



Council of the
European Union

Brussels, 2 December 2022
(OR. en)

Interinstitutional File:
2022/0394(COD)

15557/22
ADD 3

CLIMA 641
ENV 1240
AGRI 690
FORETS 129
ENER 650
IND 526
COMPET 983
CODEC 1902
IA 211

COVER NOTE

From:	Secretary-General of the European Commission, signed by Ms Martine DEPREZ, Director
date of receipt:	1 December 2022
To:	Ms Thérèse BLANCHET, Secretary-General of the Council of the European Union
No. Cion doc.:	SWD(2022) 377 final
Subject:	COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT REPORT Accompanying the document Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing a Union certification framework for carbon removals

Delegations will find attached document SWD(2022) 377 final.

Encl.: SWD(2022) 377 final



Brussels, 30.11.2022
SWD(2022) 377 final

PART 1/2

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT REPORT

Accompanying the document

**Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE
COUNCIL**

establishing a Union certification framework for carbon removals

{COM(2022) 672 final} - {SEC(2022) 423 final} - {SWD(2022) 378 final}

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Glossary

Term or acronym	Meaning or definition
BECCS	Bioenergy with carbon capture and storage is the combination of generating energy from biomass with carbon capture and storage; the stream of CO ₂ from industrial and energy-related sources at bioenergy facilities is separated (captured), conditioned, compressed and transported to a storage location for long-term isolation from the atmosphere.
Carbon Farming	Land management practices that result in the increase of carbon storage in living biomass, dead organic matter and soils by enhancing carbon capture and/or reducing the release of carbon to the atmosphere
Carbon removal	For the purposes of this Impact Assessment, carbon removal means either the storage of atmospheric or biogenic carbon within geological carbon pools, biogenic carbon pools, long-lasting products and materials, and the marine environment, or the reduction of carbon release from a biogenic carbon pool to the atmosphere
Carbon removal activity	One or more specific practices or processes carried out by an operator resulting in carbon removals
Carbon removal solution	A type of carbon removal activity.
Certification methodologies	Technical documents describing, for each specific carbon removal solution, how to quantify the net carbon removal benefits expected from a carbon removal activity, how to monitor and report emissions and removals from the activity when executed, how to establish the additionality of carbon removal activities, how to address the risks of carbon reversal, and how to assess the overall sustainability of the activity.
Certification scheme	An organisation that oversees the certification of carbon removal activities and records carbon removal activities in registries.
DACCS	Direct air carbon capture and storage uses engineering processes relying on chemical capture to remove CO ₂ directly from the atmosphere using a separating agent that is regenerated with heat, water, or both. The CO ₂ is subsequently

	desorbed from the agent and released as a high purity stream.
Operator	Any legal or physical person who operates or controls a carbon removal activity, or to whom decisive economic power over the technical functioning of the activity has been delegated
IPCC	Intergovernmental Panel on Climate Change
Programme developer	Economic operator specialising in the identification, development, registration and implementation of carbon removal activities conducted by various project operators.
Validation	The ex-ante evaluation of the conformity of a carbon removal project with the certification requirements.
Verification	The ex-post assessment that the carbon removal information and data provided by an operator or a group of operators comply with the certification requirements.

1. INTRODUCTION: POLITICAL AND LEGAL CONTEXT

Limiting the global average temperature increase to below 1.5° Celsius will require deep cuts in global GHG emissions throughout the forthcoming decades. To achieve this, first we need to improve the efficiency of our buildings, transport modes and industries, to move to a circular economy, and to massively scale up renewable energy. Second, we need to recycle carbon from waste streams, from sustainable sources of biomass or directly from the atmosphere, to use it in place of fossil carbon in the sectors of the economy that will inevitably remain carbon dependent, for instance thorough carbon capture and use (CCU) and sustainable synthetic fuels. In parallel, increasing amounts of CO₂ will have to be **captured and removed each year from the atmosphere** by carbon farming and industrial removal activities or projects to reach the climate neutrality goal.

At a global scale, the latest report by the International Panel on Climate Change (IPCC)¹ point towards a decreasing likelihood of limiting global warming to 1.5°C unless rapid GHG emission reductions occur. The IPCC report clearly states that "**the deployment of carbon dioxide removal to counterbalance hard-to-abate residual emissions is unavoidable if net zero CO₂ or GHG emissions are to be achieved**". This will mean the large-scale deployment of sustainable solutions for capturing CO₂ from the atmosphere and durably storing it in geological reservoirs, terrestrial and marine ecosystems, or products (see Box 1).

Box 1 – Carbon removal solutions

Carbon removal solutions are activities that transfer carbon from the atmosphere to storage within a non-atmospheric carbon pool. In the context of carbon farming, activities that reduce the release of carbon to the atmosphere are also considered carbon removal solutions as they have the potential to eventually turn the soil into a net carbon sink.

A study carried out for the European Commission² evaluated the potential to remove carbon of several carbon removal solutions and assessed their suitability for deployment within Europe. **Annex 5** presents more details about the characteristics of various carbon removal solutions as well as an assessment of their sustainability, cost and potential.

For the purposes of this Impact Assessment, carbon removal solutions are grouped into three families based on where the removed carbon is stored:

1. **Permanent storage solutions** store away atmospheric or biogenic³ carbon for several centuries, either in geological reservoirs (see BECCS, DACCS) or in other media. This impact assessment focuses more specifically on:
 - Bioenergy with Carbon Capture and Storage (BECCS): atmospheric CO₂ is absorbed by plant biomass and used as a fuel, and then the corresponding emissions are captured and injected into geological formations for permanent storage.
 - Direct Air Carbon Capture and Storage (DACCS): engineering processes to capture CO₂ directly from the atmosphere and store it into geological formations for permanent storage.

¹ IPCC Working Group III, 2022.

² McDonald et al., 2021 ([link](#)).

³ If the origin of carbon is fossil, then the technology can at best be considered overall carbon-neutral.

2. **Carbon farming solutions** enhance carbon sequestration in soils or in living biomass in synergy with other sustainability objectives such as biodiversity:
 - Afforestation & Reforestation: Conversion of land that has a non-forest use to forest, or restocking of trees on land that has been depleted of trees, in full respect of the principles favourable to biodiversity and contributing to the 3 Billion Tree Planting Pledge for 2030.
 - Agroforestry: Planting of woody biomass (e.g. trees, hedges, shrubs etc.) on agricultural land.
 - Peatland rewetting: Stopping and reversing the drainage of peatlands and the associated release of stored carbon, which can significantly reduce carbon emissions as well as potentially leading to net carbon sequestration in the long-term.
 - Enhanced Forest Management: forest management that increases a forest's ability to remove carbon from the atmosphere and with co-benefits to biodiversity.
 - Increase in soil organic carbon in mineral soils: practices such as cover cropping, improved crop rotations, reduced tillage, deep rooting crops, conversion from arable to grassland and other management of grazing land and grassland.
 - Blue carbon: carbon sequestration by oceanic and coastal ecosystems through e.g. algae, seagrasses, macroalgae, mangroves, salt marshes and other plants.
3. **Carbon storage in products** store atmospheric or biogenic carbon in materials that are used to make long-lasting circular products. Examples:
 - Biomass in buildings: Use of sustainably sourced and circular bio-based materials in the construction sector enables the storage of carbon captured from the atmosphere and/or delayed emissions of biogenic carbon harvested in forestry and agricultural activities
 - Carbon Capture and Utilisation (CCU): utilisation of captured atmospheric or biogenic CO₂ in production processes can store captured carbon for a long time (up to several decades).

Some carbon removal solutions belong to different categories depending on the context of their deployment. This is the case for biochar that can be used as a soil amendment contributing to the enhancement of soil properties (carbon farming), as a construction material with the partial replacement of GHG intensive material (carbon storage in products) or can be stored in suitable geological formations (permanent storage).

The European Climate Law⁴ provides for the EU to become climate neutral by 2050. This requires that greenhouse gas (GHG) **emissions and removals should be balanced** within the European Union at the latest by 2050, with the aim to achieve negative emissions thereafter. In its 2030 Climate Target Plan⁵, the Commission estimated that to achieve this objective both natural ecosystems and industrial solutions should contribute to removing several hundred million tonnes of CO₂ per year from the atmosphere. Today and with current policies, the EU is not on track to deliver these quantities: carbon removals in natural ecosystems have been

⁴ European Commission, 2021a, COM(2021) 572 final ([link](#)).

⁵ Regulation (EU) 2021/1119 ([link](#)).

⁶ European Commission, 2020a, COM(2020) 562 final ([link](#)).

decreasing in recent years and no significant industrial carbon removals are currently taking place in the EU (see **Annex 5** for more details on the role carbon removals towards 2050).

Under the ‘Fit for 55’ package, the European Commission therefore proposed – for the first time – **a separate land-based CO₂ removals target of -310 million tonnes** of CO₂-equivalent by 2030. The EU-wide target is to be implemented through binding national targets for the LULUCF⁷ sector, requiring Member States to step up ambition for their land use policies. Another proposed amendment is to establish an EU-level target of **climate neutrality for the land sector by 2035** (which combines the agriculture and LULUCF sector), requiring further enhancement of land-based carbon removals together with a necessary reduction of emissions from agriculture. The Commission has also proposed to increase the size of the Innovation Fund, which is financed with the revenues from the EU ETS, thereby helping businesses invest in innovative clean technologies, including **technology-based carbon removals solutions**.

Box 2 – The role of carbon removals in achieving the 2030 climate goals of the EU

The European Climate Law limits the amount of LULUCF carbon removals (which includes both land-based removals and carbon storage in bio-based products) that can contribute to the -55% target in 2030 to 225 MtCO₂eq, which is below the current level of LULUCF net removal in the EU (approx. -268 MtCO₂). This baseline corresponds to the aggregate commitments of Member States for 2030 as computed by applying the accounting rules from the LULUCF Regulation adopted in 2018 and now under revision. Land-based carbon removals in excess of this level can therefore be considered additional with respect to the EU Nationally Determined Contribution of -55% net emission reduction compared to 1990.

According to the Commission’s estimates⁸, the -225 MtCO₂eq baseline can be exceeded in a cost-effective manner, especially if carbon farming approaches are able to attract public and private finance based on robust certification. This consideration led the Commission to propose a separate target for the LULUCF target of -310 MtCO₂eq for the year 2030, which is now being discussed under the co-legislation procedure. In this context, the European Parliament proposed amendments that consider carbon farming as a means to go beyond the -310 MtCO₂eq target.

As to carbon removals from industrial solutions (capture and storage/utilisation of non-fossil carbon), they are not explicitly included under the EU -55% target, and therefore any such removal would be additional with respect to this target.

The Commission’s Communication on Sustainable Carbon Cycles⁹ stresses the importance of enabling a business model that rewards land managers for carbon sequestration in full respect of ecological principles (**‘carbon farming’**), and of creating an **EU internal market for capture, use, storage and transport of CO₂** through innovative technologies. The communication also defines action plans to achieve the following aspirational goals for carbon removals: by 2028, all land managers should have access to verified emission and removal data to measure carbon farming practices, and all CO₂ captured, transported, used and stored

⁷ Land Use, Land Use Change and Forestry.

⁸ European Commission, 2021b ([link](#)).

⁹ European Commission, 2021c, COM(2021) 800 final ([link](#)).

through industrial solutions should be reported and accounted; by 2030, carbon farming approaches should contribute to reaching the LULUCF target of -310 Mt CO₂eq net removals; and industrial technologies should remove annually at least -5 Mt CO₂eq by 2030.

The proposed **Nature Restoration Law** sets out the goal that 20% of the EU's land and sea should be covered by restoration measures by 2030. There are many synergies among carbon farming solutions and restoration measures. Among others, the Nature Restoration Law requires that areas under restoration show an improvement in the stock of organic carbon in agricultural and forestry ecosystems.

In line with the key megatrends foreseen by the IPCC, the European Commission has announced in the Circular Economy Action Plan from March 2020 that it will develop an effective **regulatory framework for the certification of carbon removals** to incentivise the uptake of carbon removals and to increase circularity of carbon, in full respect of the biodiversity objectives. This certification framework is applicable to carbon removals produced in the EU. It is a voluntary framework, i.e. it is not mandatory for operators or certification schemes and it can be used for several purposes (see section 2.1.3). This certification framework is a first stepping stone and it may be proposed later to apply this framework as mandatory for certain policy uses. However, any mandatory use of this framework is outside the scope of this impact assessment (see also section 5.3). The present document assesses policy options for such EU certification framework.

2. PROBLEM DEFINITION

2.1. What is/are the problems? How likely is the problem to persist?

Reducing GHG emissions must remain the absolute priority of the Union's climate policies. Nevertheless, the urgency of the climate crisis requires to make use of the full range of tools that we have available to mitigate the worst effects of global warming, including carbon removals, as concluded by the latest IPCC report. Therefore, there is also a need to incentivise land managers and industrial actors to take up sustainable management practices and technologies to sequester carbon from the atmosphere. The EU's increased climate ambition and the growing awareness of the climate and environmental crises are pushing national governments, citizens and corporations not only to step up their efforts to decrease emissions but also to support carbon removal activities in order to achieve their climate goals. However, there are at least three interconnected problems due to which the increasing willingness to support carbon removals is not yet fully exploited or is being channelled towards ineffective and unsustainable carbon removal activities.

2.1.1. It is difficult to assess and compare the quality of carbon removals

Any support to carbon removal activities must be based on reliable certification. Certification is the process of confirming that a product or service meets a set of characteristics, or standards. For instance, under the Renewable Energy Directive, biomass is certified as sustainable if its production complies with certain criteria; similarly, farmers are allowed to market their food as organic if they respect some specific rules.

Certification of carbon removals is much less common than certification of emission reductions, and it is particularly complex because of some methodological challenges which

are currently addressed in different ways by existing certification schemes (see section 2.2.1). This creates significant search costs for potential financiers of carbon removals, who need to invest time and cognitive effort to find robust carbon removal certificates and to compare the quality of the carbon removals between the various certification approaches. In addition, these certification challenges differ across carbon removal solutions (see section 2.2.2), which makes it even more difficult to compare the quality of carbon removals. This is a typical ‘market failure’ because, in the absence of reliable and comparable information about quality, users are not able to assess the true value of carbon removals, which undermines the effectiveness of any type of support. According to stakeholders, allowing comparability and competition between different carbon removal solutions is the first most important objective of the certification of carbon removals; it was selected by 52% of respondents, indicating a need for a common quality standard. In addition, the importance of internationally harmonising frameworks regarding carbon removals was often mentioned by stakeholders in the position papers submitted in their reply to the public consultation.

How likely is the problem to persist? New global standards to define the quality of carbon certificates are emerging¹⁰: these initiatives may contribute to address this problem to some extent. However, these approaches alone cannot address the EU’s needs for carbon removal certification. First, their scope includes emission reductions and does not comprehensively cover all carbon removal solutions. Second, as those approaches do not include an effective and enforceable governance, they do not offer sufficient guarantees for an impartial standard setting and may also be driven by commercial interests. And third, they do not necessarily reflect the environmental, socio-economic and regulatory context of the EU.

2.1.2. Many stakeholders do not trust existing carbon removal certificates

Previous experience of using carbon offset programs in a regulatory context, such as the possibility to buy a limited quantity of credits from the Clean Development Mechanism (CDM, established under the Kyoto Protocol) in place of ETS allowances until 2021, revealed the risks of relying on credits whose quality could not be guaranteed. An Oeko-Institut study¹¹ prepared for DG CLIMA in 2016 highlighted that the CDM had fundamental flaws in terms of environmental integrity and suggested that 85% of the CDM projects covered in their analysis and 73% of the potential 2013-2020 Certified Emissions Reduction (CER) supply had a low likelihood of emission reductions being additional and not over-estimated. Similarly, in the context of voluntary carbon markets, environmental organisations organised vocal protests calling offsets ‘scams’¹², questioning their quality and warning about the risk that they may deter action to mitigate emissions, and also took legal action¹³ against oil or airline companies for false claims. Ensuring that strong action to reduce emissions is not undermined by shifting

¹⁰ The two main initiatives in this area are the Integrity Council for the Voluntary Carbon Market ([link](#)), a coalition of government and non-governmental carbon market experts aiming to set and enforce global threshold standards, and the Carbon Credit Quality Initiative ([link](#)), established and run by EDF, WWF and the Oeko Institut to address credit quality and to provide a ranking dashboard with independent scores of different types of carbon credits. Carbon credit ratings services have also emerged that provide bespoke rating services for voluntary carbon market credit buyers (links: [1](#), [2](#), [3](#), [4](#), [5](#)).

¹¹ Oeko-Institut e.V., (2016)

¹² Macquarie R., (2022)

¹³ ClientEarth, (2021)

focus on carbon removals was the most selected challenge by NGOs in the public consultation. The risk of greenwashing is often driven by weak governance processes that open the door to unreliable and low-quality certificates, possible fraud, errors or double-counting (see section 2.2.3). This ultimately can lead to carbon removal certificates that do not deliver the climate and sustainability standards that financiers expect.

These risks undermine the trust of many stakeholders: the corporations and governments that intend to support carbon removals fear the reputational risks associated to accusations of greenwashing¹⁴, and the customers or citizens served by these corporations and governments do not believe their climate neutrality claims.

