climate cleanup

oncra

Biobased Products

Certification Protocol for the measurement of net carbon removal benefit

Based on the construction stored carbon metric from

Gideon climate cleanup asn bank

photo: Strotec/ EcoCocon

About this document

This Certification Protocol contains the criteria and guidelines to certify the Net Carbon Removal Benefit of activities involving the production of construction materials with a renewable, biogenic origin (hereinafter: *Biobased Products*). The protocol follows the overarching principles of the Provisional agreement on a Union certification framework for carbon removals between the European Commission and the European Parliament. It also follows the Open Natural Carbon Removal Accounting Guidelines. The protocol is partly based on work done in collaboration with the Dutch National Carbon Market Foundation, who published a certification method for long-lasting carbon storage in biobased construction materials (5 February 2024, in Dutch). For more information on the development of the Certification Protocol for Biobased Products, visit www.constructionstoredcarbon.org.

For the purposes of this Certification Protocol, Biobased Products are products with product-specific characteristics and environmental data, that are to be used in one or more constructions, and that in doing so facilitate the long-term storage of biogenic carbon. Given this definition, this Protocol is suitable to certify product-level activities. For a similar protocol on the building level, view the Climate Cleanup Certification Protocol for Biobased Construction.

This document consists of three main chapters: (1) general requirements for eligible projects; (2) QUALITY criteria, describing the main criteria to determine the Net Carbon Removal Benefit of eligible projects; (3) MRV requirements, describing the demands for measurement, reporting and verification of claims made and data delivered by operators of Biobased Products projects.

Authors

Climate Cleanup is a non-profit foundation and social enterprise funded by members and well-aligned partners. Our mission is to reverse climate change by removing 1500 GT CO_2 from the atmosphere with nature-based solutions. We do so by fostering systemic conditions for these nature-based solutions and a regenerative economy. We are grateful to our Ambassadors; without their support this work cannot be done.

Version History

November 2023	Dutch National Carbon Market (SNK) certification method published[1]
31 May 2024	First draft of the Certification Protocol for Biobased Products
31 July 2024	Publication date for version in consultation

[1] See here.

Executive Summary

This certification protocol is designed to facilitate the robust quantification and appreciation of the Net Carbon Removal Benefit of manufacturing Biobased Products. This benefit is caused by storing carbon for a long time in the products as they are used in different buildings. Carbon is stored in these products through the use of biomass harvested from plants and trees that have absorbed ('removed') CO_2 from the atmosphere. By constructing buildings using plant-based (or 'biobased') products, the CO_2 remains stored. This CO_2 no longer contributes to global warming. Biobased products thus become a climate solution. This protocol explains how to quantify and certify the amount of CO_2 that is stored by producing biobased products for construction.

The carbon stored in eligible biobased products, in CO_2 equivalent, minus any increase in emission or baseline storage, equals the Net Carbon Removal Benefit. The baseline storage is the amount of carbon that would have been stored anyway in a conventional construction product. This means that every tonne of CO_2 certified as Net Carbon Removal Benefit would not have been removed from the atmosphere and stored in the built environment, if it wasn't for the certified products.

This Protocol is deliberately designed to enable *transition finance* to shift from the use of fossil-based products (e.g., concrete, steel), to the use of biobased products. This changes the construction sector from a major polluter into a systemic part of the climate solution. The Protocol can be applied in all phases of production: before (ex-ante) and after (ex-post) production, for production batches or periodic (e.g. yearly) output, and facilitates products with a first-use lifespan of at least 35 years.

A simplified process for the certification of a Biobased Products activity follows these steps:

1. Identify **whether you are eligible** to get certified and which products you manufacture can be certified. If you are not eligible under this Protocol, but are a part of a biobased product value chain, either visit https://oncra.org/protocols/csc-protocols/ to find a Protocol suited to your activities, or contact a value chain partner to see if they are eligible and willing.
2. Gather **data on the biobased product(s)** being manufactured, including its Environmental Product Declaration (EPD), its 'functional unit' (the unit in which quantities it will be ordered or deployed; kg, m^2, m^3), its lifespan and carbon content. If your product has an EPD, you have this data. If you don't have an EPD, find different verified sources for this data or commission a Life Cycle Analysis (LCA) to be made of your product(s).
3. **Fill in a project plan template** (available from Oncra upon request) using the data you have gathered. Your project plan consists of project data, proofs for compliance with EU QUALITY criteria and a monitoring & reporting plan. This Certification Protocol outlines the demands for these three sections. Read these demands carefully.

