Global Artisan C-Sink - Clarification for methane emission compensation

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Methane compensation is a critical component of the Global Artisan C-Sink standard due to the urgent need to address the accelerating impacts of climate change. As one of the most potent greenhouse gases, methane possesses a global warming potential that is approximately 86 times greater than that of carbon dioxide (CO2) over a 20-year period. This stark difference underscores the necessity of mitigating methane emissions to effectively manage climate change.

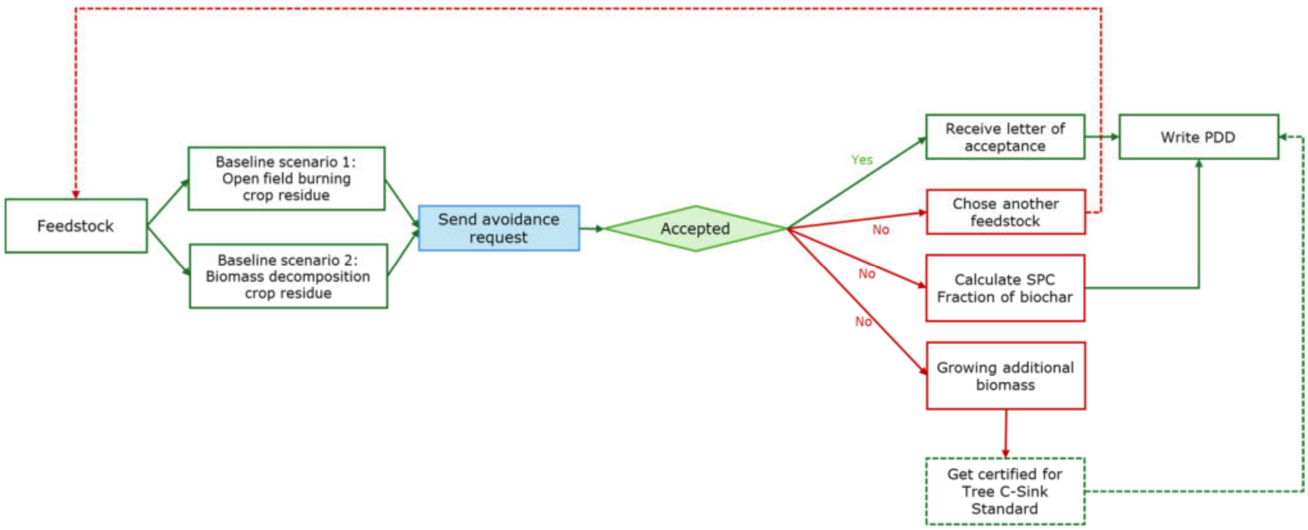
This document aims to provide further clarification on the corresponding chapter in the Global Artisan C-Sink standard and includes a flowchart outlining the most commonly used types of biomasses for projects. Additionally, it will explain the implementation of using the semi-persistent carbon (SPC) fraction from other projects and details the entries in the Global C-Sink Registry.

