Carbon removals and emissions reductions from climate-friendly soil management: defining key terms

Policy brief

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Main findings

1. Climate-friendly soil management measures generate climate impact through both temporary carbon removals and emissions reductions, posing a challenge for defining key terms such as "carbon removals, "emissions reductions," "avoided emissions," and "negative emissions" in this context.
2. Discussions leading to the establishment of the EU Certification Framework for Permanent Carbon Removals, Carbon Farming and Carbon Storage in Products (CRCF) and recent academic literature illustrate the lack of clarity around definitions of carbon removals and emissions reductions in the context of carbon friendly soil management.
3. This brief aims to review scientific definitions of carbon removals, emissions reductions, and negative emissions in the context of climate-friendly soil management to create a mini-glossary of key terms. We consider definitions established by the IPCC for national inventory reporting and common usage in the voluntary carbon market, as well as the wider scientific literature.
4. Different policy contexts require definitions to be adapted. IPCC definitions for national inventory reporting correspond to annual flows of emissions and removals. These definitions should be adjusted in the context of policies that aim to mitigate climate change, such as the EU Certification Framework for Permanent Carbon Removals, Carbon Farming and Carbon Storage in Products. For example, the definition of net-negative emissions in the voluntary carbon market should consider a broader geographic and temporal scope than the IPCC definitions in order to manage risks of carbon leakage and of non-permanence.

1 Introduction

Climate-friendly soil management measures aim to reduce emissions or sequester carbon through land-use change or changing management of agricultural soils. Soils can be a source of carbon emissions but can also accumulate carbon that had originally been removed from the atmosphere by vegetation.[1] Given that globally soils store almost four times as much carbon as vegetation and twice as much carbon as the atmosphere, soil management can play a significant role in climate regulation (Friedlingstein et al. 2023).

Effective policies to promote climate-friendly soil management require clear definition of key terms such as "removals," "emissions reductions," and "negative emissions". However, this is challenging in the context of soil carbon, as the processes in soils related to carbon "removal" and "emission" occur simultaneously. A recent survey by Don et al. (2023) assessing the use of terminology related to soil carbon sequestration found that key terms related to carbon removals are commonly used incorrectly. For example, they found that even in recent peer-reviewed papers, carbon sequestration is often conflated with carbon stocks, and that by their definition only 4% of papers they reviewed used the term carbon sequestration correctly. Incorrect usage fuels miscommunication between scientists and with stakeholders, can mislead, and may result in less effective mitigation of climate change (*Ibid.)*.

This lack of clarity in key terms was apparent in the development of the EU Certification Framework for Permanent Carbon Removals, Carbon Farming and Carbon Storage in Products (CRCF) Regulation.[2] This regulation aims to support the upscaling of carbon removals by establishing a voluntary framework for certifying carbon removals, including quality criteria for carbon removal activities, rules for certification, and requirements regarding the Commission recognition of certification schemes. The regulation explicitly covers emissions reductions and carbon removals from the management of agricultural land (referred to as "carbon farming". Initial EU Commission proposals for this policy were criticised for a lack of clarity on key terms. For example, the definition of the key term "carbon removals" was criticised as being out of step with scientific definitions and risking environmental effectiveness (Erxleben et al. 2022; Schenuit et al. 2023; McDonald et al. 2023; Meyer-Ohlendorf et al. 2023; EEB 2023).[3]

To combat this lack of clarity, in this brief we review scientific definitions of key CRCF-related terms "carbon removals," "emissions reductions," "avoided emissions," and "negative emissions" within the context of climate-friendly soil management measures. In chapter two, we introduce the context of climate-friendly soil management. In chapter three, we consider IPCC definitions, the broader scientific literature, and common usage in voluntary carbon markets to produce a mini glossary of these and other key terms. This paper aims to support clearer communication between policymakers, stakeholders, and scientists on the topic of climate-friendly soil management. It should support more effective discussions on the CRCF as well as related policies and processes including UNFCCC Article 6 and the voluntary carbon market.

[1] Soils do not remove carbon from the atmosphere sensu stricto (they are not autotrophic, that is, they do not themselves convert carbon dioxide into organic compounds) but rather are a carbon pool that stores organic compounds generated through carbon removal by e.g. vegetation. Accordingly, the carbon pool "soil" would be considered a "net remover" when the increase in carbon stocks exceeds emissions, leading to a total increase in the carbon stock of the soil.