4. **Submit your project plan to a certification scheme** (such as Oncra by Climate Cleanup Foundation). The certification scheme shall validate your plan using this Certification Protocol. After positive validation, you sign an agreement with the certification scheme and receive an issuance letter and validation report for your project. You now have validated Carbon Removal Units to use or pre-sell contingent to the monitoring & reporting plan you agreed upon with the certification scheme.
5. **Arrange for (a system for) proof of delivery** and the name and location of the construction project(s) in which your products are installed. This may be invoices paid by the construction companies to which the products were delivered.
6. **Manufacture, sell and install your products.** Report on your process periodically. Your process shall be verified by an independent verification body. After positive verification your Carbon Removal Units become verified and delivered. This means they can be used for carbon accounting purposes, realising their full financial potential (ex-post).
7. Be sure to **add a carbon removal clause to your contracts with clients,** notifying them that you retain ownership of Carbon Removal Units generated by the manufacturing of your products. Alternatively, you may also sell Carbon Removal Units alongside your products. Crucially, products for which Carbon Removal Units are sold at product level may not be incorporated in the Construction Stored Carbon assessment at the Building level unless legally transferred to the developer or building owner.

Contributors

This protocol builds on the work of many. Jeroen Loots at ASN Bank provided its main philosophy already in the development process of the CSC Metric in 2021 – the precursor to this Certification Protocol: keep it Simple, Open and Symbiotic.

The core internal team for this Certification Protocol consisted of Anastasia Vandoorne-Feys, Hanny van Hout, Hajna Tijssen, Neeraj Kand, Bart van Valenberg, and it was mainly written by Sven Jense and Sacha Brons (lead authors). A firm group of reviewers provided feedback on the Construction level protocol, which was the basis for this Product level protocol. Any feedback may be directed to csc@climatecleanup.org.

Table of Contents

Abbreviations

C	Carbon
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
CR	Carbon Removal
CSC	Construction Stored Carbon
EPD	Environmental Product Declaration
GHG	Greenhouse Gas
GWP	Global Warming Potential
LCA	Life Cycle Assessment
MPG	Environmental Performance Building (Dutch: MilieuPrestatie Gebouwen)
MRV	Measurement, Reporting, Verification
NMD	National Environmental Database (Dutch: Nationale Milieu Database)
NCRB	Net Carbon Removal Benefit
RSL	Reference Service Life

Glossary

For the purposes of this Certification Protocol, the following definitions apply:

a. 'additionality' means the extent to which the certification of a carbon removal activity leads to an additional benefit to the climate beyond a baseline situation without certification;
b. 'baseline scenario' means the standard carbon removal performance of comparable activities in similar social, economic, environmental and technological circumstances and [taking] into account the geographical context;
c. 'biobased products' means products intended for long-term use in or as construction elements, consisting of at least 70% renewable, continually replenishable biomass determined according to EN16575:2014;
d. 'biogenic carbon' means carbon dioxide removed from the atmosphere through photosynthesis and stored as carbon in biomass;
e. 'carbon removal' means either the storage of atmospheric or biogenic carbon within geological carbon pools, biogenic carbon pools, long-lasting products and materials, and the marine environment, or the reduction of carbon release from a biogenic carbon pool to the atmosphere;
f. 'carbon removal activity' means one or more practices or processes carried out by operators resulting in permanent carbon storage, enhancing carbon capture in a biogenic carbon pool, reducing the release of carbon from a biogenic carbon pool to the atmosphere, or storing atmospheric or biogenic carbon in long-lasting products or materials;
g. 'carbon removal system' means the sum of all GHG emissions and removals related to the activity that are included within the scope of certification;
h. 'carbon removal unit' means one tonne of certified net carbon removal benefit generated by a carbon removal activity and registered by a certification scheme;
i. 'certificate' means a document published by a certification body or scheme confirming the Net Carbon Removal Benefit of an activity operated by an operator;
j. 'certification body' means an independent, accredited or recognised conformity assessment body that has concluded an agreement with a certification scheme to carry out certification audits and issue certificates;
k. 'certification scheme' means a scheme managed by a private or public organisation that oversees the certification of operators or group of operators;
l. 'construction stored carbon' is a metric for the physical storage of biogenic carbon in buildings or structures expressed in tonnes of CO_2;
m. 'Expected' means the first stage of Biobased Products activities in which only an expected manufacturing output and Net Carbon Removal Benefit is available;

