



Puro.earth Certification Framework

Puro CRCF Program

CRCF BioCCS and DACCS

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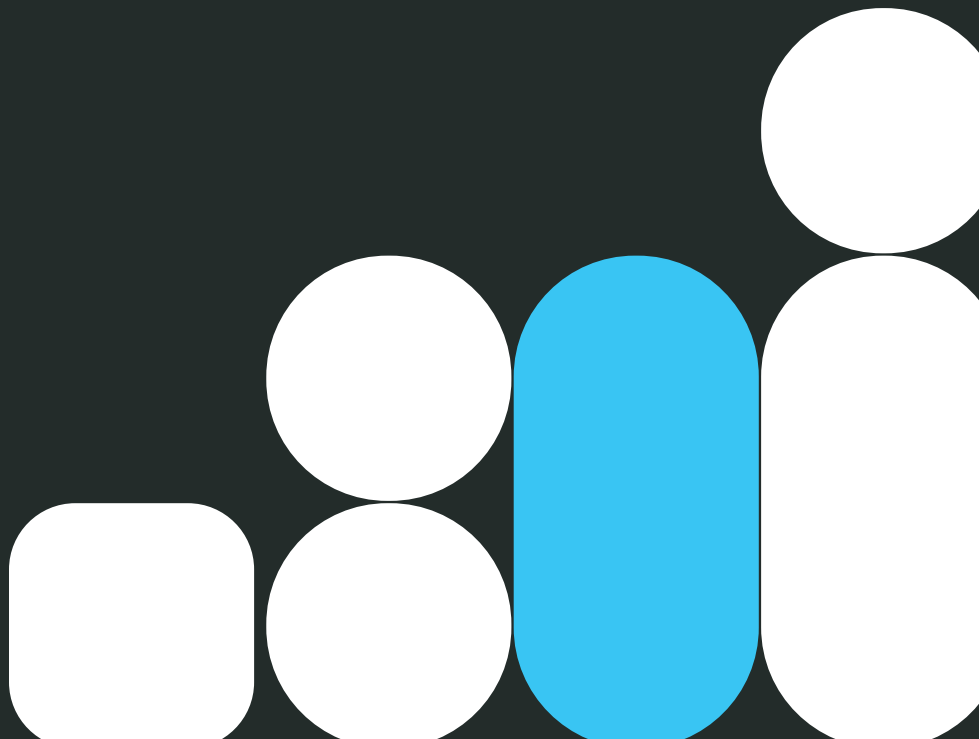


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Glossary

Associated GHG emissions – the increase in direct and indirect greenhouse gas emissions over the entire lifecycle of the activity which are attributable to its implementation;

Atmospheric CO₂ – CO₂ well mixed in the free atmosphere at ambient air temperature, where the concentration of CO₂ is not affected by local point sources but may vary because of regional anthropogenic and natural emission sources.

Biogenic emissions capture with carbon storage (BioCCS) activity – An activity resulting in a process of capturing biogenic CO₂, followed by transport and permanent storage of that biogenic CO₂ by injection at a geological storage site for which a valid permit exists in accordance with Article 8 of Directive 2009/31/EC.

Biogenic CO₂ – CO₂ produced from a source of biomass, biofuel, bioliquid or biomass fuel by a chemical or biological process acting on the carbon atoms therein, including combustion, oxidation, anaerobic digestion and fermentation.

Capital emissions – The emissions associated with the construction of facilities and equipment associated with an activity;

Captured CO₂ – CO₂ captured and concentrated from a point source of CO₂ or from the atmosphere;

Capture facility – A facility that captures CO₂ from the atmosphere or from a biogenic-CO₂ containing stream and conditions it to a form that is ready to be transported or stored, including in terms of CO₂ purity and pressure;

Certification period – The period between a re-certification audit of an activity and the most recent preceding certification audit or re-certification audit of that activity;

CO₂ fugitives – Any irregular or unintended CO₂ emissions from sources that are not localised, or are too diverse or not substantial enough to be monitored individually;

CO₂ venting – An intentional release of CO₂ occurring for operational or safety reasons;

Direct air capture with carbon storage (DACCS) activity – An activity resulting in a process that captures atmospheric CO₂ from ambient air, followed by transport and permanent storage of that atmospheric CO₂ by injection at a geological storage site for which a valid permit exists in accordance with Article 8 of Directive 2009/31/EC.

Exit point – A point at which CO₂ is transferred out of the capture facility for the purpose of either transport or storage, which excludes any smokestack, flue or other outlet at the capture facility from which CO₂ is released into the atmosphere;

Fossil CO₂ – CO₂ generated from fossil carbon, which is inorganic and organic carbon that is not zero-rated carbon under Implementing Regulation (EU) 2018/2066;

Permanent geological storage – Storage of CO₂ at a geological storage site permitted under Directive 2009/31/EC;

Point source of CO₂ – A natural or anthropogenic source of gases that has a CO₂ concentration higher than that in the free atmosphere due to the generation of CO₂ by an oxidation process or other chemical process or the release of CO₂ from some form of storage or containment;

Union – The European Union as established by the Treaty on European Union.

Useful heat – Heat generated to satisfy an economically justifiable demand for heat, for heating or cooling purposes

Note to the reader

REMARK: This methodology provides general information as well as actual requirements that must be met by all projects seeking certification under the **Puro CRCF Program** and related BioCCS and DACCS methodology. Across the entire methodology, the requirements correspond to numbered rules with formatting conforming to the example below.

0.0.1 This is an example of a numbered rule. The requirements set within numbered rules must be followed by all projects seeking certification under this methodology.

Please note that in addition to the requirements of this methodology document, all projects seeking certification under the **Puro CRCF Program** must also comply with the **Puro Certification Procedures**, the **Puro CRCF Program Annex**, and where applicable the **Puro Common Criteria**. Projects must also comply with any applicable local laws, regulations, and other binding obligations.

Access to all **Puro CRCF Program** documents is available in the [Puro Document Library](#).

Introduction

This document sets the requirements for certification of permanent carbon removals generated by biogenic emissions capture with carbon storage (BioCCS) and direct air capture with carbon storage (DACCS) activities under the EU Carbon Removal and Carbon Farming (CRCF) framework as implemented by Puro.earth. This methodology shall be read together with the *Puro Certification Procedures*, the *Puro CRCF Program Annex*, and where applicable the *Puro Common Criteria*.

For activities certified under this Methodology, the Common Criteria apply only where expressly referenced in this Methodology or in the CRCF Program Annex, and only to the extent and in the manner specified by that reference. The Common Criteria provide supporting documentation, evidence, monitoring, reporting, and conformity-assessment requirements; they do not modify the eligibility, quantification, permanence, monitoring-period, sustainability, or other methodology-specific requirements set out in this Methodology.

In the event of inconsistency between this Methodology and the Common Criteria, this Methodology shall prevail.

This methodology is derived from the following EU normative documents:

- A. [Regulation \(EU/ 2024/3012\)](#) of the European Parliament and of the Council of 27 November 2024, establishing a Union certification framework for permanent carbon removals, carbon farming and carbon storage in products
- B. [Commission Implementing Regulation \(EU\) 2025/2358](#) of 20 November 2025 laying down rules on certification schemes, certification bodies, and audits under Regulation (EU) 2024/3012 of the European Parliament and of the Council
- C. [Commission Delegated Regulation \(EU\) 2026/285](#) of 3 February 2026 supplementing Regulation (EU) 2024/3012 of the European Parliament and of the Council by establishing the certification methodologies for permanent carbon removals activities

1. Description of the carbon removal activity

1.1. Eligibility

General eligibility

- 1.1.1. A DACCS activity shall comply with the following requirements:
- (a) the eligibility criteria laid down in rules 1.1.6 and 1.1.7;
 - (b) the activity and monitoring periods laid down in Section 1.2;
 - (c) the rules for identifying the carbon removal sinks and GHG emission sources laid down in Section 2.1;
 - (d) the rules for calculating the baseline laid down in Section 2.2;
 - (e) the rules for calculating the total carbon removals, laid down in Section 2.3;
 - (f) the rules for calculating the greenhouse gas associated, laid down in Section 2.4;
 - (g) the rules on long-term storage and liability, laid down in Section 3;
 - (h) the rules on the minimum sustainability requirements laid down in Section 4.1;
 - (i) the rules on the monitoring and reporting requirements laid down in Section 1.3.
- 1.1.2. The operator of a DACCS activity shall ensure that the facility capturing the CO₂ is located in the Union.
- 1.1.3. A BioCCS activity shall comply with the following requirements:
- (a) the eligibility criteria laid down in rules 1.1.6 and 1.1.7;
 - (b) the activity and monitoring periods laid down in Section 1.2;
 - (c) the rules for identifying the carbon removal sinks and GHG emission sources laid down in Section 2.1;
 - (d) the rules for calculating the baseline laid down in Section 2.2;
 - (e) the rules for calculating the total carbon removals laid down in Section 2.3;
 - (f) the rules for calculating the greenhouse gas associated laid down in Section 2.4;
 - (g) the rules on long-term storage and liability laid down in Section 3;
 - (h) the rules on the minimum sustainability requirements laid down in Section 4.1;
 - (i) the rules on monitoring and reporting requirements laid down in Section 1.3.
- 1.1.4. The biogenic CO₂ captured in a BioCCS activity shall be generated as a by-product of production processes of goods, energy and services and shall not generate biogenic CO₂ from biomass, biofuel, bioliquid or biomass fuel solely for the purpose of capture and storage.
- 1.1.5. The operator of a BioCCS activity shall ensure that the facility capturing the CO₂ is located in the Union.
- 1.1.6. Only the capture facilities may be operators of DACCS or BioCCS activities.

- 1.1.7. DACCS and BioCCS activities may transfer all or part of the captured CO₂ to storage sites for permanent storage to generate permanent carbon removal units. If part of the captured CO₂ is transferred for utilisation or is transferred for storage but recognised under an alternative framework, no permanent carbon removal units will be generated in respect of that fraction of the CO₂.

1.2. Activity period, monitoring period and certification period

Activity period

- 1.2.1. The duration of any activity period for DACCS and BioCCS activities shall not exceed 15 years. At the end of every activity period operators may start a new activity period by submitting a new activity plan.

Monitoring period

- 1.2.2. The monitoring period for DACCS and BioCCS activities shall be the period up until the point at which responsibility for all geological storage sites utilised by the activity has been transferred to the relevant competent national authorities in accordance with Article 18 of Directive 2009/31/EC of the European Parliament and of the Council¹.

Certification period

- 1.2.3. The duration of the certification period for DACCS and BioCCS activities shall not exceed 1 year.
- 1.2.4. Where it is not possible to precisely identify the period in time during which CO₂ captured during a given certification period physically enters permanent storage, operators may estimate emissions associated with transport and storage based on data recorded during the certification period without including in the calculation a temporal delay between the time at which the CO₂ was captured and the time at which it is injected, by assessing the average associated emissions (including fugitive emissions, leakage or venting) during transport and storage of CO₂ per tonne of CO₂ handled during the certification period.

1.3. Planning and reporting

Activity plan

- 1.3.1. Before the certification audit, the operator shall submit to the certification body an activity plan that includes the information necessary to assess compliance with the requirements of this methodology, as further detailed in rule 1.3.3.
- 1.3.2. Where an operator wishes to change the activity plan during the activity period, that operator shall submit a rationale behind the changes to the certification bodies without delay and shall include any adjustment to the initial plan, in particular the recalculation of the expected greenhouse gas (GHG) emissions and removals and impacts on sustainability requirements.
- 1.3.3. The activity plan shall include:
- (a) a general description of the activity, the technologies and the infrastructure to be utilised, including georeferenced boundaries of the activity such as the location of said infrastructure;

¹ Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006 ([OJ L 140](#) 5.6.2009, p. 114).

- (b) details of all entities of the carbon removal value chain involved in delivery of the activity, including legal ownership and contact information of the operator;
- (c) identification and demonstration of compliance of the activity with any relevant local, regional and national laws, statutes and regulatory frameworks;
- (d) a list of emission sources and sinks that are relevant to the activity, in accordance with Section 2.1;
- (e) estimates of total carbon removals and GHG associated emissions of the activity for the activity period, in accordance with points (k), (l) and (m) of Annex II to Regulation (EU) 2024/3012 of the European Parliament and of the Council², as well as the expected net carbon removal benefit generated by the activity calculated from these estimates;
- (f) a description of any materiality assessment undertaken in accordance with Section 2.9;
- (g) a description of the assessment of uncertainty, in accordance with Section 2.14;
- (h) proof of compliance with the minimum sustainability requirements, in accordance with Section 4.1;
- (i) funding sources received or applied for with regard to the activity, in accordance with Section 2.2;
- (j) any other information necessary for the certification body to conduct the certification audit in accordance with Article 9 of Regulation (EU) 2024/3012;
- (k) the start date of the activity;
- (l) information on the operator's previous involvement with other certification schemes, where required under Article 8(1) of Regulation (EU) 2024/3012.

1.3.4. The activity plan shall be prepared using the applicable *Puro.earth Project Activity Description template*, and in line with the *Puro.earth Common Criteria 1.1. Project Activity Description*.

Monitoring plan

- 1.3.5. Before the certification audit, operators shall submit a monitoring plan to the certification body. That monitoring plan shall comply with the following criteria:
- (a) it shall include a description of the activity to be monitored, covering all emission sources and sinks that are relevant to the activity in accordance with Section 2.1;
 - (b) it shall include a description of the procedure for managing the assignment of responsibilities for monitoring and reporting, and for managing the competences of responsible personnel;
 - (c) it shall include, where applicable, the default values used for calculation factors indicating the source of the factor, or the relevant source, from which the default factor will be retrieved periodically;

² Regulation (EU) 2024/3012 of the European Parliament and of the Council of 27 November 2024 establishing a Union certification framework for permanent carbon removals, carbon farming and carbon storage in products ([OJ L, 2024/3012](#), 6.12.2024)

- (d) it shall include, where applicable, a list of laboratories engaged in carrying out relevant analytical procedures;
 - (e) it shall include, where measurements are taken, a description of the measurement method including descriptions of all written procedures relevant for the measurement;
 - (f) it shall include, where applicable, a detailed description of the monitoring methodology where transfer of CO₂ is carried out, including a description of continuous measurement systems used and of procedures for preventing, detecting and quantification of leakage events from CO₂ transport infrastructure;
 - (g) it shall apply, where applicable, the minimum frequencies for analysis listed in Annex VII to Commission Implementing Regulation (EU) 2018/2066³;
 - (h) it shall apply the standard for quality assurance laid down in Article 60 of Implementing Regulation (EU) 2018/2066;
 - (i) it shall include a record keeping requirement for all relevant data and information consistent with the record keeping requirements laid down in Article 67(1) of Implementing Regulation (EU) 2018/2066.
- 1.3.6. In the case that it is not possible to fully detail the monitoring plan when an operator applies for certification, the monitoring plan shall be submitted as completely as possible, clearly indicating any non-final aspects and providing an indication of how the operator expects these aspects to be addressed.
- (a) The activity may be certified on this basis provided the certification body accepts that the omissions are properly justified.
 - (b) The monitoring plan shall be finalised and presented to the certification body prior to the first re-certification.
- 1.3.7. 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, and, when requested, report this information to the certification bodies or certification schemes.
- 1.3.8. Each parameter monitored shall be accompanied with the following information:
- (a) entity responsible for collection and archiving;
 - (b) data source;
 - (c) equipment, measurement methods and procedures used for monitoring, including details on accuracy and calibration;
 - (d) monitoring frequency;
 - (e) quality assessment and quality check procedures.
- 1.3.9. All measurements shall be conducted with calibrated measurement equipment according to industry standards, following the requirements in Articles 42 of Implementing Regulation (EU) 2018/2066, and any necessary data aggregation shall be undertaken following the requirements in Article 44 of that Implementing Regulation (EU) 2018/2066.