[2] Provisional Agreement on a Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing a Union certification framework for permanent carbon removals, carbon farming and carbon storage in products. https://www.europarl.europa.eu/meetdocs/2014_2019/plmrep/COMMITTEES/ENVI/DV/2024/03-11/Item9-Provisionalagreement-CFCR_2022-0394COD_EN.pdf

[3] In particular, the Commission's CRCF proposal was criticised for its definition of carbon removals stretching to include both carbon being removed from the atmosphere and reduced emissions to the atmosphere.

2 Climate-friendly soil management: context

Climate-friendly soil management measures can be distinguished into two categories: 1) Land use change measures (e.g., conversion of arable to grassland, prevention of land take, re-wetting of peatlands and organic soils) and 2) management measures, which adapt an existing land use (e.g., crop rotations, residue/mulching/inputs, and also include technical fixes such as reduced compaction (Frelih-Larsen et al. 2022).[4] Table 1 introduces key climate-friendly soil management measures applied in the EU, based upon Siemons et al. (forthcoming). We focus here on measures that are nature-based solutions, that is, "appropriate, adaptive actions to protect, sustainably manage or restore natural or modified ecosystems in order to address targeted societal challenge(s) - such as climate change mitigation -, while simultaneously enhancing human well-being and providing biodiversity benefits" (Reise et al. 2022).

Difficulties in defining "removals", "emissions", and "negative emissions" in the context of climate-friendly soil management arise due to the fact that soils simultaneously sequester carbon and emit it. On any piece of land, soil organic carbon stocks increase as plants or other organisms (e.g. above or below-ground litter or plants, or plant roots) transfer carbon to the soil, sequestering carbon; at the same time, microbes break down soil carbon, releasing some of this to the atmosphere (Don et al. 2023). The balance of these in- and outgoing fluxes of carbon determines whether the soil is a net source of carbon emissions or a net remover. This is further complicated by soils also being sources of other greenhouse gas emissions, especially nitrous oxide, e.g. from fertiliser use, and methane, e.g. associated with the use of manure on cropland or anaerobic decomposition in peatlands or rice cultivation. In the context of designing policies to fight climate change, it is anthropogenic emissions and removals that are most relevant; that is, emissions or removals resulting from or produced by human activities (IPCC 2022). The definition of anthropogenic can be challenging in the land sector, which is also subject to natural carbon cycles.[5] Like many other nature-based solutions, climate-friendly soil management measures often result in emissions reductions and carbon removals that can be easily reversed, resulting in mitigation that can be non-permanent; accordingly, definitions must also consider the differing expected duration of mitigation.

3 Defining anthropogenic removals and emissions reductions

In this section, we survey current scientific definitions of key terms. We draw on IPCC definitions, which have been developed to facilitate annual national inventory reporting, with corresponding geographic, temporal, and sectoral boundaries. These terms are also used in slightly different climate-friendly soil management contexts, such as the voluntary carbon market, and related policies such as the CRCF. These contexts have different objectives and correspondingly different temporal, spatial, and activity scopes than IPCC national inventory

[4] Biochar is sometimes discussed as a climate-friendly soil management measure. A methodology is being developed under the CRCF, though as part of the permanent carbon removals category, not under the carbon farming category. We exclude it from our analysis in this paper as it does not meet the criteria of being a nature-based solution, see Siemons et al. (forthcoming).

[5] The definition of which emissions or removals are considered anthropogenic can differ within different land sector contexts. In the context of IPCC national inventory reporting, all emissions and removals on "managed land" are considered "anthropogenic". This assumption is a simplification that does not reflect that most soils (and land) would not have a zero C balance in absence of management. Accordingly, while IPCC inventory reporting would identify any existence of a net removal/emission on managed land as anthropogenic, this is not necessarily "resulting from or produced by human activities." Some other contexts reflect different definitions of anthropogenic emissions/removals," e.g. some voluntary carbon market methodologies quantify mitigation relative to a baseline that reflects what would have occurred in absence of specific management interventions, which would control for any background non-anthropogenic fluxes.

