Open natural carbon removal accounting for climate innovators
Open Natural Carbon Removal Accounting Guidelines

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1. About this document

These Oncra Guidelines are the accounting rulebook for the Oncra Open Natural Carbon Removal Accounting framework, stewarded by Climate Cleanup Foundation and hosted at oncra.org. It contains the main definitions, rationale, norms, methods and procedures. It is accompanied by four removal sector specific Protocol documents, on Land, Ocean, Rock and Construction Stored Carbon. The Guidelines and Protocols offer the accounting rules enabling thorough and fast carbon removal project assessments.

Version control

7 Feb 2022 First draft
12 Feb 2022 Added Methods and Norms, Real World Data principle, Ex Ante rules
1 March 2022 Buffer pool updated; 20, 35 and 50% over different TRL tiers
11 March 2022 ‘Optional’ added to transaction platform description, and clause under which CRCs may be sold outside this platform
11 June 2022 Chain Certification, Double Counting and Permanences created
‘Certificates’ and ‘CRCs’ -> ‘(removal) credits’
‘Metrics’ -> framework structure
Framework Structure elaborated on
Transaction Platform and Price moved to new Climate Cleanup transaction platform Guideline document
20 June 2022 Guidelines restructured to better follow assessment flow
11 July 2022 Ledger status and Development credit rules added
15 July 2022 Minimum soil carbon measurement interval changed from two to four years
4 November 2022 Assessment phases updated (certification before MRV)
1. What is Oncra?

Oncra is an accounting framework and cooperative enterprise, established by Climate Cleanup Foundation, headquartered in Amsterdam, The Netherlands (see Article 4. Relationship between Oncra and Climate Cleanup). Oncra was started because Removers and investors experienced a need for measurement based efficient carbon removal accounting to enable distributed scaling. Buyers and investors in removal credits experience the need for trustworthy assessments. Both groups have an incentive to keep costs low while keeping trust and efficiency high.

For thousands of climate entrepreneurs developing nature based solutions, Oncra aims to be the world’s go to carbon accounting platform that quantifies and verifies carbon removal with natural methods. Oncra is open source and builds trust through data driven empirical crediting processes. It pools project data, rendering the accounting process efficient. Oncra is effective for innovation, also because it operates without upfront costs for Removers.

Framework design principles for Oncra are aligned with the actual climate and nature crisis. These principles include: open, transparent, science based, empirical crediting, based on real data, supporting innovation, focus on natural removal, as simple as possible but not simpler, adherence to the oxford offsetting principles, and including all systemic benefits.

How does Oncra include all systemic benefits? The climate crisis doesn’t come in isolation; it is a result of humanity’s past relationship with natural systems. Nature based Solutions are systemic in that they solve the climate and biodiversity crises at the same time. This ‘multi-potency’ on a systemic level translates into a host of almost ‘too good to be true’ advantages, as most solutions provide life supporting services like clean water, habitat, nature parks, clean energy, and materials actually storing carbon. While a Doughnut analysis is performed on at least a binary (yes/no) level, all nature based removals allowed into the Oncra accounting framework are by nature regenerative: they do more good than harm to human and natural ecosystems. Oncra aligns itself with the actual climate crisis, enabling distributive scaling in carbon removal towards gigaton scale.

2. Definitions

Carbon Removal Credits (CRCs) are representations of Nature based carbon dioxide removed from the air or oceans and stored for a certain period of time. The removal credits allow Removers to be compensated for their removal services. Carbon Removal Credits are carbon accounting units representing the actual sequestration of one metric ton of CO₂ (as CO₂ equivalent) from the atmosphere or oceans. Each CRC represents a ton of carbon dioxide that is both removed and stored for at least 100 years, or is corrected for this timescale, in line with IPCC conventions on permanence, using ton-year accounting principles.
Carbon Removal Certificate a certificate issued by Oncra in accordance with the processes described in these Guidelines, mentioning the amount of removal credits it represents, based on the tons of CO₂ removed.

Nature-based Solutions (NbS) refer to human-enhanced natural processes to both restore nature and remove and store carbon dioxide. NbS includes carbon farming, also with construction crops like bamboo, seaweed cultivation, rock weathering, mangrove restoration, reforestation, and many more (see e.g. the Oxford University Nature-based Solutions Initiative). NbS helps solve both the climate and extinction crises, as they remove carbon while preserving biodiversity. The solutions are found in four realms: on land, in oceans, with rocks and human constructions. The removers are for example seaweed farmers, carbon farmers growing construction crops like bamboo or hemp, builders using bio-based construction materials, and entrepreneurs developing enhanced rock weathering processes.

Carbon Removal Project or Project The activities at a specific Location where Remover significantly removes CO₂ with Nature-based Solutions, as described in the Data Validation Statement on the basis of which carbon removal credits are registered in the Ledger on the Remover’s name, in accordance with the Oncra Certification Confirmation.

