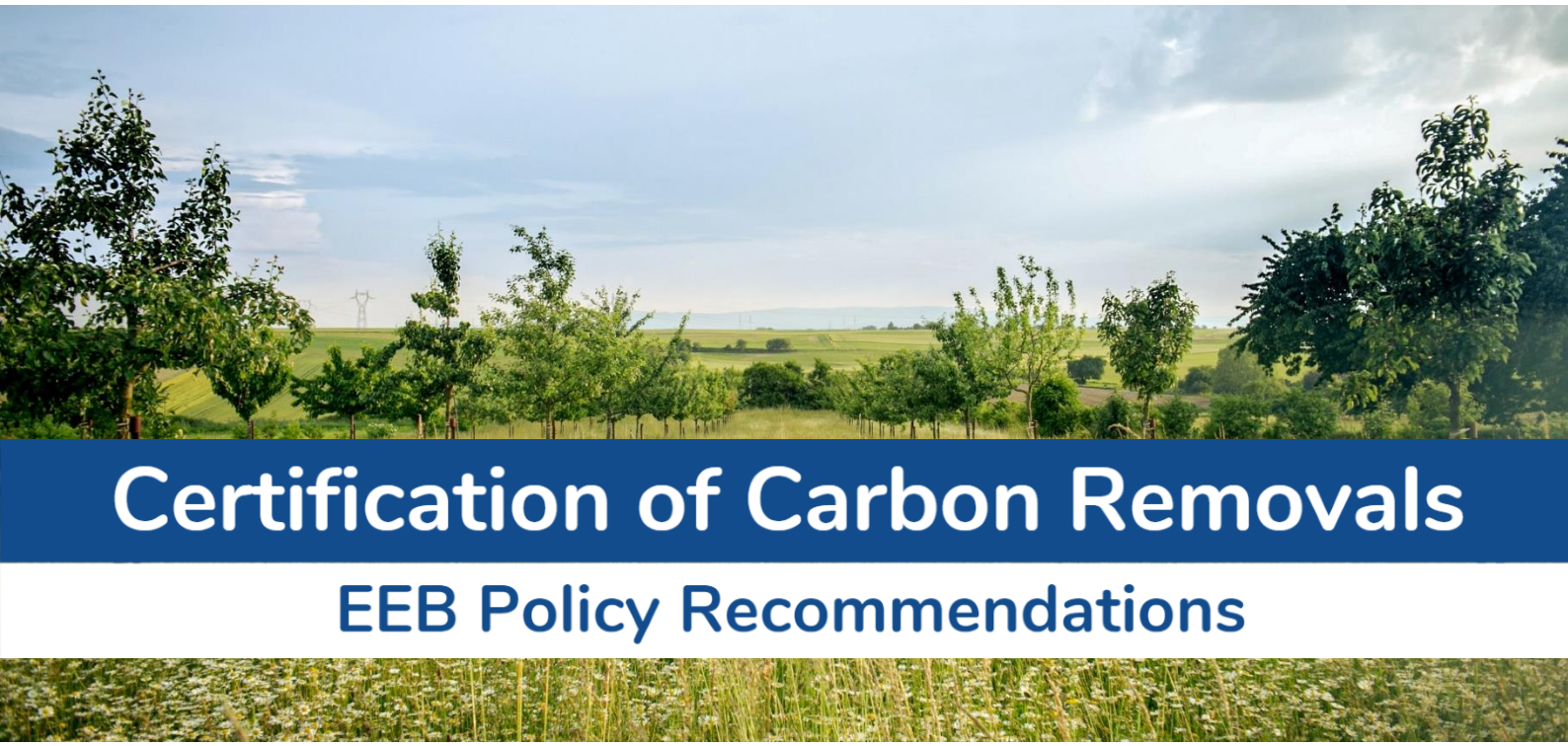
EEB
European
Environmental
Bureau



Certification of Carbon Removals

EEB Policy Recommendations

Executive summary

The unprecedented climate and biodiversity crises that we are facing today are intrinsically linked. The findings in the 6th IPCC WG3 Report show that removals will have to play a role to limit the global warming to 1.5 °C. In their Communication on Sustainable Carbon Cycles from December 2021, the European Commission announced that they will publish, by the end of 2022, a legislative proposal to establish a Carbon Removal Certification Framework.

Enhancing removals through a certification scheme presents pitfalls and opportunities that must be managed through a robust policy framework. This paper sets out the EEB's recommendations to establish a reliable and well-functioning carbon removal certification (CRC) framework.

Scope & purpose

- **Carbon removals must always be additional to emissions reductions.** This means **removal certificates must not be used for offsetting emissions by private or public entities.** The EU needs to rapidly and drastically cut greenhouse gas emissions as a first priority and prevent the likely 'deterrence effect' from investing in removals.

- **Not all "carbon farming" practices are suitable for "carbon removals certification"**. Carbon farming comprises all land management practices that increase carbon in soil and vegetation, whereby not all of them are suitable for certification due to various risks such as reversibility. Only "high quality removals" should be eligible for certification.

European Environmental Bureau

• Rue des Deux Églises 14-16, 1000 Brussels, Belgium • ☏ +32 228 91090 • eeb@eeb.org • www.eeb.org

International non-profit association • Association internationale sans but lucratif (AISBL) • EC register for interest representatives: ID number: 06798511314-27 • BCE ID number: 0415.814.848 • RPM Tribunal de l'entreprise francophone de Bruxelles

- **In the land sector, the carbon removal certification mechanism must not be solely focused on carbon, but instead centred on ecosystem restoration for climate, biodiversity, and resilience benefits.** The framework should not act as a standalone piece of legislation with the major focus of creating carbon credits, but should instead complement the overall EU environmental and climate policy. If done appropriately, it could provide great benefits for land managers, farmers and the wider society, but a policy focused on carbon quantification risks creating perverse incentives.

