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**COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN
PARLIAMENT AND THE COUNCIL**

Sustainable Carbon Cycles

{SWD(2021) 450 final} - {SWD(2021) 451 final}

1 CARBON CYCLES

Carbon is the atom of life, of our societies and economies. Carbon is in human DNA. Half the weight of the food we eat is carbon. Transforming limestone and iron ore into the cement and steel of our cities involves processing carbon. Organic chemistry exploits the uniqueness of carbon to produce highly complex molecules for the pharmaceuticals, chemicals, plastics and advanced materials of our daily life. Carbon-based fossil fuels have powered our homes, factories and vehicles for more than a century. However, emissions from fossil fuel combustion, industrial processes and land use change are cumulating in the oceans and are dramatically increasing the concentration of CO₂ in the atmosphere. As result, the global climate is warming, biodiversity is disappearing, oceans are getting more acid and extreme weather events are becoming more frequent. In turn, short-term carbon cycles between vegetation and atmosphere are disturbed and sea levels are rising due to the impact of climate change on lands, forests, seas and the cryosphere. In some regions, this is amplified by the unsustainable exploitation of natural resources. All these feedback loops accelerate the climate and biodiversity crises and present direct threat to ecosystems functioning and human societies.

Responding to the urgency for climate action highlighted in the successive assessments of the Intergovernmental Panel for Climate Change (IPCC), the European Union has set into law its objective of economy-wide Climate Neutrality by 2050. The European Climate Law¹ requires that greenhouse gas (GHG) emissions and removals are balanced within the European Union at the latest by 2050 with the aim to achieve negative emissions thereafter. The European Union has also set the goal that it will be climate resilient by 2050², to withstand the unavoidable impacts of climate change.

To achieve such ambitious objectives, we must establish sustainable and climate-resilient carbon cycles through three key actions:

- First and foremost, we need to drastically reduce our reliance on carbon, for instance by improving the efficiency of our buildings, transport modes and industries, by reducing our primary resource consumption and moving to a circular economy, and scaling up renewable energy. The European Climate Law firmly sets the goal of climate neutrality by 2050 and our long term analysis³ indicates that in order to be climate neutral we must reduce by 95% the current use of fossil carbon energy in the EU final energy consumption. This decarbonisation strategy is at the core of our existing climate, environmental and energy policies to reach the 2030 objective of 55% reduction in EU GHG emissions compared to 1990.
- 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

¹ Regulation (EU) 2021/1119 establishing the framework for achieving climate neutrality “European Climate Law” ([link](#)).

² COM (2021) 82, Forging a climate-resilient Europe - the new EU Strategy on Adaptation to Climate Change ([link](#)).

³ In-depth analysis in support of COM(2018) 773 “A Clean Planet For All ” ([link](#)).

sectors of the economy that will inevitably remain carbon dependent. The circular economy and the sustainable bioeconomy sectors can address this objective and should promote technological solutions for carbon capture and use (CCU) and the production of sustainable synthetic fuels or other non-fossil based carbon products.

- Third, we need to upscale carbon removal solutions that capture CO₂ from the atmosphere and store it for the long term, either in ecosystems through nature protection and carbon farming solutions or in other storage forms through industrial solutions while ensuring no negative impact on biodiversity or ecosystem deterioration in line with the precautionary and Do No Significant Harm principles. The development and deployment at scale of carbon removal solutions is indispensable to climate neutrality and requires significant targeted support in the next decade.

The European Green Deal and related policies, therefore, aim to quickly reduce the use of fossil carbon and phase it out in the long term. The remaining carbon required for the functioning of our society will no longer come from fossil fuel extraction; it will be sustainably sourced from our ecosystems and from our industries thanks to innovative technologies.

At the same time, current global climate action is not sufficient to maintain the atmospheric concentration of CO₂ at levels compatible with the objective of the Paris Agreement⁴. Scientific advice continues to show, with increasing urgency, that this concentration will have to be reduced actively in the future to limit global warming to 1.5°C. Moreover, climate neutrality by mid-century by all major economies is likely to be only the first step towards restoring the planet's climate balance, at least in part, at the end of this century. Carbon removals will need to play a growing role, and become the main focus of action after climate neutrality is achieved and when negative emissions will be needed to stabilise the world's temperature increase. Available solutions based on resilient natural ecosystems and industrial carbon capture and storage (CCS) should be deployed in an efficient and sustainable way that takes into account their specific characteristics. Carbon removals from both ecosystems and industrial solutions should comply with strong requirements on monitoring, reporting and verification to be recognised as contributing to EU climate and environmental objectives. Irrespective of their origins, all carbon removals need to be accounted in full transparency and by considering criteria such as the duration of the storage, the risk of reversal, the uncertainty of the measurement or the risk of carbon leakages increasing GHG emissions elsewhere.

Establishing sustainable carbon cycles in the EU economy and ecosystems is a long-term endeavour that nevertheless requires coordinated action now. This Communication focuses on the short-term actions to upscale carbon farming as a business model incentivising practices on natural ecosystems that increase carbon sequestration (section 2) and to foster a new industrial value chain for the sustainable capture, recycling, transport, and storage of carbon (section 3). These actions will all contribute to the mitigation effort of the Union either by reducing GHG emissions or by removing carbon from the atmosphere and pave the

⁴ 2021 UNEP Gap Report ([link](#)).

way for a policy of negative emissions in the future, with strong co-benefits for the Union's ambition to reverse biodiversity loss and pollution.

A fundamental step to make this possible is to put in place a regulatory framework for a clear and transparent identification of the activities that unambiguously remove carbon from the atmosphere and can decrease the atmospheric CO₂ concentration, therefore developing a EU framework for the certification of carbon removals, based on robust accounting rules, for high-quality sustainable carbon removals from both natural ecosystems and industrial solutions (section 4). With a perspective towards climate neutrality in 2050, therefore, this Communication should also start a reflection towards the further integration of carbon removals into the EU regulatory and compliance frameworks, post-2030, taking into account the scientifically validated methodologies.

2 CARBON FARMING AS A BUSINESS MODEL FOR HEALTHIER ECOSYSTEMS

2.1 Role of carbon farming

Sustainable land management will be critical in achieving the EU's 2050 climate neutrality objective as it will increase the amount of carbon captured and stored in plants and soils. While forests show annual net carbon removals at EU level, all other land uses such as croplands, grasslands, wetlands and settlements show overall annual net emissions, with significant differences among Member States. Moreover, national GHG inventories submitted to the UNFCCC report that net removals from terrestrial ecosystems in the EU have been on a declining trend over the last decade, largely driven by the deteriorating situation in forest ecosystems. Since about 2013, the annual removals on forest land have been decreasing at more than 12 MtCO₂eq per year, a trend that emerged in a number of EU regions (to varying amounts). The change since 2013 is due to a mix of factors, as outlined in the EU Forest strategy⁵ and the LULUCF Impact Assessment⁶. Solutions are available to reverse this decline and to return quickly to past levels of net carbon removals well above 300 MtCO₂eq, but their deployment needs to be facilitated⁷.

