Support to the development of methodologies for the certification of industrial carbon removals with permanent storage

Draft technical specifications for the certification of permanent carbon removals through biochar

12 March 2025

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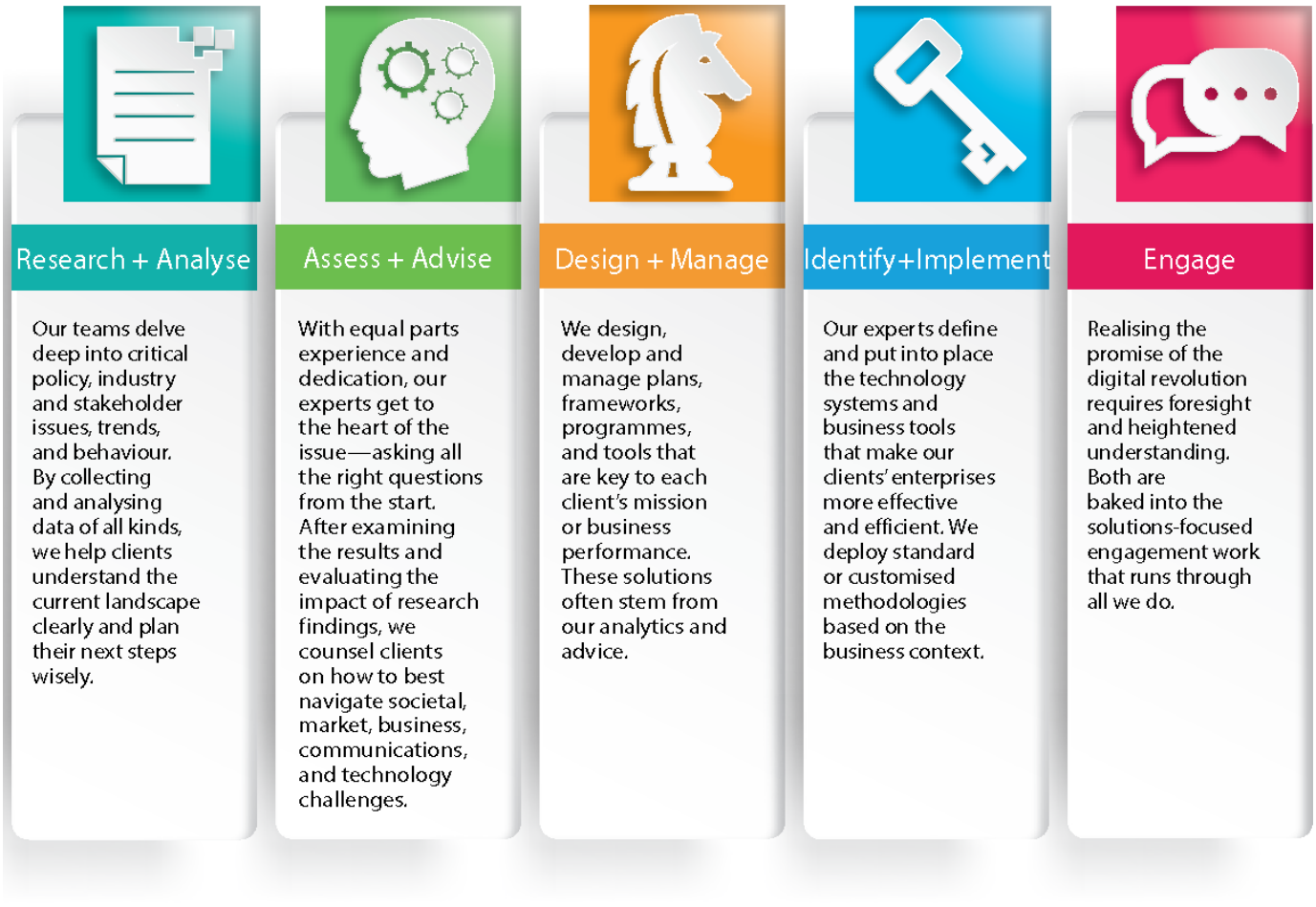

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A report submitted by ICF S.A., Cerulogy and Fraunhofer ISI

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SECTION 1: INTRODUCTION AND DEFINITIONS

1. DEFINITIONS

'activity boundary' means the geographical boundary of the facility at which the biochar production occurs;

'activity period' is defined as in Article 2(7) of [the CRCF];

'activity renewal' means performing a certification audit on an activity that has previously completed an activity period.

'activity' is defined as in Article 2(3) of [the CRCF];

'associated GHG emissions' means the increase in direct and indirect greenhouse gas emissions over the entire lifecycle of the permanent carbon removal activity that are due to its implementation;

'atmospheric CO_2' means CO_2 well mixed in the free atmosphere at ambient air temperature, where the concentration of CO_2 is not impacted by local point sources but may vary because of regional anthropogenic and natural emission sources;

'biochar' is a carbonaceous material that is produced by thermal treatment of biomass at temperatures above 350 °C in a low-oxygen environment.

'biogenic CO_2' means CO_2 produced from a source of biomass by a chemical process acting on the carbon atoms in the biomass (including combustion, fermentation, other oxidation processes, and decarboxylation processes) of carbon in biomass;

'biomass' is defined as in Article 2(24) of Directive (EU) 2018/2001, and does not include any products produced through carbon capture and utilisation using biogenic CO_2;

'calculation factors' means any numerical information used in the quantification of the permanent net carbon removal benefits. This includes, but is not limited to, information regarding net calorific value, emission factor, preliminary emission factor, oxidation factor, conversion factor, carbon content, fossil fraction, biomass fraction, zero-rated biomass fraction, RFNBO or RCF fraction, zero-rated RFNBO or RCF fraction, synthetic low-carbon fraction, zero-rated synthetic low-carbon fraction, zero-rated fraction, or unit conversion factor.

'capital emissions' means the emissions associated with the construction of facilities and equipment associated with an activity;

'carbon removal activity' means a carbon removal practice or process undertaken by an operator or group of operators that is subject to a single certification audit;

'carbon removal' means carbon removal as defined in Article 2(1) of [the CRCF];

'certification audit' means the audit undertaken prior to the commencement of a carbon removal activity, comparable to what is referred to as project validation in some other certification frameworks;

'certification body' is defined as in Article 2(14) of [the CRCF];

'certification period' means the period between a re-certification audit of an activity and the most recent preceding certification audit or re-certification audit of that activity.

'CO_2e' means carbon dioxide equivalent GHG emissions, where quantities of GHGs other than CO_2 are converted into CO_2 equivalent terms by the use of global warming potentials.

'greenhouse gas (GHG)' refers to any greenhouse gas listed in Part 2 of Annex V of the Regulation (EU) 2018/1999;

'monitoring period' is defined as in Article 2(8) of [the CRCF];

'permanent carbon removal' means permanent carbon removal as defined in Article 2(9) of [the CRCF];

're-certification audit' is defined as in Article 2(17) of [the CRCF], and means the audit undertaken at the end of a certification period in order to determine how many units may be issued, comparable to what is referred to as verification in some other certification frameworks.

SECTION 2: SCOPE

These technical specifications apply to carbon removal activities that implement projects leading to net carbon removal benefits through production and permanent storage of biochar (also referred to as biochar carbon removal, BCR, hereafter). Permanent storage may be achieved through application to soils or by incorporation in materials, subject to the requirements detailed in these specifications. The specifications require the biochar production facility and the storage location for the biochar to be located in the European Union.

Each certification must relate to biochar production at a single geographically contiguous biochar production facility. If an operator or group of operators produces biochar at more than one facility, an activity shall be defined in relation to each biochar production facility and a separate certification process is required for each activity. Biochar from a single activity may be applied or incorporated at several sites.

The operator applying for the certification is required to take on the responsibility for the entire carbon removal value chain, either by providing all the required services (operation of a biochar facility, transport to market and storage by application to soils or incorporation in a product) themself or by engaging with partners or subcontractors.

Activities certified under these specifications must comply with relevant EU, national and local regulations. In particular, biochar produced by an activity and applied to soils must meet all relevant requirements set by [the Fertilising Products Regulation], biochar must meet all relevant requirements set by [the REACH Regulation], if biochar is produced from animal by-products this must meet all relevant requirements of the [Animal Byproducts Regulation], and if biochar is produced from materials classified as wastes under [the Waste Framework Directive] then all relevant requirements of that directive must be observed.

SECTION 3: ACTIVITY PERIOD, MONITORING PERIOD AND CERTIFICATION PERIOD

1. ACTIVITY PERIOD

The activity period for a BCR activity shall be a maximum of 10 years, and can be renewed without limitation.

The activity shall be certified and re-certified against the certification methodology in place at the time of certification for the entire activity period. Any revisions made to the certification methodologies shall not be applied to existing activities until and unless they seek renewal of the activity period.

2. MONITORING PERIOD

The monitoring period for BCR activities shall be:

a. In the case of activities that use biochar by application to the land, the period up until a year after end of the certification period during which it is demonstrated that the biochar has been applied to the land.

b. In the case of activities that use biochar by incorporation in products, the period up until the point at which it is demonstrated that the biochar has been incorporated.

3. CERTIFICATION PERIOD

The certification period for DACCS and BioCCS activities shall be a period of no more than 1 year. Certification schemes may set additional requirements on the certification period, for example by setting a minimum certification period or requiring that a certified activity must use a consistent certification period throughout the activity period. The carbon removal and associated emissions for an activity shall be recorded in the certification period in which the CO_2 is permanently stored, e.g. if biochar is produced in certification period 1 and stored in certification period 2 then the removals and emissions associated with that stored CO_2 shall be reported in certification period 2.

SECTION 4: REQUIREMENTS FOR QUANTIFICATION

At the initial certification audit, removals and emissions shall be estimated for the whole activity period by summing across the relevant number of certification periods. At re-certification audits, all removals and emissions of CO_2 and emissions of other GHGs shall be assessed over the whole of the relevant certification period (i.e. twelve months) and expressed in tonnes of CO_2 equivalent (CO_2e). Emissions of GHGs other than CO_2 shall be converted to tonnes of CO_2e by use of the 100 year Global Warming Potentials detailed in Annex I of Commission Delegated Regulation (EU) 2020/1044.