Governance & financing

- **Voluntary carbon markets (VCM) are ill-suited to finance the deep changes we need to tackle the climate and biodiversity crises.** They will not benefit most land managers due to low prices, high uncertainty, strict additionality requirements, and long-term liability for reversals. The reliance on VCMs should therefore not be considered a suitable solution for promoting carbon farming.

- **The CRC framework must be fully transparent and removals must be accounted only once, separately from emission reductions, in national greenhouse gas inventories**. Such an approach will ensure the support to Member States' and EU's overarching targets set out in other legislation, such as the LULUCF Regulation or the Nature Restoration Law.

- **The certification mechanism must include robust and long-term monitoring requirements** to ensure the creation and maintenance of high-quality removals, as well as to detect reversals. Carbon farming practices which exhibit considerable difficulties and uncertainties in GHG flux quantification and monitoring are unsuitable for certification at this point in time, but may be included in the framework at a later stage, when robust monitoring is developed.

No greenwashing

- **False carbon neutrality claims must be prevented.** Offsetting and voluntary carbon markets leave the door wide open for greenwashing such as corporate climate neutrality claims. Emissions and removals should always be accounted and communicated separately to avoid misleading claims.

1. Introduction

The unprecedented climate and biodiversity crises that we are facing today are intrinsically linked[1]. Research shows that massive land use changes for agriculture and urbanisation in the last decades, as well as the intensification of land use, have been one of the most important causes for biodiversity decline and have contributed a large share of anthropogenic greenhouse gas emissions[2,3].

In their Communication on Sustainable Carbon Cycles from December 2021, the European Commission announced that they will publish, by the end of 2022, a legislative proposal to establish a Carbon Removal Certification Framework[4]. The findings in the 6th IPCC WG3 Report also show that removals will have to play a role to limit global warming to 1.5°C[5].

The challenge of enhancing removals exhibits a number of opportunities, but their complex nature is rife with pitfalls that must be managed through a robust policy framework. Foremost, the possibility

for private operators to offset their emissions with removals would greatly disincentivise actual emissions reductions and risks not providing benefits for the climate.

It is also important to distinguish between carbon farming and the carbon removals certification mechanism. Carbon farming is a broad term, with many definitions. In this paper, it is understood to encompass all land management practices that maintain and increase carbon sequestration and storage in soil and vegetation. However, not all carbon farming practices are suitable for certification due to various risks (e.g. of reversal) and shortcomings (e.g. high uncertainty in carbon measurements). Only the select high-quality removals should be allowed for certification.

In this paper, we explore solutions and provide policy recommendations for a well-functioning and trustworthy carbon removal certification framework that will provide benefits for the climate, ecosystems, and rural communities.

2. Building blocks of the CRC framework

The legislative proposal should set out rules to establish a well-functioning carbon removal certification mechanism in the EU. Specifically, it should:

- define the purpose of the removal certification;
- define what is a removal suitable for certification, and what is not;
- provide for minimum requirements for the certification methodologies;
- set out monitoring, reporting and verification requirements;
- provide for financing options.

These elements are examined in more details one by one in the following sections.

3. Purpose

The CRC Mechanism should support national and EU targets

The carbon removal certification mechanism should build towards the goal of limiting global warming to 1.5 °C and restoring healthy ecosystems for climate mitigation, adaptation, and biodiversity benefits. The EU must lead by example on environmental and climate policy. Hence, the certification mechanism should support the national and overall EU targets set out in other overarching EU climate and environmental legislation such as the Land Use, Land Use Change, and Forestry (LULUCF) Regulation and the Nature Restoration Law. It must be in line with the EU Biodiversity and Forest Strategies. Consequently, it must adopt and promote a holistic approach and should not act as a standalone piece of legislation with the sole focus on fostering a business model for carbon removals.

Why offsetting will not work for climate …

EU climate policies should clearly prioritise drastic (gross) greenhouse gas (GHG) emission reductions in agriculture, industry, and energy sectors. At the same time, they should reject the paradigm of “compensating” or “neutralising” the emissions with removals (i.e., “offsetting”, or sometimes “insetting” if the emissions are offset within the value chain, but it is essentially the same approach).

The duration of carbon storage must be understood in the context of the carbon cycle. Fossil GHG emissions release carbon which had been stored for millions of years, whereas biogenic GHG have shorter return times[6]. Absorbing carbon in the land sector can merely compensate for previous emissions of biogenic carbon, but never for GHG emissions from burning fossil fuels in the industry and energy sectors. Land-based carbon removals therefore need to be promoted in their own right. They cannot compensate for any current emissions, since they already need to "undo" past losses of biogenic carbon from the land sector.

Allowing offsetting would greatly disincentivise economic operators and public authorities to reduce their actual emissions. Carbon sequestration should only be considered as an additional measure on top of emission reduction efforts. Around 2040 and beyond, removals will be needed to balance unabatable residual emissions[5], emissions inherent to the industrial process itself and not a consequence of burning fuel. According to the 6th IPCC Report, unabatable emissions stand at approximately 5 to 10 % of current emissions, meaning the other 90 to 95 % of current emissions can and must be eliminated.