With this in mind, the Commission proposed to amend the LULUCF Regulation (EU) 2018/841⁸ ('LULUCF proposal') by setting a Union target for net annual removals of 310 MtCO₂eq by 2030, a level last seen in 2013, and allocating targets for each Member State. The proposal also includes the aim to reach climate neutrality in the entire land sector by 2035, which means that carbon removals in terrestrial ecosystems should balance the greenhouse gas emissions from all land, livestock and fertiliser use. The Commission proposal, however, does not establish direct incentives at the level of the land managers to increase carbon removals and protect carbon stocks. A system of incentives at land manager level would nevertheless leverage direct action on the ground. This Communication takes up

⁵ Forest strategy (europa.eu) - ([link](#))

⁶ SWD (2021) 609, Impact Assessment accompanying the Proposal amending the "LULUCF" Regulation (EU) 2018/841 ([link](#)).

⁷ Such solutions are presented in the Staff Working Document SWD (2021) 450.

⁸ Regulation (EU) 2018/841 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework ([link](#)).

the challenge of launching an EU carbon farming initiative as announced by the Farm to Fork Strategy⁹ and reiterated in the EU Forest Strategy for 2030¹⁰, and seeks to enable the key stakeholders in the land sector to play their decisive role in sustainable carbon management, on the pathway to climate neutrality. It will also contribute to the recovery of biodiverse and resilient nature across EU.

Carbon farming as a business model

Carbon farming can be defined as a green business model that rewards land managers for taking up improved land management practices, resulting in the increase of carbon sequestration in living biomass, dead organic matter and soils by enhancing carbon capture and/or reducing the release of carbon to the atmosphere, in respect of ecological principles favourable to biodiversity and the natural capital overall. The financial incentives can come from public or private sources and reward land managers either for their management practices increasing the storage of atmospheric carbon or the actual amount of carbon sequestered.

Recently, an increasing number of private carbon farming initiatives have emerged where the land managers sell carbon credits on voluntary carbon markets. The potential for carbon farming is significant and it is the right moment to scale up high quality supply at EU level¹¹. Exploiting at best this potential requires removing barriers that could prevent a large scale lift off and ensuring adequate reward for the carbon credits generated.

On the supply side, the carbon farming credits should become an additional “product” that land managers can sell together with their traditional products such as food and biomass. On the demand side, the buyers of these credits could be economic operators within the bioeconomy such as food processing companies that want to reduce the carbon footprint in their own value chains. This is particularly relevant, as food with low carbon footprint can have recognised added value which can create a competitive advantage for land managers implementing carbon farming practices. Potential buyers of carbon farming credits could also be companies and individuals who want to financially contribute to more climate action on the land and to neutralise their own unavoidable emissions.

Carbon farming would be a new source of income for land managers, who could in many cases benefit at the same time from advantages related to an overall more fertile and resilient land. Furthermore, carbon farming practices often provide co-benefits on biodiversity, enhance ecosystem services and help land managers being more resilient to climate change.

It is nevertheless crucial to ensure that credits generated through carbon farming do not undermine other mitigation efforts and are coupled to a net long-term benefit in terms of GHG emission avoidance. This needs to be very clear – climate neutrality in the EU needs to build on reducing GHG emissions and our efforts must focus on that. Carbon farming credits can complement those efforts and help address those situations where further reduction of

⁹ COM (2020) 381, A Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system ([link](#)).

¹⁰ COM (2021) 572, New EU Forest Strategy for 2030 ([link](#)).

¹¹ In this respect see Technical guidance handbook - Setting up and implementing result-based carbon farming mechanisms in the EU ([link](#)) that assessed the potential of several existing initiatives.

GHG emissions is no longer possible at reasonable socio-economic costs and additional climate action through carbon sequestration is possible. Several food and biomass companies have set themselves climate neutrality targets for their value chains. This is where carbon farming becomes a very useful tool to contribute to the EU's objectives of climate neutrality and halting biodiversity loss.

Carbon farming practices

The potential for carbon removals, emission reductions and protection of existing carbon stocks varies according to bioclimatic conditions and, furthermore, strongly depends on site conditions such as topography, soil type, and past and current land use practices. Although very site-dependent in application, the following are effective examples of improved land management practices that result in the increase of carbon sequestration and in most cases in co-benefits for ecosystems and biodiversity¹²:

- Afforestation and reforestation that respect ecological principles favourable to biodiversity and enhanced sustainable forest management including biodiversity-friendly practices and adaptation of forests to climate change;
- Agroforestry and other forms of mixed farming combining woody vegetation (trees or shrubs) with crop and/or animal production systems on the same land;
- Use of catch crops, cover crops, conservation tillage and increasing landscape features: protecting soils, reducing soil loss by erosion and enhancing soil organic carbon on degraded arable land;
- Targeted conversion of cropland to fallow or of set-aside areas to permanent grassland;
- Restoration of peatlands and wetlands that reduces oxidation of the existing carbon stock and increases the potential for carbon sequestration.

Co-benefits of carbon farming

Carbon farming increases carbon sequestration while often providing important co-benefits for biodiversity and other ecosystem services. An illustrative example is the rewetting of peatlands: raising their water table has multiple benefits as it contributes to reducing CO₂ emissions, preserving biodiversity, providing ecosystem services linked to water purification and helping flood control and drought prevention, whereas trade-offs resulting from the loss of agricultural land could be addressed through support for paludiculture (farming under wet conditions). Carbon farming should also preserve EU food safety and security and ensure a just transition in the context of EU enhanced climate objectives. Carbon farming incentives should then contribute to give financial recognition to these co-benefits. This was also highlighted in the new EU Forest Strategy for 2030, which promoted the setting up of ecosystem services payment schemes and the roll out of carbon farming practices under the Common Agricultural Policy and other public funding, as well as the various co-benefits of a carbon removal certification for private finance of carbon farming.

