



# **Analytical Support for the Operationalisation of an EU Carbon Farming Initiative**

*Task 1 and Task 2 Report*

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COWI

# Analytical Support for the Operationalisation of an EU Carbon Farming Initiative

CLIMA/C.3/ETU/2018/007

Lessons learned from existing result-based carbon farming schemes and barriers & solutions for implementation within the EU

COWI



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## Reader's note

This report constitutes the Task 1 and Task 2 report of the project contract on *Operationalisation of an EU Carbon Farming Initiative* with the overall objective of the project to explore how a wide-spread adoption of Carbon Farming in the EU can be triggered. To achieve this objective, Task 1 presents findings from EU and global experiences on carbon farming schemes and results-based payments linked to climate change mitigation and adaptation in the farming sector, supported by observations from the forest sector.

The report includes a review and analysis of existing international and EU payment schemes and projects that reward the delivery of carbon sequestration or other climate-related goods and establishes an overview, comparison and assessment of different carbon schemes and their approaches regarding implementation modalities, institutional arrangements and challenges, and the political context in which schemes have developed and are operating. The output of this report is an understanding of different carbon schemes approaches, their challenges, barriers and successes in development, implementation and operation of the schemes and their overall performance, as well an identification of a standard set of sustainability indicators for measuring the impacts and results of carbon schemes.

Task 2 examines possible Carbon Farming implementation modalities in an EU setting, in particular in a Common Agricultural Policy (CAP) context. Combining insights from Task 1 and Task 2 desk-based research and stakeholder consultations, this report forms basis for the development of Case Studies in Task 3 and a Guidance document on Operationalisation of Carbon Farming in the EU from Task 4, respectively.

The report is structured as followed: Chapter 1 introduces the general and specific context for carbon farming in EU and the policy rationale behind it. The policy context is followed by a presentation of the study approach, the underlying methodology and the nine design dimensions and the policy context. Chapter 3 presents the comparison and assessment of the carbon schemes structured according to the nine design dimensions, as well as the sustainability criteria. For each subsection of each of the design dimensions, specific lessons learnt are identified and explained. These Lessons Learnt are all based on observations from the scheme or project level implementation, including on policy context and institutional setting, or originate from one or more of the 50 interviews with experts, scheme operators or project developers conducted as part of the study. The Lessons Learnt constitute the conclusions of the Task 1 and are the main feed into the Task 2 work.

Chapter 4 presents the outcomes of the Task 2 analysis of barriers and solutions. It outlines barriers and solutions for each design element of result-based carbon farming schemes, as well as open questions that will be picked up and addressed in the case studies. The chapter concludes by outlining the selection of scheme options to be further investigated in Task 3 case studies. In this way, the chapter provides a bridge towards case studies in Task 3 and

developing guidance on setting up result-based carbon farming schemes in the EU under Task 4.

This report is produced by COWI A/S in cooperation with Ecologic Institute, and with support from the Institute for European Environmental Policy (IEEP).

# 1 Policy context: Mitigation action in Agriculture and LULUCF sectors

Aiming for a climate neutral economy

With recent projections of sectoral greenhouse gas (GHG) emissions, agriculture and land use in the EU emerges as a potentially dominant sector with a share of total emissions increasing towards 2050 (European Commission, 2018). For the years 2040 to 2050, Agriculture and Transport sectors will cover 20-30% of emissions each, with Land Use and Land-Use Change and Forestry (LULUCF) being a significant net sink. In other words, biogenic carbon will make up most of the carbon fluxing through the European economy by the second half of the century. In addition, depending on pathways, emissions and removals will balance each other out leading to climate neutrality as perceived in the Paris Agreement (PA)

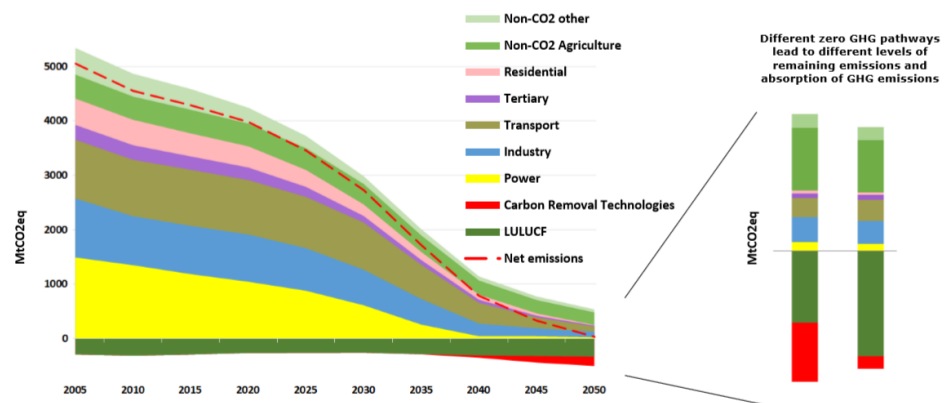


Figure 1-1. GHG emissions trajectory in a 1.5 degrees scenario. From European Commission, 2018).

Growing share of emissions comes from land and animals

The increasing share of total emissions reflects expected emission reductions in other sectors more than significant increases in sector emissions. In EU climate policy the Emission Trading Scheme (EU-ETS) is a main driver of emission reductions in the energy sector, with remaining sectors being aggregated in the non-ETS sector governed by the Effort Sharing Regulation (ESR). However, with electrification of transport, decrease in fossil-fuel household heating, and other trends, several sources of emissions will migrate into the EU-ETS in years ahead leaving agriculture to take up an even more dominant role among emissions in the non-ETS. Until 2021, the land use sector (LULUCF) remains outside of and separated from both the ETS and the Effort Sharing Decision (ESD) sectors. With the adoption of the ESR and new LULUCF legislation (European Parliament and the Council, 2018), emissions and removals from management of significant carbon pools will be linked to the ESD although with some restrictions.

Current Agricultural emissions and LULUCF removals?

Emissions from the Agricultural Sector<sup>1</sup> as defined in the Intergovernmental Panel on Climate Change (IPCC) consists of Non-CO<sub>2</sub> emissions from farm activities not related to soil or biomass management and is part of the Member States' (MS) Non-ETS sector targets. For EU, this sector covered 11% of all

<sup>1</sup> In the remainder of the introduction whenever Agricultural Sector is written with capital A, the reference concerns the IPCC sector.

emissions in 2017 (Incl. LULUCF, EU NIR, 2019 (European Environmental Agency, 2019)). Emissions and removals from changes in soil carbon stocks and in biomass in forests and wetlands (under the sector label LULUCF<sup>2</sup>) are currently not contributing to the MS 2020 emission reduction targets as set out in the ESD in 2009 (European Parliament and the Council, 2014). In 2017, the LULUCF sector was a net sink of appx 240.000 kt CO<sub>2</sub> (ex HWP) which equals 6% of the total EU emissions (with LULUCF, EU NIR 2019 (European Environmental Agency, 2019)). For the period 2005-2020, limited emission reductions have been obtained for the non-CO<sub>2</sub> agriculture, while the LULUCF sink has decreased slightly (see

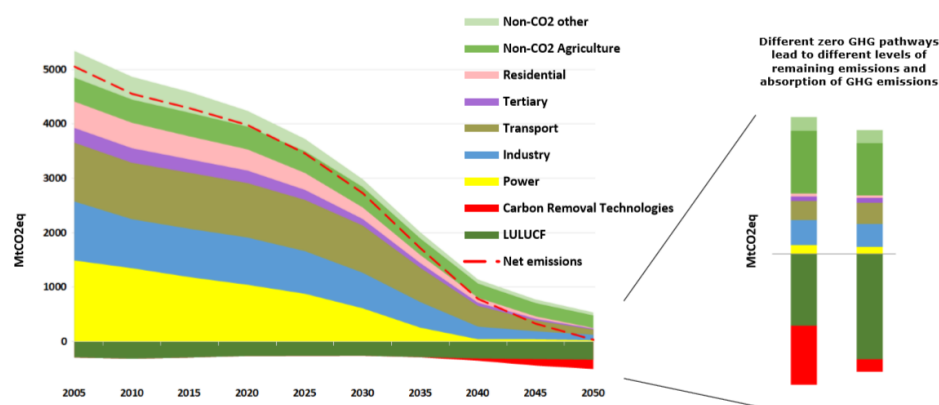


Figure 1-1 above). Since 1990, the agricultural sector has reduced emissions by 20% mainly due to efficiency improvements and reduced livestock numbers in the years 1990-2000. At the same time productivity and production have increased, leading to lower carbon intensity.

### Governing sector-wide GHG emission reductions – and removals

The purpose of EU Climate Policy is to drive climate change mitigation and adaptation action, and a crucial element of the policy is to set targets for and ensure GHG emission reductions and removals. For the last 15 years, EU climate policy has been divided into two overall policy areas; the EU-ETS and the Non-ETS sector. The two policy areas have developed separately and along different principle fault lines. In the ETS, the actors are individual entities in the energy and industry sectors that are subjected to a cap-and-trade system based on allowances and limited access to the use of international credits. In the Non-ETS, the subject of the legislation is governments, and it is government compliance with national emission reduction targets that is the driver of GHG mitigation action. The sectoral targets agreed for the EU-ETS and as part of the ESD and ESRs for the compliance periods 2008-2012 and 2013-2020 pertains to emission within the Union and through the effort sharing for MS but adding up to an EU level target. See schematic overview of principal sector split below in Figure 1-2.

<sup>2</sup> Land Use, Land Use Change and Forestry

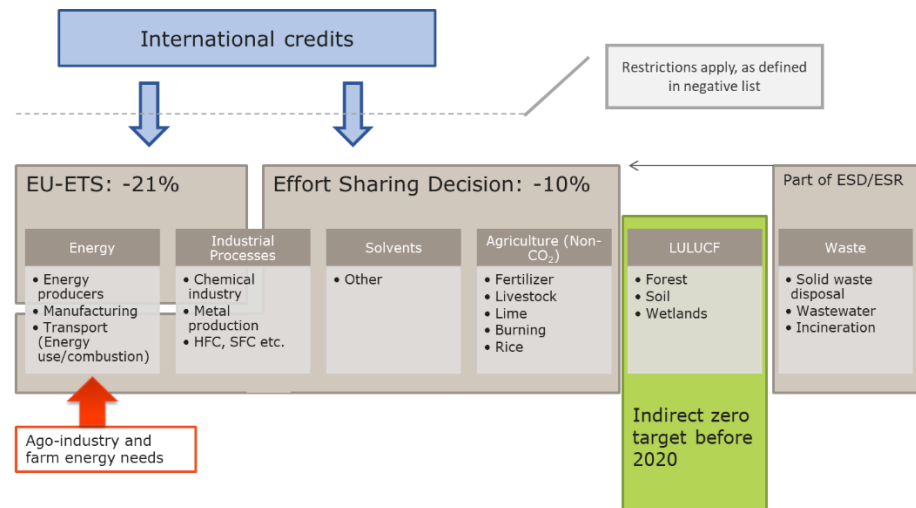


Figure 1-2. Principal overview of sectors and policies in EU climate policy until 2021. The headlines and targets refer to the 2013-2020 compliance period.

In line with IPCC guidelines and based on sector categorisation of the Long-Range Transboundary Air Pollution (LRTAP) system developed for the 1979 UN LRTAP convention, land sector emissions and removals under EU climate policy are separated in two sectors. Non-CO<sub>2</sub> emissions from agriculture are covered under *Agriculture* while CO<sub>2</sub> emissions and non-CO<sub>2</sub> emissions from forests, wetlands and agricultural soils are covered by the *LULUCF* sector.

Three levels of policies govern climate change action

The EU Climate Policy framework covers all economic sectors but leaves the development and implementation of mitigation or adaptation policies to sector specific policy areas either at EU level or for MS to implement. The CAP is the key policy for governance of European agriculture and land use, and through various ways of support holds the ability to incentivise certain farmer behaviour and action, including on climate mitigation and adaptation. The embedding of the CAP into the EU Climate Policy Framework and again of the EU into the United Nations Framework Convention for Climate Change (UNFCCC) is illustrated in Figure 1-3 below.

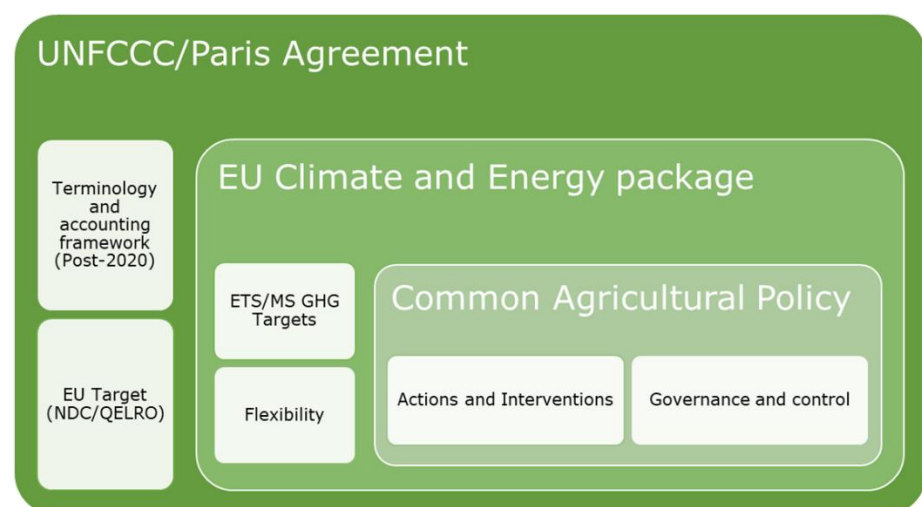


Figure 1-3. Schematic representation of the embedding of the CAP in the EU Climate and Energy Package(s) and again within the UNFCCC/PA/KP framework.

The logic of the structure is that universal and comparable rules apply to all parties, that again take on a GHG emission reduction target, with both elements being defined in the international climate agreements (Kyoto or Paris). The role of the forest, soil, and land-based resources for climate change mitigation represent an integral part in the Paris Agreement (PA). The agreement does not address, however, how forest- and landowners should be incentivised to undertake climate-friendly actions, leaving it to the individual parties to the PA, and, in the European Union, to its Member States. EU climate policy targets are further confirmed in EU legislation and rules for achieving them are agreed on, including flexibilities between sectors and member states and third countries. In the context of carbon farming, the action- and governance system is set up in the CAP. The resulting policy setup has created a mixed picture with partial incentives for governments, landowners and managers to act on climate change in the land and agriculture sectors. In short, the climate and energy policy framework does not transfer any legally binding climate change mitigation (or adaptation) obligations to farm or forest owner level, see Figure 1-4 below.

Cascading climate mitigation obligations and incentives to landowners

The resulting system of incentives and obligations rely on implementation of the CAP for the agricultural sector and for the IPCC categories cropland and grassland, while forest land and forest owners are subject to national schemes and policies, to some extent coordinated under the non-binding EU Forest Strategy. For both forests and agricultural actors, the incentives and obligations are largely integrated into multipurpose support schemes and regulation, which reflects the multipurpose use of land. As also stated by the UNFCCC itself, the Paris Agreement pre-ambls and the October 2014 European Council conclusions (European Council, 2014), any climate action in the land sector shall consider food security and food production, and biodiversity and the full range of ecosystem services provided by the landscape.

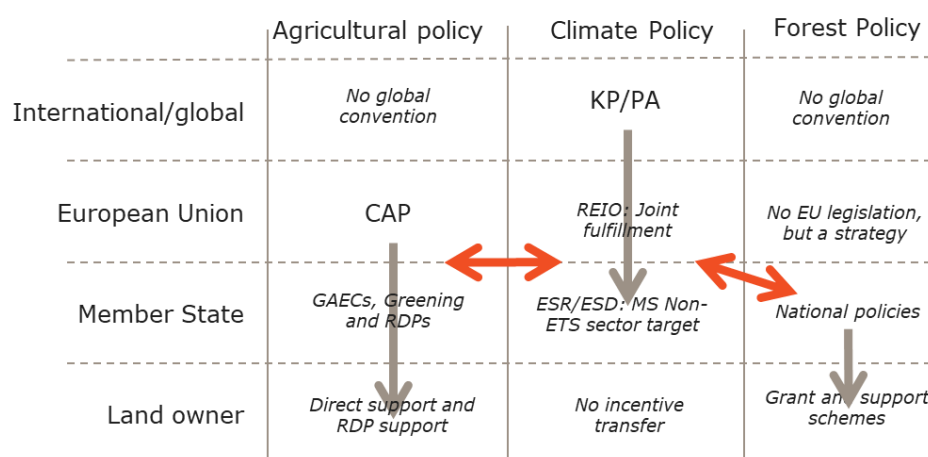


Figure 1-4. Simplified illustration of transfer of incentives and obligations (brown arrows) from global, and community levels, through MS level to land/farm owners. It is seen that no obligation or incentive reaches the main change agent under as a direct result of climate policies or through spending of climate budget. For farm owner's incentives and obligations exists but are paid out as CAP support. For forest owners, incentives and obligations are provided by national schemes. Red arrows indicate where and at what level integration of climate objectives, obligations and incentives takes place as part of policy development. Note that for entities outside the Agriculture and LULUCF

*sectors and subject to the European Union's Emission Trading Scheme, the climate action incentive ('reduction commitment') is transferred to the entity itself. Own production, COWI.*

Climate change  
mitigation  
objectives  
implemented  
through sectoral  
policies

The main difference between the three policy areas is the presence of a global convention with party level commitments in the climate change domain. The UNFCCC and its successive agreements in force since 2004 (Kyoto Protocol, KP and Paris Agreement, PA) sets out a global framework and defines quantified emission limitation or reduction objectives (QELRO, KP) or Nationally Determined Contributions (NDC, PA) for parties having ratified the respective agreements. In the agricultural and forest policy domains, there is no global framework although the United Nations Convention on Biological Diversity (UNCBD) to some extent provides a framework for and defines sustainability obligations on forest policy for parties. In any case, there are no international climate mitigation (or adaptation) objectives defined for agricultural or forest policies. At the community level, the common policy is the CAP which over time increasingly has defined climate change mitigation as one of its objectives, and through the implementation of its Direct Payment scheme, greening measures and Rural Development Programmes (RDPs) at national or subnational level transfers climate change mitigation and adaptation incentives to land owners. As concerns Forest Policy, there is no clear mandate in the treaty of the European Union for a common forest policy, and the EU Forest Strategy remains a non-binding coordination strategy that is the result of close cooperation among MS on the long term objectives and priorities of national forest policies.

In the absence of transfer of 'direct' incentives and obligations, the effectiveness and design of intervention logic and reward systems of the CAP and national forest policies are crucial for promoting mitigation action in the Agriculture and LULUCF sectors. The policy setting and design, and the respective development processes to a large extent explains the current cascading of incentives and obligations downwards from the UNFCCC and its agreements, and frame options for using carbon farming. This is investigated and explained in the following sectors for the LULUCF and Agricultural Sectors respectively.

## 1.1 Getting LULUCF ready for a target

Generating and  
using LULUCF  
mitigation outcomes

The challenge with integrating the LULUCF sector in the EU into a target architecture and transferring incentives and obligations to the landowner or internationally was and is two-folded, namely on the generation and use of mitigation outcomes in the LULUCF sector. On the one hand, concerns have been raised on the integrity and permanence of the mitigation outcomes from mitigation action on soils or forests. On the other hand, the size of the pools and fluxes at MS, EU and global level is enormous, and therefore the access to and mobilisation of unrestricted amounts of credits or emission reductions were perceived to water down any reduction commitment, and in the case of use of international credits from LULUCF sector in the EU-ETS to destabilise the carbon price and thus the incentive to transform the covered sectors. Over the past 10-15 years, the work to prepare the sector for inclusion into an EU target architecture has evolved around these two issues: ways to integrate the LULUCF

sector into the policy framework and means to ensure that mitigation outcomes delivered within the sector is credible and permanent.

### 1.1.1 Before 2005: Basic conceptualisation with focus on forests

#### Estimating emissions and removals

Understanding LULUCF starts with understanding that this sector contrary to all other sectors exhibits both emissions *and* removals, the latter in the form of sequestration of carbon in vegetation and soils. The beforementioned LRTAP system, later refined in the EU CORINAIR system implemented in the community since 1985, separates agricultural non-CO<sub>2</sub> emissions from fluxes related to soils because of the type of the sources and the methods for calculating emissions (Wehrheim and Olesen, 2015). The estimates of emission from point sources (in essence animals or installations) in the Agricultural Sector is different from the diffuse emissions and removals from soils and vegetation that takes place in the same area at the same time, in what became the LULUCF sector. Activity Data and Emission Factors in the Agricultural Sector are in simple words calculated from animals head counts or number of installations and average emissions values that can be established from short time trials in controlled environments. In the LULUCF sector, activity data concerns not only a land use matrix of changes between all land uses within a certain confined territory, but also stratified into management regimes or practices. Emission factors are highly dependent on the specific soil or growth conditions, which again depend on parent material, past land use and management history together with water availability and temperatures, i.e. whether and drainage. In addition, there is a significant lag-time for effects of changes in soil management practices and furthermore the variations in fluxes will depend both on anthropogenic and non-anthropogenic factors. To isolate the human-induced emission and removals from those caused by natural processes, factoring out of human effects is necessary but challenging (Ogle et al., 2018). Lately, discussion on indirect human impacts such as feedback mechanism on growth rates of trees from CO<sub>2</sub> fertilisation resulting from human emissions have also re-emerged. This issue was raised for the IPCC to address in its guidelines in the Marrakesh Accords (UNFCCC, 2001), but not yet incorporated.

#### Supporting reporting: IPCC Guidelines and tiers

In 1997, when the KP was adopted, science and data supporting transparent, accurate, consistent, comparable and complete GHG inventories for the LULUCF sector was not strong. The IPCC Good Practice Guidelines (GPGs) were developed by scientists to support inventory developers that faced the challenge of setting up systems that could collect or produce and report data on emissions and removals. The IPCC GPGs were developed for all sectors and for overall reporting principles, in in these three tier levels of increasing complexity and expectedly accuracy was defined. The first level entails applying (global) default emission factors for certain land management practices. The second tier includes country specific or local default factors, whereas tier 3 demands real-time modelling of fluxes, e.g. incorporating the effect of weather. Applying the three levels will produce different number for the same land, and so parties that have set up and improved system, gradually implementing new methods and tools

have found that numbers and time series of numbers have changed over the years and in retrospect.

In the years pending entry into force of the KP in 2005, the monitoring, reporting and accounting system for LULUCF (and other sectors) was clarified and formulated in the international fora. The principle of activities as different from reporting categories was adopted with the Marrakesh Accords (hereafter MA; at COP 7, 2001, (UNFCCC, 2001)), as were the definition of forest and the understanding of the so-called article 3.3 and 3.4 activities (Afforestation, Reforestation, Deforestation and Forest Management respectively), and caps for credits arising from these activities. The construction seeks to answer the need to factor out anthropogenic emissions from non-anthropogenic and secure the environmental integrity of KP accounting. Also, the activities of Grazing Land Management (GM) and Cropland Management (CM) were agreed to, setting the frame and vocabulary for fifteen years of exchanges, research and policy development in the context of LULUCF. Lastly, the MA defined the 'Removal Unit' (RMU) as a credit from LULUCF sinks, that could be traded and used for KP compliance.