Carbon Removal Chain is a Project defined as a value-chain. As opposed to a Project that describes a stock limited over place and time, a Removal Chain describes a removal process constantly taking place in a value chain. Removal Chain certification enables Removers to sell credits on an ongoing basis, taking away the need to register a new Project for eg. each new planting cycle.

Credit Point is the place in the value chain where the removal is accounted for. This is not necessarily the actual place of physical removal, but the point at which long term storage can be reasonably expected (for example, the point at which a bio based building material is leaving a factory gate).

Data Validation Statement means the statement provided by Oncra to Remover confirming the validation of the Project including the data and assumptions under which the Project is validated.

Guidelines mean the processes and rules as described in this document, that apply to the issuing of removal credits by Oncra or to any part of the process before or after that. Contracts between parties around Oncra refer to and are built on these Guidelines. The Guidelines may be amended by Oncra from time to time.

Ledger the registration bookkeeping of the removal credits issued by Oncra as published at the Oncra Accounting Platform.

Location means a plot or place where the Remover implements the carbon sequestration solution for which it receives a CRC and as further described in a Data Validation Statement. Each different Location is a separate project with a different data set and baseline.

Oncra Accounting Platform means the online platform, hosted online at www.oncra.org where Oncra facilitates the accounting of removal credits for Remover and Buyers, under the terms and conditions as mentioned in these Guidelines.
Sink Areas Parts of the natural world where carbon can be scalably stored, as indicated by the International Panel on Climate Change (IPCC) in Assessment Report 6, Chapter 12: Land, Oceans, Rocks and Constructions.

Carbon Removal Accounting Protocol The carbon accounting rules and methods that must be followed to arrive at reliable removal quantification data. Oncra is built on metrics for all four natural carbon sink areas, Land, Oceans, Rocks and Constructions. The metrics are contained in a protocol framework for each sink area. See for the protocol elements Chapter 4 on Framework Structure. Within the boundaries of the Protocols, a large number of existing Methods can be applied and followed. A list of these methods is available at www.oncra.org/methods.

Removers, or Carbon Removers, are social entrepreneurs who develop and implement Nature based Solutions for removing and storing carbon from the oceans and atmosphere.

Sub Remover means a third party within a removal sector that wishes to request for removal credits for a Carbon Removal Project through Remover through Oncra. This remover, the direct party to Oncra, is fully responsible and accountable for the subremovers information provision, legal and other arrangements.

Buyers are parties acquiring Carbon Removal Certificates from Carbon Removers. Buyers of Oncra removal credits should adhere to the Oxford Offsetting Principles (see Article 9.)

3. Oncra and Climate Cleanup Foundation

Relationship between Oncra and Climate Cleanup Foundation

Oncra was conceived of by Climate Cleanup Foundation and its related entrepreneurs. Oncra is an independent framework and verification service. The framework is a commons based set of carbon accounting rules. Using the Framework, Oncra operates an independent verification service. Currently the verification service is legally operated by Climate Cleanup Foundation. At the latest when 10 million metric tons of CO₂ are verified, Oncra as a verification service will be a social enterprise legally separated from Climate Cleanup Foundation. Until that point independence of review is provided by the practice of remunerating the verification team per assessment, instead of per carbon credit or on a per project basis.

Oncra itself does not provide marketplace services, the legal relationship between Buyers and Oncra is not a direct financial one. Oncra provides Buyers with access to the Ledger and certificates that were bought, but the marketplaces actually pay Oncra for its services at the moment a credit is sold. Marketplaces adhering to the Oxford Principles are allowed to sell Oncra removal credits, as long as they do pay the agreed verification service fee to Climate Cleanup Foundation.
Future-proof business model

Oncra thus operates as a governmental service, at a fixed fee. Climate Cleanup Foundation pays Oncra upfront for assessments, and takes a percentage of maximum 7% on the first sale of credits issued on the ledger to recoup assessment, certification and MRV costs. Any remaining balance is 100% invested in climate innovation, both in the Oncra framework and in new and better Nature-based solutions removing carbon with nature. A balance between low verification costs for Removers, optimal reliability and innovation is ensured by discussions in a yearly meeting with Removers and oversight by the Climate Cleanup Foundation's board.

4. Framework Structure

Oncra is based on four financial metrics, developed with financials, frontrunners in carbon removal and local governments. These metrics form the core of the Oncra sectoral accounting protocols for each removal sink area:

- Land Stored Carbon,
- Ocean Stored Carbon,
- Rock Stored Carbon and
- Construction Stored Carbon.

The Sectoral Carbon Removal Accounting Protocols are built on the general principles and guidelines set out in this document. The SCRAPs provide sector specific guidance on:

- eligible removal processes,
- system boundaries,
- the point of measurement of removal in the value chain (‘credit creation’) and
- the calculation and quantification of the removal
- the Measurement, Reporting and Verification (MRV) needs including minimal needed proof and evidence.