n. 'Manufactured' means the second stage of Biobased Products activities in which a manufacturing output and corresponding Net Carbon Removal Benefit is available;
o. 'Installed' means the third and final stage of Biobased Products activities in which the manufactured biobased products have been installed in a specific construction project;
p. 'long-term storage' means justifiably expected storage of carbon dioxide removed from the atmosphere for at least thirty-five (35) years[2], and potentially more than one hundred (100) years[3];
q. 'monitoring' means performing checks at a regular interval to determine whether the quantified and/or delivered Net Carbon Removal Benefit of an activity is still valid in reality, with special regard to whether the quantified biogenic carbon is still stored;
r. 'Net Carbon Removal Benefit' means the effect of a carbon removal activity on the concentration of atmospheric greenhouse gases compared to a reference ('business-as-usual') scenario, excluding any avoided emissions or substitution effects;
s. 'operator' means any legal or physical person who operates or controls a carbon removal activity, or to whom decisive economic power over the technical functioning of the activity has been delegated;
t. 'group of operators' means a legal entity that represents more than one operator and is responsible for ensuring that those operators comply with this certification protocol;
u. 'reporting' means the periodic provision of information by the operator to the certification scheme on the status of the carbon removal units generated by the activity;
v. 'risk of reversal' means the risk that any delivered carbon removals are emitted into the atmosphere before the storage lifespan declared by the operator;
w. 'scope of certification' means the boundaries in space and time within which information related to the activity is considered under this Certification Protocol;
x. 'validation' means the process of screening and evaluating a submitted activity plan and the data delivered by operators of that activity;
y. 'verification' means the process in which an independent third party with relevant expertise verifies whether the promised Net Carbon Removal Benefit is delivered.

[2] As determined by the European Commission and European Parliament in their Provisional agreement on a Union certification framework for carbon removals.

[3] Commonly referred to as 'permanent removal' (e.g., see IPCC. (2000). Land Use, Land-Use Change and Forestry: 2.3.6.3. Equivalence Time and Ton-Years).

1. General Activity Requirements

1.1 Eligible Activities

Activities eligible for certification using this protocol shall meet the following criteria:

a. The activity is defined as the production of one or more **biobased products** meant for construction, renovation or alteration of buildings or structures, aimed at or facilitating the **long-term storage** of biogenic carbon. The scope of certification is limited to biobased construction products that have a minimal lifespan in first use of 35 years.

b. The activity meets the minimum additionality and sustainability criteria outlined in paragraphs 2.2 and 2.4.

c. The activity generates carbon removal units (equal to 1 tCO_2e per unit) based on its validated Net Carbon Removal Benefit as quantified following the criteria outlined in paragraph 2.1. Each carbon removal unit passes through three stages during the activity period:
   i. 'Expected', in which the products have not yet been manufactured;
   ii. 'Manufactured', in which the products have been manufactured and sold for use in construction;
   iii. 'Installed', in which the installation of the products in a specific construction project has been independently verified.

d. All carbon removal units generated by the activity must pass the 'Installed' stage within five (5) years of being reported as 'Expected' by the operator to the certification scheme. To this end, operators shall agree upon a reporting plan with the certification scheme (see 3. Monitoring, Reporting and Verification).

1.2 Eligible Activity Operators

To be eligible for receiving certification for their activity following this protocol, operators must meet the following criteria:

a. At least one of the operators of the activity must have legal ownership and/or control over the processing, production or manufacturing of biobased construction products.

b. In case of a grouped activity in which one operator, acting as the registration preparer and/or certificate beneficiary, represents (multiple) other operators, written agreements on liability and certificate ownership must be signed between all operators.

1.3 System boundaries and scope of certification

The **carbon removal system** is defined as the sum of all Greenhouse Gas (GHG) emissions and removals related to the activity that are included within the **scope of certification**. Figure (2) shows the carbon removal system boundaries for 'Biobased Products'. The following criteria apply to the scope of certification:

a. The carbon removal system is limited to modules A1-A5 of a standard Life Cycle Assessment (LCA).
b. The only removals included in the system boundaries are negative biogenic emissions in module A1 of the life cycle of the products manufactured as a part of the activity.
c. The emissions included in the system boundaries are all emissions in modules A1-A5 of the life cycle of the products manufactured as a part of the activity.
d. Any GHG emissions or removals beyond these boundaries (i.e. after module A5) lie outside of the scope of certification and therefore do not impact the quantification of Net Carbon Removal Benefit for 'Biobased Products' activities.