How likely is the problem to persist? The unreliability of the certification process can be addressed by drawing inspiration from governance rules of similar certification schemes (e.g. certification of sustainability criteria of the Renewable Energy Directive or of organic farming), but is not yet the object of any existing EU legislation in the context of carbon removals; therefore, in the absence of this initiative, this problem is likely to persist.

2.1.3. Carbon removal providers face barriers to access finance

One of the reasons behind the existing heterogeneity of certification approaches is that different certification schemes serve different financing models, and they adapt the certification rules to the final use that will be made of the certificate. Indeed, there is a wide variety of ways to use carbon removal certificates, each of which may require specific certification approaches (see section 2.2.4). This diversity creates transaction costs for the operators that want to have their carbon removal activity certified¹⁵. First, they may incur search costs in order to understand the quality of the certification procedures of a given scheme. Second, operators that have already started a certified project to deliver carbon removals may face switching costs when trying to raise other complementary or alternative types of funding; in the current situation, this is likely to require changing their operations and providing a different set of evidence and information, which may hinder their capacity to raise enough finance for their activity. In the public consultation, creating a level-playing field was selected as the second most important objective of this initiative.

How likely is the problem to persist? There is currently no other existing or planned framework to harmonise certification methodologies and procedures across different certification schemes; therefore, in the absence of this initiative, this problem is likely to persist.

¹⁴ <https://www.spglobal.com/esg/insights/carbon-offsets-prove-risky-business-for-net-zero-targets>

¹⁵ From McKinsey blueprint for scaling voluntary carbon markets points out that: “High-quality carbon credits are scarce because accounting and verification methodologies vary and because credits’ co-benefits (such as community economic development and biodiversity protection) are seldom well defined. When verifying the quality of new credits—an important step in maintaining the market’s integrity—suppliers endure long lead times. When selling those credits, suppliers face unpredictable demand and can seldom fetch economical prices. Overall, the market is characterized by low liquidity, scarce financing, inadequate risk-management services, and limited data availability.”

2.2. What are the problem drivers?

2.2.1. Diversity of certification approaches

In the last couple of years, some companies¹⁶ have been eager to invest in a portfolio of solutions to remove carbon but they have noted the absence of clear standards for high-quality carbon removals. A study by Carbon Direct concluded that “*carbon dioxide removal project developers and purchasers lack a common framework for what constitutes a best-in-class project*”.¹⁷ Instead, a recent analysis¹⁸ of the U.C. Berkeley’s Voluntary Registry Offsets Database, which aggregates carbon management projects from the four largest voluntary offset project registries (American Carbon Registry, Climate Action Reserve, Gold Standard, and Verra), shows that emission reduction credits from renewable energy projects and avoided deforestation projects accounted for more than three quarters of the carbon credits exchanged on voluntary carbon markets, and that pure carbon removal credits are scarce (around 3%). The scarcity of carbon removal certificates was confirmed by a report for the Integrity Council for Voluntary Carbon Markets indicating that only 7% of the voluntary carbon market credits issued in 2019 and 4% in 2020 are carbon removals (the bulk being almost exclusively afforestation and reforestation)¹⁹. Also the CORSIA initiative, the Carbon Offsetting and Reduction Scheme for International Aviation, does not target specifically carbon removals, on the contrary it provides mainly emission reduction or emission avoidance credits. This is a problem for two reasons. First, “avoided emissions offsets” are not sufficient to get to the net zero emissions on a global scale that we need to reach the objective of the Paris Agreement and of the European Climate Law: they help to support cost-effective emission reduction elsewhere, but they simply do not remove carbon from the atmosphere in order to neutralise the unavoidable remaining emissions. Second, the lack of clear definition of what is considered as carbon removal hampers the scaling up of carbon removal solutions and undermines long-term planning among operators who need certainty for their investments.²⁰

In addition, carbon removals are a complex phenomenon. Certifying their quantity and their quality presents four main methodological challenges, which certification protocols address in different ways. Section 5.1.3 summarises how these approaches are addressed in the policy baseline, while Annexes 6 to 9 describe each of these four challenges and existing approaches in more details.

1. Correctly quantifying carbon removals

It is important to accurately quantify and then monitor, report and verify (MRV) the net climate effects of carbon removal activities. This requires to: set the boundaries of the activity to be certified so that the total amount of direct and indirect emissions and removals are quantified; determine the baseline that is used as a benchmark against which the net climate effect of the

¹⁶ For instance, Microsoft, Stripes, Shopify.

¹⁷ Carbon Direct and Microsoft, 2022 ([link](#)).

¹⁸ Carbon Direct, 2022 ([link](#)).

¹⁹ Taskforce on Scaling Voluntary Carbon Markets, 2021 ([link](#)).

²⁰ South Pole, 2022 ([link](#)).

activity is quantified (see more on this concept under the next challenge²¹); and finally monitor and report all GHG emissions and removals generated by the activity with the need for an appropriate verification system to be set.

2. Ensuring that more carbon is removed from the atmosphere

As said above, certification methodologies need to quantify the total amount of removals resulting from an activity (a basic information to understand the climate effect of the activity). In addition, public or private financiers want to be reassured that they finance carbon removals which go beyond standard market practices (e.g. through standard forest management practices) and regulatory requirements (e.g. through statutory management practices under the Common Agricultural Policy). The certification schemes therefore compare the total amount of removed carbon to a baseline that should represent the total removals that would have happened otherwise. The choice of the baseline presents difficult trade-offs: one trade-off is between ambition and uptake (i.e. if the baseline is too ambitious then participation will be low, but if it is too close to business-as-usual then the alignment with climate targets will not be ensured); another trade-off is between accuracy and costs (i.e. the cost to establish baselines can become a large part of the certification costs if this exercise requires too many data and information). On top of comparing the total removals to a baseline, some certification schemes undertake separate tests to check whether the carbon removal activity would have anyway been required by the law (*regulatory additionality*) or would have been profitable on its own (*financial additionality*).

3. Addressing the risk that carbon is released back into the atmosphere

A ton of CO₂ that is removed through a given carbon removal activity may be released back into the atmosphere due to natural events (e.g. extreme weather events, natural degradation of products, seismicity) or anthropogenic events (e.g. unsustainable management practices, disposal or incineration of products, cap-rock fracturing and leakage). The duration of carbon removals and the likelihood of carbon reversals are difficult to predict ex ante. This makes it challenging to guarantee that the activity results in sequestration of atmospheric CO₂ for periods relevant to the mitigation of climate change.

4. Encompassing broader sustainability impacts

Restoring areas of high biodiversity value, developing nature-based solutions for climate adaptation, and increasing the carbon stock of ecosystems can go hand in hand. Thus, carbon farming solutions can have positive impacts on other environmental or social objectives, such as biodiversity, water quality, zero-pollution, circularity, or food security. Conversely, if not well designed and implemented, carbon removal solutions can also cause negative impacts on those same objectives.

²¹ In this Impact Assessment, the concept of baselines is discussed together with that of additionality as the two are closely related.

2.2.2. Diversity of carbon removals

There exist many different ways to remove carbon from the atmosphere (see Box 1). Each of them has specific characteristics. First, the importance of the certification challenges listed under the first driver varies considerably across solutions. Second, carbon removal solutions are very different in terms of their maturity, cost-effectiveness and related monitoring costs. It is a very dynamic environment, where some carbon removal solutions or monitoring techniques that are today immature and expensive could be more widespread in a few years.

A. Permanent storage

Solutions storing carbon in geological formations (BECCS, DACCS) are well established but are expensive and their deployment has not achieved a large scale yet. On the other hand, they do not present major monitoring, reporting and verification challenges. The scarce deployment of these solutions and their explicit connection to climate change mitigation simplify the setting of the baseline (which can often be assumed to be zero) and in principle justifies an assumption that the activity can be considered additional by default. The risks of re-emission of carbon are low.

B. Carbon farming

Solutions storing carbon in biomass and soils play an important role to mitigate climate change in the short-term and can provide synergies with environmental objectives but it is more challenging to guarantee long-term storage due to natural disturbances, such as forest fires, or changes in management practices. These solutions have on average lower implementation costs than permanent storage solutions, even though costs per ton of removed carbon can still vary quite a lot depending on the specific type of carbon farming, and some practices are still consolidating (e.g. paludiculture, biochar). In addition, certain monitoring approaches (e.g. soil sampling) can be expensive and may represent a large share of the certification costs²², constituting a significant barrier to uptake for smaller land managers. However, significant progress is being made to increase monitoring accuracy and at the same time drive down costs, in particular thanks to the application of remote sensing and machine learning technologies.

There is also a lot of heterogeneity *within* the carbon farming family. First, the outcome of carbon-removing activities is highly dependent on local climate and soil characteristics (even for the same type of solution), which requires the setting up of tailored mitigation strategies. Second, the importance of the certification challenges identified above differs according to the specific type of carbon farming solution. For instance, in the case of afforestation or agroforestry, it is relatively simple to set the baseline, while this can be more difficult in the case of improved sustainable forest management or increase in soil organic carbon; peatland rewetting results in a time-dependent balance between emission reductions, new emissions, and removals.

C. Carbon storage products

²² See more details in Annex 6.

These solutions too cannot be considered as permanent, although the duration of the storage can vary considerably between products and depends on the uses to which they are put, but they can contribute to delaying emissions by prolonging the effective lifetime of carbon removals and by optimizing end-of-life uses, in synergy with the objectives of a Circular Economy. Pathways to store non-fossil carbon in bio-based materials and CCU products are very diverse. Some solutions, in particular those relying on the transformation of biomass for long-lasting circular products (e.g. construction sector, fiber-based production, nanocellulose solutions), are already deployed at a certain scale. Others, such as applications relying on industrial carbon capture and utilisation, are less mature in the EU²³. The certification challenges relate to improving the quantification methods, setting the baseline, defining the expected lifetime of long-lasting products, defining responsibilities across the product value chain, and addressing the risk of carbon reversal during the use of the product and after the end of its lifetime.

2.2.3. Risks of unreliable certification processes

As argued in section 2.1.2, certification needs to be reliable to avoid greenwashing. In particular, stakeholders expect certification schemes to put in place transparent and robust rules and procedures to mitigate three types of risks²⁴:

- Risk that the certification process is not able to detect low-quality removals, to be mitigated through sound internal governance and management.
- Risk that the carbon removal projects are not actually delivering the removals as planned, to be mitigated through third-party auditing.
- Risk that the same project is certified twice, or that the same certificate is used twice, to be mitigated through a robust registry that tracks the certified projects and removals.

2.2.4. Diversity of business models

There is a wide variety of ways to use carbon removal certificates. To date, the most common use of certificates has typically been in the context of voluntary carbon markets, but many inputs to the Call for Evidence (especially NGOs) underscore the dangers of relying on these markets to effectively address the climate and biodiversity crises, and respondents to the public consultation stressed that the main objective of the framework should be to increase transparency and the level-playing field in these markets (2nd highest-ranked objective in a list of seven, selected by 49% of respondents). The same number of respondents selected the objective to provide better public incentives for carbon removals in the EU and through national funding programmes. Other respondents supported the benefits of certification in corporate sustainability reporting (3rd, 55%), in commercial contracts in food and biomass value chains (4th, 34%) and in sustainable product labelling (6th, 31%).

- In **voluntary carbon markets**, companies that have made climate neutrality pledges buy carbon removals to compensate emissions. To avoid the risk of mitigation

²³ Platt et al., 2021 ([link](#)); Spekreijse et al., 2019 ([link](#)).

²⁴ Explained in more details in Annex 10.

deterrence²⁵, they should only finance an amount of carbon removals corresponding to the quantity of their unavoidable emissions (“offsetting”). Alternatively, companies may also finance carbon removal projects without any offsetting claim (“result-based financing”) or can use certificates to demonstrate a contribution to national targets (“contribution claims”). In these contexts, it is important that the certificates carry all the information that is needed to perform a corresponding adjustment in case compliance with article 6 of the Paris Agreement is required (see **Error! Reference source not found.**).

Box 3 – The concept of corresponding adjustment

In the context of international and voluntary carbon markets, there has been significant discussion for many years as to how to avoid double counting of emissions and removals, and reconcile levels of offsetting with Paris Goals – irrespective of whether a credit is based on emissions reductions or carbon removals. Article 6 of the Paris Agreement proposes that a “corresponding adjustment” should be made in the national inventories to address double-counting of credits, and that baseline levels need to be aligned with national targets and strategies and goals. The applicability of adjustments, and alignment with Paris goals in other contexts, including in voluntary markets and towards voluntary targets, is currently much debated, but is ultimately dependent on the nature of the claim being made by the user.

Article 6 has yet to be implemented, and the processes for adjustment and alignment are not elaborated. It is not in the scope of this initiative to assess and design options for “corresponding adjustments” in national inventories related to trading of carbon credits in international or voluntary carbon markets. The vast majority of carbon credits traded today come actually from emissions reductions and not carbon removals.

The Article 6 of the Paris Agreement, including corresponding adjustments, will need to be implemented within the EU and require the establishment of a Paris Registry. This will provide a clear framework enabling alignment of accounting standards for any credit traded on international carbon markets, irrespective of whether it is about emissions reductions or carbon removals.

- Certification is also increasingly important to support carbon removals via **public policies and initiatives**. The Union and Member States are already implementing policies to provide incentives to carbon removal practices via public subsidies (e.g. Common Agricultural Policy), public procurement (e.g. reverse auctions to buy carbon removals, contracts for difference), and public funding (e.g. Innovation Fund that supports a BECCS plant in Stockholm). In the longer term, the Union may develop new policies to better integrate incentives for carbon removals into its policies. Certification can help to make these policies increasingly result-based and effective.

²⁵ Mitigation deterrence refers to the situation when organisations buy carbon certificates to offset their emissions instead of first making an effort to reduce their own emissions as much as possible, which undermines the achievement of climate objectives. Mitigation deterrence is a strong concern of stakeholders (NGOs and farming organisations). The option to regulate how companies can use offsets to achieve and claim climate targets was discarded because other EU initiatives are addressing this challenge, see section 5.3.

- The inclusion of **sustainability in corporate reporting and in contractual arrangements** also creates an important use case for carbon removal certificates. For instance, companies in the food sector may require primary suppliers to improve their climate performance to reduce their “scope-3 emissions” from purchases; as a consequence, primary producers receive a price premium on the basis of certified climate-friendly practices. Financial institutions that want to achieve a climate-neutral portfolio are increasingly offering impact financing to projects and companies (e.g. linking the financial conditions of equity or loans to the achieved climate performance).
- Voluntary **labelling** approaches can also build on the information provided by the certificates. This brings new revenues to carbon farming producers or producers of carbon storage products via the price premium that they can charge with respect to competitors.

Each of these uses places more importance on given certification elements. For instance, in voluntary carbon markets the focus is exclusively on the net climate effect resulting from an additional activity, whereas in the other contexts the ‘gross’ climate effect of the activity is also an important piece of information (e.g. for corporate reporting and public funding it is important to know the total amount of emissions and removals that result from the activity). While reporting or labelling approaches would seek aggregate information on the net climate effect within large boundaries (e.g. Life-Cycle Assessment), a more granular breakdown of GHG emissions and removals by sources and pools would be necessary to ensure consistency with national GHG inventories (e.g. in the case of public funding, or if certificates retired in voluntary markets are subject to corresponding adjustment in the host country). Finally, the frequency of audits and verification must be on a yearly basis to be included in corporate sustainability reports whereas it can be carried out less frequently in other cases.

3. WHY SHOULD THE EU ACT?

3.1. Legal basis

The proposal is based on Article 192(1) of the Treaty on the Functioning of the European Union (TFEU), which gives the Union the right to act in order to achieve objectives of its policy on the environment. The objectives of the Union policy on the environment as defined in Article 191(1) of the TFEU include, inter alia, preserving, protecting and improving the quality of the environment; a prudent and rational utilisation of natural resources; and promoting measures at international level to deal with regional or worldwide environmental problems, in particular combating climate change.

3.2. Subsidiarity: Necessity of EU action

Climate change is a trans-boundary problem. Its effects are global, irrespective of the location of e.g. sources of greenhouse gas emissions. Therefore, these challenges cannot be solved by national or local action alone, since individual action is unlikely to lead to optimal outcomes. Coordination at the European level enhances climate action and can supplement and reinforce national and local action effectively; EU action is justified on grounds of subsidiarity, in line with Article 191 of the Treaty on the Functioning of the European Union.

3.3. Subsidiarity: Added value of EU action

A European framework would be more appropriate than national initiatives in addressing the difficulty to assess the quality of carbon removals. Such framework would create a level-playing field and a fair internal market for the certification of carbon removals, enhancing comparability and trust. A patchwork of national initiatives in this area would only exacerbate the problem rather than solving it.

4. OBJECTIVES: WHAT IS TO BE ACHIEVED?

4.1. General objectives

To address the first problem (i.e. the difficulty to assess and compare the quality of certified carbon removals), this initiative aims to create a certification framework to ensure the high quality of carbon removals in the EU. To address the second and the third problem (i.e. the lack of trust and the barriers to access finance), this initiative aims to establish an EU governance system to recognise certification schemes that correctly apply and enforce the EU quality framework in a reliable and harmonised way across the Union.

These actions are necessary to trigger action and to build any future policy in this area, in view of the need to remove hundreds of MtCO₂ per year to achieve the 2050 climate neutrality objective set in the European Climate Law and the environmental objectives of the European Green Deal. A very large majority of the respondents to the public consultation (89%) agreed that establishing a robust and credible certification system for carbon removals is the first essential steppingstone towards achieving a net contribution from carbon removals in line with the EU's climate neutrality objective. The introduction of a certification of carbon removals based on robust, solid and transparent carbon accounting was also one of the measures proposed by the Conference on the Future of Europe²⁶.