Following the sign convention established in Article 4(6) of [the CRCF], in the certificate of compliance and in the Union registry and certification registries referred to in Article 12 of [the CRCF] all quantities required for the quantification of net carbon removal benefit shall be designated as positive numbers if they are net GHG emissions and as negative numbers if they are net GHG removals/reductions.

Certification schemes must ensure that data reported as part of the certificate of compliance and/or for inclusion in the Union registry uses the terminology and sign conventions of this specification, and that if that certification scheme operates a certification registry within the meaning of Article 12 of the CRCF, the information in that registry can be displayed using the terminology and sign conventions of this specification.

In the case that a quantity of biochar is produced during one certification period but applied or incorporated in a later certification period, then the emissions and removals associated with that quantity of biochar shall be recorded in the later certification period. If it is unduly administratively burdensome for an operator to directly disaggregate the emissions in the term $GHG_{associated}$ between the biochar applied or incorporated in different certification periods, then the certification body may permit them to divide emissions on a pro-rata basis by the quantity of biochar applied or incorporated in each period.

1. QUANTIFICATION OF PERMANENT NET CARBON REMOVAL BENEFIT

The permanent net carbon removal benefit of an activity (NCR_P) shall be calculated as defined in Article 4(1) of [the CRCF]:

$$NCR_P = CR_{baseline} - CR_{total} - GHG_{associated}$$	[1]

where:

$CR_{baseline}$ = minus the total carbon removal under the baseline, in tonnes of CO_2, and shall be calculated following the rules set in section 4(2);

CR_{total} = minus the total carbon removals of the activity and represents the amount of CO_2 absorbed from the ambient air during biomass growth that is permanently stored as biochar, in tonnes of CO_2. This excludes any carbon expected to be lost to biochar decomposition. It shall be calculated following Equation [2];

$GHG_{associated}$ = the increase in direct and indirect GHG emissions over the entire lifecycle of the carbon removal activity which are due to its implementation, in tonnes of CO_2e. It encompasses the greenhouse gas emissions associated to the production of biochar, its transport, and use and shall be calculated following Equation [3].

$$CR_{total} = -{}^{44}/_{12} * F_{perm} * C_{org} * Q_{biochar}$$	[2]

where:

${}^{44}/_{12}$ = the ratio of the mass of a carbon dioxide molecule to the mass of a carbon atom;

F_{perm} = permanence fraction of the biochar calculated following the rules in section 4(5.1), as a percentage;

C_{org} = the organic carbon content of the biochar, C_{org}, shall be established by laboratory analysis as the ratio of the mass of organic carbon in the biochar to the total mass of the biochar;

$Q_{biochar}$ = the mass of biochar applied or incorporated during the certification period, in tonnes on a dry matter basis. The mass of biochar shall exclude any non-biogenic material also processed in the biochar production process, as may be the case, for example, when utilising mixed municipal waste containing plastics and other fossil carbon as feedstock. If the biochar feedstock can be expected to contain non-biogenic carbon, then the biogenic fraction in the product must be identified by carbon 14 (C^{14}) testing. If non-biogenic material is co-processed in the biochar production process then the produced char may not be applied to soils, and carbon removal units may only be issued if the mixed char produced conforms to all threshold requirements for biochar incorporated in materials (see section 6(3.4)).

$$GHG_{associated} = GHG_{biochar} + GHG_{transport} + GHG_{use}$$	[3]

where:

$GHG_{biochar}$ = GHG emissions associated with the production of biochar, calculated following the rules in section 4(3);

$GHG_{transport}$ = GHG emissions associated with biochar transport from the production facility to the point of application or incorporation, calculated following the rules in section 4(4);

GHG_{use} = GHG emissions associated with the application or incorporation of biochar, calculated following the rules in section 4(5).

These specifications shall be applied at a certification audit or at a re-certification audit. The certification audit is the first audit of an activity period and requires the operator to make estimates of operational performance. All other audits, including the final audit of an activity period, are re-certification audits and shall consider data gathered during the certification period immediately preceding the audit.

- When undertaking a certification audit, the calculation factors relating to measurable quantities under the control of the operator shall be based on expected values estimated by the operator. If a certification body is not satisfied that the estimated values represent a reasonable characterisation of the project, then it shall withhold certification. When undertaking a re-certification audit, the calculation factors relating to measurable quantities under the control of the operator shall be based on measured values.
- When undertaking a certification audit, the formulas in this section shall be applied to expected values for the carbon removal activity over the whole activity period. When undertaking a re-certification audit, the formulas shall be applied to annual measured values from the certification period immediately preceding the audit.

1.1. CARBON REMOVAL SINKS AND GHG EMISSION SOURCES

The quantification of associated GHG emissions shall be complete and cover all process and combustion emissions from all material emission sources and source streams belonging to the permanent carbon removal activities and all other relevant emissions. The GHG sources and sinks that shall be considered within the system boundaries for the purpose of the quantification of the net carbon removal benefit are shown in Table 1.

It is possible that an activity operator or a certification body may identify that emissions from a source, or from a group of sources, associated with an activity are material but are not identified in the present specifications. The principle of completeness requires that in such cases the certification body shall ensure that these emissions are included in the calculation of the associated GHG emissions.

Table 1. Sinks and sources that shall be included within the boundaries of the calculations

Phase of the operation	Emission sources/sinks	Gases included
Biochar production	Biochar production facility: Equipment used to produce biochar.	Greenhouse gases
	Biochar production facility: Any biochar processing equipment that is used to treat the biochar prior to its shipping for application or incorporation.	Greenhouse gases
	Biochar production facility: Any associated energy generation equipment that is geographically contiguous with the facility.	Greenhouse gases
	Biochar production facility: Any treatment equipment for processing wastes or byproducts of the biochar production process.	Greenhouse gases

Phase of the operation	Emission sources/sinks	Gases included
	Biomass supply emissions: Production/collection of biomass used by the biochar production facility.	Greenhouse gases
	Input emissions: Production and supply of inputs used by the biochar production facility.	Greenhouse gases
	Waste treatment: Processing and treatment of any wastes (including wastewater and exhaust gases) generated by the biochar production facility.	Greenhouse gases
	Capital emissions: Emissions associated with the construction and installation of the biochar production facility.	Greenhouse gases
Transport of biochar	Transportation: Fuel combustion and electricity consumption at road transportation (e.g. tank trucks, rails), maritime transportation (e.g. sea tanker) and other vehicles.	Greenhouse gases
Application to soils or incorporation in materials	Quantity of CO_2 permanently stored in the form of biochar	CO_2 only
	Application/incorporation site: Any energy consumption and/or generation associated with the process of application or incorporation.	Greenhouse gases

1.1.1. Materiality

In general, all emission sources identified in these specifications must be assessed and must be included in the calculation of $GHG_{associated}$, even if they do not reach the level of materiality described here. There are two potential exceptions to this principle, contexts in which a materiality assessment may be undertaken and emissions identified as below the materiality threshold do not need to be directly assessed.

These contexts are capital emissions (section 4(6.3)), and input emissions (sections 4(3.2.2)). Where a materiality assessment is required on a specified emission source, the operator must present to the certification body an estimate of the potential range of emissions associated with that source. If the emissions at the high end of this range are material, then the emissions from that source are considered potentially material and must be directly assessed.

Any emission from a source within the system boundaries shall be considered material where it is associated with emissions equal to or greater than 2% of the gross carbon removals delivered, or expected to be delivered, over the course of the activity period. At the certification audit this shall be assessed based on expected emissions and removals over the activity period. At the re-certification audit the certification body must assess whether there has been any significant deviation from the operational conditions expected at the certification audit (e.g. a change in the inputs used or quantity of inputs required), and if such a deviation is identified the materiality test should be rerun.

2. BASELINE

A standardised baseline set to 0 tCO_2/year shall apply for all BCR activities. All BCR activities assessed against a standardised baseline shall be considered additional.

The standardised baseline will be reviewed, and if necessary, updated at least every five years in light of evolving regulatory circumstances and of the latest available scientific and commercial evidence (e.g. if Union or national statutory requirements are introduced that would require the performance of the activity or would count the benefit of the activity towards other Union targets).

> ***Note on baselines:*** *There is currently a limited market for biochar, primarily as a soil improver. We agree with the assessment by private standards offering certification of BCR that this market is unlikely to achieve significant short-term growth without the additional value driver of the voluntary trading of carbon removal units. A standardised baseline of zero is therefore considered appropriate for new biochar projects under current market conditions. Setting an activity specific baseline for biochar producers that are already operational would have the effect of penalising first movers and could be seen as a disincentive for early investment in other carbon removal activities with a mixed value proposition, and therefore the specifications set a single standardised baseline for all BCR projects.*

3. INSTALLATIONS PRODUCING BIOCHAR

3.1. QUANTIFICATION OF TOTAL BIOCHAR PRODUCED AND IDENTIFICATION OF BIOCHAR BATCHES

The amount of produced biochar must be measured and assigned to production batches that share common processing conditions and feedstock mix. Common processing conditions means that the same underlying process is used (e.g. gasification or pyrolysis), that the target biochar production temperature is consistent across the batch, that the biochar residence time is consistent across the batch and that any techniques used to manage the oxygen concentration are consistent across the batch. Common feedstock mix means that the shares of feedstock types in the mix are approximately the same across the batch.

A production batch defined for the purpose of certification does not have to be produced continuously in time. For example, if the first quantity of biochar applied or incorporated during a certification period was produced from forestry residues processed at 500 °C, then the second from processing straw at 700 °C and then a third from processing forestry residues at 500 °C again, this could be recorded as two production batches for the purpose of the calculations in this section (i.e. a production batch of biochar from forestry residues at 500 °C and a production batch of biochar from straw at 700 °C). If biochar produced from the same feedstock under the same conditions is split into more than one batch for sale to different end uses, this may still be treated as a single production batch for the purpose of the calculations in this section.

Certification schemes may choose to apply additional requirements on the definition of a production batch to limit the permissible variation of the biochar in the batch.