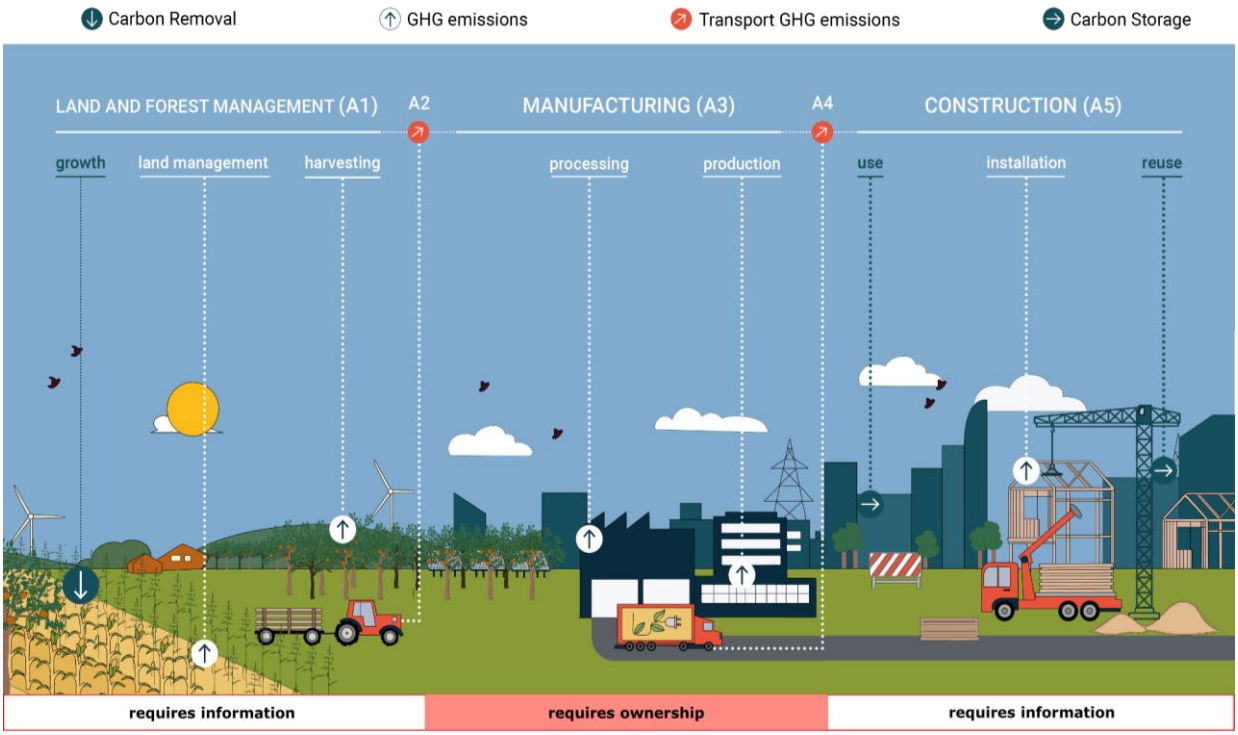

Figure 2. Carbon removal system of 'Biobased Products', including the removal, storage and emissions of CO_2-equivalents in modules A1 to A5 of the life cycle of eligible products.

2. 'QUALITY' Criteria

2.1 Quantification

Quantification of an eligible activity's **Net Carbon Removal Benefit** shall be performed according to the criteria outlined in paragraphs 2.1.1-2.1.4. Paragraph 2.1.1. describes the general formula for an eligible activity's Net Carbon Removal Benefit, Formula (1). Paragraphs 2.1.2-2.1.4 describe the methods, formulas and criteria for quantification of each of the elements of Formula (1). The general criteria for the use of Formula (1) and the interpretation of its elements are derived from the Provisional agreement on a Union certification framework for carbon removals between the European Commission and the European Parliament.

2.1.1 Net Carbon Removal Benefit

1. Operators shall use Formula (1) to quantify the Net Carbon Removal Benefit of their activity.

(1) $$NCRB = CR_{baseline} - CR_{total} - GHG_{increase} > 0$$

symbol	description	unit
NCRB	Net carbon removal benefit	t CO_2e
CR_total	Total activity carbon removals	(-) t CO_2e
CR_baseline	Carbon removals under the baseline scenario	(-) t CO_2e
GHG_increase	Direct and indirect increase in GHG emissions	(+) t CO_2e

2. In using Formula (1), operators shall comply with the following criteria:
   - 2.1. Quantities referred to in Formula (1) shall be designated with a negative sign (-) if they are net greenhouse gas removals (i.e. CR_baseline and CR_total) and with a positive sign (+) if they are net greenhouse gas emissions (i.e. GHG_increase).
   - 2.2. Quantities referred to in Formula (1) shall be expressed in tonnes of carbon dioxide equivalent (t CO_2e).
   - 2.3. Operators shall highlight any cases of uncertainty regarding the quantification of any of the elements of Formula (1) and shall make justifiably conservative estimates when exact quantities are not available. For example, when a range of values is available for the quantification of an element or sub-element of Formula (1), operators shall choose a value on the lower end of that range.
3. As paragraphs 2.1.2 and 2.1.4 show, CR_baseline and GHG_increase shall be considered to equal zero for all activities eligible for certification under this Certification Protocol. Therefore, for ease of use, an activity's Net Carbon Removal Benefit can be considered as the absolute value of the activity's total carbon removals:

$$NCRB = |CR_{total}|$$

2.1.2 Carbon removals under the baseline scenario

Carbon removals under the baseline scenario relate to the expected quantity of carbon that would have been removed from the atmosphere without the activity, or without the incentives provided by carbon removal certification. CR_baseline depends on the region and product class of the manufactured biobased products. Data on the market share of specific biobased products in specific regions is limited. Therefore, given that the operator complies with the additionality criteria as outlined in paragraph 2.2 and that biobased construction products in general are not *common practice* within the construction industry, CR_baseline can be assumed to equal zero. If they are, operators shall have to provide a region-specific market analysis.