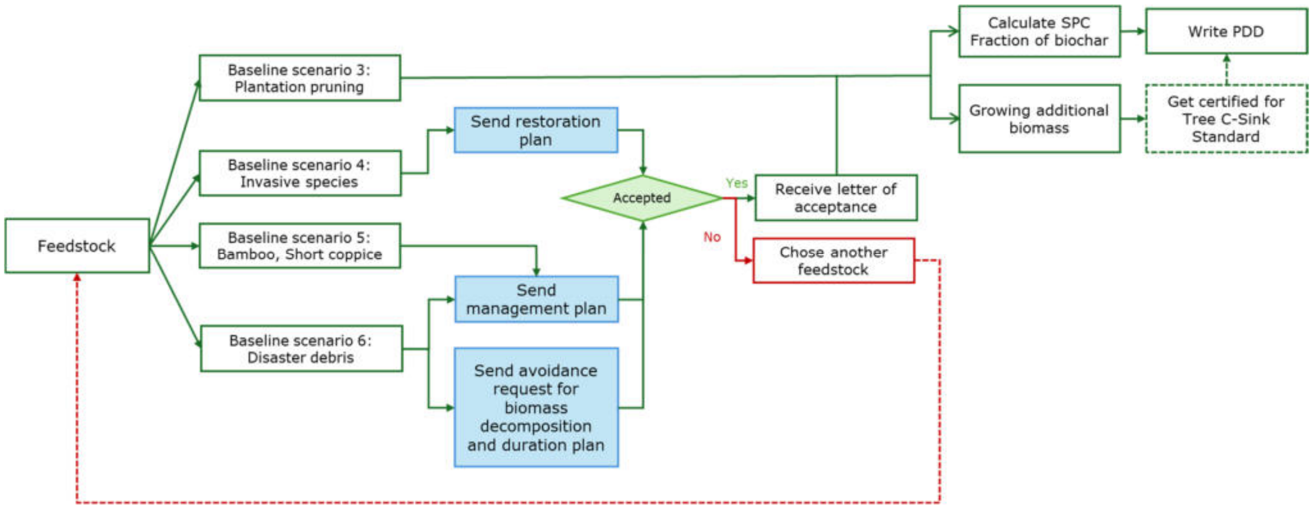
1. Common baseline scenarios

Since the implementation of the Global Artisan C-Sink (with Version 1 published in October 2022), various feedstocks and types have been utilized by different Artisan C-Sink Managers.

Drawing from this knowledge and experience related to requests for methane emission compensation and their approval, the following baseline scenarios represent the most common cases. These baseline scenarios will indicate which feedstocks or scenarios are most likely to receive approval for methane compensation schemes and which are less likely to be approved.

It is also important to note that the comparison to a baseline cannot be made for an undefined future. When considering avoidance, the comparison can be a maximum of 10 years, depending on the specific case.





2. Avoiding GHG-emissions from burning crop residues and from biomass decomposition

As mentioned in the Global Artisan C-Sink in chapter 14.6, crop residues are burnt directly in the fields in many tropical countries. While it has some positive effects on farming (ash fertilization, some pyrogenic carbon, elimination of pests), emissions of such practices are massive. Besides significant emissions of particulate matter that cause smog (the main reason for air pollution), methane and carbon monoxide emissions are very high due to the uncontrolled combustion of mostly wet or humid residues.

Based on the published data summarized in the Global Artisan C-Sink Standard, it is assumed that the overall climate impact of pyrolysis within Global Artisan C-sink is in any case not worse than direct burning of crop residues in the field. Therefore, abandoning crop residue burning can be accounted as an offset for emissions of Kon-Tiki-pyrolysis within the limits specified below.

While this methane compensation scheme can be requested by any Artisan C-Sink Manager and for any feedstock, certain types are more likely to gain approval. Examples of feedstocks that are more likely to be approved include corn cobs, stalks (such as those from cotton or corn), as well as cocoa cobs. Conversely, feedstocks such as invasive species or various forms of pruning (e.g., from coffee or other plantations) are less likely to receive approval.

The avoidance request must be submitted to CSI before the validation of the PDD begins to minimize waiting time and prevent duplicate work. For example, if the avoidance is not granted and a different feedstock is selected by the Artisan C-Sink Manager, it could lead to delays.

2.1. Request submission - Avoiding GHG-emissions from burning crop residues

A report must be submitted officially, including the date, project ID, and the signature of the Artisan C-Sink Manager.

The report should address at least the following aspects:

- Name of the feedstock, description and picture

- Current Practice: Describe the existing practice of burning crop residues after harvest.
- Effect on Environment/Health: Detail the environmental and health impacts caused by burning, such as air pollution, greenhouse gas emissions, and respiratory issues.
- With Biochar Intervention: Explain how biochar can be used as an alternative, its role in improving soil health, sequestering carbon, and reducing harmful emissions.
- Justification for Avoidance: Provide a rationale for granting avoidance, focusing on the long-term benefits to environmental sustainability, public health, and climate change mitigation.
- Example for a farmer declaration: Please find the template here.

2.2. Request submission - Avoiding GHG-emissions from biomass decomposition

A report must be submitted officially, including the date, project ID, and the signature of the Artisan C-Sink Manager.