³ 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 and amending Commission Regulation (EU) No 601/2012 ([OJ L 334](#) 31.12.2018, p. 1).

- 1.3.10. The Monitoring Plan shall be prepared using the applicable *Puro.earth Monitoring Plan template*, and in line with the *Puro.earth Common Criteria 1.2. Monitoring Plan*.

Monitoring report

- 1.3.11. Before each re-certification audit, the operator shall submit to the certification body a monitoring report including the net carbon removal benefit, the total amount of gross carbon removal generated by the activity, the amount of greenhouse gases associated to the activity and all the necessary information relating to the quantification of the net carbon removal benefit and any relevant information on the compliance of the activity with storage, liability and sustainability requirements. In particular, the monitoring report shall include the following:
- (a) all the parameters specified in rules 2.5.11 (DACCS), 2.6.16 (BioCCS), 2.7.17 and 2.8.12, measured and calculated for the quantification of carbon removals and GHG emissions associated with the activity.
 - (i) All removals and emissions of CO₂ and emissions of other GHGs shall be assessed over the certification period that is to be audited and reported in the monitoring report.
 - (ii) Emissions of GHGs other than CO₂ shall be converted to tonnes of CO₂eq by use of the 100-year Global Warming Potentials set out in Annex I to Commission Delegated Regulation (EU) 2020/1044⁴;
 - (b) the biomass feedstock or feedstock mix consumed as required under rule 4.2.1(b);
 - (c) the quantity of carbon farming sequestration units that have been purchased in accordance with rule 4.3.5;
 - (d) financing received or applied for with regard to the activity, in accordance with Section 2.2.
- 1.3.12. The Monitoring Report shall be prepared using the applicable Puro.earth Monitoring report template, and in line with the *Puro.earth Common Criteria 1.3. Monitoring Report*.

⁴ Commission Delegated Regulation (EU) 2020/1044 of 8 May 2020 supplementing Regulation (EU) 2018/1999 of the European Parliament and of the Council with regard to values for global warming potentials and the inventory guidelines and with regard to the Union inventory system and repealing Commission Delegated Regulation ([OJ L 230](#) 17.07.2020, p.1).

2. Quantification of Baseline, Total Carbon Removal and associated GHG emissions

2.1. DACCS and BioCCS activities

GHG sources and sinks

2.1.1. DACCS or BioCCS activities shall consider the GHG sources and sinks included in Table 1.

TABLE 1: SINKS AND SOURCES THAT SHALL BE INCLUDED FOR DACCS AND BIOCCS ACTIVITIES

Phase of the activity	Emission sources and sinks	Gases included
CO ₂ capture	Capture facility: Operation of equipment used to capture CO ₂ from the ambient air or from biogenic emissions, including equipment used to generate airflow, and equipment associated with regeneration processes to recover the fluids or other media used in the carbon capture process.	Greenhouse gases
	Capture facility: Any CO ₂ conditioning equipment used to further process the CO ₂ stream before transfer to transport or storage infrastructure.	Greenhouse gases
	Capture facility: Any associated energy generation equipment powering the capture process that is under the control of the operator of the capture facility.	Greenhouse gases
	Capture facility: Any treatment equipment for processing wastes or byproducts of the carbon capture process.	Greenhouse gases
	Capture facility: Fuel combustion, electricity consumption, heat consumption.	Greenhouse gases
	Biomass supply: Emissions associated with additional biomass, biofuels, bioliquids and biomass fuels consumed for the operation of the capture facility (e.g. emissions for the harvest or transport of biomass).	Greenhouse gases
	Input emissions: Production and supply of inputs used by the capture facility.	Greenhouse gases
	Waste treatment: Processing and treatment of any wastes (including wastewater and exhaust gases) generated by the capture facility.	Greenhouse gases
	Capital emissions: Emissions associated with the construction and installation of the capture facility.	Greenhouse gases
Transport of CO ₂	Transportation: Fuel consumption and electricity consumption of road and rail transportation, maritime transportation and other vehicles.	Greenhouse gases
	Infrastructure: Fuel consumption, electricity consumption and heat consumption in infrastructure	Greenhouse gases

	and buildings functionally connected to the pipeline transport network (e.g. booster/compressor stations, heaters, CO ₂ hubs, intermediate storage).	
	Losses: CO ₂ fugitive, vented, and leakage emissions from the transport network.	CO ₂ only
Injection at the geological storage site	Storage site: Removal by CO ₂ injection.	CO ₂ only
	Storage site: Fuel consumption, electricity consumption, heat consumption.	Greenhouse gases
	Losses: CO ₂ fugitive and vented emissions from injection and from the storage site prior to entering permanent geological storage.	CO ₂ only
	Input emissions: Production and supply of any inputs used by the storage site.	Greenhouse gases
	Waste treatment: Processing and treatment of any wastes (including wastewater and exhaust gases) generated by the storage site.	Greenhouse gases
	Capital emissions: Emissions associated with the construction and installation of the storage site.	Greenhouse gases

2.2. Baseline

- 2.2.1. A standardised baseline set to 0 tonnes of CO₂ per year [tCO₂/year] shall apply for DACCS and BioCCS activities.
- 2.2.2. Where the activity is financed through a combination of public and private funding when submitting the activity plan to the certification scheme, operators shall indicate any form of public financing received or applied for with regard to the activity. This information shall be included in the certificate of compliance.

2.3. Quantification of the total removals of the activity

- 2.3.1. Operators may use one of two approaches for the calculation of the total carbon removal (CR_{total}), either the approach specified in rule 2.3.12 or 2.3.13, depending on whether the CO₂ captured by the activity would be kept fully segregated from CO₂ from other sources through the transport infrastructure and at the storage site.

Identification of captured CO₂ streams

- 2.3.2. A capture facility may capture CO₂ that is:
 - (a) solely atmospheric or biogenic CO₂;
 - (b) a combination of biogenic CO₂ and fossil CO₂ from a mixed CO₂ stream;
 - (c) fossil CO₂ captured from a process associated with the capture process.
- 2.3.3. The fractions of CO₂ captured by the activity shall be given the designations defined in rules 2.3.4–2.3.10.
- 2.3.4. The total amount of CO₂ captured at the capture facility and transferred for transport or storage shall be designated CO_{2,captured,total} and calculated in accordance with equation (1).
 - (a) Any leakage of CO₂ occurring between the point of capture and the point of leaving the capture facility is implicitly excluded from the term CO_{2,captured,total}.

$$CO_{2\text{captured,total}} = \sum_i CO_{2\text{OUT,activity},i} \tag{1}$$

Variable	Description
$CO_{2\text{OUT,activity},i}$	minus the amount of CO_2 from the capture activity leaving the capture facility at each exit point i , which shall be measured.

2.3.5. The amount of atmospheric or biogenic CO_2 that is captured at the capture facility and is transferred for transport or storage shall be designated $CO_{2\text{captured,atmobio}}$ and shall be calculated in accordance with equation (2).

$$CO_{2\text{captured,atmobio}} = CO_{2\text{captured,total}} - CO_{2\text{captured,fossil}} \tag{2}$$

Variable	Description
$CO_{2\text{captured,total}}$	as defined in equation (1);
$CO_{2\text{captured,fossil}}$	as defined in equation (3).

2.3.6. Where fossil CO_2 is emitted as a result of the capture process it may be captured,⁵ either separately from the capture of CO_2 of atmospheric or biogenic origin (“separate capture”) or simultaneously with the capture of CO_2 of atmospheric or biogenic origin (“co-capture”).

- (a) If fossil CO_2 is then permanently stored it may be excluded from the calculation of $GHG_{\text{associated}}$.
- (b) For BioCCS activities only it is also permissible to capture CO_2 from a mixed stream consisting of a combination of biogenic CO_2 and fossil CO_2 (see also rule 2.3.9).
- (c) Fossil CO_2 captured from the capture process is associated with the activity, and emissions from transporting and storing that CO_2 shall be included in $GHG_{\text{associated}}$.
- (d) Fossil CO_2 captured from a mixed stream by a BioCCS activity is not associated with the activity, and emissions from transporting and storing that CO_2 shall not be included in $GHG_{\text{associated}}$.

2.3.7. The amount of fossil CO_2 that is captured at the capture facility shall be calculated in accordance with equation (3).

$$CO_{2\text{captured,fossil}} = CO_{2\text{captured,fossil,assoc}} + CO_{2\text{captured,fossil,mixed}} \tag{3}$$

Variable	Description
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⁵ In some activities, fossil CO_2 will be captured alongside CO_2 of atmospheric or biogenic origin.

$CO_{2\text{captured,fossil,assoc}}$ minus the amount of fossil CO_2 emitted as a result of the capture process that is captured, calculated using equation (4);

$CO_{2\text{captured,fossil,mixed}}$ minus the amount of fossil CO_2 captured from a mixed stream as part of a BioCCS activity, calculated using equation (5).

2.3.8. The amount of CO_2 emitted as a result of the capture process that is captured, $CO_{2\text{captured,fossil,assoc}}$, shall be determined in accordance with equation (4) as the sum of the separately captured and co-captured components.

$$CO_{2\text{captured,fossil,assoc}} = CO_{2\text{fossil,assoc,co-captured}} + \sum_{\text{sources}} CO_{2\text{fossil,assoc,source}} \quad (4)$$

Variable	Description
$CO_{2\text{fossil,assoc,co-captured}}$	minus the amount of CO_2 emitted as a result of the capture process that is co-captured with the atmospheric or biogenic CO_2 . The certification body shall confirm this amount is not more than the fossil CO_2 emissions at the capture facility reported in the calculation of $GHG_{\text{associated}}$
$CO_{2\text{fossil,assoc,source}}$	minus the measured amount of CO_2 from a source emitted as a result of the capture process that is captured separately from the capture of CO_2 of atmospheric or biogenic origin;
sources	an index of the point sources from which fossil CO_2 from processes associated with the activity is separately captured.

2.3.9. The amount of fossil CO_2 that is captured from a mixed stream as part of a BioCCS activity shall be calculated in accordance with equation (5).

$$CO_{2\text{captured,fossil,mixed}} = (1 - F_B) * (CO_{2\text{captured,total}} - CO_{2\text{captured,fossil,assoc}}) \quad (5)$$

Variable	Description
F_B	the fraction of captured CO_2 from a mixed stream that is of biogenic origin. This shall be calculated in accordance with Article 39 of Implementing Regulation (EU) 2018/2066. See rule 2.6.2 and 2.6.3;
$CO_{2\text{captured,total}}$	as defined in equation (1);
$CO_{2\text{captured,fossil,assoc}}$	as defined in equation (4).

2.3.10. The amount of captured CO₂ for which transport or storage emissions shall be counted towards the term GHG_{associated} shall be designated CO_{2,activity} and shall be calculated in accordance with equation (6) as the sum of the atmospheric or biogenic CO₂ captured by the activity and transferred for permanent storage to be counted towards total carbon removals and the associated share of the amount of fossil CO₂ captured at the capture facility from processes that are specifically associated with the activity.

$$CO_{2,activity} = F_{CRCF} * (CO_{2,captured,atmobio} + CO_{2,captured,fossil,assoc}) \tag{6}$$

Variable	Description
F _{CRCF}	as defined in rule 2.3.11;
CO _{2,captured,atmobio}	as defined in equation (2);
CO _{2,captured,fossil,assoc}	as defined in equation (4).

Fraction of captured CO₂ to be counted towards the total carbon removal

2.3.11. An operator may choose to dispatch some fraction of the captured CO₂ of atmospheric or biogenic origin for purposes other than storage at an eligible site, or may choose to count part of the CO₂ that is permanently stored under a scheme other than the Regulation (EU) 2024/3012.

- (a) The operator shall designate the fraction of the captured CO₂ of atmospheric or biogenic origin that shall be counted towards the total carbon removal as F_{CRCF}, which shall be 1 in the case that all of the captured CO₂ of atmospheric or biogenic origin shall be transferred to permanent storage and generate permanent carbon removal units.

Segregated CO₂ stream

2.3.12. If all of CO_{2,captured,total} is sent for storage and this CO₂ is at all times segregated from CO₂ from other sources during transit in the transport infrastructure and during storage and injection at the storage sites, CR_{total} shall be measured as the quantity of CO₂ entering storage, adjusted where necessary to exclude any CO₂ in the segregated stream that is not atmospheric or biogenic in accordance with equation (7).

$$CR_{total} = F_C * F_{CRCF} * \left(\frac{CO_{2,captured,atmobio}}{CO_{2,captured,total}} * \sum_S CO_{2,injected,S} \right) \tag{7}$$

Variable	Description
CO _{2,injected,S}	minus the amount of CO ₂ (of all origins) from the segregated stream that is injected at each storage site S, which shall be measured during injection;
CO _{2,captured,atmobio}	is defined in equation (2);

$CO_{2\text{captured,total}}$	is defined in equation (1);
S	an index of utilised storage sites, at which CO_2 from the activity is fully segregated from any CO_2 from other sources up to and including the point of injection;
F_c	the conservatism factor calculated based on the uncertainty in the measurement of the activity calculated in accordance with Section 2.14;
F_{CRCF}	is defined in rule 2.3.11(a).

Non-segregated CO_2 stream

2.3.13. As an alternative to rule 2.3.12, the operator may or, where the CO_2 captured by the activity is not fully segregated from other CO_2 in the transport infrastructure or at the storage site, shall, calculate CR_{total} in accordance with equation (8).

$$CR_{\text{total}} = F_c * (F_{\text{CRCF}} * CO_{2\text{captured,atmobio}} + CO_{2\text{transport,losses}} + CO_{2\text{storage,losses}}) \quad (8)$$

Variable	Description
$CO_{2\text{captured,atmobio}}$	is defined in equation (2);
$CO_{2\text{transport,losses}}$	amount of atmospheric or biogenic CO_2 lost during transport from the capture facility to the storage sites, calculated following rules 2.7.6–2.7.13 ;
$CO_{2\text{storage,losses}}$	amount of atmospheric or biogenic CO_2 lost at the storage sites prior to entering permanent geological storage, calculated following rules 2.8.5–2.8.7;
F_{CRCF}	is defined in rule 2.3.11(a);
F_c	the conservatism factor calculated based on the uncertainty in the measurement of the activity calculated in accordance with Section 2.14.