… nor farmers …

Offsets ought to last at least as long as the emissions they compensate for – meaning millennia for carbon dioxide emissions. However, land-based carbon removals are vulnerable to "reversal", meaning that changes in practices, extreme climate, or other unforeseen events (e.g. pests or fires) can release the carbon back to the atmosphere. The mechanisms designed by carbon markets to deal with this risk are becoming increasingly inappropriate, as the climate becomes more extreme (as seen with the huge wildfires across the US and Europe in recent years), leaving the question of liability for reversals open. Should several generations of land managers be held liable for reversals of carbon credits sold by their ancestors?

… nor citizens

The possibility for an entity to buy a carbon removal credit and to offset their emissions may lead to widespread greenwashing, such as corporate claims on carbon neutrality on the basis of removals without significantly reducing their emissions. There is a number of such examples already present[7]. To avoid that, the EU policy should strictly and consistently require separate accounting and targets of emissions and removals in all cases.

In this regard, the forthcoming Initiative on substantiating green claims[8] should precisely and strictly regulate claims on climate neutrality. To ensure transparency and minimise the risk of greenwashing, economic operators should perform separate accounting as per their emission reductions and their financing of carbon farming projects. Consequently, opaque corporate climate claims such as "net emissions" or "net-zero" claims, where actual emissions are concealed behind removals, should not be allowed.

4. Requirements for high-quality removals

The certification scheme should provide benefits for climate mitigation

Accounting for how much carbon is removed from the atmosphere is key to evaluating the real benefits for climate mitigation. That requires a full life cycle analysis, also taking into account all emissions that are the consequence of external energy and other inputs associated with the carbon

removal project. A legitimate removal should be an actual physical removal of carbon from the atmosphere and net of all associated emissions.

Enhancing biodiversity and climate resilience is the best strategy to ensure long-term land-based removals

When it comes to certifying removals, the question of permanence is one of the paramount issues to consider. Permanence or reversibility describe the likelihood of the event that the carbon sequestered through a carbon farming project is re-emitted (reversed) back into the atmosphere.

Permanence is one of the biggest challenges associated with land-based removals – they entail the risk of being re-emitted into the atmosphere (reversal)[9] due to deliberate or indeliberate action – retrogression to old conventional farming practices, abandonment of good land management practices, droughts, floods, wildfires, and others.

The risk of unintentional reversals cannot be completely avoided, but in some cases, it can be diminished to a minimum, thus ensuring high-quality removals. The duration of carbon storage in terrestrial systems is directly linked to the integrity of ecosystems[12]. The focus should be on practices that enhance biodiversity, with ecosystem integrity regarded as a prerequisite for a high-quality removal and not merely a co-benefit. Ecosystem integrity also vastly increases the resilience of land to the existing and future impacts of climate change, especially through the increased water retention capacity, multitude of species, and preventing erosion.

Scientists consider some of the high-quality land-based removals permanent, such as old-growth forests[10] or peatlands[15] (further discussed in section 5). A robust and detailed monitoring system must be put in place to manage and detect reversals.

Local communities must not be left behind

The certification mechanism must be just, ensuring that no one is left behind, including local communities, foresters and workers, with a special attention to small-scale farmers. It must not negatively impact land tenure and must not provoke any adverse social impacts, such as competition for land and monetisation of land, or result in land concentration. In this regard, it must be designed in a way – and accompanied by relevant legislative action at national level – to avoid any land-grabbing due to speculation. Involving local communities in carbon removal projects is crucial and is a central aspect of the guidance for nature-based solutions developed by the IUCN[11].

5. Practices

The Carbon Removals Certification framework should narrow down eligibility only to the carbon farming practices which ensure climate mitigation and adaptation benefits, enhance biodiversity and ecosystem health, provide benefits for farmers and land managers, and for which reliable monitoring methodologies are available. This will allow to limit the risks inherent to the certification of removals, such as reversals, deterioration of biodiversity[12], and adverse impacts on rural communities.

Restoration of wetlands and peatlands offers first-rate benefits for climate, nature, and farmers

A majority of wetlands and peatlands in the EU have been drained for agriculture, forestry and peat extraction, turning them from a long-term carbon sink into major sources of GHG and resulting in an alarming loss of biodiversity[13]. Rewetting these areas (by ending drainage and allowing the water table to rise) is urgently needed to turn them back into carbon sinks.

Done well, rewetting ends carbon dioxide emissions, reduces nitrous oxide emissions, increases methane emissions (especially in the first years), and after a few years, restart the accumulation of carbon in the ground as dead plant biomass. Overall, this leads to a considerable reduction in emissions in the short term and within 5-10 years generates a net carbon sink. Rewetted areas can be rewilded or used productively through paludiculture (or "wet agriculture", i.e. growing crops or rearing animals that are well adjusted to perpetually flooded environments such as reed, cotton, and water buffaloes)[14].

Rewetting of only 3 % of its agricultural land, the EU can turn it into a net carbon sink, sequestering about 6 Mt CO_2 eq. per year[15].

Wetland restoration is crucial for biodiversity as well as for climate adaptation. Rewetting re-establishes crucial ecosystem services, including water management: wetlands are excellent natural buffers against droughts and floods, greatly reducing the vulnerability of agriculture and society to droughts and floods in the river-basin[16]. On the local level, water bodies allow for a cooling effect during periods of heat.

Rewetting of drained wetlands and peatlands is the most space efficient long-term carbon store and can sequester carbon nearly indefinitely. Research shows that rewetting of drained peatlands is the most cost-efficient land-based carbon sequestration measure[14] and that the economic gains from rewetting exceed its costs in most cases[17].