If biobased construction products are not common practice in a region, CR_baseline = 0

2.1.3 Total product carbon removals

a. Total carbon removals for a product are defined as the biogenic carbon stored in the product(s), expressed in tonnes of CO_2-equivalent[4]. Depending on the available activity-specific data, the following variants of Formula (4) shall be used to quantify the CSC value of the biobased product(s), in order of priority:

i. The product has an EPD in EN 15804+A2 format and Biogenic Carbon content in **kgCO_2e**/functional unit is given by the product's EPD. In this case;

(4.i) $$CSC = CO2_{biogenic} \times N$$

symbol	description	unit
CSC	Construction Stored Carbon	kg CO_2e / 100 years
CO2_biogenic	Biogenic Carbon Content	kg CO_2e / unit
N	Quantity of product manufactured in the activity	kg, m^3, m^2 or m

ii. The product has an EPD in EN 15804+A2 format and Biogenic Carbon content in **kgC**/functional unit is given by the product's EPD. In this case;

(4.ii) $$CSC = C_{biogenic} \times N \times \frac{44}{12}$$

symbol	description	unit
CSC	Construction Stored Carbon	kg CO_2e / 100 years
C_biogenic	Biogenic Carbon Content	kg C / unit
N	Quantity of product manufactured in the activity	kg, m^3, m^2 or m
44/12	Carbon to CO_2 conversion factor	kg CO_2e / kg C

iii. No specific value is given for Biogenic Carbon content and the product's EPD is in EN 15804+A2 format. The Biogenic Carbon content should be estimated based on stages A1 to A3 from GWP - biogenic. In this case;

(4.iii) $$CSC = -1 \times (GWP_{A1}biogenic + GWP_{A2}biogenic + GWP_{A3}biogenic) \times N$$

symbol	description	unit
CSC	Construction Stored Carbon	kg CO_2e / 100 years
GWP_{A1}biogenic	Negative biogenic emissions in raw materials supply	kg CO_2e / unit
GWP_{A2}biogenic	Positive biogenic emissions in transport to factory	kg CO_2e / unit
GWP_{A3}biogenic	Positive biogenic emissions in product manufacturing	kg CO_2e / unit
N	Quantity of product manufactured in the activity	kg, m^3, m^2 or m

iv. No specific value is given for Biogenic Carbon content, the product's EPD is not in EN 15804+A2 format and the product is timber-based (i.e. at least 95% woody biomass). In this case, Biogenic Carbon content may be estimated to be 0.45 kg C / kg product as per EN 16449. In this case;

[4] For clarification of the Construction Stored Carbon metric, view https://climatecleanup.org/constructionstoredcarbon/metric/ and this report by SGS Search for the Dutch Ministry of the Interior and Kingdom Relations. The lifespan multiplication factor in these metrics has been disregarded in this protocol.

(4.iv) $$CSC = V \times \rho \times 0.45 \times N \times \frac{44}{12}$$

symbol	description	unit
CSC	Construction Stored Carbon	kg CO_2e / 100 years
V*	Volume of timber-based product	m^3
ρ*	Density of timber-based product	kg/m^3
0.45	Simplified carbon content of the timber-based product	kg C / kg product
N	Quantity of product manufactured in the activity	kg, m^3, m^2 or m
44 / 12	Carbon to CO_2 conversion factor	kg CO_2e / kg C

**Must be considered at appropriate moisture levels as per EN 16449*

v. No specific value is given for Biogenic Carbon content and the product's EPD is not in EN 15804+A2 format and the product is not timber-based (i.e. less than 95% woody biomass). In this case, the same method applies as in formula (4.iv), but $\frac{m_c}{m_{tot}}$ must be determined through an independent product-specific study and this has to be disclaimed in reporting. In this case;

(4.v) $$CSC = V \times \rho \times \frac{m_c}{m_{tot}} \times N \times \frac{44}{12}$$

symbol	description	unit
CSC	Construction Stored Carbon	kg CO_2e / 100 years
V*	Volume of timber-based product	m^3
ρ*	Density of timber-based product	kg/m^3
m_c / m_tot	Simplified carbon content of the timber-based product	kg C / kg product
N	Quantity of product used in the activity	kg, m^3, m^2 or m
44 / 12	Carbon to CO_2 conversion factor	kg CO_2e / kg C

**Must be considered at the same moisture levels as per the quantification of* $\frac{m_c}{m_{tot}}$

Regardless of the variant of Formula (4) chosen, Formula (5) shall be used to quantify total activity carbon removals as a sum of the CSC-values of the unique biobased products produced.