Table 1 Climate-friendly soil management measures in the EU (Siemons et al. forthcoming)

Mitigation measure		Description
Land use change, grasslands and set-aside areas	**Conversion from arable land to grassland**	Converting arable land for the purpose of grazing or fodder production to sequester carbon and reduce emissions (Vleeshouwers and Verhagen 2002; Don et al. 2009).
	Rewetting of organic soils	The deliberate action of raising the water table on drained soils to re-establish water-saturated conditions to restore wetlands and reduce emissions from drainage (Tiemeyer et al. 2020; Schumann and Joosten 2008). Rewetting these soils also creates suitable conditions for removing carbon from the atmosphere (Wilson et al. 2016a).
	Silvoarable and silvopastoral agroforestry	Silvoarable agroforestry consists of woody perennials such as trees or hedges and agricultural, usually annual, crops grown on the same cropland in a specific spatial and/or temporal fashion to sequester carbon and reduce emissions (e.g. from fertiliser use) (Cardinael et al. 2017; FAO and ICRAF 2019). Silvo-pastoral agroforestry refers to a mild-successional system of grasslands interspersed with trees and shrubs (Jose and Dollinger 2019).
	Mixed crop-livestock systems	Farm-scale systems where livestock and cash crop production are combined to optimise resource efficiency, sequester carbon, and reduce emissions (e.g. from off-farm fertiliser) (FAO 2001; Ryschawy et al. 2012; EIP-AGRI Focus Group 2017).
	Permanent grassland management	Managing grasslands to sequester carbon, i.e. in habitats with a mixture of native grasses, herbs and a low proportion of woody species (Gibson 2009).
	Low input grasslands / set-aside areas	Grassland managed with minimal or no external production inputs (e.g. mineral fertiliser and pesticides) to reduce emissions (e.g. from applying fertiliser) (Henderson et al. 2015).
	Buffer strips	Riparian buffers consist of woody and/or herbaceous crops located along water courses, maintained with permanent vegetation to control soil and water quality, erosion and other agricultural benefits, and to sequester carbon (Gilley 2005; Englund et al. 2021).
Management: Crop rotations	**Use of cover crops, crop rotation**	Cover crops are "plants that are grown in order to provide soil cover and to improve the physical, chemical, and biological characteristics of soil"(FAO 2011, p. 9) and sequester carbon. They can be sown independently or combined with the main crops. They are also known as catch or green manure crops. Crop rotation means cultivating different crops in a temporal sequence on the same land (Sumner 2018).
Management: Residue, inputs	**Residue management**	Also known as green manuring, this includes all field operations from planting to harvest that affect the amount and distribution of all types of on-field residues, including crop, forest, sawmill, residues, etc. (NRCS 2006; Biala 2016). Incorporation of residues has been found to increase SOC (Lehtinen et al. 2014).
	Applying manure / compost	The use of biologically decomposed organic nutrients derived from organic waste materials mainly via the process of composting, for the purpose of soil amendment, which increases SOC (Doble und Kumar 2005; Bihn et al. 2014). Manure/compost can also be sourced from off-farm, e.g. municipal compost, though this poses some risks.
Management: Technical	**Reduce soil compaction**	Managing vehicle traffic to reduce soil compaction and thus protect soil functions and reduce N2O emissions (Horn et al. 1995; Schmeer et al. 2014).

Author's own compilation, based upon Siemons et al (forthcoming) and Frelih-Larsen et al (2022).

reporting. Accordingly, the IPCC definitions require additional specification in these contexts. To this end, we also draw on recent academic literature and voluntary carbon market practice. A text box with definitions of additional key terms is included at the conclusion of the section.

3.1 Carbon dioxide removals

Climate-friendly soil management can generate “carbon dioxide removals” by sequestering carbon from the atmosphere in soils or biomass. For example, agro-forestry offers significant potential for removing carbon from the atmosphere through trees and sequestering it in soils and woody biomass.

The United Nations Framework Convention on Climate Change (UNFCCC) offers a starting point for a definition of anthropogenic carbon removals.[6] Under the UNFCCC, Annex 1 countries are required to submit an annual national inventory report, which covers anthropogenic emissions and removals of GHGs that occurred in the country over the past year. In this context, “removals” are defined by the IPCC as the “removal of greenhouse gases and/or their precursors from the atmosphere by a sink,” with a sink defined as “any process, activity or mechanism which removes a greenhouse gas, an aerosol, or a precursor of a greenhouse” (IPCC, 2006).[7] In the context of the land use, land use change and forestry sector (LULUCF), these removals (and emissions) are usually estimated as changes in carbon stocks, with some exceptions. This definition of removals does not imply any degree of permanence beyond a year, befitting the policy context: any subsequent reversal of a carbon removal would be recorded in the national inventory as an emission in the subsequent year that it was released to the atmosphere.[8]

Don et al. (2023) provides a definition in the specific context of climate-friendly soil management, who define “carbon sequestration in soils,” as the “process of transferring carbon from the atmosphere into the soil through plants or other organisms, which is retained as soil organic carbon resulting in a global carbon stock increase of the soil.”