2.4. Quantification of the greenhouse gas emissions associated with the activity

2.4.1. The greenhouse gases associated shall be calculated according to equation (9).

$$GHG_{\text{associated}} = F_{\text{CRCF}} * GHG_{\text{capture}} + GHG_{\text{transport}} + GHG_{\text{storage}} \quad (9)$$

Variable	Description
$GHG_{capture}$	GHG emissions associated with the capture facility, calculated following rules 2.5.2–2.5.10 in the case of atmospheric CO ₂ capture and following rules 2.6.4–2.6.15 in the case of biogenic CO ₂ capture;
$GHG_{transport}$	GHG emissions associated with CO ₂ transport from the capture facility to the storage sites, calculated following rules 2.7.14–2.7.16;
$GHG_{storage}$	GHG emissions associated with the storage sites, calculated following rules 2.8.8–2.8.11;
F_{CRCF}	is defined in rule 2.3.11(a).

2.5. Capture of CO₂ Directly from the Air

Quantification of total CO₂ captured

2.5.1. The total amount of CO₂ captured at the capture facility, $CO_{2,captured,total}$, shall be calculated in accordance with equation (1) and the quantity of CO₂ of atmospheric origin captured, $CO_{2,captured,atmobio}$, shall be calculated in accordance with equation (2).

Quantification of associated GHG emissions

2.5.2. The GHG associated emissions with the capture shall correspond to the sum of emissions associated with the capture facility itself and relevant processes to produce inputs to the capture facility and shall be calculated in accordance with equation (10).

$$GHG_{capture} = GHG_{facility} + GHG_{inputs} \tag{10}$$

Variable	Description
$GHG_{facility}$	total GHG emissions from all relevant activities within the boundaries of the capture facility, in tonnes of CO ₂ e [tCO ₂ e], including emissions associated with conditioning CO ₂ prior to transfer to transport infrastructure or to a storage site;
GHG_{inputs}	total emissions associated with inputs to the capture facility, in tCO ₂ e.

Emissions from the capture facility

2.5.3. The emissions $GHG_{facility}$ associated with the capture facility shall be calculated in accordance with equation (11).

$$GHG_{facility} = GHG_{on-site} + GHG_{elec} + GHG_{heat} + GHG_{capital} + GHG_{disposal} \tag{11}$$

Variable	Description
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$GHG_{on-site}$	emissions due to fuel consumption and any other GHG emissions as part of the capture activity at the capture facility, as further detailed in rule 2.5.4
GHG_{elec}	emissions due to net electricity consumption at the capture facility, as further detailed in rule 2.5.5
GHG_{heat}	emissions due to net consumption of useful heat at the capture facility, as further detailed in rule 2.5.6
$GHG_{capital}$	capital emissions from construction and installation of the carbon capture facility, as further detailed in rule 2.5.7;
$GHG_{disposal}$	emissions from the treatment or disposal of any wastes generated by the direct air capture facility, as further detailed in rule 2.5.8.

2.5.4. $GHG_{on-site}$ refers to emissions due to fuel consumption and any other GHG emissions as part of the capture activity at the capture facility, calculated in accordance with equation (12).

$$GHG_{on-site} = \sum_{fuels} (Q_{fuel} * EF_{fuel}) + GHG_{other} + CO_{2\ stored,fossil} \quad (12)$$

Variable	Description
Q_{fuel}	quantity of the fuel consumed in the certification period, expressed in an appropriate unit;
EF_{fuel}	emission factor, expressed in tCO ₂ e per unit [tCO ₂ e/unit], selected in accordance with the rules in Section 2.12;
GHG_{other}	any other GHG emissions that are part of the capture process at the capture facility;
$CO_{2\ stored,fossil}$	minus the quantity of fossil CO ₂ from capture-related processes at the capture facility captured and permanently stored, in tonnes CO ₂ . It shall be calculated as $CO_{2\ captured,fossil,assoc}$ (as defined in equation (4)), plus any CO ₂ losses occurring prior to storage (the calculation of losses from captured fossil CO ₂ must be consistent with the calculation rules for losses of atmospheric or biogenic CO ₂ in Sections 2.7 and 2.8).

2.5.5. GHG_{elec} refers to emissions due to net electricity consumption at the capture facility, calculated in accordance with equation (13).

$$GHG_{elec} = \sum_{electricity\ source} Q_{elec} * EF_{elec} \quad (13)$$

Variable	Description
Q_{elec}	net quantity of electricity consumed in the certification period, selected in accordance with Section 2.10, expressed in an appropriate unit;
EF_{elec}	emission factor for the consumed electricity, expressed in tCO ₂ e/unit, selected in accordance with the rules in Section 2.12.

2.5.6. GHG_{heat} refers to emissions due to net consumption of useful heat at the capture facility, calculated in accordance with equation (14).

$$GHG_{heat} = \sum_{\text{heat source}} Q_{heat} * EF_{heat} \tag{14}$$

Variable	Description
Q_{heat}	net quantity of useful heat consumed in the certification period, selected in accordance with Section 2.10, expressed in an appropriate unit;
EF_{heat}	emission factor for the consumed heat, expressed in tCO ₂ e/unit, selected in accordance with the rules in Section 2.12.

2.5.7. $GHG_{capital}$ refers to capital emissions from construction and installation of the carbon capture facility and shall be calculated in accordance with the principles detailed in Section 2.13.

2.5.8. $GHG_{disposal}$ refers to emissions from the treatment or disposal of any wastes generated by the direct air capture 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.

Emissions from inputs

2.5.9. Where there are inputs including chemicals consumed by the capture facility the emissions associated with the consumption of these inputs during the certification period shall be calculated in accordance with equation (15).

$$GHG_{inputs} = \sum_{\text{inputs}} Q_{input} * EF_{input} \tag{15}$$

Variable	Description
Q_{input}	quantity of the input consumed in the certification period, expressed in an appropriate unit;
EF_{input}	emission factor for the input consumed, expressed in tCO ₂ e/unit, selected in accordance with the rules in Section 2.12 .

2.5.10. Operators 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 $2\% * CR_{total}$, i.e. a group of inputs for which, when taking a high-end estimate of expected associated emissions, is in accordance with equation (16).

$$\sum_{inputs} Q_{input} * EF_{input} < 2\% * CR_{total} \quad (16)$$

Monitoring and reporting

2.5.11. In accordance with Section 1.3, operators shall include in the monitoring report before each re-certification audit the measured or calculated parameters listed in Table 2. Where a parameter is noted as to be monitored, it shall be included in the monitoring plan in accordance with Section 1.3.

TABLE 2: PARAMETERS FOR INCLUSION IN THE MONITORING REPORT

Equation	Parameter	Unit	Definition	Notes
(1),(2), (7)	$CO_{2,captured,total}$	tCO ₂	The total amount of CO ₂ that is captured at the capture facility and transferred for transport or storage	Calculated using eq. (1)
(1)	$CO_{2,OUT,activity,i}$	tCO ₂	Amount of CO ₂ from the capture activity leaving the capture facility at each exit point i	To be monitored
(2),(6), (7),(8), (27),(28), (35)	$CO_{2,captured,atmobio}$	tCO ₂	Amount of CO ₂ of atmospheric or biogenic origin captured at the capture facility and transferred for transport or storage	Calculated using eq. (2)
(2),(3)	$CO_{2,captured,fossil}$	tCO ₂	Amount of fossil CO ₂ from processes associated with the activity that is captured at the capture facility and transferred for transport or storage	Calculated using eq. (3)
(3),(4), (6)	$CO_{2,captured,fossil,assoc}$	tCO ₂	Amount of fossil CO ₂ emitted as a result of the capture process that is captured	Calculated using eq. (4)

(4)	$CO_{2\text{fossil,assoc,co-captured}}$	tCO ₂	Amount of CO ₂ emitted as a result of the capture process that is co-captured with the atmospheric or biogenic CO ₂	To be monitored or calculated
(4)	$CO_{2\text{fossil,assoc,source}}$	tCO ₂	Amount of CO ₂ emitted as a result of the capture process that is captured separately	To be monitored
(6),(27),(28),(35)	$CO_{2\text{activity}}$	tCO ₂	The amount of CO ₂ for which transport and/or storage emissions shall be counted towards the term GHG _{associated}	Calculated using eq. (6)
(6),(7),(8),(9),(27),(28)	F_{CRCF}	ratio	The fraction of the captured CO ₂ of atmospheric or biogenic origin that shall be counted towards the total carbon removal	
(9),(10)	GHG_{capture}	tCO _{2e}	Total GHG emissions associated with the capture of CO ₂ from ambient air	Calculated using eq. (10)
(10),(11)	GHG_{facility}	tCO _{2e}	Total GHG emissions from all relevant activities within the boundaries of the capture facility	Calculated using eq. (11)
(10),(15)	GHG_{input}	tCO _{2e}	Total GHG emissions associated with inputs to the capture facility	Calculated using eq. (15)
(11),(12)	$GHG_{\text{on-site}}$	tCO _{2e}	Emissions due to fuel consumption at the capture facility	Calculated using eq. (12)
(11),(13)	GHG_{elec}	tCO _{2e}	Emissions due to net electricity consumption at the capture facility	Calculated using eq. (13)
(11),(14)	GHG_{heat}	tCO _{2e}	Emissions due to net consumption of useful heat at the capture facility	Calculated using eq. (14)

(11),(48)	GHG_{capital}	tCO ₂ e	Capital emissions	Calculated using eq. (48)
(11)	GHG_{disposal}	tCO ₂ e	Emissions from waste disposal	To be monitored
(12)	Q_{fuel}	appropriate unit	Quantity of the fuel consumed in the certification period	To be monitored
(12)	EF_{fuel}	tCO ₂ e/unit	Emission factor for consumed fuel	
(12)	GHG_{other}	tCO ₂ e	Any other GHG released during the capture process	To be monitored or calculated
(12)	$CO_{2\text{stored,fossil}}$	tCO ₂	Quantity of fossil CO ₂ from fuel combustion at the capture facility captured and permanently stored	To be monitored
(13)	Q_{elec}	appropriate unit	Net quantity of electricity consumed in the certification period	To be monitored
(13)	EF_{elec}	tCO ₂ e/unit	Emission factor for consumed electricity	
(14)	Q_{heat}	appropriate unit	Net quantity of useful heat consumed in the certification period	
(14)	EF_{heat}	tCO ₂ e/unit	Emission factor for consumed heat	
(15)	Q_{input}	appropriate unit	Quantity of the input consumed in the certification period	To be monitored
(15)	EF_{input}	tCO ₂ e/unit	Emission factor for input consumed	
(48), (49)	$GHG_{\text{materials}}$	tCO ₂ e	Emissions from the materials utilised in the construction of the facility	Calculated using eq. (49)

(49) $Q_{\text{materials}}$ t Quantity of materials utilised in the construction of the facility

$EF_{\text{materials}}$	tCO ₂ e/t of material	Emission factor for the utilised materials
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2.6. Capture of CO₂ from Biogenic Emissions

Quantification of total CO₂ captured

2.6.1. The total amount of CO₂ captured at the capture facility, $CO_{2\text{captured,total}}$, shall be calculated in accordance with equation (1) and the quantity of CO₂ of biogenic origin captured, $CO_{2\text{captured,atmobio}}$ shall be calculated in accordance with equation (2).

Capture of CO₂ from partially biogenic streams

2.6.2. Activities that capture biogenic CO₂ as part of a mixed stream that also contains CO₂ of fossil or other origin may be certified for the biogenic part. Such activities include, among others, activities capturing CO₂ from co-fired bioenergy facilities or from waste-to-energy facilities processing partially biogenic waste, as well as from energy-intensive industries, including but not restricted to cement, lime, metal and silicon producers that use partially biogenic fuel or feedstock.

2.6.3. Only the biogenic part of the captured CO₂ may be counted towards CR_{total} . Emissions associated with the carbon capture facility shall be allocated proportionately between the biogenic fraction that shall be included in $CO_{2\text{captured,atmobio}}$ and the non-biogenic fraction that shall not be included in the quantification. After transfer of the CO₂ from the point of capture into transportation infrastructure or a storage site, either a segregated system or mass balance accounting shall be used to identify a quantity of biogenic CO₂ entering permanent storage that is consistent with the amount of biogenic CO₂ captured (minus any losses).

Quantification of associated GHG emissions

2.6.4. The calculation of the GHG_{capture} term shall consider only the emissions specifically associated with operating the capture process and the transfer of the CO₂ for storage or transport. The calculation shall include emissions associated with any static and mobile machinery utilised to enable the capture process. Emissions associated with the normal operation of the facility generating the biogenic CO₂, that do not result from the operation of the capture process, shall not be included in the quantification. In the case that an emission source (e.g. on-site mobile machinery) serves both the capture process and one or more other processes at the facility, then a pro-rata fraction of the emissions from that source shall be attributed to the capture process.

2.6.5. GHG_{capture} shall be calculated in accordance with equation (17).

$$GHG_{\text{capture}} = \left(1 - \frac{CO_{2\text{captured,fossil,mixed}}}{CO_{2\text{captured,total}}} \right) * (GHG_{\text{facility}} + GHG_{\text{inputs}}) \quad (17)$$

Variable	Description
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$CO_{2\text{captured,fossil,mixed}}$	is defined in equation (5);
$CO_{2\text{captured,total}}$	is defined in equation (1);
GHG_{facility}	total GHG emissions from all relevant activities required for CO_2 capture at the capture facility, in tCO_{2e} , including emissions associated with conditioning CO_2 prior to transfer to transport infrastructure or a storage site;
GHG_{inputs}	total emissions associated with inputs to the capture facility, in tCO_{2e} .

Emissions from the capture facility

2.6.6. The emissions GHG_{facility} associated with the capture facility shall be calculated in accordance with equation (18).

$$GHG_{\text{facility}} = GHG_{\text{bio}} + GHG_{\text{bio-storage}} + GHG_{\text{on-site}} + GHG_{\text{elec}} + GHG_{\text{heat}} + GHG_{\text{capital}} + GHG_{\text{disposal}} \tag{18}$$

Variable	Description
GHG_{bio}	emissions due to the supply of additional biomass that is used to generate energy consumed by the capture process, as further detailed in rule 2.6.7;
$GHG_{\text{bio-storage}}$	CH_4 emissions due to biomass storage prior to processing at the facility where CO_2 is captured, as further detailed in rule 2.6.8;
$GHG_{\text{on-site}}$	$GHG_{\text{on-site}}$ refers to emissions due to fuel combustion and any other GHG emissions at the capture facility that are associated with the capture activity specifically, including any CH_4 and N_2O emissions from additional biomass combustion as defined in Section 2.11 but applying a CO_2 emission factor of zero to biomass combustion, as further detailed in rule 2.6.9;
GHG_{elec}	emissions due to net consumption of electricity at the capture facility for the capture process specifically, excluding own electricity consumption, as further defined in rule 2.6.10;
GHG_{heat}	emissions due to net consumption of useful heat at the capture facility for the capture process specifically, excluding own heat consumption, as further defined in rule 2.6.11;
GHG_{capital}	capital emissions from construction and installation of the carbon capture facility, as further detailed in rule 2.6.12;
GHG_{disposal}	emissions from the treatment or disposal of any wastes generated specifically due to the capture activity, including waste from any

biomass, biofuel, bioliquid or biomass fuel used for energy consumed by the capture process, as further detailed in rule 2.6.13.

