Endorsement of dMRV for a Global C-Sink standard

A digital monitoring, reporting, and verification (dMRV) system is a crucial tool for tracking, reporting, and verifying data related to various processes and activities.

This document aims to provide a clear understanding of the steps involved and the requirements needed to obtain the endorsement as dMRV provider for one of the Global C-Sink standards by Carbon Standards International.

The endorsement is valid for a specific version of a Global C-Sink standard (e.g. Global Artisan C-Sink Version 2.1). As long as there are no major updates or changes to the standard, the dMRV endorsement will be renewed with a re-endorsement audit every year. With every standard update, CSI will define as well, if a more complex re-endorsement is required. However, it is important to note that if there is a major update or revision to the standard, the dMRV endorsement may need to be reviewed with a full re-endorsement audit and the dMRV itself potentially updated to align with the new version of the standard. This ensures that the endorsement reflects the most current best practices and requirements in the field of dMRV.

Basis for the endorsement are the respective Global C-Sink standards published by Carbon Standards International.

1. Endorsement process

Step	Description	Responsible party
1	dMRV provider reaches out to Carbon Standards International (CSI) for a first introduction call right here.	dMRV provider
2	The dMRV provider registers for the endorsement process. Registration can be done through this link. With this step the annual fee will be invoiced.	CSI/ dMRV provider
3	An offer for the service is sent out by CSI, signed by the dMRV provider. In addition, an NDA can be signed if wished.	CSI
4	The dMRV provider hands in the requested and required documents.	dMRV provider
5	CSI checks for completeness of the documentation.	CSI
6	Endorsement of the dMRV, includes online meetings with the dMRV provider, finding reports of non-compliances and deadlines for implementation of actions to take.	CSI/ dMRV provider
7	Upon successful completion, the dMRV provider will receive a certificate designating them as an "Endorsed dMRV provider". The dMRV provider will be listed on the website of CSI. After the audit the costs for the endorsement process will be invoiced. If the endorsement is not successful, the dMRV provider has the chance to improve their product and start the endorsement process again. The costs for the endorsement will be invoiced in any case.	CSI

2. General requirements for Global C-Sink

In the following table, general requirements of Carbon Standards International for dMRV system provider are listed. Those aspects are additional to the specific requirements of the different Global C-Sink standards.

Requirement	Description
Quality management documentation	The dMRV provider must hand-in specific documents with information about the system: • User Manual in English • Flowchart of the system • Technical description • Internal process for checking of data quality and completeness • Access to the dMRV (App and web interface) • Data security strategy
Data collection	Based on the specific standard, all data and information required must be tracked.
Data aggregation and consolidation	Based on the specific Global C-Sink standard, the calculation and aggregation must be implemented. In the web interface, a detailed overview of the data aggregated and sent to the Global C-Sink Tool (see chapter 5) for verification must be accessible. Internal identification numbering to ensure backtracking, e.g. from "application" to "mixing" to biochar "production" of a C-sink.
Data accuracy and reliability	The dMRV must have a built-in mechanisms to ensure data accuracy, such as data plausibility checks and data quality controls. Find more in section 3 (specific requirements) below.
Emissions factors and default values	An accessible table within the web interface must exist where specific standard values and data is shown. Emission factors are given by CSI, any additional ones need to be approved by CSI. Those are, but not limited to: • Emission factors used, incl. their sources (e.g.: Emission factor diesel, 2.7 kg CO_2e/liter; Global Biochar C-Sink) • Equations implemented • Margin of security given by the standard
Data security and data privacy	The dMRV provider must demonstrate the implemented procedures for data security and privacy, including the data backup strategy (e.g., ISO 27001 certification or equivalent practices in place).
Utilisation	The dMRV must be in a status where the data currently used is populated with data from actual production (e.g. data from a pilot phase).
Languages	All web interfaces and smartphone apps used, must be available in English. Additional languages are possible.
Global C-Sink Registry	C-Sink Units can only be sent for verification to the Global C-Sink Tool and C-sinks are only issued in the Global C-Sink Registry.

Requirement	Description
Responsibility of data entries	In the dMRV, it must be clearly defined which data points are entered by the user and which are provided by the dMRV provider (either entered or defined by the dMRV provider).
Archive	The dMRV must maintain an archive of all tracked data for a period of 10 years.

3. Specific requirements for Global C-Sink Standards

For each of the Global C-Sink standards, additional requirements are defined in the standard itself. In the following subchapters specific requirements are listed and explained.

3.1. Specific requirements for Global Artisan C-Sink Standard

The Global Artisan C-Sink standard lists in different chapters the main aspect of data and equation which needs to be collected for the verification of a C-sink. E.g. chapter 9 provides a list with data and information requirements, chapter 13 about emission portfolio and margin of security.
The table below gives more information about the implementation of some requirements given in the standard and specify additional ones.