Trying to address concerns over integrity and measurability

In the formative years of international LULUCF between 1996 and 2005, discussion started around definitions and terms, but soon evolved into concerns over the potential to undermine environmental integrity alongside technical processes on measurements, factors, and data. The pre-amble of the LULUCF decision under the MA, request 2e from the parties to the IPCC is in many ways illustrative for the work ongoing:

*"To develop definitions and modalities for including afforestation and reforestation project activities under Article 12 in the first commitment period, taking into account the issues of non-permanence, additionality, leakage, uncertainties and socio-economic and environmental impacts, including impacts on biodiversity and natural ecosystems..."*

Size and measurability of forest carbon stocks

The key is the identified need of the international community to have guidance on how to address non-permanence, additionality, leakage, uncertainties and socio-economic and environmental impacts and to have these modalities for forests, more precisely for the activity of planting trees. For a mix of reasons, including that the growing stock of forests worldwide was by then recognised as a huge stock of carbon that could be released as CO<sub>2</sub> or maintained as a storage, much of the work centred on exactly trees and forests. The importance of forests and their role was among other recognised by Sir Nicolas Stern in his much used 2006 report (Stern, 2006). It was also a result of mainly commercial or managed forests in Annex 1 being fairly well mapped and understood, in the sense that look up tables, forest inventories and methods for measuring and estimating carbon stock in large populations already existed. By comparison to the agricultural activities of CM and GM, the measurability appeared much better at least for the above ground biomass. The agricultural activities are hardly mentioned in the Conference of the Parties (COP) proceedings and papers from this period before 2005, and therefore there is a distinct focus on forests in the discussions around the integrity issues.

By the time the KP finally entered into force and the targets for the first commitment period applied to Annex 1 countries, reporting guidelines and methodologies had been developed for Afforestation, Reforestation and Deforestation (ARD) and Forest Management (FM), with ARD as mandatory to be accounted for towards the emission reduction target for 2012. Guidance had also been developed for CM and GM, but only very few parties took a commitment to account for these activities. Wetland Drainage and Rewetting (WDR) was acknowledged as an activity, but very little guidance existed. This focus on forests came to dominate discussion in the years after.

#### Integrity issues for climate mitigation actions in forests

- > The discussion of fifteen years ago on integrity of mitigation outcomes reflects the nature and complexity of managed forest ecosystems, but is equally relevant for managed vegetation, soils and wetlands in general. The issues are briefly described in Table 1-1 on next page, which also explains that most of the issues are not exclusively relevant for LULUCF and Agricultural Sectors but pertain to other sectors as well. In these sectors, the implications and possible actions to address them are however different in nature, as the experiences gathered by this study form existing schemes will unravel.

### 1.1.2 After 2005: Forest gets targeted, soils surface

#### REDD+ comes out of the forest

The ensuing discussion on the above issues (and the embedding of the forest and land in general) in the following years became emblematic for the difficult development process of a Global Forest Carbon Mechanism (GFCM), which was making very little progress for a number of years amidst difficult technical conceptual discussions. From high expectations and optimism in the middle of the decade to reservations and scepticism a few years later. In 2008, in the run up to COP15 in Copenhagen concepts were being shared and discussed for how to address emission from global land use. The concept of a Reduced Emissions from Deforestation and Degradation (REDD) mechanism was consolidating, while still often being mentioned in the frame of a GFCM, which would complement the CDM scheme on land use. The European Commission produced a small communication in late 2008 (COM 645/2008 (European Commission, 2008)) on this matter and the GFCM, wherein it is stated that inclusion of forestry credits into the ETS after 2020 could be considered based on a review and testing. In the concluding parts of the short paper it is emphasised however, that additionality, permanence and liability pertaining to mitigation outcomes (Credits) must be addressed, mirroring the AM pre-amble of Decision 11/CP.7 (UNFCCC, 2001). Some of the main categories of concerns are briefly explained in Table 1-1 below using independent sources.

*Table 1-1. Overview of definitions of key integrity issues. Based on REDDdesk, the UK Woodland Carbon Code.*

| Issue      | Short Description                                                                                                                                                                                          | Sink or source relevance        |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Permanence | <i>In the case of GHG standards for land use, permanence refers to the longevity of a carbon pool and the stability of its stocks, given the management and disturbance of the environment in which it</i> | Sequestration in trees and soil |

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                               |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|
|                     | <i>occurs. The risk of non-permanence (also referred to as "reversals") describes the possibility of reversing climate benefits through the loss of forest carbon biomass, for example through a fire or pest outbreak that releases carbon back into the atmosphere. Reversals are sometimes categorized as "intentional vs. unintentional" referring to whether it was anthropogenic (i.e. induced by human activity, such as harvesting) or a natural disturbance (e.g. a hurricane). However, there are challenges in attributing and separating natural from man-made effects on emissions.</i>                                                                                                                                                                                                              |                                                               |
| Additionality       | <i>Additionality is important when emission reductions or removals are used as offsets. This is because if an offset does not represent a real emission reduction or removal and it is used to offset an emission elsewhere there is a net increase in emissions and the atmosphere is worse off. Additionality can be challenging, however, due to its counterfactual nature. Establishing a workable way to judge whether reductions in emissions are additional to what would have happened in the absence of the activity is a common reason why methodologies and projects have been rejected (where such requirements apply), i.e. project proponents are unable to credibly demonstrate additionality.</i>                                                                                                 | For all project types, also outside Agriculture and LULUCF    |
| Leakage             | <i>Leakage is referred to as 'displacement'. Some distinguish the two suggesting that displacement only refers to increased emissions (or decreased removals) that occur outside the project or program boundaries. In contrast, leakage may occur both within and outside the project or program boundaries and represents any increased emissions (or decreased removals) that are not accounted for—for example, degradation both within and outside a project boundary, attributable to a project that is only accounting for deforestation. In many cases, treatment of leakage differs when taking a jurisdictional (national or subnational) approach versus a project-based approach, with more stringent requirements at smaller scales where activity shifting is assumed to be a much higher risk.</i> | For all project types                                         |
| Uncertainties       | Value that defines the accuracy level of a reported value. This can be due to measurement error, lack of available data, modelling assumptions or future estimation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | A prominent issue for LULUCF, but not exclusive to the sector |
| Non-climate impacts | Impacts on biodiversity, society, and other aspects not related to climate mitigation or adaptation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | For all project types                                         |

When the Warsaw Framework was adopted in 2013, a safeguard information system had emerged, which gave guidance on how to address many of the abovementioned issues in a developing country implementation setting. The Warsaw Framework consists of four design elements joined in an overall Framework (see Figure 1-5). In combination, the four elements are intended to ensure stable and relevant policy setting (blue box), consistent and reliable baseline setting ensuring additional mitigation outcomes (green box), reliable and continuous tracking and mapping of land use dynamics (orange), and consideration of non-carbon impacts, via the Safeguards Information System (SIS, purple).



Figure 1-5. The REDD+ Framework Design Elements. Source: UN-REDD.

The safeguards of the SIS system were defined in an appendix to the Cancun Agreements (Decision 1/CP.16 (UNFCCC, 2010)) in 2010 and closely mirrors the integrity issues listed in Table 1-1 above. The safeguards are in some ways the result of a collaborative, multi-stakeholder, science-based process and were adopted by consensus. Notwithstanding their later clear reference to implementation of Reduced Emissions from Deforestation and Degradation in developing countries (REDD+) as a part of phase 1 for prospective countries, the categories of information and the issues addressed gives a comprehensive overview of the main high-level integrity concerns relevant for Carbon Farming and climate mitigation action in the LULUCF and Agricultural sectors in general. The original safeguards are listed below next to the behind lying integrity issue. Additionality is not mentioned explicitly by the safeguards but is key to the setting of Forest Reference (Emission) Levels defined by Para 71 (b).

Table 1-2. Overview of the safeguards of the SIS adopted in Cancun at COP16 and part of the Warsaw Framework for REDD+ adopted at COP19 in Warsaw. Any reference in the original, unedited text in the rightmost column refers to Decision 1/CP.16 (UNFCCC, 2010).

| Integrity Issue                                                           | Safeguard                                                                                                                                                                                                              |
|---------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Policy consistency                                                        | (a) That actions complement or are consistent with the objectives of national forest programmes and relevant international conventions and agreement                                                                   |
| Legality and rule of law                                                  | (b) Transparent and effective national forest governance structures, taking into account national legislation and sovereignty                                                                                          |
| Rights of indigenous people, including land rights secured by land tenure | c) Respect for the knowledge and rights of indigenous peoples and members of local communities, by taking into account relevant international obligations, national circumstances and laws, and noting that the United |

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                        | Nations General Assembly has adopted the United Nations Declaration on the Rights of Indigenous Peoples;                                                                                                                                                                                                                                                                                                 |
| Stakeholder involvement and acceptance | (d) The full and effective participation of relevant stakeholders, in particular indigenous peoples and local communities, in the actions referred to in paragraphs 70 and 72 of this decision                                                                                                                                                                                                           |
| Non-carbon impacts: Biodiversity etc.  | (e) That actions are consistent with the conservation of natural forests and biological diversity, ensuring that the actions referred to in paragraph 70 of this decision are not used for the conversion of natural forests, but are instead used to incentivize the protection and conservation of natural forests and their ecosystem services, and to enhance other social and environmental benefit |
| Permanence                             | (f) Actions to address the risks of reversals                                                                                                                                                                                                                                                                                                                                                            |
| Leakage                                | (g) Actions to reduce displacement of emissions                                                                                                                                                                                                                                                                                                                                                          |

### LULUCF in EU Climate Policy: no target

At the domestic arena in the EU, in the planning for the second commitment period and the EU2020 framework, the LULUCF sector was kept separate from the ESD and thus effectively without an emission reduction target enshrined in EU legislation. Concerns around environmental integrity and watering down of reduction commitments was mentioned as reasons in the Impact Assessment (SWD 41/2012 (European Commission, 2012) published together with the proposal for the later LULUCF Decision. While some of the concerns identified in the Cancun Safeguards applied mostly to a developing country setting, such as land tenure rights, several of the concerns could be raised in an EU context although less pronounced. The lack of reliable and detailed timeseries of forest and soil inventory data in most EU countries was found to constitute a barrier for inclusion of LULUCF. Leakage and additionality were also concerns.

Before the conclusion of the Durban COP decision (Decision 2, CMP.7 (UNFCCC, 2012)) there was only clear accounting rules for ARD, and simple rules for accounting of emission and removals for FM. With the 2013 EU LULUCF Decision (529/2013 (European Parliament and the Council, 2013)) on accounting rules, Forest Management Reference Levels and accounting rules for CM and GM, were incorporated into the *acquis Communautaire* and MS obliged to prepare systems for monitoring and accounting on LULUCF in view of a later inclusion into the EU climate policy (Wehrheim and Olesen, 2015). MS would in any case have target under the Kyoto Protocol (KP) for the second Commitment Period for forests (ARD and FM)<sup>3</sup>. Looking ahead to 2030, with the LULUCF regulation (841/2018 (European Commission, 2018)), LULUCF can now contribute to the attainment of ESR targets after 2021 under certain conditions, lending some flexibility to MS. Non-CO<sub>2</sub> emissions from agriculture have been fully included under reduction targets in the EU and in other countries with sector-wide emission reduction targets, ensuring that an incentive to develop policies and implement action on the ground has existed since 2008.

<sup>3</sup> Some MS took additional commitments: DK, ES, and PT included GM and CM. RO included Revegetation.

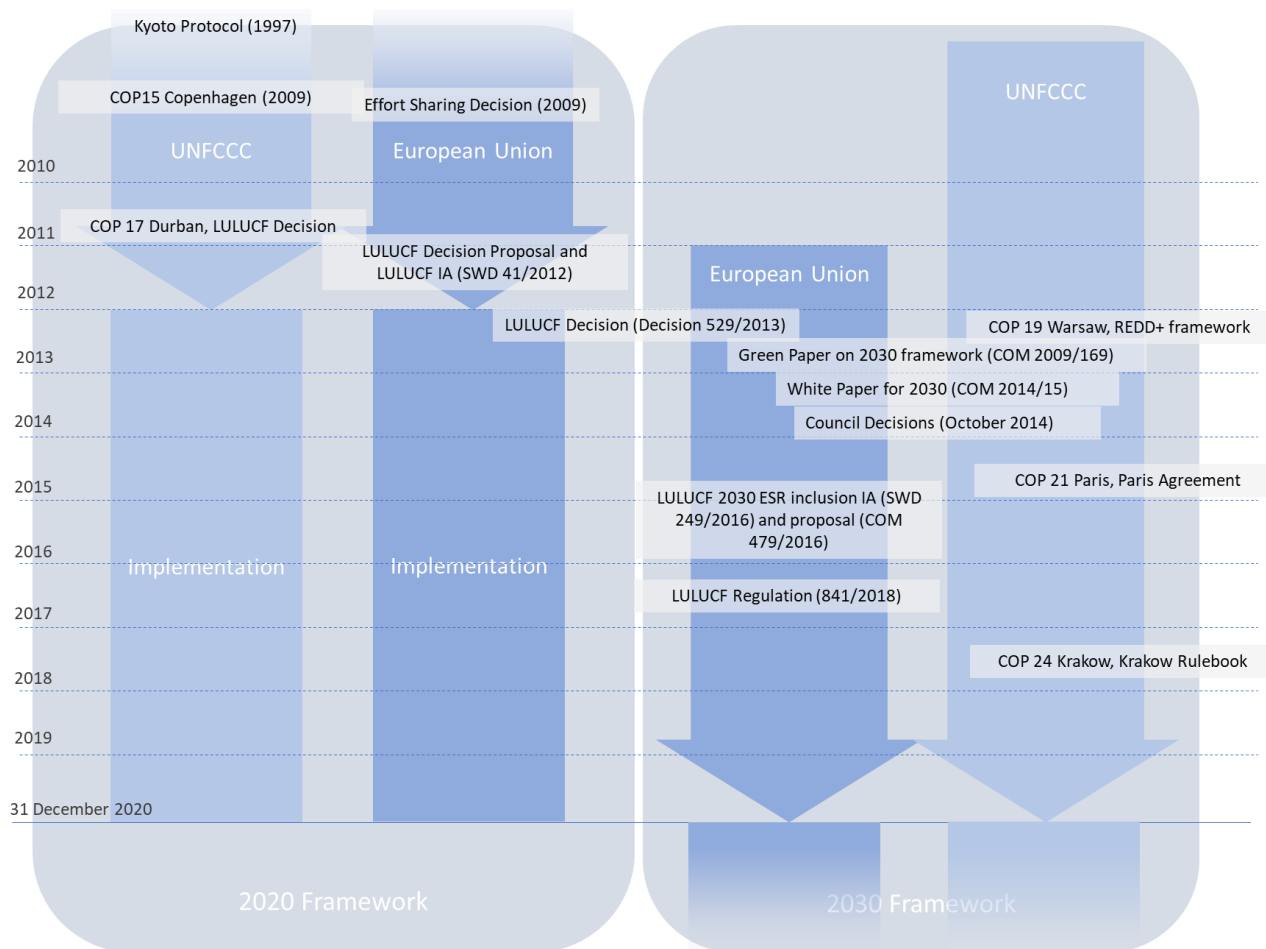


Figure 1-6. Overview of timing of work in international and EU domestic policy development, on 2020 Framework (KP CP2 and EU2020) and 2030 Framework.

### International credits not from LULUCF sector

Last, but not least, the third party LULUCF mitigation outcomes could play another potential role as source of credits for compliance. In recognition that the EU is part of a global community and to offer cost-effective flexibility for entities under the ETS and MS alike, emission reductions achieved outside of the EU have been allowed to contribute to compliance both at MS and EU-ETS entity level. Both in the ETS and in the ESD/ESR, international credits can be used though with some restrictions both on quantity and type of the credits. For both the ETS and the other non-trading sectors, these restrictions have been applied to ensure domestic action and integrity of the systems. One of the restrictions still applying is that LULUCF credits are on the negative list<sup>4</sup> alongside credits from nuclear energy projects and projects on the destruction of certain HFCs. Also, after 2012 credits can only be used from projects hosted by a Low Development Country (LDC).

The limited and late inclusion of LULUCF sector emission and removals, both in EU policy and in terms of the sustained restriction on use of international

<sup>4</sup> [https://ec.europa.eu/clima/sites/clima/files/ets/markets/docs/general\\_negative\\_list\\_en.xls](https://ec.europa.eu/clima/sites/clima/files/ets/markets/docs/general_negative_list_en.xls)

LULUCF credits<sup>5</sup> reflects concerns on the measurability, integrity and permanence of mitigation outcomes. Various concerns by policy makers, NGOs, stakeholders and investors on challenges with the integrity of the sector have led to extended policy preparation. During this time intense scientific and research work has been done as well as testing to build a strong basis for policy development.

## 1.2 Driving sustainable intensification and development of EU agriculture

### Agricultural sector emissions

Climate mitigation action driving emission reductions of non-CO<sub>2</sub> in the agricultural sector entails intervening on livestock production in the EU, as most emissions (95%; European Commission, 2018) come from fertilizer use, enteric fermentation or manure management. Mitigation options in this domain are costly, have long implementation times provided reduction in herd numbers is excluded because such an intervention can interfere with production and thus food security. Thus, it is recognised as challenging to design mitigation actions in the IPCC Agricultural sector. Nonetheless, the CAP which is the main EU policy for management of domestic productive land, has gradually been re-orientated towards sustainable development and climate change mitigation and adaptation over the past many reforms. This chapter outlines the story of climate change mitigation under the CAP. The resulting changes in land and farm management have led to the reductions in emissions in the Agricultural Sector observed in the Non-ETS sector over the years, and to the maturation of the LULUCF sector in view of target inclusion. While the overview of EU Climate Policy Development provided above concerns conceptual development and progressive global consensus around monitoring, reporting and accounting rules and GHG target architecture, the CAP has been and remains the implementing policy.

### 1.2.1 Evolution of the CAP's green architecture to tackle climate action

#### The early years: Rise of environmental requirements

Through influencing farmers' land management decisions, the CAP has a major impact on the environmental and climate performance of the agriculture sector, both of which are intrinsically linked. While in 1962 the CAP was set up to provide affordable food for EU citizens and a fair standard of living for farmers, since the mid-1990s climate and wider environmental objectives have become more prominent in the EU agricultural policy. Through a series of reforms, the focus has shifted from price and production support to a policy of decoupled income support to farmers and rural development with different instruments and measures targeting specifically agri-environmental issues. Specific examples from the period prior to 2007 include the introduction of mandatory requirements attached to area-based income support (Pillar 1 of the CAP) as

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<sup>5</sup> In this context, LULUCF credits is used to refer to any type of land use based mitigation outcome measured, reported and verified according to an international standard. This includes RMUs, ICER/tCERs, REDD+ credits, VCS credits or any AAU/ERU issued based on emission reductions or sequestration in the LULUCF sector.

well as agri-environmental measures largely developed in the rural development policy (Pillar 2 of the CAP).

### 2003: Mandatory respect for land, animals and health

The cross-compliance requirement in the 2003 Fischler Reforms obliged all farmers in receipt of area-based payments under Pillar 1 and 2 to comply with a set of basic rules, including Statutory Management Requirements (SMR) and standards of Good Agricultural and Environmental Condition (GAEC), addressing environmental, public and animal health as well as animal welfare issues. Among these the most relevant were the requirements for MS to put in place standards to avoid soil erosion and maintain soil organic matter levels and soil structure as well as the protection of permanent pastures by limiting the proportion that could be ploughed in order to prevent carbon release and halt the decline biodiversity present in semi-natural pastures. These requirements have been further developed to some extent under subsequent reforms and are the environmental base line or reference level for agri-environment-schemes.

### 2007 RDPs: Climate Change introduced

Agri-environmental schemes have been the main tool used to support climate action since their introduction under the CAP with 1992 MacSharry reforms when Member States were obliged to put them in place in order to incentivise the uptake of more sustainable land management practices. With further CAP reforms these have become a key of the EU's rural development policy portfolio. In the 2007-2013 rural development policy, which was clustered around 4 axes, climate change was highlighted for the first time explicitly, stating that *"the resources devoted to axis 2 ['improving the environment and the countryside'] should contribute to three EU level priority areas: biodiversity and preservation of high nature value farming and forestry systems, water, and climate change."*

### 2013 Reform: Climate Change in both pillars

The 2013 CAP reform then went a step further in terms of incorporating climate priorities across the entire CAP architecture having sustainable management of natural resources and climate action as one of three new core objectives for the CAP.<sup>6</sup> As a result in 2013 climate action became for the first time an objective for both Pillar I and Pillar II. For Pillar 1 payments, on which approximately 70% of the CAP budget is spent, the key change was the introduction of a new greening component for direct payments in order to further encourage environmentally sustainable and climate beneficial agricultural practices. Under the greening component MS are required to use 30% of their Pillar 1 budget to support farmers in implementing the three compulsory greening obligations, including crop diversification, maintenance of permanent grassland and ecological focus areas. Whilst its impacts on the ground remain below the expectations ([Alliance Environnement and the Thünen Institute, 2017](#)), the significance of greening is that in the first time it earmarked a share of the traditionally much larger Pillar 1 budget to support environmentally beneficial farming practices and it covers a much higher number of farms than Pillar 2. In addition, the concept of cross-compliance with basic environmental requirements and standards continues to apply for all area-based payments. With regards Pillar 2, climate change remained one of the cross-cutting objectives of the 2014-2020 rural development policy with one of its six priorities addressing

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<sup>6</sup> The other two objectives included viable food production and balanced territorial development

explicitly resource efficiency and the transition towards a low carbon and resilient economy.

### 1.2.2 Towards a greater climate ambition under the CAP Post-2020

#### CAP proposals for post-2020

The above described policy evolution demonstrates an increasing focus over the years on supporting climate objectives under the CAP, including a combination of instruments setting minimum standards as well as mandatory/voluntary measures providing payments for specific climate friendly management practices. That said, the CAP proposals for the 2021-2027 period highlight that even greater ambition is required to meet the relevant EU and national targets for climate (and other environmental objectives). This foresees a renewed focus on investments in environmental and climate instruments under Pillar 1 with the introduction of an eco-scheme. The key difference between the current greening measures and the eco-scheme is that the eco-scheme can be tailored and targeted to MS environmental and climate needs much like the agri-environment-climate schemes under the rural development policy. The main difference with Pillar 2 measures is that payments would be funded under the European Agricultural Guarantee Fund (EAGF) and therefore 100% financed by the EU budget unlike payments under Pillar 2 which are co-financed by Member States (see Table 1-3).<sup>7</sup>

Table 1-3. Comparison of programming requirements for eco-schemes and other agri-environment-climate schemes (Meredith & Hart, 2019)

|                      | Eco-scheme: Schemes for the climate and the environment - (Art. 28)                                                                                         | AECM: Environment, climate and other management commitments - (Art. 65)                                                  |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Beneficiaries        | Farmers                                                                                                                                                     | Farmers and land managers                                                                                                |
| Eligibility criteria | Fulfilling the genuine farmer, eligible hectares criteria defined by the Member States, other selection criteria could also be defined by the Member States | Achieving the one or more of the CAP specific objectives, other selection criteria could be defined by the Member States |
| Contract duration    | Annual or multiannual                                                                                                                                       | Multiannual up 5 to 7 years or more                                                                                      |

<sup>7</sup> The current CAP has two funds financing Pillar 1 – the EAGF 100% financed by the EU budget and Pillar 2 – the European Agricultural Fund for Rural Development (EAFRD) – co-financed by the EU and Member States. The EAGF accounts for over two-thirds of CAP budget whereas the EAFRD accounts under one-third.