¹² SWD (2021) 450, Sustainable carbon cycles for a 2050 climate-neutral EU – Technical Assessment

Finally, carbon farming can be a key tool to implement other EU policies, such as:

- it would support, among other things, the reforestation, afforestation and forest restoration activities set out in the New EU Forest Strategy for 2030, including the planting of three billion additional trees;
- it would enable nature-based solutions and their benefits for climate adaptation, as highlighted in the EU Strategy on adaptation to climate change;
- it would provide a novel business model to land managers for the provision of ecosystem services as supported by the EU Bioeconomy Strategy
- it would support the goals of protecting and restoring many carbon-rich natural and semi-natural ecosystems set out under the EU Biodiversity Strategy for 2030;
- it would increase the alignment of CAP to climate and biodiversity objectives;
- it would support the restoration, rewetting and conservation of peatlands as included in the action plan of the Long-Term Vision for Rural Areas;
- it would favour the objectives of the EU strategy to reduce methane emissions;
- it would support the vision for healthy soils set in the new EU Soil Strategy and enhance soils' contribution to stopping climate change;
- it would contribute to the goals of the future Nature Restoration Law to recover biodiverse and resilient nature across EU land and sea

2.2 Upscaling carbon farming

Given the clear benefits of carbon farming, the Commission wants to accelerate its upscaling across the Union. However, there are several barriers to a widespread uptake of carbon farming initiatives across the EU:

- financial burden resulting from the costs of carbon farming management practices and uncertainty about revenue possibilities;
- uncertainty or lack of public trust in the reliability of standards in voluntary carbon markets, in conjunction with concerns around environmental integrity, additionality or permanence;
- unavailability, complexity or high costs of robust monitoring, reporting and verification systems;
- insufficiently tailored training and advisory services.

This Communication aims to address these barriers. Existing EU and national policies have already several tools in place to better support carbon farming practices and to create win-win situations for climate action, biodiversity and the bioeconomy. Nonetheless, knowledge and access to these opportunities should be facilitated and brought at the level of land managers. To that end, the Commission published a technical handbook¹³ that explored key issues, challenges, trade-offs and design options of this business model. The new Common Agricultural Policy (CAP) will have to play an important role in stimulating action

¹³ Technical guidance handbook - Setting up and implementing result-based carbon farming mechanisms in the EU ([link](#)).

and in creating the enabling conditions for emission reductions, particularly from cultivated drained organic soils, as well as for carbon sequestration.

2.2.1 Public funding to kick-start carbon farming

Public funding under the CAP and other EU programs – LIFE, the cohesion funds, Horizon Europe¹⁴ – can support the upscaling of carbon farming by funding the roll out of the practices, as well as for example by covering additional costs related to monitoring, reporting and verification aspects, or by financing projects that improve the understanding of carbon farming practices and fill the existing knowledge gaps. Advisory services, knowledge exchange or information actions for farmers and foresters are essential to the uptake of carbon farming and can also be financed under the CAP or through State aid.

By reducing the financial burden related to costs inherent to carbon farming schemes, EU or national public funding significantly relieves the financial burden and reduces risks for land managers that enter into such schemes. Public funding is therefore key to complementing revenue possibilities from private markets, which will secure land managers’ interest in this business model and build confidence in carbon farming schemes. The Commission will mainstream carbon farming in EU public support, especially promoting it in the national CAP strategic plans, whilst ensuring that there will be no double funding.

Public funding opportunities for carbon farming	
Source of public funding	Type of funding
CAP	<ul style="list-style-type: none"> • Eco-schemes and rural development agri-environment-climate measures or investments can directly support carbon farming practices • The European Innovation Partnership for agricultural productivity and sustainability (EIP-AGRI) helps land managers cooperate and test new approaches • Support to advisory services brings knowledge to land managers
LIFE Programme	Focuses on pilot projects for the upscaling of carbon farming elements (e.g. three new projects to start in 2021 on better monitoring tools; existing Carbon Farming Scheme project testing incentives to enable the trading of removal certificates).
Cohesion Policy	Investments into e.g. restoration and conservation of peatland (also Just Transition)

¹⁴ See section 2.2.3 for funding opportunities under Horizon Europe.

	Fund) Cooperation across regions (INTERREG)
State aid	<ul style="list-style-type: none"> • Possibility of result-based carbon farming schemes in agriculture and forestry • Incentive payments for forest ecosystem services for the benefit of environment and climate • Support to carbon farming within aid for agri-environmental-climate commitments, investments, advisory services, research and development, cooperation

2.2.2 Standardisation of monitoring, reporting and verification methodologies for carbon farming

The success of carbon farming in Europe will be judged on the quantity and longevity of the sequestration of carbon in plants and soils by enhancing carbon capture and/or reducing the release of carbon to the atmosphere. To upscale carbon farming successfully and to establish long-term business perspectives, it will be essential to standardise the methodologies and rules for monitoring, reporting and verifying (MRV) the gains, or losses, in carbon sequestered. Currently, private schemes apply very different benchmarks and rules to the carbon credits placed on the voluntary markets. Without a high degree of transparency, environmental integrity, and methodology standardisation, buyers will be hesitant about the quality of the offered carbon farming credits, land managers will find it difficult to estimate their potential revenues, policy makers will be reluctant to allow the use of such credits for compliance into the regulatory framework and it will be challenging to develop a successful market.

The Commission intends therefore to set up an expert group on carbon farming where Member States' authorities and stakeholders can share their experience with a view to exchanging and establishing best practices on carbon farming, in particular on improving the quality of carbon farming credits and MRV methodologies, to foster peer-to-peer knowledge exchange. The expert group would also support the Commission in monitoring the development of carbon farming initiatives implemented by private or public bodies and their impact on emissions reductions and carbon removals as well as on the environment, in particular biodiversity.

Furthermore, the expert group would also assist the Commission in creating a better link between the carbon farming initiatives with the existing and proposed policy framework at the level of the Member States. The LULUCF proposal already sets a governance, policy implementation monitoring and incentives framework for Member States, thereby encouraging the design of national policies for carbon farming. More consideration needs to be given to the reflection of carbon farming initiatives in the reporting by Member States towards their net removal targets. The progress of such initiatives needs to be recognised, thus giving value to carbon farming actions, while avoiding double-claiming in national inventories and related reports, as well as ensuring a net contribution by the sector to climate neutrality. Synergies with Nature Restoration Law monitoring and reporting will be ensured.

Under the LULUCF proposal, Member States would also need to upgrade their geographically explicit datasets relating to carbon baselines. These improvements will also firmly underpin the implementation of MRV in carbon farming schemes.

Carbon farming challenge

Carbon farming can support the achievement of the proposed 2030 climate target of net removals of 310 Mt CO₂eq in the land sector. To that end:

- every land manager should have access to verified emission and removal data by 2028 to enable a wide uptake of carbon farming;
- carbon farming initiatives should contribute to the increase by 42 Mt CO₂eq of the land sink that is required to meet the objective of 310 Mt CO₂eq net removals by 2030.