3.2. QUANTIFICATION OF ASSOCIATED GREENHOUSE GAS EMISSIONS

The emissions associated with the operation of the biochar facility shall be calculated as follow:

$$GHG_{biochar} = F_{alloc} * \left(GHG_{facility} + GHG_{inputs}\right) \quad [4]$$

where:

F_{alloc} = allocation fraction for biochar, calculated using equation [5]. The biochar shall be treated as a residue of another process if the chemical energy in the produced biochar (LHV) is less than 10% of the total energy of the produced co-products, and in that case $F_{alloc} = 0$ and it is not necessary for the terms $GHG_{facility}$ and GHG_{inputs} to be calculated;

***Example of biochar as a residue**: A biomass gasifier produces syngas consisting of hydrogen and carbon monoxide and biochar. The biochar contains 10% of the total chemical energy of the combined outputs on a lower heating value basis. The biochar is therefore treated as a residue of the gasification process, and none of the process emissions are allocated to the biochar.*

$GHG_{facility}$ = total GHG emissions from operation and construction of the biochar production facility, calculated in accordance with section 4(3.2.1);

GHG_{inputs} = total emissions associated with inputs to the biochar production facility, calculated using equation [12].

$$F_{alloc} = \begin{cases} 0 \text{ if the biochar is treated as a residue} \\ E_{biochar} \Big/ \left(E_{biochar} + \sum_{co-products} E_{co-products}\right) \text{ otherwise} \end{cases} \quad [5]$$

where:

$E_{biochar}$ = chemical energy in the biochar in MJ per kg of biochar produced, assessed by laboratory testing on a lower heating value basis;

$co-products$ = an index of the energy-containing co-products of the biochar production process. Only co-products that are exported from the facility, as opposed to being consumed for process energy for the biochar production process, shall be considered. All electricity and useful heat exported from the facility shall be treated as co-products. Co-products that are subject to further processing before export from the facility shall be included based on their energy content prior to this additional processing. Co-products with no heating value (e.g. ash) shall not be considered in the allocation calculation;

> ***Example of co-products**: A fast pyrolysis process generates a mix of biochar, pyrolysis gas, pyrolysis liquid, and heat. The gas is combusted to heat the reactor, and therefore the co-products are the biochar, the pyrolysis liquid, and the useful heat that is recovered and supplied for other uses. The energy content in each of these three output streams must be determined (considering the pyrolysis oil as produced by the pyrolysis process, not including any further upgrading processes). If the biochar contains 20% of the total energy contained in the three co-products then 20% of the process emissions shall be allocated to the biochar*

$E_{co-products}$ = In the case of material co-products, the chemical energy in each co-product in MJ per kg of biochar produced, assessed by laboratory testing on a lower heating value basis. In the case of electricity and heat as co-products, the amount of electricity or useful heat supplied to a grid, network or user outside the system boundary, where useful heat is defined as heat generated to satisfy an economical justifiable demand for heat, for heating and cooling purposes (cf. Paragraph 1 of Part C of Annex V to [the RED III]).

3.2.1. Emissions from the biochar facility ($GHG_{facility}$)

The emissions $GHG_{biochar}$ associated with the biochar production facility shall be calculated in accordance with the following equation:

$$GHG_{facility} = GHG_{bio} + GHG_{bio\text{-}storage} + GHG_{combustion} + CH_{4\,release} + GHG_{electricity} + GHG_{heat} + GHG_{capital} + GHG_{disposal} \quad [6]$$

The terms in equation [6] are as follows.

GHG_{bio} refers to emissions associated with the production and supply of biomass used at the biochar-producing facility, calculated in accordance with the following equation:

$$GHG_{bio} = \sum_{fuels} Q_{biomass} * EF_{biomass} \quad [7]$$

where:

$Q_{biomass}$ = quantity of the biomass that is consumed in the certification period, expressed in an appropriate unit, excluding any non-biomass contamination (e.g. soil, rocks);

$EF_{biomass}$ = lifecycle emissions value, expressed in tonnes of CO_2e per unit, selected in accordance with the rules in section 4(6.2).

$GHG_{bio\text{-}storage}$ refers to CH_4 emissions due to biomass storage prior to processing at the biochar production facility. When moist biomass is stored for a period prior to processing, in some cases anaerobic decomposition may occur in the biomass pile leading to degradation of the biomass and generation of CH_4. Significant CH_4 emission may be avoided by following best practices for biomass storage. $GHG_{bio\text{-}storage}$ shall be set to zero if one or more of the following practices are followed for all biomass utilised:

- Biomass stored for use in the biochar production process consists of coarse woody material that will naturally remain well aerated;
- Biomass stored in a form that will not necessarily remain naturally aerated (including wood chips, agricultural residues, sawdust etc.) shall either:
  - be stored for no more than four weeks prior to processing; or
  - be stored with a maximum of 30% residual moisture.
- Biomass is pelleted for storage;
- It is demonstrated to the satisfaction of the certification body that biomass is stored in a way that ensures aeration.

Otherwise, $GHG_{bio\text{-}storage}$ shall be calculated in accordance with the following equation:

$$GHG_{bio\text{-}storage} = \sum_{feedstocks} \left(\frac{16}{12} * 0.0013 * Q_{feedstock} * C_{feedstock} * (T_{storage} - 1) \right) * GWP_{CH_4} \quad [8]$$

where:

$Q_{feedstock}$ = quantity of the fuel consumed in the certification period, expressed in an appropriate unit;

$C_{feedstock}$ = carbon content of the feedstock, expressed as a mass %;

$T_{storage}$ = time months for which the feedstock batch is stored (rounded up);

feedstocks = an index of the batches of feedstocks consumed;

0.0013 = assumed monthly fractional loss of biomass carbon from storage.

$GHG_{combustion}$ refers to emissions due to fuel consumption at the biochar production facility, including CH_4 and N_2O emissions from biomass combustion for energy, calculated in accordance with the following equation:

$$GHG_{combustion} = \sum_{fuels} (Q_{fuel} * EF_{fuel}) + CO_{2\,fossil,stored} \quad [9]$$

where:

Q_{fuel} = quantity of the fuel consumed in the certification period, expressed in an appropriate unit, including in the case of mixed biogenic non-biogenic feedstocks any fossil-carbon-based material in the input that is combusted to CO_2;

EF_{fuel} = lifecycle emissions value, expressed in tonnes of CO_2e per unit, selected in accordance with the rules in section 4(6.2);

$CO_{2\,fossil,stored}$ = the quantity of fossil CO_2 from fuel combustion at the biochar production facility captured and permanently stored at a site permitted under the CCS Directive, expressed as a negative number;

fuels = an index of the fuels consumed.

$\mathbf{CH_{4\,release}}$ refers to any emission of methane generated by the biochar production process (e.g. pyrolysis) into the atmosphere. For the most efficiently run facilities this term will be zero, and all certified biochar production facilities must seek to make this term zero. Methane emissions must be sampled at least twice per pyrolysis unit during the first certification period with an interval of at least a third of the certification period, and measured in units of grams of methane emission per kilogram of biochar production. If these measurements are consistent then the average of the measurements may be taken as characteristic of the pyrolysis unit. Methane emissions measurements shall be considered consistent if either:

a) Both measurement demonstrate that methane is only emitted at trace levels, defined as a level of methane emissions that would amount to less than 1% of CR_{total} if continued for the entire certification period and expressed in tonnes of CO_2e on a GWP 100 basis.

b) The measured level is similar for the two measurements, defined as the higher of the two measurements being not more than 40% above the lower.

If the measurements are not consistent, then more measurements must be taken in order to establish a reliable estimate of average methane emissions to the satisfaction of the certification body. In the case that non-zero methane emissions above a trace level are identified then the operator or group of operators must produce and implement a methane reduction plan to eliminate these emissions, and methane emissions must be measured again in the subsequent certification period. If methane emissions are found to be emitted at only trace levels, then that measured level may be taken as representative for that pyrolysis unit for the next five years, after which methane emissions should be measured again.

$\mathbf{GHG_{electricity}}$ refers to emissions due to electricity consumption at the biochar production facility, calculated in accordance with the following equation:

$$GHG_{electricity} = \sum_{electricity\ source} Q_{electricity} * EF_{electricity}$$	[10]

where:

$Q_{electricity}$ = quantity of electricity consumed in the certification period, expressed in an appropriate unit;

$EF_{electricity}$ = lifecycle emission factor for the consumed electricity, expressed in tonnes of CO_2e per unit, selected in accordance with section 4(6.2).

GHG_{heat} refers to emissions due to consumption of useful heat at the biochar producing facility where that heat is generated outside the system boundary, calculated in accordance with the following equation:

$$GHG_{heat} = \sum_{heat\ source} Q_{heat} * EF_{heat} \quad [11]$$

where:

Q_{heat} = quantity of useful heat produced outside the system boundary and consumed in the certification period for the biochar production process, expressed in an appropriate unit;

EF_{heat} = lifecycle emission factor for the consumed heat, expressed in tonnes of CO_2e per unit, selected in accordance with section 4(6.2);

heat source = index of all utilised external heat sources.

$GHG_{capital}$ refers to capital emissions from construction and installation of the biochar production facility and is to be calculated in accordance with the principles detailed in section 4(6.3).

$GHG_{disposal}$ refers to emissions from the treatment or disposal of any wastes generated by the biochar production facility. This shall include emissions associated with the supply of any energy and inputs consumed in the course of waste disposal and any other GHG emissions associated with the disposal process including emissions of N_2O and/or CH_4 due to aerobic or anaerobic degradation of biomass wastes. For some facilities this term will be zero.

3.2.2. Emissions from inputs (GHG_{inputs})

Where there are inputs including chemicals (but excluding anything within the scope of capital emissions) consumed by the biochar production facility, other than fuels that are considered in the $GHG_{combustion}$ term, the lifecycle emissions associated with the consumption of these inputs during the certification period must be characterised in accordance with the following equation:

$$GHG_{inputs} = \sum_{inputs} Q_{input} * EF_{input} \quad [12]$$

where:

Q_{input} = quantity of the input consumed in the certification period, expressed in an appropriate unit;

EF_{input} = lifecycle emission factor for the input consumed, expressed in tonnes of CO_2e per unit, selected in accordance with section 4(6.2).