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                              |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| payment calculation | Full or partial compensation for cost incurred/income foregone (including opportunity costs), or fixed top-up payment to the basic income support (based on Member States justification)                                                                                                                                                                                                                                                                                                                                                                                                                        | Full or partial compensation for cost incurred/income foregone (including opportunity costs) |
| Payment type        | Annual per hectare payment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Annual per hectare payment, once flat-rate or as a one-off payment per unit                  |
| Fund                | EAGF (annual, 100% EU financed)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | EAFRD (Annual, EU and nationally co-financed)                                                |
| Reference level     | Underpinned by conditionality, which sets out basic standards and requirements similar to the current cross compliance. Relevant GAEC include Maintenance of permanent grassland (GAEC 1), appropriate protection of wetland and peatland to protect carbon-rich soils (GAEC 2) Ban on burning arable stubble (GAEC 3), Use of Farm Sustainability Tool for Nutrients (GAEC 5), tillage management reducing the risk of soil degradation (GAEC 6), no bare soil in most sensitive periods (GAEC 7) Crop rotation (GAEC 8) and ban on converting or ploughing permanent grassland in Natura 2000 sites (GAEC 10) |                                                                                              |

The proposal also seeks to better align both Pillars of the CAP through an overarching framework of common objectives and indicators. Climate action continues to be an overarching environmental objective of the CAP, but now with the specific objective to “*contribute to climate change mitigation and adaptation, as well as sustainable energy*” covering both Pillars. Furthermore, from an environmental and climate perspective, the reform envisages a more joined up approach to EU environmental, climate and agricultural policy based on Member States’ needs and priorities for farming and rural areas across the environmental, social and economic spheres. The so-called performance-based approach would be set out in CAP Strategic Plans comprising a portfolio of CAP instruments and measures aligned to relevant EU and national environmental and climate objectives and targets.

### 1.2.3 Design of agri-environment-climate schemes

The implementation of agri-environment-climate schemes<sup>8</sup> by Member States has typically included a combination of entry-level to higher-level operations targeted at different farm types and land uses and may have either horizontal or zonal coverage. Schemes are designed around a management-based approach whereby farmers and land managers are fully or partially paid for the specific

<sup>8</sup> This refers to CAP’s Pillar 2 agri-environment-climate measure where Member States currently has the most flexibility to design measures to their specific environmental and climate needs unlike the Pillar 1 greening measures which are narrow in scope i.e. focus on three basic management practice and where there are limited possible for Member State to target and tailor the measures. The newly proposed eco-scheme under Pillar 1 therefore present new opportunities for more focused environmental and climate action.

management practices they carry out. The purpose of management-based payments scheme (MBPS) is to undertake practices designed to produce a desired result, which can subsequently lead to a medium to long-term impact.

Alongside MBPS, results-based payments schemes (RBPS) have been developed and implemented in a number of EU Member States with many supported under the Pillar 2 agri-environment-climate measure. A 2017 report on result-based schemes found that there are more than 30 schemes in place across the EU (Allen et al. 2014). These schemes have primarily implemented in Northern and Western Europe and have tended to focus on the achievement of biodiversity objectives. While there is no common agreed definition of what constitutes a result-based agri-environment scheme, in the EU RBPS have largely contrasted with MBPS because the emphasis is on achieving the actual desired result<sup>9</sup>. The experience from these schemes (including in particular the ones operated under the CAP) together with the new options proposed for the CAP 2021-2027 provide a sound basis for incentivising result-based carbon farming in the future.

## 1.3 Mitigation activities under a Carbon Farming scheme

As the preceding narratives have outlined, combined climate and agricultural EU policy setting is framed by the past. A Carbon Farming scheme as investigated in this study, would include activities both within the Agricultural and LULUCF sectors, and be implemented by MS or regional authorities following CAP rules, be it as stand-alone projects and schemes or as more widely adopted type of intervention. Any Carbon Farming Scheme or project would be expected to address all the integrity issues related to mitigation outcomes in the LULUCF sector, but also to offer a reliable and cost-effective opportunity to spend public money on farm level climate action in line with the Integrated Administration Control System (IACS). Lastly, it would build on the experiences gained from RBP schemes developed under the Pillar 2 AEEM. In the context of carbon farming, the result to be paid for would be GHG emission reductions or carbon sequestration. As the GHG emissions arise from a long range of different farm activities and land management practices, and carbon sequestration is possible from soil management, afforestation and management of forests, this last section of the introduction provides an overview of mitigation actions, as an entry to understanding different types of possible carbon farming activities.

### 1.3.1 Defining result-based Carbon Farming

The role of the forest, soil, and land-based resources for climate change mitigation represent an integral part in the PA. The agreement does not address, however, how landowners should be motivated to undertake climate-friendly actions, leaving it to the individual parties to the PA, and, in the European

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<sup>9</sup> Care should be taken not to mix-up terminology such as performance-based approaches and outcomes-based payments, which are often used interchangeably in the context of the CAP Post-2020).

Union, to its Member states. A key challenge resulting from the policy context framed in the preceding sections, is the transfer of direct incentives to farm or landowner level, ideally in the form of a financial reward for a measured, reported and verified mitigation outcome.

### Carbon Farming

Carbon farming refers to anthropogenic interference with carbon pools, flows and greenhouse gas (GHG) fluxes at farm-level with the purpose of minimising climate change. Farmers and foresters manage vast carbon stocks and significant GHG fluxes. The size of the soil carbon pool under agricultural land and forests and the carbon stored in vegetation gives them an important part to play in climate change mitigation action.

### Paying for results

Result-based has been used to make a distinction between making payments to land managers on the basis of the results that they deliver, rather than the management actions that they pursue. This is seen as a means to more directly link the use of public funds (the payments) to the results that those funds are intended to deliver. In the case of carbon farming schemes results based would imply making a payment for the emissions avoided/reductions achieved. This is intended to create a clearer basis for informing land managers about the desired outcomes for society from activities on their farms and providing Member States and land managers with choice in terms of how this is achieved.

## 1.3.2 Identifying Potential mitigation activities

### Criteria and Screening

A vital component in the development of a carbon farming scheme is the selection and inclusion of mitigation activities as opportunities for farmers and landowners to participate in the scheme and garner credits from GHG emission reductions. Mitigation actions for land use cover a wide range of sectors, which are then divided further into sector-specific activities. A report for DG CLIMA produced by Ricardo, *Effective performance of tools for climate action policy - meta-review of Common Agricultural Policy (CAP) mainstreaming*, conducted a screening process for mitigation activities that are related to land-use in the EU context considering mitigation potential. Labelled as mitigation actions, the report factored in the following criteria in selecting the actions:

- > The ability to provide worthwhile reductions in GHG emissions or remove CO<sub>2</sub> from the atmosphere for long-term storage in soils or biota;
- > Be compatible with practices typical of the main farming systems in the EU;
- > Be verifiable by monitoring agencies;
- > Not impose excessive financial burdens on the farmer;
- > Be compatible with improvements in business efficiency or with other CAP environmental support measures;
- > Socially acceptability;
- > Sensitivity of effectiveness to farmer implementation;

- > The extent to which there may be other benefits to the farmer from adoption of the MA;
- > Whether there may be any adverse impacts on the environment, including leakage of GHG emissions as a result of production being diverted to regions outside the EU where there are greater GHG emissions associated with production of the crop or livestock.

Another report conducted by Ecologic, *Mainstreaming of climate change into rural development policy post 2013*, screened mitigation activities based on technical feasibility, uncertainty/variability of effects, negative ancillary effects, and whether the activities are amenable to policy.

In addition to selecting actions through the criteria above, the Ricardo report went through multiple phases of selection, which resulted in the exclusion of certain activities as they were not compatible directly in the EU context or fulfilling the criteria outlined above. The omitted mitigation actions included: 'improving grassland management to improve carbon sequestration,' 'use of grassland to reduce fire risk,' 'biochar applied to soil,' 'extend the perennial phase of crop rotation,' 'delay applying mineral N to a crop that has already had slurry applied,' 'maintain soil pH at suitable levels for crop/grass production,' and 'increased on-farm biogas production.' Most were excluded due to their lack of data availability, but some were removed because they resulted in increased N levels despite an increase in SOC levels.

#### Combining mitigation activities

Alongside an overview of the potential across mitigation actions throughout Europe and varying levels of uptake and data availability, the report also analysed the interactions across mitigation actions. Many mitigation actions are complementary while others would not be able to be conducted in the same plot as they have very clearly conflicting land uses (i.e. conversion to grassland vs conversion to woodland). A few examples of complementary actions include:

- > The conservation/restoration of wetlands/peatlands with:
  - > Woodland planting
  - > Conversion of arable land to grassland to sequester carbon
- > Use of cover/catch crops with:
  - > Soil and nutrient management
  - > Improved nitrogen efficiency
- > Feed additives for ruminant diets with:
  - > Optimised feeding strategies for livestock

The combining of activities is one way to create positive linkages between activities and mitigation potential. Ecologic discusses the benefits of combining measures in order to 'enhance synergies.' The determination of mitigation measures that show benefits of combination is conducted through a set of

guidelines. These guidelines can be used as a way to eliminate or choose between mitigation activities as it shows which activities could negatively or positively affect others. A key feature of these guidelines is determining whether the combination of these activities is voluntary or compulsory for implementation. In the setup of a scheme, voluntary combination could allow for more flexibility, while a compulsory combination would work for activities that cannot work as stand-alone activities. Programming of combined activities is also important to consider as overcompensation or double counting can occur if two activities are treated as separate but leading to the same mitigation benefits. If there is a combining of measures, there needs to be a sufficient level of training and knowledge regarding combination.

#### Mitigation potential

The ranking of potential within the EU across number of MS where the action can be implemented is also presented in the Ricardo report with the list of all of the additional environmental benefits associated with each activity. The below list shows the overall mitigation potential and lists out the number of MS in which this action is estimated to have significant mitigation potential. What is important to note about this ranking of lowest to greatest potential is that the highest number of MS with potential for mitigation does not align with the difference in overall mitigation (i.e. soil and nutrient management plans has potential in all MS but is categorized in low mitigation potential). Exact mitigation potentials as well as the MS are also listed below in Table 1-4.

#### IPCC 2019 Report

The Ecologic and Ricardo reports cover the mitigation activities for land use in the EU context as selected for this review. These activities are further corroborated by the most recent update of the IPCC report on Climate Change and Land, published in 2019. The report discusses options for land management that are associated with mitigation, adaptation, desertification, land degradation, and food security. The response options align with the mitigation activities outlined by Ecologic as well as Ricardo. The list is clustered into Agriculture, Forests, Soils and Other ecosystems followed by a list of general 'activities' that include livestock management, fire management, and forest management, among others.

Beyond this list, the IPCC report covers adaptation and mitigation response options in part B that go into further detail. For example, in listing practices for sustainable land management in the realm of agriculture, specific activities listed include green manure crops and cover crops, crop residue retention, reduced/zero tillage and maintenance of ground cover through improved grazing management. Although these are not listed in their overview list, the mitigation activities spelled out in the document report very high confidence in the potential for these activities to reduce vulnerability to soil erosion and nutrient loss. The alignment between the reports are highlighted in Table 1-4.

Table 1-4. Mitigation activities adapted from an internal literature review.

| Cluster                   | Action                                                                                   | EU Context <sup>10</sup> | IPCC Report 2019 | MS Potential <sup>11</sup> | MS Median Mitigation Potential |
|---------------------------|------------------------------------------------------------------------------------------|--------------------------|------------------|----------------------------|--------------------------------|
| Crop management           | Extend the perennial phase of crop rotations                                             | Specifically excluded    | (✓)              |                            |                                |
|                           | Reduced Tillage                                                                          | ✓                        | ✓                |                            | 45 kt CO <sub>2</sub> e/y      |
|                           | Zero Tillage                                                                             | ✓                        | ✓                | 4 MS                       | 210 kt CO <sub>2</sub> e/y     |
|                           | Leaving crop residues on the soil surface                                                | ✓                        | ✓                |                            | 1,400 kt CO <sub>2</sub> e/y   |
|                           | Ceasing to burn crop residues and vegetation                                             | ✓                        | (✓)              |                            | 880 kt CO <sub>2</sub> e/y     |
|                           | Use cover/catch crops                                                                    | ✓                        | ✓                | All MS                     | 1,500 kt CO <sub>2</sub> e/y   |
|                           | Biochar applied to soil                                                                  | Specifically excluded    | ✓                |                            |                                |
|                           | Maintain Soil pH at suitable levels for crop/grass production                            | Specifically excluded    |                  |                            |                                |
|                           | Delay applying mineral N to a crop that has had slurry applied                           | Specifically excluded    |                  |                            |                                |
|                           | Reduce soil compaction                                                                   |                          | ✓                |                            |                                |
| Livestock/herd management | Livestock disease management                                                             | ✓                        |                  | 17 MS                      | 120 kt CO <sub>2</sub> e/y     |
|                           | Use of sexed semen for breeding dairy replacements                                       | ✓                        | (✓)              | 2 MS                       | 32 kt CO <sub>2</sub> e/y      |
|                           | Breeding lower methane emissions in ruminants                                            | ✓                        | (✓)              |                            | 11 kt CO <sub>2</sub> e/y      |
|                           | Feed additives for ruminant diets                                                        | ✓                        | (✓)              | 3 MS                       | 55 kt CO <sub>2</sub> e/y      |
|                           | Optimised feeding strategies for livestock                                               | ✓                        | (✓)              |                            | 15 kt CO <sub>2</sub> e/y      |
|                           | Changing the composition of animals in herd (i.e. to change average weight (+), age (-), |                          |                  |                            |                                |

<sup>10</sup> The actions that are 'specifically excluded' from the EU analysis due to data availability or if the activity may result in an increase in other GHGs despite an increase in C sequestration, for example.

<sup>11</sup> These numbers represent MS with *significant* mitigation potential.

|                                                                                               |                                                                                                |                       |     |       |                              |
|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-----------------------|-----|-------|------------------------------|
|                                                                                               | productivity (+), ratio of livestock classes)                                                  |                       |     |       |                              |
| Grazing system                                                                                | Changing grazing patterns                                                                      |                       | ✓   |       |                              |
|                                                                                               | Rejuvenating pastures                                                                          |                       |     |       |                              |
|                                                                                               | Integrated pasture cropping                                                                    |                       |     |       |                              |
|                                                                                               | Deep subsoil manuring                                                                          |                       |     |       |                              |
| Manure management                                                                             | Anaerobic digestion (to reduce GHG emissions during manure storage)                            |                       | (✓) |       |                              |
|                                                                                               | Covering slurry and farm-yard manure                                                           |                       | (✓) |       |                              |
| Actions to reduce emissions from agricultural use of organic soils (e.g. raising water table) | Wetland/peatland conservation/restoration                                                      | ✓                     | ✓   |       | 7.1 kt CO <sub>2</sub> e/y   |
|                                                                                               | Extensification of agricultural land-use in wetlands                                           |                       |     |       |                              |
|                                                                                               | Methane avoidance from crop management                                                         |                       | (✓) |       |                              |
| Above-ground living biomass management (landscape features, agro-forestry, forestry)          | Agroforestry                                                                                   | ✓                     | ✓   |       | 950 kt CO <sub>2</sub> e/y   |
|                                                                                               | Woodland planting                                                                              | ✓                     |     | 10 MS | 3,100 kt CO <sub>2</sub> e/y |
|                                                                                               | Preventing deforestation and removal of farmland trees                                         | ✓                     | ✓   | 22 MS | 6,200 kt CO <sub>2</sub> e/y |
|                                                                                               | Management of existing woodland, hedgerows, woody buffer strips and trees on agricultural land | ✓                     | (✓) | 14 MS | 560 kt CO <sub>2</sub> e/y   |
| Land Use                                                                                      | Conversion of arable land to grassland to sequester carbon in the soil                         | ✓                     |     |       | 5,900 kt CO <sub>2</sub> e/y |
|                                                                                               | Use of grassland to reduce fire risk                                                           | Specifically excluded |     |       |                              |
|                                                                                               | Afforestation of degraded lands                                                                |                       | (✓) |       |                              |

## 2 Study approach

In this chapter, the study approach will be presented for both the assessment of experiences gained in existing schemes and for the assessment of barriers and solutions for potential implementation within the EU.

### 2.1 Policies, Payment schemes and projects

For the purpose of this study, the below Figure 2-1 shows a general overview of the terminology applied and types of projects included. In the applied understanding, a policy can include a payment scheme or a project, and a payment scheme can include projects, just as projects can be developed individually without an overarching policy or scheme.

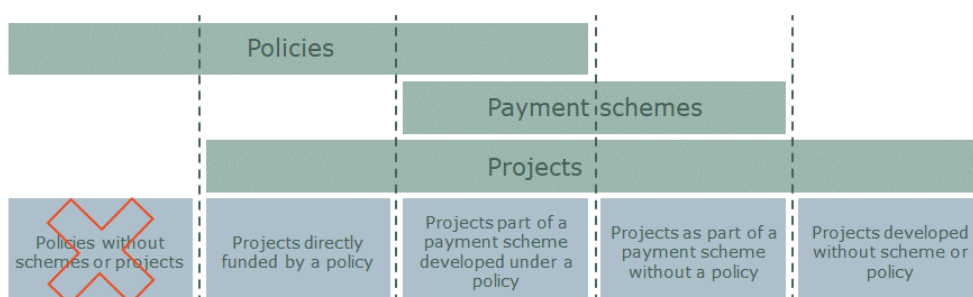


Figure 2-1. Schematic overview of policies, payment schemes and projects used to explain terminology and scope of the analysis.

### 2.2 Selection of schemes

The study focusses on the three international schemes Clean Development Mechanism (CDM), Joint Implementation (JI) and the Voluntary Carbon Standard (VCS), covering thus compliance and voluntary markets. In addition, this study looks at four domestic schemes; the Australian Carbon Farming Initiative under the Emission Reduction Fund (ERF) for being a front runner when it comes to soil management practices, the New Zealand Emission Trading Scheme (NZ ETS) in combination with the Permanent Forest Sink Initiative (PFSI) for including forestry in the ETS and California's Compliance Offset Programme (CCOP) to cover a scheme that is connected to a cap and trade programme. Under each of the schemes, a number of projects will be used for illustration and to ensure that the analysis reaches the farm-level.

In addition, five European projects or mini-schemes are analysed, bearing in mind the innovative nature and contemporary launches of such initiatives. The recently launched French Label Bas Carbone (LBC) is a voluntary market scheme with three approved forest methodologies and a whole farm dairy method (CARBON AGRI) that is currently under review. The latter emerged from Ferme Laitière Bas Carbone (FLBC). Healthy Soils for Healthy Food (HSHF) is an Austrian Private Sector Initiative, thus providing valuable insight on alternative governance structures. MoorFutures is a German voluntary market scheme that rewards project owners for peatland rewetting and restoration. The Finnish Carbon Action project is still under development yet included in the analysis to

cover methodology development on soil carbon sequestration. The recent Woodland Carbon Code (UK) is also covered.

### 2.2.1 Methods and data sources

Annex A contains file cards of each of the schemes included in this study organised according to the design dimensions. For every dimension, the file card entails a general description of the different results-based schemes and project type related examples to identify potential challenges and solutions. In a second setup, the file cards inform the comparative analysis undertaken in Chapter 3.

This study is based on a literature review of peer-reviewed publications, reports and analyses, data from relevant project databases and, where applicable, on a thorough review of project documents, e.g. design documents, methodologies, and progress reports. In addition, policy experts, decision makers, verifiers, carbon agents and project owners have been interviewed in a semi-structured manner (see Appendix F for the list of interviewees including short summaries).

## 2.3 Design dimensions

To be able to pay a farmer/forester for climate mitigation results at the farm/forest level, a number of technical, legal and practical preconditions need to be sorted out. Assuming that the climate mitigation results are defined as tonnes of CO<sub>2</sub>e sequestered or emissions avoided, a carbon farming scheme design framework should include the nine design dimensions presented in Table 2-1. The design dimensions largely represent the integrity issues as discussed in chapter 1, as well as more detailed operational elements such as the means and requirements for the payment for the mitigation outcome, herein called the *Reward Mechanism*.

*Table 2-1. Topic considered within the design dimensions covered. Source: COWI, 2018 based on the Terms of Reference for the study contract. Further to these dimensions, sustainability indicators for measuring impacts are also covered in the study.*

| Dimension                | Examples of topics considered                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Governance               | <ul style="list-style-type: none"> <li>&gt; What type of entity owns and operates the schemes in practice?</li> <li>&gt; What targets, compliance, offsetting (if any) can the mitigation outcome be used for?</li> <li>&gt; In what way is the scheme or projects supported by legislation (if any)?</li> <li>&gt; Who ensures overall structure of payment scheme?</li> <li>&gt; How is it structured and evaluated?</li> </ul> |
| Coverage & Eligibility   | <ul style="list-style-type: none"> <li>&gt; Who can participate in the scheme?</li> <li>&gt; What are the eligibility criteria?</li> <li>&gt; What sectors and geographies are covered?</li> <li>&gt; Description of different types of thresholds for eligibility and manners in which one can set up thresholds.</li> </ul>                                                                                                     |
| Baseline & Additionality | <ul style="list-style-type: none"> <li>&gt; How has the additionality been measured?</li> <li>&gt; Against which baseline has the additionality been measured?</li> </ul>                                                                                                                                                                                                                                                         |

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Monitoring, Reporting and Verification | <ul style="list-style-type: none"> <li>&gt; How are the results monitored?</li> <li>&gt; How is the data aggregated?</li> <li>&gt; Are there differences between project types?</li> </ul>                                                                                                                                                                                                                                                 |
| Reward Mechanism                       | <ul style="list-style-type: none"> <li>&gt; How are the farmers rewarded?</li> <li>&gt; Are prices negotiated or do they follow market conditions?</li> <li>&gt; Who provides the reward?</li> <li>&gt; What are contract arrangements?</li> <li>&gt; Is there a property title (i.e. carbon credit)?</li> <li>&gt; How is double claiming between firms avoided?</li> <li>&gt; To which country are the reductions attributed?</li> </ul> |
| Transparency & Reporting               | <ul style="list-style-type: none"> <li>&gt; How is transparency ensured?</li> <li>&gt; Information sharing and availability</li> <li>&gt; Has the scheme or project conducted stakeholder consultations before/during/after the project lifetime?</li> </ul>                                                                                                                                                                               |
| Permanence                             | <ul style="list-style-type: none"> <li>&gt; How is permanence ensured</li> </ul>                                                                                                                                                                                                                                                                                                                                                           |
| Risk Mechanisms                        | <ul style="list-style-type: none"> <li>&gt; What buffers, insurances or compensation mechanisms have been devised related social and environmental risks (non-carbon risks)?</li> </ul>                                                                                                                                                                                                                                                    |
| Acceptance & Barriers                  | <ul style="list-style-type: none"> <li>&gt; How did the most relevant stakeholder groups react to the scheme?</li> <li>&gt; What are associated direct and indirect costs per scheme?</li> <li>&gt; Is there any evidence on or information on pre-requirements on capacity of participating landowners?</li> <li>&gt; Is there any training or advice offered to participants as part of the scheme or project?</li> </ul>                |

The covered schemes and projects are described and analysed after the above design dimensions and has been selected for their inclusion of mitigation activities listed in Table 1-4.

## 2.4 Identifying barriers and solutions

To develop the assessment of barriers and solutions for implementation of results-based Carbon Farming in the EU, we first identified potential options for result-based schemes in the EU. Drawing on existing examples (see Annex A) and desk-based research four potential options were identified: whole farm carbon audit, peatland restoration, afforestation, agroforestry, and sequestration of soil organic carbon on mineral soils. These were proposed drawing on the criteria of mitigation potential, fit with EU farming systems, and potential for scalability of these schemes. A schematic description of these options was prepared, along with questions relating to practical barriers and potential solutions for scaling up these within the EU context. The scheme options and key questions were presented and discussed at a stakeholder roundtable on 'Carbon Farming Schemes in Europe' took place in Brussels on October the 9<sup>th</sup>. The roundtable was attended by 75 stakeholders, followed by further 364 external viewers via webstream (see for a summary of take-aways Appendix G). Moreover, interviews with experts were conducted before and after the roundtable. Roundtable participants and interviewees included regulators and stakeholders involved in existing carbon farming schemes (e.g. MoorFutures,

CarbonAGRI, Woodland Carbon Code, among others) and experts with specific knowledge relevant to design elements (e.g. on farm data, farm carbon audit tools, MRV). The stakeholder consultations served to validate initial results and to gather additional input. The full list and summary of interviews is included in Appendix F. The results of the workshop are summarised in Appendix G.