2.6.7. GHG_{bio} refers to emissions due to the supply of additional biomass that is used to generate energy consumed by the capture process, calculated in accordance with the following equation (19).

$$GHG_{bio} = \sum_{\text{biomass types}} Q_{\text{biomass}} * EF_{\text{biomass}} \tag{19}$$

Variable	Description
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Q_{biomass}	quantity of additional biomass that is consumed in the certification period to supply any on-site heat or electricity used for the capture process and the transfer of the CO_2 for storage or transport specifically, calculated in accordance with the rules in Section 2.11, expressed in an appropriate unit;
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EF_{biomass}	emission factor, expressed in $tCO_2e/unit$, selected in accordance with the rules in Section 2.12.
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2.6.8. $GHG_{bio-storage}$ refers to CH_4 emissions due to biomass storage prior to processing at the facility where CO_2 is captured. It shall be calculated for each quantity of feedstock of a given type that is harvested or collected at the same time and stored in the same way. $GHG_{bio-storage}$ shall be set to zero for a quantity of feedstock if one or more of the following practices are followed for all biomass utilised:

- (a) biomass stored consists of coarse woody material that naturally remains well aerated;
- (b) biomass that is stored in a form that does not necessarily remain naturally aerated shall either:
 - (i) be stored for no more than four weeks prior to processing; or
 - (ii) be stored with a maximum of 30 % residual moisture.
- (c) biomass is pelleted for storage;
- (d) operators otherwise demonstrate that biomass is stored in a way that avoids significant CH_4 emissions from anaerobic decomposition given the nature of the feedstock and the local conditions.

Otherwise, $GHG_{bio-storage}$ shall be calculated in accordance with equation (20).

$$GHG_{bio-storage} = \frac{Q_{\text{biomass}}}{Q_{\text{biomass,total}}} * GWP_{CH_4} * 1.335 * 0.0013 * \sum_{\text{feedstock}} Q_{\text{feedstock}} * C_{\text{feedstock}} * (T_{\text{storage}} - 1) \tag{20}$$

Variable	Description
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Q_{biomass}	quantity of additional biomass that is consumed in the certification period to supply any on-site heat or electricity used for the capture process and the transfer of the CO_2 for storage or transport
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specifically, calculated in accordance with the rules in Section 2.11, expressed in an appropriate unit;

$Q_{\text{biomass,total}}$	total quantity of biomass consumed by the capture facility in the certification period for both the main process generating the captured CO ₂ stream and for the capture process, expressed in an appropriate unit;
$Q_{\text{feedstock}}$	quantity of the feedstock, expressed in an appropriate unit;
$C_{\text{feedstock}}$	carbon content of the feedstock, expressed as a mass %;
T_{storage}	time in months for which the feedstock is stored (rounded up);
feedstock	an index of the feedstocks consumed;
GWP_{CH_4}	global warming potential of methane, 100 year basis;
1.335	the mass ratio of a methane molecule to a carbon atom;
0.0013	assumed monthly fractional loss of biomass carbon from storage.

2.6.9. $GHG_{\text{on-site}}$ refers to emissions due to fuel combustion and any other GHG emissions at the capture facility that are associated with the capture activity specifically, including any CH₄ and N₂O emissions from additional biomass combustion as defined in Section 2.11 but applying a CO₂ emission factor of zero to biomass combustion. In the case that a facility requires the use of fossil fuels to start up the combustion cycle the emissions from those fuels shall not be included as they are not considered associated with the capture process specifically. In the case that fuel is consumed for biomass handling or pre-treatment, then a fraction of that fuel calculated as $Q_{\text{biomass}}/Q_{\text{biomass,total}}$ (see equation (20)) shall be treated as associated with the capture process specifically. $GHG_{\text{on-site}}$ shall be calculated in accordance with equation (21).

$$GHG_{\text{on-site}} = \sum_{\text{fuels}} (Q_{\text{fuel}} * EF_{\text{fuel}}) + GHG_{\text{other}} + CO_{2\text{stored,fossil}} \quad (21)$$

Variable	Description
Q_{fuel}	quantity of the fuel consumed in the certification period, expressed in an appropriate unit;
EF_{fuel}	emission factor, expressed in tCO ₂ e/unit, selected in accordance with the rules in Section 2.12;
GHG_{other}	any other GHG emissions that are part of the capture process at the capture facility;

$CO_{2\text{ stored,fossil}}$ minus the quantity of fossil CO₂ from capture-related processes at the capture facility captured and permanently stored, in tonnes CO₂. It shall be calculated as $CO_{2\text{ captured,fossil,assoc}}$ (as defined in equation (4)), plus any CO₂ losses occurring prior to storage (the calculation of losses from captured fossil CO₂ must be consistent with the calculation rules for losses of atmospheric/biogenic CO₂ in Sections 2.7 and 2.8).

- 2.6.10. GHG_{elec} refers to emissions due to net consumption of electricity at the capture facility for the capture process specifically, excluding own electricity consumption, calculated in accordance with equation (22).

$$GHG_{\text{elec}} = \sum_{\text{electricity sources}} Q_{\text{elec}} * EF_{\text{elec}} \tag{22}$$

Variable	Description
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Q_{elec}	net quantity of electricity from each source consumed in the certification period for the capture process and the transfer of the CO ₂ for storage or transport specifically, selected in accordance with Section 2.10, expressed in an appropriate unit;
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EF_{elec}	emission factor for the consumed electricity, expressed in tCO ₂ e/unit, selected in accordance with Section 2.12.
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- 2.6.11. GHG_{heat} refers to emissions due to net consumption of useful heat at the capture facility for the capture process specifically, excluding own heat consumption, calculated in accordance with equation (23).

$$GHG_{\text{heat}} = \sum_{\text{heat source}} Q_{\text{heat}} * EF_{\text{heat}} \tag{23}$$

Variable	Description
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Q_{heat}	net quantity of useful heat consumed in the certification period for the capture process specifically, selected in accordance with Section 2.10, expressed in an appropriate unit;
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EF_{heat}	emission factor for the consumed heat, expressed in tCO ₂ e/unit, selected in accordance with Section 2.12.
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- 2.6.12. GHG_{capital} refers to capital emissions from construction and installation of the carbon capture facility and shall be calculated in accordance with the principles detailed in Section 2.13.

- 2.6.13. GHG_{disposal} refers to emissions from the treatment or disposal of any wastes generated specifically due to the capture activity, including waste from any biomass, biofuel, bioliquid or biomass fuel used for energy consumed by the capture process. 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 N₂O and/or

CH₄ due to aerobic or anaerobic degradation of the fraction of biogenic wastes associated with additional biomass use.

Emissions from inputs

2.6.14. Where there are inputs including chemicals consumed by the capture facility the emissions associated with the consumption of these inputs during the certification period shall be calculated in accordance with equation (24).

$$GHG_{inputs} = \sum_{inputs} Q_{input} * EF_{input} \tag{24}$$

Variable	Description
Q_{input}	quantity of the input consumed in the certification period for the capture process specifically, expressed in an appropriate unit;
EF_{input}	emission factor for the input consumed, expressed in tCO ₂ e/unit, selected in accordance with Section 2.12.

2.6.15. 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 2% * CR_{total}, i.e. a group of inputs for which, when taking a high-end estimate of expected associated emissions, is in accordance with equation (25).

$$\sum_{inputs} Q_{input} * EF_{input} < 2\% * CR_{total} \tag{25}$$

Monitoring and reporting

2.6.16. In accordance with Section 1.3, operators shall include in the monitoring report before each re-certification audit the measured or calculated parameters listed in Table 3. Where a parameter is noted as to be monitored, it shall be included in the monitoring plan in accordance with Section 1.3.

TABLE 3: PARAMETERS FOR INCLUSION IN THE MONITORING REPORT

Equation	Parameter	Unit	Definition	Notes
(1),(2), (7),(17)	CO _{2captured,total}	tCO ₂	The total amount of CO ₂ that is captured at the capture facility and transferred for transport or storage	Calculated using eq. (1)
(1)	CO _{2OUT,activity,i}	tCO ₂	Amount of CO ₂ from the capture activity leaving the capture facility at each exit point i	To be monitored
(2),(6), (7),(8)	CO _{2captured,atmobio}	tCO ₂	Amount of CO ₂ of atmospheric or biogenic origin captured at the capture facility and	Calculated using eq. (2)

			transferred for transport or storage	
(2),(3)	$CO_{2\text{captured,fossil}}$	tCO ₂	Amount of fossil CO ₂ from processes associated with the activity that is captured at the capture facility and transferred for transport or storage	Calculated using eq. (3)
(3),(4), (5),(6)	$CO_{2\text{captured,fossil,assoc}}$	tCO ₂	Amount of fossil CO ₂ emitted as a result of the capture process that is captured	Calculated using eq. (4)
(3),(5), (17)	$CO_{2\text{captured,fossil,mixed}}$	tCO ₂	Amount of fossil CO ₂ captured from a mixed stream as part of a BioCCS activity	Calculated using eq. (5)
(4)	$CO_{2\text{fossil,assoc,co-captured}}$	tCO ₂	Amount of CO ₂ emitted as a result of the capture process that is co-captured with the atmospheric or biogenic CO ₂	To be monitored or calculated
(4)	$CO_{2\text{fossil,assoc,source}}$	tCO ₂	Amount of CO ₂ emitted as a result of the capture process that is captured separately	To be monitored
(5)	F _B	%	For a BioCCS activity capturing CO ₂ from a mixed stream, the fraction of captured CO ₂ that is of atmospheric or biogenic origin	To be monitored
(6),(27), (28),(35)	$CO_{2\text{activity}}$	tCO ₂	The amount of CO ₂ for which transport and/or storage emissions shall be counted towards the term GHG _{associated}	Calculated using eq. (6)
(6),(7), (8),(9)	F _{CRCF}	ratio	The fraction of the captured CO ₂ of atmospheric or biogenic origin that shall be counted towards the total carbon removal	
(17)	GHG _{capture}	tCO _{2e}	Total GHG emissions associated with the capture of CO ₂	Calculated using eq. (17)

(17),(18)	GHG _{facility}	tCO ₂ e	Total GHG emissions from all relevant activities required for CO ₂ capture at the capture facility	Calculated using eq. (18)
(17),(24)	GHG _{inputs}	tCO ₂ e	Total GHG emissions associated with inputs to the capture facility	Calculated using eq. (24)
(18),(19)	GHG _{bio}	tCO ₂ e	Emissions due to additional biomass use for energy consumed by the capture process	Calculated using eq. (19)
(18),(20)	GHG _{bio-storage}	tCO ₂ e	CH ₄ emissions due to biomass storage prior to processing at the facility where CO ₂ is captured.	Calculated using eq. (20)
(18),(21)	GHG _{on-site}	tCO ₂ e	Emissions due to fuel combustion and any other GHG emissions at the capture facility for the capture process specifically, including CH ₄ and N ₂ O emissions from additional biomass combustion but applying a CO ₂ emission factor of zero to biomass combustion	Calculated using eq. (21)
(18),(22)	GHG _{elec}	tCO ₂ e	Emissions due to net consumption of electricity at the capture facility	Calculated using eq. (22)
(18),(23)	GHG _{heat}	tCO ₂ e	Emissions due to net consumption of useful heat at the capture facility	Calculated using eq. (23)
(18),(48)	GHG _{capital}	tCO ₂ e	Capital emissions	Calculated using eq. (48)
(18),	GHG _{disposal}	tCO ₂ e	Emissions from waste disposal	To be monitored where relevant
(19)	Q _{biomass}	[appropriate unit]	Quantity of additional biomass that is consumed in the certification period to supply any on-site	To be monitored.

			heat and/or electricity used for the capture process specifically	
(19)	EF_{biomass}	tCO ₂ e/unit	Emission factor for additional biomass consumed	
(20)	$Q_{\text{feedstock}}$	[appropriate unit]	Quantity of the feedstock	To be monitored where relevant
(20)	$C_{\text{feedstock}}$	%	Carbon content of the feedstock	To be monitored where relevant
(20)	T_{storage}	months	Time in months for which the feedstock is stored	To be monitored where relevant
(21)	Q_{fuel}	[appropriate unit]	Quantity of the fuel consumed in the certification period	To be monitored
(21)	EF_{fuel}	tCO ₂ e	Emission factor for the consumed fuel	
(21)	$CO_{2\text{stored,fossil}}$	tCO ₂	Quantity of fossil CO ₂ from fuel combustion at the capture facility captured and permanently stored	To be monitored
(22)	Q_{elec}	[appropriate unit]	Net quantity of electricity from each source consumed in the certification period for the capture process	To be monitored
(22)	EF_{elec}	tCO ₂ e	Emission factor for the consumed electricity	
(23)	Q_{heat}	[appropriate unit]	Net quantity of useful heat consumed in the certification period for the capture process	To be monitored
(23)	EF_{heat}	tCO ₂ e	Emission factor for the consumed heat	
(24)	Q_{input}	[appropriate unit]	Net quantity of the input consumed in the	To be monitored

			certification period for the capture process	
(24)	EF_{input}	tCO ₂ e	Emission factor for input consumed	
(48),(49)	$GHG_{materials}$	tCO ₂ e	Emissions from the materials utilised in the construction of the facility	Calculated using eq. (49]
(49)	$Q_{materials}$	t	Quantity of materials utilised in the construction of the facility	
(49)	$EF_{materials}$	tCO ₂ e/t of material	Emission factor for the utilised materials	

2.7. Transport of CO₂

This section provides rules for the quantification of GHG emissions associated with CO₂ transportation activities via pipelines, road, rail or water transportation, and their infrastructure including intermediate storage, as well as losses of CO₂ occurring during this process.

- 2.7.1. The rules in Section 2.7 apply to activities that transport captured CO₂ as a concentrated CO₂ stream from a capture facility to one or more storage sites using one or more modes of CO₂ transportation. The transport pathway from the capture facility to the storage sites consists of one or more segments of transport infrastructure as defined in Article 3, point (29), of Regulation (EU) 2024/1735 of the European Parliament and of the Council⁶, which may be parts of one or more transport networks as defined in Article 3, point (22), of Directive 2009/31/EC. Where relevant data is available from reporting under Implementing Regulation (EU) 2018/2066, that data shall be considered reliable for the purpose of calculating transport emissions for the activity.
- 2.7.2. Transport infrastructure segments shall be designated in order to allow the allocation of transport-related emissions in the case that CO₂ from more than one source passes through parts of the same transport network. If CO₂ captured by a single removal activity is the only CO₂ passing through the relevant transport infrastructure, the whole transport pathway may be designated as a single transport infrastructure segment. Otherwise, the transport pathway shall be divided into a series of transport infrastructure segments. A new transport infrastructure segment shall be designated at least every time two or more CO₂ streams are merged, or two or more CO₂ streams are separated. Additional transport infrastructure segments may be specified at the discretion of the operator or certification body for organisational reasons.
- 2.7.3. An allocation fraction F_S shall be specified for each transport infrastructure segment S as the fraction of the CO₂ passing through the segment in a certification period that comes from the activity and is being sent for storage (i.e. not including

⁶ Regulation (EU) 2024/1735 of the European Parliament and of the Council of 13 June 2024 on establishing a framework of measures for strengthening Europe's net-zero technology manufacturing ecosystem and amending Regulation (EU) 2018/1724 ([OJ L 1735](#) 28.6.2024, p. 1).

any CO₂ coming from the activity that is being transferred for utilisation) in accordance with equation (26).

$$F_S = \text{CO}_{2\text{activity},S} / \text{CO}_{2\text{total},S} \quad (26)$$

Variable	Description
CO _{2 total,S}	total amount of CO ₂ from all sources passing through the CO ₂ infrastructure segment S in the certification period, in tCO ₂ ;
CO _{2 activity,S}	amount of CO ₂ from the activity, see equation (6), that is being transferred for permanent storage passing through the CO ₂ infrastructure segment S in the certification period, in tCO ₂ . For the first infrastructure segment in the transport pathway, this is equal to the part of the activity CO ₂ (CO _{2 activity}) measured as transferred from the capture facility to the infrastructure segment. For subsequent infrastructure segments, this is the quantity of activity CO ₂ entering the previous infrastructure segment minus any CO ₂ losses in that infrastructure segment, and where the CO ₂ stream is split at a node to be sent to multiple storage sites the activity CO ₂ shall be allocated across the infrastructure segments leaving that node;
S	index of the transport infrastructure segment.