The Framework Structure is depicted as an accounting stack in Figure 1.

Figure 1. The Oncra Framework accounting stack

The Oncra Protocols specify for each sink area the framework guideline elements. Each element should be congruent with and may refer to applicable, existing rulebooks and methods found in the accounting framework stack. Unspecified elements will be understood as to default to the most fundamental (lower) stack items. This keeps actual removal project and process descriptions as short and simple as possible (but not simpler).

Oncra thus is not another standard, but rather a ‘standard of standards’, a framework facilitating removers and buyers while combining the best and most effective carbon accounting practices. Oncra integrates existing ‘Methods’ as developed by CDM, Gold
Standard, Verra, Puro and others with the financial PCAF standard, the emerging European Commission carbon removal credit guidance and GHG Protocol. Innovation is facilitated by working with trusted carbon data innovators. Oncra is developed by removers collaborating in Climate Cleanup Foundation, in an ecosystem of partners like a bank and regional governments. Oncra is a removal accounting framework operating in an open, transparent, effective, affordable, self-learning and entrepreneur/remover centred way.

5. Oncra Assessment Process Flow

In case a Remover wishes to obtain Certificates for its Project(s), a Project or Chain assessment follows the following process flow. The assessment flow follows three phases: quantify, verify and certify.

QUANTIFY
- Remover registers a Project with Oncra by submitting an application via the Platform
- Remover provides data necessary for Oncra assessment and signs contract via the Platform
- Remover company integrity is assessed by Oncra
- Project / Chain integrity is assessed by Oncra
- The Oncra Project assessment will be based on the framework elements (removal process, system, credit point, quantification metrics and MRV guidelines) in the applicable Oncra Carbon Removal Accounting Protocol
- the Innovation TRL level of the Project will be determined
- It will be determined how much CO2 will be removed

In case the Oncra assessment is finalised positively:
- a Data Validation Statement will be issued to Remover, in which the Protocol elements specific to the project are described, including the expected quantity of carbon removal.

In case the quantification procedure has a negative outcome and does not lead to the issuance of a Data Validation Statement:
- The Oncra application for Certificates can be rejected or reassessed, in which case the above procedure may be done again

After a positive finalisation of the quantification process by issuance of a Data validation Statement the Verification and Certification processes are started.

CERTIFY - Issuance of certificates (example below)
After issuance of the Data Validation Statement the number of credits will be credited to the Ledger.
- Remover is obliged to report any status changes to Oncra that will subsequently update changes in the Ledger
- In case Remover wishes to sell its Certificate or part of it to a buyer, Remover will inform Oncra and Oncra will check the Ledger if credits are sufficiently available.
If Remover wishes to sell more than 1.000 credits? Then Oncra performs a Buyer KYC.
In case (a) sufficient credits are available at the Ledger for the intended sale of credits by Remover to a buyer, (b) the KYC of buyer, if required, has a positive outcome, (c) and Remover has paid the fee as meant in article 13 then:
- The Ledger will be updated: buyer linked to credit(s), saleable quantity reduced
- A Certificate will be issued by Oncra in buyer’s name with number of credits purchased

VERIFY
- After a positive finalisation of the quantification procedure the monitoring process starts. The monitoring process includes:
  - periodical check of data and measurements: are commitments being made? Period is defined in Protocol.
  - after x years (time specified in Protocol): holding pool adjustment.
    Positive deviation: holding pool free, extra credits
    Negative deviation: holding pool cancelled, compensation from other projects AND/OR future projects
    Large negative deviation, bankruptcy, force majeure: credits marked as expired, but NO compensation for buyer or remover.

The three assessment phases are explained in more detail below.

Quantification
Quantification follows the accounting principles as set out in the applicable Sectoral Carbon Removal Accounting Protocol: Land, Ocean, Rock or Construction Stored Carbon. These protocols refer to accounting methods set out by bodies recognised in the Oncra Accounting Stack, and define specific sectoral accounting guidelines

Raw data is meticulously kept and stewarded, as these data points (like soil measurements) are the fundamental asset. LCA norms have to be adhered to (ISO 14040, and an LCA system diagram (including clear system boundaries) should be the basis of both quantification and verification analyses.
If no specific data on process emissions is available, a standard deduction for these emissions of at least 20% has to be included.

Carbon sequestration capacity may be estimated by referencing to comparable removal projects in similar ecosystems and environments.

Remover provides Oncra with specific information about the project before verification and credits can be added to the ledger. This information includes at least:

- name of field or location
- geo-location
- surface area
- final legal ownership: name and ID of final carbon value owner
- one photo of the project location
- one photo of the final carbon value owner
- written description of major project risks

Quantification of carbon removed is enabled by collaboratively proving at least:

- specification of carbon removal practice(s)
- certified* report of soil carbon baseline (in carbon dioxide weight-equivalent)
- estimation of soil carbon capacity using best available scientific data
- estimation or specification of full life cycle analysed operational impacts (carbon dioxide and other greenhouse gases, other impacts when relevant)
- any other relevant information that may affect the project’s climate impact

*Certified means the measurements are done following ISO 10694, 14235 and 14040 norms or comparable.