### 3 Comparing schemes and approaches

This chapter provides a comparison of international, (sub)national carbon schemes and European programmes and their key design elements in order to draw lessons that can inform the development of EU-wide carbon farming schemes. These lessons learnt can furthermore inform the continuing global climate change negotiations on guidelines for transfers of international emissions reduction credits included in Article 6 of the PA.

#### 3.1 Overview of the schemes considered in this analysis

This chapter provides a brief overview of the schemes included in this study, which are roughly clustered into global, domestic and European domestic schemes.

##### Global schemes

**CDM** and **JI** are two of the three flexible market-mechanisms established under the KP to provide a vehicle for Parties to meet their targets by purchasing carbon credits. Whereas CDM allows a public or private actor from an Annex I Party to implement a project on the territory of a non-Annex I Party, JI enables Annex I Parties to financially support activities in other Annex I countries and have them contribute to their national target.

Verra (formerly known as **VCS**) is a not-for-profit organisation and operates the largest voluntary crediting scheme VCS since 2006. Credits generated under VCS, Verified Carbon Units (VCUs) can be used to meet compliance obligation under California Cap & Trade as well as under the KP Cap & Trade System when cancelling the according amounts of Assigned Amount Units (AAUs).

##### Domestic schemes

Under the **AU ERF**, Australia's Clean Energy Regulator (CER) can purchase offsets from carbon farming. Since 2014, the fund operates as a competitive reverse auction mechanism, where the regulator sets a benchmark price and 25% of the volume under that price is accepted.

Established in 2008, the **NZ ETS** is the first carbon trading scheme under the KP that aims at covering all sectors of the economy, including forestry and agriculture, and encompasses all six GHGs. However, although agriculture is included in the scheme, the current design of the NZ ETS only requires the reporting of agricultural emissions without their surrender. The NZ ETS began operating under the Kyoto emission cap with the allowance for global trading but, following NZ's withdrawal from second commitment period of KP has since transitioned into a domestic scheme.

The New Zealand **PFSI** was introduced in 2006 and served as a pre-cursor to earning emission units in NZ. NZ ETS and PFSI are seen as complimentary with latter having a clear focus on the establishment of permanent forest sinks. Post-1989 forest landowners are free to choose between PFSI and ETS, they cannot register their project under both schemes though. To ensure policy cohesion,

PFSI will be discontinued and transitioned into a new permanent post-1989 forest activity to be included under NZ ETS.

California's cap-and-trade operates outside the KP and caps the state's largest GHG emission sources. Part of the compliance obligation can be offset through **CCOP** that started in 2013.

#### European domestic schemes and pilots

In addition to the review of global large-scale schemes, this section considers four pioneer (mini-)schemes and one pilot project implemented in Europe where additional national and regional result-based carbon farming schemes have been broadly missing.

The included EU carbon farming schemes with a result-based dimension are either developed for the voluntary carbon market where credits can be purchased by private actors/business to reduce their climate footprint and/or enhance their emissions reductions (for example **MoorFutures** and **LBC**) or developed as a part of a supply-chain management such as **HSHF**. LBC is a recent advance from the French authorities to create domestic Carbon Standard for voluntary offsets. The stakeholder informed project Voluntary Carbon Land Certification (VOCAL) has led to LBC's first three forestry methods and methodology and experiences from **FLBC**, also included in this study, inspired an agricultural methodology (CARBON AGRI) soon to be included under the standard. The Finnish **Carbon Action** project is still developing the project design and does not have consolidated practices and methods (Summer 2019). In the absence of a soil carbon sequestration method in Europe, the already mentioned Carbon Action has an ambitious goal to develop a calculator that describes the stocks (vegetation, soil) and fluxes (photosynthesis, plant and microbial respiration, plant growth, litter production, harvest, leaching) of carbon in agricultural fields. The Woodland Carbon Code (UK), offers ideas and insights into how to set up and govern a forest targeted mini-scheme.

## 3.2 Governance & Policy

Most schemes included in this study have a dedicated governance body supervising the activities, however, the schemes and programmes have different levels of governance, composition of governance bodies and responsibilities developed and shaped in a political context. This section explores the governance structure across the identified carbon schemes as set out in the legislation, including institutional setup and the political context and decision-making structure in which schemes are developing.

### 3.2.1 Governance structure

Governance structure refers to the composition of the institutional setup of governing bodies, institutions and program administrators. Table 3-1 provides an overview of governance structure of the schemes and EU programmes regarding scale of governance body, executive body, program administrators and registries as according to legislation and guidance documents for the schemes.

*Table 3-1. Governance structure for each of the schemes included in this study. Detailed description of each of the schemes' governance structure is found in Annex A.*

| Scheme/program  | Governance body               | Executive body / supervision                                                                                                                                                                                                                                             | Program administrators                                                                                                                                                                                                                          | Registries                                                                       |
|-----------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| CDM             | International and centralised | Conference of Parties serving as the meeting of the Parties to the KP (CMP): CDM rule-making<br><br>CDM Executive Board (CDM EB): Provides final approval of e.g. schemes methodologies, project registration, accrediting authorities and credit insurance              | UNFCCC Sustainable Mechanisms (SDM);<br>Registration and Performance Monitoring / Issuance and Performance Monitoring Team:<br>Review of validation and verification reports, technical assessments of compliance of new requests for insurance | CDM registry and the international transaction log (ITL) and national registries |
| JI              | International and centralised | CMP provides guidance regarding the implementation of Article 6, Decision 9/CMP.1, while national governments (host Parties) develops procedures for e.g. project approval, accreditation of auditors, project registration                                              | National Designated Focal Points (DFPs) are responsible for project endorsement, approval and registration, decision on ERU insurance and accrediting auditors if envisages, else Track 2 AIEs are auditors                                     | ITL and national registries                                                      |
| VCS             | International and centralised | VCS Board: Approves changes to the standard, program, procedures, new standards or guidelines<br>VCS Association (VCSA) is responsible for day-to-day management including reviews of projects, oversee the validation/verification bodies, methodology approval process | VCS management and staff responsible for program management, methodologies and program development                                                                                                                                              | VCS registry system                                                              |
| AU CFI / ERF    | National                      | Australian Government, Department for the Environment                                                                                                                                                                                                                    | The Clean Energy Regulator, project approval and issuing ACCUs for emissions reductions                                                                                                                                                         | CFL Registry                                                                     |
| NZ PFSI and ETS | National                      | New Zealand Government: Ministry for the Environment (MfE), the Ministry of Primary Industries (MPI), and the Environmental Protection Agency (EPA).                                                                                                                     | The NZ ETS operational Executive Group and The NZ ETS Coordinators Group                                                                                                                                                                        | NZ ETS Unit Register                                                             |

|                                |              |                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                   |                                                                                                 |
|--------------------------------|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| CCOP                           | Sub-national | California Air Resources Board adopt the California Cap-and-Trade Regulation, amendments and its Compliance Offset Protocols.<br>Executive Officer approves Offset Project Registries and accreditation of auditors | CARB staff in Program Operations Section, oversee entire Compliance Offset Programme and issue ARB offset credits in CITSS, approve Offset Project Registries list projects, review project reporting documents and issue registry offset credits | Western Climate Initiative's Compliance Instrument Tracking Systems Service (CITSS)             |
| FLBC                           | National     | National Interprofessional Center for Dairy Economics (CNIEL)                                                                                                                                                       | French Livestock Institute Idele provides scientific and technical support.                                                                                                                                                                       | Registry is conducted through FLBC's homepage. <sup>12</sup> Information is provided in French. |
| LBC                            | National     | French Ministry for Ecologic and Solidary Transition (MTES)                                                                                                                                                         | MTES is the program administrator, but oversees, reviews and approves the development of methodologies from a number of private institutions (see ).                                                                                              | Registry is not yet available, but projects are tracked on MTES' website.                       |
| MoorFutures                    | Regional     | MV State Ministry of Agriculture and Environment and the Academy for Sustainable Development in MV                                                                                                                  | Project work group (PAG) and a scientific advisory board (WB)                                                                                                                                                                                     | MoorFutures runs own registry from its main webpage. <sup>13</sup>                              |
| Healthy Soils for Healthy Food | National     | SPAR and WWF Austria                                                                                                                                                                                                | SPAR is responsible for the project coordination with support from WWF Austria in expert support and communication methods.                                                                                                                       | N/A                                                                                             |
| Carbon Action                  | National     | Baltic Sea Action Group (BSAG) and Finnish Meteorological Institute (FMI) with larger steering group including the Ministries of Agriculture and Forestry as well as the Environment.                               | BSAG is responsible for training and the farmer (project owner) coordination. Scientific support comes from FMI alongside various academic institutions.                                                                                          | Run through the Carbon Action main webpage. <sup>14</sup>                                       |

<sup>12</sup> <http://www.ferme-laitiere-bas-carbone.fr/des-eleveurs-engages>

<sup>13</sup> <https://www.moorfutures.de/>

<sup>14</sup> <https://carbonaction.org/science/>

**No one-size-fits-all  
set up****Governance approaches**

The covered schemes and individual projects represent many different legislative and geographical contexts and are organised differently. The global/international compliance schemes of JI and CDM is governed in a way that is adapted to the multi-stakeholder, UNFCCC-consensus driven decision modality while the local and regional projects in the EU are less complex and often not attached to schemes. MoorFutures, LBC, and Carbon Action are associated with national ministries and all three have a combination of public and private administrative support. FLBC and HSHF do not have direct government affiliation (regional or national). All of the EU schemes take lessons from the EU CAP as well as CDM and EU-ETS to set the stage for their own governance methods. In line with this, many of the governance features covered in the below paragraphs relates to governance of a scheme and not individual projects, but have profound and direct implications for development, management and feasibility of the individual projects under each scheme.

**Organisation and  
operation of carbon  
farming schemes**

The type and responsibility of involved agencies in the operation of schemes differ, and often reflect a need for specific capacities or regulatory aspects to be part of the governance structure. The organisational location of such capacities however varies, and therefore many different ministries and agencies are involved. In the case of JI, CDM, VCS and CCOP, the schemes are governed by a Committee or Board, which holds delegated powers from the owners of the schemes to manage the scheme. For the first three, the committee is a group of experts or politically appointed members who oversee that the purpose and priorities of the schemes is adhered to in the implementation of projects. For these schemes, the Committee is designated to the scheme and its operation is confined to the operation of the scheme. For CCOP, the California Air Resources Board (CARB) was pre-existing when the scheme was set up and running of the CCOP was added to the boards list of responsibilities. As the CARB is an independent organisational entity, the board has been able to withstand political pressure that the CDM Executive Board (EB) and the Joint Implementation Supervisory Committee (JISC) would have had difficulties operating under. As for the CDM and JI, the VCS Board is the executive entity, which is mandated by the General Assembly. Both the CDM and the VCS operate with expert working groups, and both schemes have dedicated CF subgroups on Afforestation and Agriculture, Forestry and other Land Use (AFOLU) respectively. These groups have profound and documented expertise in the topic domain and advise on approval and review of methodologies and other matters where carbon farming projects differ from projects in other sectors.

The two-government led and operated schemes (NZ ETS and CFI; see Table 3-1), do not have Boards or Committees. Both are governed by inter-institutional collaboration between ministries or agencies with distinct responsibilities as specified in the basic regulation supporting the scheme. These government entities are then coordinating and managing the scheme jointly. For example, all three entities involved in NZ ETS work together to expand upon and improve the scheme with regular reviews adopted by and accepted by all entities. The allocation of the responsibilities of each government department is laid out in the Memorandum of Understanding with specific details in the ETS

Operations Manual. In general, the separation and distribution of administrative functions has been purposeful and has offered transparency and a system of checks and balances (Leining & Kerr, 2018).

#### Comparing daily operation of schemes

In terms of daily governance, the government operated schemes are able to provide clarifications, interpret rules and manage participant interaction directly and under public administration rules and procedures (such as short public hearings). For example, under the CFI, a large number of clarifications and modifications considered non-substantial have been issued continuously and as a fast response to public input and to help owners, buyers and other actors navigate and develop projects. For the international schemes (JI and CDM), modifications and clarifications are in principle dependant on consensus and approval from stakeholders, ultimately the parties at the COPs which is often more time consuming. Also, allocation of additional resources for approval or review is more difficult for the scheme administrators not funded by a single government budget. Staff shortages were among the reasons for very long approval processes under the CDM in 2010-2013 (at times more than a year).

#### Core elements of scheme governance

As regards organising the development, approval and verification process under a scheme, the assessed schemes show similar set ups. The project cycle for carbon farming projects is the same although named differently. A core element is the methodologies for project development, baseline setting, monitoring, reporting and verification (MRV) and transparency, which is detailed under each scheme, with CDM being one of the more well documented schemes. Methodologies are crucial as they serve as benchmark and reference for developers and seem to be essential for the practical viability of project types. The definition of numerical thresholds, alternative approaches and level of documentation have direct implications on the feasible size and type of projects, and therefore the right to propose methodologies seems to be a key element of scheme governance. The right to propose (and revise) methodologies is different among schemes, with CDM, JI and VCS allowing for project developers to develop schemes, that will then be subject to close scrutiny and if approved subsequent acceptance. Other schemes, such as the NZ ETS have centralised methodologies. Adherence to methodologies are often a hard requirement for acceptance of projects and subsequent issuance of credits. Responsibility for checking this is partly handed to verifiers or auditors, while ensuring that projects are developed to meet such requirements seem to necessitate advisors to help project owners that are (e.g.) not MRV experts. Some schemes (e.g. CDM) entail approval of designated verifiers, but this step seems to impose additional costs and administrative burden on the scheme. In the case of LBC, methodologies are developed privately. For example, the Institute for Climate Economics (I4CE), a think tank, developed the entire forestry methodology for LBC.

In summary, all schemes, but not individual projects necessarily, have entities or procedures for each of the core features of a scheme: methodology development, revision and approval, project review and approval, project registry, use of independent verifier/auditor (and for some approval of verifiers and auditors), issuance of credits, a registry for credits, and regulation of trade and use of credits (if for compliance).

## Validation

Validation refers to the assessment of a proposed project to evaluate if the project meets the program requirements and standards as an eligible project. Validation of project activities are required by most of the carbon schemes included in this project. Validation is primarily done by either independent third-party entities (such as under CDM, JI Track 2 and CCOP) or by an executing government agency (such as in the AU ERF). For some schemes (e.g. CDM and JI) validation is a part of project registration, while other schemes (such as AU CFI, CCOP and VCS) validation is undertaken at the same time as verification (World Bank, 2015). Further details are found under verification in Section 3.5.3

## Early screening of project opportunities

In the Australian Scheme, change agents and aggregators are involved in mobilising farmers and developing methodologies to help farmers deal with bureaucratic procedures and smoothen processes (Verschuuren, 2017). The setup involves early contact to and screening for key elements that could turn out to be implementation barriers later in the project cycle. In order to avoid discarding advanced projects because of barriers that cannot be overcome and thereby creating sunk costs and frustration, the change agents will engage with potential project owners before the official project activity starts. Currently, under the CFI the cost of a visit is paid for by the farmer, which might be an issue in other jurisdictions.

Based on this observation, upfronting and expert screening of core elements at project level could be an advantage, especially in the initial years after implementing an emissions trading scheme. This could potentially speed up a constructive implementation on the farmer level, which could give critical initial feedback to the governance structure and institutional setup and thus ensure an iterative design process whereas many stakeholders as possible are involved. Use of extension services and dedicated advisors could be envisaged, however the core element will be allocation of costs of this service.

## Linking schemes

Modes for linking schemes are not a specific research topic of this study, however in a carbon farming context such modes are important given the still low level of recognition of credits from carbon farming for compliance purposes. The low level of recognition of AFOLU sector credits are related to the perceived higher risks of non-permanence, complicated MRV systems and non-carbon/environmental and social risks covered elsewhere in this report, which all to some extent are associated with climate action in the AFOLU sector. The ways these schemes deal with the AFOLU sector specific risks can therefore help to establish a knowledge base to be utilised later in the study.

Linking to other schemes, international fungibility of credits or use of international standards across the schemes are different. While JI and CDM are two comparable versions of global schemes differentiated by the type of host country (Annex 1 vs Non-Annex 1) do not anticipate linking outwardly. Other domestic schemes foresee and aim for linking beyond the schemes borders (internationally). The CCOP is linked to other schemes via the Western Climate Initiative (WCI). The NZ PFSI scheme was organised in such a way that it would be easily connected to a future global emissions trading system. In concrete

terms this is ensured by applying UNFCCC compliant typology and thresholds for projects (e.g. 1990 cut-off date for afforestation). Further, the NZ Government in certain cases can swap NZ Emission Reduction Units (ERUs) for internationally fungible allowances so that projects in NZ can trade their mitigation outcomes out of the country. In this way, future interregional collaboration and communication becomes easier, which can allow for faster growth of such system. Under the AU CFI, mitigation outcomes can be issued as Kyoto or Non-Kyoto Units and the former can be traded internationally, provided the demand side recognize the unit for compliance use. In case Kyoto Australian Carbon Credit Unit (ACCUs) are issued, the Government assumes the risk of in-permanence unless protected in the Contract between the owner and the government. The EU-ETS does not recognise these units (both from NZ-ETS and CFI) in order to manage influx of international credits that may increase supply and reduces prices in the ETS, so in reality very little international trade has taken place. The Programme also recognizes VCS credits. Further to the above, none of the Kyoto eligible schemes (CFI and NZ-ETS) were found to have established Carbon Farming project specific modalities for linking. For the non-Kyoto Schemes (CCOP and VCS), linking is dealt with by en-bloc acceptance of certain types of credits, e.g. from REDD+ projects. With this model, the accepting scheme relies on the review and MRV of the issuing scheme.

### Public vs private governance

Schemes can be initiated, owned and managed by either public or private entities. The type of ownership has direct implications for the scheme which will be subjects of this section. Table 3-2 contains an overview of the scheme ownership.

Table 3-2. Overview of scheme ownership.

|         |            |                                                                                                         |                                                                                         |
|---------|------------|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| Public  | Compliance | <ul style="list-style-type: none"> <li>&gt; CDM</li> <li>&gt; JI</li> <li>&gt; AU ERF</li> </ul>        | <ul style="list-style-type: none"> <li>&gt; NZ ETS</li> <li>&gt; CCOP</li> </ul>        |
|         | Voluntary  | <ul style="list-style-type: none"> <li>&gt; PFSI</li> <li>&gt; LBC</li> </ul>                           | <ul style="list-style-type: none"> <li>&gt; MoorFutures</li> </ul>                      |
| Private | Compliance |                                                                                                         |                                                                                         |
|         | Voluntary  | <ul style="list-style-type: none"> <li>&gt; VCS</li> <li>&gt; Healthy Soils for Healthy Food</li> </ul> | <ul style="list-style-type: none"> <li>&gt; FLBC</li> <li>&gt; Carbon Action</li> </ul> |

### Obligation creates demand

All compliance schemes analysed are owned by public entities, mainly connected to the power of public authorities to enforce obligations to companies or governments (CDM and JI). Strict regulations that cap emissions and let entities trade their allowances with each other create a high demand for offsets as compared to the voluntary pendants. The underlying mechanisms and effects

will be further explored in **Error! Reference source not found.** on *Voluntary and Compliance Markets*.

#### Private engagement

Experience from NZ ETS showed that landowners are often sceptical towards public authorities, therefore, privately owned schemes might be more attractive alternative for some stakeholders. The privately-owned schemes prove that beyond policies and strict regulation, private entities can organise climate action, yet on a smaller scale. HSHF specifically shows that private companies are willing to pay for environmental benefits. Similarly, FLBC is partly reliant on private sector dairy companies to finance the farm audits in addition to the funding that scheme and its precursors received from EU LIFE and EBRD. However, for some programmes it remains uncertain how long they will be continued. Carbon Action is merely in scheme development phase and relies on uncertain private funding. Similar applies to FLBC, this scheme however led to the development of the CARBON AGRI method to be included in LBC. Carbon Credits are expected to finance the MRV costs, FLBC farmers showed however sceptic whether the credits will create enough revenue to compensate the efforts.

#### Innovative approaches

The front runners for voluntary markets were private entities, typically NGOs or foundations. Verra (formerly VCS) is a non-profit organization and due to lesser restrictions and rules on market participants, VCS as well as other voluntary schemes in the USA and globally acted as testing field for new procedures and methodologies later to be adopted by regulatory schemes (CORE, 2011). Another example for innovative approaches is the producer – retailer – consumer approach by HSHF. The retailer SPAR does not believe in emission offsetting but offers supplying farmers 3-year contracts that promise them a bonus of EUR 30 per tonne of soil carbon sequestered (CO<sub>2</sub>e). Produce that results from carbon farming is labelled as stemming from humus building farming practices, thus providing the consumers with an option to buy regional food that contributes to soil carbon sequestration.

With the Sustainable Development Goals (SDGs) and the PA public and private actors across the globe are encouraged to contribute to climate mitigation. With a doctrine change on double counting (see section **Error! Reference source not found.**), public entities reacted to the recurred demand for local voluntary crediting schemes (LBC and MoorFutures). More and more companies are interested in supporting projects that are regional and promise high environmental integrity.

#### Public-Private Partnerships

To ensure finance, scale and longevity on the one hand and innovative and custom-fit approaches that are backed up by the market on the other hand, cooperation between public and private entities to design and run results-based carbon farming schemes have emerged. For both the forestry methodologies and the CARBON AGRI methodology, sector relevant stakeholder cooperated with the support of MTES. Through this approach the LBC is well known among potential project proponents and methodologies are relevant for the geography.

### Lesson Learnt

- > For schemes operated by more than one owner (government), a public multi-stakeholder steering committee or board is common and seems justified as the forum where the operational and development decisions are made. If there is one (public) owner of the scheme, such committees are not found. The advantage of single ownership appears to be faster operational guidance and clarifications, but on the other hand the trade-off seems to be less involvement of stakeholders. For schemes where other sectors than AFOLU are involved, there is a need to mandate an expert working group due to the perceived complexity and particularity of land use sector projects as compared to other sectors.
- > The governance system of a carbon farming scheme seems to rely on procedures and entities reviewing and approving at three levels: Methodologies, Projects and Verifiers. These features are universal and not surprising. Furthermore, to prevent fraud and double-counting, registries of projects and credits are in place in all cases.
- > All the market-based carbon farming schemes covered foresee linking and cross-scheme fungibility of credits in order to increase possible demand and stable price setting. The approaches taken by the individual schemes represents three different aspects of linking, namely linking, fungibility and consistency in methods. A fourth element would be recognition of credits on demand side, which is not currently the case.
- > The recent advent of local voluntary schemes that are initiated and managed by public authorities appeals to companies that want to contribute to climate action beyond offsets and compliance.
- > Privately governed schemes historically acted as testing grounds for methods to be adopted by public schemes. Due to the novelty of carbon farming in the carbon market, this role is remains in particular relevant for the agricultural sector and will be further supported if credits from privately owned scheme will be increasingly accepted by public/compliance schemes.
- > Public as well as private entities have different advantages and shortcomings related to scheme ownership, through public private partnerships, scheme will profit from a good outreach and innovative approaches while having secured finance and public support.
- > The emergence of smaller and local voluntary markets as well as producer-retailer-consumer arrangements bring buyers closer to the mitigation impact and encourages interest in climate action.