The operator may group any number of inputs whose collective emissions are considered non-material on the basis of a materiality assessment and substitute for them an emission term equal

to $1\% * CR_{total}$, i.e. a group of inputs for which when taking a high end estimate of expected associated emissions:

$\sum_{inputs} Q_{input} * EF_{input} < 2\% * CR_{total}$	[13]

3.2.3. CO_2 capture at the biochar production facility

In the case that CO_2 capture of biogenic CO_2 is implemented at the biochar production facility, this shall not be counted as a negative emission in $GHG_{associated}$ but may be eligible for certification as a second carbon removal activity, following the technical specifications for permanent carbon removal through BioCCS.

3.3. MONITORING AND REPORTING

A monitoring plan consisting of a detailed, complete and transparent documentation of the parameters used in calculations, which will be monitored on an annual basis throughout the certification period, shall be submitted by the operator.

Such plan shall include, at minimum, the parameters listed in Table 2.

Table 2. Parameters for inclusion in the monitoring plan

Emission source	Data / Parameter	Data unit	Description	Notes
$GHG_{biochar}$	$E_{biochar}$	MJ	Energy in biochar per kg of biochar produced.	
	$E_{co-products}$	MJ	Energy in other co-products per kg of biochar produced.	Where available energy density may be taken from RED data so that only mass produced need be measured.
GHG_{bio}	$Q_{biomass}$	Mass	Quantity of biomass consumed for biochar producing process	
	$EF_{biomass}$	tCO_2e/mass	Emission factor for that biomass	Data may be available from RED reporting.

$GHG_{\textbf{bio-storage}}$	$Q_{feedstock}$	Mass	Quantity of feedstock in each batch stored for more than four weeks in potentially anaerobic conditions	Does not need to be monitored if storage conditions meet requirement
	$C_{feedstock}$	%	Carbon fraction in that feedstock	Does not need to be monitored if storage conditions meet requirement
	$T_{storage}$	Months	Period for which feedstock batch is stored in potentially anaerobic conditions	Does not need to be monitored if storage conditions meet requirement
$GHG_{combustion}$	Q_{fuel}	[appropriate unit]	Quantity of the fuel consumed in the certification period	
	$CO_{2\,fossil,stored}$	tonnes CO_2	Quantity of fossil CO_2 from fuel combustion at the capture facility captured and permanently stored	
$CH_{4\,release}$	$CH_{4\,release}$	Tonnes CO_2e	Quantity of methane emitted from the biochar producing process in tCO_2e	
$GHG_{electricity}$	$Q_{electricity}$	[appropriate unit]	Quantity of electricity consumed in the certification period	
GHG_{heat}	Q_{heat}	[appropriate unit]	Quantity of useful heat produced outside the system boundary and consumed in the certification period	
GHG_{inputs}	Q_{input}	[appropriate unit]	Quantity of the input consumed in the certification period,	

$GHG_{capital}$	-	-	To be informed by the operator	

4. TRANSPORT OF BIOCHAR

This section provides rules and requirements for the quantification of GHG emissions associated to biochar transportation. Any emissions associated with biomass transportation from the point of harvest/collection to the biochar production facility should not be counted in this section but instead be included in the term GHG_{bio} in Equation [6].

4.1. QUANTIFICATION OF ASSOCIATED GREENHOUSE GAS EMISSIONS FOR TRANSPORT

The transportation of biochar results in GHG emissions from the combustion of fuels during the journeys.

Equation [14] outlines the calculation:

$$GHG_{transport} = \sum_{T} \sum_{L=1}^{O} (K_{T,L} * Q_{T,L} * EF_{T} * 10^{-3}) \quad [14]$$

where:

$GHG_{transport}$ = GHG emissions due to energy use for biochar transportation across mode of transportation type "T", in tonnes CO_2e;

$K_{T,L}$ = distance of one-way trip travelled by mode of transportation type "T", in kilometres;

$Q_{T,L}$ = amount of biochar transported in each one-way trip in mode of transportation type "T", in tonnes (at moisture content as transported);

EF_T = emission factor for mode of transportation type "T", in kg CO_2e / tonne.km. The emission factor presented in section 4(6.2.5) shall be applied;

L = outbound trip by the mode of transportation;

O = total number of outbound trips by the modal per year;

T = road (tank trucks or other road transportation), rail and maritime.

Note that the more detailed and broken-down is the information available on distance between sites, and volume transported, the more accurate will be the calculation of $GHG_{transport}$. Therefore, if data is available per trip, operators shall calculate the emissions for each trip, using the average distance in each leg, and the amount of biochar transported in that exact leg (which can be derived from the estimated capacity of the vehicle), and add them up, as described in the

above equation. Otherwise, an approximated estimate of the total distance travelled in the year and the total emissions transported in the year is allowed as a proxy.

4.2. MONITORING AND REPORTING

A monitoring plan consisting of a detailed, complete and transparent documentation of the parameters used in calculations, which will be monitored on an annual basis throughout the certification period, shall be submitted by the operator.

Such plan shall include, at minimum, the parameters listed in Table 3.

Table 3. Parameters for inclusion in the monitoring plan

Emission source	Data / Parameter	Data unit	Description	Notes
$GHG_{transport}$	$K_{T,L}$	km	Distance travelled by biochar from production facility to point of application/incorporation	
	$Q_{T,L}$	tonnes	Quantity of biochar despatched to each point of application/incorporation	

5. USE OF BIOCHAR

This section provides rules and requirements for the quantification of CO_2 removals and GHG emissions associated to the application of biochar to soils or incorporation of biochar to materials. Requirements relating to the way that biochar is applied or incorporated are stated in section 6(2) and section 6(3.4).

5.1. CALCULATION OF THE PERMANENCE FRACTION F_{perm}

The permanence fraction of the biochar, F_{perm}, may be calculated either by the direct assessment of the inertinite fraction in the biochar following the rules in section 4(5.1.1) or by the application of a decay function parameterised by the H/C_{org} ratio of the biochar (which must always be less than or equal to 0.7) and the annual average temperature (soil temperature for application to soils, air temperature for incorporation in materials) at its location of application or incorporation following the rules in section 4(5.1.2). Operators are not permitted to combine elements of these two approaches.

5.1.1. Inertinite assessment

Operators using this option for permanence assessment must submit samples of each production batch of biochar for random reflectance testing at a qualified laboratory. The fraction of the biochar that is identified as having an R_o reflectance value of 2% or greater shall be treated as delivering permanent carbon storage for that production batch.

5.1.2. Decay function

Operators using this option for permanence assessment must use the H/C_{org} ratio for the biochar and the expected average temperature for the location of biochar application/incorporation to calculate F_{perm} following Equation [15] using the appropriate parameters m and c from Table 4. This estimates the remaining carbon after 200 years using the decay data documented by Woolf et al. (2021)[1].

$F_{perm} = m * H/C_{org} + c$	[15]

where:

H/C_{org} = ratio of hydrogen to organic carbon in the biochar production batch;

m = a parameter for the linear part of the modelled relationship ship between H/C_{org} ratio and permanence;

c = a parameter for the constant part of the modelled relationship ship between H/C_{org} ratio and permanence;

Table 4. Parameters for calculating F_{perm}

Temperature (°C)	m	c
5	-0.564	1.108
10	-0.650	1.001
15	-0.653	0.896
20	-0.636	0.829
25	-0.621	0.789

***Note on decay function**: The decay parameters presented here are based on Woolf et al. 2021, which is an academic analysis using the same dataset as underlies the protocol developed by the IPCC as a basis for future methodological development of national biochar accounting. The 200 year values are not directly presented in the paper and so were derived from the underlying data by the project team. This issue is discussed at greater length in the previously circulated technical review paper, and has been discussed at previous expert*

[1] https://pubs.acs.org/doi/10.1021/acs.est.1c02425

group meetings. We consider that the Woolf et al. (2021) parameters provide an estimate of carbon storage in biochar over 200 years that is likely to be conservative. The choice of decay parameters for a biochar certification methodology under the CRCF is clearly an important one, and the choice of parameters will be kept under continuous review until a formal proposal for a biochar methodology is presented.

5.2. QUANTIFICATION OF ASSOCIATED GREENHOUSE GAS EMISSIONS

The GHG emissions associated with the application and/or incorporation of biochar into soils and materials across one or more application/incorporation sites shall be calculated following Equation [16]. Only emissions that are directly related to the use of the biochar must be included. In the case that biochar is intermixed with another material, such as fertiliser prior to application to soil or by incorporation into concrete, emissions associated with producing and handling those second materials shall not be included, and the emissions from application or incorporation shall be allocated on a mass basis.

Certification schemes may choose to facilitate emissions calculations by setting more detailed requirements on how the associated greenhouse gas emissions shall be assessed for particular types of activities.

$$GHG_{use} = \sum_{S} \left(F_S * GHG_{on-site,S} \right) \quad [16]$$

where:

F_S = mass fraction of the project biochar in the total quantity of soil amendment applied to soils or of material incorporated into products at each site. The total mass includes the biochar from the activity, any biochar sourced from other activities for use at the same site, and any other materials intermixed with the biochar.

5.2.1. Emissions from application or incorporation

The on-site GHG emissions at each site shall be calculated as

$$GHG_{on-site} = GHG_{combustion} + GHG_{electricity} + GHG_{heat} \quad [17]$$

where:

$GHG_{on-site}$ = GHG emissions associated to energy use and operation to apply or incorporate the biochar or biochar-containing matrix, in tonnes CO_2e;

$GHG_{combustion}$ = GHG emissions due to fuel consumption at the application or incorporation facility, including by vehicles and mobile equipment, in tonnes CO_2e. Calculated in accordance with Equation [18];

$GHG_{electricity}$ = GHG emissions due to electricity consumption at the application or incorporation facility in tonnes CO_2e. Calculated in accordance with the equation [19];

GHG_{heat} = GHG emissions due to heat consumption at the application or incorporation facility, in tonnes CO_2e. Calculated in accordance with the equation [20].