The adoption by farmers and foresters of standardised monitoring and reporting methodologies is a pre-condition for an EU-regulated market for climate action in the land sector after 2030. Taking into account the recommendation by the European Court of Auditors to assess the application of the polluter-pays principle in agriculture, the Commission will by December 2023 carry out a study to assess the potential of applying the polluter-pays principle to GHG emissions from agricultural activities.

2.2.3 Improving knowledge, data management and tailored advisory services to land managers

Providing land managers with improved knowledge, tools and methods for a better implementation, assessment and optimisation of the carbon benefits is key to securing their engagement in carbon farming. This is particularly relevant for European small farmers or forest holders – and critical to scaling up action across the Union. These groups are not only implementing policies but, if appropriate information, training, education, upskilling and reskilling, particularly in sustainability, are provided, they can be the engine of change of EU food systems.

Several key datasets and tools are available through current systems and legislation. The CAP already requires geographically explicit monitoring of agricultural parcels and provides for regular and systematic observation, tracking and assessment of agricultural activities and practices through Integrated System (IACS) - notably the geospatial aid application used by the CAP beneficiaries - and the monitoring using Copernicus Sentinels (or other, equivalent) satellite data. Peatlands and wetland areas are good examples of where progress is being made rapidly using remote sensing methods. The Commission will continue exploring with Member States new ways to leverage the use of these tools and help address interoperability issues that may emerge.

The Agricultural Knowledge and Innovation System (AKIS) will underpin CAP Strategic Plan implementation through support to advisory services, knowledge exchange, training, information actions or interactive innovation projects for farmers and foresters. Through

AKIS, Member States will ensure advice and knowledge transfer on environmental aspects, thereby potentially facilitating carbon farming.

On-farm calculations, moreover, will enable land managers – or their advisors – to access carbon farming schemes more easily, to assess carbon sequestration potentials of an individual land holding and to optimise strategies. The reformed CAP includes the Farm Sustainability Tool for nutrients (FaST) – a digital application for farmers for sustainable management of nutrients. The Commission is working on the integration of a module for the calculation of GHG balance at holding level, complementing the assessment of the nutrient balance.

Today's forest monitoring builds heavily on field observations acquired in national forest inventories and in a few cases also national forest soil inventories. While some Member States explore or have already integrated Earth observation in their forest monitoring, the capacity to retrieve coherent and harmonised forest-related information across the EU has not yet been explored.

The key to accurate and cost-efficient monitoring of EU forests is to effectively link bottom up approaches of ground-based sample plots to top down measurements by Earth observation. Detailed information in the spatial and temporal domain will be essential for carbon farming to assess the carbon sequestration at parcel level. In addition, the monitoring should be harmonised across the EU to ensure the same standards, and thus the value of carbon removals, in all Member States. The Commission announced in the New EU Forest Strategy for 2030 that in 2023 it will put forward a legislative proposal on EU Forest Observation, Reporting and Data Collection, subject to an impact assessment.

European Climate Pact

The European Climate Pact can also help promote carbon farming initiatives. The Climate Pact can enable a direct exchange of experiences among land managers, who can become Climate Pact ambassadors, to lead by example and raise awareness on carbon farming in their neighbourhoods and further, also via a dedicated social platform. By committing to a pledge, they can showcase benefits to their peers and that moving to carbon farming is feasible within a short period of time. Land managers may also commit to a joint pledge, for example with their municipality, on initiatives going beyond their plot of land.

Fostering research and innovation

Horizon Europe will continue to foster innovative approaches, in particular through a major R&I European mission to promote soil health: “A Soil Deal for Europe”¹⁵, its thematic Clusters¹⁶ and the European Innovation Council:

- The Horizon Europe mission “A Soil Deal for Europe” aims to spur the transition to healthy soils by 2030, in line with Green Deal commitments for climate, biodiversity, zero pollution and sustainable food systems. Together with the recently launched

¹⁵ COM (2021) 609 Commission Communication on European Missions ([link](#)).

¹⁶ Cluster 6 'Food, Bioeconomy, Natural Resources, Agriculture and Environment' and Cluster 5 'Climate, Energy and Mobility'.

European Soil Observatory and the new EU Soil Thematic Strategy, the mission will be part of a comprehensive framework to address soil and land stewardship at large scale across land uses. Under the mission, carbon farming has been identified as a “hotspot” area for research and innovation. Furthermore, a network of 100 living laboratories and lighthouses planned under the mission, will serve to test, demonstrate and upscale solutions for carbon farming. The soil monitoring component of the mission will support efforts for harmonised soil monitoring in Europe.

- As part of the first work programmes of Horizon Europe, a demonstration network on climate-smart farming will be established to provide support to the implementation of carbon farming.
- For the Horizon Europe’s next programming periods, the Commission will increase the focus on carbon farming and on several other related elements across calls for projects. A particular attention will be given to the potential of digital technologies and data technologies for more accurate, cost effective and efficient estimates of carbon emissions, removals from plants and soils and carbon farming practices. Coupled with in-field instruments and experience from the ground, those technologies will also help to adjust carbon farming practices for an optimization of environmental benefits.
- The European Innovation Council (EIC) supports research in breakthrough technologies and game-changing innovations. The EIC Accelerator Challenge “Technologies for ‘Fit for 55’” supports the development and scale up of sustainable agriculture to increase climate resilience, abate nitrogen and methane emissions and increase carbon stock in the soil.
- In the New EU Forest Strategy for 2030 the Commission announced, inter alia, the intention to develop together with Member States and stakeholders a “Planning our Future Forests” research and innovation agenda and to support the evidence-based design and implementation of forest restoration strategies, including through the planned research and innovation mission on soil health for forest soils.

The contribution of up to EUR 1 billion of Horizon Europe will be combined with the complementary private investment in the future Circular Bio-based Europe Partnership to boost innovative and resource efficient bio-based materials and products that have strong potential to substitute their fossil-based counterparts.

2.3 Blue carbon economy

Marine ecosystems cover 71% of the planet although blue carbon¹⁷ mostly refers to coastal ecosystems that can be most directly influenced by human activity: mangroves, tidal marshes and seagrasses. These ecosystems sequester and store large quantities of blue carbon in both the plants and the sediment below. Despite being neglected in blue carbon assessments, seaweed (e.g. kelp) forms the most extensive and productive vegetated coastal habitat, with high sequestration potential (around 25% of carbon sequestered in long-term reservoirs, such as coastal sediments and the deep sea¹⁸).

¹⁷ Blue carbon is carbon sequestration by the world's oceanic and coastal ecosystems, mostly by algae, seagrasses, macroalgae, mangroves, salt marshes and other plants and plant-like organisms.