### 3.2.2 Policy context

This section explores and compares the political context of the identified carbon farming schemes were developed and governed and how they contribute to carbon emission reductions towards international and national climate change

commitments. It covers two topics of overall nature, namely the purpose of the scheme and preservation of target integrity by preventing various forms of double counting.

### Purpose of scheme

**Compliance or target?** The schemes covered serve different purposes. Purposes in this context are defined as the intended use of the mitigation outcomes, as enshrined in the legislation or decisions defining the scheme. Mitigation outcomes can be used for offsetting, meeting targets, or as a basis for results-based payments. The use of the mitigation offset can be restricted to users within the scheme geography, domestic use within a country or for international use, and the outcome can be issued as an international, recognised credit or a simpler product. In addition, an important distinction is whether the scheme proponents purchase mitigation outcomes for compliance purposes or voluntarily. An overview of the defined purposes of the schemes as concerns the mentioned elements is presented below. Any mitigation outcome that is KP compliant can be used for KP CP2 target compliance. The use geography is covered in more detail in 3.3.1 (*Geographical coverage*).

*Table 3-3. An overview of the defined purposes of the schemes as concerns offsetting, meeting targets, or as a basis for results-based payments as well as geographical restrictions.*

| Scheme      | Use                                                | Driver     | Outcome                                                                                        | Geography                                                    |
|-------------|----------------------------------------------------|------------|------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| CDM         | Government KP targets                              | Compliance | KP unit (CER or RMU). EU applies quantitative restrictions.                                    | Produced in Annex II parties, and used by Annex I            |
| JI          | Government KP targets                              | Compliance | KP Unit (ERU or RMU). EU applies quantitative restrictions.                                    | Produced by Annex I parties for use by other Annex 1 parties |
| VCS         | Private Sector Offsetting                          | Voluntary  | Credits called VCU. <i>Not recognised under EU-ETS</i>                                         | Produced and used globally                                   |
| NZ-ETS      | National target corresponding to NZ KP CP2 target  | Compliance | NZU, which is not a KP recognised unit. Government can exchange these for AAUs and sell these. | New Zealand                                                  |
| CFI         | National target corresponding to AUS KP CP2 target | Compliance | ACCU, which is not a KP recognised unit.                                                       | Australia                                                    |
| CCOP        | Subnational target, not linked to KP CP2 target    | Compliance | ARB offset credits                                                                             | California, and certain Canadian and US states.              |
| MoorFutures | Offsetting                                         | Voluntary  | A certificate of 1 tonne                                                                       | Local and global companies alike                             |

|                                |                                                                            |           |                               |     |
|--------------------------------|----------------------------------------------------------------------------|-----------|-------------------------------|-----|
| Healthy Soils for Healthy Food | <i>Mitigation outcomes not used</i>                                        | Voluntary | No defined mitigation outcome | N/A |
| FLBC                           | <i>Mitigation outcomes not used, but will later be used for offsetting</i> | Voluntary | No defined mitigation outcome | N/A |
| Carbon Action                  | <i>Mitigation outcomes not used</i>                                        | Voluntary | No defined mitigation outcome | N/A |

### Schemes to meet KP targets

CDM was developed in order to assist Parties not included in Annex 1 to the Convention in achieving sustainable development and in contributing to the ultimate objective of the Convention and in achieving compliance with their quantified emission limitation and reductions commitments under Article 3 of the KP. The JI was established for the purpose of meeting commitments of Parties included in Annex 1 (Article 6 in KP). Projects under these schemes are captured in the host country's national inventory. The VCS was developed to complement the KP mechanisms as an alternative channel for market access for project developers, mainly targeted at entities with voluntary emission reduction commitment in essence private sector buyers.

### The National Schemes with a target

In addition, to these international schemes, Parties to the Convention have developed national and regional schemes with the aim to reduce carbon emissions and their commitments under international climate change agreements. For example, the Australian CFI was developed to contribute to meet its international obligation under the KP, as well as to increase incentives for offsets consistent with the protection of Australia's environment. Furthermore, the Emission Reduction Fund (ERF) is a centrepiece of Australia's climate change mitigation effort and directly funds abatement for a range of eligible project activities. Enhanced removals achieved under Australia's ERF are contributing to their national targets, thus reversals are factored in the Australian inventory. For CCOP, the California Global Warming Solutions Act of 2006 required the state of California to reduce its GHG emissions to 1990 levels by 2020.

So far, none of the European schemes included in this study are contributing to national results. Like VCS, they were thought to complement compliance mechanisms targeting private entities with voluntary contribution ambitions. The French LBC was developed with the ambition to contribute to national targets, but currently there are no measures to capture achieved mitigation results in the inventory. For the Forestry methodologies, projects are too small and with regards to the agricultural method CARBON AGRI, inventory methods are not precise enough. Idele who developed CARBON AGRI is cooperating with the national inventory centre to ensure that methodologies are aligned.

## Ensuring target integrity

### Types of double counting

In the context of climate change mitigation, double counting refers to situations where a single GHG emission reduction or removal is used more than once to achieve mitigation targets. Double counting can either occur in form of double claiming, i.e. when two or more parties claim the same emission reduction/removal enhancement to comply with their mitigation targets or in form of double issuance, i.e. when more than one emission reduction unit is registered for the same mitigation benefit under different mitigation mechanisms, e.g. the sustainable development mechanism and an NDC (Climate Focus, 2016). When selling the credits, the project owner surrenders all associated ownership rights in all of the baseline and credit schemes presented. MoorFutures stresses that complete and reliable documentation is necessary not only to avoid double selling but also to create confidence in the market.

Double counting raises concerns with regards to environmental integrity, as it implies an overestimation of mitigation results. This in turn can jeopardise the achievement of mitigation objectives and undermine the credibility of the climate regime (Climate Focus, 2016). There are however different implications depending on whether double claiming occurs between two Parties or between companies and Parties.

### Double counting between Parties

Under the Kyoto regime, only Annex I Parties accepted reduction targets to be supported through national inventories. Since the actual reduction takes place in a Non-Annex I country, CDM structurally eliminated the risks of having the same CER accounted in two inventories. JI requires the cancelation of AAUs or RMUs to ERUs therefore preventing the same reduction in emissions from being counted twice as part of meeting the Kyoto requirements. With the PA, both Annex I and Non-Annex I countries have reduction targets formulated in their NDCs, future mechanisms need to consider double counting.

### Double counting between mechanisms

To achieve international mitigation targets, a country could implement a domestic offsetting scheme. In this case, the country would have an incentive to avoid any double counting, since such double counting would be reflected in the national GHG inventory, rendering it more difficult to achieve the target. For example, the units under the EU-ETS, European Union Allowances (EUAs), are not used for accounting purposes under the KP. The reductions from the EU-ETS are reflected in the national GHG inventories. For this reason, the EU has adopted policies to avoid double counting of emission reductions between domestic JI projects and its ETS. NZ ETS has had a similar experience where cancelling New Zealand Emission Reduction Units (NZUs) would increase the required level of mitigation action within the ETS sectors. That could either increase the ETS price or be accommodated with a higher ETS cap.

### Double counting and voluntary schemes

Voluntary offset standards have historically not been active in the EU because of their doctrine forbidding double claiming between a country and a firm. This has hampered the development of offset schemes in the EU, although domestic schemes like LBC have recently emerged and do not consider that this doctrine has no solid basis. This is particularly true in a world regulated by the PA and voluntary standards like VCS have begun to abandon this doctrine.

Despite these doctrine changes, there are still challenges to overcome when including emissions reductions/removal enhancements in national inventories. In France, policy makers perceive their accounting as a bonus, yet do not act to achieve this. Currently, forestry projects do not have the scale to be included and agricultural methods are not precise enough to include mitigation results achieved through voluntary offset programmes.

Table 3-4 shows the different mechanisms that schemes have in place to avoid double counting. The mechanisms depend on the context in which the mechanism works, i.e. whether it is a Kyoto mechanism, a voluntary or a compliance market and a common pattern is having units registered.

Table 3-4. Overview of ways in which double is avoided by the different schemes.

| Scheme          | Avoidance of double counting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CDM             | <ul style="list-style-type: none"> <li>&gt; Projects can be hosted only by countries that have ratified the KP and do not have emissions reduction targets under the KP</li> <li>&gt; CERs are issued on the CDM registry</li> <li>&gt; Each CER has a unique serial number, which includes a project identifier, party of origin and commitment period</li> <li>&gt; Transaction are tracked via the ITL and national registries</li> </ul>                                                                                                                                                                                         |
| JI              | <ul style="list-style-type: none"> <li>&gt; Projects can be only hosted by Annex I Parties with emission reduction targets under the KP and established AAUs</li> <li>&gt; ERUs are issued through the conversion of AAUs or RMUs<sup>15</sup></li> <li>&gt; Each ERU has a unique serial number, which includes a project identifier, party of origin and commitment period</li> <li>&gt; Transaction are tracked via the ITL and national registries</li> </ul>                                                                                                                                                                    |
| VCS             | <ul style="list-style-type: none"> <li>&gt; A secure registry system that offers assurance against double counting and provides transparency to the public</li> <li>&gt; Project proponents must demonstrate, and VCS registry administrators check, that GHG emission reductions or removals presented for VCU issuance have not also been issued under any other GHG programme or been recognised as another form of GHG-related environmental credit</li> <li>&gt; Countries have not been allowed in countries with a reduction target under KP, unless cancellation of AAUs occurs (recent doctrine shift see below)</li> </ul> |
| AU ERF          | <ul style="list-style-type: none"> <li>&gt; ACCUs are created traded, tracked, and retired in the CFL Registry</li> <li>&gt; Each ACCU has a unique serial number</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| NZ ETS and PFSI | <ul style="list-style-type: none"> <li>&gt; Adequate tracking of NZUs through the joint emissions registry, distinguishing between ETS and PFSI</li> <li>&gt; When the NZ ETS operated under the KP, if an ETS market participant bought and cancelled an AAU, it automatically reduced New Zealand's assigned amount (target</li> </ul>                                                                                                                                                                                                                                                                                             |

<sup>15</sup> A Removal Unit (RMU) is a tradable carbon credit or 'Kyoto unit' representing an allowance to emit one metric tonne of greenhouse gases absorbed by a removal or Carbon sink activity in an Annex I country.

|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             | <p>budget). Currently, there is no mechanism that enables firms or individuals to cancel NZUs in a way that would both reduce NZ ETS supply and tighten New Zealand's target (see below). Two options are considered:</p> <p>Create a mechanism through which the cancellation of an NZU would flow through to New Zealand's target or GHG inventory reporting. A quantity limit could be used to limit ETS price risk.</p> <p>Enable firms or individuals to buy international units directly from the government and cancel them, assuming they do not have the option to purchase them directly from the international market.</p> |
| CCOP        | <ul style="list-style-type: none"> <li>&gt; CARB offset credits are created, traded, tracked, and retired in the Western Climate Initiative's (WCI) Compliance Instrument Tracking System Service (CITSS)</li> <li>&gt; Regulated entities are liable for invalidated offsets that they have tendered for compliance</li> </ul>                                                                                                                                                                                                                                                                                                       |
| LBC         | <ul style="list-style-type: none"> <li>&gt; Adequate tracking through emissions registry</li> <li>&gt; Scheme owners and authorities do not consider double claiming of companies and countries problematic</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                |
| MoorFutures | <ul style="list-style-type: none"> <li>&gt; At the moment of selling, the owner cedes all associated ownership rights. Complete and reliable documentation is necessary not only to avoid double selling but also to create confidence in the market. For this reason, the trading of carbon credits must be documented indisputably in central registries.</li> </ul>                                                                                                                                                                                                                                                                |
| HSHF        | <ul style="list-style-type: none"> <li>&gt; SPAR does not use the scheme for offsetting, therefore double claiming does not apply here.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

### LULUCF sector mitigation outcomes after 2020

The LULUCF sector can contribute to Non-ETS target compliance after 2020 in accordance with the mitigation outcomes governed by LULUCF regulation and the ESR. This again means that afforestation projects, soil conservation or peatland restoration projects under a scheme that issues mitigation outcomes for voluntary offsetting used by a company in the EU can end up being double counted. The challenge is of principle nature, as for example smaller industrial companies falling under the Non-ETS target in a certain MS cannot use credits for compliance as they are not subject to a company level reduction commitment. The challenge is more of principal nature, as a company proclaiming that they (voluntarily) have offset emissions via afforestation or peatland restoration, would claim a removal that the government would also use for compliance against EU (and PA) targets.

A pre-requisite for avoiding principal double counting would be that MS GHG inventories rely on Approach 3 land use activity data, that would allow them to detect changes in land use from real time observations using satellite or drone data. A more simplistic correction could be applied during accounting by a subtraction of the offset amount (of CO<sub>2</sub>e) from the final accounts.

### Lesson Learnt

- > The purpose of the scheme will be decisive for many decisions on many design dimensions and should be clarified early on. International compliance

(against PA NDCs post 2020) will require scheme mitigation outcomes to be issued as a recognised credit, fully compliant with rules under the new market mechanism, which are still to be defined. On the other hand, voluntary offsetting by private companies as served by the MoorFutures, requires less stringency on methodologies (as will be assessed later in this report).

- > A multi-project scheme supplying a compliance or voluntary demand for credits must incorporate a rigorous and reliable registry system that allows to track all issued mitigation outcomes, and which can withstand fraud. Credits must hold a unique identifier, and the registry must be checked and overseeing by competent authorities.
- > Project or schemes developed in the EU cannot issue CDM units (CER) and only under very unlikely circumstances JI units (ERUs). This is not only because the second commitment period under KP the about to end, but also because there is no demand for these units within the EU. In principle, a EU based scheme could seek to develop and issue VCUs.
- > Schemes can define their own credit type, name it and if linked to a compliance scheme determine design dimensions to allow for international or EU fungibility.
- > With the inclusion of LULUCF sector into EU GHG target architecture after 2020, all schemes serving voluntary purposes should be recognised in the National GHG inventory of the host country, and any use of future mitigation outcomes by companies in the Non-ETS sector must not be accounted for by the government under LULUCF, in order to avoid principle double counting. A mechanism, and ideally a sufficiently advanced reporting setup would be necessary to prevent this situation.

### 3.3 Coverage & Eligibility

This section covers issues related to sectoral and geographical coverage as a means to restrict eligibility of scheme participants, and in some cases also credit users.

#### 3.3.1 Geographical coverage

Geographical coverage in this study is understood as the geography within which projects can produce credits that are eligible under the scheme. This is called *credit producer geography*. In some cases, the *credit user geography* is also restricted, but rarely as part of the scheme itself. The covered schemes exhibit different approaches to defining geographical scope for credit producers, ranging from global coverage to socio-economic criteria and differing commitments, and from national territory to no geographical criterion. Furthermore, schemes have expanded their geographical scope in different ways. One approach to broaden geographical coverage can be to allow opt-in from other credit producer geographies, or to link schemes by making credits cross-fungible.

This section explains and explores geographical coverage for the identified schemes as set out in the legislation and compares this to the actual development of projects under the schemes in terms of geographical concentration. It also considers initiatives taken by the owners of the schemes to directly or indirectly increase or restrict geographical coverage during each scheme's lifetime.

### Formal geographical coverage

CDM, JI and VCS targets certain credit producer geographies

The geographical coverage of the covered schemes is formally determined by the legislation supporting the individual schemes. JI and CDM are both global in nature, as they allow countries on all continents to participate though with some socio-economic and commitment constraints that limit what countries that can act as host countries for projects. For CDM the geographical coverage is restricted to countries in Africa, Asia, the Pacific, South- and Latin America that are all non-Annex 1 countries (developing). This means that CDM projects can be implemented in non-Annex countries and the credits generated sold globally. The JI geography is restricted to Annex 1 countries of the Convention, which are developed countries in Europe as well as signatories of the KP such as New Zealand, Japan, Canada and others. Buyers of credits from the international schemes (CDM, JI, VCS) represent a broad geographical (and sectoral) scope and are primarily focused on using credits for complying with the binding international emission reduction targets. For example, CDM and JI are used by Annex 1 countries with a reduction commitment under the KP, as well as private buyers covered under an ETS or voluntary buyers (World Bank, 2015). In contrast, the VCS standard does not have any geographical limitations and the scheme is generating international offsets to be used by anyone, however not for KP compliance purposes. It has been observed in this study that voluntary buyers/users are primarily located in the US and Europe.

Credit user restrictions often not decided by scheme

It is common that for the global/multinational schemes the geographical scope is defined for a participating project in terms of host country eligibility but does not restrict the geography for the use of the credits. The (sub)national schemes included in this study limit the geographical coverage for participating projects to the specific jurisdiction within which the individual scheme is setup. Both the Australian and New Zealand schemes confine participating projects to their respective national territories. For example, for Australia's ERF the national government is the primary buyer/purchaser of ACCUs. CCOP shows a different approach, in that the location of the individual projects producing credits is not restricted. However, the primary users of credits are defined by a geographical scope and includes entities covered by California's and Quebec's cap-and-trade programmes.

The individual projects in the EU are defined by a national or regional credit producer context. MoorFutures is limited to three specific federal states in Germany, while the remaining European programmes are limited to national producer credits. As concerns credit users, the geographical scope is limited to national jurisdiction for all the European approaches, with the exception of the HSHF programme where credit users are limited to consumers with access to SPAR products.

**Joint  
Implementation  
developed distinct  
geographic focus**

### Observed geographical scope

It was observed in this study that JI projects are geographically concentrated in countries in eastern Europe (explained by their different Kyoto compliance positions), and that ERUs are highly influenced by the existence – or lack of existence – of low-carbon policies (such as EU-ETS). Several studies (such as Kollmuss et al., 2015; World Bank, 2016a; Zhenchuk, 2012) have argued that the EU-ETS and other climate policies have limited the geographical coverage of JI project implementation due to risks of double counting, which could lead to double rewarding of emission reductions, transactions costs and regulatory uncertainty. However, another study (Shishlov et al., 2012) argued that the JI mechanism has extended the scope of the EU-ETS by including Parties (and sectors) not covered in the EU-ETS. VCS projects have developed from having projects geographically concentrated in Turkey, US and Asia, to a focus on the AFOLU sector and its pioneer position in developing robust criteria for crediting AFOLU projects, including, REDD+ projects clustered in South America and Africa. It has been observed that the number of REDD+ projects have increased after the implementation of the Jurisdictional and Nested REDD+ (JNR) framework, broadening the geographical and jurisdictional scope of VCS projects.

The (sub)national schemes included in this study limit their geographical coverage to a confined jurisdiction and are usually designed to complement other domestic mitigation policies. For example, findings suggest that domestic schemes like the NZ PFSI were better suited to address local emission sources and sectors. An advantage of national or subnational schemes seems to be the opportunity to adjust the scheme and its activities in accordance to a country's specific policy targets.

**EU schemes defined  
by restricted  
subnational  
geography**

As before mentioned, the EU individual programmes are currently restricted to national and federal geography with restrictions of producers and users. Examples include FLBC, HSHF, and Carbon Action. The development of both an offset scheme for France under VOCAL and for Germany under MoorFutures was primarily fuelled by the demand for local offsetting options. Having domestic schemes gives buyers the chance to obtain tangible offsets, potentially of better quality with additional positive effects on the local economy and ecology. However, most of the programmes foresee the geographical scope to ensure transferability to other regions and other European countries in the coming years. For example, MoorFutures has developed an advisory and drafted reports to other German regions on how to develop voluntary carbon credits from regional peatland rewetting projects. Furthermore, SPAR and WWF Austria see the possibility of extending HSHF project to other countries, under consideration of country specific challenges. WWF Austria is also sharing knowledge with other country offices in Europe, especially where SPAR is operating (Haslinger & Mair, 2017).

### Alternative: Domestic plus specific outside jurisdictions

#### Restricted access to specific producer geographies

However, the domestic schemes are not completely isolated. For example, the CCOP allows projects outside California, including US, Mexico and Canada, and attempts have been made to include REDD+ into the California schemes for several years but without successes, potentially reasoned by objections from different stakeholders in California. Furthermore, the NZ ETS was conceived as a nested system under the KP with links to the international carbon market but became a fully domestic scheme in 2015. The decision to de-link has since been reconsidered with an aim to re-establish a high-integrity international carbon market as indicated in their NDC and strategy for meeting 2030 targets. This would likely make the NZ ETS more compatible for international linking in the future. The domestic producer geography with restricted and specific access to certain outside producer geographies for generating credits is a way for scheme owners to increase supply and secure price competition.

#### Lessons Learnt

- > There are different overall approaches to defining geographical coverage. it is both worth considering restricting the participants (projects producing credits) and buyers (users of credits). From a geographical point of view only, limiting credit producer location to a subnational or national space, will allow for more targeted design of the other design elements such as MRV methodologies, baselines and sector or project type eligibility. On the user geography, it is mostly a question of managing demand. Restricting credit use to the same geography as the credit producers, effectively turns the scheme into a regional or national cap-and-trade provided a target is defined, e.g. in the form of a quantitative restriction on emission within the scheme area.
- > A confined credit producer geography can drive regional or national mitigation action and drive optimization of land use and reducing GHG emissions among comparable farmers. The eligibility of produced credits for compliance purposes is an enabler for demand but is rarely determined by the scheme itself in isolation.
- > At an overall level, any scheme developer must decide whether the carbon farming scheme is set up to drive mitigation action within a confined geography or whether it forms part of a cross-sectoral or multinational scheme to reduce costs of compliance with a reduction target.

### 3.3.2 Sector coverage

In this study, sector coverage refers to the inclusion and exclusion of sectors (or subsectors) of project activities. The covered schemes exhibit different approaches in the selection of sectors from broad scope schemes to ones with a more selective scope. This section explains and explores sector coverage set out in the legislation and compares this to the actual development of projects under the schemes, as well as considers alternative approaches to sector coverage development. In general terms, it is found that the more international a scheme is, the more general or wide its sectoral coverage will be. Subnational schemes

are mostly sector specific. An implicit observation is therefore also that there is no international LULUCF or agricultural specific scheme, perhaps notwithstanding REDD+ which is still to generate its first compliance credit.

#### Observed sector coverage

##### CDM and JI: All sectors but LULUCF

The CDM, JI and VCS are schemes with broad sector coverage, ranging from supply side energy efficiency improvements, renewable energy and industrial processes to agriculture and sink projects. While CDM limits forestry projects to afforestation and reforestation (e.g. no forest management projects), there are no limitations for forestry projects under JI. The scheme recognises a number of LULUCF projects as eligible, which would not match the CDM eligibility criteria, including projects on sustainable agriculture, avoided deforestation, and wetland and crop management. Although emission reduction opportunities in agricultural land management and restoration of soil carbon pools on degraded land exist, these opportunities have yet to be exploited and enhanced in both CDM and JI. Several reasons contributed to this such as the late development of a rather restrictive guidance for LULUCF projects or the temporary nature of forestry credits. Further explanations for this observation could be the 2-year delay in the publication of relevant sector-specific UNFCCC rules compared to other project types and in the higher expected returns from the energy and industrial sectors having direct implications for the cost efficiency and thus for investment attractiveness (Larson et al., 2011). However, the exclusion of forestry credits from the EU-ETS probably provides a partial explanation: without access to this major source of demand, forestry credits could not fetch the same price as other credit types (Bellassen et al., 2008). Like CDM and JI, the VCS scheme is broadly sector scoped. However, in contrast to CDM, the AFOLU sector programmes are dominating, as the sector incorporates a wide range of activities related to GHG emission reduction or/and removal, including its pioneer position for crediting REDD+ projects. As the main difference between CDM/JI and VCS is the appetite for land use credits on the demand side and the compliance use of VERs/ERUs, it appears that the *observed* sector coverage is directly linked to and a result of demand side priorities.