(5) $$CR_{total} = \frac{1}{1000} \times N \times \sum_{i=1}^{N} CSC_i$$

symbol	description	unit
CR_total	Total product carbon removals	(-) t CO_2e
CSC_p	Construction Stored Carbon of biobased product i	kg CO_2e
N	Total number of biobased products used	functional units

2.1.4 Direct and indirect increase in GHG emissions

a. Any direct or indirect increase in GHG emissions (GHG_increase) caused by the activity must be subtracted from the activity's Net Carbon Removal Benefit. This increase is related to a baseline scenario for GHG emissions. Table 3 shows the GHG emission sources included in the scope of this Certification Protocol as defined in paragraph 1.3.

b. Formula (6) shows the quantification rules for GHG_increase.

(6) If $GHG_{activity} > GHG_{baseline}$ then, $GHG_{increase} = GHG_{activity} - GHG_{baseline}$

If $GHG_{activity} < GHG_{baseline}$ then, $GHG_{increase} = 0$

c. The baseline scenario for this activity, as described in paragraph 2.1.2, is predominantly shaped by the use of conventional construction products. Within the scope as shown in Table 3, biobased products generally have less embodied emissions and therefore do not contribute to an increase in GHG emissions. Additionally, no indirect increase in GHG emissions (leakage) occurs, under the condition that biomass for the eligible biobased products used is sustainably sourced. Instead, these products avoid emissions by substituting conventional materials[5]. Avoided emissions are not included in the scope of this Certification Protocol, as is shown in Formula (6). Therefore, the following rule applies:

Because GHG_baseline is generally larger than GHG_activity, GHG_increase = 0

Table 3. GHG sources included in the calculation of GHG_increase.

Emission Source	Included?	Explanation
A1-3 GWP-fossil	Yes	Always included.
A1-3 GWP-biogenic	No	Included in quantification of CR_total
A1-3 GWP-luluc	Yes	Always included.
A4-5 GWP-fossil, GWP-biogenic & GWP-luluc	Yes	Always included.
B1, B6 & B7 GWP-fossil, GWP-biogenic & GWP-luluc	No	Not included, covered by sustainability criteria 2.4.1a and 2.4.1b.
B2-B5 GWP-fossil, GWP-biogenic & GWP-luluc	No	Not included, irrelevant for eligible products and beyond the scope of this certification.
C1-4 GWP-fossil, GWP-biogenic & GWP-luluc	No	Not included, beyond the scope of this certification.
Module D	No	Not included, module D is only potentially used as substantiation of reusability or lifespan claims.

2.2 Additionality

Biobased Products activities are deemed additional and therefore eligible for certification if operators comply with the following additionality criteria:

a. Any carbon removal and/or storage **directly** subsidised or required by law, either in total tonnes of CO_2e or as a percentage of total activity carbon removals (CR_total), shall be subtracted from the activity's Net Carbon Removal Benefit.

b. For the purposes of criterion 2.2a, a subsidy measure is considered **directly** relevant to carbon removal when it specifically targets tonnes of CO_2e removed or similar, or when the subsidy's demands are **only** achievable through the use/manufacturing of biobased

[5] For scientific literature on avoided emissions, e.g., see Arehart *et al.*, (2021) or Leskinen *et al.*, (2018).

products or the removal and storage of carbon. Any other subsidy or statutory requirement is deemed irrelevant for this certification protocol.

c. The carbon removals associated with the activity shall not be double counted (i.e. no two certificates are issued for the same tonne of CO_2e removed). Operators shall be held liable for any occurrence of double counting and double counted carbon removal units shall be excluded from certification. Three types of double counting shall be considered:
    i. Operators shall not certify the Net Carbon Removal Benefit of their product under any other carbon removal certification scheme.
    ii. Operators shall ensure to the best of their abilities that suppliers of the raw materials (biomass) used in the activity have not yet claimed and/or certified the Net Carbon Removal Benefit generated by the biomass.
    iii. Operators shall ensure to the best of their abilities that their clients shall not claim and/or certify the Net Carbon Removal Benefit generated by the products included in this activity, unless the carbon removal units generated by the activity are explicitly transferred to them by the operator.
    iv. All carbon removal units generated with the activity and sold to a third party shall not be used by operators themselves for climate neutrality claims, unless the relevant purchase agreement(s) explicitly state(s) that the buyer refrains from these claims.

d. Operators shall describe the purpose and use for revenue generated as a result of the activity's carbon removal certification, explicitly stating how the generated revenue impacts the operator's business model and/or plans for scaling the activity.

e. Operators shall disclose what percentage of revenue generated as a result of the activity's carbon removal certification directly benefits the primary producers of the biomass in the manufactured products (e.g., farmers, foresters).