Equations [19], [20] and [21] are described as follows:

$$GHG_{combustion} = \sum_{fuels} Q_{fuel} * EF_{fuel}$$	[18]
$$GHG_{electricity} = \sum_{electricity\ source} Q_{electricity} * EF_{electricity}$$	[19]
$$GHG_{heat} = \sum_{heat\ source} Q_{heat} * EF_{heat}$$	[20]

where:

Q_{fuel} = quantity of the input consumed in the certification period, expressed in appropriate unit;

EF_{fuel} = lifecycle emission factor for the fuel consumed, expressed in tonnes of CO_2e per unit, selected in accordance with section 4(6.2.3);

$Q_{electricity}$ = quantity of electricity imported from outside the system boundary and consumed in the certification period, expressed in appropriate unit;

$EF_{electricity}$ = lifecycle emission factor for the consumed electricity, eexpressed in tonnes of CO_2e per unit, selected in accordance with section 4(6.2);

Q_{heat} = quantity of useful heat produced outside the system boundary and consumed in the certification period, expressed in appropriate unit;

EF_{heat} = lifecycle emission factor for the consumed heat, expressed in tonnes of CO_2e per unit, selected in accordance with section 4(6.2.2).

5.3. MONITORING AND REPORTING

A monitoring plan consisting of a detailed, complete and transparent documentation of the parameters used in calculations, which will be monitored on an annual basis throughout the certification period shall be submitted by the operator.

Such plan shall include, at minimum, the parameters listed in Table 5.

Table 5. Parameters for inclusion in the monitoring plan

Emission source/sink	Data / Parameter	Data unit	Description	Notes
CR_{total}	H/C_{org}	Dimensionless	H/C_{org} ratio is to be measured for every production batch	
	C_{org}	%	Fractional content of organic carbon in the biochar production batch	
	$Q_{biochar}$	tonnes	Quantity of biochar in the production batch	
$GHG_{combustion}$	Q_{fuel}	[appropriate unit]	Amount of fuels used for combustion at storage site for all relevant storage sites	Relevant data may be available in verified MRR reporting
$GHG_{electricity}$	$Q_{electricity}$	MWh	Amount of electricity taken from outside the system boundary for use at each storage site, for all relevant storage sites	
GHG_{heat}	Q_{heat}	MWh	Amount of useful heat taken from outside the system boundary for use at storage site, for all relevant storage sites	

6. COMMON PRINCIPLES FOR QUANTIFICATION

6.1. ACCURACY, CONSERVATIVENESS AND TRANSPARENCY

Carbon removal activity operators shall ensure that emission determination is neither systematically nor knowingly inaccurate. They shall identify and reduce any source of inaccuracies as far as possible. They shall exercise due diligence to ensure that the calculation and measurement of emissions exhibit the highest achievable accuracy. Certification schemes may choose to facilitate accurate emissions calculations by further specifying monitoring requirements, required measurement techniques, and calculation factors.

Operators shall quantify the carbon removals achieved by carbon removals activities conservatively, meaning that if there is uncertainty in the calculation of total carbon removals then operators should adopt calculation approaches that are more likely to lead to an underestimate than an overestimate, and that if there is uncertainty in the calculation of associated GHG emissions then operators should adopt approaches that are more likely to lead to an overestimate than an underestimate.

Operators shall obtain, record, compile, analyse and document monitoring data, including assumptions, references, activity data and calculation factors, in a transparent manner that enables the reproduction of the determination of emissions by the certification bodies, certification schemes and competent bodies.

6.2. EMISSION FACTORS

6.2.1. Electricity

The emission factor applied in the calculation of emissions associated with any electricity consumption for activities certified under these specifications (EF_{elec}) shall be calculated following the rules in paragraph 6 of Part A of the Annex to Commission Delegated Regulation (EU) 2023/1185 (the rules to set emissions factors for electricity used in the production of renewable fuels of non-biological origin, RFNBOs), with the exception that the calculation period for the electricity emission factor may be less than a calendar year if the certification period includes only part of a given calendar year.

- If the certification period falls entirely within a single calendar year, then the electricity emission factor shall be calculated based on that period.
- If the certification period includes one or more full calendar years, and parts of up to two calendar years, then emissions factors shall be calculated for each of the calendar years and each of the part calendar years, and utilised in respect of the calculation of emissions from electricity consumption in those periods.
- If data is not available to allow an emission factor to be calculated for a given part of a calendar year then the electricity emission factor for that period may be set equal to the emission factor calculated for the full relevant calendar year.

Under these rules, operators may always report electricity emissions based on a grid average emission factor for the country in which the activity is located. Operators may choose the reporting basis for each source of consumed electricity independently, i.e. they do not have to use the same basis for setting the emission factor for electricity consumed in different locations.

6.2.2. Heat

The emission factor applied in the calculation of emissions associated with any heat consumption for activities certified under these specifications shall be:

a) In the case that heat is recovered from a process that is part of the activity, there are no additional emissions (but there may be emissions that must be accounted and that are associated with the process that generated the heat that is then recovered);

b) In the case that heat is generated by combustion of fossil fuels, the lifecycle emission factors for fossil fuel supply and combustion in the latest version of the document *Definition of input data to assess GHG default emissions from biofuels in EU legislation*

published by the Joint Research Centre divided by the thermal efficiency of the heat generation process;

c) In the case that heat is generated from biomass resources, emission factors for the supply and combustion (excluding CO_2 from combustion) of the biomass used, calculated using the rules in Annex VI of Directive (EU) 2018/2001 ('the RED III'), divided by the thermal efficiency of the heat generation process;

d) In the case that heat is generated from non-biomass renewable sources (such as solar or geothermal heat), zero;

e) In the case that heat is provided from nuclear energy, zero;

f) In the case that heat is recovered from a process from which heat was not previously recovered (i.e. not recovered until a maximum of three months prior to the commencement of the carbon removal activity), zero;

g) In the case that heat is recovered from a process from which heat was already recovered or from a new process (i.e. a process coming into operation less than 6 months prior to the commencement of the carbon removal activity), and that process is not directly related to the carbon removal activity (i.e. the emissions associated with the energy or fuel supplied to that process are not considered within $GHG_{associated}$) the indirect effect associated with competing demands for waste heat shall be considered by setting the emission factor to the EU ETS benchmark emission factor for heat;

h) In the case that heat is supplied from a heat network, set to the EU ETS benchmark emission factor for heat.

6.2.3. Biomass

When biomass or biomass-derived fuel meeting the requirements of Article 29 of [the RED] is consumed for an activity, any CO_2 produced by chemical processes from the carbon atoms contained in the biomass shall be treated as having zero associated CO_2 emission, but the supply chain emissions for provision of the biomass must be accounted for, and any non-CO_2 emissions associated with biomass combustion (primarily CH_4 and N_2O) must be accounted.

The emission factor applied in the calculation of emissions associated with any consumption of biomass (through combustion or otherwise) for the activity shall be calculated following the rules for calculating the GHG emissions associated with biomass supply under Annex V and Annex VI of [the RED III], considering the emissions up to the point of consumption associated with the terms e_{ec}, e_l, e_p, and e_{td} as defined in those annexes, and converting where necessary from emissions per unit of energy produced by a bioenergy facility to emissions per unit of feedstock consumed. Emissions for transport of the biomass raw materials to the capture facility shall be calculated based on the actual distance travelled and mode of transport, the disaggregated default emissions values listed for the e_{td} term shall not be used. While indirect land-use change (ILUC) emissions are within the scope of the calculation of $GHG_{associated}$, it is not expected that there would be any significant ILUC emission associated with the increase in biomass consumption required to provide on-site heat and/or electricity used for the capture process specifically, as it is not considered likely that this heat and/or electricity would be supplied by consumption of the resources (cereals and starch-rich crops, sugars, or oil crops) listed in Part A of that annex, and as Part B of that annex confirms that feedstock not listed in Part A of the annex are considered to have estimated ILUC emissions of zero. There is therefore no requirement to report ILUC emissions.

Certification schemes may choose to facilitate calculations by further specifying what is required for an RED-consistent calculation based on disaggregated default values, and by providing guidance on undertaking the calculation for feedstocks that do not have disaggregated default values in the RED annexes.

6.2.4. Inputs

Where the specifications for an activity require the calculation of emissions associated with the use of inputs to that activity, including fossil fuels and materials used in the construction of capital equipment, lifecycle emission factors for those inputs shall be taken from the version of the source in the following data hierarchy list that is current at the time of the re-certification audit, sourcing data from the first source in the list from which it is available:

- Part B of the Annex to Commission Delegated Regulation (EU) 2023/1185;
- The JRC document, "Definition of input data to assess GHG default emissions from biofuels in EU legislation";
- The JEC Well-to-Wheels report;
- The ECOINVENT database;
- Official sources such as the IPCC, IEA or government;
- Other reviewed sources such as the E3 and GEMIS database; peer reviewed publications.

The ECOINVENT database is a proprietary data source, and as such not all operators will have access to this data. If an operator does not have access to ECOINVENT it is therefore permitted to take data from sources at level 5 or 6 of the hierarchy.

The lifecycle emission factors should reflect the emissions associated with supplying those inputs up to the point of use by the activity. If necessary, lifecycle emissions values taken from these sources shall be adjusted to exclude any carbon contained within the input material itself. If such carbon is oxidised and emitted as a result of processes associated with the activity this shall be counted as an emission source directly. The use of data from divergent sources may lead to slight inconsistencies in the scope of lifecycle accounting applied to different inputs, e.g. the JEC Well-to-Wheels study does not consider capital emissions associated with fuel production. Operators are not expected to recalculate data from these sources to achieve full consistency in lifecycle scope across the utilised input data.

6.2.5. Transport

Emissions from transport, whether of CO_2 or of bulk materials, may be calculated either based on assessment of the fuel consumption and consequent emissions associated with the specific vehicles/routes utilised or based on conservative default factors provided by the certification scheme. If certification schemes choose to facilitate applications by providing additional conservative default emission factors for specific forms of CO_2 or bulk material transport, they must clearly document the basis for these values and demonstrate that they are conservative.

Where default values are not used, the operator may either undertake the calculation by recording the actual fuel consumption of the vehicles or other infrastructure utilised or as the product of the average GHG emissions associated with operating the specific vehicle or infrastructure (in gCO_2e/tkm) and the distance travelled. GHG emission factors for fuel consumption must be set on a lifecycle basis (i.e. including upstream emissions). GHG emission

factors for vehicles transporting CO_2 must account for the mass of the CO_2 containment equipment and for energy expenditures to compress/liquefy the CO_2 and maintain it in that state. Operators must assume that vehicles used to transport CO_2 or bulk materials will undertake an empty return trip and must account for the emissions associated with that return trip, unless able to demonstrate that the return trip will be used to provide another useful transport service (in which case the return emissions allocated to the activity may be treated as zero).