4.2. Specific objectives

The four identified problem drivers correspond to four specific objectives: **quality, tailored methodologies, trust** and **harmonisation**.

4.2.1. Quality

To harmonise the way in which the four certification challenges identified above are addressed, the framework will promote existing best practices through the establishment of four certification criteria (under the acronym **QU.A.L.I.TY**): **QU**antification, **A**dditionality and baselines, **L**ong-term storage, and **S**ustainabil**ITY**. The shortlisting of these four **QU.A.L.I.TY** criteria follows a general consensus about what constitutes high-quality certification according to most existing certification methodologies analysed in the study supporting this Impact Assessment²⁷, as well as by the main international references for GHG accounting such as the

²⁶ Conference on the Future of Europe, 2022 ([link](#)).

²⁷ McDonald et al., 2021 ([link](#)).

GHG Protocol²⁸, the ISO Standard 14064-2²⁹, and the draft Core Carbon Principles proposed by the Integrity Council for the Voluntary Carbon Market³⁰.

4.2.2. Tailored methodologies

To address the diversity of carbon removal solutions (even within the same family of solutions, in particular within the carbon farming domain), the framework should include specific certification methodologies that are tailored to each type of carbon removals, while being aligned with the four Q.U.A.L.I.T.Y criteria. The respondents to the public consultation clearly indicated that the Commission should allow different types of certificates depending on the characteristics of the carbon removal solutions (55%).

4.2.3. Trust

To address the need to ensure the reliability of certification processes, the framework should provide public guarantees that certification schemes are capable of enforcing the four Q.U.A.L.I.T.Y criteria, rely on third-party independent auditors to certify their projects, and manage registries of good quality to avoid double-counting. These guarantees would increase trust in certification schemes for carbon removals.

4.2.4. Harmonisation

To minimise the transaction costs for providers of carbon removals when navigating through different certification schemes, an EU governance process should be established to harmonise as much as possible the rules and procedures of certification schemes operating in the EU framework. The certificates should transparently carry all the core information needed to access financing opportunities of different types (e.g. both net and gross climate effect, a granular breakdown of emissions and removals), while certification schemes shall be allowed to go beyond the EU standard (e.g. more ambitious baseline, longer commitment periods, higher frequency of audits) to differentiate themselves, including on specific aspects that are more relevant for the uses of the certificates they issue.

5. WHAT ARE THE AVAILABLE POLICY OPTIONS?

5.1. What is the baseline from which options are assessed?

5.1.1. Overview of certification actors and roles

Three broad categories of actors are involved in the certification of carbon removals.

First, **operators** are defined as those who carry out carbon removal activities, i.e. companies implementing industrial removal solutions or land managers implementing carbon farming solutions, and who seek certification for these activities. These **project operators**, especially in the carbon farming domain, are often SMEs; therefore, it may be difficult for them to directly

²⁸ GHG Protocol, 2022 ([link](#))

²⁹ ISO, 2019 ([link](#)).

³⁰ Integrity Council for the Voluntary Carbon Market, 2022 ([link](#)).

access the opportunities offered by certification schemes, because of lack of skills or time. This has created a demand for intermediary operators (called *programme developers* in this Impact Assessment) who aggregate multiple projects, support them in obtaining certification, and usually take a share of the revenues linked to the certificates.

Then, **certification schemes** provide a set of rules and procedures to certify operators. Typically, the following actions need to be performed:

- Establish certification criteria and develop the related certification methodologies. Often, certification schemes apply certification methodologies that are developed in a bottom-up fashion by external parties (often, the programme developers); in such cases, the schemes would establish a methodology approval process to check that the methodologies are aligned with the scheme’s criteria.
- Validate projects ex-ante and verify climate benefits ex-post; this is often delegated to third-party auditors called certification bodies (see more below).
- Issue removal certificates corresponding to the verified carbon removals (this could also be done by certification bodies on behalf of certification schemes), and record them in a registry system.

Finally, **certification bodies (VVB)** are third-party auditors that are often appointed by certification schemes to evaluate documentation at two stages in the certification cycle, and to issue certificates on behalf of the certification scheme. At the stage of project registration, these auditors perform an ex-ante project validation, i.e. an initial assessment of carbon-removing projects to evaluate the reasonableness of statements about the outcome of future activities. At the issuance of credits, they perform an ex-post verification of carbon removals, i.e. they audit the projects to confirm the quantified climate impact and ensure alignment with the scheme’s criteria.

These actors, roles, and relationships are illustrated in **Error! Reference source not found.**

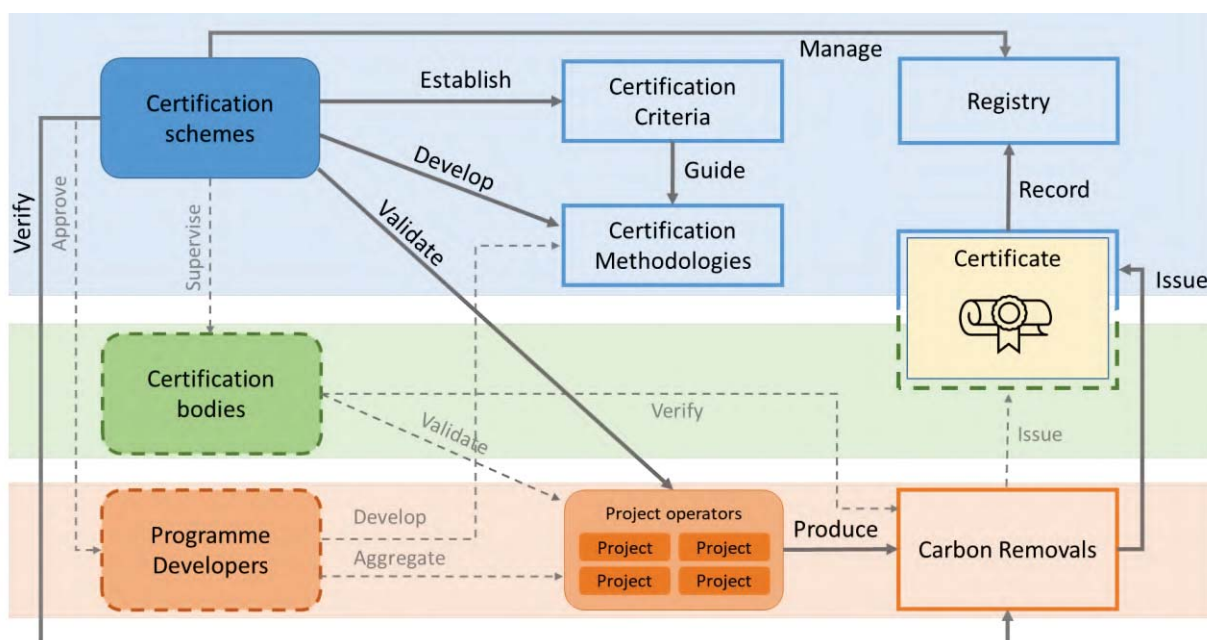


Figure 1 - Roles in a certification system. Dashed elements indicate optional roles or relationships that are not always present.

5.1.2. Current status of carbon removal certification in the EU

There is little presence of European projects on voluntary carbon markets. For instance, the two biggest certification schemes in voluntary carbon markets, the Voluntary Carbon Standard and Gold Standard, have respectively registered only 11 and 4 projects as taking place in the EU³¹, of which only 1 is specifically aimed at carbon removals. Thus, it is possible to conclude that currently the largest certification schemes in voluntary carbon markets have virtually no role in certifying carbon removals happening in the EU. In this context, a few national or local certification schemes have emerged in the EU that are solely or mainly dedicated to certifying various types of CO₂ removals.

An example of a certification scheme run by a national public authority is the **Label Bas Carbone** in France, which is managed by the French Ministry for Ecologic and Solidary Transition and jointly developed with the Ministry of Agriculture and Food, as well as external experts. It currently³² certifies 233 projects covering farming and forestry activities to both reduce emissions and increase removals; of these, the large majority (176) are individual carbon removal projects in the afforestation or forest management domains (total carbon removal potential: ~325 ktCO₂), but there is also one large collective project (Carbon'Agri) gathering 300 individual livestock farms based on a methodology to certify emission reductions (total emission reduction potential: ~140 ktCO₂). The Ministry has defined the basic certification criteria in a decree³³, and it convenes an ad-hoc, informal expert group to help the review and approve the methodologies submitted by programme developers and project operators. After third-party verification, the Ministry issues the certificates; French companies, public organisations or individuals can buy those credits but not resell them further.

Another national certification scheme is the Spanish **Registro de Huella de Carbono**, a public registry managed by the Ministry for the Ecological Transition. It covers both emission reductions projects in many sectors (2.057 projects³⁴) as well as carbon removal activities (166 projects, two thirds of which started in 2021, mainly afforestation and forest restoration). The registry asks operators to apply recognised methodologies and to be validated and verified by independent auditors. Once the project is verified, the Ministry records the certificates on a public registry. In addition, the Ministry gives a three-tier label to private companies that (1) compute their carbon footprint, (2) reduce their emissions and (3) compensate their remaining emissions by buying certificates from the registry.

Other local initiatives in the EU, run by either private or public actors, include Puro.earth from Finland, certifying 30 projects (of which 13 in Europe) dedicated to both industrial carbon removal solutions and carbon farming solutions, for a total removal potential of ~100 ktCO₂eq³⁵; MoorFutures³⁶ from Germany, dedicated exclusively to peatland rewetting and certifying two projects for a total mitigation potential of ~10-15 ktCO₂eq; and CarboCert (Germany) and Kaindorf Humuszertifikate (Austria), both dedicated to CO₂ removals in

³¹ 2021 data only, extracted from: The Voluntary Carbon Market Dashboard, 2022 ([link](#)).

³² Database at Label Bas Carbone, consulted on 4 July 2022.

³³ Arrêté du 28 novembre 2018 ([link](#)).

³⁴ As of the end of 2021. Data extracted from the 2021 annual report: ([link](#)).

³⁵ Estimated from Puro.earth, 2022a ([link](#)) Puro.earth, 2022b ([link](#)) [accessed May 2022].

³⁶ Estimated from MoorFutures, 2022a ([link](#)) and MoorFutures, 2022b ([link](#)).

organic soils³⁷. In the UK, the Woodland Carbon Code certifies around 1000 projects for a total removal potential of around ~100 ktCO₂eq³⁸. This overview does not include several local schemes and start-ups that have emerged recently and which could not be considered due to their small size or not yet available data. It can therefore be concluded that several national or local EU certification schemes have emerged in recent years, but that these are very specialised and cover small regions. Except Puro.earth, there is virtually no other scheme certifying industrial carbon removal solutions or carbon storage products. This provides a rationale for an EU certification initiative to encourage the scale-up of the activities of existing schemes and the entry of new ones.

Annex 4 provides an overview of certification schemes that are active globally or in the EU.

5.1.3. Quality of existing carbon removal certification

It is not only important to scale up carbon removal activities but also to ensure a growth path based on robust certification schemes that create trust in the quantity and quality of carbon removals. As explained in section 2, certificates are still associated with a large reputational risk if unreliable and non-transparent certificates are used as a means for “greenwashing”, and there is still a high degree of confusion about what classifies as high-quality carbon removals, as evidenced by the diversity of certification approaches. Stakeholder’s replies to the public consultation (summarized in **Annex 2**) provide an overview of **the most salient quality gaps** of the current approaches to carbon removal certification. **Annexes 4, 6, 7, 8, 9** provide overviews and in-depths assessments of current approaches.

- **Quantification.** Despite the existence of comprehensive guidance on the necessary steps to establish quantification, monitoring and reporting protocols³⁹, there are still gaps in our ability to monitor, report and verify carbon removals via either direct observation or modelling techniques. The best practice when establishing the boundaries of certification is to carry out a life-cycle assessment to capture the total impacts of a given carbon removal activity, including related upstream and downstream emissions. Different approaches to establish the baseline are discussed below. Some certification schemes estimate the amount of carbon removals based on direct measurement, others rely on modelling, others do both, but methodologies differ in approaches to manage uncertainty (e.g. discounts, buffers, conservative assumptions), and the potential to use of remote sensing to increase the accuracy and lower the costs of MRV in the carbon farming domain is not yet fully exploited. Respondents to the public consultation put a great emphasis on this challenge. Ensuring precise, accurate and timely measurement for removals was ranked as the most important challenge regarding the integration of carbon removals in EU climate policies (this result was mainly driven by the replies of business associations and companies/business organisations). The robustness of MRV aspects was the most selected criterion defining the types of carbon removals that EU climate policies should incentivise. When asked

³⁷ For more details about these certification schemes, see the supporting review by McDonald et al., 2021 ([link](#)).

³⁸ Estimated from IHS Markit, 2022 ([link](#)). Credits issued only includes Woodland Carbon Units (WCUs) and not provisional units (PIUs). Projects activity estimated due to the varying names of similar activities.

³⁹ The Greenhouse Gas Protocol ([link](#)) established by the World Resources Institute (WRI) and the Business Council for Sustainable Development (WBCSD), and the international standard ISO 14064-2 ([link](#)).

what information the certification of carbon removals should disclose, respondents selected as the three top replies “Quantity of carbon removed”, “Type of carbon removals” and “Information on MRV processes”.

- **Additionality and baselines.** There are different ways to define baselines, depending on whether the carbon removals are compared to the historical practice of the individual operator or with the standard practice of other operators under similar circumstances; there are also different approaches to ensure the ambition of the baseline, e.g. a discount on the historical level of emissions and removals, or the choice of an ambitious benchmark such as best available technologies or best performing activities. The key question is how to find the good balance between accuracy and ambition on the one hand, and lower costs and a broad uptake on the other hand. Most schemes adopt project-specific baselines, but these have shortcomings in terms of ambition, reliability, administrative burden and incentives for “first-movers” (see Annex 6 for more details). In terms of additionality, only few certification schemes require both regulatory and financial additionality (they more often require just one of the two, or none)⁴⁰. In the public consultation, the challenge of setting appropriate baselines and demonstrating the additionality of removals was considered relatively less important than others, as it only ranked 6th in a list of eight challenges. Nevertheless, in a question specifically dedicated to additionality, 71% of respondents call for EU guidance on baseline and additionality criteria.
- **Long-term storage.** Most certification schemes define a specific duration for the monitoring period of the project⁴¹, which can last from 10 to 100 years⁴², and the continuous storage of carbon removals is not guaranteed after this period. However, the issued certificates have no expiration date, thereby failing to fully recognise the non-permanence of some types of carbon removal solutions (see Annex 7 for more details). In addition, to cover the risk of early release of reversals, certification schemes create buffer accounts and allocate liabilities (imposing adequate redress and compensations) on the carbon removal supplier, the certification scheme or the user of the certificate. Providing sufficient guarantees for the duration of carbon storage and the prevention of reversals was considered the 3rd (among eight) most important challenge by the respondents to the public consultation. Regarding the way to best manage the risks of reversal, the most common response was to require risky removal solutions to be discounted or have a proportion of expected removals be stored in a buffer account; the second most popular response was to require multi-year monitoring plans at the outset of the certification procedure; the third most popular response was for certificates to be issued with specific durations (e.g. 5, 7, or 10 years), which could then be renewed.
- **Sustainability.** Existing schemes include more or less stringent prescriptions and tools to identify and to clarify how sustainability impacts are managed. Some schemes require the disclosure of additional co-benefits, as long as they can be monitored and verified, but very few certification schemes require to provide an assessment of the environmental and social impacts of the projects based on specific rules and monitoring

⁴⁰ The quality of existing certification schemes (covering not only carbon removals but also emission reduction and avoidance) was reviewed in a recent report carried out for the French Ministry of Ecological Transition, see DGEC, 2022 ([link](#)).

⁴¹ DGEC, 2022 ([link](#)).

⁴² Arcusa and Sprengle-Hyppolite, 2021 ([link](#)).

tools⁴³. More typically, schemes may require identifying and mitigating risks of adverse side-effects on sustainability, or exclude activities that, despite their climate benefits, are likely to generate them. Avoiding potential negative environmental impacts and complying with sustainability principles was considered a less important challenge by respondents to the public consultation (ranked 7th out of eight), but it was considered an important criterion (especially by NGOs and EU citizens) when defining the types of removals that should be incentivised (ranked 4th).

Regarding the reliability of the certification process, the majority of the larger schemes score well on transparency⁴⁴: they have third-party verification, they submit their methodologies to peer-review and public consultation, they publish their certification methodologies and all the documents related to the verification and certification of the projects, and they have a public registry that identifies each certificate with a serial number. However, other best practices (such as the publication of withdrawn certificates and their final destination) are only followed by a minority. Current procedures to avoid double counting still rely on manually checking if the registries from other schemes include certificates from the same project. In the public consultation, many stakeholders indicated that certificates should include transparent information on the carbon removal provider, on the certificate owner, and on the use of the certificate with a view to avoid double counting (respectively the 5th, 6th and 7th most selected types of information in a list of 12). See **Annex 10** for an overview of the best practices to ensure transparency.