2.3 Long-term storage

To ensure the **long-term storage** of carbon, operators must meet the following criteria:

a. The minimum first lifespan of each eligible biobased product manufactured in the activity shall equal 35 years, in accordance with the Provisional agreement on a Union certification framework for carbon removals by the European Commission and Parliament.

b. The minimum first lifespan of each eligible biobased product manufactured in the activity must have been determined through independent assessment. The Reference Service Life (RSL) of a product as declared in an independently verified Environmental Product Declaration (EPD) is an eligible data source.

c. Operators may substantiate a total lifespan of their biobased products beyond their first lifespan, by including a reused lifespan, up to a maximum of two times . The total lifespan of a biobased product may be quantified using Formula (7):

(7) $$L_{total} = L_{use} + v \times L_{reuse}$$

Symbol	description	unit
L_total	Total product lifespan	years
L_use	Lifespan of product in first application	years
v	Correction variable for product disassembly potential	-
L_reuse	Lifespan of product in reused applications	years

d. In the quantification of total product lifespan (L_total) for a biobased product, the elements of Formula (7) shall be substantiated as follows:
   i. The product's lifespan in first application (L_use) shall be determined using the product's Reference Service Life (RSL) as declared in a valid EPD, independent technical report, or similar.
   ii. The correction variable for product disassembly potential (v) shall equal zero (0) when no data is provided as substantiation and shall range between zero (0) and one (1) depending on the disassembly potential of the product or its building layer. This reusability shall be substantiated by calculating the Disassembly Potential of each eligible biobased product used, using the 'Circular Buildings' Disassembly Potential Measurement Method[6] or similar.
   iii. The product's lifespan in reused applications (L_reuse) shall be determined using the product's technical lifespan as independently shown in scientific literature, technical reports or similar. Operators may also use take-back guarantees from suppliers as substantiation of L_reuse. **The maximum value for L_reuse shall equal the product's lifespan in first application (L_use).**

e. After operators deliver the activity and its Net Carbon Removal Benefit, the risk of reversal of any carbon stored must be monitored. Monitoring shall be performed by the certification scheme, or an independent third party appointed by the certification scheme. Monitoring shall be performed through random sampling of the products manufactured and installed in buildings following the activity. Only publicly available data sources, such as remote imagery, cadastral data, confirmed permits, or external inspection, shall be used to verify if products still exist in the declared building. The certification scheme shall periodically

[6] Alba Concepts, Dutch Green Building Council, Netherlands Enterprise Agency, & W/E Adviseurs (2021). *Circular Buildings. Disassembly Potential Measurement Method*. For background information (Dutch and English), see here. For a direct download link (English version), click here.

publish an audit report that verifies the delivered Net Carbon Removal Benefit of the activity.

f. Monitoring requirements may be nullified if region-specific statutory requirements ensure the long-term storage of biogenic carbon in the activity for at least the duration of the monitoring period. For example, if statutory law requires the 100% reuse of biobased construction products, the monitoring requirements become obsolete.

2.4 Sustainability

2.4.1 Minimum requirements: Do No Harm policy

a. To comply with the minimum sustainability requirements of this Certification Protocol, the activity shall have at least a neutral impact on the following six sustainability objectives:
   i. Climate change mitigation;
   ii. Climate change adaptation;
   iii. Sustainable use and protection of water and marine resources;
   iv. Transition to a circular economy;
   v. Pollution prevention and control;
   vi. Protection and restoration of biodiversity and ecosystems.

   To justify a neutral impact on these objectives, operators shall comply with criteria 2.4.1b-c.

b. Operators shall provide evidence of compliance with national statutory requirements for building product sustainability. If no harmonised or standardised national sustainability requirements exist for the activity, operators may alternatively provide an (inter)nationally recognised sustainability certificate of choice. In this case, the certification scheme shall determine whether the attained sustainability certificate complies with the minimum sustainability requirements.

c. Operators shall provide evidence of at least neutral biodiversity impact of all eligible biobased products used. This may be done in two ways, depending on the type of product used:
   i. For wood-based products, operators shall prove that the product is certified according to FSC, PEFC or similar certification;
   ii. For other biobased products, operators shall prove within reasonable assurance that the production of raw materials for these products has not contributed to deforestation or destruction of vulnerable ecosystems. Raw materials sourced from the European Union are deemed to comply with this demand unless there is reason to suspect otherwise.