Certification (issuance of certificates)

After a positive project or chain assessment, Certificates are issued by Oncra on the Ledger in the Remover’s name.

Oncra provides the remover, at the moment of project validation, with access to:

- A Carbon Removal Certificate (CRC) congruent with the applicable metric, industry standard best practices and government prescribed (compliance) standard
- all of the removers own and derived data
- all of other removers’ carbon data unless marked proprietary
- actual estimates and assessments of the project’s carbon removal and wider climate impacts
- a TRL level assessment (1-9) over three tiers (see 7. Technology Readiness Level)
- an indication on permanence (how long is the carbon expected to be stored)
- all estimation and calculation methods and models developed within Oncra
- all actually used models and calculations to account and estimate climate value
Verification

In the Verification phase, the MRV Protocol specified in the Data Validation Statement has to be followed to reach reasonable assurance about the actual carbon removal. If the Remover fails to follow the MRV Protocol or if irregularities like deviations from the removal projection beyond the holding pool appear, Oncra may first give the credits the Ledger status Concern. Removers will be informed of the irregularities in written form. If Remover fails to respond such that the integrity is restored within two years of the first warming, Oncra may label the credits as Void. This is irreversible. No compensation for either Remover or Buyer can be claimed with Oncra, neither can the Buyer claim any form of compensation with the Remover. However, newly created credits in current or future Projects or Chains by the same Remover will automatically be allocated to the Buyer which has Void credits issued on its Ledger account.

In the case Verification shows that the projected removal has been realised, credits in the holding pool are released. If more removal has taken place, extra credits may be issued at the Removers’ initiative.

Remover is responsible for the accurate and concise data collection and allows Oncra at all times to verify the data internally or via independent parties. Removers will always allow Oncra at its Project for monitoring.

During Verification phase, the Remover has to provide at least, if applicable:

- Yearly carbon crop harvest information: tonnes of material, carbon content and end use, congruent with the financial Construction Stored Carbon (CSC) metric
- Certified soil carbon measurements at least once every three years
- Value Chain credits: sales volume information
- Any other relevant information that may affect the project’s climate impact

6. TRL Levels, Ledger, Buffer holding pool

Technology Readiness Level (TRL) assessment

Nature-based carbon removal is an early industry and innovation is desperately needed in face of the climate crisis. Oncra assesses Projects on three TRL level tiers. The three tiers cover TRL’s 1-3 for research phase projects, 4-6 for the development phase, and 7-9 for market ready integration phase projects. Removers may use data points with a lower margin of certainty, for example from non ISO certified labs or measurements, however this will result in certification under a lower TRL level tier.

<table>
<thead>
<tr>
<th>TRL Level tier</th>
<th>TRL 1-3</th>
<th>TRL 4-6</th>
<th>TRL 7-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovation phase</td>
<td>Research</td>
<td>Development</td>
<td>Integration</td>
</tr>
</tbody>
</table>

Research and Development Projects

For reversing climate change, innovation of natural carbon removal strategies is crucial. Scalable pathways like ocean based removal and enhanced weathering, but also
innovative pathways based on well developed practices like biobased building, have extreme high removal potential but are in early stages of development. Oncra facilitates research by enabling a special category of removal credits for the research phase. Research credits have a different MRV protocol rule: when the actual removal in a research project lags behind the ex-ante expectations, the Remover is not required to compensate for that beyond the bufferpool of the specific project: the credit’s status, in that case, is set as void. The risk for this lies with the buyer. The buyer is not allowed to offset emissions with Removal credits until they pass their MRV requirements and actual removal is delivered (at which time the project may also have over-performed). The Buyer can always claim the credits in their ESG or CSR reporting as investments in carbon removal. To compensate the Buyer for the larger risk, the bufferpool is large (50% or 35%, see below) and the price may be lower, at the Remover’s discretion. Research and development tier projects may deviate from the standard 20 year timescale to accommodate pilots and prototypes.

Buffer Pool

Onbra recognises inherent uncertainties in nature based climate solutions, and their certification. To ensure full integrity and mitigate the risk of reversal (stored carbon again emitted) and overestimation, without increasing the carbon accounting administrative burden, a substantial buffer pool is held. The size of the buffer is related to the TRL level, as indicated below in Tabel 2. .

<table>
<thead>
<tr>
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<th>TRL 4-6</th>
<th>TRL 7-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovation phase</td>
<td>Research</td>
<td>Development</td>
<td>Integration</td>
</tr>
<tr>
<td>Buffer pool</td>
<td>50%</td>
<td>35%</td>
<td>20%</td>
</tr>
</tbody>
</table>

Table 2: TRL Tiers with buffer pool requirements (% of certificates in holding awaiting final verification).