- 2.7.4. Operators may utilise independently verified F_S values provided by CO₂ network operators.
- 2.7.5. In the case that the CO₂ passing through a transport infrastructure segment is a mix of atmospheric or biogenic CO₂ and fossil CO₂ emitted as a result of the capture process that was captured, then any losses shall be considered to consist of a pro-rata mix of atmospheric or biogenic CO₂ and fossil CO₂.

Quantification of fugitive, vented and leaked emissions of captured CO₂

- 2.7.6. In the event of intentional or accidental losses of transported CO₂ throughout the transport network, if the quantity CR_{total} is calculated based on equation (8), these losses shall be explicitly quantified. Quantification rules are based on Implementing Regulation (EU) 2018/2066, which sets out the following two methods for the quantification of GHG emissions due to the operation of pipeline transport network: Method A (rule 2.7.8), based on the overall mass balance of all input and output streams across an infrastructure segment or series of segments; and Method B (rule 2.7.9), relying on the monitoring of emission sources individually, as included below. Operators may choose which of the two approaches to use for each infrastructure segment or series of segments.
- 2.7.7. Operators shall choose the method that leads to lower uncertainty of the overall emissions without incurring disproportionate costs.

CO₂ losses: Method A

- 2.7.8. Operators shall quantify CO_{2 transport,losses}, the intentional and accidental losses of atmospheric or biogenic CO₂ being sent for permanent storage to generate carbon removal units throughout the transport segment or segments, in accordance with equation (27).

$$CO_{2\text{transport,losses}} = \left(\frac{F_{\text{CRCF}} * CO_{2\text{captured,atmobio}}}{CO_{2\text{activity}}} \right) * \sum_S F_S * (CO_{2\text{in,S}} - CO_{2\text{out,S}}) \quad (27)$$

Variable	Description
F_{CRCF}	is defined in rule 2.3.11(a);
$CO_{2\text{captured,atmobio}}$	is defined in equation (2);
$CO_{2\text{activity}}$	is defined in equation (6);
F_S	defined in equation (26);
$CO_{2\text{in,S}}$	amount of CO_2 entering transport infrastructure segment S, determined in accordance with Articles 40 to 46 and Article 49 of Implementing Regulation (EU) 2018/2066, in tCO_2 ;
$CO_{2\text{out,S}}$	amount of CO_2 leaving transport infrastructure segment S, determined in accordance with Articles 40 to 46 and Article 49 of Implementing Regulation (EU) 2018/2066, in tCO_2 ;
S	index of the transport infrastructure segments.

CO₂ losses: Method B

2.7.9. Operators shall quantify $CO_{2\text{transport,losses}}$, the intentional and accidental losses of atmospheric or biogenic CO_2 being sent for permanent storage to generate carbon removal units throughout the transport segment or segments, in accordance with equation (28).

$$CO_{2\text{transport,losses}} = \frac{F_{\text{CRCF}} * CO_{2\text{captured,atmobio}}}{CO_{2\text{activity}}} * \sum_S F_S * (CO_{2\text{fugitive,S}} + CO_{2\text{vented,S}} + CO_{2\text{leakage,S}}) \quad (28)$$

Variable	Description
F_{CRCF}	is defined in rule 2.3.11(a);
$CO_{2\text{captured,atmobio}}$	is defined in equation (2);
$CO_{2\text{activity}}$	is defined in equation (6);
F_S	defined in equation (26);
$CO_{2\text{fugitive,S}}$	sum of fugitive emissions from CO_2 transported in the transportation infrastructure, such as from seals, valves,

intermediate compressor stations in pipeline structures and intermediate storage sites, in tCO₂;

CO₂_{vented,S} sum of vented emissions from CO₂ transported in the transportation infrastructure, in tCO₂;

CO₂_{leakage,S} sum of CO₂ transported in the transportation infrastructure, which is emitted as the result of the failure of one or more components of the network, in tCO₂;

S index of the transport infrastructure segments.

Fugitive emissions

2.7.10. Fugitive emissions during CO₂ transportation in any of the following components shall be calculated in accordance with equation (29):

- (a) seals;
- (b) measurement devices;
- (c) valves;
- (d) intermediate compressor stations;
- (e) intermediate storage sites.

$$CO_{2 \text{ fugitive}} = \sum_S \sum_c EF_{\text{occur},c,S} * N_{\text{occur},c,S} \tag{29}$$

Variable	Description
F _S	defined in equation (26);
EF _{occur,c,S}	average emission factors per component per time period, expressed in tCO ₂ /unit time. EF _{occur,c} shall be determined for each type of component. These factors shall be reviewed at least every 5 years based on newly available techniques and knowledge;
N _{occur,c,S}	number of components type c in the transportation system, multiplied by the number of time periods;
c	type of component: seals; measurement devices; valves; intermediate compressor stations; and intermediate storage sites;
S	index of the transport infrastructure segments.

Vented emissions

2.7.11. Activity operators shall calculate CO₂_{vented} for each transport infrastructure segment S as the expected venting identified for that transport infrastructure segment by the operator of the transport network. If the operator of the transport network does not provide venting emissions at the disaggregated level of the

transport infrastructure segment, venting emissions shall be allocated by segment on a reasonable basis to be agreed by the activity operator and certification body.

Leakage events

- 2.7.12. Implementing Regulation (EU) 2018/2066 requires that each transport network operator shall monitor the transport network and calculate the amount of CO₂ leaked from the transport with a suitable methodology documented in the monitoring plan, based on industry best practice guidelines.
- 2.7.13. Activity operators shall calculate CO₂ leakage for each transport infrastructure segment S as the amount of leakage identified for that transport infrastructure segment by the operator of the transport network during the certification period. If the operator of the transport network does not report leakage emissions at the disaggregated level of the transport infrastructure segment, leakage emissions shall be allocated for each segment on a reasonable basis to be agreed by the activity operator and certification body.

Quantification of associated GHG emissions for transport

- 2.7.14. GHG emissions associated with the transportation of CO₂ (for vehicles and/or in the supporting infrastructure) shall be calculated in accordance with equation (30).

$$GHG_{transport} = \sum_S F_S * \sum_T GHG_{T,S} + GHG_{infra,S} \tag{30}$$

Variable	Description
F _S	defined in equation (26);
GHG _{T,S}	GHG emissions due to energy use for CO ₂ transportation in mode of transportation type T in infrastructure segment S, in tCO ₂ e;
GHG _{infra}	GHG emissions due to energy use at the supporting infrastructure connected to the CO ₂ transport network (including pipeline operation infrastructure), in tCO ₂ e;
T	transport type for the infrastructure segment (road, rail or maritime);
S	index of the transport infrastructure segments.

Emissions from non-pipeline transportation of CO₂

- 2.7.15. Following the principles in rules 2.12.12 and 2.12.13, GHG emissions associated with the non-pipeline transport of CO₂ by transportation mode T in each transport infrastructure segment, GHG_{T,S}, shall either be calculated based on actual data on fuel consumption in accordance with equation (31) or based on vehicle efficiencies and actual data about vehicle distance travelled in accordance with equation (32). Operators are permitted to use different approaches for different transport modes and infrastructure segments.

$$GHG_{T,S} = \sum_{trips} (Q_{fuel,S} * EF_{fuel}) \tag{31}$$

$$GHG_{T,S} = \sum_{L=1}^O K_{L,S} * EF_{vehicle,loaded} + \sum_{L=1}^R K_{L,S} * EF_{vehicle,unloaded} \quad (32)$$

Variable	Description
$Q_{fuel,S}$	quantity of fuel consumed for each trip in infrastructure segment S, including empty return trips, expressed in an appropriate unit;
EF_{fuel}	emission factor for the consumed fuel, expressed in tCO ₂ e/unit, selected in accordance with the rules in Section 2.12;
trips	an index of the trips taken.
$K_{L,S}$	distance of each trip in infrastructure segment S in kilometres [km];
$EF_{vehicle,loaded}$	the CO ₂ emissions per kilometre of the vehicle when loaded, in tCO ₂ /km travelled.;
$EF_{vehicle,unloaded}$	the CO ₂ emissions per kilometre of the vehicle when unloaded, in tCO ₂ /km travelled. If no data/default is available for the unloaded vehicle but a value is available for $EF_{vehicle,loaded}$, then the operator may set $EF_{vehicle,unloaded} = EF_{vehicle,loaded}$;
O	total number of outbound trips taken;
R	total number of empty return trips taken;
L	an index of the trips.

Emissions from transportation infrastructure

2.7.16. GHG emissions due to fuel and electricity consumption across all processes at installations required to operate the transport network shall be calculated according to equation (33).

$$GHG_{infra} = \sum_S \left(F_S * \sum_f (Q_{stat,f} * EF_f + Q_{mob,f} * EF_f) + Q_{elec} * EF_{elec} \right) \quad (33)$$

Variable	Description
$Q_{stat,f}$	quantity of fuel type f combusted in stationary sources at the installed infrastructure, in giga joule [GJ].
$Q_{mob,f}$	quantity of fuel type f combusted in mobile sources at the installed infrastructure, in GJ;
EF_f	emission factor due to the combustion of the fuel type f, in tCO ₂ e/GJ, chosen following Section 2.12;
Q_{elec}	net amount of electricity imported from the grid and consumed at the installed infrastructure, selected in accordance with Section 2.10, in MWh;
EF_{elec}	emissions factor for the generation of electricity, in tCO ₂ e/MWh, chosen following Section 2.12;

f fuel type, including those from fossil and biogenic origin.

Monitoring and reporting

2.7.17. In accordance with Section 1.3, operators shall include in the monitoring report before each re-certification audit the measured or calculated parameters listed in Table 4. Where a parameter is noted as to be monitored, it shall be included in the monitoring plan in accordance with Section 1.3.

TABLE 4: PARAMETERS FOR INCLUSION IN THE MONITORING REPORT

Equation	Parameter	Unit	Definition	Notes
(26)	F_S	%	Allocation fraction defined for each transport segment S as the fraction of the CO ₂ from the activity passing through the segment in a certification period and is being sent for storage	Calculated using eq. (26)
(26)	$CO_{2,activity,S}$	tCO ₂	Amount of CO ₂ from the activity passing through the CO ₂ infrastructure segment S in the certification period	To be monitored
(26)	$CO_{2,total,S}$	tCO ₂	Total amount of CO ₂ from all sources passing through the CO ₂ infrastructure segment S in the certification period	To be monitored
(8),(27), (28)	$CO_{2,transport,losses}$	tCO ₂	Amount of losses of atmospheric or biogenic CO ₂ being sent for permanent storage to generate carbon removal units throughout the transport network	Calculated using eq. (27) or eq. (28)
(27)	$CO_{2,in,S}$	tCO ₂	Amount of CO ₂ transferred to the transport infrastructure segment S, determined in accordance with Articles 40 to 46 and Article 49 of Commission Implementing Regulation (EU) 2018/2066	To be monitored

(27)	$CO_{2out,S}$	tCO ₂	Amount of CO ₂ transferred out of the transport infrastructure segment, determined in accordance with Articles 40 to 46 and Article 49 of Commission Implementing Regulation (EU) 2018/2066	To be monitored
(28),(29)	$CO_{2fugitive,S}$	tCO ₂	Sum of fugitive emissions from CO ₂ transported in the transportation infrastructure	Calculated using eq. (29)
(28)	$CO_{2vented,S}$	tCO ₂	Sum of vented emissions from CO ₂ transported in the transportation infrastructure	To be informed by the operator of the transport network.
(28)	$CO_{2leakage,S}$	tCO ₂	Sum of CO ₂ transported in the transportation infrastructure, which is emitted as the result of the failure of one or more components of the network	To be informed by the operator of the transport network.
(29)	$EF_{occur,c,S}$	tCO _{2e} /unit time	Average emission factors per type of component per occurrence	To be monitored.
(29)	$N_{occur,c,S}$	number of time units/year	Number of components in the transportation system per type of component	To be monitored.
(30)	$GHG_{transport}$	tCO _{2e}	Total amount of GHG emissions from the combustion of fuels during the transportation of CO ₂	Calculated using eq. (30)
(30),(31), (32)	$GHG_{T,S}$	tCO _{2e}	Emissions due to energy use for CO ₂ transportation in mode of transportation type T in infrastructure segment S	Calculated using eq. (31) or (32)
(30), (33)	$GHG_{infra,S}$	tCO _{2e}	Emissions due to energy use at the supporting infrastructure connected to the CO ₂ transport network	Calculated using eq. (33)

(31)	Q_{fuel}	[appropriate unit]	Quantity of the fuel consumed in the certification period	To be monitored
(31)	EF_{fuel}	tCO ₂ e	Emission factor for consumed fuel	
(32)	$K_{L,S}$	km	Distances of trips in infrastructure segments S	To be monitored
(32)	$EF_{\text{vehicle,loaded}}$	tCO ₂ e/km	CO ₂ emission per kilometre of the loaded transport vehicles	
(32)	$EF_{\text{vehicle,unloaded}}$	tCO ₂ e/km	CO ₂ emission per kilometre of the unloaded transport vehicles	
(33)	$Q_{\text{stat},f}$	GJ	Quantity of fuel type f combusted in stationary sources at the installed infrastructure	To be monitored. Where relevant, the density and Net Calorific Value used shall be reported.
(33)	$Q_{\text{mob},f}$	GJ	Quantity of fuel type f combusted in mobile sources at the installed infrastructure	To be monitored
(33)	Q_{elec}	MWh	Amount of electricity imported from the grid and consumed at the installed infrastructure	To be monitored
(33)	EF_f	tCO ₂ e/GJ	emission factor due to the combustion of the fuel type f	
(33)	EF_{elec}	tCO ₂ e/MWh	emissions factor for the generation of electricity	

2.8. Injection of CO₂ at storage sites

2.8.1. A CO₂ capture activity may transfer CO₂ via a transport pathway to one or more storage sites for injection into geological storage.