##### CFI successful on land and livestock

The domestic schemes included in this study are restricted regarding sector inclusion and include the land sector to varying degrees. AU CFI was limited to carbon credits from activities in the land use sector that lead to emissions avoidance or carbon sequestration projects. CFI included credits from land (AFOLU) and industrial sectors, and in particular carbon sequestration projects have been prominent. The dominance of the land sectors may seem surprising based on observations from other schemes, however, those projects started already with the CFI and were ready to sell generated ACCUs at auctions, when the ERF commenced. More specially, for the IPCC Agricultural Sector there has been limited project uptake, with the exception of livestock management, which could be reasoned by the Australia Pork, a lobby group for the pig producer's industry that developed a methodology and convinced its members to use it. Their previous interest in environmental initiatives and knowledge on cost savings was enough to convince the other members to participate and thus limit the effectiveness of the carbon program (Verschuuren, 2017). The CCOP has limited its sectoral coverage for carbon credits to sectors not covered under the

California cap-and-trade programme, such as livestock management, rice cultivation and reforestation, conservation and avoided conservation projects.

#### All sectors but agriculture in New Zealand

The NZ ETS was initially designed to cover all sectors of the economy, including forestry. Since 2008, the NZ ETS has gone through several iterations, and years of designing and calibrating the sector coverage has led to a staged implementation and gradual inclusion of sectors and project types over time. The PFSI is limited to forest sink projects and only applied to land use conversions into permanent forests, taking place after 1990. Although the agriculture sector in New Zealand is among the most significant emitters, the agricultural sector has not yet been included in the NZ ETS despite a political ambition to do so.

The European programmes are smaller in sectoral scope and some focus only on a sub-sector under the land use or agricultural sector. MoorFutures has a sub-sectoral coverage focusing on creating carbon credits from rewetting and regeneration of peatlands while ensuring ecological and climate benefits. HSHF focuses on carbon sequestration through soil improvements to enhanced quality of agricultural soils and their climate impact, while Carbon Action addresses carbon emissions from the Finnish agricultural sector, including enhancing carbon sequestration and improving soil health. The FLBC program focuses on low carbon dairy farms taking into account the direct emission reduction released on the scope of the project, but also indirect emissions reductions. LBC covers the agricultural and forestry sector, including afforestation/reforestation, improved forest management (IFM) and livestock.

#### Implications of sector coverage designs

The selection of sector scope appears to be closely linked with three other design dimensions: geographical scope, political context, and MRV costs at scheme level.

#### Determines access to mitigation potential

As for geographical scope, broad sector schemes are able to realise a larger absolute mitigation potential by its inclusion of a higher number of possible project participants. This again relates to an economic consideration of sufficient supply of credits to ensure cost efficiency of the scheme itself, and transparent price setting, a challenge the PFSI and the NZ ETS at times faced. Furthermore, for CDM and JI and to some extent the NZ ETS, the purpose of the scheme is to ensure most cost-effective emission reductions to achieve an emission reduction target. Such schemes however often face difficulties mobilising the agricultural and LULUCF sectors.

#### Political context decides

Sector selection can also be driven by the political context, e.g. the policy architecture at a higher level, as mentioned in the case of agriculture in the NZ ETS. ON the other hand, a desire or ambition to promote mitigation in a particular sector can lead to its inclusion into a scheme, as is the case for certain agricultural activities under the CCOP. Lastly, the exclusion of LULUCF credits from the EU-ETS, partly depended on the need to secure stable prices in the ETS and thus reduce inflow of credits. This in turn meant that any agriculture or

LULUCF based European scheme would find very little compliance demand, if any.

**Consistency  
between sectors  
may drive costs up**

In several schemes it was found that simplification and mainstreaming of methods for sector (and geography) wide application led to added costs and uncertainty for project developers. For example, the MoorFutures project restrained from strictly follow the VCS criteria due to prohibited costs of using globally valid standards for smaller scale projects, and instead developed regional and sector specific standards to reduce costs. In general, regional standards with a limited sectoral coverage usually operate within a fixed set of judicial rules and regulations as well as lower costs (MoorFutures).

### Lessons Learnt

- > In accordance with what was observed in the introduction, the covered global and national schemes have had difficulties mobilising projects in agricultural and LULUCF sectors. This is partly because of the concerns around integrity, but also due to marked forces, e.g. lower prices of credits from other sectors.
- > The subnational EU schemes tend to be restricted to one sector or even limited to one or few mitigation actions. Interestingly, the individual schemes/projects almost all target soil carbon either in mineral, organic or peatland soils. This project type is sparsely developed under the other established schemes. This could indicate, that concerning carbon farming for soils, crucial experiences are being gathered these years that may prove more useful to an EU based scheme than the few scattered projects from very different policy and nature contexts.
- > Focused sectoral approaches could be used to provide clear signals as to which types of projects are to be incentivized through carbon offset. The approach was found to be less complex regarding emissions reductions calculations.
- > As for geographical coverage, any scheme developer must decide whether the carbon farming scheme is set up to drive mitigation action within a specific sector, or if it aims at promoting the most cost-effective emission reduction across sectors.

## 3.4 Baseline & Additionality

This subchapter concerns a number of issues of highly technical and often debated nature. Baseline setting, often called reference level in forestry and LULUCF contexts is closely linked to additionality, and again dependant on MRV, which however is covered in its own subchapter.

### 3.4.1 Methodology development

In the context of carbon farming schemes as covered by this study, methodologies and protocols are documents that define parameters and

operations required for the calculations and measurements of emission reductions or removals for the lifetime of a particular project type (Peskett & Brown, 2010a; World Bank, 2015). These documents could either be proposed top-down by the regulator/scheme owner or emerge bottom-up in the case of project proponents developing their own methodologies that could further be used in similar projects once approved by the relevant authority. The covered schemes and projects vary in their approaches to methodology development (see Figure 3-1), and the differences and reasoning for the various design options are the main subject of this section.

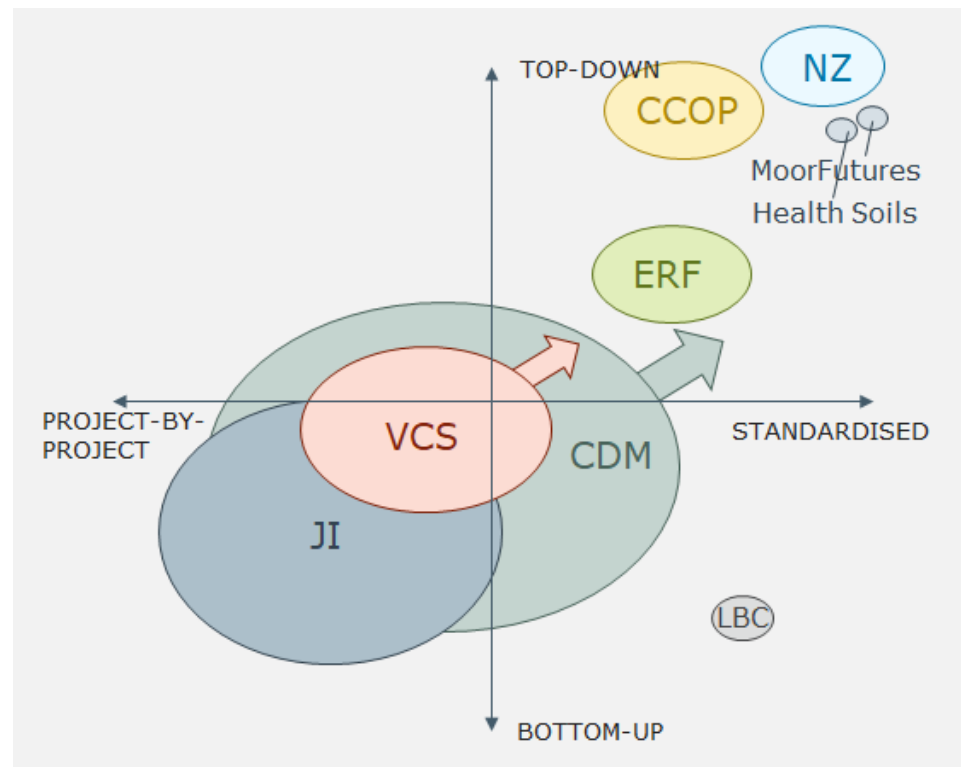


Figure 3-1. *Methodology Approaches of Offset Programmes. Own representation adapted from World Bank, 2015. Bottom-up and top-down refers to the approach to methodology development, whereas Project-by-project and standardised indicate how baselines are set and additionality is determined.*

### Bottom-up vs Top-down

From the schemes included in this study, it appears that international schemes tend to have a more bottom-up approach to methodology development than the domestic schemes, resulting in a relatively broad sector coverage that is driven by demand as compared to the domestic relatively top-down schemes with strict project eligibility criteria, eminent when mapping the schemes included under the study (see Figure 3-1).

### Implications on sector coverage and uptake

The three international schemes (CDM, JI, and VCS) have a bottom-up approach to methodology development. Accordingly, these schemes started off with a few methodologies and the pool of eligible methodologies grew over time as developers, investors and stakeholders realised the need for specialised and

project specific methodologies and undertook the development of the method they needed. In addition, projects under JI and VCS have the possibility of either applying or adjusting a CDM methodology allowing for cross-learning between schemes which again promotes joint standards. An exception forms the recently launched French scheme LBC that started with the development of three forestry methodologies by I4CE and the Ministry of Ecologic and Solidary Transition (MTES). A methodology for whole farm audits of dairy farms that emerged from the project FLBC is currently being reviewed by MTES to be adopted under LBC and a number of stakeholder initiatives formed to explore other sectors (e.g. agricultural soil carbon sequestration, mangrove restauration and an agroforestry method on hedges).<sup>16</sup>

### Finding uptake

An interviewed policy expert reflected on the advantages and pitfalls of bottom-up vs top-down methodology development. The bottom-up approach allows for new and innovative project activities that emerged from the free market and would otherwise not exist. However, this approach leads to a huge array of project specific methodologies that might not be implemented that frequently raise cost-effectiveness questions. VCS tried to mitigate this development risk by remunerating bottom-up development of new and broadly applicable methodologies by rebating 20% of the levy on VCUs issued to methodology developers, when a project uses the developed method.

The CCOP applies a mere top-down approach based on scientific evidence, inspired by methods in existing voluntary schemes (VCS, American Carbon Registry (ACR), and CAR). Experiences from the ERF and CCOP's top-down methodology development showed that this approach might lead to fewer methodologies, yet without guaranteeing that all will find uptake. Thus, the opportunity costs of developing methodologies that do not result in projects have to be borne by the scheme owners. The way of developing the CARBON AGRI methodology under the French LBC mitigated this risk, as the methodology accrued from preceding low carbon projects targeting the French dairy and beef sectors, therefore implying sector awareness and interest.

### Strategic orientation

Schemes with a confined sectoral and geographical scope emerge typically from political will and are naturally top-down. Here lies another advantage of top-down development: Strategic orientation. The two schemes in New Zealand (PFSI and ETS), as well as the German and Austrian mini-schemes MoorFutures and HSHF focus on one specific project type. Policy makers or scheme owners that will promote or incentivise certain mitigation activities or actors (e.g. type of farmers), can use development of methodologies to ease entry barriers.

### Combining bottom-up and top-down

Although the bottom-up approach remains dominant within CDM, JI and VCS, the scheme owners realised the necessity for top-down regulation, e.g. for improving existing methodologies, integrating common tools across methodologies, merging and generalising methodologies on similar practices, and addressing gaps in methodological coverage. A combination of bottom-up and top-down proved most effective in managing the balancing act between

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<sup>16</sup> Confirmed in an interview.

ensuring high integrity of credits and keeping methodologies practical and rather easy to implement.

The young LBC has a rather standardised approach to baseline and additionality which distinguishes it from the other bottom-up schemes, reflecting however the recent shift to top-down regulation. In line, Australia's ERF employs both approaches, but mainly top-down methodologies either to express political preferences (e.g. *Savanna Fire Management—Emissions Avoidance, 2018*) or to streamline and improve existing methods (*Measurement of Soil Carbon Sequestration in Agricultural Systems, 2018* as a result of two earlier methods on soil carbon). Bottom-up developed methodologies mirror sector demand (e.g., *Destruction of Methane Generated from Manure in Piggeries – 1.1, 2013*).

### Financial and technical capacity

A main difference between bottom-up and top-down approaches lies in who is bearing the costs of methodology development. Developing a methodology is a lengthy process that requires financial resources and technical expertise, especially if the scheme implies a high degree of standardisation. Therefore, the domestic schemes ERF, CCOP, NZ ETS and PFSI let public institutions guide the process of development which also entails footing the bill. Technical and sector expertise has been achieved through cooperation with research institutions or private sector organisations. For bottom-up development, only project developers with sufficient technical and financial capacity can develop a new methodology tailored to an innovative project type which is a potential barrier for small scale project developers, as experience from CDM proved. Carbon Action constitutes an example of a current effort to bottom-up development of a methodology on soil carbon sequestration facing financial constraints.

### Public funding support

The French approach to methodology development includes a large stakeholder engagement and has been financed by European funds and programmes, i.e. EU LIFE funds (the projects Beef Carbon and Carbon Dairy leading to the CAP'2ER tool used in FLBC and the CARBON AGRI methodology under LBC) or the European Regional Development Fund (ERDF) in case of the forestry methodologies under LBC. With this approach, methodologies are likely to find uptake as the stakeholder's guide discussions on what sectors and mitigation activities to consider. According to interviewed methodology developers under LBC, the French Environment and Energy Management Agency (ADEME) showed willingness to finance the development of further methodologies to be included under LBC.

### Compatibility with IPCC guidance for National GHG inventories

Another important aspect of methodology development is consistency with the IPCC guided principles for national inventories. Although national GHG inventories are different in nature from project level MRV and accounting, the two need to be linked for various reasons. First, as seen in the case of the NZ ETS and PFSI, the credits issued for mitigation action are issued by the government, which thereafter needs to ensure that the emission reduction or carbon sequestration is not accounted for towards international targets, to prevent double counting. In the KP CP2 period, this means that any credit issued

for IFM, must be counterbalanced by a deduction/debit in the accounting under the Forest Management Reference Level of New Zealand. Secondly, national inventory compilers will want credits to be based on baseline setting, default factors, land classification and uncertainty ranges compatible with those applied for the same land use category (or activity), in the national inventory.

For CDM and JI, the IPCC consistency is integrated from the start, yet does not prevent national inventories in the host country from applying a different methodology, approach or tier. Therefore, for JI the default approach has been to deduct credits as simple reduction in accounting emission reduction at the end of a compliance period and just before closing accounts. For NZ ETS, a similar approach is adopted. For VCS, the issue is relevant in the context of double counting both at the host and user country level, however by adopting the CDM principles, this is addressed.

For national or subnational schemes without access to international trade in credits, the consistency and compatibility between national and project accounts is mainly a domestic issue. For the methodologies investigated for CCOP, and the European schemes there is no indication that IPCC methodologies have been used as more than inspiration.

### Lessons Learnt

- > A reasonable bottom-up approach where the regulator streamlines and ensures that project-specific methodologies are broad enough to be replicated requires some degree of top-down regulation to reduce complexity and ease operation and governance.
- > Top-down development of methodologies ensures the strategic orientation and particular focus on mitigation activities and geographies. Governments or scheme owners wanting to promote a certain type of mitigation activities can develop and make available methodologies, and thereby remove entry barriers.
- > The technical and financial resources required for methodology development constitute a major bottleneck to bottom-up methodology development in particular for small-scale developers. Broad stakeholder engagement can balance out the advantage that bigger private sector organisations have to promote their methodologies while ensuring participation in the scheme. Responsible ministries and agencies should consider allocating funding for methodology development.
- > In order to incentivise private actors to engage in the resource heavy and lengthy process of methodology development while ensuring that bottom-up developed methodologies are more broadly applicable; scheme owners can remunerate developers if their methodologies are being used by other projects.
- > The International Schemes and the NZ-ETS/PFSI are or have been linked to international carbon markets for government compliance, and therefore have

installed requirements that should prevent double counting and allow for transparent incorporation into KP accounting by both the project host country and the buyer country. These requirements do not ensure that all project methodologies are compatible with host or buyer country inventory practices but secures that IPCC standards as concerns MRV are complied with.

- > For the CCOP and national schemes in the EU, the methodologies are (not yet) consistent with IPCC standards, although in the case of MoorFutures the standard applied is based on international experience.

### 3.4.2 Additionality

- > At the core level of additionality is the simple concept that a project will be additional if it can demonstrate that the emission reductions or removals occurred only due to the intervention of the scheme (see explanation under 1.1 and definition below). Project developers must ensure that their projects result in real and measurable climate change benefits and should be additional, i.e. *"anthropogenic GHG emissions are reduced below those that would have occurred in the absence of the project activity"* (UNFCCC, 2002: CMP.1 Art.43). Additionality is an important requirement for offsetting mechanisms where emission reductions achieved through offsetting projects elsewhere permit the implementing party to emit more GHG than their assigned Kyoto targets. Thus, a non-additional offset would, thus, result in an overall rise of global GHG emissions (Alexeew et al., 2010).
- > Seemingly simplistic, additionality is one of the more complex aspects of a carbon pricing scheme as it makes it necessary to find a balance between ensuring stringent requirements while still maintaining consistent uptake at the project owner level. In Art. 12.5(c) of the KP, additionality is determined by *"(a) voluntary participation approved by each party involved; (b) real, measurable, and long-term mitigation benefits; and (c) reductions in emissions that are additional to any that would occur in the absence of the certified project activity."* While this definition offers what seems like a basic demonstration of voluntary participation, additionality directly follows baseline setting, which also has different approaches across schemes (see 3.4.3 *Underlying Baselines*).

#### Approaches to Additionality

- > As outlined in Table 3-5 below, there are four approaches to additionality: Environmental, Financial, Technological, and Legal, under which the schemes' approaches can be classified.

Table 3-5. *Additionality concepts and definitions. Adapted from World Bank, 2016b.*

| Additionality concept       | Explanation                                                            |
|-----------------------------|------------------------------------------------------------------------|
| Environmental Additionality | > Activity is additional if it leads to lower emission level than BAU; |

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                | <ul style="list-style-type: none"> <li>&gt; Not relevant whether other factors would have resulted in mitigation action (e.g. higher profitability);</li> <li>&gt; Implicit assumption that all actions that lower emission level face barriers, therefore requires accurate assessment of the baseline scenario.</li> </ul>                                                                                                                                                                                                                                        |
| Financial<br>Additionality     | <ul style="list-style-type: none"> <li>&gt; Activity is additional if it leads to higher costs or relatively lower profitability than would have otherwise occurred;</li> <li>&gt; Assumes that project proponents are profit-maximising which a strong assumption often refuted by reality due to do-good mentalities, limited information, and financial constraints. In addition, projects are often proposed by public authorities, i.e. typically not profit-maximising;</li> <li>&gt; Profitability rates are dependent on variable carbon prices.</li> </ul> |
| Technological<br>Additionality | <ul style="list-style-type: none"> <li>&gt; Activity is additional if it leads to the accelerated deployment of a technology than would have otherwise occurred;</li> <li>&gt; Typically based on barrier or common practice analysis</li> <li>&gt; It is difficult to estimate future penetration rates and assuming incorrect penetration rates for BAU might lead to non-additional projects being accepted</li> </ul>                                                                                                                                           |
| Legal<br>Additionality         | <ul style="list-style-type: none"> <li>&gt; Credits shall not be earned for actions that are mandated by law to achieve compliance with policy requirements.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                             |

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## Environmental Additionality

Environmental additionality occurs if the project is producing emission reductions beyond the baseline scenario. This form of additionality generally takes into account emissions without any other factors such as financial gains or technological investment, among others. It has been criticised for being too simple, yet it is used by both CDM and JI. Both schemes clearly stipulate that projects are additional if '*anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity*' (World Bank, 2016b). For the LBC whole farm approach, the demonstration of additionality is primarily focused around emission reductions as a result of the scheme. The CARBON AGRI report is concentrated around the carbon intensity of milk and beef production and how the approach itself is additional because it will cause a reduction in the emissions from dairy farms. Beyond this, CDM and JI also consider technological additionality and CDM factors in financial additionality under 'Investment Additionality,' which is covered below. LBC also takes into account current regulation, which would be classified under both financial and legal additionality. In order to test for additionality, CDM uses two separate tools: one specific to additionality and the testing for baseline scenario included in the other. These tools are used as guidelines for project participants, but through the EB, project participants are welcome to develop or propose alternative methods to test for additionality for consideration by the EB (see Bottom-up approach under 3.4.1 *Methodology development*). Under JI, the CDM tools are frequently used. CDM incorporates environmental additionality mainly in its barrier analysis test (discussed further below), which is also used in testing for technological additionality. For other

schemes, additionality goes beyond environmental additionality to consider legal, technological as well as financial additionality.

#### Financial Additionality

Financial (or Investment) additionality requires a project to demonstrate that it has relatively low profitability compared to the Business-as-usual (BAU) scenario. Across all of the major schemes besides Australia (CDM, CCOP, JI, NZ ETS, and VCS) financial additionality acts as a mechanism to protect project-owners from profit-maximizing investors. In order to maintain the environmental integrity of the scheme, the financial additionality factor allows for projects that may not be the most economically viable, but result in the most emission reductions, are chosen. For VCS, the determination for additionality is almost identical to that of CDM as it is adapted from the CDM tool for determination of additionality. For CDM (and consequently VCS), this criterion is in place to protect rural and low-income communities that are most “in need” of help in implementing environmentally focused projects that also provide non-financial benefits (Au Yong, 2009). A criticism of investment additionality is that it relies specifically on prediction of project profitability, which in turn is determined by the price of credits. This assumes that every investor is financially motivated and makes decisions that solely incorporate the profitability of a project, rather than its environmental integrity. LBC forestry methodology relies on the calculation of benefits (net value added) of the project to demonstrate the project is most cost-effective, which further leans on the need for sufficient and accurate data. In relation to this, which also corresponds to legal additionality, is proving that there is no significant existing public aid (<50%).

#### Project exclusion

- > Furthermore, by requiring that projects show financial additionality, the possibility arises of excluding projects that might otherwise be valid. Landowners who are already motivated by environmental benefits and GHG mitigation may be ineligible to receive credits because they are already operating beyond the BAU scenario before the scheme was initiated. For example, a livestock farmer may already have technology in place that captures methane because of previous environmental awareness, something that another livestock farmer would only put in place with the incentive of a crediting scheme. Financial additionality has the potential to punish project owners to ensure that money invested in projects is going to the projects that are the most in need. This can lead to a nonoptimal scenario as the exchange between the beneficiaries is skewed.
- > In CCOP, financial additionality is considered as part of three-pronged approach to assessing additionality within the regulatory analysis. The approach determines additionality through the lens of regulation, common practice, followed by barriers to implementation. The CARB staff examines, under the scope of barriers to implementation, whether there are cost barriers to employing technological or mitigation methods. In this way, CCOP also relies on technological additionality as a determination for overall additionality. For NZ ETS and PFSI, financial additionality arises in the fact that all projects that are commercial forests, will forego income that could be gained from frequent harvest to rely on carbon payments. In this way the forestry projects will be additional as they are not motivated by immediate profit. Same applies to the German MoorFutures mini scheme as

rewetting and conservation of peatlands is less profitable than using the land for agriculture.

#### Technological Additionality

Technological additionality governs whether a certain technology is put into use as a result of the scheme. It is typically calculated based on the progression of that technology in the host country and the level of penetration in the market. Technological additionality is, for the most part, easy to determine as technologies are typically easy to track and report on. On the other hand, it is also quite simplistic in may underestimate the actual spread of technology as it assumes that an estimate of a future penetration rate for a technology is only reliant on a few factors (World Bank, 2016b). Under CDM, technological additionality is accounted for within the barrier analysis in that one barrier to implementation can include technological setbacks (incl. labour and regional availability).