5.1.4. EU regulatory context

An important consideration when creating a framework for the certification of carbon removals produced in the EU is to build on some elements that are already included in relevant EU legislation and that partially address the challenges identified as the first problem driver. It will be important to ensure consistency with this legislation so that synergies can be exploited and inconsistent legislation avoided. However, the current legislation **does not provide a comprehensive framework for carbon removal certification**: for instance, some relevant monitoring rules or indicators apply to the national level and not to the individual level or are of a voluntary nature. See **Annexes 6 to 9** for more details.

- **Quantification.** The ETS Directive⁴⁵ explicitly includes carbon capture and storage (CCS) solutions, and therefore CO₂ captured, transported and stored according to the **CCS Directive**⁴⁶ will be considered as not emitted. To this end, CCS should be quantified in accordance with a comprehensive methodology outlined in the **Commission Implementing Regulation (EU) 2018/2066**⁴⁷ on the monitoring and reporting of GHG emissions for the ETS (especially Articles 40 to 46 and Article 49 and Annex IV, Section 21). Based on these rules, the Commission has also developed detailed methodologies for the GHG quantification of BECCS and DACCS projects

⁴³ Arcusa and Sprenkle-Hyppolite, 2021 ([link](#)).

⁴⁴ Arcusa and Sprenkle-Hyppolite, 2021 ([link](#)).

⁴⁵ Directive 2003/87/EC ([link](#)).

⁴⁶ Directive 2009/31/EC ([link](#)).

⁴⁷ Commission Implementing Regulation (EU) 2018/2066 ([link](#)).

that apply to receive grants from the **Innovation Fund**⁴⁸, and requires successful projects to maintain records of measurements and annual reports. For carbon farming solutions and harvested wood products, the **LULUCF Regulation**⁴⁹ provides a blueprint for accurate monitoring and reporting of carbon removals in line with IPCC guidelines and in synergy with biodiversity, renewable energy and adaptation policies. The rules encourage monitoring land use in a geographically-explicit way, at low cost and in a timely fashion, for example through digital databases and maps, combined with remote sensing, including the Copernicus Sentinel satellites or commercially available services.

- **Additionality and baselines.** The **Common Agricultural Policy**⁵⁰ provides a set of regulatory requirements referring to different pieces of environmental legislation (called Statutory Management requirements) and of conditionality requirements (called Good Agricultural and Environmental Conditions, GAECs) that farmers must comply with in order to be eligible for income support; these can be of inspiration when establishing that carbon farming projects are additional from a regulatory point of view (for example that they exceed legal obligations and/or conditionality requirements).
- **Long-term storage.** For geological storage, the already mentioned **CCS Directive**⁵¹ establishes that the carbon removal project remains responsible for monitoring and reporting and liable to compensate for any re-emission, with a transfer of liability foreseen at the cessation of the activities.
- **Sustainability impacts.** The proposal for a **Nature Restoration Law**⁵² defines a list of indicators to assess the improvement of agricultural ecosystems⁵³ and forest ecosystems⁵⁴, with a duty for Member States to put measures in place to increase their trends at national level. . Once defined and developed, these indicators could be taken as a basis for the disclosure of co-benefits of carbon removal activities. The **Taxonomy Regulation**⁵⁵ establishes six environmental objectives: climate change mitigation, climate change adaptation, sustainable use and protection of water and marine resources, transition to a circular economy, pollution prevention and control, and protection and restoration of biodiversity and ecosystems. Relevant activities for carbon removal certification in the first Taxonomy Delegated Act (for the climate-related objectives) were forestry, restoration of wetlands, and underground permanent geological storage of CO₂. The Taxonomy Do No Significant Harm criteria can inspire a general approach to exclude activities with a significant negative impact on sustainability. The sustainability criteria for biomass from the **Renewable Energy Directive**⁵⁶ can be taken as a basis for sustainability safeguards for the biomass used for BECCS or for bio-based construction products. In the case of bio-based construction

⁴⁸ European Commission, 2021d ([link](#)).

⁴⁹ Regulation (EU) 2018/841 ([link](#)).

⁵⁰ Regulation (EU) 2021/2116 ([link](#)).

⁵¹ Directive 2009/31/EC ([link](#)).

⁵² European Commission, 2022a ([link](#)).

⁵³ Grassland butterfly index; share of agricultural land with high-diversity landscape features; farmland bird index at national level; stock of organic carbon.

⁵⁴ Standing deadwood; lying deadwood; share of forest with uneven age structure; forest connectivity; common forest birds index; stock of organic carbon.

⁵⁵ Regulation (EU) 2020/852 ([link](#)).

⁵⁶ Directive (EU) 2018/2001 ([link](#)).

products, safeguards and co-benefit disclosure could also largely build on provisions from the **Ecodesign for Sustainable Products Regulation**⁵⁷ and the **Construction Products Regulation**⁵⁷, which the Commission is proposing to revise⁵⁸. Finally, the Environmental Footprint method⁵⁹ defines the recommended modelling requirements, data quality requirements⁶⁰, and life cycle impact assessment⁶¹ to be followed when assessing the environmental performance of products and organization. Such methods allow to identify co-benefits and trade-off between climate change and the other 15 impact categories.

Finally, when it comes to the Transparency criteria, experience with the **Renewable Energy Directive** but also with the **EU ETS** confirm the need to have robust registries in place to track certificates to avoid double-counting. The rules to harmonise registries for carbon removal certification could build on these experiences. See **Annex 10** for more details.

5.2. Description of the policy options

To achieve the general objectives stated in section 4.1, the EU will (i) develop a high-quality standard for carbon removals and (ii) ensure its enforcement. Accordingly, two sets of policy options will be assessed:

- **Quality options:** based on the Q.U.A.L.I.T.Y criteria established in a legislative framework (Regulation), specific methodologies will be developed by either the certification schemes (option Q1) or the Commission (option Q2).
- **Governance options:** based on the Transparency criteria established in the framework, certification schemes will be recognised by either the Member States (option G1) or the Commission (option G2).

The diagram in Figure 2 summarises the intervention logic of the Impact Assessment.

⁵⁷ Regulation (EU) No 305/2011, consolidated text ([link](#)).

⁵⁸ European Commission, 2022b, COM/2022/144 ([link](#)).

⁵⁹ European Commission, 2021 ([link](#))

⁶⁰ JRC, 2020 ([link](#))

⁶¹ The Environmental Footprint reference package includes the flow list, the life cycle impact assessment methods and other related xml files ([link](#))

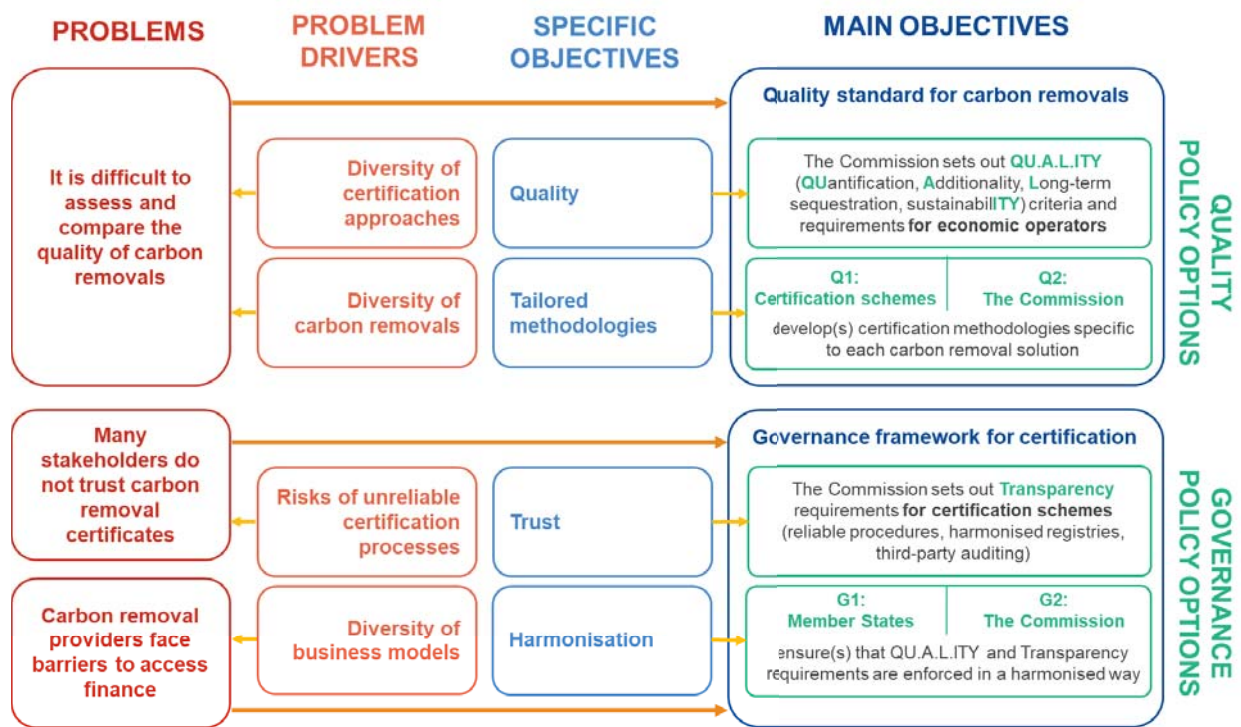


Figure 2 - Overview of the intervention logic

5.2.1. Quality options Q1 and Q2 – Developing the tailored certification methodologies

The development of the certification methodologies will build on the best practices from existing certification schemes and EU legislation. The existing approaches for each QU.A.L.I.TY criterion, their strengths and weaknesses, and the best practices have been extensively assessed in dedicated annexes (Annexes 6 to 9). The results from this analysis are summarised in Table 1.

Table 1 - Summary of best practices for the QU.A.L.I.TY criteria

Quantification
<p>Goal: Quantify all relevant removals and emissions based on a life-cycle approach including direct and secondary emissions attributable to the carbon removal project.</p> <p>Annex 6 analyses existing approaches to quantify carbon removals and concludes that the project boundaries should be set in a way that accounts for all removals and emissions attributable to the carbon removal activity, and that the climate benefit assessment of a carbon removal project should be conducted by comparing the net removals expected from the project activities to a representative baseline. In addition, the carbon removal project should provide a comprehensive monitoring plan describing in detail the procedures used for the measurement or the estimates of all GHG data and other information relevant to the project and the baseline, including a detailed breakdown of the emissions and removals attributable to the project.</p>
<p>Essential elements for the development of tailored methodologies</p>

Permanent storage	Carbon farming	Carbon storage products
The quantification can build on the methodologies already developed for the Innovation Fund (i.e. a life-cycle approach including direct and secondary emissions attributable to the carbon removal project).	<p>The quantification should build on the scope of the LULUCF regulation. While increased non-LULUCF emissions due to the activity should be subtracted, decreases should be disclosed as a co-benefit.</p> <p>The best available data and monitoring techniques should be in line with the Commission proposal for the LULUCF Regulation. To decrease costs and enable large participation, the full potential of remote sensing should be exploited.</p>	More research and experience is needed to develop a dynamic life-cycle approach, identify the correct boundaries of the activity and recognise the temporary storage of carbon in long-lasting products.

Additionality and baselines

Goal: Deliver removals beyond the standard practices and channel incentives where they are needed to take up or maintain a carbon removal activity.

Annex 7 looks at approaches to define a real, transparent, conservative, and credible baseline (beyond standard practice), that encourages ambition over time – in line with the Paris agreement – and broad participation. It also argues for the importance to demonstrate that carbon removal activities are additional from a regulatory and a financial point of view. The annex concludes that a standardised baseline, which reflects the market and regulatory conditions in which the carbon removal activity takes place, has many advantages: it is objective and robust, it rewards the action of early-movers, and it reduces the need for complex tests on financial and regulatory additionality.

Essential elements for the development of tailored methodologies

Permanent storage	Carbon farming	Carbon storage products
As these are nascent technologies developed with the specific aim of removing carbon, the baseline can generally be set at zero removals, and the activity considered additional.	The baseline should represent the standard practices in comparable land parcels based on integrated datasets and remote sensing. Absent these data, baselines can be based on available best practices (based e.g. on EU legislation), historical averages of national, regional or project-specific data that should be corrected for data uncertainties and higher ambition than business-as-usual. Design simplified approaches to determine additionality.	More experience is needed to identify best practices.

Long-term storage

Goal: Incentivize long-term storage through fair and transparent risk-sharing arrangements.

Annex 8 concludes that the choice of time-limited and renewable contracts for carbon farming activities can recognise the non-permanence of these practices and avoid land managers having to take a too long commitment that could discourage their interest in taking up these certification schemes, while at the same time providing incentives for the continuation of the carbon removal activities in order to obtain a renewal of the contract. In addition, thanks to the detailed rules of the CCS Directive on monitoring and liability for re-emissions, the EU framework can recognise the high quality of BECCS and DACCS and therefore simplify access to finance.

Essential elements for the development of tailored methodologies

Permanent storage	Carbon farming	Carbon storage products
Operators are liable to compensate for any re-emission during the full period of carbon storage, with a transfer of liability foreseen at the cessation of the activities, as stipulated in the CCS Directive.	To keep liabilities manageable for land managers, they can commit to carbon storage for a limited time period, during which they are liable for re-emission. The certificate expires at the end of the commitment period or can be prolonged. Land managers are also free to commit to a longer period upfront.	More experience is needed to identify best practices.

Sustainability

Goal: Incentivise carbon removals with higher co-benefits (including biodiversity, water quality, zero-pollution, circularity, or food security) through a balance between safeguards from existing legislation, disclosure of co-benefits, and minimum sustainability requirements.

Annex 9 concludes that the inclusion of strong requirements on sustainability is necessary to tackle the climate crisis and the biodiversity crisis in a synergistic manner. While minimum requirements for co-benefits should be defined for carbon farming activities due to the strong potential for synergies, in the case of permanent storage solutions and carbon storage products relevant safeguards can build on existing legislation.

Essential elements for the development of tailored methodologies

Permanent storage	Carbon farming	Carbon storage products
CCS, Renewable Energy Directive and Taxonomy provide the relevant safeguards and minimum requirements for safe geological carbon storage and sustainable supply of biomass (BECCS).	Only carbon farming activities that provide a neutral or positive impact on the environment are eligible. The minimum requirements should go beyond mandatory legal standards, and can be inspired by relevant taxonomy criteria or best practices from private certification schemes. Disclosure of co-benefits can build on relevant EU legislation (e.g. biodiversity indicators from proposed Nature Restoration Law).	Minimum requirements and indicators for co-benefits to be developed in close synergy with Sustainable Products Regulation and Construction Products Regulation.

The legal framework will set out these QU.A.L.I.T.Y criteria; based on them, certification methodologies tailored to each specific carbon removal solution have to be developed:

Under option Q1, the certification schemes will develop new methodologies or adjust their existing methodologies in line with these criteria and elements if they want to be recognised under the EU certification framework. The certification schemes are free to submit their methodologies at any time to the responsible public authority for recognition (see governance options G1 and G2).

Under option Q2, the Commission will develop the methodologies in close consultation with an expert group that includes experts from the Member States, independent experts, and stakeholders⁶². Q2 is the preferred option for the respondents to the public consultation: 64% of them believe that the methodologies should be established by public administration rather than private entities. The Commission will decide on the sequence and priority of the methodologies to be developed based on several criteria (see Box 4), in consultation with the expert group.

Box 4 – Establishing the priority for tailored certification methodologies under Q2

Respondents to the public consultation shared their views on the time horizon for including specific carbon removal solutions in the certification framework: both carbon farming solutions (especially sustainable forest management) and industrial solutions (with some exceptions) were broadly supported for implementation as soon as possible. The three most frequently selected criteria to prioritise the methodologies were *robustness of MRV aspects* (54% of all respondents), *potential for deployment at large scale* (49%), and *technical readiness and economic feasibility* (45%). Another important criterion, due to its relevance for the EU Green Deal, are the *potential environmental co-benefits* (the most selected criterion among NGOs). Carbon removal solutions perform very differently against these criteria:

- **BECCS** and **DACCS** have a large mitigation potential, their certification can ensure robust MRV and, as shown in in Table 1.

Table 1 - Summary of best practices for the QU.A.L.I.T.Y criteria

Quantification
<p>Goal: Quantify all relevant removals and emissions based on a life-cycle approach including direct and secondary emissions attributable to the carbon removal project.</p> <p>Annex 6 analyses existing approaches to quantify carbon removals and concludes that the project boundaries should be set in a way that accounts for all removals and emissions attributable to the carbon removal activity, and that the climate benefit assessment of a carbon removal project should be conducted by comparing the net removals expected from the project activities to a representative baseline. In addition, the carbon removal project should provide a comprehensive monitoring plan describing in detail the procedures used for the measurement or the estimates of all GHG data and other information relevant to the project and the baseline, including a detailed breakdown of the emissions and removals</p>

⁶² The call to set up this Expert Group can be found here: [\(link\)](#). FAQ: [\(link\)](#).

attributable to the project.

Essential elements for the development of tailored methodologies

Permanent storage	Carbon farming	Carbon storage products
<p>The quantification can build on the methodologies already developed for the Innovation Fund (i.e. a life-cycle approach including direct and secondary emissions attributable to the carbon removal project).</p>	<p>The quantification should build on the scope of the LULUCF regulation. While increased non-LULUCF emissions due to the activity should be subtracted, decreases should be disclosed as a co-benefit.</p> <p>The best available data and monitoring techniques should be in line with the Commission proposal for the LULUCF Regulation. To decrease costs and enable large participation, the full potential of remote sensing should be exploited.</p>	<p>More research and experience is needed to develop a dynamic life-cycle approach, identify the correct boundaries of the activity and recognise the temporary storage of carbon in long-lasting products.</p>

Additionality and baselines

Goal: Deliver removals beyond the standard practices and channel incentives where they are needed to take up or maintain a carbon removal activity.