Overall, this makes wetlands and peatlands restoration the most effective nature-based climate mitigation solution, while at the same time providing significant benefits for climate adaptation and biodiversity. Yet, harmful subsidies embedded in the CAP provide perverse incentives to keep drained peatlands dry, which should be removed.

Close-to-nature management as a prerequisite for reliable and long-term carbon removals in forests

Close-to-nature forestry is a concept that puts an emphasis on simultaneously integrating multiple forest functions on a specific area, as opposed to the widespread conventional segregated forest management approach, which comprises separate areas for wood production and biodiversity conservation. The approach builds above all on introducing mixed species and uneven-aged forests across a certain landscape, thus greatly increasing stability, climate resilience, productivity, and continuity of forest conditions.

In particular, ecosystem stability is central to the concept of close-to-nature forestry, comprising the development of plant and faunal communities and processes, such as carbon and nutrient cycles. Research shows that forests under conventional even-aged management are particularly vulnerable to storms, climate extremes, and destabilisation through nutrient leaching and accelerated soil acidification. Ecological stability is predicted to become the most important factor in the EU when it

comes to disturbances due to climate change, including wind storms, insect outbreaks, and snow damage[18].

The deployment of close-to-nature forestry creates new job opportunities in economically marginal areas where rural depopulation is a serious problem. With the main focus on increasing resilience, close-to-nature forestry is one of the best land-based practices for certification due to its low risk of reversals and major benefits for climate and local communities.

Agroforestry combines climate, biodiversity, and social benefits

Agroforestry is the integration of trees and shrubs into agricultural land. It comes in various forms, such as silvo-arable systems (introducing trees and shrubs into cropland, such as hedges, tree alleys and windbreaks), silvo-pastoral systems (introducing trees and shrubs into pastures, combining forestry and grazing), riparian forest buffers (introducing trees between farmland and a water body) and others[19].

Agroforestry differs from traditional forestry and agriculture mainly by its key focus on the interactions and synergies between the two systems rather than on individual elements. Research has confirmed that such systems can be more profitable and more sustainable[20].

Such systems control much more efficiently the runoff, increasing the water retention potential and therefore mitigating the effects of both droughts and floods, thus greatly enhancing climate resilience. Apart from water retention, they also locally mitigate extreme heat and prevent erosion. With the rooting system of trees and shrubs highly developed in comparison to crops, they maintain more favourable physical properties of the soil, increase soil fertility, and enhance biodiversity, including pollinators and other beneficial insects[21,22].

Converting the conventionally used farmland (both croplands and pastures) in areas with highest environmental pressures, hence defined as priority areas (roughly 9 % of the EU's total agricultural land), could sequester up to 14 t CO2 eq. per hectare per year[20].

Reforestation: bringing uneven-aged forests back

Reforestation is the process of reintroducing trees to form a forest in an area that has been affected by clear-cutting or by natural disturbances such as wildfires. This is a highly desirable practice that is suitable for certification, although it does come with risks. To ensure a high level of biodiversity and resilience, all reforestation efforts must be deployed with close-to-nature forestry techniques, with special attention to an uneven age of trees and to the species diversity of the succeeding forest.

Grasslands may provide a net sink, but effective monitoring is yet to be explored

Grasslands in the EU currently show a minor net carbon sink[23]. Extensively managed, biodiverse and healthy grasslands store large amounts of carbon in the soil and root system, are much more resilient to climate extremes, and constitute a crucial, but highly threatened, habitat for biodiversity. Research even suggests that such grasslands may be more reliable carbon sinks than forests in some areas[24]. However, monitoring methodologies are still poorly developed, which makes the reliability of those sinks difficult to verify. Healthy and biodiverse grasslands should be promoted and protected. More effort should be invested into the development of monitoring methodologies before grasslands can potentially be included into the certification mechanism.

More research is needed before DACCS can be certified

Technology-based solutions for carbon removals will have to play a limited role in the EU climate policy to keep the global warming below 1.5 °C, as shown in the 6th IPCC Report[5]; at the same time, the Report warns against the reliance on large-scale deployment of those solutions given the uncertainties in their effectiveness.

Direct air carbon capture and storage (DACCS) is the process of capturing carbon directly from the atmosphere and storing it permanently. It currently requires large energy inputs to sequester carbon. When calculating the real net removal benefit of a specific solution, comprehensive life cycle analysis must be performed, particularly factoring in all external energy inputs and associated emissions to ensure a net removal. In some cases, these solutions can even prove to be net emissions. All energy inputs required to fuel the plant must be acquired from renewable sources and must not be imported from third countries, in order to follow the energy independence agenda and to avoid carbon leakage in third countries. Any deployment of DACCS, including the storage, must not provoke any adverse impacts on biodiversity or local communities, or impede ecosystem restoration.

That said, more research is needed to thoroughly understand and effectively prevent the environmental impacts of DACCS, and especially to develop them in a way to become less energy intensive. The select technological solutions that show the highest net carbon sequestration potential and do not adversely affect biodiversity, ecosystems and social aspects, can be deployed at a later stage when the EU will be on the way to reaching net negative emissions as stipulated in the European Climate Law. Meanwhile, further research should be undertaken.

Soil organic carbon is highly reversible and not suitable for certification

Soils are a huge store of carbon, accumulated over millennia and cycling constantly through the biosphere. Intensive and extractive land management lead to large amounts of soil carbon being released into the atmosphere. 70% of European soils are degraded (with low soil carbon content a major factor for soil degradation), affecting their ability to perform key functions for our society: retaining and filtering water, cycling nutrient, hosting soil life, and supporting plant growth and health [25]. Restoring healthy soils across the EU should be a major priority for policy-makers for climate adaptation and long-term food security.