#### Legal Additionality

Legal additionality is understood that any emission reductions cannot occur as a result of what would otherwise be required by policy or regulation in the project area. Overarching CCOP's determination of additionality is the legal requirement, as it is common for states to have varying policies with more and less stringent environmental requirements for landowners. In determining additionality, CARB staff establish whether a given project is already common practice in the specific region (typically state) where it is located. In doing the analysis, they consider technological and cost barriers in the region. The Australian ERF is similar in this regard through regulatory additionality. LBC also requires that a project go beyond the legal requirements or common practice for a given region. MoorFutures, on the other hand, has no uniform guidelines for satisfying additionality, but still public aid is considered. Similarly to LBC, this is an economic criterion mainly with a focus on public assistance making it a legal additionality feature as well.

#### Determination

Determination of additionality is structured differently across each scheme with CDM, JI, and VCS determined on a project-by-project basis with self-reported data. In JI, additionality requirements are set by the host Party under Track 1. Under Track 2, JI typically uses the CDM additionality tool. On the other side are programmes with a more selective scope (CCOP and CFI/ERF) and use a standardised additionality determination. If a project is eligible for the scheme, then it is automatically considered additional. Beyond this, the determination of additionality is also conducted through a number of tests, briefly mentioned in the passages above: Barrier and Common Practice Analysis as well as through the use of positive and negative lists. The text below attempts to highlight the link between the determination methods and concepts presented above.

#### Barrier, Common Practice and Investment Tests

Barrier and common practice analysis are used across the different types of additionality and have implications across all the relevant schemes. In CDM methodologies, the additionality verification is done through barrier, investment and common practice tests at the project level, where there is a good chance that project owners are responsible for their own additionality tests. Barrier analysis makes sure that the proposed project has some obstacle to implementation, in order to justify the investment of funds and credits; the

investment test investigates how economically attractive a project is in comparison to another similar project; the common practice test analyses whether the project has already gone beyond its regional traditional practices (Schneider, 2007). Investment analysis here specifically falls under financial additionality explained above. Common practice additionality is used mainly in the realm of technological additionality and it is important when using this kind of test to ensure that geographical scope is taken into account, as different types of technology may be available only in certain areas, depending on a variety of factors. It typically involves using a threshold penetration rate above which a project is deemed additional. These rates rely on accurate data as well as a stringent third-party verification method, which may be hard to come by depending on information transparency in the project area (World Bank, 2016b). CDM, CCOP, VCS, and JI all utilise the common practice test in determining technological additionality. For VCS the common practice test is complementary to the barrier analysis in earlier steps of the determination process.<sup>17</sup> Technological, common practice and barrier analysis are also used in CCOP within the positive list system.

### Positive lists

Some schemes also rely on a checklist (positive and negative), which specify eligibility for projects including methodology and activity requirements including determination of additionality. A number of methodologies under VCS and CDM apply a positive list aligning with the framework for standardized methods (leading to more top-down approach). Projects on a positive list are automatically deemed additional. The Australian CFI employed a positive list approach, which has since been discontinued due to its complexity. The checklist method is streamlined and works best for projects where there is narrow set of methodologies. A more focussed scope works for checklists as it simplifies the process of approving a project and, consequently, deeming it additional. CCOP only has six protocols, each with a strict method to approve projects and ensure additionality.

### Lessons Learnt

- > A combination of additionality categories provides a more accurate representation of additionality. Environmental or technological additionality are too simplistic on their own.
- > A split between different determination methods across schemes highlights the fact that top-down determination can be complex on an international level. Domestic schemes are more conducive to using positive lists, or automatic eligibility requirements.
- > Using a step-by-step approach (CDM, JI, VCS) for additionality (barrier, common practice, and investment analysis) allows project owners to choose how many tests they would like to use. Allowing for autonomy on the project level is a plus for bottom-up approaches.

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<sup>17</sup> VCS, *Tool for the demonstration and assessment of additionality in VCS agriculture, forestry and other land use (AFOLU) project activities*, Version 3.0.

- > Data availability and third-party analysis is important when testing for and verifying additionality especially in barrier and common practice analysis as they rely on penetration or threshold rates.

### 3.4.3 Underlying baselines

In crediting mechanisms, the baseline represents a level of emissions against which change resulting from project activity is measured. The baseline should therefore represent a scenario of emission levels in the absence of the project (BAU). To get credit for emissions reductions, a project must lower emissions below the established baseline (Peskett & Brown, 2010d). The section **Error! Reference source not found.** on *Additionality* introduced the concept of additional emission reductions/removal enhancements and compared different approaches and tests for additionality. The baseline is the level against which the quantity of additional emission reductions/removal enhancements (thus credits) is measured.

This section compares how schemes set baselines. In particular, whether emission reductions are measured in relative or absolute terms, what data is used for determining the baseline and whether project-by-project or standardised baselines are applied.

#### Absolute vs Intensity Baselines

Emission factor and activity data

All baseline emissions are a product of the activity that would occur in the absence of the project (baseline activity) and the baseline emission factor, i.e. emissions per unit. Whereas absolute baselines estimate both the level of activity and the emission factor for the crediting period, intensity baselines merely establish the baseline emission factor in advance and baseline emissions are established at the time of crediting by multiplying the actual activity with that emission factor. Therefore, an apparent disadvantage of intensity baselines is that both actual emissions and the actual activity must be measured whereas the absolute baseline relies on estimates for the baseline emissions and only actual emissions need to be measured. Linked to this, intensity baselines can only capture emission reductions from activities that can be clearly defined, as opposed to most carbon farming projects. Agricultural sinks and sources are diffuse, and one farm might produce multiple goods, rendering intensity baselines challenging (Australian Climate Change Authority, 2014b).

Differences between baselines

Baselines measure absolute emission reductions (i.e. one tonne of CO<sub>2</sub>e per credit). However, the absolute baseline is established *ex ante* and the intensity baselines allow crediting even though overall emissions might have increased (due to enhanced activities). The absolute baseline consequently disregards any external factors that could change over the period, which means that project proponents could manipulate their baselines by artificially boosting emissions if not prohibited historic data requirements (see below). The intensity baseline assumes that the level of activity remains constant, therefore possible and probable efficiency gains or losses resulting from the project activity remain ignored.

CCOP only employs absolute baselines, while AU ERF employs both absolute and intensity baselines, depending on the methodology. CDM determines baselines project-by-project, therefore both intensity and absolute baselines are used. The CARBON AGRI methodology to be included under LBC and built on the experiences from FLBC uses an intensity baseline. Two interviewed stakeholders did not show concern regarding the possible raise in total emissions due to the programme as the market would regulate the total emissions through demand for animal products and indeed the number of dairy farms in France continue to decrease. Experiences from FLBC showed that the activities implemented have reduced the emission intensity per litre of milk, but also per bovine head and farm level because the animals are more efficient.

The global demand for dairy products is expected to grow and a reducing number of farms does not necessarily go along with decreasing emissions. Since FLBC demonstrated that lower emissions are correlated with better economic performance, farms might expand, and the scheme does not lead to overall emission reductions.

#### Historical vs projected data

There are certain data requirements in order to develop an appropriate and realistic BAU baseline. Scheme owners could either require historic data, projections or a combination of both.

**Historic reference level** If measurement systems are already in place, historic data is the most cost-effective option. Measuring emission reductions/removal enhancements against historic data, however, does not account for external circumstances that affect emission, for example economic recessions. Averaging, smoothing and excluding outliers can help to provide a more realistic picture (Australian Climate Change Authority, 2014b). Therefore, historic data is only appropriate when the level of activities is expected to remain stable. In addition, in anticipation of engaging in crediting schemes, project proponents could boost their emissions artificially to arrive at a less ambitious baseline. Projections are more complex and resource consuming than historic data, due to high data requirements and inherent judgements and calculations. Furthermore, such projections rely on assumptions that may be uncertain.

#### Examples from schemes

In reality, projects work mostly with either combining historic and projected data or mere projections. The methodology on Plantation Forestry, 2017 under AU ERF relies on simulation scenarios that are entirely projection-based. For stratification, Carbon Estimation Areas (CEAs) must be defined under this methodology. The baseline scenario simulates the management actions of the default baseline management regime, recurring with a period of 12 months between rotations and any natural disturbance that has occurred at the time of the simulation. VCS' methodology for Sustainable Agricultural Land Management (SALM) (VM0017) relies on a CDM baseline calculation methodology for fertiliser use and for removals from woody perennials. The rest is derived from historical data. For reforestation and IFM projects under CCOP's U.S. Forestry protocol, the baseline modelling relies on both initial field inventory measurements and

modelled harvest volumes. For avoided conversion, the baseline modelling relies additionally on expected land-use conversion rates.

### Standardised vs project-by-project determination

There are various ways of deviating from a project-by-project approach and standardising approaches to baseline setting, i.e. the use of common methods, factors, and equations applicable across multiple methodologies, emission intensity benchmarks, and the use of positive lists. Standardisation tends to reduce costs and risks.

Comparing schemes in terms of methodology development, Figure 3-1 indicates that schemes that are developed top-down tend to use standardised baselines. Another trend apparent from the figure is that the younger schemes tend to refrain from individual project baselines.

### Advantages of standardised baselines

Despite not accurately reflecting project-specific circumstances, standardised baselines provide several advantages. Standardised baselines are cost effective and easily applicable. They further render projects comparable. Using common practice benchmarking rewards early movers and impedes that laggards receive payments for something that is already broadly implemented, thus reducing the need to conduct common practice additionality tests. In order to register an LBC forestry project, the project proponent needs to simply enter a few parameters (such as number of trees planted or area of the project plot) and consequently obtains the baseline against which removal enhancements are measured. For afforestation and reforestation projects, the project proponent can choose to certify his project specific fertility class or opt for a standard factor ("medium" fertility class), against a small penalty (10% discount).

The project-by-project approach of JI led to a number of projects that were challenged for weak environmental integrity, resulting in potentially low-additionality ERUs distorting the market. An interviewed farm advisor observed that some French dairy farmers who participated in FLBC found the farm specific baseline setting burdensome and would not pay for it themselves, even when reimbursed through carbon credits. They perceive that the time and costs connected to the individual farm data collection would eat all the benefits from the carbon revenue.

### Difficult to capture reality

However, standardised approaches might be too imprecise to capture project results. The development of a CDM methodology on feed supplements was challenged by the high variability of emissions by breed, feed characteristics and region, thus it was not accurate to use national averages. The project baseline uses for calculating emission reductions the specific emissions by the farm's production categories, i.e. groups of large ruminants categorised based on level of intensity and presence of genetics and uses a stratified multi-stage cluster baseline survey to determine production categories.

### Lessons Learnt

- > Intensity baseline might lead to overall emission increase if mitigation activities are likely to result in economic gains.

- > Standardised methodologies are more objective and less costly to implement but likely lead to more windfall effects. A mix of standardisation – eg. positive lists for rare technologies – and customized baseline setting may be optimal. Methodologies may also leave the choice to project proponents, as in the Label Bas Carbone, with a penalty proportional to the level of standardisation. Two other approaches promoted by academics to reduce windfall effects are the stringent baselines (AU ERF) and imposing the enrolment of large areas to avoid cherry-picking.
- > The assumption that land use would remain identical over a long-time span seems unrealistic and due to the outlined uncertainties and imprecisions, baselines should be reviewed on a regular basis. The AFOLU projects under VCS are required to renew their baselines every 10 years which seems reasonable in light of project lifespans up to 100 years.

### 3.4.4 Carbon leakage

This section deals with observed approaches to address (carbon) leakage and ways and options for minimising and/or preventing leakage within. For the purpose of this study, carbon leakage is defined as the displacement of economic activities that directly or indirectly result in GHG emissions to be displaced from a jurisdiction with GHG constraints to another jurisdiction with no or less GHG constraints. This displacement could potentially lead to an increase in their total emissions (EC, n.d). This potential displacement is a result of the asymmetric climate change (and environmental) policies, costs and prices in different regulatory areas, such as national, regional and local, as well as the difference in carbon prices at a global scale. Leakage may occur through activity shifting, for example if the farmer moves animals out of the project farm land to a farm outside the project area but does not end the activities. Another way is through market leakage which could occur if several farmers decrease output potentially resulting in increased market prices that induces additional farming activities to increase elsewhere.

#### Observed approaches to account for and prevent leakage

#### CDM, JI and VCS

Leakage is observed to be addressed in relation to baseline setting, additionality and permanence in carbon schemes and initiatives to ensure environmental integrity of the GHG reduction measures. Determination and quantification of potential/occurred leakage to ensure leakage is properly accounted for are required in CDM, JI and VCS schemes – however, the specific accounting rules vary between project methodologies. The *CDM modalities and procedures* for example include leakage in terms of "measurable" and "attributable", and the precise accounting rules for leakage depend on the project methodology. Furthermore, some CDM methodologies require the Project Design Document (PDD) to also elaborate on the procedure for periodic review of measures to minimise leakage (REDD desk, 2016a; Dinar et al., 2013; UNFCCC, 2011a). In demonstrating additionality, JI project developers have to provide information on how leakage will be assessed and how to avoid indirect negative effects, such as increasing GHG emissions, outside the project scope. Under JI (Track 1) requirements for leakage accounting is decided upon by the project host Party.

However, typically the rules are based on Track 2 (which again copies the CDM approach) stating that project participants must undertake an assessment of the potential leakage of the proposed JI project and identify and illustrate necessary sources of leakage to be considered. Such sources are to be quantified and a procedure provided for an ex-ante estimate included under the baseline setting (World Bank, 2015).

#### AFOLU projects under VCS

Like for the CDM, specific accounting rules for leakage vary by project methodology. Accounting for leakage is mandatory for all VCS projects. In particular for VCS, AFOLU projects must account for relevant market, activity shifting and potential ecological leakage, if the leakage in tonnes of CO<sub>2</sub>e is found to be more than 5% of the project emissions. VCS excludes any kind of positive leakage, meaning emission reductions or sequestration outside of the project area due to the project activity. The VCS method for estimating emissions from carbon pools (e.g. soils) from activity shifting out of the project area mirrors the CDM method for leakage monitoring for A/R projects. Both offer a mandatory and a back-up approach, where the former entails monitoring activities of a subset of agents (e.g. farmers) within the project area during the project implementation. If changes are observed over a five-year period, an assessment of starting point (carbon stock) and change of carbon pools must be undertaken, and emissions estimated. The back-up approach relies on a leakage belt being considered around the project, where activities are to be monitored. A similar methodological module exists for domesticated animal activities and for marked shifting. For market shifting, the project owner must *"Identify all commodities or services whose supply may be reduced on a local, regional, national or international scale due to implementation of the project activity"* and determine barriers and markets pre and post the project activity, before outlining replacement paths and the ways for which emissions can be estimated. For all methods and modules, any leakage emissions must be included in the ex-post crediting estimate. For REDD+ projects under VCS, the leakage can be accounted for through leakage sharing agreements, a leakage belt and simplified leakage deduction factors (REDD desk, 2016c; World Bank, 2015).

#### Leakage in domestic schemes

Leakage is also included in domestic schemes. CFI project methodologies are to consider all sources and sinks directly or indirectly affected by the project which must be estimated and accounted for in cases where there is a decrease in production. More specifically, activity shifting leakage is dealt with in the design of project methodologies and must be accepted by the project administrators before the endorsement of a methodology. Accounting for leakage could potentially result in the making of a leakage deduction in the calculation of the abatement or sequestration number. However, the CFI does not require accounting for leakage to other countries outside the scheme geographical coverage, which could potentially lead to displacement of carbon emissions (REDDesk, 2016d).

For the CCOP, Compliance Offset Protocols are required to account for potential leakage from activity-shifting for the offset project type, unless leakage risks are eliminated through eligibility conditions (World Bank, 2015). Whereas the risk of leakage can be minimised if an offset scheme creates a closed system with clearly defined boundaries, the Californian scheme allows for flexibility with

changing and incomplete boundaries. This is due to the exclusion of some industries in its accounting framework and because projects are not limited to the state of California (Marland, 2017; World Bank, 2015).

The NZ ETS accounts for leakage in the energy and transportation sector, through the allocation of NZUs. In the land-use side of the ETS, the risk of carbon leakage is partially eliminated through the exclusion of the agricultural sector in the scheme. Leakage was cited specifically as a reason to keep agricultural emissions out of the ETS due to the global movement of agricultural products (Catapult, 2018). In MPI's Guide to the PFSI, leakage is not mentioned and is not specifically required in the calculation of forest carbon storage.

#### EU Initiatives

The EU initiatives included in this study provide limited information on specific rules and approaches to account and prevent for potential leakage but refer to and uses criteria and standards under other schemes. For example, MoorFutures standards are based/build on the criteria of VCS and the KP and provides additional updates on for example how to avoid/minimise leakage by site selection.

#### Quantifying LULUCF leakage

##### Challenges and opportunities for preventing leakage

In a situation where complementary and compatible carbon farming schemes covered all farms in all countries, leakage would not be an issue. However, in the absence of wall-to-wall coverage, accounting for and preventing leakage from activities on different scales and sectors are challenging. Quantifying leakage in LULUCF activities can be particularly challenging. For example, under afforestation and forest restoration projects, the participants banned from fuelwood extraction are usually faced with a challenge of replacing the firewood with an alternative fuel or/and finding another source of firewood that could induce leakage or threaten the permanence (Dinar et al., 2013; UNFCCC, 2011a). Furthermore, leakage could occur if farmers for example decreased afforestation outside the project area in response to increased afforestation on project farms, or leakage could be driven by changes in market prices. Another option is to require participatory farms to report on expected change in land use and expected GHG impact outside of the participation farm as a result of their scheme participation. However, this setup will require the development of MRV methods for leakage estimation and could lead to increase complexity and responsibility for project participants. For example, the Californian programme has already been criticised for placing the burden of leakage on project owners without granting control or ownership over these – however, this approach has found to be the most optimal to ensure market efficiency (Marland, 2017).

#### Variation in leakage quantification methods

From this study it appears that the covered schemes have very different methods for dealing with leakage. Some schemes have no requirements, while those that have demand very different levels of detail and scope. For some schemes' (e.g. CDM and CFI) incremental improvement and learnings, means there are inconsistencies between older methodologies that did not include leakage in the baseline calculation and the updated and reviewed methodologies that include such calculations. This means two similar projects, developing

credits in parallel for 10-20 years or more, will not produce the same amount of credits from similar activities.

### Lessons Learnt

- All the global schemes require the project owner to estimate carbon leakage through activity- and market shifting out of the project area, and account for (subtract) them ex-post before crediting. The methods applied are similar and involves either a substantial and demanding multi-annual monitoring system or depends on many assumptions.
- From a climate change point of view carbon leakage carbon farming activities aiming to reduce GHG emissions need to induce carbon leakage which results in an increase of emissions elsewhere to be an efficient project/measure. For example, carbon schemes and projects could potentially reduce leakage by ensuring higher interconnectivity between sub-sectors and scale. On local scale, addressing leakage from a whole-farm approach would be beneficial.
- While there is convergence of principles behind methods for estimating leakage across the scheme that consider this issue, there is not general agreement of level of detail and scope of the estimation. It is a complex matter, for which more methodological development appears to be needed.

## 3.5 MRV of climate impacts

MRV refers to the activities that project developers (and countries) need to take to collect data on emissions, mitigation actions and support, and aims to ensure that the number of carbon credits issues are reliable and equal to the achieved GHG reductions. The sections below provide a description and comparable analysis of the MRV procedures of GHG emissions used in existing carbon schemes relevant for land use and carbon farming practices. The schemes are analysed along key MRV criteria such as approach to data aggregation and monitoring, reporting and verification procedures, as well as potential challenges related to uncertainty and costs proving value lessons for the development of existing and new carbon (farming) schemes.

### 3.5.1 Monitoring

#### Regulatory monitoring requirements

Monitoring refers to the collection and ongoing control of data for all variables necessary to calculate GHG emissions and carbon credits generated at project level within a given scope and timeframe. The identified carbon schemes and programmes include a variety of monitoring approaches from direct measurement to the use of proxies, which are typically defined in a scheme or project methodology. Furthermore, some schemes and programmes include requirements to estimation and calculation of monitoring uncertainty between the estimated and actual GHG emissions reduction.

### CDM and VCS: Monitoring plan and international standards

In the CDM, monitoring requirements are defined in the methodologies in accordance with guidance documents and standards provided by the CDM EB. All CDM projects are required to develop a monitoring plan which should include a justification of the choice of methodology and its applicability and identify and regularly measure (or estimate) GHG emissions from sources within the project boundaries (Grimault et al., 2018; Bellassen & Stephan, 2015). Under CDM, monitoring standards differ from small- and large-scale projects, with simplified procedures allowed for small scale projects. The monitoring standards stipulates applicability conditions, carbon pools to be included and the simplifications that the project developer as allowed to apply, e.g. what emission that can be excluded. monitoring standards further suggests how to stratify the project area in the case of vegetation and presents algorithms for calculating sinks and sources (see e.g. AR AMS0004 and AR-AM0014, both for afforestation). For JI, the approach is different as the criteria for monitoring and baselines setting is defined in one document common for all projects, called the *Guidance on Criteria for baseline setting and monitoring*<sup>18</sup> which was first released in 2005 and revised and adopted in version 3 in 2011. The guidelines distinguish between Emission Reduction and Removal projects and sets out that any LULUCF sector project must be developed in accordance with monitoring procedures defined in IPCC Good Practice Guidelines for LULUCF inventories, to ensure that any RMU issued can be subtracted from the host party account. The monitoring procedures of the IPCC GPG are general and designed for country wide coverage, so project specific adaptation will be needed for each project. For ER projects, JI project developers can either fully or partially apply CDM methodologies, develop their own methodology subject to host party approval, or use a methodology developed by another JI project proponent which has been approved. This system is the result of the host country dependant governance structure covered previously, and in reality leaves a lot of room for varying monitoring systems for Agricultural Sector projects. In combination, the JI and CDM system offers a long list of methodologies for Carbon Farming projects which contains different monitoring regimes, including frequency of measurements. Common for all is that there are no mandatory values given, but that algorithms, procedures and system designs are defined, leaving the exact design to the individual project developer.

Some overall requirements on monitoring uncertainty are included in the CDM guidance e.g. *Materiality Standard* and the *Standard for Sampling and Surveys for the CDM and Materiality Standard*, however, these differ between methodologies. Certainty requirements for sampling error activity data and requirements are included in specific CDM methodologies and should be estimated on project level. Sampling error activity related to surveys and samples, are required to be include in the monitoring plan in which inter alia uncertainty levels of variables shall use 90% or 95% confidence level depending on the project scale.

VCS monitoring requirements are defined in each methodology in compliance with VCS standards and is required to provide a monitoring plan, in which the calculation of applied uncertainty factor should also be included (World Bank,

<sup>18</sup> [https://ji.unfccc.int/Ref/Documents/Baseline\\_setting\\_and\\_monitoring.pdf](https://ji.unfccc.int/Ref/Documents/Baseline_setting_and_monitoring.pdf)

2015). Monitoring requirements for JI projects are indicated in a monitoring plan and set by the JI project host Party. JI Track 1 rules are typically similar to the Guidance on criteria for baseline setting and monitoring under JI Track 2 (UNFCCC, 2006; REDD desk, 2016b).