Annex 7 looks at approaches to define a real, transparent, conservative, and credible baseline (beyond standard practice), that encourages ambition over time – in line with the Paris agreement – and broad participation. It also argues for the importance to demonstrate that carbon removal activities are additional from a regulatory and a financial point of view. The annex concludes that a standardised baseline, which reflects the market and regulatory conditions in which the carbon removal activity takes place, has many advantages: it is objective and robust, it rewards the action of early-movers, and it reduces the need for complex tests on financial and regulatory additionality.

Essential elements for the development of tailored methodologies

Permanent storage	Carbon farming	Carbon storage products
<p>As these are nascent technologies developed with the specific aim of removing carbon, the baseline can generally be set at zero removals, and the activity considered additional.</p>	<p>The baseline should represent the standard practices in comparable land parcels based on integrated datasets and remote sensing. Absent these data, baselines can be based on available best practices (based e.g. on EU legislation), historical averages of national, regional or project-specific data that should be corrected for data uncertainties and higher ambition than business-as-usual. Design simplified approaches to determine</p>	<p>More experience is needed to identify best practices.</p>

	additionality.	
Long-term storage		
<p>Goal: Incentivize long-term storage through fair and transparent risk-sharing arrangements.</p> <p>Annex 8 concludes that the choice of time-limited and renewable contracts for carbon farming activities can recognise the non-permanence of these practices and avoid land managers having to take a too long commitment that could discourage their interest in taking up these certification schemes, while at the same time providing incentives for the continuation of the carbon removal activities in order to obtain a renewal of the contract. In addition, thanks to the detailed rules of the CCS Directive on monitoring and liability for re-emissions, the EU framework can recognise the high quality of BECCS and DACCS and therefore simplify access to finance.</p>		
Essential elements for the development of tailored methodologies		
Permanent storage	Carbon farming	Carbon storage products
Operators are liable to compensate for any re-emission during the full period of carbon storage, with a transfer of liability foreseen at the cessation of the activities, as stipulated in the CCS Directive.	To keep liabilities manageable for land managers, they can commit to carbon storage for a limited time period, during which they are liable for re-emission. The certificate expires at the end of the commitment period or can be prolonged. Land managers are also free to commit to a longer period upfront.	More experience is needed to identify best practices.
Sustainability		
<p>Goal: Incentivise carbon removals with higher co-benefits (including biodiversity, water quality, zero-pollution, circularity, or food security) through a balance between safeguards from existing legislation, disclosure of co-benefits, and minimum sustainability requirements.</p> <p>Annex 9 concludes that the inclusion of strong requirements on sustainability is necessary to tackle the climate crisis and the biodiversity crisis in a synergistic manner. While minimum requirements for co-benefits should be defined for carbon farming activities due to the strong potential for synergies, in the case of permanent storage solutions and carbon storage products relevant safeguards can build on existing legislation.</p>		
Essential elements for the development of tailored methodologies		
Permanent storage	Carbon farming	Carbon storage products
CCS, Renewable Energy Directive and Taxonomy provide the relevant safeguards and minimum requirements for safe geological carbon storage and sustainable	Only carbon farming activities that provide a neutral or positive impact on the environment are eligible. The minimum requirements should go beyond mandatory legal standards, and can	Minimum requirements and indicators for co-benefits to be developed in close synergy with Sustainable Products Regulation and Construction Products

supply of biomass (BECCS).	be inspired by relevant taxonomy criteria or best practices from private certification schemes. Disclosure of co-benefits can build on relevant EU legislation (e.g. biodiversity indicators from proposed Nature Restoration Law).	Regulation.
<ul style="list-style-type: none"> • , the QU.A.L.ITY criteria can largely build on existing legislation, but their economic feasibility is still a challenge. Thus, these methodologies can and should be built relatively quickly to attract investment. • While certification methodologies have already been developed and rolled out at a larger scale for some carbon farming solutions (e.g. forestry, afforestation), others are still applied at a smaller scale (e.g. agro-forestry, peatland rewetting, soil carbon⁶³, biochar...). Besides the existing experience with certification, the choice of the specific carbon farming solutions to prioritise should be driven by the extent of the environmental and socio-economic co-benefits that these solutions can provide. • The certification of carbon storage in products is still in its infancy. While waiting for a more robust scientific consensus, no best practices can yet be identified. First, sophisticated quantification methods must be developed by experts and discussed with the relevant stakeholders. The 2022 Commission Work Program for CEN/CENELEC includes a mandate for developing a methodology to integrate carbon storage into LCA for construction materials. 		

5.2.2. Governance options G1 and G2 – Implementing the certification framework

The EU framework will guarantee that certification schemes ensure a well-functioning certification process by establishing three **Transparency criteria** (see **Annex 10**):

- **Reliable rules and procedures:** certification schemes shall be operated on the basis of reliable rules and procedures in order to ensure their capacity to check that operators comply with the QU.A.L.ITY criteria. In particular, these include internal management and monitoring, complaints and appeals management, stakeholder consultation, transparency and publication of information, approval and training of certification bodies, management of non-conformities, and management of registries.
- **Third-party verification and certification:** certification schemes shall ensure that information and data submitted by operators for verification of the generated carbon removals and certification of the carbon removal activities are subject to independent auditing. Certification schemes shall also ensure that the verification and certification activities are carried out by accredited certification bodies in a cost-effective way.
- **Robust registries:** certification schemes shall duly maintain a public registry of validated and verified carbon removals and certificates. The certificates in the registry

⁶³ In this area, two recent calls under the Horizon mission “A soil deal for Europe” could help to prepare the technical work for the development of relevant certification methodologies. A call for establishing a carbon farming network has a budget of 3 million EUR; another call relate to the monitoring, reporting and verification of soil carbon and greenhouse gases balance will grant an EU contribution of up to 7 million EUR to two projects. The calls closed in September 2022 and the applications are currently under evaluation.

should include all relevant information needed to assess the quality of the certificate, to identify it (e.g. a unique tracking number) and to track its use. Registries should be inter-operable to help preventing double-counting.

The definition of these transparency criteria largely draws from existing experience with the certification of sustainable biomass under the Renewable Energy Directive. In that context, the Commission carried out a review⁶⁴ of the certification schemes operating under the 2018 Renewable Energy Directive, which pointed to several good practice rules that are generally applicable to certification schemes operating in other fields.

In addition, public authorities can contribute to ensuring the credibility and integrity of certification schemes by:

1. Recognising the certification schemes that comply with the Transparency criteria and that can therefore be used by operators to demonstrate compliance with the QU.A.L.ITY criteria and tailored methodologies;
2. Taking appropriate measures or sanctions in case of irregularities;
3. Producing reports about the implementation of the certification framework.

Depending on who is the public authority responsible for these three roles, two governance options will be assessed:

Under option G1, Member States are the public authority responsible for ensuring the credibility and integrity of certification schemes. Alternatively, under this option, each Member State may decide to establish a public certification scheme which would directly perform the typical functions of a certification scheme.

Under option G2, the Commission is the responsible public authority and the certification schemes recognised by the Commission could then be active across the whole Union. The EU recognition would be valid for a fixed number of years (e.g. five) and regularly monitored.

5.3. Options discarded at an early stage

The option to establish a mandatory requirement on all EU operators that seek to certify carbon removals to do so in accordance with the EU framework was discarded. The Commission considered that more experience is needed in this novel and complex area before any effective mandatory requirement can be designed. In particular, before any mandatory use of the framework is proposed, the certification methodologies need to be already in place and tested. This initially voluntary phase will serve as a pilot phase during which operators and certification schemes can build capacity. Based on the lessons learnt, the Commission should undertake an evaluation and assess further policy options.

The option to establish rules on how the certificates can be used by private and public organisations to report on their climate performance and to substantiate their climate-related

⁶⁴ Guidehouse (2021) Report on the harmonisation and strengthening of sustainability certification for biofuels, bioliquids and biomass fuels under REDII

claims was discarded, as this type of requirements would have largely overlapped with existing EU legislation. In particular, a Delegated Act on **EU sustainability reporting standards** will be published in June 2023; these standards will become a mandatory requirement for companies covered by the proposed Corporate Sustainability Reporting Directive⁶⁵, and will define how to report information about the climate footprint of an organisation. A draft proposal⁶⁶ by EFRAG was submitted to public consultation in summer 2022, and included disclosure requirements on how to report on climate targets and on climate performance (e.g. requirement that undertakings do not include GHG removals, carbon credits or avoided emissions as means to achieve GHG emission reduction targets, reporting requirements on GHG removals in own operations and the value chain, GHG mitigation projects financed through carbon credits). The proposal for a **Green Claims initiative** will be adopted on the same day as the carbon removal certification framework and will aim to make environmental claims (including climate-related ones) reliable, comparable and verifiable across the EU, thus protecting consumers from the risk of greenwashing; the certification methodologies developed under the carbon removal certification framework should be designed in synergy with the provisions of the Green Claims initiative.

The option to include the certification of emission reductions – such as from livestock management or use of fertilisers – in the framework was discarded because of the polluter-pays principle. In the EU climate policy framework, emission reductions are among others incentivised through the EU Emission Trading System, regulatory measures, such as the CO2 standards for cars, or national targets under the Effort Sharing Regulation. Following a recommendation by the European Court of Auditors⁶⁷, the Commission is currently undertaking a study that assesses policy options to apply the polluter-pays principle to emissions from the agricultural sector.

6. WHAT ARE THE IMPACTS OF THE POLICY OPTIONS?

6.1. Identification of impacts

A screening of the possible impacts of this initiative⁶⁸ has led to the identification of eight relevant categories of impacts related to seven Sustainable Development Goals (SDG).

Table 3 associates each of these impact categories with the relevant policy choice: the Q.U.A.L.I.T.Y criteria and methodologies in comparison with the baseline, the relative impacts of options Q1 *vis à vis* option Q2, the Transparency criteria in comparison with the baseline, and the relative impacts of options G1 *vis à vis* option G2.

⁶⁵ European Commission, 2021e, COM(2021) 189 final ([link](#)).

⁶⁶ <https://www.efrag.org/lab3>

⁶⁷ European Court of Auditors, 2021 ([link](#)).

⁶⁸ Based on the Better Regulation Tool #18, “Identification of impacts” (European Commission, 2021f, [link](#)); this initiative is not expected to have any impact on fundamental rights.

Table 3 - Identification of impacts

	Impact category	Sustainable Development Goals	QU.A.L.I.TY	Q1 vs Q2	Transparency	G1 vs G2
Environmental	Climate	13 (Climate Action)	X	X	X	
	<i>The potential to increase the uptake of carbon removal activities by decreasing entry costs while requiring a high level of quality.</i>					
	Environment	15 (Life on Land)	X	X	X	
	<i>Co-benefits of carbon removal activities for other environmental objectives, while ensuring that no harm is done to these same objectives.</i>					
Economic	Sectoral competitiveness and internal market	8 (Decent Work and Economic Growth)	X	X	X	X
	<i>Contribution to a level-playing field for the certification of carbon removals.</i>					
	Conduct of business	12 (Responsible Production and Consumption)	X	X	X	X
	<i>Operators and certification schemes joining the voluntary framework may have to adjust their business model and their operations.</i>					
	Innovation and digital economy	9 (Industry, Innovation and Infrastructure)	X		X	
	<i>New monitoring techniques, new technologies and products to remove carbon, availability of digital data on carbon removals in open access registries.</i>					
	Public authorities	16 (Peace, Justice and Strong Institutions)		X	X	X
<i>Possible costs for public administrations in term of developing certification methodologies and/or recognising certification schemes.</i>						
Social	Rural areas and food security	2 (Zero Hunger)	X			
	<i>Economic diversification and new business opportunities in rural areas & improved soil productivity and resilience, but also possibly higher competition for land.</i>					
	Participation	16 (Peace, Justice and Strong Institutions)		X	X	
<i>Improved access to information for stakeholders by promoting transparency and by involving them in the development of the certification methodologies.</i>						

As the market for certified carbon removals is currently at an early stage of development, the assessment of the options is primarily qualitative, based on the assessment of existing certification schemes, literature and expert reviews (see **Annexes 3 to 11**), and drawing from

the analysis of the replies to the Open Public Consultation and the positions papers submitted to the Call for Evidence (see **Annex 2**).

6.2. Impacts of QU.A.L.ITY criteria and methodologies (Quality options)

Climate. The main impact of this initiative on climate is the increased quality of certified carbon removals compared to the policy baseline. The QU.A.L.ITY criteria increase the clarity on the climate benefits of carbon removal activities and establish a higher standard for the development of methodologies:

- *Quantification* – clear principles for the calculation of the carbon removal benefits of activities, in accordance with international standards, requiring a detailed breakdown of all removals and emissions attributable to the activity and robust monitoring fitting the different types of carbon removals (see **Annex 6**).
- *Baseline and Additionality* – the demonstration of the additionality of carbon removals is simplified by promoting a representative benchmark of standard practices; this will reward first-movers and avoid subjectivity that result from baselines that are based on project-specific scenarios (see **Annex 7**).
- *Long-term storage* – the expected duration of carbon storage for which the operator takes liability, is clearly indicated and will allow for better risk-sharing arrangements (see **Annex 8**).

Currently, the mitigation potential of carbon removal activities is far from being fully realised due to many existing barriers. The main climate impact of this initiative is delivered by addressing these barriers, with the aim of increasing the uptake of carbon removal activities and achieving the goals set in the Sustainable Carbon Cycle communication, while ensuring the high-quality of these activities. These barriers are specific to the different carbon removal activities and will be addressed as follows:

- A. Stakeholders interviewed in the context of a recent report by CarbonPlan⁶⁹ agreed that the main barriers to scale **permanent storage solutions** are lack of public sector support and the high cost of these technologies, but they also converged on the idea that certification standards could play an increasingly important role as the market for this type of certificates grows. To promote these solutions, the certification criteria recognise that these carbon removals are additional (as these technologies are currently still too expensive to enter the market without financial support) and permanent (with the liability rules of the CCS Directive applying), which will give them a competitive advantage in terms of quality and facilitate their financing.
- B. A study on **carbon farming** carried out on behalf of the Commission found that the main barriers to uptake are: the financial burden (cost of management practices and uncertainty about revenues); lack of public trust in the reliability of voluntary carbon markets; concerns around environmental integrity, additionality or permanence; the unavailability, complexity or high costs of monitoring, reporting and verification systems; the insufficiently tailored training and advisory services. Participants to the Thematic Group on carbon farming organised by the European Network for Rural

⁶⁹ Merchant et al., 2022 ([link](#)).

Development⁷⁰ confirmed these findings and indicated that scaling these solutions requires (*inter alia*) better advisory services, lower costs of monitoring, reporting and verification⁷¹, the recognition of the action of early movers, approaches to ensure the long-term storage of carbon, the development of different funding models (i.e. not only voluntary carbon markets), and awareness of the environmental co-benefits. The EU certification criteria will address these barriers by increasing trust and predictability on the outcomes of carbon farming practices and how they are certified and rewarded; enabling easier access to different funding opportunities through a harmonised certification process; promoting the use of remote sensing techniques to lower monitoring costs compared to on-site checks; defining the baseline as a benchmark based on standard practices (preferably set on remote sensing data), which will bring clarity, and recognise the performance of first-movers; creating certificates that are based on the different duration of carbon storage and clear liability rules; and providing common methodologies to disclose environmental and sustainability co-benefits.

- In the case of **carbon storage products**, the main barrier is that, due to the complexity of certification, there is yet no consensus on methodologies to properly account for the temporary aspect of storage of carbon in products. A study conducted for the Commission⁷² found that wood-based construction products have a low market share in the EU and that, to scale these solutions, there is a need to both improve capacity along the whole value chain and to refine current assessment methods for the climate performance of buildings. Such assessment could follow a dynamic life-cycle approach, but this is particularly difficult because there are various actors involved in the value chain, and those that influence the rate of carbon removals (biomass producers) are different than those that transform biomass into a storage product (wood manufacturers), who are still different than those that have control over the longevity of the products (the owners of the building). In the case of Carbon Capture and Utilisation (CCU), the main barrier is of a financial nature: the cost of capture is still quite high and the processing of non-fossil CO₂ into products often requires a lot of energy, but the final product in practice is often indistinguishable from its fossil fuel equivalent and it is therefore difficult to gain a competitive advantage. A recent metareview⁷³ surveyed 26 policy reports on CCU covering the policy measures that are considered to be potential barriers or incentives for the development and deployment of CCU: most of these papers recommended policy measures such as public funding for R&D and for market upscale (which is available in the EU under the Horizon programme and the Innovation Fund) and inclusion of CCU technologies in the EU ETS (which was included in the proposal to amend the ETS under the Fit for 55 package); after these policy measures, the most recommended one was the development of standardised and transparent assessment methods. This initiative will address the barriers to carbon

⁷⁰ European Network for Rural Development, n.d. ([link](#)).