The UNFCCC Paris Agreement aims to limit the increase in global average temperatures to well below 2°C, with the ambition of limiting it to 1.5°C. Carbon removals are only a useful tool for reducing peak planetary warming if they store carbon out of the atmosphere at least beyond the time when temperatures stabilise (Cullenward 2023).[9] For policies that aim to promote carbon removals to mitigate climate change, such as the CRCF, it is therefore important to set definitions that also consider the degree of long-term storage. This can be achieved by including requirements for long-term storage in the definition of removals. For example, the 2023 State of Carbon Dioxide Removal extends the IPCC definition, specifying that removals must be stored “for decades to millennia,” in a manner that is “durable, such that CO_2 is not soon reintroduced to the atmosphere” (Smith et al. 2023). Meyer-Ohlendorf et al. (2023) go

[6] National inventories are the established instruments with which to assess EU climate targets, making these inventory definitions particularly relevant when considering the European Climate Law’s net zero target.

[7] This definition is repeated in the 2019 Refinement to the IPCC guidelines for National Greenhouse Gas Inventories.

[8] The IPCC (2023a) provides a more detailed definition than this 2006 definition, defining “carbon dioxide removals,” as, “anthropogenic activities removing carbon dioxide (CO2) from the atmosphere and durably storing it in geological, terrestrial, or ocean reservoirs, or in products. It includes existing and potential anthropogenic enhancement of biological or geochemical CO2 sinks and direct air carbon dioxide capture and storage (DACCS), but excludes natural CO2 uptake not directly caused by human activities.” While the term “durably” is used in the second sentence, it is not defined; given the IPCC (2006) definitions, it could be assumed that this implies “at least one year”, i.e. stored sufficiently long to be recognised by national inventories.

[9] Mitigating climate change aims to reduce the maximum amount of warming, e.g. to maximum of 2°C, with a goal of 1.5°C as under the Paris Agreement. As warming corresponds with cumulative CO_2 emissions, for carbon removals to reduce warming they must reduce cumulative emissions calculated at their peak (that is, must not be re-released as emissions) before the period of peak warming is past (Cullenward 2023).

further, proposing that removals should be defined as delivering permanent storage, "defined as the time that carbon is set to stay in the atmosphere, which is up to 1000 years or more."

These definitions pose significant challenges for removals in the context of climate-friendly soil management, as soil carbon storage timescales range from "decades to centuries" (IPCC 2023a) and may be as short as months or years (Angers et al. 2022). An alternative approach is to differentiate removals (and associated credits or units) according to their expected permanence. For example, the CRCF treats carbon farming units as temporary units, which expire at the end of their monitoring period (current legislative text sets monitoring for soil carbon at a minimum of five years) and can thus not be used to offset emissions that stay in the atmosphere for several centuries.[10] Care must be taken to ensure that marketplaces and buyers adequately differentiate "temporary" removals from more permanent removals, such as the CRCF's "permanent carbon removal units", which are generated by removal activities that capture and store carbon "for several centuries".

3.2 Emissions reductions (and avoided emissions)

Climate-friendly soil management can mitigate climate change by reducing the amount of GHG emissions from soils or from associated activities. This can be achieved by an activity change that reduces the current level of emissions from soils (e.g. reduced fertiliser application or peatland rewetting[11]) or activity change that avoids a future release of emissions (e.g. avoided deforestation, permanent grassland management[12]).

In the context of UNFCCC national inventory reporting, emissions are defined as, "the release of greenhouse gases and/or their precursors into the atmosphere over a specified area and period of time" (IPCC, 2006). For inventory reporting, the relevant period of time would be one year. When inventory reporting is used to monitor compliance with targets (e.g. national targets), then the absolute annual emissions are generally compared to a base year (e.g. 1990 emissions) and a target (e.g. 20% reduction on 1990 emissions). In this context, "emissions reductions" would refer to a decrease in annual emissions relative to the base year.