2.4.2 Sustainability co-benefits

a. Operators may report on any additional benefits generated by the activity beyond the minimum sustainability requirements outlined in paragraph 2.4.1. These co-benefits shall be communicated transparently by the certification scheme in a clear and concise manner. The following criteria apply for co-benefit reporting on the six sustainability objectives as listed in criterion 2.4.1a:
    i. For climate change mitigation, operators may report on the expected avoided emissions resulting from their activity, using internationally accepted scientific data and estimates on avoided emissions per product category and region;
    ii. For climate change adaptation, operators may report on the interventions taken at the building level that improve climate change adaptation;
    iii. For sustainable use and protection of water and marine resources, operators may describe how the activity improves water use and water retention compared to conventional construction practices;
    iv. For the transition to a circular economy, operators may show how the activity uses circular materials and/or has improved circularity (i.e. through design for disassembly), based on a quantification of Product Disassembly Potential following criteria 2.3d and 2.3e;
    v. For pollution prevention and control, operators may show calculations of the emissions of chemical compounds beyond carbon dioxide equivalents related to the activity;
    vi. For the protection and restoration of biodiversity and ecosystems, operators may show how the activity improves biodiversity and/or ecosystem integrity at the building level and/or throughout the value chains of the products manufactured in the activity. Any biodiversity claims made must be independently verified before submission.
b. Any additional sustainability certification on the product level may be submitted and shall be shown on certification documents and/or registry pages related to the activity if deemed appropriate by the certification scheme.
c. Operators may report on any other co-benefits (e.g., social or economic co-benefits) generated by the activity beyond the sustainability objectives outlined in criterion 2.4.1a. Their description of other co-benefits shall be transparently communicated by the certification scheme.

3. Measurement, Reporting and Verification Requirements

3.1 Measurement

a. In order to receive 'Expected' carbon removal units, operators shall operators shall measure and/or collect the following data:
    i. (Potential) input of raw materials, especially biomass, for the manufacturing process of the biobased products included in the activity;
    ii. Product-specific data on biogenic carbon storage for each of the biobased products manufactured in the activity conforming to the criteria outlined in paragraph 2.1.3;
    iii. Expected Net Carbon Removal Benefit of the activity after one year of production, based on previous production levels, business expansion plans, (pre-)purchased raw materials, offtake agreements or similar.
    iv. Proof that no (parts of the) biobased products submitted for certification are subject to similar carbon dioxide claims;
    v. The first and/or total lifespan of the biobased product(s), quantified according to the criteria outlined in paragraph 2.3;
    vi. The activity's (expected) impact on the sustainability objectives as outlined in paragraph 2.4;
    vii. Description and proofs of how generated carbon revenue is shared between value chain actors, especially to crop suppliers (farmers).

b. In order to transform any amount of 'Expected' carbon removal units into 'Manufactured' carbon removal units, operators shall measure and/or collect the following data:
    i. Actual input of raw materials, especially biomass, for the manufacturing process of the biobased products which shall correspond to that amount of carbon removal units;
    ii. Output of biobased products for use in construction, which shall correspond to that amount of carbon removal units;
    iii. Invoices, offtake agreements or similar evidence to substantiate the declared output and sale to the construction industry;

c. In order to transform any amount of 'Manufactured' carbon removal units into 'Installed' carbon removal units, operators shall measure and/or collect the following data:
    i. The name and location of the specific construction projects that the manufactured biobased products are used in;
    ii. Invoices to substantiate the use of the manufactured biobased products in those specific construction projects.

3.2 Reporting

a. When submitting an activity for certification following this Certification Protocol, operators shall write an activity plan based on the template as provided by the certification scheme. Proofs and data shall be separately submitted as appendices.

b. The activity plan shall include a quantity of 'Expected' carbon removal units that shall be issued to the operator after positive validation of the activity plan. This quantity shall be based on the expected Net Carbon Removal Benefit of the activity after one year of production.

c. The activity plan shall include a reporting plan that describes how and when the operator shall deliver data required to transform 'Expected' carbon removal units into 'Manufactured' carbon removal units, and 'Manufactured' carbon removal units into 'Installed' carbon removal units. Reporting shall occur at least once every five years and at most once every year.

d. Operators may request new 'Expected' carbon removal units once all of their previously requested 'Expected' carbon removal units have been transformed. Operators may then update their existing activity plan instead of submitting a new activity plan.

3.3 Verification

In addition to validation of activity plans and reports by the certification scheme, all 'Produced' and 'Installed' carbon removal units shall be verified by an independent third party with relevant expertise to ensure the certified Net Carbon Removal Benefit is delivered in reality. To that end, the following criteria apply:

a. Carbon removal units shall be labelled 'issued' until they have been verified by an independent third party, after which they shall be labelled 'delivered'.

b. Issued carbon removal units shall be rendered 'void' after five years unless they have been verified by an independent third party following the criteria in this paragraph (3.3).

c. 'Expected' carbon removal units shall be rendered 'void' if the products have not been produced in the year of expected production, or the three years following that year.

d. For carbon removal units to be labelled as 'delivered', data, proofs and descriptions measured and reported by operators according to the criteria outlined in this Chapter (3) shall be verified by an independent third party with relevant accreditation and expertise.