⁷¹ Many organisations representing the farming sector (e.g. European Coordination Via Campesina, Copa-Cogeca, CEJA, Austrian Chamber of Agriculture), the agro-food industry (Agoro Carbon Alliance, Carbon+ Farming coalition) but also research institutes or projects (Bellona Foundation, I4CE, LIFE Carbon Farming, Interreg North Sea Carbon Farming), underscored the issue of MRV costs and the need for an approach to reduce the administrative burden of implementation.

⁷² Trinomics et al., 2021 ([link](#)).

⁷³ Olfe-Kraeutlein et al., B., (2021)

storage product certification by undertaking more work in this direction in the coming years.

Tailored certification methodologies based on the Q.U.A.L.I.T.Y criteria will enhance comparability. New certification schemes, or existing ones that want to expand their portfolio and cover new types of carbon removal solutions, can refer to a set of certification criteria (if Q1) or methodologies (if Q2) targeted to their needs, which will speed up the start of operations. Operators will have a clearer understanding of their business opportunities and the methodologies that they will need to follow, which will contribute to a decrease of uncertainty and risk-aversion that often holds back action in this field. The benefits of a harmonised regulatory framework in increasing uptake of carbon removal solutions was underlined by many businesses and companies that provided input to the Call for Evidence.⁷⁴

While the harmonised criteria improve comparability, they allow certification schemes and carbon removal operators to be more ambitious on certain criteria as requested by the financiers and uses of carbon removal, for instance in terms of baseline (e.g. increasing the ambition of the baseline level), or long-term storage (e.g. increase the duration of the commitment period). However, the underlying technical criteria (e.g. the type and level of details of the information to be provided, the certification processes) remain the same. This will make it easier for carbon removal providers to switch between different financiers with minimal transaction costs.

Based on these approaches to lower costs and increase uptake while ensuring the quality of the certificates, quantities of carbon removed from the atmosphere are expected to increase because of this initiative, thanks to the enabling effect of harmonised and cost-effective certification methodologies. Another indirect and positive effect on the climate is represented by the wealth of accurate information that will be created by certification, which will improve the understanding of the effectiveness of climate action and the quality of national GHG inventories. This will indirectly help national authorities to target support where it is most effective, with positive impacts towards climate objectives.

A potential risk is that the voluntary nature of the initiative could undermine its success and therefore its effectiveness in upscaling carbon removal solutions. As explained in section 5.3, it was judged more appropriate to start with a voluntary framework co-created in a step-wise fashion with experts, and any future shift to a mandatory framework will be based on the learnings of this voluntary phase. The uptake of the initiative can be encouraged by exploiting synergies with upcoming EU initiatives such as the Green Claims Initiatives, which can help to promote the EU certification framework as a valid way to substantiate green claims. The EU standards for corporate sustainability reporting will also contribute towards greater transparency from the side of companies using certificates, which will create more pressure on these users to only buy high-quality certificates. It will need to be further evaluated how these initiatives play together to inform the policy choices post-2030.

⁷⁴ For instance, Syngenta wrote that a legislative framework could improve the commercial viability, scalability, and permanence of existing technologies and foster the development of novel technologies. The Negative Emission Platform recognised that common minimum standards can help with the timely implementation of carbon removal at the necessary scale. E.ON observed that certification is key to unlock private investment. GE stated that the framework can support the necessary developments of market unification and increased investment.

Environment. By setting clear sustainability criteria that include minimum requirements for the environment (e.g. in relation to biodiversity status and trends, soil quality, water quality, nitrogen balance, and other ecosystem services) and disclose information about them, land managers will be incentivized to adopt more climate-friendly management practices that improve biodiversity, soils quality or water management. According to many stakeholders that submitted input to the Call for Evidence⁷⁵, these win-win synergies should be encouraged for carbon removals to effectively contribute to the interconnected climate and biodiversity crises.

The sustainability criteria and indicators can draw on an evolving set of EU legislation. For instance, applying selected minimum sustainability requirements from the Taxonomy climate delegated act would ensure that the planting of tree monocultures, or any other forestry activity with a significant negative impact on biodiversity, will not be certified. To keep administrative burden low and ensure policy consistency, it will be important to rely on existing indicators and criteria that can be easily monitored.

Sectoral competitiveness and functioning of the internal market. The improved comparability of carbon removal certificates across different schemes and types of carbon removal activities will lead to better price signals and decrease the likelihood of low-quality carbon removal certificates. Several stakeholders⁷⁶ have stressed in their contribution to the Call for Evidence that reliable and comparable criteria will create legal certainty and a business case for investment in these technologies, strengthening the market and enabling a scalable industry. These developments are expected to boost the demand for carbon removals and for certification services, which will create economic benefits for all certification actors:

- Higher demand for carbon removal certificates will create additional revenues for operators (i.e. the providers of carbon removals). The voluntary carbon market has grown at significant pace in recent years. Over the period 2013 to 2018, average traded volumes stood around 68 MtCO₂ per year, whereas the period 2018 to 2020 traded volumes more than doubled to on average 130 MtCO₂ per year. These volumes look set to double again through 2021/2022 with an increasing role for carbon removals.⁷⁷ As discussed in section 2.2.4, other actors – food and biomass companies or public authorities – show also an increasing interest in financing carbon removals.
- Certification schemes would see increases in revenues arising from increased registry activities; the main actors on the market, Verra and Gold Standard, make 72% to 89% of their revenues from registry and issuance fees (see **Annex 3**).
- Certification bodies will have positive benefits arising from increased demand for certification services. Certification schemes and certification bodies who are already active in the fields of organic farming labelling or sustainable biomass certification could expand their business and include the certification of carbon removals in their offer.

⁷⁵ The views on this topic went from stressing the importance of environmental safeguards (e.g. Ecosystem Value Association, I4CE, Carbon Farming Coalition) to actively promoting co-benefits (European Environmental Bureau, Agreea, European University Institute (School of Transnational Governance), Veolia, Greifswald University, FoodDrink Europe).

⁷⁶ E.g. Negative Emission Platform, Confederation of European Waste-to-Energy Plants, Veolia, European Biogas Association, Confederation of European Forest Owners.

⁷⁷ Ecosystem Marketplace, 2021 ([link](#)).

Finally, the improved quality of certification will also benefit the users of the certificates, such as the companies in the food and biomass processing industry who will be able to show their consumers and investors their improved climate performance in a reliable way.

These assessments entail some uncertainty, however, and it is difficult to quantify more precisely the impact of voluntary EU certification rules on the development of the market for carbon removals. The expectation of benefits relies on the assumption that the market will need to scale up over the next years from a low level (see section 5.1) and that demand will be primarily driven in the next years by the financing decisions of private and public actors, including financing of carbon farming by food and biomass companies and Member States (to fulfil their LULUCF targets), and synergistic EU policies in the areas of food systems, agriculture and forestry, biodiversity, corporate sustainability reporting, circular bioeconomy and the Innovation Fund. As shown by existing projects, carbon removals produced in the EU are more expensive than the typical emission reduction credits that can be found on the voluntary carbon markets. There will likely be some competition from less expensive certificates from outside the EU, but the rising demand for high-quality carbon removal certificates can create a profitable business case around more expensive carbon removal certificates of higher quality. Furthermore, as explained below, it is not expected that carbon removals certified according to future EU standards will be significantly more expensive than those from current high-quality projects.

Conduct of business. It is important to note that this initiative will be voluntary for both the operators and the certification schemes. This being said, if these actors do participate in the framework, they may incur adjustment costs, depending on the way they were conducting their business in the baseline. **Annex 3** indicates that, while the absolute monitoring and reporting costs are subject to uncertainty, such costs are expected to remain the same under the EU certification framework for schemes that already implement the identified best practices. These costs can decrease for similar or better monitoring results if the EU framework promotes the adoption of promising digital monitoring and modelling technologies in replacement of traditional sampling (see below).

Conversely, an operator who is currently with a certification scheme which does not require stringent quantification will experience higher costs, that should however be compensated by a higher price of the certificate thanks to the higher trust in the quality of the generated carbon removals. **Annex 3** demonstrates that if the global carbon removal price could be estimated around 4 €/tCO₂ in 2021⁷⁸, marketplaces with high-quality carbon removals propose carbon removal certificates at a price that can reach 20 €/t to 70 €/t or more.⁷⁹

Many operators that provide carbon removals are small or micro-sized enterprises, and it is important that this be taken into account into the development of the certification methodologies. The proposed certification methodologies include some approaches to facilitate the participation of SMEs (especially in the area of carbon farming), such as: use of remote sensing technologies to decrease the burden of monitoring and reporting for individual operators; possibility of simpler verification procedures (e.g. for small-scale businesses); building on existing legal requirements to avoid duplication of approaches; participation into

⁷⁸ Ecosystem Marketplace report Q3 2022 ([link](#)).

⁷⁹ DGEC, 2021 ([link](#)).

specific carbon removal programmes pooling the risk of carbon reversals but also providing advices to the farmer on how to increase at the same time carbon storage and economic benefits. As this initiative is considered highly relevant for SMEs, a more detailed analysis of impacts on SMEs (“SME test”) can be found in **Annex 11**.

Innovation and digital economy. Increased certification activities can help spur innovation in the field of carbon removals. Europe hosts several key global carbon removal demonstration sites (e.g. EU-funded BECCS at Stockholm district heating plant; Project Drawdown for enhanced rock weathering in Germany; Orca DACCS project in Iceland) which already involve many leading EU research institutes. Many more such demonstrators are also in the planning. In particular, multiple research efforts are focussed on advancing our understanding of the efficacy, fate and behaviour of several emergent carbon removal solutions (e.g. enhanced rock weathering; ocean alkalinity enhancement; oceanic CO₂ removal). The commercialisation pathway and the policy perspective offered by certification can help these research activities accelerate innovation towards market deployment.

Furthermore, more stringent criteria on monitoring quality will spur research and innovation to enhance the available monitoring techniques. Developments in digital monitoring and reporting will be key to unlocking confidence, reliability and efficiency in land-based sequestration solutions. In the EU, remote sensing technology (e.g. the Earth observation systems under Copernicus) and uses of cloud computing systems and artificial intelligence to support interpretation and translation of systems such as the Copernicus Land Monitoring System (e.g. for real-time changes in land use activities, vegetation state, and coupling with climate and weather data etc) will likely be critical to lowering the cost and improving the accuracy of nature-based removals monitoring. The quantification of removals through soil carbon restoration, for example, will likely require the use of multiple tools to interpolate soil carbon stock changes between highly discrete sampling sites, and the use of predictive models to estimate changes of carbon stock under differing conditions. The use of remote sensing data to calibrate these predictive models against vegetation cover and weather conditions will likely prove vital to the effective scale-up of certification for these types of activities.⁸⁰

According to the World Bank⁸¹, the combination of innovative approaches and increased data availability is expected to overcome several serious challenges facing current MRV approaches, by enabling more frequent monitoring of carbon stocks, decreasing the time needed to generate estimates (potentially from months to weeks), decreasing the uncertainty of estimates, standardizing estimates to render them comparable at different scales, and providing spatially-explicit estimates to facilitate straightforward attribution. The implementation of these technologies is a crucial step to enable the digitisation of the MRV system. The EU, through enhancing the quality requirements of removals certification, can help to lead the way in developing and demonstrating advanced digital monitoring and reporting tools and methodologies, building upon the Union’s long track-record in climate innovation.

⁸⁰ In the feedback to the Call for Evidence, stakeholders such as the European Association of Remote Sensing Companies, Single.earth, Carbon Direct or Cleantech for Europe have provided information on innovative technologies that can already offer robust monitoring and verification for most carbon farming practices.

⁸¹ World Bank, 2021 ([link](#))

Rural areas and food security. In the specific case of carbon farming, certification can be expected to contribute towards new business opportunities and economic diversification in rural areas, and to ensure long-term food security through better soil quality and resilience, in consistency with the objectives of the Farm to Fork Strategy⁸². The core priorities set out in the EU Long-Term Strategy for Rural Areas, and in particular the flagship initiative on building up carbon sinks by investing into rewetting wetlands and peatlands, will be complemented by the emergence of carbon removals certification. The process of monitoring and verifying carbon removals activities will also create new economic opportunities within rural communities, i.e. new types of high-quality jobs and new sources of income for rural economies. The high-profile and transparent nature of carbon removals certification should allow for experiences to be readily shared across operators within the EU, fostering knowledge transfer and driving innovation across the Union's agricultural communities. Potential negative effects on rural communities relate to the fact that higher demand for land-based carbon sequestration may increase competition for land, especially in the case of afforestation and rewetting of organic soil, thus threatening food security, as underlined by several organisations responding to the Call for Evidence⁸³. To deal with these impacts, the certification criteria to address potential sustainability impacts will promote activities that have no negative impacts on food security at Union level and recommended to build collaboration arrangements with rural communities.

Even if the revenue from carbon farming can provide additional revenue to the farmer, it is unlikely to constitute a primary source of income. Experience from carbon farming projects shows that improved agricultural land management can generate a carbon benefit equivalent to 1t to 2t of CO₂ per hectare that can currently be rewarded at a carbon price of 15 to 40 € per tonne of CO₂ in emerging schemes that specifically target high-quality carbon removals⁸⁴. Under these assumptions, a farmer can expect an additional revenue of approximately 50 €/ha/year, to be compared to a potential 1440 €/ha revenue from soft wheat production in 2021⁸⁵ or the average 297 €/ha/year income support from the CAP⁸⁶ that an EU young farmer could receive (with substantial variation across Member States). The higher carbon sequestration potential from afforestation of 5t to 10t of CO₂ captured per hectare can generate an annual average of 250 €/ha for the first 30 years, with lot of uncertainty regarding the fluctuation of the carbon price during this long period.

6.3. Impacts of the choice between Q1 and Q2

Climate and environment. Under policy option Q2, the Commission decides which methodologies will be developed first based on, among other criteria, their potential for environmental co-benefits (see Box 4). Thus, carbon removal activities that have the highest potential for triple-win solutions (climate, environment, socio-economic benefits) will be

⁸² European Commission, 2020b, COM/2020/381 final ([link](#)).

⁸³ E.g. European Environmental Bureau, European Coordination Via Campesina, COPA-COGECA, Austrian Chamber of Agriculture, EUSTAFOR, Tetrapak.

⁸⁴ Such as Label Bas Carbone, Soil Capital, Indigo Ag or Nori.

⁸⁵ Soft wheat is the main cereal produced in Europe, in 2021; the average yield was 6t/ha (Baruth et al., 2022, [link](#)) and the average price of soft wheat on MATIF was approximately 240 €/t (BASF, n.d., [link](#)).

⁸⁶ Farmers applying to CAP support in the EU receive an average basic payment of approx. 143 €/ha, an additional 80€/ha via greening payments, and additional financial support of 74 €/ha/year if they are under 41 (DG AGRI CATS data CY2020, determined areas and payments extracted in 18 July 2022).

prioritised. Policy option Q1, where certification schemes develop methodologies and submit them to the relevant public authority for recognition, gives more power to the certification schemes to decide on the development sequence. As certification schemes will be guided by their own interests, it is not guaranteed that those methodologies with the highest positive impact on climate and environment will be prioritised under policy option Q1.

Sectoral competitiveness and the functioning of the internal market. The choice between policy option Q1 and Q2 will have an impact on the extent to which the initiative creates a level-playing field for the European market. Option Q1 could encourage the development of local or regional methodologies, which could address some specific circumstances (especially with carbon farming), but the resulting diversity of approved methodologies for the same carbon removal activity would maintain a certain level of confusion which could discourage the uptake of carbon removal solutions. On the other hand, option Q2 would give more direct guidance for the certification of carbon removals to underpin a well-functioning internal market and provide methodologies for the more mature carbon removals solutions, so that these can rapidly scale-up across the Union.

Conduct of business. Under option Q1, the entry costs for new certification schemes related to developing new methodologies would be slightly reduced thanks to the guidance provided by the certification criteria. Existing certification schemes would need to adjust their methodologies to take into account the EU certification criteria. A recent review⁸⁷ reveals that several existing certification schemes already adopt *some* best practices to implement the Q.U.A.L.I.T.Y principles, but the overview is quite heterogeneous, and no scheme already performs well against all criteria. Therefore, most existing certification schemes would face some one-off adjustment costs, and possibly some ongoing implementation costs if the revisions to their methodologies entail new elements (e.g. more accurate monitoring, new environmental safeguards). They will also face one-off and ongoing administrative costs associated with applying for the recognition that their scheme's methodologies and procedures are in line with the EU certification framework. Instead, under option Q2, a benefit for new certification schemes is the avoidance of the cost of developing new methodologies, as they can simply adopt the methodology developed by the Commission. Another advantage with respect to Q1 is that their application procedure to be recognised by the relevant public authority would only concern the scheme's internal rules and procedures (i.e. compliance with Transparency criteria) and not the recognition of the methodologies. Certifying projects according to the Commission's methodologies may create some one-off adjustment costs and possibly ongoing implementation costs as under option Q1.

Public authorities. The choice between options Q1 and Q2 also implies different costs for public authorities. Under Q1, there would be potentially many certification schemes that would need recognition of their methodologies by the relevant authority which, depending on the choice between G1 or G2, could be national competent authorities or the Commission. The number of methodologies implementable within Europe has been growing over the past 5 to 10 years.⁸⁸ For example, McDonald et al. (2021) identified a long list of 42 removals

⁸⁷ DGEC, 2021 ([link](#)).