When a project is accepted into the Ledger, the indicated percentage of credits is marked as ‘on hold’, until the applicable MRV protocol has proven the actual physical removal and storage of the carbon dioxide (in the form of carbon). At that point, the number of credits for the project is adjusted according to the measurements, and the corresponding number of credits in the holding pool is either released for sale or destroyed.

If the project underperforms even the buffer pool, the Remover has to compensate from either existing or future projects. If the project overperforms, creating more removal than anticipated, the Remover will receive additional credits on the Ledger, in addition to the credits at that point released from the holding pool.

Ex ante innovation certification assurance needs

Ex ante certification enables certification of projects before the carbon has been actually removed and stored. It is crucial now for the development of Nature based Solutions, because scaling of value chains towards gigaton removal needs rapid innovation.
Ex ante certification is enabled by the combination of solid modelling, rigorous data collection regularly refining storage predictions, and best-in-industry buffer pools (see article 12.). The ex ante project reviewer must provide a complete, valid and accurate assessment following IAASB guidelines, delivering a limited assurance level for projects in the first two TLR tiers (1-3 and 4-6), while reasonable assurance is required for implementation of the highest TLR level projects (TRL 7-9).

Ex post provisions

As Oncra facilitates transition carbon finance, ex post credits are explicitly encouraged. Typically frontrunners will have ‘already started’, and on the other hand it is undesirable to provide e.g. farmers exploring carbon removal credits with an incentive to first lower the carbon content of their soil by ploughing before signing up. Removers applying for ex post credits will need to declare and prove that carbon funds will be used for further transition and carbon removal. Also Remover needs to declare that he or she will preserve the carbon sequestered for at least 20 years, with the intention of indefinite permanent storage. Ex post credits may be issued 20 years back in time, and as there is no uncertainty about the sequestration (it has already happened), the buffer pool works as an insurance against reversal.

7. Ledger rules

Oncra CRCs are issued as certificates and recorded on the Oncra carbon removal Ledger. All transactions of certificate ownership have to be recorded in the ledger, if not the Oncra certification status is immediately set to Void (see below), effectively destroying the credits.

Ledger Status Indications

Credits on the Leger related to Projects or chains can have different status, reflecting the actual removal process and integrity. These status indicators are:

- Holding: In holding pool
- Issued: Credits issued and available for transfer
- Transferred: Sold to Buyer
- Retired: Cancelled by Buyer to claim removal in reporting
- Concern: Applicable MRV protocol is not followed or shows irregularities
- Void: Project or chain integrity void by contingency or force majeure

8. Requirements for buyers: Oxford Offsetting Principles

Oxford University has defined a set of principles for carbon offsetting to be effective. For Removers the principles prescribe actual and long term removal with low reversal risk. For Oncra, the principles mean that Research and Development is a key priority, and carbon...
removal accounting should facilitate that. Buyers should first and foremost look at reducing their emissions, and only then start removing. As Oncra adheres to the Oxford Offsetting Principles, this means that high carbon emitting companies and individuals are not allowed to buy removal credits that have been accounted for using the Oncra framework. For a substantial, +1.000 ton CO₂ transaction to be added to the ledger a KYC with the buyer must be shared proving that the buyer is not listed in or over 10% invested in one of the companies listed in the Carbon Underground 200 list, as published at [https://fossilfreefunds.org/carbon-underground-200/](https://fossilfreefunds.org/carbon-underground-200/)

**The Oxford Offsetting Principles**

1. Reduce your emissions first, use high quality compensation and regularly review the compensation strategy as the procedures and methods (best practices) used evolve.
2. Shift from offsetting through carbon reduction to offsetting through carbon removal and storage.
3. Shifting to high-quality, long-term storage with a low risk of reversal.
4. Support research and development of methods and strategies aimed at carbon neutrality.

The Oxford Offsetting Principles can be found at [https://www.ox.ac.uk/news/2020-09-29-oxford-launches-new-principles-credible-carbon-offsetting](https://www.ox.ac.uk/news/2020-09-29-oxford-launches-new-principles-credible-carbon-offsetting)

**9. Oncra Assessment Principles**

The following Assessment Principles serve to guide the accounting decisions made in the Assessment Flow as set out before (Article 6.)

**Empirical Crediting: Real World Data Principle**

Most carbon removal project accounting needs some form of modelling and interpretation. While these models are never perfect, what we call Real World Datapoints (RWD) is the closest we can get to actual reality. Technological advantages (satellite, IoT sensing) using actual data enables empirical crediting. Oncra meticulously records real world data points, and acquiring these data points must be done by parties and labs following international standards and norms.