An alternative framing is provided by the voluntary carbon market. The Integrity Council for the Voluntary Carbon Market (ICVCM) defines emissions reductions as "a net reduction in anthropogenic greenhouse gas emissions by sources" (ICVCM 2023). In this context, emissions reductions are calculated as the difference between actual emissions over a set period of time and a counterfactual baseline, i.e. the expected level of emissions that would have occurred in the absence of a specific climate-friendly soil management measure.[13] In the specific context of climate-friendly soil management, Don et al. (2023) refer to emissions reductions activities as "soil organic carbon loss mitigation," which they define as "an anthropogenic intervention to reduce soil organic carbon losses compared to a business-as-usual scenario."

In the scientific literature, the terms "avoided emissions" and "reduced emissions" are often used interchangeably. This is illustrated by the 2023 IPCC AR6 Synthesis Report Summary

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[10] Provisional Agreement on a Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing a Union certification framework for permanent carbon removals, carbon farming and carbon storage in products. https://www.europarl.europa.eu/meetdocs/2014_2019/plmrep/COMMITTEES/ENVI/DV/2024/03-11/Item9-Provisionalagreement-CFCR_2022-0394COD_EN.pdf

[11] Peatland rewetting mitigates primarily by reducing carbon emissions, though it will also induce some carbon removals, as well as increase methane emissions; see section 4.

[12] Permanent grassland management mitigates primarily by reducing emissions (e.g. avoiding degradation/conversion) though it can also lead to increased removals; see section 4.

[13] Baselines can be set in numerous ways, e.g. they can be set equal to historical emissions levels, relative to performance benchmarks, reference areas, or forward modelling, with different strengths and weaknesses in different contexts. See Siemons et al. (2023).

for Policymakers (IPCC 2023b). The term “emissions reductions” is the most used term, appearing eighteen times in the report.[14] It is used to refer to both mitigation that has already occurred[15] and mitigation that will occur in the future.[16] The term “avoided” emissions is used markedly less frequently, only appearing three times.[17] Where it is used, “avoided” emissions refers to both past mitigation and mitigation that will occur in the future; that is, it is used equivalently to the term “emissions reductions.”[18] The voluntary carbon market also use the terms “reduced emissions” and “avoided emissions” inconsistently, though not always interchangeably. For example, the Integrity Council for Voluntary Carbon Markets (ICVCM) uses “emissions reductions” collectively to describe “a net reduction in anthropogenic greenhouse gas emissions by sources”; they do not refer to “avoided emissions” (ICVCM 2023).[19] The term “avoided emissions” is sometimes used in the LULUCF sector to refer to a subset of mitigation achieved by preventing a future carbon emitting activity (e.g. avoided deforestation[20], avoided grassland conversion).[21] For clarity, in the remainder of this report, we follow the ICVCM and use only the term “emissions reductions” to refer to all mitigation that reduces anthropogenic GHG emissions.

3.3 Negative emissions

The IPCC (2022) defines net negative greenhouse gas emissions as achieved “when metric weighted anthropogenic greenhouse gas (GHG) removals exceed metric-weighted anthropogenic GHG emissions.[22, 23] In the context of climate-friendly soil management, this will occur when, in a set area and over a set period of time (e.g. one year) carbon gains in soils and other biogenic stocks exceeds the carbon losses from those biogenic stocks and other greenhouse gas emissions (in carbon dioxide equivalents).

The meaning of the term “net” is also important to consider. In this IPCC definition of net negative emissions, the focus is on carbon removals net of emissions, in a set area and time. It is not clear what time period or how broad the scope of considered emissions (or removals) should be. Within a UNFCCC inventory context, “net negative emissions” could be achieved by soils if the amount of carbon removals from the atmosphere exceed the GHG emissions from soils within a country within one reporting year (in this case, it would be referred to as a “sink”). This offers no guarantee that over the long term, there will be fewer GHGs in the atmosphere (as these could be offset by net positive emissions in a subsequent year).

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[14] The pairing “emissions reductions” appears 18 times, with “reductions” in relation to “emissions” appearing an additional 21 times.

[15] e.g. C6.4 “…carbon pricing instruments have incentivized low-cost emissions reduction measures…”

[16] e.g. A4.3 “…assuming immediate action imply deep global GHG emissions reductions this decade”

[17] The pairing “avoided emissions” does not appear once; the term “avoided” in relation to “emissions” appears three times.

[18] e.g. A4.1 “Multiple lines of evidence suggest that mitigation policies have led to several24 Gt CO_2-eq yr$_{-1}$ of avoided global emissions (medium confidence).”

[19] This contrasts with their definition of GHG emissions removal, which they define as “a net enhancement of anthropogenic removals by sinks.”