⁸⁸ E.g. as evidenced by e.g. Puro.earth, Woodland Carbon Code, MoorFutures, Label bas-carbone, and as documented in e.g. McDonald et al., 2021 ([link](#)), Cevallos, Grimault and Bellassen, 2019 ([link](#)).

methodologies from 11 schemes,⁸⁹ which was a selection, and not an exhaustive list.⁹⁰ The extent to which new methodologies may be submitted for approval remains uncertain. However, it can be expected that the number of methodologies will continue to grow, also because the establishment of the EU certification framework is anticipated to result in increased demand for removals certification. While the common certification criteria would ensure some level of harmonisation amongst these methodologies, the potentially high number of methodologies submitted for recognition under Q1 could represent a high workload for authorities. Under option Q2, instead, the Commission would bear the cost of developing the certification methodologies with the support of the relevant experts. The process would minimise the costs of methodology development by exploiting synergies with existing legislation and procedures.

Participation. The process to develop the methodologies will be more inclusive of the relevant stakeholders under option Q2. Under this option, the Commission would rely on the consultation of relevant experts in alignment with Better Regulation guidelines.

6.4. Impacts of Transparency criteria (Governance options)

Climate and environment. The establishment of the Transparency criteria aims to create more trust in carbon removal certification, which will indirectly contribute to increasing demand for carbon removals and, accordingly, their supply. It will also ensure a higher quality of carbon removals overall. Therefore, it can be expected that the Transparency criteria can indirectly have positive effects on the climate and, through enforcement of the sustainability criteria, the environment.

Sectoral competitiveness and the functioning of the internal market. Operators will benefit from more inter-operability regarding the rules and procedures of publicly recognised certification schemes, which will give them easier access to different types of financial opportunities linked to carbon removal activities. A harmonised regulatory environment will also benefit certification schemes by providing public guarantees to help them signal their quality, and will create new business for certification bodies which will be required for the verification of the carbon removal activities.

Conduct of business. The Transparency criteria may create some new or additional administrative costs for operators and certification schemes, depending on the extent to which these requirements are already complied with in the baseline, especially in terms of regular verification. As explained in section 5.1.3, the majority of the large and well-established certification schemes already perform well in terms of transparency, and therefore complying with these requirements would not entail any significant adjustment cost for these certification schemes. However, no comprehensive overview exists for the level of transparency of smaller certification initiatives or new entrants. In addition, a set of harmonised rules to run registries may increase the costs of this activity but could also help in performing double-counting checks more effectively than in the baseline. Large certification schemes have already in place good quality registries, while smaller schemes can rely on third-party managed registry systems that offer registry capacity for relatively low prices.

⁸⁹ Seven of these methodologies were for emission reduction based activities (e.g. peatland rewetting and CCU).

⁹⁰ E.g., Verra's VCS has 13 methodologies for land-based mitigation that could include carbon removals (Verra, n.d., [link](#)).

Innovation and digital economy. The rules to harmonise registries of carbon removal certificates, and in particular the requirements to ensure transparency of information and to avoid double counting, will be more effectively implemented through the use of digital technologies. This can spur the uptake of innovative technologies such as block-chain.

Public authorities. While the specific administrative costs under the two Governance options will be discussed in the next section, a more indirect and positive impact of the Transparency criteria for registries will be the availability of better and more granular data on carbon removals which can improve the quality of national GHG inventories and hence the effectiveness of climate policy making.

Participation. Thanks to the Transparency criteria, the EU certification framework can level up the quality of the internal administration of certification schemes and make information more easily accessible to stakeholders and other certification schemes.

6.5. Impacts of the choice between G1 and G2

Sectoral competitiveness and the functioning of the internal market. Under option G1, Member States would be in charge of ensuring the correct implementation of the certification framework. The decentralised nature of this option would address some possible barriers for certification schemes, such as language differences or the difficulty in taking part in EU application processes. However, this option would be less effective in ensuring a level-playing field, as different Member States may establish different control systems and recognition procedures. Under option G2, certification schemes recognised by the Commission would be able to operate everywhere on the EU territory, which would therefore be more appropriate for larger, international certification schemes (including new entrants), and work better in terms of promoting the internal market.

Conduct of business, public authorities. Under option G1, there is a risk of duplication of work if the same certification scheme applies for recognition in several Member States, which could increase total administrative costs for both businesses and public authorities and discourage cross-border scale-up (especially if different Member States have different control systems and recognition procedures). Under G2, the administrative costs related to recognition processes would be smaller, both for certification schemes and for public authorities, as duplication of applications in different Member States would be avoided. Option G1 would also entail some costs for Member States authorities in terms of reporting regularly to the Commission about the results of the controls carried out and the measures taken in case of non-compliance.

7. HOW DO THE OPTIONS COMPARE?

This section compares four possible policy packages:

- **Q1+G1:** Member States create their own public certification scheme and develop their own methodologies, or approve certification methodologies proposed by programme developers in compliance with the EU criteria (similarly to the functioning of the French “*Label Bas Carbone*”); alternatively they may also recognise private certification schemes with their own methodologies that comply with the EU criteria, and delegate the control system to them.

- **Q1+G2:** certification schemes develop their own methodologies and then apply for recognition of their methodologies and operations to the Commission; this model is similar to *CORSIA*, where a supranational organisation (ICAO) assesses whether existing certification schemes and their methodologies are compliant with a set of international certification criteria.⁹¹
- **Q2+G1:** the Commission (assisted by an expert group) develops the certification methodologies and the Member States have the primary responsibility for enforcing compliance by operators through a public certification scheme or by recognising private certification schemes. This model is similar to the one of the *Organic Farming Regulation*, where the Commission directly establishes the certification rules; based on these rules, Member States' competent authorities can either certify organic farms themselves (as "control authorities") or delegate this role to private "control bodies".
- **Q2+G2:** the Commission (together with experts) develops the methodologies and then checks that certification schemes correctly apply them to certify operators. This is similar to the governance model for certifying sustainable bioenergy under the *Renewable Energy Directive*: here, the criteria and rules defining the sustainability of bioenergy are set in the Directive and in its delegated/implementing acts; the Commission recognises private or public certification schemes after assessment of the scheme's internal rules and governance against the EU criteria and rules.

These policy packages are illustrated in Figure 3, which also summarises how they compare in terms of their effectiveness to achieve the specific objectives, their respective key impacts (efficiency) and their coherence with other policy initiatives and instruments, as also explained in the rest of this section.

⁹¹ The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) is managed by the International Civil Aviation Organisation (ICAO). ICAO has established some eligibility criteria (called Emission Unit Criteria) under which certification schemes and their methodologies are assessed. Only certificates considered eligible with this compliance standard can be used by the international aviation sector towards the goal of offsetting all emissions occurring beyond a baseline level (2019).

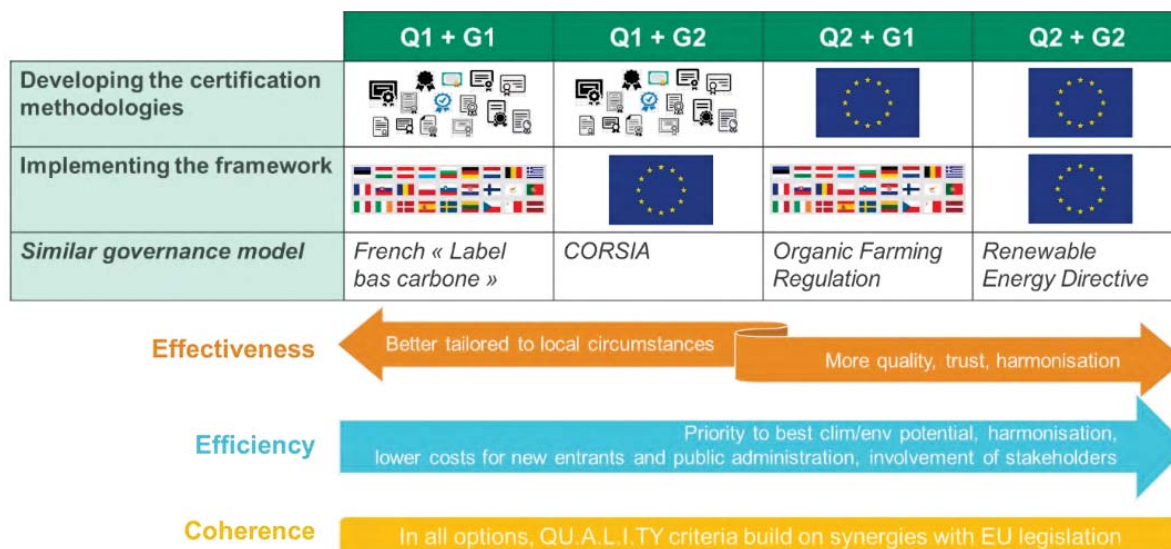


Figure 3 – Comparison of policy packages

7.1. Effectiveness

	Q1+G1	Q1+G2	Q2+G1	Q2+G2
Quality of carbon removals	+	+	++	++
Tailored methodologies	++	++	+	+
Trust in the certification process	+	++	++	+++
Harmonisation			+	+

The first objective of this initiative is to promote best practices to certify **high-quality** removals, and thereby provide guidance on how to address the four certification challenges related to quantification, additionality, long-term storage, and sustainability. In this respect, all packages bring about an improvement with respect to the baseline, because the initiative will set out certification criteria underlining the future development of certification methodologies. Yet, guidance will be more effective under the packages that include option Q2, where methodologies are developed by the Commission in consultation with the relevant experts and stakeholders: these will provide a common approach on how to translate these criteria into operational protocols, providing more comparability and consistency compared to packages that include Q1, where certification schemes can propose their own methodologies.

The second objective is to deliver certification methodologies that are **tailored** to each type of carbon removal solution. Again, all packages deliver on this objective. If the Commission develops the methodologies (i.e. packages that include option Q2), then these will be tailored to specific carbon removal solutions, starting from those which are already mature in terms of certification best practices and that provide the highest sustainability co-benefits. However, those options that rely on several certification schemes for the development of the methodologies (i.e. packages that include option Q1) may be better able to tailor their

methodology not only to a specific type of carbon removal solution, but also to the specific geographic or socio-economic context where such activities take place.

The third objective is to ensure the transparency and reliability of certification processes, which can increase **trust** in certification activities. All packages deliver on this objective by creating some public guarantees about the quality of carbon removals. However, if the Commission recognises certification methodologies and/or certification schemes instead of the Member States (as in packages that include option G2), the recognition process will be carried out in the same way and based on the same criteria for all applications, which would improve trust in the system. In addition, if the Commission develops the certification methodologies giving priority to the highest potential for mitigation and sustainability (as in packages that include option Q2), this could create a more stable and predictable policy framework which would also have a positive impact on trust.

The fourth and last objective is to harmonise certification rules and minimise transaction costs for operators (i.e. ensuring that the operator can easily move from one type of financing to another). This is less easy when many different certification methodologies exist (as in packages that include option Q1). This risk will be mitigated if the Commission develops standard methodologies that integrate information requirements and guarantees needed in different financing contexts.

7.2. Efficiency

	Q1+G1	Q1+G2	Q2+G1	Q2+G2
Climate and Environment	+	+	++	++
Internal market	+	++	++	+++
Conduct of business				
Development/adjustment of methodologies	-	-	+	+
Recognition of methodologies	--	-		
Recognition of certification schemes	--	--	-	-
Member State budgets				
Approval/recognition of methodologies	-			
Recognition of certification schemes	-		-	
Participation			+	+

The impacts on innovation and rural areas are not discussed in this section because they do not change significantly across the policy options. This section focuses on those impacts that depend on the choice of the policy options, as described in more details in sections 6.3 and 6.5.

Option Q2, where the Commission leads the development of certification methodologies in consultation with experts, it will be possible to prioritise those carbon removals which have the highest positive impact on **the climate and the environment**. Therefore, packages including option Q2 are better suited to more quickly deliver the positive climate and environmental impacts of the framework.

In terms of **sectoral competitiveness and the functioning of the internal market**, option Q1 provides a slight improvement with respect to the baseline because of the QU.A.L.I.T.Y certification criteria based on best practice, and option G1 brings the benefits of decentralised recognition procedures for smaller and regional certification schemes (e.g. no language barrier, closer contacts with the administration); however, a package of these two options could give rise to many different methodologies recognised according to different procedures, which would not play in favour of well-functioning internal market. Options Q2 and G2 are better in this respect, because they ensure (respectively) a unified set of certification methodologies and a harmonised recognition process favouring the cross-border operations of larger certification schemes. Thus, the packages including one of these two options provide for more harmonisation, while the package including both performs best in terms of the functioning of the internal market.

The framework will also affect the way that certification schemes⁹² **conduct their business** and could create some administrative costs, mainly of three types: the development/adjustment of the methodologies, the application for recognition of methodologies, and the application for recognition of certification schemes. The first and second cost categories only apply under the packages that include Q1 (Q1+G1 and Q1+G2), where certification schemes develop their own methodologies. Under these packages, existing schemes would have to adjust their methodologies to the EU certification criteria, which should entail minimal adjustment costs for certification schemes that already have many best practices in place. Conversely, under the packages that include option Q2, new certification schemes would benefit from the existence of standardised methodologies developed by the Commission as this will save them the costs of developing their own methodology. In addition, under packages including option Q1, existing schemes would face some costs related to adjusting their procedures and standards and applying for recognition of their methodologies: these costs would be larger in package Q1+G1, where this process is managed by the Member States, because of the risk of multiple application procedures. Finally, in all packages, certification schemes would apply for recognition of their rules and procedures according to the Transparency criteria. Synergies are possible with certification schemes that are already active in related but different certification activities, especially in packages that include option Q2: when Q2 is combined with G1, certification schemes operating in the area of organic farming labelling can expand their operations to the field of carbon farming, and when it is combined with G2, synergistic opportunities arise for EU-wide certification schemes operating in the area of certifying sustainable biomass under the Renewable Energy Directive.

The certification framework would also entail some costs for **public authorities** in the Member States. Under the combination of options Q1 and G1, the Member State may have to incur the cost of approving certification methodologies proposed by programme developers (if they set up a public certification scheme) or of recognising the certification methodologies applied by private certification schemes (if they delegate the control role to private schemes); in either case, there is a risk of a high number of methodologies to be approved or recognised, including for more complex carbon removal activities for which mature certification rules do

⁹² The impact on operators depends mostly on the introduction of the quality criteria, which are equivalent across all options. Therefore, this aspect is not taken into account in the comparison of options.

not yet exist⁹³, and the related costs would be repeated in each Member State. The cost of recognising certification schemes is relevant for Member States under the packages that include option G1 (where this recognition is responsibility of the Member States).

Finally, under the packages that include option Q2, the Commission develops certification methodologies on the basis of systematic expert consultation, which guarantees the **participation** of relevant stakeholders in the development of certification methodologies and taking into account the latest state of knowledge and experience, in line with Better Regulation rules.

Box 6 – The One-In-One-Out assessment

The “One-In-One-Out” principle means that newly introduced burdens from EU legislation should be offset by removing equivalent burdens in the same policy area.

Overall, the carbon removal certification initiative should generate only minimal administrative burdens to businesses compared to the baseline, because the initiative does not introduce new significant administrative requirements and it is of a voluntary nature.

- Operators developing carbon removal solutions are already facing similar administrative requirements when applying today to existing certification schemes.
- Certification schemes would face some administrative costs to apply for recognition to the competent public authority (Member States under G1 or the Commission under G2); they may also face adjustment costs under option Q1 (adjustment of their certification methodologies to the EU criteria).
- Costs for public administrations would only occur under option G1 where Member States would have to recognise existing certification schemes in case a Member State decides to set up a public certification scheme; in addition, in the combination Q1+G1, Member States may have to incur the cost of approving certification methodologies proposed by programme developers or of recognising the certification methodologies applied by private certification schemes.

The One-In-One-Out assessment for the preferred option is included in **Annex 3**.

7.3. Coherence

All options are based on Q.U.A.L.I.T.Y criteria, which are designed to build on existing legislation, such as the CCS Directive, the LULUCF Regulation, the Taxonomy Regulation, the Renewable Energy Directive, the Common Agricultural Policy. See Section 5.1.4 for more details. In addition, existing and future EU policies will benefit from the existence of the EU

⁹³ A Member State could also decide to directly develop certification methodologies, which would mitigate this risk; this would still entail some costs, albeit lower.

certification framework, e.g. for better company accounting under the European Sustainability Reporting Standard, better incentives for nature-based solutions to achieve the restoration targets under the Nature Restoration Law, or better removal data for the national LULUCF inventories.

8. PREFERRED OPTION

Considering the effectiveness, efficiency and coherence dimensions discussed in the previous section, it can be concluded that the package Q2+G2 performs better against all impact indicators and addresses more effectively almost all objectives. Thus, **the preferred policy option is one where the Commission: (i) develops certification methodologies in consultation with experts and stakeholders, and (ii) ensures the correct implementation of the framework by recognising the certification schemes that comply with the Transparency criteria and that will certify the compliance of operators with the QU.A.L.ITY criteria.**

Member States may opt for the establishment of a public certification scheme to implement the framework, in order to provide operators on its territory with a closer contact point; such public scheme would need to be recognised by the Commission in the same manner as private certification schemes, to ensure a level-playing field across Member States.