ISO norms, set by the International Organisation for Standardisation in Switzerland are the basis for rigorous and science based assessments. These include ISO 14064-1 (on the quantification of greenhouse gas emissions and removals) and ISO 14064-2 (providing project level guidance) and ISO 14064-3 (on validation and verification). All calculations must follow full life cycle assessment principles, as specified in ISO norms 14040 and 14044. On Soil Organic Carbon levels, for example, measurements must follow ISO 10694 (dry combustion method) or ISO 14235 (sulfochromic oxidation method), or comparable.
In addition to empirical crediting, Oncra allows for referencing comparable projects in the Quantification assessment phase. For example, to estimate a soil organic carbon capacity for a field, measurements from nearby forest may be used, and a new bamboo farm may refer to existing climaxed farms in comparable climatic zones. These comparable project rules must be specified in the applicable Protocol.

**Double Counting**

Double Counting of removed carbon, thus double selling credits, is very undesirable and therefore prohibited. No-double-counting has to be proven by Removers by handing over contracts with both suppliers and customers over the value chain, stating that they have and will not sell carbon credits on the products or materials.

**Additionality**

Additionality is necessary, in the sense that money from carbon credits should lead to extra carbon dioxide actually sequestered. The remover declares that they will re-invest the carbon credit income in additional carbon removal. As long as carbon income is reinvested, Oncra – given the climate crisis and Oncra’s focus on distributed scaling – does not require an extensive analysis on whether the removal pathway or project is represented in the National Determined Contributions of the country where the removal is effectuated.

**Ton-year accounting and Permanence**

Permanence describes the time for which removed carbon is stored before it is released again into the atmosphere. Ton-year accounting is the emerging practice of considering the length of storage in the carbon removal calculations. Carbon accounting experts globally are not yet converged on best practices. Oncra aims to set a standard by calculating on a ‘minimum-100 year’ permanence basis. The main reason for this choice is the increasing likelihood of tipping points occurring in the climate system (see eg. Rockström et al 2019, [https://www.nature.com/articles/d41586-019-03595-0](https://www.nature.com/articles/d41586-019-03595-0)), which implies that carbon removal now is orders of magnitude more effective than removal later. The 100 year timespan is generally used in IPCC modelling and reporting, for example in the first special report on carbon dioxide capture and storage (IPCC 2005). It was historically based on an arbitrary, political choice made as a basis for the Kyoto Protocol, in dealing with the comparison of the relative global warming potentials of different greenhouse gases (Vogtländer 2014). In LCA practice, this 100 year timescale has been adopted as the cut-off point between short-term and long-term storage. For these reasons, Oncra metrics work at the min100 year timescale. If storage is expected to last more than 100 years, like reached with enhanced rock weathering (which stores for millions of years), this also is counted for as 100 years, and one ton in this case is simply one ton. This favours both long term removal as quick removal in the short term, thus being in line with the climate crisis and its imminent tipping points.

For each removal pathway, Oncra determines an expected permanence in years. Removal credits are all converted to the 100 year timescale. This means that a project with
an expected permanence of 70 years will receive 70/100, or 70% or the credits. Local, regional, and global policy developments are part of the analysis on expected permanence.

10. **Open Sourcing data and calculations**

In carbon accounting practice, methods (the rules) are often open source but the actual calculation models are mostly not. Because of this, it is hard to get trustworthy estimations and calculations on for example how much carbon your average bamboo forest or seaweed farm could store. Most experts do not have real incentives to pool, disclose and share data. Also farmers and other removers might be reluctant to share data related to their business plan. Oncra radically opens and shares all data, unless it is very clearly endangering business models; in that case we anonymise data points.

In the climate crisis, sharing this data is of the utmost importance. We take an example in Volvo, who at some point opened their patent for car seatbelts, or Tesla, who shared IP for their electric cars. If you are in a boat which is sinking, and you have the design for a better lifeboat, it’s better for everyone to share that design, as soon as possible.

11. **Selling Oncra removal credits**

Oncra Removal Credits can be sold by Removers to buyers or investors. All transactions have to be administered in the Oncra Ledger via the Oncra Platform. Failure to register a transaction on the Ledger will result in the credits status set to void. Oncra does not sell credits, but advises a selling price will at all times cover the total removal costs, and is based on the ETS Carbon price as listed on the [EEX Auction Market](https://www.eex.com/en-market-places/eem/carbon-market/ets.html).

Oncra facilitates the sale of removal credits to buyers and will not be part of the selling agreement between Remover and any buyer, and will therefore not be liable for any damage resulting from that relationship. In case of any sale by Remover of credits to a buyer, Remover will inform Oncra in writing including the relevant details. Removal credits may only be sold to buyers complying with the Oxford principles. See [Article 9. Requirements for buyers: Oxford Offsetting Principles](https://www.oxfordoffsetting.com/principles/).