6.3. CAPITAL EMISSIONS

If the specifications for the activity require the consideration of capital emissions associated with one or more facilities, then:

a) If any facility first came into operation or has been expanded or refitted within 20 years of the certification date of the activity, the capital emissions associated with that construction/expansion/refit of that facility must be considered.

b) For any facility that has not entered operation or been expanded or refitted within 20 years of the certification date of the activity, the capital emissions shall be considered to be zero.

c) A materiality assessment shall be undertaken for the sum of all capital emissions across all relevant facilities. If the certification body concludes on the basis of this assessment that capital emissions may be material, then the capital emissions must be assessed.

d) Any capital emissions associated with non-biomass renewable energy generating equipment shall be excluded from the calculation.

e) Capital emissions shall only be assessed for the part of facilities/the equipment that is directly required for the performance of the activity – so, for example, in the case of biochar production at a fast pyrolysis plant that also upgrades pyrolysis oil, capital emissions must be assessed of the pyrolysis unit but not for the parts of the facility required only for pyrolysis oil upgrading.

If capital emissions must be assessed, then the total capital emissions for each facility or facilities shall be calculated by taking an inventory of the construction materials utilised and fuel and energy consumed in the construction of the facility and summing the associated emissions. Emissions factors used in assessing capital emissions should consider the full lifecycle of the materials and energy utilised. The calculated capital emissions for each facility shall then be amortised by dividing them across twenty years. In the case that a facility has equal or lower material requirements for construction than a previously constructed facility of the same type, then it is permissible for the operator to use the capital emission for that previous facility as an estimate of capital emissions for the new facility.

Certification schemes may choose to facilitate emissions calculations by providing conservative capital emissions factors that may be used for specific activity types/activity stages/facility sizes as an alternative to undertaking a project-specific materiality assessment or full calculation. Such conservative values should be set in such a way that they can be reasonably expected to be higher than the actual capital emissions for the relevant facility in at least 95% of cases. If providing a default-based option, the certification scheme must clearly document the basis for treating the provided values as conservative.

This amortised emission shall be added to the associated GHG emissions for the activity for each year until the twentieth year following the year in which the facility came into operation/was expanded/was refitted, as relevant:

$$GHG_{capital} = \frac{(GHG_{combustion} + GHG_{electricity} + GHG_{heat} + GHG_{materials})}{20} \quad [21]$$

where $GHG_{combustion}$ shall be calculated as in Equation [9], $GHG_{electricity}$ shall be calculated as in equation [10], GHG_{heat} shall be calculated as in Equation [11] (but substituting the energy consumption in construction for the energy consumption at the biochar facility) and $GHG_{materials}$ shall be calculated in accordance with the following equation:

$$GHG_{materials} = \sum_{electricity\ source} Q_{materials} * EF_{materials} \quad [22]$$

where:

$Q_{materials}$ = quantity of materials utilised in the construction of the facility, expressed in tonnes;

$EF_{materials}$ = lifecycle emission factor for the utilised materials, expressed in tonnes of CO_2 per tonne of material, selected in accordance with section 4(6.2).

6.4. MEASURED DATA AND UNCERTAINTIES

Where data is measured, this measurement should be undertaken in accordance with relevant best practices, using methods based on relevant EN standards where applicable. Measurements should be undertaken in a way consistent with the requirements of Article 42 of [the MRR]. Certification schemes may choose to facilitate consistent measurement practices by providing additional guidelines for specific types of measurement.

6.4.1. Assessment of uncertainty

Where measured, estimated and/or default data are used as the basis for calculations of sources or sinks, the operator shall assess the uncertainty introduced into the calculation of net carbon removals. Certification schemes shall facilitate the consistent assessment of uncertainty by setting requirements for each type of activity, having regard to the principles for combining uncertainties of section 3 of chapter 6 ("Quantifying Uncertainties in Practice") of the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*.[2] In setting these requirements, certification schemes must balance the need to provide a meaningful characterisation of uncertainty and to respect the principle of conservatism with the need to avoid creating a disproportionate burden for operators.

If the total resulting uncertainty estimate is ≤ ± 2.5%, then no adjustment is necessary (i.e. $F_C = 1$).

[2] https://www.ipcc-nggip.iges.or.jp/public/gp/english/

If the total resulting uncertainty estimate is > ± 2.5% and ≤ ±5%, then a conservatism factor of 0.975 shall be applied to the net carbon benefit (i.e. $F_C = 0.975$).

If the total resulting uncertainty estimate is > ± 5% and ≤ ±10%, then a conservatism factor of 0.9 shall be applied to the net carbon benefit (i.e. $F_C = 0.9$).

If the total resulting uncertainty estimate is > 10% and ≤ ±20%, then a conservatism factor of 0.8 shall be applied to the net carbon benefit (i.e. $F_C = 0.8$).

If the total resulting uncertainty estimate is greater than ±20% than the activity may not be issued units for that certification period.

Certification schemes may choose to facilitate uncertainty calculations by providing more detailed instructions on the calculation of uncertainty for specific activity types.

6.5. MONITORING AND REPORTING

At certification all activities must propose a monitoring plan detailing the parameters to be monitored and parameters not to be monitored (e.g. default values) and the associated measurement or estimation approaches.

The monitoring plan shall be consistent with the Commission Implementing Regulation (EU) 2018/2066 of 19 December 2018 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council. In particular, the monitoring plan:

- Shall consist of at least those elements required by Paragraph 1 of Annex I of [the MRR] that are relevant to the activity.
- Shall apply the minimum frequencies for analysis listed in Annex VII of [the MRR] where applicable.
- Shall apply the standard for quality assurance set by Article 60 of [the MRR].
- Shall include a record keeping requirement for all relevant data and information consistent with the record keeping requirements set by Article 67(1) of [the MRR].

Certification schemes may choose to facilitate the development of monitoring plans by providing additional guidance specifying which elements must be included for each type of activity, specifying minimum measurement frequencies for measurements not listed in Annex VII of [the MRR], and/or specifying best practice requirements for quality assurance.

Operators shall obtain, record, compile, analyse and document monitoring data, including assumptions, references, activity data and calculation factors in a transparent manner that enables the checking of performance achieved during the various activity stages. Data shall be monitored continuously where that is practical and proportionate, otherwise operators must establish a frequency of monitoring in the monitoring plan. If the certification body is not satisfied that the frequency of monitoring in a certification period or part of a certification period is adequate to provide an accurate characterisation of delivered net carbon removals then carbon removal units shall not be issued in relation to the affected removals.

Each parameter monitored shall be accompanied with the following information:

a) Area / Department responsible for collection and archiving.

b) Data source.

c) Equipment used for monitoring, including details on accuracy and calibration.

d) Monitoring frequency.

e) QA/QC Procedures.

f) Brief description, including measurement methods and procedures.

g) Reliability.

All measurements shall be conducted with calibrated measurement equipment according to industry standards, following the requirements in Section 3 of Chapter III of [the MRR] where applicable, and in line with relevant [EU ETS] requirements where applicable.

SECTION 5: STORAGE MONITORING AND LIABILITY

The use of produced biochar must be monitored up to the point of application to soil or incorporation in a product, and carbon removal units may only be issued in relation to the quantity of biochar applied or incorporated. Biochar from certified activities must be segregated in the supply chain from any biochar produced by non-certified activities until reaching the point of application/incorporation. Certified and non-certified biochars may be mixed at that point and then applied or incorporated. If biochar from multiple production batches produced by certified activities is mixed together it must be well mixed, with the shares of each production batch in the mixed batch calculated following mass balance principles. Mass balance principles may not be used if the biochar batches are not well mixed (i.e. segregated supply is mandatory unless batches are demonstrated to be well mixed). The chain of custody must in particular ensure that biochar is only used in ways that are appropriate to its production and characteristics, e.g. that biochar produced only meeting a material incorporation specification is never applied to soils.

Where biochar is applied to soils and this application is not directly overseen by a certification body, access must be given on request to the location of application to the certification scheme, certification body or relevant competent national authority, during the certification period in which the biochar was applied and for a year from the end of that certification period, to allow the soil to be tested in order to confirm that biochar has been applied. If such testing concludes either that no biochar has been applied or that the amount of biochar identified is so low as not to be plausibly consistent with the stated rate of biochar application, then this shall be treated as a reversal and the operator or group of operators must surrender carbon removal units to compensate for it. As it is not practically possible to precisely identify the quantity of biochar applied based on soil testing, no further action shall be required in the case that the level of biochar identified in the soil is plausibly consistent with the stated application rates.

No further monitoring is required after the end of the year following the certification period during which biochar is demonstrated to have been applied to the land or incorporated into a product, as the risk of reversal for the permanent fraction of the carbon in the biochar is considered low beyond this point, for the permitted uses.

> ***Note on risk of reversal**: The risk of reversal is considered low once biochar is applied to soils or incorporated in cement, concrete or asphalt. It would not be practical beyond this point to re-separate the biochar and utilise it in an energy application, and biochar in these uses is at low risk of loss through fire (losses to fire would generally be limited to biochar at the surface of the relevant medium). For incorporation in these materials, the only processes the project team has identified that might pose a risk of significant reversals would be some form of high temperature cement recycling processes (an example is detailed by Dunant et al. 2024 here: https://www.nature.com/articles/s41586-024-07338-8). Given that such processes are not in common use at this time and may not be applied to a significant fraction of biochar-incorporating materials produced in the initial activity periods under BCR specifications, we propose that it would not be proportional at this time to impose a requirement to monitor all materials through to their end of life. It will be appropriate for the Commission to continue to monitor developments in this field.*

SECTION 6: REQUIREMENTS FOR BIOCHAR PRODUCTION AND USE

1. REQUIREMENTS FOR BIOCHAR

The biochar must have an H/C_{org} ratio no greater than 0.7.