The framework would be established through several legal acts, in the following order:

- A Regulation establishing the QU.A.L.ITY criteria for carbon removals and the requirements for the certification of carbon removal activities, on the functioning of certification schemes and public registries, and on the process for their EU recognition;
- A number of delegated acts establishing the tailored certification methodologies for specific carbon removal activities. In developing these delegated acts, the Commission will be assisted by a new Expert Group on Carbon Removals;
- A number of implementing acts establishing harmonised technical rules on the functioning of the certification schemes, on the verification and certification process, on the management of registries and databases, and on the process of notification and recognition of certification schemes.

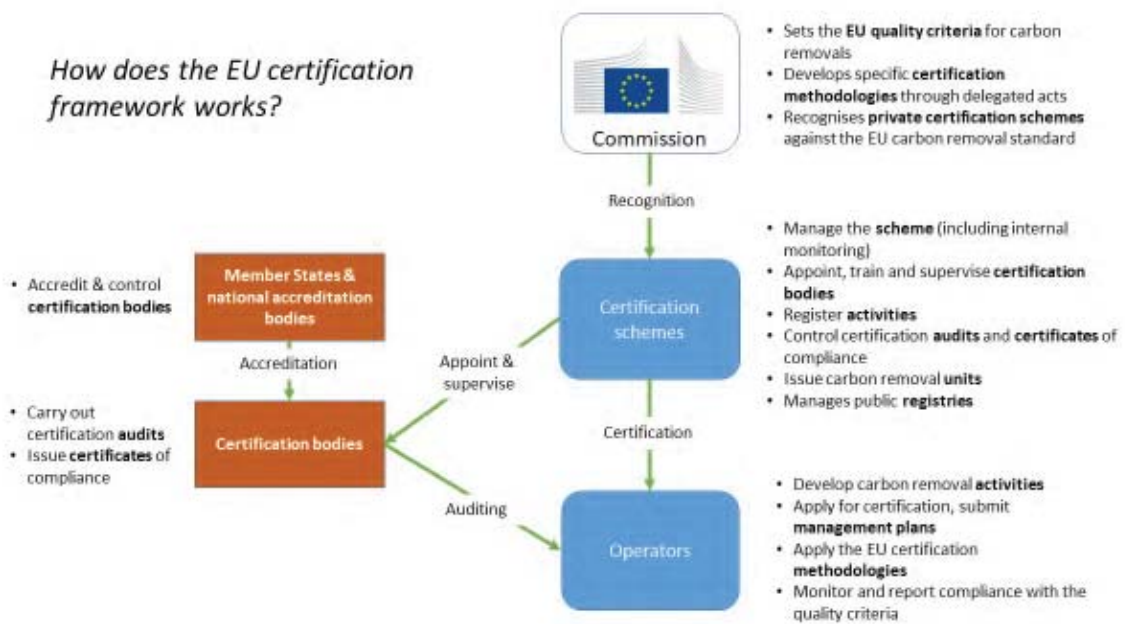


Figure 4 shows an overview of the various actors and responsibilities of the EU certification framework under the preferred option.

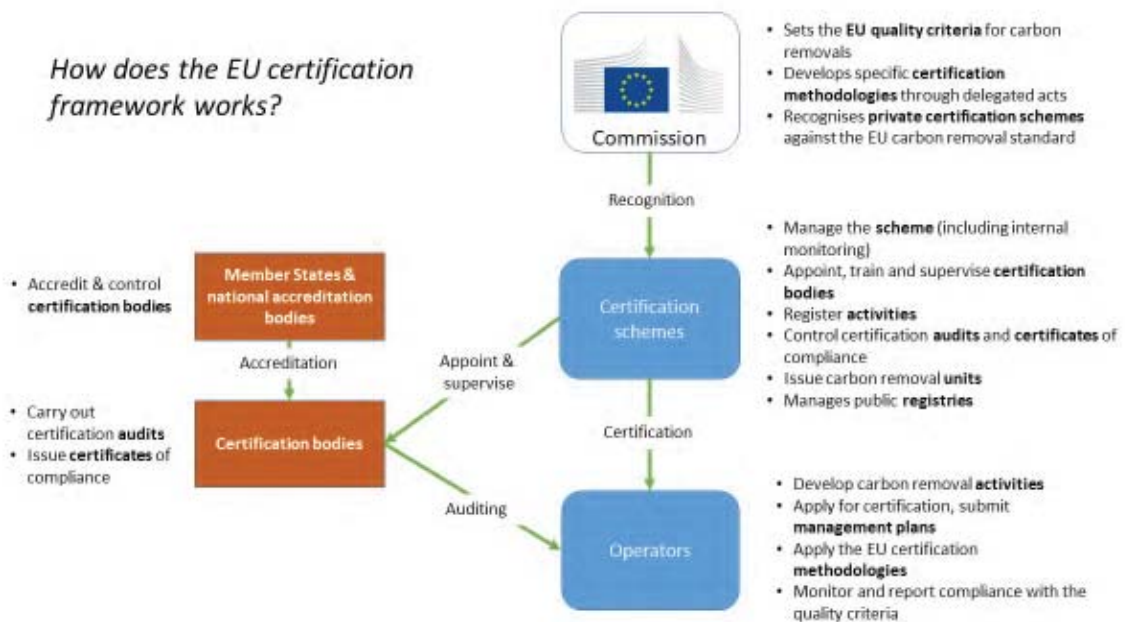


Figure 4 – Overview of the EU certification framework for carbon removals

9. HOW WILL ACTUAL IMPACTS BE MONITORED AND EVALUATED?

A plan will be designed to track the Commission’s implementation of the actions required against a specific timeframe (e.g. adoption of secondary legislation covering certification methodologies and implementing rules for the governance framework).

In addition, the Commission will monitor the following impact indicators on a regular basis (annual or biannual) at the level of different types of carbon removal activities:

- Number of carbon removal projects, by type of solution and by MS
- Certificates issued by type of solution and by MS
- Size of carbon removal projects (t CO₂ removed, by project, by solution, by MS)
- Environmental impacts of carbon removal projects (relevant environmental indicators, by project, by type of solution, by MS)
- Socio-economic impacts of carbon removal projects (relevant environmental indicators, by project, by type of solution, by MS)
- Use of certificate, type of financing (public, private)
- Certification costs, by type of solution
- Methodologies used by type of solution, by solution provider
- Number and type of complaints filed (over operators, over verifiers)
- Coherence with national GHG inventories

Reports by certification schemes and from the certified carbon removal projects will provide the Commission with data on the climate, environmental and socio-economic impacts of the certification framework and on the overall quality of the certified projects and of the certification process (including information about the validation, verification, issuance and registry stages).

A comprehensive evaluation of the Regulation should be informed by the outcomes of these monitoring activities, build upon solution-specific review studies and focus on the contribution of the framework to achieving the aspirational objectives set out in the Communication on Sustainable Carbon Cycles:

1. By 2028, every land manager should have access to verified emission and removal data to enable a wide uptake of carbon farming,
2. By 2030, carbon farming approaches should contribute to reaching the LULUCF target of -310 Mt CO₂eq net removals,
3. By 2028, any ton of CO₂ captured, transported, used and stored by industries should be reported and accounted by its fossil, biogenic or atmospheric origin, and
4. By 2030, industrial technologies should remove annually at least -5 Mt CO₂eq by 2030.

An initial evaluation of progress towards this objectives will take place in 2028.

10. REFERENCES

- Allen, M., Axelsson, K., Caldecott, B., Hale, T., Hepburn, C., Hickey, C., Mitchell-Larson, E., Malhi, Y., Otto, F., Seddon, N. and Smith, S., 2020. *The Oxford principles for net zero aligned carbon offsetting*. Oxford Net Zero. September 2020 ([link](#)).
- Arcusa, S. and Sprengle-Hyppolite, S., 2021. Snapshot of the Carbon Sequestration Certification Market Ecosystem, *Climate Policy*, DOI: 10.1080/14693062.2022.2094308 ([link](#)).
- Arrêté du 28 novembre 2018 définissant le référentiel du label Bas-Carbone ([link](#)).
- Baruth, B., Bassu, S., Ben Aoun, W., Biavetti, I., Bratu, M., Cerrani, I., Chemin, Y., Claverie, M., De Palma, P., Fumagalli, D., Manfron, G., Morel, J., Nisini Scacchiafichi, L., Panarello, L., Ronchetti, G., Seguni, L., Toreti, A., Van Den Berg, M., Zajac, Z., Zucchini, A., Tarnavsky, E. and Van Der Velde, M., *JRC MARS Bulletin - Crop monitoring in Europe*, 30(5), May 2022, Van Den Berg, M. and Niemeyer, S. editor(s), Publications Office of the European Union, Luxembourg, doi:10.2760/908536, JRC127961 ([link](#)).
- BASF, n.d. Cours et marchés du blé tendre ([link](#)).
- Carbon Direct, 2022. Assessing the State of the Voluntary Carbon Market in 2022 ([link](#)).
- Carbon Direct and Microsoft, 2022. Criteria for high-quality carbon dioxide removal ([link](#)).
- Cevallos, G., Grimault, J. and Bellassen, V., 2019. *Domestic carbon standards in Europe – Overview and perspectives*. I4CE ([link](#)).
- ClientEarth, 2021. *The legal risk of advertising carbon ‘offsets’*. ClientEarth Communications ([link](#)).
- Commission Implementing Regulation (EU) 2018/2066 of 19 December 2018 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council and amending Commission Regulation (EU) No 601/2012 (Text with EEA relevance), *OJ L 334*, 31.12.2018, p. 1–93 ([link](#)).
- Conference on the Future of Europe, 2022. *Report on the final outcome*. May 2022 ([link](#)).
- DGEC (Direction Générale de l’Energie et du Climat), 2022. *Etude comparée des standards de compensation existants. Evaluation des critères pertinents de sélection des standards et projets pour la mise en œuvre de l’article 147 de la loi Climat et Résilience*. I Care ([link](#)).
- Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast) (Text with EEA relevance), *OJ L 328*, 21.12.2018, p. 82–209 ([link](#)).
- Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC (Text with EEA relevance), *OJ L 275*, 25.10.2003, p. 32–46 ([link](#)).

- Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006 (Text with EEA relevance), *OJ L 140*, 5.6.2009, p. 114–135 ([link](#)).
- Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006 (Text with EEA relevance), *OJ L 140*, 5.6.2009, p. 114–135 ([link](#)).
- Ecosystem Marketplace, 2021. *State of Voluntary Carbon Markets 2021*, Installment 1. Washington D.C., Forest Trends Association ([link](#)).
- European Court of Auditors, 2021. *Common Agricultural Policy and climate. Half of EU climate spending but farm emissions are not decreasing*. Special report ([link](#)).
- European Commission, 2020a. Stepping up Europe’s 2030 climate ambition – Investing in a climate-neutral future for the benefit of our people. COM(2020) 562 final ([link](#)).
- European Commission, 2020b. A Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system, COM(2020) 381 final ([link](#)).
- European Commission, 2021a. New EU Forest Strategy for 2030, COM(2021) 572 final ([link](#)).
- European Commission, 2021b. Impact assessment report. Accompanying the document Proposal for a Regulation of the European Parliament and the Council amending Regulations (EU) 2018/841 as regards the scope, simplifying the compliance rules, setting out the targets of the Member States for 2030 and committing to the collective achievement of climate neutrality by 2035 in the land use, forestry and agriculture sector, and (EU) 2018/1999 as regards improvement in monitoring, reporting, tracking of progress and review. SWD/2021/609 final ([link](#)).
- European Commission, 2021c. Sustainable carbon cycles. COM(2021) 800 final ([link](#)).
- European Commission, 2021d. Innovation Fund (InnovFund). Call for proposals. Annex C: Methodology for calculation of GHG emission avoidance. 10 June 2021 ([link](#)).
- European Commission, 2021e. Proposal for Corporate Sustainability Reporting Directive. 21 April 2021. COM(2021) 189 final ([link](#)).
- European Commission, 2021f. Better Regulation Toolbox, November 2021 ([link](#)).
- European Commission, 2021g. Recommendation on the use of Environmental Footprint methods. C(2021) 9332 final ([link](#)).
- European Commission, 2022a. Proposal for a Nature Restoration Law. 22 June 2022 ([link](#)).

- European Commission, 2022b. Proposal for a Regulation of the European Parliament and of the Council laying down harmonised conditions for the marketing of construction products, amending Regulation (EU) 2019/1020 and repealing Regulation (EU) 305/2011. COM/2022/144 final ([link](#)).
- European Network for Rural Development, n.d. *Upscaling carbon farming in the EU*. ENRD Thematic Group on Carbon farming ([link](#)).
- GHG Protocol, 2022, *Land Sector and Removals Guidance* ([link](#)).
- Integrity Council for the Voluntary Carbon Market, 2022. *Core carbon principles, assessment framework and assessment procedure. Draft for public consultation* ([link](#)). Accessed October 2022.
- IHS Markit, 2022. Data extracted from Markit Environmental Registry ([link](#)).
- ISO, 2019. ISO 14064-2:2019. Greenhouse gases — Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements. April 2019, 2nd edition ([link](#)).
- IPCC Working Group III, 2022. Technical Summary. In: *Climate Change 2022: Mitigation of Climate Change. Sixth Assessment Report* ([link](#)).
- JRC, 2020. Technical Report “Guide for EF compliant data sets. Version 2.0” ([link](#))
- La Hoz Theuer, S., Doda, B., Kellner, K. and Acworth, W., 2021. *Emission Trading Systems and Net Zero: Trading Removals*. Berlin, ICAP. May 2021 ([link](#)).
- Macquarie R., 2022. *Searching for trust in the Voluntary Carbon Markets*, Commentary in LSE Business Review, London School of Economics ([link](#))
- McDonald, H., Bey, N., Duin, L., Frelth-Larsen, A., Maya-Drysdale, L., Stewart, R., Pätz, C., Hornsleth, M. N., Heller, C., Zakkour, P. 2021. *Certification of Carbon Removals, Part 2: A Review of Carbon Removal Certification Mechanisms and Methodologies*, Umweltbundesamt GmbH ([link](#)).
- McKinsey, 2021, *A blueprint for scaling voluntary carbon markets to meet the climate challenge* ([link](#)).
- Merchant, N., Chay, F., Cullenward, D. and Freeman, J., 2021. Barriers to scaling the long-duration carbon dioxide removal industry, CarbonPlan, July 2022 ([link](#)).
- MoorFutures, 2022a. Projekt Rehweise ([link](#)).
- MoorFutures, 2022b. Königsmoor (Schleswig-Holstein) ([link](#)).
- Oeko-Institut e.V., 2016, *How Additional is the Clean Development Mechanism?* ([link](#))

- Olfe-Kräutlein, B., Strunge, T., and Chanin A., 2021. *Push or Pull? Policy Barriers and Incentives to the Development and Deployment of CO2 Utilization, in Particular CO2 Mineralization*, *Frontiers in Energy Research*, 9, 2021 ([link](#)).
- Platt, R., Bauen, A., Reumerman, P., Geier, C., Van Ree, R., Gursel, I. V., Garcia, L., Behrens, M., von Bothmer, P., Howes, J., Panchaksharam, Y., Vikla, K., Sartorius, V. and Annevelink, B., 2021. *EU Biorefinery Outlook to 2030. Studies on support to research and innovation in the area of bio-based products and services*, Publications Office of the European Union, Luxembourg, doi:10.2777/103465 ([link](#)).
- Puro.earth, 2022a. Puro Registry ([link](#)). Accessed May 2022.
- Puro.earth, 2022b. CORC Supplier Listing ([link](#)). Accessed May 2022.
- Regulation (EU) 2018/841 of the European Parliament and of the Council of 30 May 2018 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework, and amending Regulation (EU) No 525/2013 and Decision No 529/2013/EU (Text with EEA relevance) , *OJ L 156*, 19.6.2018, p. 1–25 ([link](#)).
- Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088 (Text with EEA relevance), *OJ L 198*, 22.6.2020, p. 13–43 ([link](#)).
- Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law') ([link](#)).
- Regulation (EU) 2021/2116 of the European Parliament and of the Council of 2 December 2021 on the financing, management and monitoring of the common agricultural policy and repealing Regulation (EU) No 1306/2013, *OJ L 435*, 6.12.2021, p. 187–261 ([link](#)).
- Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC (Text with EEA relevance), consolidated text ([link](#)).
- South Pole, 2022. *Charting carbon removals on the road to net zero: corporate views on carbon removals in climate act?* ([link](#))
- Spekreijse, J., Lammens, T., Parisi, C., Ronzon, T., Vis, M., 2019. *Insights into the European market of bio-based chemicals. Analysis based on ten key product categories*, EUR 29581 EN, Publications Office of the European Union, Luxembourg, doi:10.2760/549564, JRC112989 ([link](#)).
- Taskforce on Scaling Voluntary Carbon Markets, 2021. *Phase II report*. 8 July 2021 ([link](#)).
- Trinomics, VITO, Wageningen University, Research, Technische Universität, Graz and Ricardo, 2021. *Evaluation of the climate benefits of the use of Harvested Wood Products in*

the construction sector and assessment of remuneration schemes. Report to the European Commission, DG Climate Action, under Contract N° 340201/2020/831983/ETU/CLIMA.C.3, Trinomics BV, Rotterdam ([link](#)).

Verra, n.d. Verified Carbon Standards – Methodologies ([link](#)).

Voluntary Carbon Markets Dashboard, 2021. Extraction of data. ([link](#))

World Bank, 2021. *Policy Paths towards Second-Generation Measurement, Reporting and Verification (MRV 2.0)*. Policy Brief, June 2021 ([link](#)).