[20] Confusingly, this is also referred to as “reduced emissions” from deforestation and degradation.

[21] Beyond this LULUCF sector example, we also found evidence of “avoided emissions” being used to refer to “claims about the GHG impacts of their products, relative to the situation where those products do not exist” (e.g. the reduction in emissions due to construction of a renewable energy powerplant instead of a coal power plant, or the sale of more efficient ball bearings) (Russel 2022). These are sometimes referred to as “scope 4” emissions. We do not consider them further in this brief.

[22] The definition continues: “…Where multiple GHG are involved, the quantification of net emissions depends on the metric chosen to compare emissions of different gases (such as global warming potential, global temperature change potential, and others, as well as the chosen time horizon)“ (IPCC 2022).

[23] The phrase net-negative emissions is generally applied at high geographic scales, e.g. related to global or national targets. At the project level, the term “net removal” is commonly used to refer to this case.

Outside of the specific context of the UNFCCC national inventory reporting, these IPCC definitions must be adapted to the context of the policies and activities being considered. In the context of policies that aim to mitigate climate change, it is appropriate to extend the geographic, activity, and temporal scope of the definition of "net" negative emissions. For example, in the context of climate-friendly soil management, Don et al. (2023) call for "leakage effects" to also be considered as part of the net negative emissions calculation, that is "additional GHG emissions caused by climate change mitigation measures," such as carbon emissions associated with planting buffer strips. Similarly, Tanzer & Ramirez (2019) also call for upstream or downstream GHG emissions associated with the activity to be "comprehensively estimated and included in the emission balance," e.g. emissions associated with sourcing manure for manure management. These calls for consideration of wider geographic and activity scopes, e.g., induced emissions in other areas or countries and fossil fuel emissions associated with implementing the activity, would help to ensure that "net negative emissions" reflects the actual impact on atmospheric GHG levels. In terms of temporal scope, Tanzer & Ramirez (2019) also emphasise that removals calculated as part of the net negative emissions balance must be stored in "a manner intended to be permanent," concluding that negative emissions are only truly negative emissions when the "total quantity of atmospheric GHGs removed and permanently stored is greater than the total quantity of GHGs emitted to the atmosphere"; i.e. the temporal scope of the definition is extended from the one year considered in UNFCCC inventory reporting to the time scale of permanence.

The term "negative emissions" is not used consistently within the voluntary carbon market. For example, it is not referred to by the ICVCM.

Other key terms (from IPCC Sixth Assessment Report) (IPCC 2022)

Pool (e. g. carbon pool) A reservoir in the Earth System where elements, such as carbon and nitrogen, reside in various chemical forms for a period of time.

Sequestration: The process of storing carbon in a carbon pool.

Soil carbon sequestration: Land management changes which increase the soil organic carbon content, resulting in a net removal of carbon dioxide (CO_2) from the atmosphere.

Sink (carbon sink): Any process, activity or mechanism which removes a greenhouse gas, an aerosol or a precursor of a greenhouse gas from the atmosphere.

Source: Any process or activity which releases a greenhouse gas (GHG), an aerosol or a precursor of a GHG into the atmosphere.

Stock (carbon stock): The quantity of carbon in a carbon *pool*.

4 Conclusions

Care must be taken when using key terms such as emissions reductions, removals, and negative emissions, especially in the context of climate friendly soil management. While IPCC national inventory reporting definitions are a key reference, they are not appropriate for all contexts. IPCC national inventory definitions were developed for the specific context of annual inventory reporting, with a time scale of one year and geographic scope of a country. Policies that aim to promote long-term carbon storage, such as the EU Commission's CRCF and the voluntary carbon market must adapt these IPCC definitions, extending the time scale and considering induced emissions in other countries and other sectors of the economy. It is important to use such broader definitions of "net" negative emissions in the CRCF and voluntary carbon market to manage the limited permanence of nature-based removals and risks of carbon leakage, and to ensure that these policies deliver real and long-term reductions in atmospheric greenhouse gas emissions and peak warming.

The use of different definitions in different policies also has implications for transferability of results across policy contexts. "Carbon removals" and carbon farming units certified under the CRCF or other voluntary carbon market schemes do not match the definition of IPCC national inventory reporting, covering different temporal, geographic, and category scopes. Therefore, care must be taken before using project-based credits to support or assess attainment of national inventory targets, such as the EU Climate Law's net zero 2050 target or Member State LULUCF Regulation targets.

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