Requirement	Description
Artisan Biochar Producer and C-Sink Cook profiles	The dMRV must implement a profile section for each Artisan Biochar Producer or C-Sink Cook, accessible in a web interface with at least the following information: • Name, address, phone number • Proof of successful participation and proficiency test for Artisan Biochar Producers • Kiln typ and kiln ID used • For C-Sink Farmers, GPS of each of their fields, including crop rotation, harvest data and harvest amount must be included. • Volume measuring device and respective volume • Finances and payments
Biomass Profiles	For each biomass type in the system, the dMRV needs to have a specific profile, accessible in the web interface. In the specific profile important information must be listed, as for example: • Name and mixing rations of the biomass • Carbon content and bulk density of the resulting biochar, including proof of lab analyses (reports) • Methane compensation scheme (avoidance or compensation (e.g. tree/SPC)) for each project individually, including the approval of CSI • Description of the pre-processing steps
Technology profiles	For each technology type in the dMRV, a specific profile needs to be implemented, accessible in the web interface. In the profile specific data and information must be listed, as for example: • Pictures showing the kiln • Upper surface, depth and total volume of the kiln type

Requirement	Description
	• Methane emissions per ton of biochar produced, including the approval of CSI • Definition of a production load
Matrix list	Contains a list of matrices listed in the standard, and can be found in the *Excel bulk uploads*
Data accuracy and reliability	The dMRV has built-in mechanisms to ensure data accuracy, such as data plausibility checks and data quality controls for the following parameters, but not limited to: • Carbon content • H/C ratio • GHG emissions along the supply chain • Production quantity vs. production capacity • Matrix allowed • GPS locations should be provided in decimal format with a minimum of five decimal places (e.g., 14.12345/8.12345)
Bundling of C-sinks into a C-Sink Unit	For Global Artisan C-Sink the following attributes must be complied with to create a C-Sink Unit: • A C-Sink Unit should not be smaller than 1 to CO_2e • C-sinks with same C-content (e.g. 71,30%), same biomass and same pyrolysis technology • Only C-sinks within the same matrix *positive list of permissible matrices for the establishment of biochar C-sinks*) • Only C-sinks from the same Artisan Pro, C-Sink Network or C-Sink Village • Same project according to the corresponding PDD • For every C-Sink Unit, a deeplink (URL) to the corresponding entry in the dMRV is provided (CSI and VVB).
Additional GHG emissions	The dMRV should be able to capture additional emissions not covered in the margin of security: • Emission during the transportation, drying and processing of biomass • Emissions during the processing and transportation of biochar
Further information to be sent to the Global C-Sink Tool	Following further information must be submitted with each C-Sink Unit: • Information mentioned in the excel bulk upload or API (STOCK and SINK transaction, see *Excel bulk uploads*) • Monitoring report of the C-Sink Unit in PDF (*link*) • Annex of the monitoring report in PDF (*link*) • Valid certificate of the Artisan C-Sink Manager

3.2. Specific requirements for Global Biochar C-Sink Standard

The Global Biochar C-Sink Standard lists in different chapters the main aspect of data and equations which needs to be collected for the verification of a C-sink.
Until the factory-gate, the Biochar Tool is calculating the production emissions directly (cradle-to-gate). The focus of dMRV providers is to track the downstream emissions (gate-to-grave). E.g. chapter 10 provides further information about the post-production of the biochar after the factory gate.
Carbon Standards International published a *formula and emission factor guidance* (contact CSI) as well, which is also part of the requirements, as it defines specific calculation and factors to be used.
The table below shall give some more information about the implementation of some requirements given in the standard and specify additional ones.

Requirement	Description
Emission Portfolio	As each stakeholder (e.g. producer, processer) involved needs to be certified according to EBC/WBC, the specific CSI ID number needs to be assigned and used to link the different emission categories (e.g. fossil fuel emissions and methane emissions). The emissions will be needed to establish the *Emission Portfolio*. Emissions caused by post-processing and transportation are accounted for and assigned to the specific stakeholder.
Tracking of packages and goods	A digital ID (e.g. QR code) must serve the dMRV system to track the biochar from the factory gate to its final use. The EBC/WBC and the Global Biochar C-Sink Standard use the same QR code generated by the Biochar Tool. Alternatively, the dMRV provider may use its own digital ID but must link then from the QR code landing page to the batch information provided by the Biochar Tool. Each packaging unit needs to have its own tracking code.
Data accuracy and reliability	The dMRV has built-in mechanisms to ensure data accuracy, such as data plausibility checks and data quality controls for the following parameters, but not limited to: • Carbon content • H/C ratio • GHG emissions along the supply chain (cradle-to-grave) • Production quantity vs. production capacity • Matrix allowed (EBC/WBC categories) • GPS locations should be provided in decimal format with a minimum of five decimal places (e.g., 14.12345/8.12345) to ensure accurate and reliable position tracking • A procedure is implemented to ensure that biochar is only applied to matrices according to its certification class and that mixing with non-certified biochar is excluded (e.g. EBC Agro is not used as animal feed, WBC Material not in agriculture).
Bundling of C-sinks into a C-Sink Unit	For Global Biochar C-Sink the following attributes must be complied with to create a C-Sink Unit: • A C-Sink Unit should not be smaller than 1 to CO2e • A biochar batch from a producer, processor or trader (the one who is responsible for the last processing step of the biochar - production, milling,