However, the very nature of soil organic carbon makes it unsuitable for certification as a “carbon removal”. Soil carbon is constantly cycling (being broken down by micro-organisms, emitted through oxidisation and soil respiration and re-absorbed by plants) and concentrations vary strongly across and within plots of land and through time. Land management practices as well as soil types and climate conditions have huge impacts on the soil carbon cycle. This makes measurements highly uncertain, precise monitoring very expensive, and gains in carbon storage inherently reversible[26]. Soil carbon sequestration should therefore not be pursued as a carbon removal solution, but rather as a proxy of overall soil health and a crucial strategy to increase the resilience of our land – with climate mitigation as a co-benefit. Hence, the Carbon removal certification mechanism is not the appropriate piece of legislation to tackle soil organic carbon, which will already be addressed in other environmental legislation, such as the forthcoming Soil Health Law.

BECCS, Biochar & Carbon storage in products: major concerns

Bioenergy with carbon capture and storage (BECCS) is the process of extracting bioenergy from biomass and capturing and storing the carbon. The biomass involved can come in a variety of forms, such as wood or crops. The deployment of BECCS is constrained by the availability of biomass[27],

whereby the production of biomass for this purpose would raise major concerns regarding land take, biodiversity, and food security.

Biochar is the material obtained from the thermochemical conversion of biomass in an oxygen-depleted environment – it is a residue remaining after pyrolysis of biomass[28]. As a carbon removal solution, it raises concerns from the environmental perspective, as its impacts are still uncertain. In some circumstances, it can release toxic compounds like polycyclic aromatic hydrocarbons. Over its full life cycle analysis, biochar may not always be a net removal[29].

Large-scale deployment of both biochar and BECCS would drive unsustainable levels of land-use change and biomass use that are incompatible with the objectives to increase carbon sequestration in soils and vegetation, and would hinder ecosystem restoration and a transition away from the unsustainable extractive model of agriculture and forestry.

Carbon storage in products is not an effective carbon removal solution. The carbon content in products diminishes over time with the carbon being gradually re-released into the atmosphere, or the products are ultimately burned or deposited in landfills where they decay, releasing the carbon back into the atmosphere. The very nature of such carbon storage makes this solution only a delayed emission, but not a removal. The UNECE remains cautious about choosing to account for carbon storage in products, not to compromise close-to-nature forest management[30].

Afforestation is not favourable at the expense of more biodiverse ecosystems

Afforestation raises major concerns regarding biodiversity and competition for land. It is essential that the growing interest in using forests as carbon sinks does not lead to the afforestation of healthy, biodiverse and carbon storing ecosystems such as grasslands, wetlands and peatlands. It is paramount for the certification mechanism to prevent the highly likely phenomenon of competition for land at the expense of valuable habitats or cropland. The focus should therefore be on restoring existing forests and recently deforested areas, as well as on introducing trees into brownfield sites[31] and urban areas.

6. Governance, monitoring & methodologies

The certification mechanism must come with stringent monitoring requirements

A robust monitoring system is essential for the long-term credibility of carbon removals. Because the local properties of the land sector change rapidly across small distances[32], monitoring of carbon removal projects must be of high resolution, but most importantly, site-specific. It is imperative to ensure a continuous monitoring throughout the duration of the project, as well as after the project has ended to detect potential reversals.

When a validation process is needed before a project is deployed to assess the amount of carbon that can be reliably sequestered, available historic data (such as satellite imagery) should be used to verify that the land use has not been changed prior to the beginning of the project, in order to establish ground-truthed baselines.

The certification system should be established by public administration, and the certification procedure itself should be conducted by a public entity. Validation processes of the carbon removal project before its deployment, as well as verification processes after a project has been implemented, should likewise be ensured by public authorities.

Since continuous monitoring is needed to maintain the quality of a removal and to detect potential reversals, it is necessary to ensure continuous monitoring after the project has ended. That can be carried out by the Member State through its monitoring obligations under the LULUCF Regulation. To ensure reliability of the data, the monitoring should be improved to Tier 3 methodologies and in line with the latest IPCC guidance. Monitoring should be maintained permanently, even after a certificate has been nullified.

To ensure trustworthiness, the certificates must disclose key information about the removal

The certificate should, as a minimum requirement, disclose the following information:

- type of carbon removal;
- project duration;
- quantity of carbon removed;
- benefits for ecosystem integrity;
- social benefits;
- financing party and total cost of project;
- details on monitoring, reporting and verification processes;
- details on baseline methodologies.

Baselines must be ground-truthed and set conservatively

Removal baselines are fundamental to the carbon removal certification mechanism, setting reference levels that are used to determine the quantity of certificates awarded for a given carbon removal enhancement project[33,34]. The baselines must be calculated based on ground measurements in all cases before a carbon farming project is deployed.

Baselines must be calculated in a realistic way. Given the large differences in the properties of land across small distances, the calculations must be site-specific and ground-truthed. Studies have shown that the application of regional benchmarks which are established by means of approximated values over larger areas, are not fit for purpose and may lead to vastly overestimated carbon removals, as seen in California[35]. The baselines against which the removals are estimated should be set conservatively, in order to minimise the likelihood of over-certifying.

All certificates must feed into the national greenhouse gas inventories

Carbon removal certificates should be perceived as a public good and as such must not be owned by any private entity or subject of a free market. Instead, all certificates must feed into the national greenhouse gas inventories to ensure transparency. Such an approach eliminates many risks inherent to the principle of owning certificates and using them as offsets. These risks are extremely difficult if not impossible to tackle within carbon markets, such as liability in case of a reversal and false corporate climate neutrality claims.