2.8.2. If CO₂ from sources other than the activity is stored at the same site, an allocation fraction shall be defined for each storage site S as the fraction of the CO₂ stored at that site in a certification period that comes from the activity in accordance with equation (34).

$$F_S = CO_{2\text{activity.injected},S} / CO_{2\text{injected},S} \tag{34}$$

Variable	Description
$CO_{2\text{activity.injected},S}$	the part of $CO_{2\text{activity}}$, see equation (6), that is stored at site S. In the case of a non-segregated CO_2 stream this amount shall be specified on a mass balance basis;
$CO_{2\text{injected},S}$	total amount of CO_2 from all sources stored at site S in the certification period;
S	index of the storage sites.

Quantification of CO_2 entering the storage site

2.8.3. The amount of CO_2 entering the storage site shall be determined at the entry point or points using a measurement-based approach in accordance with Articles 40 to 45 and Article 49 of Implementing Regulation (EU) 2018/2066.

Application of mass balance rules

- 2.8.4. Other than in the case that the CO_2 stream is fully segregated and rule 2.3.12 is used to determine CR_{total} , a mass balance system based on the following principles shall be used to trace CO_2 through the transport infrastructure from the capture facility to the storage site:
- (a) each quantity of CO_2 entering the transport or storage system may be treated as having been stored or otherwise discharged from the system (by losses or by supply for a non-storage application) only once;
 - (b) the sum of the quantities of CO_2 entering, or released from intermediate storage at, any transport infrastructure segment or storage site in a given period shall be equal to the sum of the quantities of CO_2 identified as leaving or being intermediately or permanently stored at that infrastructure segment or storage site in the same period (allowing for any discrepancy associated with the quantity of CO_2 actively in transit or undergoing storage related processes at the end of the period and for measurement uncertainty);
 - (c) where a quantity of CO_2 from an activity is mixed with a quantity of CO_2 from other sources, and that mixed stream of CO_2 is then transferred to more than one subsequent transport infrastructure segments or storage sites, then the operator may agree with other interested parties which of the transferred quantities of CO_2 is (or are) to be treated as originating or partially originating from that activity;
 - (d) where a quantity of CO_2 is transferred into an interconnected transport network and thereby mixed with a quantity of CO_2 from other sources, the operator is not required to model the transit time of the CO_2 from the activity through the transport network – any corresponding quantity of CO_2 transferred out of the transport network after the time at which the CO_2 from the activity enters the transport network may be treated as the CO_2 from the activity, with the constraint that it is not permissible to assume

that CO₂ has travelled against the flow direction in a transport infrastructure segment;

- (e) subject to these principles detailed in points a) to d), contractual arrangements may be used to identify a quantity of CO₂ being injected at a storage site with an equivalent quantity of CO₂ from a capture installation (accounting for losses in transit using the rules in this methodology) that was transferred into a system of shared infrastructure, even though the actual physical location of the CO₂ molecules captured by the activity may be unknown. No other quantity of CO₂ stored by or leaving that system of shared infrastructure may be identified with the quantity of CO₂ captured by the carbon removal activity;
- (f) operators shall provide adequate evidence (or arrange for the entities providing the transport and/or storage infrastructure services to provide adequate evidence) that the abovementioned mass balance requirements are met.

Quantification of fugitive and vented emissions of captured CO₂

- 2.8.5. In the event of any intentional or accidental losses of CO₂ prior to entering permanent storage, if the quantity CR_{total} is calculated based on Equation (8), these losses shall be explicitly quantified.
- 2.8.6. Fugitive and vented emissions during injection at the storage site shall be calculated in accordance with Section 23, subsection B.1., of Annex IV to Implementing Regulation (EU) 2018/2066. For geological storage, data regarding fugitive and vented emissions shall be based on data recorded by the entity operating the storage site under Implementing Regulation (EU) 2018/2066. The total loss of CO₂ from the activity during storage shall be calculated in accordance with equation (35).

$$CO_{2\text{storage,losses}} = F_{\text{CRCF}} * \frac{CO_{2\text{captured,atmobio}}}{CO_{2\text{activity}}} * \sum_S F_S * (CO_{2\text{fugitive,S}} + CO_{2\text{vented,S}}) \tag{35}$$

Variable	Description
F _{CRCF}	is defined in rule 2.3.11(a);
CO _{2captured,atmobio}	is defined in equation (2);
CO _{2activity}	is defined in equation (6);
F _S	fraction of the CO ₂ stored at site S that originates from the activity, in %;
CO _{2fugitive,S}	fugitive CO ₂ emissions from the site S, in tonnes CO ₂ ;
CO _{2vented,S}	vented CO ₂ emissions from the site S, in tonnes CO ₂ ;

- 2.8.7. At each site S, the sum of the fugitive and vented emissions shall be equal to the difference between the measured amount of CO₂ entering the site and the

measured amount of CO₂ injected in the storage reservoir, in accordance with equation (36).

$$CO_{2\text{fugitive},S} + CO_{2\text{vented},S} = CO_{2\text{IN},S} - CO_{2\text{injected},S} \quad (36)$$

Variable	Description
CO _{2IN,S}	measured total amount of CO ₂ entering the site S, in tonnes CO ₂ ;
CO _{2injected,S}	measured total amount of CO ₂ injected for permanent storage at the site S, in tonnes CO ₂ .

Quantification of associated GHG emissions

2.8.8. The GHG emissions associated with injection at a storage site shall be calculated in accordance with equation (37).

$$GHG_{\text{storage}} = \sum_S F_S * (GHG_{\text{storage site}} + GHG_{\text{inputs}}) \quad (37)$$

Variable	Description
GHG _{storage site}	GHG emissions associated with energy use and operation at the storage site, in tonnes CO ₂ e, defined in equation (38);
GHG _{inputs}	GHG emissions associated with the production and use of other inputs used at the storage site, in tonnes CO ₂ e.

Emissions from the storage site

2.8.9. The GHG emissions at each storage site shall be calculated in accordance with equation (38).

$$GHG_{\text{storage site}} = GHG_{\text{combustion}} + GHG_{\text{elec}} + GHG_{\text{heat}} + GHG_{\text{capital}} \quad (38)$$

$$GHG_{\text{combustion}} = \sum_{\text{fuels}} Q_{\text{fuel}} * EF_{\text{fuel}} + CO_{2\text{stored,fossil}} \quad (39)$$

$$GHG_{\text{elec}} = \sum_{\text{electricity source}} Q_{\text{elec}} * EF_{\text{elec}} \quad (40)$$

$$GHG_{\text{heat}} = \sum_{\text{heat source}} Q_{\text{heat}} * EF_{\text{heat}} \quad (41)$$

Variable	Description
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$GHG_{\text{combustion}}$	GHG emissions due to fuel consumption at the storage site, in tonnes CO ₂ e, calculated in accordance with equation (39);
GHG_{elec}	GHG emissions due to net electricity consumption at the storage site in tonnes CO ₂ e, calculated in accordance with equation (40);
GHG_{heat}	GHG emissions due to net useful heat consumption at the storage site, in tonnes CO ₂ e, calculated in accordance with equation (41);
GHG_{capital}	capital emissions from construction and installation of the storage site, in tonnes CO ₂ e, calculated in accordance with the principles detailed in Section 2.13.
Q_{fuel}	quantity of the fuel consumed in the certification period, expressed in an appropriate unit;
EF_{fuel}	emission factor for the fuel consumed, expressed in tCO ₂ e/unit, selected in accordance with Section 2.12;
$CO_{2\text{stored,fossil}}$	minus the quantity of fossil CO ₂ from fuel combustion at the storage site captured and permanently stored, in tonnes CO ₂ . It shall be calculated as minus the measured quantity of CO ₂ captured from fossil sources at the storage site plus any CO ₂ losses prior to storage;
Q_{elec}	net quantity of electricity consumed in the certification period, selected in accordance with Section 2.10, expressed in an appropriate unit;
EF_{elec}	emission factor for the consumed electricity, expressed in tCO ₂ e/unit, selected in accordance with Section 2.12;
Q_{heat}	net quantity of useful heat consumed in the certification period, selected in accordance with Section 2.10, expressed in an appropriate unit;
EF_{heat}	emission factor for the consumed heat, expressed in tCO ₂ e/unit, selected in accordance with Section 2.12.

Emissions from inputs

2.8.10. Where there are inputs consumed at the storage site the emissions associated with the consumption of these inputs during the certification period shall be calculated in accordance with equation (42).

$$GHG_{\text{inputs}} = \sum_{\text{inputs}} Q_{\text{input}} * EF_{\text{input}} \tag{42}$$

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

EF_{input} emission factor for the input consumed, expressed in tCO₂e/unit, selected in accordance with the rules in Section 2.12.

2.8.11. 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 2% * CR_{total}, i.e. a group of inputs for which, when taking a high-end estimate of possible associated emissions, is in accordance with equation (43).

$$\sum_{inputs} Q_{input} * EF_{input} < 2\% * CR_{total} \tag{43}$$

Monitoring and reporting

2.8.12. In accordance with Section 1.3, operators shall include in the monitoring report before each re-certification audit the measured or calculated parameters for the certification period being audited listed in Table 5. Where a parameter is noted as ‘to be monitored’, it shall be included in the monitoring plan in accordance with Section 1.3.

TABLE 5: PARAMETERS FOR INCLUSION IN THE MONITORING REPORT

Equation	Parameter	Unit	Definition	Notes
(34)	F_S	%	Allocation fraction of the CO ₂ stored at site S that originates from the activity and shall be used to generate carbon removal units	
(34)	$CO_{2,activity,injected,S}$	tCO ₂	The part of $CO_{2,activity}$ stored at site S	To be identified following mass balance rules in the case of non-segregated CO ₂ streams
(34),(36)	$CO_{2,injected,S}$	tCO ₂	Total amount of CO ₂ injected for permanent storage at each relevant storage site	To be monitored
(8),(35)	$CO_{2,storage,losses}$	tCO ₂	Amount of losses of atmospheric or biogenic CO ₂ being sent for permanent storage to generate carbon removal units during storage activity	Calculated using eq. (35)

(35),(36)	$CO_{2,vented,S}$	tCO ₂	Amount of CO ₂ vented at each relevant storage site	To be monitored
(35),(36)	$CO_{2,fugitive,S}$	tCO ₂	Amount of CO ₂ fugitives at each relevant storage site	To be monitored or calculated using eq. (36)
(36)	$CO_{2,IN,S}$	tCO ₂	Amount of CO ₂ entering the storage site S	To be monitored
(37)	$GHG_{storage}$	tCO _{2e}	GHG emissions associated with the injection at a storage site	Calculated using eq. (37)
(37),(38)	$GHG_{storage\ site}$	tCO _{2e}	GHG emissions associated with energy use and operation at the storage site	Calculated using eq. (38)
(37),(42)	GHG_{inputs}	tCO _{2e}	GHG emissions associated with the production and use of other inputs used at the storage site	Calculated using eq. (42)
(38),(39)	$GHG_{combustion}$	tCO _{2e}	GHG emissions due to fuel consumption at the storage site	Calculated using eq. (39)
(38),(40)	GHG_{elec}	tCO _{2e}	GHG emissions due to net electricity consumption at the storage site	Calculated using eq. (40)
(38),(41)	GHG_{heat}	tCO _{2e}	GHG emissions due to net useful heat consumption at the storage site	Calculated using eq. (41)
(38),(48)	$GHG_{capital}$	tCO _{2e}	Capital emissions	To be informed by the operator. Calculated using eq. (48)
(39)	Q_{fuel}	[appropriate unit]	Amount of fuels used for combustion at each storage site	To be monitored
(39)	EF_{fuel}	tCO _{2e} /unit	Emission factor for the fuel consumed	

(40)	Q_{elec}	MWh	Net amount of electricity consumed at each storage site	To be monitored
(40)	EF_{elec}	tCO ₂ e/unit	Emission factor for the consumed electricity	
(41)	Q_{heat}	MWh	Net amount of useful heat consumed at storage site, for all relevant storage sites	To be monitored
(41)	EF_{heat}	tCO ₂ e/unit	Emission factor for the consumed heat	
(42)	Q_{input}	[appropriate unit]	Amount of input consumed	To be monitored
(42)	EF_{input}	tCO ₂ e/unit	Emission factor for the input consumed	
(48),(49)	$GHG_{materials}$	tCO ₂ e	Emissions from the materials utilised in the construction of the storage site	Calculated using eq. (49)
(49)	$Q_{materials}$	tonne	Quantity of materials utilised in the construction of the storage site	To be monitored
(49)	$EF_{materials}$	tCO ₂ e/tonne material	Emission factor for the utilised materials	

2.9. Completeness and materiality

- 2.9.1. The quantification of associated GHG emissions shall be complete and shall 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.
- 2.9.2. Where an operator or a certification body identifies emissions from a source, or from a group of sources, associated with an activity that are material but are not covered by the present methodology, the operator shall ensure that such emissions are included in the calculation of the associated GHG emissions.
- 2.9.3. Unless otherwise stated, all emission sources identified in these rules 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, i.e., Section 2.9. There are two potential exceptions to this principle, contexts in which a materiality assessment may be undertaken and emissions assessed as being below the materiality threshold do not need to be directly assessed. These contexts are capital emissions (Section 2.13), and input emissions (rules 2.5.9, 2.5.10, 2.6.14, 2.6.15, 2.8.10 and 2.8.11).

2.9.4. A materiality assessment may also be required, as noted in rule 2.9.2 above, if the operator or certification body identified emissions from a source that is associated with the activity but is not explicitly identified in the present methodology. Where a materiality assessment is required on a specified emission source or group of emission sources, the operator must present to the certification body an estimate of the potential range of emissions across the activity period associated with that source. If the emissions at the high end of this range are equal to or greater than 2 % of the gross carbon removals delivered, or expected to be delivered, over the course of the activity period, then the emissions from that source are considered potentially material and must be directly assessed. At the certification audit operators shall carry out the materiality assessment based on expected emissions and removals over the activity period, and the basis for concluding that any emissions are immaterial shall be described in the activity plan. At re-certification audits the certification body shall assess whether there has been a significant deviation from the operational conditions declared at the certification audit. If such a deviation is identified operators shall carry out the materiality assessment again.

2.10. Net consumption of useful heat or electricity

- 2.10.1. Any energy recovery resulting from process configurations may lead to a reduction in the additional net consumption of a specified type of energy or a shift in net demand from one energy type to another. Therefore, for the calculation of net electricity or net useful heat consumption, operators shall assess the overall change in demand after such recovery processes have been implemented. The calculation of net consumption shall exclude any electricity or heat both produced and consumed on-site at the capture facility or the storage site or for the transport infrastructure. Emissions associated with electricity or heat generated on-site at a facility shall be accounted for separately by consideration of the fuel consumed. The overall change in demand corresponds to the difference between the quantity of electricity or heat imported from outside the facility for use directly by the activity and the quantity of electricity or heat that is exported for other uses that was recovered from processes directly required for the activity, including downstream processes such as CO₂ liquefaction. The calculation of net electricity or net useful heat consumption shall not include any heat or electricity that is produced specifically for export from the facility rather than recovered from a necessary process.
- 2.10.2. Where the net quantity of consumed heat or electricity is less than the gross quantity and this heat or electricity originates from more than one source, the net consumption from each source shall be calculated proportionally so that:

$$Q_{\text{heat/elec,net,source}} = Q_{\text{heat/elec,gross,source}} * \frac{\sum_{\text{sources}} Q_{\text{heat/elec,net,source}}}{\sum_{\text{sources}} Q_{\text{heat/elec,gross,source}}} \quad (44)$$

Variable	Description
$Q_{\text{heat/elec,gross,source}}$	gross quantity of electricity or useful heat from a given source consumed in the certification period;
Sources	Index of sources of heat or electricity.