¹⁸ Krause-Jensen, D et al. (2016) Substantial role of macroalgae in marine carbon sequestration ([link](#)).

The main challenge is the degradation of blue carbon ecosystems leading to the release of stored carbon into the atmosphere and the reduction of the potential for future carbon removals. Additionally, there is insufficient information to quantify how human activity actually affects them, whether managing, damaging or regenerating those ecosystems.

Several projects such as the network of operational marine farms for regenerative ocean cultivation¹⁹, or the EU project MEDSEA²⁰ that estimated the economic value of marine carbon sequestration, could contribute to the development of blue carbon initiatives. The Commission is also looking at monitoring and reporting possibilities for carbon and nitrogen uptake, and their trade on voluntary carbon markets²¹.

The following developments on blue carbon ecosystems could be envisaged:

- Enhanced knowledge on identification of regions at risk;
- Investments to preserve or restore habitats, and to provide solutions to enhance resilience and protection of EU coastal areas against climate change and biodiversity loss;
- Increased knowledge and data on blue carbon quantification;
- Carbon farming through nature-based solutions, for example on coastal wetlands as well as seaweed and mollusk regenerative aquaculture²² and marine permaculture²³.

The development of blue carbon initiatives would lead to multiple co-benefits, such as ocean regeneration and oxygen production, food security by bringing algae-based proteins to the market or new green and local job opportunities.

¹⁹ Coordinated by the Danish NGO Havhost.

²⁰ funded by the European Commission under Framework Program 7 ([link](#)).

²¹ Two studies funded by the European Maritime and Fisheries Fund (EMFF) to be started end 2021, i) Algae and Climate, and ii) Shellfish and Algae.

²² By implementing new EU Sustainable aquaculture guidelines ([link](#)) and by developing a cross-cutting EU Algae initiative in 4th Quarter 2022.

²³ Marine Permaculture is a form of mariculture that reflects the principles of permaculture by recreating seaweed forest habitat and other ecosystems in nearshore and offshore ocean environments.

Key actions to support carbon farming

In order to upscale carbon farming up to 2030, the Commission will undertake the following actions:

- create an expert group on carbon farming where Member State authorities and stakeholders can share their experiences in view of establishing best practices on carbon farming and on robust monitoring, reporting and verification;
- provide guidance and mainstream dedicated carbon farming funding in most relevant EU policies and related tools (such as the Common Agricultural Policy, LIFE, cohesions funds) to contribute to address the relevant implementation challenges;
- support the coordination of the research community and key stakeholders on developing, testing and demonstrating carbon farming practices through Horizon Europe clusters 5 and 6;
- provide a digital carbon navigator template and guidelines on common pathways for the quantitative calculation of GHG emissions and removals for agricultural land managers;
- carry out a study to assess the potential to apply the polluter-pays principle to emissions from agricultural activities;
- create a carbon farming group within the Climate Pact social platform to bring together land managers to encourage them to become Climate Pact ambassadors and feed the exchange on direct experiences;
- create living labs that test and demonstrate practices for carbon farming across various locations in Europe under the mission “A Soil Deal for Europe”.
- promote and pilot blue carbon farming practices through some of the lighthouses of the Mission “Restore our Ocean and Waters”

3 INDUSTRIAL CAPTURE, USE AND STORAGE OF CARBON

The EU consumed approximately one billion tonne of biogenic (45%) and fossil (54%) carbon for the functioning of its economy in 2018²⁴. The carbon is used to provide food (25%), energy (56%) and materials (19%) and only a very small fraction of the carbon used today is from recycled origin (1%). Beyond decarbonising its energy system to be climate neutral by 2050, the EU will also need to rethink its sourcing of carbon as feedstock for industrial production. Fossil carbon should be replaced by more sustainable streams of recycled carbon from waste, sustainable biomass and directly from the atmosphere

The EU climate-neutrality objective would require to capture between 300Mt and 500 Mt of carbon dioxide from those sources by 2050²⁵. The EU economy will use it for the production of synthetic fuels, plastics, rubbers, chemicals and other materials requiring carbon as a

²⁴ Carbon Economy - Studies on support to research and innovation policy in the area of bio-based products and services ([link](#)).

²⁵ SWD (2021) 450, Sustainable carbon cycles for a 2050 climate-neutral EU – Technical Assessment

feedstock even when a complete and well-functioning circular economy will minimise the end of life impact of these products. The CO₂ captured can also be stored either permanently in geological sites or in new long-lasting products to provide up to 200Mt of industrial carbon removals by 2050.

Biogenic carbon will have an important role to play in the construction sector by providing substitutes for conventional building materials which are able to store carbon for long periods of time.

3.1 A sustainable bioeconomy

As recognised in the Communication ‘Clean Planet for All’²⁶, the bioeconomy contributes to achieving climate neutrality by reducing fossil emissions through the replacement of GHG-intensive materials and fossil fuels with bio-based materials and bioenergy, respectively. The climate mitigation benefit of bio-based products can be optimised by increasing the proportion of material use (especially for long-lived products) in total biomass uses through the application of the cascading principle while ensuring that land-based removals and biodiversity are maintained or enhanced.

Increased sustainable long-term storage of carbon in bio-based products will contribute to reach the net carbon removal target of 310 MtCO₂eq by 2030, as put forward by the LULUCF proposal. To incentivise the development of more innovative and long-lasting bio-products, it is further proposed to enlarge the category of Harvested Wood Products and to also cover innovative carbon storage products, such as bio-based material from biomass and natural fibres like flax, hemp and others. Improving the climate performance of buildings is an opportunity for the bioeconomy, by being able to reduce overall emissions of the construction sector while storing substantial amounts of carbon, as set out in the Renovation Wave Strategy²⁷ and the new European Bauhaus initiative²⁸.

There is, however, still no scientific consensus about methodologies to measure such storage, in particular concerning its duration. Given the potential trade-offs as well as synergies among policies that create additional demand on the use of biological resources, the Commission will carry out a study on an Integrated assessment, evaluating the impact of national and EU Bioeconomy policies on land use²⁹.

In the new EU Forest Strategy for 2030, the Commission announced it would develop a standard, robust and transparent methodology to quantify the potential climate benefit of construction products and other building materials, including those associated with carbon capture and utilisation. In this context, on the example of wood-based construction products

²⁶ COM (2018) 773, A Clean Planet for all A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy ([link](#)).

²⁷ COM (2020) 662, A Renovation Wave for Europe - greening our buildings, creating jobs, improving lives ([link](#)).

²⁸ New European Bauhaus ([link](#)).