Land-based removals are prone to reversals; hence it is paramount to ensure the high quality of removals to reduce the risk of reversal to a minimum. However, it is impossible to eliminate this risk. When a reversal is detected, the procedure in the national GHG inventories is very straightforward:

the certificate is annulled and accounted for as emission. With the large-scale deployment of land management practices that can be certified, there will be a steady influx of certificates into the inventories, while a certain percentage will be annulled due to reversals. As long as the combined amount of high quality certificates is higher than the amount of annulled certificates, land based removals will be on the increase.

Additionality is a deceptive concept – yet, it can be avoided if the certificates are not "owned"

Using carbon credits for offsetting would entail strict additionality criteria in order to ensure that the climate financing claims are substantiated by actual climate benefits. A carbon removal would be additional if it would not have occurred in the absence of a certain project put in place[Error! Bookmark not defined.] and were counted on top of national and EU targets for sinks. Additionally, strict additionality requirements may be discriminatory towards those land managers that have already been applying measures to create high-quality removals, since in their case, the additionality criteria are more difficult to meet. Therefore, carbon markets are likely too restrictive to trigger large-scale deployment of carbon farming practices. Conversely, if the certificates are not "owned", but are reflected in the national greenhouse gas inventories instead, these criteria are redundant, and the certificate must only show that a new net removal has been created.

A likely but often overlooked phenomenon: carbon leakage

Scientists have found that many accounting methodologies and rules that govern the certification mechanisms globally, in particular those in the US, overestimate the amount of removals produced due to carbon leakage[36]. Leakage is a phenomenon that occurs when a project aimed at creating additional removals results in additional emissions or dwindling removals elsewhere, outside of the project boundaries.

All efforts to increase carbon sequestration through the carbon removal certification mechanism must ensure safeguards to avoid carbon leakage and land use changes elsewhere. The certification scheme must take into account all greenhouse gas fluxes influenced by the project, including energy used (e. g. in machinery) and embedded in inputs.

Incentivising long-term contracts and mandatory non-regression clauses

The certification framework should incentivise land managers to strive towards concluding contracts for carbon removal projects for as long a period as possible. Longer-term contracts would greatly increase the likelihood of a successful implementation of good land management practices while also ensuring long-term financial certainty for land managers and monitoring.

Deliberate actions that increase the risk of reversals should be prevented through non-regression clauses, specifying that the end of a project cannot constitute valid grounds for abandoning the land management practices which created the removals[37]. The non-regression principle should also be enshrined in the CRC regulation, similarly to the Water Framework Directive and the Commission proposal of the Nature Restoration Law.

Public participation and access to justice

To ensure transparency, all data related to and used for the creation of carbon removal certificates must be publicly available. The EU should maintain a database of all carbon farming projects that have been certified through the carbon removal certification mechanism.

Local communities should be consulted before a project with significant impact takes place, such as projects with changes to land use. In case of alleged irregularities of a certification process, members of the public must have a means of redress to challenge the legality of the certificate issued.

7. Financing

Large-scale deployment of favourable land management practices will demand deep changes to conventional agricultural and forestry practices. This demands substantial investments and incentives, in addition to regulatory action to phase out unsustainable practices.

Public finance must be increased and improved at EU and national level

Since climate change is a collective challenge, it requires a collective response. Member States have committed to key targets and must take action to attain them. Therefore, the focus of financing of carbon removal projects should be on public funds. At the EU level, the CAP should contribute significantly more to foster the deployment of high-quality removals, which requires more political will from national governments as well as an improved performance and accountability framework. Projects can be financed through the LIFE programme as well, which will need to be significantly upscaled to meet the magnitude of the challenges ahead.

The Common Agricultural Policy should be a substantial source of funds for carbon removal projects, but is currently still spending vast amounts of taxpayers' money on untargeted, and sometimes even harmful, subsidies, while money earmarked for climate has so far not delivered any significant change[38]. Additionally, the EU Innovation fund is one of the first-rate sources of finance to upscale carbon removals. Albeit one of the largest programmes for the demonstration of innovative climate mitigation approaches, it will have to be significantly increased to meet the urgent climate and environmental needs that the EU is faced with.

National funding will need to complement these programmes, and several Member States have already set up a Climate Fund (e.g. Denmark and the Netherlands), but overall public spending on quality land-based removals is still lacking, and Member States should be required to demonstrate clearly in their National Energy and Climate Plans how they will finance the action needed to reach their national LULUCF targets. Additional financing as state aid should be made available, with proper public scrutiny.

Private funding can play a role, but voluntary carbon markets will likely not benefit climate, nature, or land managers

Private entities should be encouraged to contribute to the climate mitigation efforts by financing carbon removal projects. However, voluntary carbon markets - where an economic operator can buy carbon credits on a free market to offset their emissions - are ill-suited for upscaling high quality carbon removals.

Voluntary carbon markets are volatile and cannot give land managers the financial certainty and anticipation to plan good land management practices. The prices of carbon credits on voluntary carbon markets are vastly inadequate to finance the deep changes we need to tackle the climate and biodiversity crises. The international voluntary carbon markets are teeming with cheap low quality

credits, whereas high quality carbon removals in the EU will cost more, which will make the EU certificates uncompetitive. Yet, many big corporations and billionaires are speculating on a future higher price on carbon and rushing to buy land for carbon credit projects, at the expense of rural communities and further inflating land prices and hindering access to land for young and new farmers.