2.10.3. In case of a net increase in availability of a type of energy as a result of energy recovery, the quantity (Q_{heat} or Q_{elec}) may be reported as a negative value.

Operators shall ensure that any above-mentioned negative quantity is substantiated through correct process assumptions. In the case that one or both of the terms Q_{heat} or Q_{elec} calculated for a process element is negative, then the accompanying emission factor (EF_{heat} or EF_{elec}) shall be set to zero (i.e. there shall never be a negative term for GHG_{heat} or GHG_{elec}).

2.11. Additional biomass consumption

2.11.1. Additional biomass consumption refers to the biomass, biofuel, bioliquid and biomass fuel that is consumed specifically to provide energy for a carbon capture process. In the case that heat is recovered from an existing biomass-based process whose primary aim is not the production of heat or electricity, and is used by the capture facility, this shall not be treated as a form of additional biomass consumption and shall instead be assessed using an emission factor for the consumed heat following Section 2.12.

Bioenergy facilities generating only electricity

2.11.2. In the case that carbon is captured at a bioenergy facility generating only electricity and some of this own electricity is consumed to power the carbon capture process, the additional biomass consumption Q_{biomass} shall be calculated from the net amount of own electricity consumed in accordance with equation (45).

$$Q_{\text{biomass}} = \frac{Q_{\text{elec}}}{\eta_{\text{elec}}} \tag{45}$$

Variable	Description
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Q_{elec}	the net consumption of own electricity;
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η_{elec}	the electrical efficiency of the facility, defined as the electricity produced in the certification period, including the electricity consumed for carbon capture, divided by the fuel input in the certification period based on its energy content.
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Bioenergy facilities generating only heat

2.11.3. In the case that carbon is captured at a bioenergy facility generating only heat and some of this own heat is consumed to power the carbon capture process, the additional biomass consumption Q_{biomass} shall be calculated from the net amount of own heat consumed in accordance with equation (46).

$$Q_{\text{biomass}} = \frac{Q_{\text{heat}}}{\eta_{\text{heat}}} \tag{46}$$

Variable	Description
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Q_{heat}	the net consumption of own heat;
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η_{heat}	the heat efficiency of the facility, defined as the heat produced in the certification period, including the heat consumed for carbon capture,
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divided by the fuel input in the certification period based on its energy content.

Bioenergy facilities generating a mix of heat and electricity

2.11.4. In the case that carbon is captured at a bioenergy facility generating both electricity and heat, the additional biomass consumption Q_{biomass} shall be calculated from the net amount of own electricity and own heat consumed in accordance with equation (47), whereby the value Q_{biomass} shall be > 0).

$$Q_{\text{biomass}} = \frac{(C_{\text{elec}} * Q_{\text{elec}} + C_{\text{heat}} * Q_{\text{heat}})}{(C_{\text{elec}} * \eta_{\text{elec}} + C_{\text{heat}} * \eta_{\text{heat}})} \quad (47)$$

Variable	Description
Q_{elec}	the net consumption of own electricity;
η_{elec}	the electrical efficiency of the facility under typical operational conditions. This may either be calculated as the electricity produced in the certification period, including the electricity consumed for carbon capture, divided by the fuel input in the certification period based on its energy content, or may be set for the whole activity period based on technical documentation (design values) of the installation;
Q_{heat}	the net consumption of own heat;
η_{heat}	the heat efficiency of the facility under typical operational conditions. This may either be calculated as the heat produced in the certification period, including the heat consumed for carbon capture, divided by the fuel input in the certification period based on its energy content, or may be set for the whole activity period based on technical documentation (design values) of the installation;
C_{elec}	The fraction of exergy in the electricity, set to 1;
C_{heat}	Carnot efficiency (fraction of exergy in the useful heat), defined as $C_{\text{heat}} = \frac{(T_{\text{heat}} - T_0)}{T_{\text{heat}}}$ where T_{heat} is the average temperature of the consumed heat in K (kelvin), and T_0 is 273.15 K.

The two parameters η_{elec} and η_{heat} must be set consistently, either both by calculation or both by reference to technical documentation. If the values are based on technical documentation then they must be set on the same basis as if they were calculated (i.e. expected electricity and heat output, respectively, divided by expected fuel consumption in a representative mode of operation) and the certification body shall verify that the values used are consistently achievable under nominal operation of the facility, and that the mode of operation used to set the values is a reasonable representation of the way in which the installation is actually operated.

2.12. Emission factors

Electricity

2.12.1. The emission factor applied in the calculation of emissions associated with any net electricity consumption (EF_{elec}) shall be calculated in accordance with paragraphs 5 and 6 of Part A of the Annex to Commission Delegated Regulation (EU) 2023/1185⁷.

By way of derogation from the first paragraph:

- (a) the calculation period for the electricity emission factor may be less than a calendar year and may span across parts of two calendar years; the certification period includes only part of one or two calendar years:
 - (i) if the certification period falls entirely within a single calendar year, the electricity emission factor shall be calculated either based on data for the exact certification period or on data for the full calendar year;
 - (ii) if the certification period spans across two calendar years, an electricity emission factor shall be calculated for electricity consumed in each of those calendar years either based on data for the exact part of the certification period falling in each year or on data for the full calendar years;
- (b) for any activity based on a new capture facility for which a final investment decision is made and construction has started no later than 31 December 2029, and for which the operator claims a zero emission factor for consumed electricity on the basis that the electricity is fully renewable, then if the operator is required to demonstrate temporal correlation between the consumption and generation of the renewable electricity, that temporal correlation may be assessed on an annual basis instead of on an hourly basis until 31 December 2044 or the end of the first activity period, whichever is sooner.

2.12.2. Operators may choose the approach to attribute greenhouse gas emissions values to the electricity for each source of consumed electricity independently, i.e. they are not required to use the same approach for setting the emission factor for electricity consumed in different locations.

2.12.3. In the case of net electricity export (a negative value for Q_{elec}) the emission factor shall be zero.

Heat

2.12.4. The following emission factors shall be applied in the calculation of emissions associated with any net heat consumption:

- (a) for heat that is recovered from a process that is part of the activity: there are no additional emissions;
- (b) for heat that is generated by combustion of fossil fuels: lifecycle emission factors for fossil fuel supply and combustion set out in the latest version of the Joint Research Centre document *Definition of input data to assess GHG*

⁷ Commission Delegated Regulation (EU) 2023/1185 of 10 February 2023 supplementing Directive (EU) 2018/2001 of the European Parliament and of the Council by establishing a minimum threshold for greenhouse gas emissions savings of recycled carbon fuels and by specifying a methodology for assessing greenhouse gas emissions savings from renewable liquid and gaseous transport fuels of non-biological origin and from recycled carbon fuels ([OJ L 157](#) of 20.6.2023, p.20).

*default emissions from biofuels in EU legislation*⁸ divided by the thermal efficiency of the heat generation process;

- (c) for heat that is generated from biomass, biofuel, bioliquid or biomass fuel other than the case of own-heat consumption by a facility capturing CO₂ from biomass consumption for energy generation: emission factors for the supply and combustion (excluding CO₂ from combustion) of the biomass, biofuel, bioliquid or biomass fuel used, calculated in accordance with Annex VI to Directive (EU) 2018/2001 divided by the thermal efficiency of the heat generation process;
- (d) for heat that is generated from non-biomass renewable sources: the emission factor is equal to zero;
- (e) for heat from nuclear energy production: the emission factor is equal to zero;
- (f) for heat that is recovered from a process from which heat was not previously recovered until a maximum of three months prior to the start of the activity): emission factor is equal to zero;
- (g) for heat that 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 start of the activity, and that process is not directly related to the activity: the emission factor shall be set to the EU ETS benchmark emission factor for heat;
- (h) for heat that is supplied from a heat network: the emission factor shall be set to the EU ETS benchmark emission factor for heat.

2.12.5. In the case of net heat export (a negative value for Q_{heat}) the emission factor shall be zero.

Biomass

2.12.6. When biomass, biofuel⁹, bioliquid¹⁰ or biomass fuel¹¹ meeting the sustainability requirements set out in Article 29 of Directive (EU) 2018/2001 is consumed for an activity (see Section 2.6), any CO₂ produced by chemical processes from the carbon atoms therein contained shall be accounted for with a CO₂ emission factor equal to zero, but the supply chain emissions for provision of the biomass, biofuel, bioliquid or biomass fuel shall be accounted for, and any non-CO₂ emissions associated with biomass combustion (primarily CH₄ and N₂O) shall be accounted for.

2.12.7. The emission factor applied in the calculation of supply chain emissions associated with any consumption of biomass, biofuel, bioliquid or biomass fuel for the activity shall be calculated in accordance with the rules for calculating the GHG emissions associated with biomass, biofuel, bioliquid or biomass fuel supply set out in Annex V and Annex VI to Directive (EU) 2018/2001, considering the emissions up to the point of consumption associated with the terms e_{ec} , e_l , and e_p as defined in those annexes plus emissions associated with transport (see rule 2.12.8), and converting where necessary from emissions per unit of energy produced by a bioenergy facility to

⁸ Edwards, R., O'Connell, A., Padella, M., Giuntoli, J., Koeble, R., Bulgheroni, C., Marelli, L., Lonza, L., Definition of input data to assess GHG default emissions from biofuels in EU legislation, Version 1d - 2019, EUR 28349 EN, Publications Office of the European Union, Luxembourg, 2019, ISBN 978-92-76-02907-6, doi:10.2760/69179, JRC115952. <https://data.europa.eu/doi/10.2760/69179>.

⁹ Liquid fuel for transport produced from biomass.

¹⁰ Liquid fuel for energy purposes other than for transport produced from biomass.

¹¹ Gaseous or solid fuel produced from biomass.

emissions per unit of feedstock consumed. As in Directive (EU) 2018/2001, wastes and residues shall be considered to have zero life-cycle greenhouse gas emissions up to the process of collection of those materials. For municipal waste, post-consumer wood waste and sewage sludge the ‘process of collection’ for the purposes of emissions calculation under Regulation (EU) 2024/3012 shall be understood to start only when the material is deposited at the facility at which the CO₂ capture activity will be implemented (for example at an energy recovery facility).

- 2.12.8. Emissions for transport of the biomass, biofuel, bioliquid or biomass fuel to the capture facility shall be calculated based on the actual distance travelled and mode of transport, whereby the disaggregated default emission factors listed for the e_{td} term shall not be used. With regard to indirect land-use change (ILUC) emissions, the requirements set in rules 4.3.1–4.3.4 prevent the increase in the consumption of food and feed crops or food and feed-crop based biofuels, bioliquids or biomass fuels to supply on-site heat or electricity used for the CO₂ capture process and therefore ILUC emissions shall be set to zero.
- 2.12.9. In the event that an operator uses biomass feedstocks that do not have disaggregated default values in the Annexes to Directive (EU) 2018/2001, the calculation of the associated biomass supply chain emissions shall be performed following a similar scope as in this Directive and attributional LCA conventions. This shall include all relevant life cycle stages up to the system boundary defined in the Directive, using activity data and emission factors that reflect average or activity-specific conditions rather than marginal effects. Where relevant, calculations shall be consistent with the principles and framework set out in ISO 14067 (Greenhouse gases – Carbon footprint of products – Requirements and guidelines for quantification).

Inputs and fuels

- 2.12.10. Where the quantification rules 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 following hierarchical list of sources, sourcing the emission factors from the first source in the list from which it is available and using, where available, the most recent version of the sources:
- (a) part B of the Annex to Delegated Regulation (EU) 2023/1185;
 - (b) the most recent version of the Environmental Footprint datasets, or EF-compliant datasets;
 - (c) the Joint Research Centre document, *Definition of input data to assess GHG default emissions from biofuels in EU legislation*;
 - (d) the JEC Well-to-Wheels report¹²;
 - (e) the ECOINVENT database, version 3.5 or a more recent version, or other comparable commercial databases;
 - (f) official sources such as the Intergovernmental Panel on Climate Change (IPCC), International Energy Agency (IEA), or government;
 - (g) other reviewed sources or peer-reviewed publications.

¹² Prussi, M., Yugo, M., De Prada, L., Padella, M., Edwards. JEC Well-To-Wheels report v5. EUR 30284 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-20109-0, doi:10.2760/100379, JRC121213, <https://data.europa.eu/doi/10.2760/100379>.

Where access to any databases under subrule (e) is not possible, operators may rely on subrules (f) or (g) above.

- 2.12.11. The lifecycle emission factors shall reflect the emissions associated with supplying those inputs up to the point of use by the activity. If necessary, emission factors taken from the sources listed in rule 2.12.10 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. Operators are not required to recalculate data from these sources to achieve full consistency in lifecycle scope across the utilised input data.

Transport

- 2.12.12. Emissions from transport, whether of CO₂ or of bulk materials, may be calculated based on assessment of the fuel consumption and consequent emissions associated with the specific vehicles and routes utilised.
- 2.12.13. Where default values are not used, operators may estimate the emissions either by recording the actual fuel consumption of the vehicles and other infrastructure utilised; or by calculating the product of the average GHG emissions associated with operating the specific vehicle or infrastructure (in gCO₂e/km) and the distance travelled. GHG emission factors for fuels consumed shall be set on a lifecycle basis (i.e. including upstream emissions) in accordance with rules 2.12.10–2.12.11. GHG emission factors for vehicles transporting CO₂ shall account for the mass of the CO₂ containment equipment and for energy expenditures to compress and liquefy the CO₂ and maintain it in that state. Operators shall account for the emissions associated with the return trip of vehicles used to transport CO₂ or bulk materials considering them empty, unless they demonstrate that the return trip is used to provide another transport service. In that case the return emissions allocated to the activity may be set at zero for those trips.

2.13. Capital emissions

- 2.13.1. If the quantification rules require the consideration of capital emissions associated with one or more facilities, the following shall apply:
- (a) if any facility first came into operation or has been expanded or refitted within 15 years prior to the certification date of the activity, or will be expanded or refitted within the activity period, the capital emissions associated with that construction, expansion or refit shall be considered;
 - (b) for any other facility, 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, the capital emissions shall 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 or equipment that is directly required for the performance of the activity (i.e. specifically required for the CO₂ capture and not solely for the underlying activity from which CO₂ is captured).