²⁹ The Bioeconomy Progress Report will assess the implementation of the Bioeconomy Strategy Action plan and European bioeconomies, providing an additional analysis on the need of policy coherence in the context of the European Green Deal and its various objectives.

for new building³⁰, the Commission has explored the relevance of life cycle assessment methodologies for a reliable and verifiable quantification of the net carbon removals via temporary storage in construction products. Such approaches can provide additional information to support the elaboration of market-based schemes to reward construction actors for their carbon removals, as well as other policy frameworks, in particular those related to the climate performance of products.

The Commission will support the development of scientifically sound methodologies with the objective of acknowledging carbon storage in all European frameworks related to the climate performance of products, including the Construction Products Regulation³¹ and the Sustainable Product Initiative³². The Commission will also consider the possibility to revise the existing rules on carbon storage accounting in the EU Product and Organisation Environmental Footprint (PEF/OEF)³³ methods and harmonised European standards for construction products³⁴, once alternative tested methodologies are available.

Beyond the issue of regulatory measures, Horizon Europe provides funding for research on the benefits of the transition away from linear fossil-based systems to sustainable circular bio-based systems, novel feedstocks for biorefineries, and the design of bio-based products and processes³⁵. Horizon Europe will also offer opportunities for research on climate performance and the whole life carbon of buildings, including under the European Partnership for People-centric Sustainable Built Environment (Built4People³⁶), and in a range of bio-based materials and chemicals, including under the Circular Bio-based Europe Joint Undertaking³⁷. Going beyond the research stage, the Innovation Fund, which is financed by the revenues from the EU Emissions Trading System (EU ETS), can support innovative projects that replace energy-intensive materials, such as cement and steel, with bio-based materials and products.

3.2 Creating an internal market for capture, use, and storage of CO₂

Besides a sustainable bioeconomy, it is pivotal that the EU supports today the development of emerging technologies that are needed to achieve climate neutrality in 2050. Industrial projects have long lead times and project developers are often faced with scale-up challenges and fierce global competition, in particular in the energy-intensive industries, where large amounts of products will have to be produced through new processes.

Since natural resources are limited and the bioeconomy cannot provide all the carbon to fulfil the energy and material needs of a climate-neutral EU economy in 2050, other streams of carbon should be developed to replace fossil carbon, including capturing CO₂ directly from the atmosphere, also called Direct Air Capture (DAC).

³⁰ Trinomics (2021) Evaluation of the climate benefits of the use of Harvested Wood Products in the construction sector and assessment of remuneration schemes ([link](#)).

³¹ Construction Product Regulation ([link](#)).

³² Sustainable Product Initiative ([link](#)).

³³ Environmental footprint by the European Platform on Life Cycle Assessment ([link](#))

³⁴ Harmonised European standards for construction products ([link](#))

³⁵ Bio-based products and processes ([link](#)).

³⁶ Built4People ([link](#)).

³⁷ COM (2021) 87 establishing the Joint Undertakings under Horizon Europe ([link](#)).

Another promising route is to turn the CO₂ from a waste to a resource and use it as feedstock for the production of chemicals, plastics or fuels. Carbon dioxide as feedstock is today mainly used in the production of urea for fertiliser application and in marginal volumes in some specialised applications. Mastering the production of methanol from CO₂ at reasonable costs would pave the road to the production of a large range of chemicals such as ethylene or propylene used for the production of plastics, coolants, and resins.

The permanent storage of CO₂ in geological formations is an option to mitigate industrial emissions and to remove carbon from the atmosphere when the CO₂ is captured directly from the atmosphere – Direct Air Carbon Capture and Storage (DACCS) – or from the combustion or fermentation of biogenic carbon, also called Bio-Energy Carbon Capture and Storage (BECCS). Depleted oil and gas reservoirs and saline aquifers have the potential to store billion tonnes of CO₂ in offshore sites, the binding of CO₂ to basalt rocks or other carbon mineralisation processes being other options potentially deployable at large scale. The pyrolysis of biomass to biochar, a stable solid form of carbon similar to charcoal, can improve the properties of soils while storing carbon for the long term.

The Directive on the geological storage of CO₂³⁸, the so called CCS Directive, establishes a legal framework for the environmentally safe geological storage of CO₂ by covering all CO₂ storage in geological formations in the European Economic Area, and the entire lifetime of storage sites, while the EU ETS Directive³⁹ already gives a price incentive for permanent geological storage of fossil CO₂⁴⁰ to take place. BECCS deployment should be approached in full consideration of the limits and availability of sustainable biomass in order to avoid excessive demand of biomass for energy that would have negative effects on carbon sinks and stocks, biodiversity and air quality.

The EU has been supporting the development and deployment of CCU and CCS technologies for many years. In the past, Horizon 2020 has supported completing the industrial carbon cycle with funding for research on carbon capture, use and storage and the CCUS Projects Network for knowledge sharing. Horizon Europe has launched calls on the integration of CCUS in industrial hubs and clusters, on decarbonising industry with CCUS, on the cost reduction of CO₂ capture, carbon negative sustainable biofuel production and direct atmospheric carbon capture and conversion. Future calls of Horizon Europe will cover CO₂ transport and storage, CCU, DACCS and BECCS. The European Innovation Council Pathfinder Challenge “Carbon and Nitrogen management and valorisation” focuses on new biological, chemical, physical routes that integrate the capture, sequestration and/or recovery of carbon and nitrogen species and their conversion into value-added and decarbonised commodities, chemicals, fuels and energy vectors.

³⁸ Directive 2009/31/EC on the geological storage of carbon dioxide ([link](#)).

³⁹ Directive (EU) 2018/410 amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments, and Decision (EU) 2015/1814 ([link](#)).

⁴⁰ CCS-biomass projects with a clear and verifiable climate benefit could potentially benefit from recognition pursuant to Article 24a of the revised EU ETS Directive - Parliamentary question ([link](#)).

Industrial Sustainable Carbon challenge

Reaching climate neutrality requires capturing carbon from the atmosphere for storage and for use as substitute to fossil carbon. This Communication puts forward the following aspirational objectives and the Commission will engage in a dialogue with stakeholders in relevant fora, and work together towards a cost-effective and environmentally sound achievement:

- 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;
- At least 20% of the carbon used in the chemical and plastic products should be from sustainable non-fossil sources by 2030, in full consideration of the EU's biodiversity and circular economy objectives and of the upcoming policy framework for bio-based, biodegradable and compostable plastics.
- 5Mt of CO₂ should be annually removed from the atmosphere and permanently stored through frontrunner projects by 2030

The Innovation Fund is the world's largest funding programme for the deployment at scale of innovative low-carbon technologies. It is financed by the EU ETS revenues and is currently expected to provide financial support of around EUR 25 billion over the period 2021-2030 (based on a carbon price of EUR 50/tCO₂). The goal is to help businesses invest in innovative clean technologies, including CCU, CCS and carbon removals, and thereby reinforce European leadership. The proposed new Climate, Energy, and Environment State aid Guidelines further enable Member States to provide support to close the financial gap for CCU, CCS and carbon removal projects.