12. **Compensation for Services and Payment**

As a compensation for Oncra’s services to Remover regarding the quantification, verification and certification of a Project, Remover will pay a transaction fee for every CRC sold. This fee will be 7% of the net value of each sold CRC as agreed with the buyer of such CRC, excluding VAT and with a maximum of €5,000,-. The fee is payable to Climate Cleanup Foundation, as the Foundation pre-finances Oncra for assessments so the Removers are not hindered by upfront costs, and Oncra will be independent as possible because the Oncra team is compensated per assessment, and not per credit, thus not incentivizing the issuance of more credits. The fee is payable to Climate Cleanup Foundation at the moment a Removal Credit is sold to a buyer. When the fee for a sale of Credits from Remover to a Buyer is paid it must be registered in the Ledger, as discussed above.
13. **Liability**

Oncra shall not be liable for consequential damages or indirect damages such as lost profits, loss of data or data integrity. Oncra is held to provide best efforts in all services provided.

14. **Law and court**

This Agreement and the rights and obligations of the parties to which it is subject are subject to Dutch law and must be interpreted in accordance with it.

Any dispute that may arise between the parties concerning the conclusion, interpretation, execution, non-performance and termination of this contract will be subject to the exclusive jurisdiction of the court of Amsterdam.
References


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Annex 1. PCAF greenhouse gas accounting principles

The core principles of greenhouse gas accounting for the financial sector have been set out in the PCAF Accounting and Report standard report (PCAF 2020), which builds on the principles as set out by GHG Protocol\(^1\) (figure below). Following GHG Protocol the standard requires scope 3 inventories\(^2\) to be complete, consistent, relevant, accurate and transparent, with additional PCAF requirements for recognition, measurement, attribution, data quality and disclosure. These principles all apply for carbon removal accounting as well. The requirements for ‘measurement’ in the PCAF principles already have a provision for carbon removal, stating that “… removed emissions can also be measured if data is available and methodologies allow” (PCAF 2020, p34). This current report aims to complement these methodologies with a specific metric for carbon removed and stored.

To define when a practice can be considered to lead to actual carbon dioxide removal (CDR), Tanzer and Ramírez have laid out four principles (Tanzer & Ramírez 2019). These principles have been extensively quoted and analysed by the EU funded Zero Emissions Platform (ZEP 2021).

The four core CDR accounting principles

1. Carbon dioxide is physically removed from the atmosphere.
2. The removed carbon dioxide is stored out of the atmosphere in a manner intended to be permanent.
3. Upstream and downstream greenhouse gas emissions, associated with the removal and storage process, are comprehensively estimated and included in the emission balance.
4. The total quantity of atmospheric carbon dioxide removed and permanently stored is greater than the total quantity of carbon dioxide equivalent emitted to the atmosphere.

Following these principles ensures that carbon dioxide is actually taken out of the atmosphere, so global warming is geophysically mitigated. Because these principles are somewhat self-evident and well described in the above mentioned sources, this report advises to follow these principles in all carbon accounting practices, and for them to be added to the PCAF GHG Protocol principles for scope 3 inventories. In effect they add full life cycle assessment systematics for carbon removal to the emission accounting requirements (Box above).

Annex 2. The Oxford Principles

As RSC describes carbon dioxide taken and stored away from the atmosphere, it may play a role in the creation of carbon credits and eventual offsets (certificates used to compensate emissions by individuals, organisations or jurisdictions). Offsetting carries several serious systemic risks, like problematic ‘additionality’: in 2016 the European Commission found that 85% of offsets failed to reduce emissions


\(^2\) Scope 3 refers to indirect emissions related to products or services earlier or later in the value chains. They are opposed to scope 1 (direct) and scope 2 (indirect energy related) emissions.
There is also a risk of greenwash: offsetting cheaply and advertising climate neutrality while continuing emissions.

In 2020, a group of experts from across the University of Oxford comprised a set of principles for effective use of carbon offsets, published as The Oxford Principles for Net Zero Aligned Carbon Offsetting, or Oxford Principles (Allen et al 2020). The group tried to answer the question how carbon offsets can be used to deliver net zero emission commitments without greenwash, while stimulating the right kind of credit supply. They identified four principles for responsible offset practices (box below)

The Oxford Principles for Net Zero Aligned Carbon Offsetting

1. Cut emissions, use high quality offsets, and regularly revise offsetting strategy as best practice evolves
2. Shift to carbon removal offsetting
3. Shift to long-lived storage
4. Support the development of net zero aligned offsetting