A robust carbon credit must comply with strict additionality rules -ruling out land managers who are already applying good land management practices – and strict MRV - making it prohibitively expensive for all but the largest land managers to participate. So there is an inherent tension between ensuring integrity and climate benefits, and what will benefit most land managers. All that may cause large investment being channelled to large-scale, highly intensive holdings, disadvantaging yet again smaller and more sustainable holdings.

Relying on voluntary carbon markets to finance carbon removals at large scale implies a tremendous risk not to provide any benefits for climate nor for land managers. Focusing the certification mechanism on this avenue would be a huge waste of time and public resources.

Potential sources of private funding

A viable option is reverse auctioning. Contrary to a "conventional" auction, a reverse auction is a type of auction in which a private entity would put up a request for a carbon removal project implementation, while land managers would bid for the price at which they are willing to apply it[39].

Another option is value chain financing[40]. In this model, companies within the agricultural or forest value chain such as food processing plants or supermarkets finance a carbon farming project comprising carbon farming practices that are suitable for certification, e. g. agroforestry. However, such a mechanism must be apprehensive of the inherent risks and designed carefully to ensure fairness and social integrity, incorporating stringent safeguards for the rights of producers and land managers.

In all cases, companies should strictly implement separate accounting for their emission reductions and financing of carbon removal projects. Nevertheless, private funding alone is unlikely to finance the large-scale deployment and maintenance of high-quality carbon removals that the EU needs[41].

[1] Mori, A. S., 2020. Advancing nature-based approaches to address the biodiversity and climate emergency. Ecology Letters, 2020(23): 1729-1732. https://onlinelibrary.wiley.com/doi/epdf/10.1111/ele.13594 (accessed 22/07/2022)

[2] UNEP, 2014. Predicting the impact of land use change on biodiversity. https://www.unep-wcmc.org/en/news/predicting-the-impact-of-land-use-change-on-biodiversity (accessed 22/07/2022)

[3] Yee Lam W et al., 2021. Estimating greenhouse gas emissions from direct land use change due to crop production in multiple countries. Science of the total environment, 2021, vol. 755(2), https://www.sciencedirect.com/science/article/pii/S0048969720368698

[4] https://ec.europa.eu/clima/eu-action/forests-and-agriculture/sustainable-carbon-cycles_en (accessed 22/07/2022)

[5] https://www.ipcc.ch/report/sixth-assessment-report-working-group-3 (accessed 22/07/2022)

[6] Selin N. E. Carbon sequestration. Encyclopaedia Britannica. https://www.britannica.com/technology/carbon-sequestration (accessed 22/07/2022)

[7] Harvey F., 2022. World's biggest firms failing over net-zero claims, research suggests. The Guardian. https://www.theguardian.com/environment/2022/feb/06/amazon-ikea-nestle-biggest-carbon-net-zero-claims (accessed 22/07/2022)

[8] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12511-Environmental-performance-of-products-businesses-substantiating-claims_en (accessed 08/08/2022)

[9] Ruseva et al, 2020. Rethinking standards of permanence for terrestrial and coastal carbon: implications for governance and sustainability. Current opinion on environmental sustainability, Vol 45: 69-77. https://www.sciencedirect.com/science/article/abs/pii/S187734352030083X (accessed 22/07/2022)

[10] Luyssaert S. et al, 2008. Old-growth forests as global carbon sinks. Nature, 2008(455): 213-215. https://www.researchgate.net/publication/23250353_Old-growth_forests_as_global_carbon_sinks/link/0fcfd50d4c3ac45d6c000000/download (accessed 22/07/2022)

[11] Cohen-Sacham E. et al, 2016. Nature-based solutions to address global societal changes. IUCN. https://www.researchgate.net/publication/307608144_Nature-based_Solutions_to_address_global_societal_challenges (accessed 22/07/2022)

[12] Isbel F. et al, 2015. Biodiversity increases the resistance of ecosystem productivity to climate extremes. Nature, 2015. https://www.researchgate.net/publication/282870243_Biodiversity_increases_the_resistance_of_ecosystem_productivity_to_climate_extremes

[13] Greifswald Mire Centre, National University of Ireland - Galway, 2019. Peatlands in the EU – Common Agricultural Policy (CAP) after 2020. 2019. http://www.stmuv.bayern.de/themen/naturschutz/foerderung/efre.htm (accessed 22/07/2022).

[14] Tanneberger F. et al., 2021. The Power of Nature-Based Solutions: How Peatlands Can Help Us to Achieve Key EU Sustainability Objectives. Advanced Sustainable Systems, vol.5(1).

[15] Couwenberg J. Sequestration potential of peatlands in the EU. 2021.

[16] UNEP. Peatlands rewetting, restoration and conservation offers a low-cost, low-tech, high impact nature-based solution for climate action. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjF4qm-mJ75AhWbi_0HHcNqByQQFnoECAQQAQ&url=https%3A%2F%2Fwedocs.unep.org%2Fbitstream%2Fhandle%2F20.500.11822%2F28893%2FPeatlands_Rewetting.pdf%3Fsequence%3D1%26isAllowed%3Dy&usg=AOvVaw31upkPJGfIY1oXcFkTQVWz (accessed 22/07/2022)

[17] Stachowicz, M. et al., 2022. To store or to drain – To lose or to gain? Rewetting drained peatlands as a measure for increasing water storage in the transboundary Neman River Basin. Science of the total Environment, vol. 829. https://www.sciencedirect.com/science/article/abs/pii/S0048969722016539 (accessed 08/08/2022)

[18] Bauhus J. et al., 2013. Close-to-nature forest management in Europe: Does it support complexity and adaptability of forest ecosystems. Managing Forests as Complex Adaptive Systems: building resilience to the challenge of global change: p187-213. https://www.researchgate.net/publication/235427552_Close-to-Nature_Forest_Management_in_Europe_Does_It_Support_Complexity_and_Adaptability_of_Forest_Ecosystems (accessed 22/07/2022)

[19] Agroforestry practices. USDA National agroforestry center. https://www.fs.usda.gov/nac/practices/index.shtml (accessed 22/07/2022)

[20] Kay, S., 2019. Agroforestry creates carbon sinks whilst enhancing the environment in agricultural landscapes in Europe. Land use policy 2019(83): 581-593.