In order to speed up commercialisation of innovative technologies, the Commission has proposed to increase the size of the Innovation Fund and to include the possibility of carbon contracts for difference (CCD) in the revised EU ETS Directive. The next practical step while awaiting the agreement on the proposal will be an in-depth analysis of the possible design options and implementation modes.

Regulatory changes in the near future will further benefit first movers who deploy CCU technologies. The Commission proposal for ReFuelEU Aviation⁴¹ should ensure demand for synthetic fuels based on CCU and advanced biofuels and complement the proposal for a revised Renewable Energy Directive, which sets a sub-target for renewable fuels from non-biological origin. The Commission proposal for a revised EU ETS Directive⁴² sets out the basis to avoid the double counting of emissions when synthetic fuels based on CCU are both produced and consumed in activities covered by the EU ETS. In addition, the proposal for a revised EU ETS Directive creates an incentive for capturing and utilising emissions to become permanently chemically bound in a product so that they do not enter the atmosphere under normal use.

⁴¹ COM (2021) 561, Proposal for a regulation on ensuring a level playing field for sustainable air transport ([link](#)).

⁴² COM (2021) 552, Proposal for a Directive amending Directive 2003/87/EC ([link](#)).

However, the lack of sufficient capacity for transport and storage of CO₂ can become an important bottleneck in the use of these technologies as infrastructure needs to undergo lengthy permitting processes and may not advance due to uncertainties related to cross value chain risks. The transport network needs to connect the current and future CO₂ sources with the available CO₂ storage sites and production sites consuming CO₂, to track the carbon flows, and to take into account possible local public concerns. An open-access infrastructure ensures competition between different transport and storage operators and will thereby help drive down cost and allow CO₂ capture operators to choose between different options for the transport, use or storage of CO₂. The development of CCUS hubs, where many CO₂ emitters can benefit from a common infrastructure, and an open-access transport network for CO₂ across national borders will be critical because not all Member States have access to suitable storage sites. The Commission will study the cross-border CO₂ infrastructure deployment needs at EU, regional and national level until 2030 and beyond, involving all relevant public and private stakeholders.

The Connecting Europe Facility (CEF) under the TEN-E Regulation provides funding for targeted infrastructure investment of European importance, including CO₂ transport infrastructure. In the 2020 call for proposals, several CO₂ transport projects were successful. The CEF will also be a key funding instrument for CO₂ infrastructure in the future.

The Commission intends to facilitate the development of a competitive CCUS market by taking stock of the existing knowledge base and engaging with all the relevant industrial, public and civil society stakeholders. The CCUS Forum in October 2021 has already been a first successful step and will be held each year from now on. To facilitate further the uptake of CCS, the Commission envisages, on the basis of technological progress and stakeholder feedback, to update the four Guidance Documents from 2011 that assist stakeholders to implement the CCS Directive⁴³.

Industrial installations capturing CO₂ for utilisation or storage must also properly monitor, report and account the quantity and origin of the CO₂ they process. The EU needs an efficient system for the traceability of captured CO₂ that can track how much fossil, biogenic or atmospheric CO₂, respectively, is transported, processed, stored and potentially re-emitted to the atmosphere each year. This will allow a differentiation between industrial solutions that permanently remove carbon dioxide and those that store the carbon for shorter periods or without a net decrease of the CO₂ concentration in the atmosphere.

Such system, duly considering the existing legal framework of the EU ETS and its rules for the monitoring and reporting of emission, would provide the foundation for the certification of industrial carbon removals in the upcoming EU regulatory framework presented in the section 4. The certification framework will facilitate the purchase of carbon removal credits by private or public buyers. Carbon removal projects can increase their viability by combining the grants from the Innovation Fund with the revenues from the sale of carbon removal credits, whereby any double funding has to be duly avoided. The experience with carbon removal projects under the Innovation Fund would provide important feedback for the

⁴³ Implementation of the CCS Directive ([link](#)).

development of the certification of industrial carbon removals and their possible further regulatory treatment in the longer term.

Key actions to support industrial capture, use and storage of CO₂

In order to upscale industrial solutions for the capture, use and storage of CO₂, the Commission will undertake the following actions:

- Further develop a standard, robust and transparent methodology to quantify the climate benefit of sustainably-produced wood construction products and other building materials with carbon storage potential;
- develop methodologies and carry out an integrated EU bioeconomy land-use assessment, with the aim of ensuring consistency of aggregated national and EU policies and targets, and provide technical assistance to Member States to carry out national assessments in support of their bioeconomy policies.
- better support industrial carbon removals with the Innovation Fund;
- Horizon Europe calls will continue supporting industrial CO₂ capture, transport, use, and storage in its next work program (2023/24);
- launch a study on the development of the CO₂ transport network;
- update the guidance documents for the CCS Directive, covering risk management, monitoring, and financing;
- organise an annual CCUS forum.

4 A REGULATORY FRAMEWORK FOR THE CERTIFICATION OF CARBON REMOVALS

To reach the climate neutrality objective of the EU Climate Law, carbon removals will have to be fully integrated into EU climate policy. By 2050, each single tonne of CO_{2eq} emitted into the atmosphere will have to be neutralised by a tonne of CO₂ removed from the atmosphere. The establishment of a regulatory framework, centred on a legislative proposal for the certification of carbon removals⁴⁴ will therefore be an essential stepping stone towards this goal. Any future policy choice (in the post-2030 legislative cycle) to allow carbon removals in EU compliance frameworks would need, as a necessary precondition, a sound and reliable definition of carbon removals providing guarantees in terms of environmental integrity. A certification mechanism should first focus on solutions taking place in the Union that remove CO₂ from the atmosphere with sufficient guarantees on the storage duration, on measurement quality, the management of risk of reversal or risk of ‘carbon leakage’ inducing GHG emissions elsewhere. This is important for the achievement of EU domestic climate neutrality. The question of the “validity” of carbon removals taking place outside the Union is also important, but it presents greater complexity, in particular with regard to monitoring and verification issues; it can only be effectively addressed once the Union has a domestic

⁴⁴ The Commission will propose an EU regulatory framework for the certification of carbon removals by end of 2022 ([link](#)).

regulatory framework for carbon removals against which activities taking place elsewhere can be benchmarked.