1.1. BIOCHAR PROPERTIES

Operators must undertake laboratory testing on each batch of biochar. Certification schemes should provide guidance on the list of properties that must be reported to certification bodies during recertification audits, which must at a minimum include all properties mentioned in this methodology.

Biochars must comply with all relevant provisions under REACH.

1.2. BIOCHAR SAMPLING

All production batches of biochar must be sampled. When samples are taken they must be representative of the average properties of the production batch being sampled. Operators must include a sampling plan for review by the certification body at the certification audit, and must follow this plan during activity operation or propose and have approved an amended sampling plan that gives at least equal assurance that sample data is representative of the batches. Sampling plans must be consistent with the requirements set by Article 33 of [the MRR], with the exception that the reference to Implementing Regulation (EU) 2018/2067 is not relevant in the case of biochar sampling.

The biochar to be sampled should be well-mixed, and an appropriate number of samples must be taken to enable the certification body to be confident that the data from the samples is representative of the production batch. If taking multiple samples demonstrates non-homogeneity of a batch, then the sampling protocols should require that additional samples are taken as required to develop a robust characterisation of the average properties of the production batch. When a production batch is produced over a period of time (in one or more production runs) either sampling must be undertaken after mixing of the biochar produced over the full production period, or else sampling may be undertaken on subsets of the batch and a sufficient number of samples must be taken to robustly establish the average properties of the biochar across the full production batch given the potential for variability and seasonality in biochar properties. A certification body or certification scheme may require analysis of retention samples if this is deemed necessary to establish a representative characterisation of a production batch, or to confirm that measurements taken are representative. If a certification body or certification scheme is not satisfied that an appropriate sampling regime has been implemented that ensures that the results of laboratory analysis are representative of the production batch, then units may not be issued in relation to that production batch.

Sampling plans may allow for a reduction in the frequency of sampling over time if it can be demonstrated to the satisfaction of the certification body that a process reliably produces biochar with consistent characteristics from a given feedstock. Certification schemes may choose to facilitate the agreement of appropriate sampling plans by providing additional guidance, which may differentiate the level of sampling required for different production contexts.

Certification schemes must facilitate consistent sampling by setting appropriate sampling requirements, for example by reference to relevant ISO standards. These requirements may differentiate between different types of biochar where that is technically justified.

1.2.1. Retention samples

The biochar producer must take retention samples of the biochar produced which must be made available on request to the certification body, certification scheme or relevant representatives of competent national authorities. One litre retention samples must be taken for each production batch every day that biochar is produced and may be aggregated across the calendar month for storage, keeping samples of each production batch separate. Retention samples should be stored for at least two years.

1.3. SUSTAINABILITY REQUIREMENTS FOR BIOCHAR PRODUCTION AND BIOMASS FEEDSTOCK

(i) The activity shall comply with the criteria set out in Appendix A to Annex 1 to Commission Delegated Regulation (EU) 2021/2139.

(ii) Any potential risks due to the activity to the good status or the good ecological potential of bodies of water, including surface water and groundwater, or to the good environmental status of marine waters from the researched technology, product or other solution shall be evaluated and addressed.

(iii) Any potential risks to the circular economy objectives from the activity shall be evaluated and addressed, by considering the types of potential significant harm as set out in Article 17(1), point (d), of Regulation (EU) 2020/852.

(iv) Any potential risks to generate a significant increase in the emissions of pollutants to air, water or land shall be evaluated and addressed.

(v) Any potential risks to the good condition or resilience of ecosystems or to the conservation status of habitats and species, including those of Union interest, shall be evaluated and addressed.

(vi) All biomass/biomass-derived fuel that is as a feedstock for biochar production by the activity and any additional biomass/biomass derived fuel consumed to produce energy for the activity shall comply with the sustainability requirements detailed in Article 29 of [the RED III], as further specified in the following subparagraphs:

a. Where the text of Article 29 of [the RED III] sets requirements that must be met in order for "biofuels, bioliquids and biomass fuels" to be "taken into account for the purposes referred to in points (a), (b) and (c) of the first subparagraph of paragraph 1 [of the RED III]", in the context of the CRCF these requirements shall be applied by the certification body also to biomass/biomass-derived fuel consumed in relation to an activity that seeks to generate carbon removal units, even if the activity does not generate renewable energy that is taken into account under the RED III.

b. All biomass/biomass-derived fuel used must be recorded by the operator in batches grouped by sustainability characteristics (feedstock; whether the biomass/biomass-derived fuel constitutes a waste or residue under the RED III; the GHG intensity assigned to the supply of the biomass/biomass-derived fuel).

c. The requirements of paragraph 10 of Article 29 apply only in the case of a capture activity taking place at a facility producing heat or electricity or a biofuel or biogas; in those cases the requirements must be satisfied in relation to that produced heat, electricity, biofuel or biogas.

d. In the case that the biomass/biomass-derived fuel is produced from wastes or residues other than agricultural, aquaculture, fisheries and forestry residues, it must meet only the greenhouse gas emissions saving criteria laid down in paragraph 10 of Article 29, where required by the subparagraph preceding this one. All other biomass/biomass derived fuels must meet the requirements of paragraphs 2 to 7 and 10 of Article 29.

Voluntary schemes approved by the Commission in relation to the provision of accurate data for the demonstration of compliance with requirements of [the RED III] (cf. Paragraph 4 of Article 30 of [the RED III]) shall be treated as providing accurate data in relation to the demonstration of compliance with these requirements.

(vii) If biomass is sourced from areas designated by the national competent authority for conservation or in habitats that are protected, the sourcing is in accordance with the conservation objectives for those areas.

(viii) In order to avoid unsustainable demand for biomass raw materials, any production batch of biochar in which the produced biochar accounts for [50%] or more of the total energy outputs in the co-products of the biochar production facility (see Equation [5]) may only be produced from waste or residual feedstocks as defined under [the RED III].

2. REQUIREMENTS FOR THE BIOCHAR PRODUCTION PROCESS

The biochar production process must:

1. Involve heating biomass to temperatures of at least 350 °C.
2. Be designed with the intention of fully capturing or destroying any methane produced with the biochar.
3. Deliver an energy conversion efficiency from feedstock to output co-products of at least [60%], i.e. must satisfy Inequality [23].

$$\left(E_{biochar} + \sum_{co-products} E_{co-products}\right) \Big/ \sum_{feedstocks} E_{feedstock} > [60\%] \qquad [23]$$

where:

$E_{biochar}$ = chemical energy in the biochar in MJ per kg of biochar produced, assessed by laboratory testing on a lower heating value basis;

$co - products$ = an index of the energy-containing co-products of the biochar production process. Only co-products that are exported from the facility, as opposed to being consumed on-site (e.g. for process energy) shall be considered. Co-products that are subject to further processing before export from the facility shall be included based on energy content prior to this additional processing. Co-products with

no heating value (e.g. ash) shall not be considered in the allocation calculation;

$E_{co-products}$ = in the case of material co-products, the chemical energy in each co-product in MJ per kg of biochar produced, assessed by laboratory testing on a lower heating value basis. In the case of electricity and heat as co-products, the amount of electricity or useful heat supplied to a grid, network or user outside the system boundary, where useful heat is defined as heat generated to satisfy an economical justifiable demand for heat, for heating and cooling purposes (cf. Paragraph 1 of Part C of Annex V to [the RED III]);

$E_{feedstock}$ = chemical energy in the utilised feedstock in MJ per kg of biochar produced on a lower heating value basis; this may be assessed by laboratory testing or based on standard energy density data for the feedstocks processed.

3. REQUIREMENTS FOR THE APPLICATION OF BIOCHAR TO SOILS

3.1. Eligible forms of soil application

CRCF units may be issued in relation to biochar that is demonstrated to have been:

- Either directly without first intermixing it with any other product, or after intermixing with a matrix consisting of soil and/or one or more additional soil amendment products permitted under [the fertilising products regulation]:
    - Applied to agricultural soils;
    - Intermixed into soil and used in landscaping, for daily cover at landfill sites or for filling holes, including disused mines and oil wells;
    - Applied to forest soils;
    - Applied to urban soils, including planting media used in flowerbeds or for urban tree planting and in public parks and public or private gardens, or in soil in greenhouses.

3.2. Application to soils

3.2.1. Agricultural, forest or urban soils

Activities that produce biochar that is applied to agricultural, forest or urban soils must demonstrate the following before carbon removal units may be awarded:

1. That the risk that the climate benefit of the BCR is offset by heat absorption due to albedo decreases must be reduced by either:
    a. Integrating the biochar into the soil at the point of application; or
    b. Demonstrating that the biochar will be integrated into the soil within four months of application by normal agricultural operations (e.g. tillage), and that the

biochar will have been integrated into the soil by the 1st of May in the relevant year; or

c. Integrating the biochar into some other applied matrix such as manure prior to the point of application in a volume ratio of no more than one part biochar to two parts of other material; or

d. Demonstrating that in the soil context in which the biochar is applied that surface application would not be expected to lead to a significant albedo reduction.

2. That the biochar complies with the limit values on heavy metals and organic contaminants stated in section 6(3.3).
3. That the biochar meets all requirements relating to 'pyrolysis and gasification materials' in Regulation (EU) 2019/1009 of the European Parliament and of the Council (the Fertilising Products Regulation), including the limitations on permissible input materials.

The biochar must also be demonstrated to comply with any relevant additional national or local requirements.

Where biochar is being applied to agricultural soils, it must be demonstrated that the local agricultural context has been considered and that it is reasonable to expect that the application of biochar will have no overall negative effect on agricultural production or soil health, and there should be no reason to believe that the application of biochar is expected to cause significant reductions in the storage of other soil organic carbon through 'positive priming' effects. If the certification body concludes that significant loss of other soil organic carbon is likely, or that deleterious impacts on agricultural productivity and/or soil health are likely, then it shall not issue carbon removal units in relation to that applied quantity. Certification schemes may choose to facilitate this assessment by providing certification bodies with additional guidance or requirements relating to the assessment of the impact of biochar use on agricultural productivity and/or ecosystem function. Certification schemes may seek to optimise the agricultural and/or ecological outcomes of biochar application by setting additional best practice requirements or soil health monitoring requirements on biochar application to soils.