Requirement	Description
	blending, etc.) can be bundled to a bigger C-Sink Unit. Although a C-Sink Unit can only include biochar of one producer to connect the quantities to the correct project. • Each C-Sink Unit has attached the corresponding certificate IDs from the producer, and all processors and/or traders involved • A C-Sink Unit can only be bundled with biochar applied in the same country • Only C-sinks within the same matrix (*positive list of permissible matrices for the establishment of biochar C-sinks*) can be bundled into a C-Sink Unit • Every single C-sink will be entered into the Global C-Sink Registry with its GPS coordinates and the corresponding applied biochar quantity in tons (mt) • For every C-Sink Unit, a deeplink (URL) to the corresponding entry in the dMRV is provided (CSI and VVB).
Necessary information to be sent to the Global C-Sink Tool	Following further information must be submitted with each C-Sink Unit: • Information mentioned in the excel bulk upload or API (STOCK and SINK transaction, see *Excel bulk uploads*) • Monitoring report in PDF (*link*) • Annex of the monitoring report in PDF (*link*) • Valid C-Sink potential attestation • A deeplink to the respective entry in the dMRV tool is provided. This serves the VVB to gather detailed information on the C-Sink Unit. This entry is usually password protected.

3.3. Specific requirements for Global Tree C-Sink Standard

The Global Tree C-Sink Standard outline the requirements for data and equations employed for the quantification and verification of tree-based C-Sinks.
Project emissions are based on tree plantation activities, covering the entire lifecycle from land preparation to tree harvesting or conservation. The specific parameters per activity, formulas, and guidance on the emission reporting are found in the Global Tree C-Sink Standard.

The following table provides additional details on the key requirements for approval of a dMRV System for Global Tree C-Sink projects:

Requirement	Description
Emission Portfolio (Carbon Expenditures)	Emissions attributed to the project activities are reported following the Emission Portfolio guidance in Global Tree C-Sink. These emissions, attributed to the project activities, are reported annually and integrated in the calculation of the Carbon Expenditures
Data Specifications	The dMRV has built-in mechanisms to ensure data plausibility checks and quality controls for the following parameters at the C-Sink Unit level:

Requirement	Description
	• C-Sinks (t CO2e), Carbon Stock (t C), Biomass (t). • GHG emissions of project activities • Management Unit and other C-Sink Units within the project area. • GPS locations should be provided in decimal format with a minimum of five decimal places (e.g., 14.12345/8.12345) to ensure accurate and reliable position tracking of the C-Sink Unit • Time stamps, including the time-zone, transaction time and ID, etc.
Carbon Accounting Specifications	The integrated carbon accounting method must demonstrate: • A minimum spatial and temporal resolution that allows for tracking carbon stock changes and other significant tree-related indicators at the C-Sink Unit level within the defined monitoring period of the project. • A minimum accuracy level of ±10% (against the validation dataset presented for endorsement)
Bundling of C-sinks into a C-Sink Unit	For Global Tree C-Sink the following attributes must be complied with to create a C-Sink Unit: • A C-Sink Unit should not be larger than 10 ha and located in a radius of <5km • The boundaries are clearly established to report the Carbon Stock of each individual C-Sink Unit. • Each C-Sink Unit has attached the corresponding certificate ID • The boundaries and information of the corresponding Management Unit (group of CSUs) are clearly established and will be reported in the annex of the monitoring report • Every single C-Sink will be entered into the Global C-Sink Registry with its GPS coordinates and the corresponding C-Sinks (t CO2e) • Each C-Sink Unit provides information to the expected C-Sink Curve. • For every C-Sink Unit, a deeplink (URL) to the corresponding entry in the dMRV is provided (CSI and VVB)
Necessary information to be sent to the Global C-Sink Tool	Following information must be submitted with each C-Sink Unit: • Information mentioned in the bulk upload (see *Excel bulk uploads*) • Monitoring report in PDF (*link*) • Annex of the monitoring report in PDF (*link*) • Verification Statement • Endorsed C-Sink Curve estimations • A deeplink to the respective entry in the dMRV tool is provided. This serves the VVB to gather detailed information on the C-Sink Unit. This entry is usually password protected

4. Case study

As part of the Endorsement and specific to the standard, pilot data within the system will be used to serve as a case study to look at required data consolidation and reporting.

5. Transfer to Global C-Sink Tool

Once the registration process is complete, the dMRV provider will receive the following credentials:

- Credentials for the Global C-Sink Tool in STAG
- Credentials for the Global C-Sink Tool in PROD
- Credentials for our APIs

When a product is added to a stable matrix, the dMRV provider enables the first C-sink owner to submit all necessary data via API (STOCK and SINK transaction) or *Excel bulk uploads* to the Global C-Sink Tool. This will automatically trigger the verification task of the VVB.