The certification framework development should ensure the transparent identification of carbon farming and industrial solutions that unambiguously remove carbon from the atmosphere sustainably. Robust monitoring, reporting and verification of carbon removals at the level of individual land holdings (section 2) or through the industrial capture, transport and storage of CO₂ (section 3) is a necessary prerequisite to ensure their authenticity, as well as to minimise the risk of fraud and errors. Certification is therefore a pre-condition for any sound regulation of – and enhanced uptake by – market-based carbon removal solutions.

This certification nevertheless faces a number of challenging technical issues. Carbon removals are at risk of uncontrolled re-emission (so-called non-permanence) and specific measurement difficulties (leading to uncertainty of estimates). With regard to carbon farming, moreover, existing certification frameworks deploy a wide variety of approaches to quantify the amount of carbon removals which are generated compared to standard land management practices (additionality), and for the determination of co-benefits for bio-diversity. Lack of standardisation is a further major barrier to the expansion of the voluntary carbon market.

The accounting and certification rules should therefore set scientifically robust requirements in terms of measurement quality, monitoring standards, reporting protocols and verification means. This framework should moreover ensure environmental integrity and prevent negative impacts on biodiversity and ecosystems, especially when concerning resource or energy intensive industrial solutions.

The credibility of the accounting and certification framework will also depend on its effective implementation. Preference should be given to a transparent process for the definition and updating of the accounting and certification rules. Various options exist for a governance framework involving public authorities and private bodies to support its implementation, ranging from a single, centralised EU system through to a more decentralised structure. The administrative costs, including those related to the monitoring, reporting, and verification of carbon removals, need to be kept manageable. The use of state-of-the-art digital solutions should allow for a cost-efficient and market-friendly implementation.

The Commission will pay particular attention to the involvement of stakeholders in the preparation of the legislative proposal and the accompanying impact assessment. Among other actions, the Commission will launch a call for evidence to strengthen the Commission's understanding of carbon removals and key issues for their accounting and certification, and will organise a conference to bring together representatives from academia, business sectors, public organizations, NGOs and civil society to exchange views on the EU-wide certification concept.

The next few years should see the scaling up of carbon removals – be it in the land sector or in industry – as well as gaining market and regulatory experience, in particular with regard to improvements to monitoring, reporting and verification. Carbon farming and industrial projects that invest in carbon removals today should have a prospect of a future robust accounting and certification framework that ensures comparability and environmental integrity, and recognition of the action started already on the ground.

The accounting and certification framework should, moreover, be consistent with other EU policy initiatives, such as the future Directives on Sustainable Corporate Governance and on Corporate Sustainability Reporting. The framework could thereby enhance reporting transparency by companies on their climate targets, as well as the Sustainable Product legislative initiative, where it could help to demonstrate and encourage carbon storage in long-lived products.

At Glasgow, Parties agreed to finalise the Rulebook of the Paris Agreement and to establish, under Article 6, a robust and comprehensive accounting framework for international carbon markets. All activities taking place in this context will have to rely on ambitious baselines approaches and to respect environmental safeguards. Being a pioneer in the regulatory certification of carbon removals will make the EU the trailblazer. This will provide a global inspiration for designing, under Article 6, robust and ambitious methodologies aligned with the objective of the Paris Agreement.

Key actions towards the legal proposal for a certification of carbon removals

On the way towards an integration of carbon removals in EU climate policy, the Commission will undertake the following actions:

- launch a Call for Evidence to strengthen the Commission's understanding of carbon removals and key issues for their accounting and certification (early 2022);
- organise a conference to exchange on sustainable carbon cycles and the upcoming legislative proposal for the certification of carbon removals (first quarter 2022);
- propose an EU regulatory framework for the accounting and certification of carbon removals (end 2022);
- establish an EU standard in monitoring, reporting and verifying GHG emissions and carbon removals at farm and forest holding level as well as for captured fossil, biogenic or atmospheric CO₂ that is transported, processed, stored and potentially re-emitted to the atmosphere each year;
- organise regular exchanges with other jurisdictions on carbon removal accounting and certification.

5 CONCLUSION

In order to reach climate neutrality, greenhouse gas emissions will have to be reduced drastically and rapidly while carbon removals will have to be increased and further integrated into EU climate policies. With this Communication and consequent actions, the Commission wants to kick-start and upscale carbon removal across the EU by addressing the current implementation challenges:

- Utmost attention needs to be paid to the quality and credibility of carbon removals in the land sector as well as in industrial sectors. As in the case of any new business model, building trust will be crucial. This is why the Commission will develop a new framework for the certification of carbon removals in 2022, underpinned by an impact assessment and an open public consultation. A certification mechanism will provide

more clarity on the quality of carbon removals, and ensure their environmental integrity. It will address the lack of standardisation of existing frameworks and contribute to a level playing field.

- The land and bio-economy are crucial for achieving sustainable carbon cycles. The Communication proposes concrete actions how to better reward land managers for reducing emissions and increasing removals based on a credible business model that aims for high environmental integrity and avoids any kind of greenwashing. EU and national public funding can significantly relieve the financial costs and risks inherent to carbon farming. In particular, funding under the Common Agricultural Policy will be key to provide land managers with improved knowledge through targeted advisory, data and monitoring services. The Commission therefore calls on Member States to integrate carbon farming into their proposals of their national CAP strategic plans which will be in place in 2023. The public funding will complement the private funding that can come from the revenues generated through the sale of carbon credits or through incentive contracts with food and biomass processors who promise a climate-neutral supply chain to their clients and investors.
- While drastically reducing the use of fossil carbon, the EU economy will need to capture CO₂ and use it as feedstock for the production of fuel, chemicals and materials that still require carbon. Industrial solutions storing CO₂ for the long-term can generate carbon removals when the CO₂ is captured from the atmosphere. To kick-start and upscale industrial capture, use, and storage of carbon, a credible and reliable monitoring and tracking of the CO₂ captured, transported, used and stored by its fossil, biogenic or atmospheric origin is essential and key to the certification of carbon removals. The EU ETS Innovation Fund, as one of the world's largest funding programme for innovative low-carbon technologies, will support businesses to invest into carbon use and removal technologies, and thereby reinforce European leadership. To fully realise the potential of the new carbon industry, a transport network needs to connect the CO₂ sources with the CO₂ storage sites and production sites consuming CO₂. The Commission will study the cross-border CO₂ infrastructure deployment needs and continue to provide funding through the Connecting Europe Facility (CEF).

Making carbon cycles sustainable is an urgent necessity for the humanity. This process needs to be accelerated and it must be credible. With the Green Deal as the EU's growth strategy, carbon removals should also become a new business model.