3.2.2. Landscaping, landfill and hole filling

Activities that produce biochar that is used for landscaping, landfill or hole filling must intermix the biochar with at least one other material prior to application and must be able to demonstrate that the intermixture cannot self-sustain combustion. Biochar used in these applications must comply with the limit values on heavy metals and organic contaminants stated in section 6(3.3), and must comply with any relevant EU, national or regional legislation in relation to the type of application.

3.3. Limit values on heavy metals and organic contaminants for biochar applied to soil

The biochar must be demonstrated by lab analysis to have no more than the listed concentrations of the following substances in units of grammes per tonne dry matter (g/t dm):

- Lead; 120 g/t dm;
- Cadmium; 1.5 g/t dm

- Copper; 100 g/t dm
- Nickel; 50 g/t dm
- Mercury; 1 g/t dm
- Zinc; 400 g/t dm
- Chromium; 90 g/t dm
- Arsenic; 13 g/t dm
- PAH_{16}[3]; 6 g/t dm
- PAH_8[4]; 1 g/t dm
- Benzo[e]pyrene; 1 g/t dm
- Benzo[j]fluoranthene; 1 g/t dm
- PCB 0.2 g/t dm
- PCDD/F 0.000020 g/t dm

The biochar must also be demonstrated to comply with any relevant additional national or local requirements.

3.4. Requirements for biochar incorporated into a matrix prior to soil application

Biochar may be applied to the land either directly without being intermixed with any other material, after incorporation into a mixed soil amendment, or in the manure of livestock animals that have been fed the biochar as a feed additive. Mixed soil amendments may consist of a combination of biochar with any combination of materials permitted to be applied to the soil under the terms of [the fertilising products regulation], which include manure, compost, liquid fertiliser and anaerobic digestate.

3.4.1. Biochar used in livestock feed

If biochar is applied to soils in the form of manure after use as a livestock feed additive then the biochar utilised must additionally meet the following requirements:

1. The biochar feedstock must consist only of pure plant biomass;
2. The feed hygiene requirements of [Regulation 183/2005] must be satisfied;
3. The H/C_{org} ratio of the biochar shall be no greater than 0.4;
4. The biochar must be demonstrated by lab analysis to have no more than the listed concentrations of the following substances in units of grammes per tonne on an 88% dry matter basis (g/t 88% dm):
    a. Lead; 10 g/t 88% dm;

[3] Sum of naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo[a]anthracene, chrysene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, indeno[1,2,3-cd]pyrene, dibenzo[a,h]anthracene and benzo[ghi]perylene.

[4] A subset of PAH_{16} being the sum of benzo[a]pyrene, benzo[a]anthracene, chrysene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenzo[a,h]anthracene, indeno[1,2,3-cd]pyrene and benzo[ghi]perylene.

b. Cadmium; 0.8 g/t 88% dm;
c. Mercury; 0.1 g/t 88% dm;
d. Arsenic; 2 g/t 88% dm;
e. PCDD/F; 0.75 µg TE/t 88% dm;
f. PCDD/F + dl-PCB; 0.35 µg TE/t 88% dm;
g. Sum 6 of DIN PCB; 10 µg TE/t 88% dm;
h. Fluor; 150 g/t 88% dm.

Operators must demonstrate to the certification body that all manure produced by the animals receiving the biochar adulterated feed product will either be naturally applied to soils by the animal in situ, or else will be collected and applied to the soil. Operators may assume that the permanent fraction F_{perm} of the biochar is unaffected by its use in livestock feed.

4. REQUIREMENTS FOR THE INCORPORATION OF BIOCHAR IN PRODUCTS

Carbon removal units may be issued for projects that incorporate biochar in:

- Cement
- Concrete
- Asphalt

4.1. Limit values on heavy metals and organic contaminants for biochar applied to soil

The biochar must be demonstrated by lab analysis to have no more than the listed concentrations of the following substances in units of grammes per tonne dry matter (g/t dm):

- PAH_8[5]; 4 g/t dm
- Benzo[e]pyrene; 1 g/t dm
- Benzo[j]fluoranthene; 1 g/t dm
- PCB 0.2 g/t dm
- PCDD/F 0.000020 g/t dm

The biochar must also be demonstrated to comply with any relevant additional national or local requirements.

[5] A subset of PAH_{16} being the sum of benzo[a]pyrene, benzo[a]anthracene, chrysene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenzo[a,h]anthracene, indeno[1,2,3-cd]pyrene and benzo[ghi]perylene.

SECTION 7: INFORMATION TO BE INCLUDED IN THE CERTIFICATE OF COMPLIANCE

The certificate of compliance for activities certified under the biochar specifications shall include the information listed below. At an initial certification audit this information should reflect expectations for the first certification period. At re-certifications this information should reflect the actual recorded outcomes of the preceding certification period. All information included in the certificate of compliance must be checked by the certification body.

Certification schemes may choose to facilitate the market for biochar by specifying additional market-relevant information to be reported and disclosed for each batch of biochar (for example properties of the biochar that are agriculturally relevant but do not affect the calculation of net carbon removals) but this information will not be included on the certificate of compliance.

(a) The name of the activity and whether it stores biochar by application to soils, incorporation in products or both. The name and contact details of the operator or group of operators responsible for the activity. The practices and processes involved in the activity, which shall include:

- The technology utilised by the production facility;
- The target production temperature of the biochar kiln/gasifier;
- For pyrolysis facilities, whether a fast or slow pyrolysis process is used;
- Which co-products (e.g. pyrolysis liquid, pyrolysis gas, syngas, electricity, heat) are exported from the facility.
- the biomass feedstock or feedstock mix consumed (including % contribution of each feedstock to the resulting CO_2 stream), disaggregating feedstock to the level required in RED III reporting. Operators must also include explicit identification of:
    - The fraction of the feedstock that comes from saw logs for which no temporary carbon removal units have been cancelled;
    - The fraction of the feedstock that comes from saw logs for which temporary carbon removal units have been cancelled;
    - The fraction of the feedstock that comes from veneer logs for which no temporary carbon removal units have been cancelled;
    - The fraction of the feedstock that comes from veneer logs for which temporary carbon removal units have been cancelled;
    - The fraction of the feedstock that is identified as wastes and residues under the RED III;
    - The fraction that comes from mixed material that may include industrial grade roundwood, stumps and roots;

- The fraction that comes from material that can be verified as not including saw logs, veneer logs, industrial grade roundwood, stumps and roots.

Note that these fractions may not be mutually exclusive.

(b) The location of the activity, including geographically explicit location of the activity boundaries, respecting 1:5000 mapping scale requirements for the Member State.

(c) The duration of the activity period, including start date and end date.

(d) The name of the certification scheme.

(e) The name, address and logo of the certification body.

(f) The unique number or code of the certificate of compliance issued by the certification scheme.

(g) The place, date of issuance and validity period of the certificate of compliance. For a certification audit the validity period is the first 12 month certification period. For a re-certification audit the validity period is the preceding 12 month certification period, plus the subsequent 12 month certification period if the activity period has not yet ended.

(h) Reference to the applicable certification methodology operated by the certification scheme;

(i) The permanent net carbon removal benefit in tonnes CO_2e, as specified in section 4(1).

(j) The carbon removals under the baseline in tonnes CO_2, $CR_{baseline}$, as specified in section 4(1).

(k) The total carbon removals CR_{total} in tonnes CO_2, as specified in section 4(1).

(l) The increase in direct and indirect emissions $GHG_{associated}$ in tonnes CO_2e, as specified in section 4(1). This shall be accompanied by a breakdown of the term $GHG_{associated}$ into the terms $GHG_{capture}$, $GHG_{transport}$ and $GHG_{storage}$, with each of these three terms further disaggregated to identify:

- The contribution of each greenhouse gas (CO_2, CH_4, N_2O, other)
- What fraction of the emissions the operator believes to have been reported under the EU ETS/ETS2. In the absence of evidence to the contrary, the operator may assume that emissions in the terms $GHG_{transport}$, $GHG_{electricity}$, GHG_{heat}, $GHG_{capital}$, $GHG_{storage}$ are reported under the ETS, and that emissions under the terms GHG_{bio} $GHG_{bio\text{-}storage}$, $CH_{4_{release}}$ and $GHG_{combustion}$ have not been reported under the ETS. Emissions under the term GHG_{inputs} should be considered based on the operators understanding of where the inputs were produced and whether the relevant industry falls under the scope of the EU ETS.

(m) The duration of the monitoring period of the activity.

(n) The sustainability co-benefits delivered and the quantity of carbon removal units delivering each co-benefit.

(o) The amount of biomass used and confirmation of the voluntary scheme or other assurance basis used prove of compliance with the minimum sustainability requirements.

(p) A reference to any other international or national certification of the activity, including the unique certification number or code.

(q) The quantity and validity of certified units.

(r) An identification of the major uncertainties in the calculation of permanent carbon removal benefit and indicating measures taken to ensure that the permanent carbon removal is calculated conservatively.

(s) An identification of the major uncertainties in the calculation of permanent carbon removal benefit and a short description of measures taken to ensure that the permanent carbon removal is calculated conservatively;

(t) Acknowledgement and description of any state aid received by the project.

(u) The quantity, if any, of biochar that is produced in association with the activity and that is stored with recognition outside the CRCF framework (e.g. biochar carbon removal certified under CORSIA).

SECTION 8: INFORMATION TO BE INCLUDED IN THE ACTIVITY PLAN

Prior to the initial certification audit the operator must submit an activity plan to the certification body. The activity plan must include a detailed description of the activity, including its location and operator and start and final dates of the activity. The description must include details of the activity's compliance with these specifications.

In particular, the activity plan must include:

1. The information required for the Certificate of Compliance.
2. A general description of the project and the technologies to be utilised.
3. Details of all entities other than the operator that will be involved in delivery of the activity.
4. Identify and demonstrate compliance of the project with all and any relevant local, regional and national laws, statutes and regulatory frameworks.
5. A list of emissions sources and sinks that are considered relevant to the activity.
6. An explanation of how the activity will ensure compliance with the sustainability requirements.
7. A description of the required assessment of uncertainty.
8. A statement of commitment to compliance with the CRCF requirements on double counting.
9. The monitoring plan.
10. Any other information required by the certification scheme.