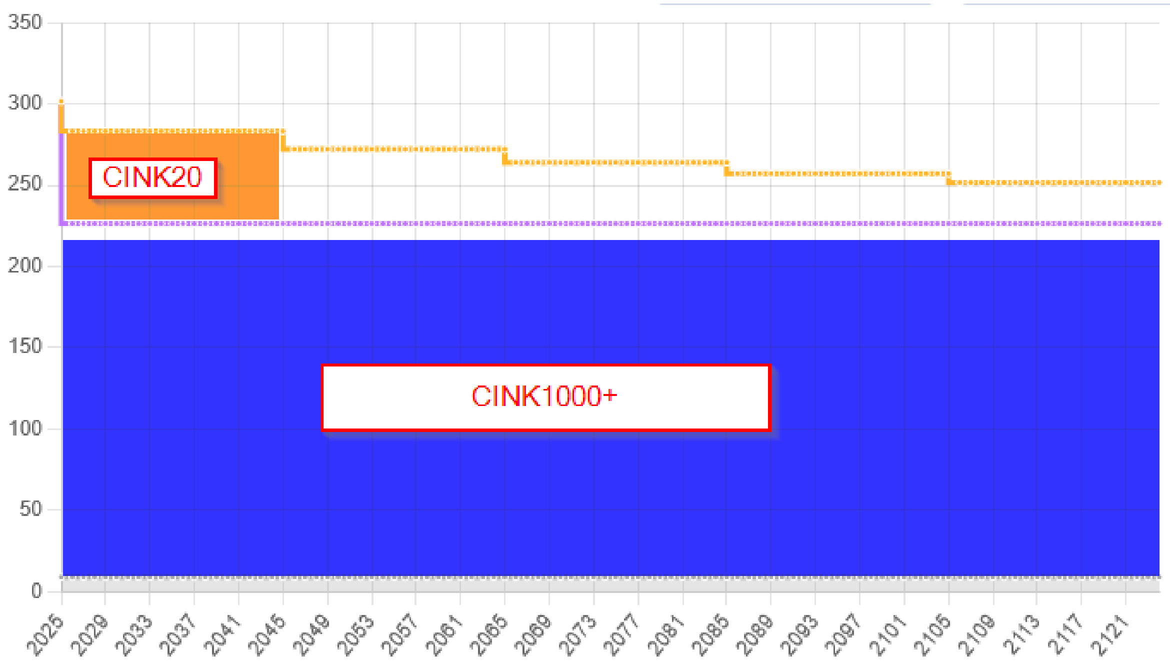
The report should address at least the following aspects:

- Name of the feedstock, description and picture
- Current Practice: Describe the existing practice of biomass decomposition after harvest.
- Effect on Environment/Health: Detail the environmental and health impacts caused by biomass decomposition, such as air pollution, greenhouse gas emissions, and respiratory issues.
- With Biochar Intervention: Explain how biochar can be used as an alternative, its role in improving soil health, sequestering carbon, and reducing harmful emissions.
- Justification for Avoidance: Provide a rationale for granting avoidance, focusing on the long-term benefits to environmental sustainability, public health, and climate change mitigation.

3. Offsetting methane emissions with the SPC-fraction of biochar

The global warming effect of methane emissions caused by a Kon-Tiki or TLUD can at least partly be offset by the global cooling effect of the first 20 years of the SPC fraction. To calculate it correctly, the annual global cooling of the SPC for each of the first 20 years must be summed-up and match the AGWP100 (the Accumulated Global Warming Potential of the methane emissions over 100 years) of the CH4 emission to be compensated. The exact explanation is given in chapter 14.5 in the Global Artisan C-Sink Standard.

The semi-persistent carbon (SPC) fraction of biochar over a 20-year period (CINK20, orange area in the picture below) can be utilized to compensate for methane emissions. However, in most cases, the SPC fraction of an Artisan biochar alone will not be sufficient under the Global Artisan C-Sink standard. Therefore, it is necessary to retire the SPC fraction from additional entries in the Global C-Sink Registry.



It is important to note that if third-party entries are used, a contract must be established with their owners. The corresponding SPC shares must be retired prior to use. This process aligns with the procedure for retiring a permanent carbon sink.