- 2.13.2. If capital emissions are to be assessed, 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 shall consider the full lifecycle of the materials and energy utilised. The calculated capital emissions for each facility shall be amortised by dividing them across either fifteen or twenty years. In cases where not all of the CO₂ handled by the facility is associated with the activity certified under Regulation (EU) 2024/3012 (e.g. if some of the CO₂ is transferred for utilisation) a pro-rata fraction of the capital emissions shall be allocated to the activity. In the case that a facility has equal or lower material requirements for construction than a previously constructed facility of the same type, operators may use the capital emission for that previous facility as an estimate of capital emissions for the new facility.
- 2.13.3. This amortised emission shall be added to the associated GHG emissions for the activity for each year until either the fifteenth or the twentieth year (depending on the operator's chosen amortisation period) following the year in which the facility came into operation, was expanded or was refitted, as relevant, in accordance with equation (48).

$$GHG_{\text{capital}} = \frac{Q_{\text{activity}}}{Q_{\text{total}}} * \frac{(GHG_{\text{combustion}} + GHG_{\text{elec}} + GHG_{\text{heat}} + GHG_{\text{materials}})}{T} \quad (48)$$

Variable	Description
T	amortisation period of either 15 or 20 years;
Q _{activity}	utilisation of the capital equipment by the activity in a relevant unit;
Q _{total}	expected annual average total utilisation of the capital equipment over its operational lifetime in the same unit (so that Q _{activity} /Q _{total} = 1 if the equipment is used only by the activity)
GHG _{combustion}	emissions due to fuel consumption in the construction of the facility, calculated as in rule 2.8.9;
GHG _{elec}	emissions due to electricity consumption in the construction of the facility, calculated as in rule 2.5.5 (DACCS) or 2.6.10 (BioCCS), and in rule 2.8.9 (both DACCS and BioCCS);
GHG _{heat}	emissions due to net consumption of useful heat in the construction of the facility, calculated as in rule 2.5.6 (DACCS) or 2.6.11 (BioCCS), and in rule 2.8.9 (both DACCS and BioCCS);
GHG _{materials}	emissions due to consumption of materials utilised in the construction of the facility, as further defined in rule 2.13.4.

- 2.13.4. The parameter GHG_{materials} refers to the emissions due to consumption of materials utilised in the construction of the capture facility. GHG_{materials} shall be calculated in accordance with with equation (49)

$$GHG_{\text{materials}} = \sum_{\text{materials}} Q_{\text{materials}} * EF_{\text{materials}} \tag{49}$$

Variable	Description
$Q_{\text{materials}}$	quantity of materials utilised in the construction of the facility, expressed in t;
$EF_{\text{materials}}$	emission factor for the utilised materials, expressed in tCO ₂ /t of material, selected in accordance with Section 2.12.

2.14. Measured data and uncertainties

- 2.14.1. Measurements, including measurements of CO₂ flows, shall be undertaken in a way consistent with the requirements of Article 42 of Implementing Regulation (EU) 2018/2066.
- 2.14.2. Where measured, estimated 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.
 - (a) Operators shall follow the principles for combining uncertainties set out in Section 3 of Chapter 6 ('Quantifying Uncertainties in Practice') of the IPCC document *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*¹³. Uncertainty shall be assessed based on the 95 % confidence interval.
 - (b) If the total resulting uncertainty estimate is lower than ± 2.5 %, no adjustment shall be applied (i.e. F_c = 1). Otherwise, the conservatism factor F_c shall be set to 100% minus the total uncertainty estimate.
 - (c) If the total resulting uncertainty estimate is greater than ± 20 %, no units shall be issued for that certification period.

2.15. Confirmation of origin of CO₂ stream

- 2.15.1. For carbon removal activities with CO₂ capture and permanent carbon storage, if the facility at which the CO₂ is captured is not subject to monitoring under the ETS of the biogenic CO₂ amount, the operators shall provide access, immediately at request, to representatives of certification bodies, certification schemes or relevant national authorities to allow unannounced random C14 testing of the CO₂ stream leaving the facility prior to the point of leaving the facility (and if relevant prior to being intermixed with any separately captured fossil CO₂ stream) to confirm its atmospheric or biogenic origin. If the atmospheric or biogenic origin cannot be confirmed then no units may be issued for the corresponding certification period, and the certification scheme must consider whether further action is required.

¹³ Penman, J., Kruger, D., Galbally, I., Hiraishi, T., Nyenzi, B., Emmanuel, S., Buendia, L., Hoppaus, R., Martinsen, T., Meijer, J., Miwa, K., & Tanabe, K. (Eds.). (2000) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC National Greenhouse Gas Inventories Programme, Institute for Global Environmental Strategies ISBN 4-88788-000-6, <https://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

3. Carbon storage and liability

- 3.1.1. The CO₂ captured by the activity shall be injected at an operational geological storage site permitted under Directive 2009/31/EC and operators of storage sites used by DACCS and BioCCS activities are liable for any release of CO₂ from permanent geological storage under the rules set out in Article 16 of Directive 2009/31/EC.

4. Sustainability

4.1. Minimum sustainability requirements

Climate change mitigation

- 4.1.1. The eligibility requirements listed in Section 1.1 prevent the certification of activities that significantly harm the objective of climate change mitigation.

Climate change adaptation

- 4.1.2. Operators shall comply with the criteria related to climate adaptation set out in Appendix A to Annex 1 to Commission Delegated Regulation (EU) 2021/2139¹⁴.

Sustainable use and protection of water and marine resources

- 4.1.3. Operators shall evaluate and address 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. In the case that pollutants that are scrubbed from flue gases in order to reduce air pollution may be released to a body of water, the air pollution benefit and the availability of alternative discharge strategies shall be taken into consideration when evaluating the impact on water quality.

Transition to a circular economy, including the efficient use of sustainably sourced bio-based materials

- 4.1.4. Operators shall evaluate and address any potential risks to the circular economy objectives from the activity, by considering the types of potential significant harm as set out in Article 17(1), point (d), of Regulation (EU) 2020/852 of the European Parliament and of the Council¹⁵. Operators shall comply with the requirements set in Sections 4.2 and 4.3.

Pollution prevention and control

- 4.1.5. Operators shall evaluate and address any potential risks to generate a significant increase in the emissions of pollutants to air, water or land from the activity. Where facilities are within the scope of Directive 2010/75/EU of the European Parliament and of the Council¹⁶ they shall comply with all requirements arising from that Directive.

Protection and restoration of biodiversity and ecosystems including soil health, as well as avoidance of land degradation

- 4.1.6. Operators shall evaluate and address 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 or to the achievement of targets or obligations set

¹⁴ Commission Delegated Regulation (EU) 2021/2139 of 4 June 2021 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by establishing the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to climate change mitigation or climate change adaptation and for determining whether that economic activity causes no significant harm to any of the other environmental objectives ([OJ L 442](#), 9.12.2021, p. 1)

¹⁵ Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088 ([OJ L 198](#), 22.6.2020, p. 13).

¹⁶ Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial and livestock rearing emissions (integrated pollution prevention and control) (recast) ([OJ L 334](#), 17.12.2010).

out in national restoration plans established under Regulation (EU) 2024/1991 of the European Parliament and of the Council¹⁷, from the activity.

4.2. Biomass sustainability

- 4.2.1. All biomass, biofuel, bioliquid or biomass fuel that is used to generate the CO₂ captured by the activity and any additional biomass, biofuel, bioliquid or biomass fuel consumed to produce energy for the activity shall comply with the following requirements:
- (a) where Article 29 of Directive (EU) 2018/2001 sets requirements that are to be met in order for biofuels, bioliquids and biomass fuels to be taken into account for the purposes referred to in Article 29(1), points (a), (b) and (c), of that Directive, those requirements shall be applied by the certification body also to biomass, biofuel, bioliquid or biomass 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 Directive (EU) 2018/2001;
 - (b) operators shall disclose the biomass feedstock or feedstock mix consumed by the activity, and the biomass feedstock or feedstock mix used to produce consumed biofuels, bioliquids or biomass fuels, disaggregating feedstock to the level required in Directive (EU) 2018/2001 reporting, in national guidance and in relevant industrial standards;
 - (c) certification bodies are required to verify that the requirements in Article 29(10) of Directive (EU) 2018/2001 are met only in the case of a capture activity taking place at a facility producing heat or electricity or a biofuel, bioliquid or biogas, and with regard to the heat, electricity, biofuel, bioliquid or biogas produced;
 - (d) the biomass, biofuel, bioliquid or biomass fuel produced from wastes or residues other than agricultural, aquaculture, fisheries and forestry residues, is not subject to the requirements set out in Article 29(2) to (7) of Directive (EU) 2018/2001
- 4.2.2. Voluntary schemes approved by the Commission in accordance with Article 30(4) of Directive (EU) 2018/2001 and national schemes recognised by the Commission in accordance with Article 30(6) of Directive (EU) 2018/2001 shall be treated as providing accurate data for the demonstration of compliance with the biomass sustainability requirements for permanent carbon removal activities of this methodology. Similarly, any other schemes that have been recognised by competent national authorities in the state where the capture facility is located shall be treated as providing accurate data in relation to the demonstration of compliance with these requirements.
- 4.2.3. With regard to facilities regulated under Directive (EU) 2018/2001, periodic assessments of the compliance with sustainability requirements by Member State competent authorities shall not prevent certification bodies approving the issuance of units. However, if such assessment subsequently results in any non-conformity with Article 29 of that Directive, the non-conformity shall be notified to the certification bodies.
- 4.2.4. Where the CO₂ captured by the activity is produced by a process that generates energy that is taken into account under Directive (EU) 2018/2001:

¹⁷ Regulation (EU) 2024/1991 of the European Parliament and of the Council of 24 June 2024 on nature restoration and amending Regulation (EU) 2022/869 ([OJ L, 2024/1991](#), 29.7.2024).

- (a) the certification body shall verify that the national implementation of Directive (EU) 2018/2001 applies to the entity operating that process, and that the entity operating that process complies with this national implementation;
 - (b) the certification body shall verify that the entity operating that process complies with any measures in national implementations of Directive (EU) 2018/2001 that are introduced to ensure that woody biomass is used according to the list of priorities established in Article 3(3) of Directive (EU) 2018/2001, including any derogations introduced by Member States under Article 3(3a) of Directive (EU) 2018/2001, if the entity operating that process benefits from a relevant support scheme for the energy production;
 - (c) the certification body shall verify that the entity operating that process does not receive direct financial support from Member States for the use of saw logs, veneer logs, industrial grade roundwood, stumps and roots to produce energy, as set in Article 3(3c) of Directive (EU) 2018/2001;
- 4.2.5. The biomass, biofuel, bioliquid or biomass fuel from which emitted CO₂ is captured, or from which the biofuel, bioliquid or biomass fuel from which the emitted CO₂ is captured is produced, shall not be identified as being or as being produced from a high indirect land use change-risk feedstock under Directive (EU) 2018/2001.
- 4.2.6. If biomass is sourced from areas designated by the national competent authority for conservation, including areas covered by the national restoration plan pursuant to Regulation (EU) 2024/1991, or in habitats that are protected, the sourcing shall be in accordance with the conservation and restoration objectives for those areas.

4.3. Avoidance of unsustainable demand for biomass raw material

Requirements for BioCCS

- 4.3.1. Any biomass, biofuel, bioliquid or biomass fuel from which CO₂ emitted is captured shall be consumed with the primary purpose of generating a product other than CO₂ for capture, and the process shall not be adjusted in a way that increases the generation of CO₂ per unit of output if that adjustment is made solely to increase the quantity of CO₂ that is available to be captured. This shall not be understood to preclude adjustments made to increase the fraction of the facility's output that can be made subject to CO₂ capture – for example if a facility has two combustion units one of which has a carbon capture unit, the facility may seek to maximise the use of the unit with carbon capture even if this marginally reduces the overall thermal efficiency of the facility – or to increase the overall efficiency of a production system.
- 4.3.2. In order to ensure the avoidance of unsustainable demand for biomass raw material, the following additional requirements apply to facilities where the primary purpose of biomass, biofuel, bioliquid or biomass fuel consumption is to produce heat or electricity (with exceptions as detailed in rule 4.3.3):
- (a) where the facility generating heat or electricity is a newly-constructed facility that became operational not more than one year before the start of the activity period, or a facility that previously consumed fossil fuel feedstock, either partly or entirely, and that was adjusted to increase the share of biomass, biofuel, bioliquid or biomass fuel in the feedstock mix not more than one year before the start of the activity period, operators shall demonstrate that the facility would still be economically viable without the carbon removal activity, i.e. that the net present value would be positive for

a version of the facility without the cost of carbon capture or the revenue from carbon removal units or any other support predicated on the delivery of carbon removals;

- (b) in all other cases, the operator shall demonstrate that the nameplate energy generation capacity of the facility has not increased by more than the amount necessary to supply energy for the capture process, as compared to the nameplate capacity on whichever date is later out of the date on which the facility became operational and the date three years prior to the start of the activity period.

4.3.3. The requirements in rule 4.3.2 do not apply to waste-to-energy facilities combusting wastes or residues other than agricultural, aquaculture, fisheries and forestry residues, nor to facilities using biomass, biofuel, bioliquid or biomass fuel for non-energy applications or for energy applications where heat and or electricity are not the primary outputs (e.g. biofuel or biogas production), nor to facilities where biomass, biofuel, bioliquid or biomass fuel is used as part of a chemical reaction in an industrial process aimed at producing a product other than heat or electricity, even if energy is also extracted from the biomass, biofuel, bioliquid or biomass fuel in this process.

4.3.4. Where the feedstock processed at the installation from which CO₂ is captured includes food and feed crops or food and feed crop-based biofuels, bioliquids or biomass fuels, it is not permissible for energy derived from that feedstock to be used to operate the capture process, excepting the case of recovered heat.

Voluntary compensation of biomass used by carbon removal activities

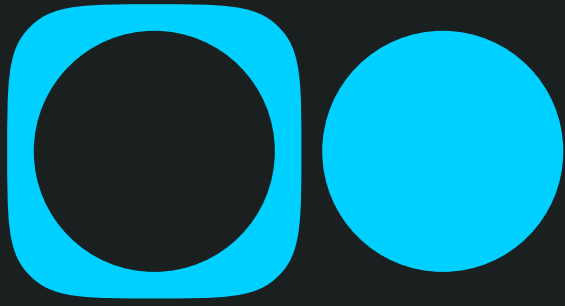
4.3.5. To support the regeneration of natural carbon stocks used for the generation of permanent carbon removals, operators of carbon removal activities that are based on consumption of biomass feedstock may purchase carbon farming sequestration units.

- (a) The quantity of carbon farming sequestration units purchased by the operator shall be reported in the certificate of compliance.

Document History

The new version of the document is effective on Issue Date.

Version	Issue Date	Comment
V 1.0	01 June 2026	Initial version published



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Puro.earth is the world's leading market infrastructure provider for engineered carbon dioxide removal (CDR). Backed by Nasdaq, we provide the certification frameworks, scientific standards, and digital systems that allow engineered CDR to scale and operate as an investment-grade market.

At the core of this infrastructure is the Puro Standard - the world's first dedicated standard for engineered carbon removals. Our methodologies are used by suppliers to certify their carbon removal solutions that durably store carbon dioxide for at least 100 years, and in many cases, over 1000 years. We have certified over 100 engineered carbon removal projects to date, resulting in the issuance of CO₂ Removal Certificates (CORCs) in the Puro Registry as verified, traceable, investable assets. Our infrastructure is trusted by over 600 companies worldwide to purchase carbon removals with confidence, including Microsoft, McKinsey and BCG. It supports both voluntary and compliance pathways, including integration with CCS+ methodologies and readiness for emerging frameworks such as the EU CRCF.

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