[21] Schoeneberger, M. M. et al., 2017. Agroforestry : Enhancing resiliency in U.S. agricultural landscapes under changing conditions. U.S. Department of agriculture. https://www.fs.usda.gov/treesearch/pubs/55775 (accessed 22/07/2022)

[22] About agroforestry. Agroforestry research trust. https://www.agroforestry.co.uk/about-agroforestry/ (accessed 22/07/2022)

[23] Annual European Union greenhouse gas inventory 1990-2020 and inventory report 2022. EEA, 2022. https://www.eea.europa.eu/publications/annual-european-union-greenhouse-gas-1 (accessed 08/08/2022)

[24] Dass, P. et al., 2018. Grasslands may be more reliable carbon sinks than forests in California. Environmental research letters, vol. 13(7). https://iopscience.iop.org/article/10.1088/1748-9326/aacb39 (accessed 22/07/2022).

[25] Lal R., 2011. Sequestering carbon in soils of agroecosystems. Food Policy.

[26] Smith, P. et al., 2019. How to measure, report and verify soil carbon change to realize the potential of soil carbon sequestration for atmospheric greenhouse gas removal. Global change biology, vol. 26(1): 219-241. https://onlinelibrary.wiley.com/doi/full/10.1111/gcb.14815 (accessed 22/07/2022)

[27] Rhodes, J. S., Keith, D. W., 2008. Biomass with capture: negative emissions with social and environmental constraints. Climatic Change, vol. 87: 321-328. https://link.springer.com/article/10.1007/s10584-007-9387-4 (accessed 15/09/2022)

[28] International biochar initiative, 2015. Standardised product definition and product testing guidelines for biochar that is used in soil. https://www.biochar-international.org/wp-content/uploads/2018/04/IBI_Biochar_Standards_V2.1_Final.pdf (accessed 15/09/2022)

[29] Tisserant A, Cherubini F., 2019. Potentials, limitations, cobenefits,and trade-offs of biochar applications to soils for climate change mitigation. Land.

[30] UNECE. Carbon storage in harvested wood products (HWP). https://unece.org/forests/carbon-storage-harvested-wood-products-hwp (accessed 15/09/2022)

[31] Burascano S., 2016. Current European policies are unlikely to jointly foster carbon sequestration and protect biodiversity. Biological conservation, vol. 201: 370-376. https://www.sciencedirect.com/science/article/abs/pii/S0006320716303081 (accessed 22/07/2022)

[32] Negassa, W. et al., 2019. Small-scale spatial variability of soil chemical and biochemical properties in a rewetted degraded peatland. Frontiers in environmental science, 2019(7). https://www.frontiersin.org/articles/10.3389/fenvs.2019.00116/full (accessed 22/07/2022).

[33] Huettner, M. et al., 2009. A comparison of baseline methodologies for reducing emissions from deforestation and degradation. Carbon balance and management.

[34] Gillenwater, M., 2022. What is a baseline. GHG management institute. https://www.technologyreview.com/2021/04/29/1017811/california-climate-policy-carbon-credits-cause-co2-pollution/ (accessed 22/07/2022).

[35] Temple, J., Song, L., 2021. The climate solution actually adding millions of tons of CO2 into the atmosphere. MIT technology review. https://www.technologyreview.com/2021/04/29/1017811/california-climate-policy-carbon-credits-cause-co2-pollution/ (accessed 22/07/2022).

[36] Haya, B., 2019. The California air resources board's US fores offset protocol underestimates leakage. Goldman school of public policy. https://gspp.berkeley.edu/faculty-and-impact/working-papers/policy-brief-arbas-us-forest-projects-offset-protocol-underestimates-leaka (accessed 22/07/2022).

[37] Peers, S. Non-regression clauses: The fig has fallen. Industrial law journal, no. 39(4): 436-443. https://www.researchgate.net/publication/275384115_Non-regression_Clauses_The_Fig_Leaf_Has_Fallen (accessed 08/08/2022)

[38] CAP Strategic Plans – Are they likely to deliver on given promises? EEB, 2022. https://eeb.org/library/cap-strategic-plans-are-they-likely-to-deliver-on-given-promises/ (accessed 08/08/2022)

[39] Chen, J., 2021. Reverse Auction. https://www.investopedia.com/terms/r/reverse-auction.asp (accessed 22/07/2022)

[40] Royal Tropical Institute & International Institute for Rural Reconstruction, 2010. Value chain finance: Beyond microfinance for rural entrepreneurs. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjj6YKogLr5AhWXhP0HHbc4BegQFnoECDQQAQ&url=https%3A%2F%2Feuropa.eu%2Fcapacity4dev%2Ffile%2F30109%2Fdownload%3Ftoken%3D-u5d0bFN&usg=AOvVaw06P7e8GITB8upwy4sDRjWz (accessed 08/08/2022)

[41] Honegger M. et al, 2021. Who is paying for carbon dioxide removal? Designing Policy instruments for mobilizing negative emission technologies. Policy and practice reviews, 2021(3).