 containing only 0.4 tCO2e biochar, the biochar-compost can be considered a diffuse C-sink.~~ Biochar products not intended for soil application may have shorter or longer lifetimes but will eventually end up in waste incineration or recycling processes, releasing carbon as a greenhouse gas back into the atmosphere. For those products, either a control period (to check if the carbon product is still in use) or the average lifetime of the product is applied to define the lifetime of the C-sink. ~~If the biochar carbon contained in the C-sink materials represents less than 1 t CO2e, no geo-localization is needed for the individual products.~~ It can be expected that CO2 capture from waste incineration plants will become obligatory until 2050 and that the biochar-carbon of those industrial or consumer materials will never be released back into the atmosphere. However, as long as CO2 capture from incineration and thermal waste treatment are not yet state-of-the-art, only the average lifecycle of the C-sink products can be registered.

When biochar is distributed in small amounts over a large number of serial products (e.g., several grams of biochar in a million pairs of skies), the registration of the temporary C-sink lies with the producer using the average lifetime of the products, and no C-sink location is required. In those specific instances where marginal quantities of biochar are applied or utilized in products, the registration of diffuse carbon sinks is permitted. Diffuse C-sinks may present a risk of double counting if, e.g., the biochar-based product (e.g., a 30-l biochar-compost bag or the 25 kg bag of biochar clay plaster) was certified as a diffuse C-sink by the processor while the client thinks to compensate for some of its own global warming effects when using the biochar product in a garden or for the renovation of a house. To avoid such misunderstandings, diffuse C-sinks that are already registered as such must be labeled as a C-sink product, informing the buyer that the C-sink of the product is already registered and cannot be claimed for other emission compensations. This reference must at least be made by printing the following Carbon Standards registered seal: "Registered C-Sink" and a QR-Code with the web link to more detailed information about the C-sink registration and use. Further details can be found in Carbon Standard's Design Manual. If a biochar-based product is used in a garden as a diffuse C-sink and the gardener applies for soil organic carbon certification ("humus certificates"), double accounting could theoretically occur because the usual measurements used to quantify soil carbon will account for biochar as soil organic carbon. However, as diffuse C-sinks by definition are well-distributed quantities in terms of spatial distribution, the amount of biochar at a single point is minimal. As such small amounts are hardly measurable using common methods for measuring soil carbon, the risk of double certification can be considered inexistent (Rathnayake et al., 2023a). Moreover, as Rathnayake et al. (2023) recommended, certification of soil organic carbon (SOC) requires declaring any biochar application and deducing it from certified SOC.

8. 12.2 Application in Animal Farming

The chapter is replaced by:

If the biochar is first applied as feed, bedding, or manure additive, the biochar becomes blended with a C-sink matrix and is thus eligible as C-sink. If documentation is available that provides that the complete manure will ultimately end up in a soil-based application, registration as diffuse C-sink is possible. Special attention must be paid to horse and chicken fodder, as horse and chicken manure are often used for energetic purposes, which must be excluded. Pet feed products are generally excluded as pet execreta end up mainly in waste treatment plants.

However, the location of the eventual C-sink can still be registered. If the biochar containing animal manure or compost is spread or incorporated on-farm, the entire farm can be considered as C-sink location. ~~If the biochar containing manure or compost with a biochar C-sink unit size above 1 t CO2e biochar is sold or provided to another farm or company, the biochar-compost-producing farm must be registered as a biochar processor. However, in most cases the biochar containing manure or compost will not be transported in packaging units to adjacent farms but rather as bulk material, and it may become impractical to create new packaging unit IDs.~~ Depending on the individual systems in place, appropriate tracking of the biochar containing manures, composts, or digestates to other farms and thus C-sink sites will be developed during the technical audit of the biochar manure processor.~~For C-sink units below 1 t CO2e of biochar, the biochar-manure substrate may be considered a diffuse C-sink (c.f., chapter 10.7).~~

9. 12.3 Concrete Construction Materials

The chapter is replaced by:

Biochar applied in construction materials, such as buildings, urban constructions, and infrastructure, is typically pre-mixed at a processor's site. In most cases, these pre-mixed materials are transported as bulk material, measured by weight or volume, rather than in packaging units. Depending on the individual systems in place, appropriate tracking of the materials to the construction site, and thus to the carbon sink site, must be developed and submitted to Carbon Standards for approval. Only when the tracking to the construction site is verified, and the building itself is registered as the carbon sink location can the biochar carbon sink be registered. Here, the PAC fraction is registered as persistent for > 1000 years, while the SPC fraction is registered without decay for the expected average lifetime of the construction and potentially longer if material use in new constructions is tracked (c.f., scenario 2.2), followed by the SPC decay function (c.f., equation 4) starting with the year of the demolition of the construction (c.f., figure 3).

~~Given the complexity of tracking the biochar from the production of biochar-based building materials to the construction site, a transition period until 31st December 2026 is granted. During the transition period, biochar C-sinks in construction materials may be registered like diffuse construction C-sinks without leakage over the average life cycle of 60 years, followed by the SPC decay function (c.f., equation 4) starting with year 60 after its production (c.f., figure 3).~~

~~For diffuse C-sinks of < 1 t CO2e, tracking from the concrete mixing site to the construction site is not required.~~ Biochar contained in the concrete ~~at quantities of less than 1 t CO2e~~ is registered without degradation over the average life cycle of 60 years, followed by the SPC decay function (c.f., equation 4) starting with year 60 after its production (c.f., figure 3).

The packaging/delivery note of the diffuse C-sink material must clearly state that the biochar contained in the concrete material has already been registered as C-sink and must not be registered again as part of a construction or any other use. If the biochar is intended to be used under the Construction C-sink Standard, it must be tracked through to the building.