Rock Stored Carbon as proposed in this current report aligns with most of the Oxford Principles. RSC based credits would make high quality additional offsets (part of principle 1) if the price per ton CO$_2$ is sufficient to cover the potential extra costs for biobased construction. RSC describes carbon removal by definition (principle 2), and long-lived storage (principle 3) depending on the end of life arrangements (see section Burn, Bury or Reuse?). RSC credits are currently innovative, so they are supportive to the development of net zero aligned offsetting (principle 4). Whether the entity buying the offsets cuts its own emissions (principle 1 part 1) is outside the scope of RSC, but apart from that RSC credits align well with the Oxford Principles. In the diagram in the figure below, taken from Allen et al 2020, RSC offsets would fall in category V (Carbon removal with long-lived storage), as the stored carbon in RSC is by default converted to an at least 100 year timescale.
Annex 3. Policy developments influencing soil carbon permanence

Carbon is captured through sustainable soil management, also known as regenerative agriculture. At present, some farmers are already taking measures on a voluntary basis to manage the soil sustainably. These farmers are the frontrunners. Regenerative soil management will probably become mandatory in the future, which can already be traced back to various visions and legislations of the Ministry of Agriculture – unless society at large collapses. A summary of the main global and regional policy developments pointing in this direction follows below.

1 Paris Climate Agreement (2019)
In the climate agreement, countries have made binding agreements for the benefit of the climate. The Netherlands has also made promises about reducing CO2 emissions. The Dutch part of the climate agreement includes a specific chapter for ‘agriculture and land use’. It describes how the Dutch agricultural sector will reduce CO2 emissions. Quantities are divided over a number of topics.

The agricultural soils in the Netherlands must capture 0.5 Mton extra CO2 equivalents per year by 2030. This must be achieved by preventing the formation of nitrous oxide and by building up the organic matter content in the soil. From a practical point of view, the entire soil management must be made more sustainable, because matters such as leaching, compaction and soil life are interdependent. There is therefore a binding, international agreement to improve organic matter levels in the soil.

The following measures are encouraged:
- More acreage where the soil is not disturbed or otherwise worked shallowly
- More use of catch crops and green manures, do not leave the soil open in winter.
- Grow more protein and rest crops
- Using Organic Soil Improvers
- Using organic substances, fertilizer substitutes and circular fertilizers on agricultural land
- Grassland no more tearing
- Improve crop rotation based on the needs of the soil
- Grow more grass clover.

In the climate agreement, ambitions are expressed and agreements are made to encourage farmers to use soil better. In addition to the measures mentioned, various pilots and studies are being launched to increase and stimulate knowledge about soil use. There is no binding legislation for individual entrepreneurs, but the measures are supported sector-wide. That is why this gives an explicit impulse to better soil management, storage of organic matter and thus carbon sequestration.

In addition to the measures, there is a clear task that must be achieved. This is shown below from the climate agreement.

2 Common Agricultural Policy (2023)
The new CAP will come into effect in 2023. In this policy, the income support for farmers will be changed. In the previous CAP up to and including 2022, there was a basic compensation plus a greening payment. This has been adjusted in the new CAP. There is again a basic premium. On top of the basic premium, farmers can receive an eco-premium, depending on which activities (which are good for the environment) they do. These activities are all beneficial for the quality of soil and air, water, climate, biodiversity and landscape. They encourage a more sustainable cropping plan by awarding rewards to, for example, catch crops, fiber crops and soil measures.

3 7th Nitrates Directive Action Programme
Nitrates Directive action program will come into effect from 2023. Because the maximum nitrate levels in surface water are exceeded in some places in the Netherlands, there is a mandatory program. This is revised every 6 years, just like the CAP, there is also coherence between these schemes. The action
program is part of the fertiliser legislation, so prescribed measures are legally required. A number of far-reaching new measures have been taken for 2023.

- 4% non-productive agricultural land: Companies that cultivate less than 75% grassland must use 4% of their arable land as non-productive. This can be filled in with green fallow, landscape elements or green manures. This benefits biodiversity and soil.

- It has been agreed nationally that the share of permanent grassland (land where grass has been cultivated for more than 5 years) may not fall by more than 5% in the coming years. Permanent grassland captures a lot of CO2 and retains a lot of carbon in the soil.

- It is mandatory to apply crop rotation on arable land, after each main crop a different crop has to be done or a catch crop has to be grown. Rotation improves the soil structure and thus the build-up of organic matter in the soil.

4 New fertiliser policy
The government is currently working on developing a new manure policy. The way in which it is checked whether farmers adhere to manure rules has changed. Dairy farming will have to be land-based by 2032. This stimulates the cultivation of more grass, which stores carbon. Emissions of ammonia and leaching of nitrate into the surface water will also decrease.

5 National plan rural area
A diversity of climate goals is approached integrally in the national plan for rural areas. This is currently NGO under development. The various climate goals that have been set are elaborated in an area plan for each area, by provinces and involved parties such as farmers and nature organizations. The plans are elaborated on the main objectives of water, climate and nature. Specifically, the climate goals have clear legal agreements about reducing CO2 emissions, but also sequestering CO2 through carbon sequestration in the soil. From the agricultural perspective, this carbon sequestration is emphatically part of regular agricultural practice.