To determine the proportion of one's own biochar or SPC fraction that can contribute to methane emission offsetting, it is advisable to use the CSI Calculation Tool. This tool can calculate the amount of Absolute Global Warming Potential (AGWP100) required to offset a ton of methane and the proportion of Absolute Global Cooling Potential (AGCP20, Accumulated Global Cooling Potential of the SPC fraction of the Biochar C-Sink over the first 20 years) in the SPC fraction. Any shortfall must be offset through other biochar C-sinks (CINK20).

3.1. Example for compensating methane emissions with SPC-fraction

In this example project we will look at the case, where an invasive species was taken to produced biochar in a Kon-Tiki.

Several information and numbers are needed to be able to calculate:

- **Methane emission of the kiln technology**: For Kon-Tikis, the standard defines the factor as 0.03 t CH4 per ton of biochar.
- **Carbon content of the resulting biochar**: Based on the lab report from an endorsed laboratory, in our case, this is 70%.
- **H/Corg ratio**: Each endorsed kiln technology must demonstrate that the H/Corg ratio is below 0.4. For our example, we will use a ratio of 0.35.
- **Amount of biochar produced**: In this example, we are focused on the results per ton of biochar, so we will consider 1 ton of biochar (dry matter).

Below you'll find an export from the CSI-Calculator. The key calculator values are:

- AGWP(100) of methane in t ACO2e
- AGCP(20) of SPC in t ACO2e

For this example, the AGWP(100) of the methane is 38.1 t ACO2e, the SPC fraction of the biochar has an AGCP(20) of 7.5 t ACO2e, or roughly 20% of the methane compensation.

This means that 30.6 t ACO2e must be offset by other C-sink entries in the Global C-Sink Registry.

Input parameters	Calculation results
Methane emissions in t CH4 0.03 **Biochar** Amount of Biochar in t (DM) 1 C-content of biochar (%) 70 H/Corg 0.35	**AGWP(100) of methane in t ACO2e :** 38.1 **Total Biochar Carbon in t CO2e :** 2.57 **PAC in t CO2e :** 1.93 **SPC in t CO2e :** 0.64 **AGCP(20) of SPC in t ACO2e :** 7.5 **Methane emissions compensable with SPC :** 20% | 0.01 t CH4 **Remaining methane emissions non compensable with SPC :** 0.02 t CH4 **Number of years required to compensate all CH4 emissions with the SPC fraction (maximum 20 years) :** *The biochar C-Sink does not contain enough SPC to compensate for the entire CH4 emission*

Imagine that in our example project, we also have a second feedstock available: corn stalks.

- Since corn stalks are a classic crop residue, our project received avoidance approval from CSI.
- Consider biochar produced from corn stalks with a carbon content of 60%. The calculator indicates that its AGCP20 is 6.2 tons.
- To offset the methane warming from 1 ton of the invasive species biochar (derived from our initial feedstock), you would require the AGCP20 from approximately 5 tons of this corn stalk biochar. (This is based on the calculation: 5 tons x 6.2 cooling power per ton = 31, which is close to the 30.6 needed for offsetting).
- Once the C-sinks from the biochar made from corn stalks are verified and recorded in the Global C-Sink Registry, we can retire the CINK20 to offset the methane emissions from our invasive species biochar. Alternatively, we could utilize the CINK20 from other projects and their entries in the Global C-Sink Registry.

4. Compensation of methane emissions by growing additional biomass

To offset methane emissions, the Global Artisan C-Sink accepts the planting of trees to create forest gardens on fallow land, silvo-pastures on pastures, agroforestry on annual and perennial crop land, re- and afforestation. Replacing existing older trees in a tree-crop or forest garden cultivation cannot be accounted for methane offsets. However, the active management of natural regeneration of eroded, deforested steppe land where natural regrowth of trees is promoted through measures such as scrub removal, weeding, irrigation, pruning, etc., and can equally be accepted for methane offsets.

However, all tree plantations considered for methane offsetting must be certified under the Global Tree C-Sink standard and registered in the Global C-Sink Registry.

This means that the corresponding C-sinks must be verified and listed in the Global C-Sink Registry to be used for methane offsets, consequently the corresponding project must already be validated and verified.