#### Standard national monitoring frameworks

For the Australian CFI and ERF, monitoring must be performed according to rules set out in approved standard methodologies. For example, under CFI's Reducing GHG Emissions by Feeding Dietary Additives to Milking Cows methodology strictly outlines that monitoring involves tracking the number of milking cows in the milking herd. Beyond this, the project owner must do so using an animal identification tag or another unique identifier and must be counted once per month in each year of the baseline and each project year. For both, PFSI and NZ ETS focusing on forest, carbon is measured applying the UNFCCC inventory reporting guidelines and KP accounting guidelines and default emissions factors. MRV follows a self-assessment model beyond which the government can conduct audits to check for compliance. The CCOP differs from the other as the monitoring requirements are linked to local jurisdictions. Each specific protocol contains basic monitoring requirements, but refers to the Monitoring, Reporting and Record Retention Requirements for Offset Projects within the Official California Code of Regulations (the Regulation (95976).

Table 3-6. Overview of overall approach to monitoring and uncertainties management for each scheme.

| Scheme | Regulatory monitoring requirement                                                                                                                                                                                                                                     | Uncertainty requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CDM    | <ul style="list-style-type: none"> <li>&gt; Defined in methodologies and guidance and standards</li> <li>&gt; Sector-specific methodologies for monitoring</li> <li>&gt; Monitoring plan (in PDD) including</li> <li>&gt; Variety of monitoring approaches</li> </ul> | <ul style="list-style-type: none"> <li>&gt; Uncertainty assessments for default values and parameters (e.g. emissions factors) are only to be described but does not necessarily need to be quantified</li> <li>&gt; CDM guidance provides maximum level of uncertainty allowed for sampling error activity data and requirements included</li> <li>&gt; Accounted for on a project level by incorporating national and local data already available in order to establish some sort of consistency</li> </ul> |
| JI     | <ul style="list-style-type: none"> <li>&gt; Requirements are set by host Party and are typically similar to the Guidance on criteria and rules for monitoring of JI Track 2</li> </ul>                                                                                | <ul style="list-style-type: none"> <li>&gt; Refers to the <i>IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories</i> to account for monitoring and reporting uncertainties</li> <li>&gt; JI guidance provides maximum level of uncertainty allowed for sampling error activity data and requirements included.</li> </ul>                                                                                                                                            |
| VCS    | <ul style="list-style-type: none"> <li>&gt; Defined in each methodology in compliance with VCS standards</li> </ul>                                                                                                                                                   | <ul style="list-style-type: none"> <li>&gt; Provides explicit guidelines on how to address emissions reductions uncertainty</li> <li>&gt; Project level with sampling error no greater than 10% for forest management projects and no greater than 2.5%-10% for agricultural N<sub>2</sub>O projects</li> </ul>                                                                                                                                                                                                |

|                                |                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AUS ERF / CFI                  | <ul style="list-style-type: none"> <li>&gt; Monitoring (and calculation of emissions reductions) according to rules set out in the approved methodology</li> </ul>             | <ul style="list-style-type: none"> <li>&gt; Uncertainty is accounted for on the methodology level</li> <li>&gt; Several methodologies under the CFI scheme require detailed descriptions of provisions designed to ensure that measurement errors remain immaterial and/or describe how modelling error is treated.</li> <li>&gt; Example is within the Measurement of soil C sequestration in agriculture, where biochar is not included in emissions calculations</li> </ul> |
| NZ ETS and PFSI                | <ul style="list-style-type: none"> <li>&gt; Default emissions factors and forest look-up tables</li> </ul>                                                                     | <ul style="list-style-type: none"> <li>&gt; No information on uncertainty requirements</li> </ul>                                                                                                                                                                                                                                                                                                                                                                              |
| CCOP                           | <ul style="list-style-type: none"> <li>&gt; Linked to their local jurisdictions and specified the local Cap-and-Trade regulation and in Compliance Offset Protocols</li> </ul> | <ul style="list-style-type: none"> <li>&gt; For the U.S. Forestry methodology level, the uncertainty monitoring requirements are quite strict and outlined in each protocol.</li> <li>&gt; Follows a conservative approach</li> <li>&gt; No uncertainty for Livestock methodology</li> </ul>                                                                                                                                                                                   |
| LBC                            | <ul style="list-style-type: none"> <li>&gt; Defined in methodologies and guidance and standards</li> </ul>                                                                     | <ul style="list-style-type: none"> <li>&gt; For the whole farm approach methodology, different uncertainty levels for different data levels including:<br/>Activity data from farmer, where uncertainty is low<br/>Default data using average emissions that have a moderate uncertainty<br/>Emission factors with no discount factor</li> </ul>                                                                                                                               |
| MoorFutures                    | <ul style="list-style-type: none"> <li>&gt; Defined in methodology</li> </ul>                                                                                                  | <ul style="list-style-type: none"> <li>&gt; Uncertainty requirements are dealt with using conservative estimates</li> <li>&gt; Project example in Kieve Polder, uncertainties present in the emission estimates led to the reduction of 14,325 t CO<sub>2</sub>e (difference between project and the alternative baseline scenario) as a highly conservative basis (Joosten et al., 2015).</li> </ul>                                                                          |
| Healthy Soils for Healthy Food |                                                                                                                                                                                | No information                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

The projects rely on three different but recognised approaches to monitoring. In the case of afforestation and reforestation projects, their approaches are listed in Table 3-7 below. It should be noted, that for JI and to some extent CDM, satellite data and yield tables can play a role on the monitoring systems using inventory principles. For soil/land management projects and the various other farm discipline projects, proposed monitoring set ups are very similar across schemes though factors and values such as default emissions from a certain type of livestock vary with geography.

*Table 3-7. Overview of monitoring approaches for AR projects under the different schemes.*

| Approach                      | Schemes                    |
|-------------------------------|----------------------------|
| Inventory based methodologies | CDM, JI, LBC (CARBON AGRI) |

|                                    |                           |
|------------------------------------|---------------------------|
| Satellite data                     | VCS                       |
| Yield tables                       | PFSI, NZ ETS              |
| Flexible, though inventory default | CCOP, AU ERF, MoorFutures |

The main challenge across schemes and independent of the type of project seems to be selecting, designing and implementing MRV systems without costly reliance on MRV experts throughout the project lifetime. The project owners often have difficulties understanding the material and deciding what to do, in particular in the early phases where a number of principal decisions on design is often necessary.

#### Data sources – new and existing

Data collection and aggregation for monitoring purposes can be demanding in carbon farming projects, especially when it comes to inventorying forests or measuring soil carbon. Even if one adopts simplified, practice-based, monitoring methods, the diffuse nature of the AFOLU emissions may still render data collection costly, in particular from soils. Innovative technology such as remote sensing or existing spatially explicit databases are increasingly used to address the first challenge. And within the EU context, existing data from the CAP or farms accountancy can drastically reduce the necessity for new data collection, although soil inventory data with the spatial and time resolution necessary to support carbon farming is not currently available in most MS.

#### Addressing monitoring uncertainties

Project developers are sometimes challenged with data and measurement uncertainty related to providing additional and reliable carbon emissions reductions/removal enhancements, as well how such monitoring uncertainties should be addressed.

#### Limited guidance on uncertainty

It was observed that only limited guidance exists on how to address monitoring uncertainty and how to report it among the schemes. Whereas VCS provide explicit guidelines on how to address emissions reductions uncertainty (at least in theory), other schemes (e.g. CDM, JI, and CCOP) provided only maximum level of uncertainty allowed for sampling error activity data and requirements included. This means that other possible sources of monitoring uncertainty, such as allometric factors or carbon wood density are neglected (e.g. for CDM and JI). However, some specific methodologies require a more detailed description of provisions designed to ensure that measurement errors remain immaterial and/or describe how modelling error is treated. This is for example the case for several methodologies included under the CFI.

Addressing monitoring uncertainty is done in several ways across schemes, methodologies and project activities. All schemes, and the majority of the projects included in this report use stratification sampling as a way to address monitoring uncertainty and to improve the precisions by dividing strata according to for example vegetation or soil types. Furthermore, several of the project examples included in this report used established permanent plots,

meaning that the same unit can be found and reassured at each project reporting time. The CCOP makes use of sequential sampling and provide a statistical model in which to compare carbon stocks of the project for verifiers.

In general, it was observed that for most the advanced schemes and project activities, such as found under the CDM and JI, the discussion around addressing monitoring uncertainty is centred around setting minimum certainty thresholds and materiality and monitoring standards, whereas for other schemes where only limited comparable data is available, default factors are more used to reduce potential measuring and monitoring uncertainty. This approach was observed to be especially valid for the NZ ETS and PFSI where the use of default emission factors and forest look-up tables providing values of forest carbon stocks for a given forest type is a requirement for schemes participants with less than 100ha are registered. This approach was used to reduce the administrative complexity, uncertainty and costs, while the average across all small forests ensures higher consistency of emission reporting across other schemes. However, using default table might not be an accurate representation of the carbon stock for forest owners as tables are not specific to a participant's forest, and some farmers have criticised the use of default look-up tables and the conservative average carbon stock values to underestimate the amount of carbon they have sequestered (MPI, 2015). For example, an interviewee identified default look-up tables as a potential barrier to project participation for smallholder foresters as these values constitute a conservative average carbon stock and lead to underestimating the carbon sequestered of about 20% according to his judgement.

#### Reducing uncertainties using expertise

MRV and project development costs and ways to reduce these are briefly described in several CDM projects. For example, *the Improving Rural Livelihoods Through Carbon Sequestration by Adopting Environmental Friendly Technology based Agroforestry Practices*<sup>19</sup> project, only use a monitoring frequency of five years based on remote sensing data for plots more than 2ha. Satellite data are an increasingly low-cost alternative, with high temporal and spatial resolution and can be used to track vegetation dynamics and even livestock herd counts. The project is co-developed with the BioCarbon Fund and had its second verification completed in 2018, having now issued around 80.000 tonnes Certified Emission Reductions (CERs) based on satellite MRV. The *Moldova Soil Conservation*<sup>20</sup> project identify high monitoring costs due to the large productivity and soil type variations within the project boundary. The project area is large, in total 20.300 hectare and was planted between 2002 and 2006. It is expected to deliver 3.6 M t CO<sub>2</sub>e in carbon sequestration over its first 20 years. The 20.300 hectares of afforestation however consists of forest block of on average 7 hectares spread over a large area (from project monitoring plan). Based on a calculation to reach to desired precision level, 120 fixed sample plots would be required which was found to be a large but not unreasonable number for estimation of the aboveground biomass.

<sup>19</sup> <https://cdm.unfccc.int/Projects/DB/TUEV-SUED1298895593.56/view>

<sup>20</sup> <https://cdm.unfccc.int/Projects/DB/SGS-UKL1216031019.22/view>

However, estimating soil carbon stocks and changes for 120 plots would be prohibitive in terms of costs, and based on proxy site measurements during the baseline definition phase, it was decided to exclude soil carbon under certain tree species (*Pinus Nigra*), as observed soil carbon stock changes in other settings was found to be indistinguishable over the 20 years project period. For remaining plots (mainly under hardwood) a *Reliable Mean Estimate* approach was applied using only two sampling campaigns at the start and end of the project period respectively and relying on temporary and random plots. The advantage of the designed soil sampling strategy is that it delivers changes in stocks but not the stock itself using statistical methods. The downside of the approach is that the soil carbon pool can only be included and used for crediting ex-post after the project period ends. In both case examples, precise, detailed and advanced solutions were devised to overcome monitoring barriers linked to the complexity of the land use system within the project boundary. Also, in both cases highly skilled expert knowledge was needed to design this system, which again illustrates the need for topic experts when setting up systems, in particular for soils carbon and land use dynamics

Lastly, it should be noted that the Carbon Fund of the Forest Carbon Partnership Facility (FCPF) (REDD+) promotes lower uncertainty. This means that potential partner countries in practice prefer to leave out carbon pools that have high uncertainty from projects. This is on the other hand in contradiction to IPCC guidelines. Here it is better to include more pools even if it means higher uncertainty. Also, the Green Climate Fund in its application reviews is asking for detailed uncertainty calculations, however it seems there are still limited understanding of the concept of uncertainty. There is always uncertainty on the emission factors (e.g. how much carbon is lost per ha) as they are often aggregates or averages of many measurements, and there can be uncertainty on the activity data, e.g. how many hectares of land has changed land use. The two uncertainties can then be combined to uncertainty on the reference level (or baseline) and similar uncertainty on the results period and finally combining the two and calculate uncertainty on the mitigation outcome that is supporting the issuance of each credit. This last calculation is rarely done according to one interviewed expert.

### Lessons Learnt

- > It is necessary to account for existing data and innovative technologies in order to design cost-effective methodologies. It is seen from project examples and scheme assessment that in recent years in particular mapping technologies have made huge advances, so that drones, satellite images and GIS technologies are now much more detailed, low cost and easy to apply that ten-fifteen years ago when many of the JI/CDM/VCS/NZ-ETS projects were initiated.
- > Based on the above observations, several approaches exist on how to address monitoring uncertainty. Despite some schemes including guidelines on uncertainty, these are often limited to sampling activity and sample numbers. Therefore, carbon schemes and methodologies could potentially improve by allowing for more flexible approaches for addressing monitoring

uncertainty such as LBC in order to ensure that agricultural and forestry project, which are often related to high levels of monitoring uncertainty, are not impeded. In this, there is a need to create incentives to project developers to increase monitoring accuracy (absence of bias). Increasing monitoring precision (narrower confidence interval) is less important (Bellassen and Shishlov, 2016).

- The lessons from the two examples (Agroforestry in India, and Moldova Soil Conservation) is that monitoring- and reporting designs are very interdependent, and that detailed expert knowledge on statistics, soils science or silviculture, use of modern technologies and detailed understanding of the project setting usually allows to devise tailor-made systems that can address some of the challenges and costs associated with the complexity of the monitoring and reporting challenge.

### 3.5.2 Reporting

Reporting involves the aggregation, recording and communication of the monitoring data to relevant authorities and/or government entities. In short, it covers the administrative side of the MRV procedure (Bellassen, 2015). Reporting differs between the schemes in terms of rules and requirements as well as reporting format and frequency. The sections below compare reporting requirements across schemes as set out in regulatory reporting rules, as well as approaches and challenges for schemes and project owners and developers to follow such reporting rules and requirements as observed in this study.

#### Regulatory reporting requirements

In general, the international carbon schemes (CDM, JI and VCS) allow for a certain degree of flexibility in reporting, while the domestic schemes generally have more specific requirements (as illustrated in Table 3-8). JI specifies no frequency for reporting thus allowing variation across sectors as well as between project developers. In practice, this means the credit buyer in case of co-development of JI projects will set the bar based on own needs. On the other hand, domestic schemes do not have specifications for frequency of reporting but contain more detailed instructions or guidelines on reporting. The intensity in which the schemes verify the reporting process is split as well, where schemes like NZ ETS have, for example, no third-party verification, while CCOP has strict top-down rules for the entire MRV process, including selection of verifiers and reporting methods.

#### Examples from California, Australia and New Zealand

CCOP's reporting method comes from the Mandatory Reporting Regulation (MRR) that was established under Assembly Bill 32 (AB 32) and requires reporting from entities emitting at minimum 10,000 CO<sub>2</sub>e under the cap-and-trade mechanism (this is below the 25,000 CO<sub>2</sub>e compliance level). On the offset side, an offset project data report is required and must be maintained in a project owner's records for 5 years after the end of the crediting period, or 100 years after a project is issued its last offset credit for sequestration projects. In order to ensure compliance and consistency, CARB provides training on proper reporting for regulated entities. In a compliance scheme, frequent reporting and

strict requirements help to ensure that fines are kept to a minimum. In AU ERF, there is more leniency to the reporting process besides a mandatory audit report included in some of the project reports (indicated in the audit schedule) financed by the project owner. The auditors must be registered greenhouse and energy auditors under the *National Greenhouse and Energy Reporting Act 2007*. Although NZ ETS allows for self-assessment, there is still a mandatory requirement for a report on removals and emissions and takes into account previous voluntary reports as to avoid double-counting (ICAP, 2019).

Table 3-8. Overview of regulatory reporting requirements across carbon schemes.

| Scheme          | Regulatory reporting requirements                                                                                                                                                                                                                                                                                                                    |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CDM             | <ul style="list-style-type: none"> <li>&gt; Monitoring report in which the aggregation and communication of data and methodology are presented according to the CDM Project Standard document.</li> <li>&gt; No predefined reporting frequency requirements.</li> <li>&gt; Monitoring reports are submitted to a DOE for verification</li> </ul>     |
| JI              | <ul style="list-style-type: none"> <li>&gt; Monitoring reports</li> <li>&gt; No predefined reporting frequency requirements</li> </ul>                                                                                                                                                                                                               |
| VCS             | <ul style="list-style-type: none"> <li>&gt; Monitoring reports according to the VCS Standard</li> <li>&gt; No specified frequency, but the project developer must identify and provide detail hereon</li> </ul>                                                                                                                                      |
| AUS ERF         | <ul style="list-style-type: none"> <li>&gt; Monitoring reports are submitted to the Clean Energy Regulator at the end of each reporting period</li> <li>&gt; The reporting period vary between 6 months to 5 years depending on the project type and methodology</li> </ul>                                                                          |
| NZ EST and PFSI | <ul style="list-style-type: none"> <li>&gt; Annual reporting.</li> <li>&gt; Post-1989 forest owners also have a mandatory reporting period of 5 years.</li> <li>&gt; Participants are required to self-assess with no third-party verification.</li> <li>&gt; Government conducts audits through random sample of participants each year.</li> </ul> |
| CCOP            | <ul style="list-style-type: none"> <li>&gt; Mandatory offset project data report (under the Mandatory Reporting Regulation)</li> </ul>                                                                                                                                                                                                               |
| LBC/FLBC        | <ul style="list-style-type: none"> <li>&gt; Reporting procedures have not yet been included in the CAP'2ER® software</li> </ul>                                                                                                                                                                                                                      |
| MoorFutures     | <ul style="list-style-type: none"> <li>&gt; Monitoring plan including tentative monitoring intervals.</li> <li>&gt; No identification on monitoring reporting requirements</li> </ul>                                                                                                                                                                |
| HSHF            | <ul style="list-style-type: none"> <li>&gt; No reporting requirements</li> </ul>                                                                                                                                                                                                                                                                     |

|               |                                                                                                                                                                      |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Carbon Action | > MRV are to take place through a newly developed calculator tool. However, at certain point no information is made public regarding reporting rules and procedures. |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Reporting Period

The reporting period requirements across the schemes highlight some of the additional ways in which the schemes are divided. In NZ ETS, reporting is done annually as to align with NZ's GHG inventory reporting alongside the 5 year post-1989 report every 5 years. For the Australian ERF, the reporting period is chosen by the project owner, but must fall within the minimum and maximum reporting periods dependent on the methodology. For example, the soil carbon sequestration projects based on soil sampling are required to submit a monitoring report to the CER every six months to five years, whereas projects estimation sequestration of soil carbon using default values need to monitor the CEAs on their properties every six months. A reporting period can even be as short as one month if the net abatement for the period is 2,000 CO<sub>2</sub>e. The wide window of monitoring periods under AU ERF allows for flexibility at the methodology level, while still providing meaningful guidelines for project owners new to the MRV process. For CDM, the reporting period is chosen by the project owner and presented in their monitoring report. The frequency for reporting allows projects to lower transactions costs, which can have an impact on projects for which additional costs can mean the difference between joining the scheme or not. This was the case in the CDM project, *Improved Rural Livelihoods Through Carbon Sequestration by Adopting Environmental Friendly technology based on Agroforestry Practices*, where engaging participant farmers proved difficult because of the farmer perception of excessive and costly controls being imposed. VCS and JI follow a similar monitoring report system in which there is no defined frequency for reporting. Under MoorFutures, the guidelines are also losing in that the first report should be produced after 3-5 years with ten-year increments afterwards.

## Reporting Penalties

In NZ ETS, the cost to project owners is 30 NZ\$ per misreported unit including a fee for late payment. In AU ERF, there is no fee for late reporting, but if a project owner is unable to meet their initial self-set deadline, they must notify the CER three months prior to the last day their report must be submitted. The CER will then determine if the notice is sufficient to allow the project owner to push back the initial deadline. The consequence of no report or late notice may result in all the projects being revoked as well as the possibility for a civil penalty order.

## Lessons Learnt

- > Allowing for flexibility in reporting frequency allows projects to lower transaction costs paving the way for smallholders to engage in a scheme.
- > Applying differentiated reporting requirements based on the size of the emissions at the project site, may allow for smaller farms or forest plots to avoid costly procedures. This may make sense as farms or forests with limited emissions or sequestration of carbon, the risks associated with less frequent reporting is smaller.

- > In a compliance space, strict reporting helps to lower penalties and avoid cancellation of project units. In non-compliance settings, even voluntary offsetting demands rigorous documentation to ensure environmental integrity. Only for local, voluntary scheme not linked to distant third-party users of mitigation outcomes can reporting requirements be more lax.
- > Training for relevant stakeholders (project owners, auditor, verifiers) on MRV processes has the potential to avoid reporting mistakes, which in turn can lower the bureaucratic costs of issuing fines and penalties.

### 3.5.3 Verification

Verification refers to the procedure of detection of potential errors and is usually conducted by a third-party not involved in the monitoring and reporting or by an executing government agency. During the verification procedures, reported data and information on carbon emissions reductions/removal enhancements are verified by to ensure consistency between the project objective, the monitoring plan and implementation of project. An overview of the regulatory verification procedures and requirements are summarised for each of the schemes is found in Table 3-9 below.

*Table 3-9. Overview of regulatory verification requirement for the schemes includes in this study. Source: Scheme guidelines and standards; World Bank, 2015; Michaelowa, 2019.*

| Scheme | Regulatory verification requirements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CDM    | <ul style="list-style-type: none"> <li>&gt; Monitoring reports are submitted to a Designed Operations Entities (DOE) for third-party verification and validation of CDM projects</li> <li>&gt; DOEs are accredited by CDM EB</li> <li>&gt; Projects have to be periodically verified</li> <li>&gt; DOEs must differ from the entity performing the validation</li> <li>&gt; DOEs are paid by project developers</li> </ul>                                                                                                                                                                                           |
| JI     | <ul style="list-style-type: none"> <li>&gt; Verification and validation by Accredited Independent Entities (AIEs)</li> <li>&gt; Under Track 1, accreditation requirements are determined by the host Party</li> <li>&gt; Third-party verification by AIE, however AIE can be the same as the one that performed determination (Track 1)</li> <li>&gt; Under Track 2 AIEs are accredited by the JISC (most common verification procedure)</li> <li>&gt; Third-party verification by the AIE can be the same entity/auditor performing the validation</li> <li>&gt; Auditors are paid by project developers</li> </ul> |
| VCS    | <ul style="list-style-type: none"> <li>&gt; VCS auditor approved by CDM as a DOE; by the JI as an AIE; accreditation by ANSI or by CAR</li> <li>&gt; Auditors are pad by project developers</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                               |

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AUS ERF/CFI     | <ul style="list-style-type: none"> <li>&gt; Mandatory audit report, by registered GHG and energy auditor under the National Greenhouse and Energy Reporting Act 2007</li> <li>&gt; Auditors are paid by project developers</li> </ul>                                                                                                                                                                                                                          |
| NZ EST and PFSI | <ul style="list-style-type: none"> <li>&gt; No requirements on independent third-party verification (or validation)</li> <li>&gt; The government is permitted to run audits and verify participant's compliance with regulations</li> </ul>                                                                                                                                                                                                                    |
| CCOP            | <ul style="list-style-type: none"> <li>&gt; Verification of eligibility of offsets by ARB-accredited verification bodies</li> <li>&gt; Auditors are paid by project developers</li> </ul>                                                                                                                                                                                                                                                                      |
| LBC             | <ul style="list-style-type: none"> <li>&gt; Third-party verification</li> <li>&gt; Auditors are chosen and paid by project developers</li> <li>&gt; For the coppice forest methodology, auditors are not required to travel, the project developer has to provide a list of documents to the auditor</li> <li>&gt; For afforestation and reforestation projects, verification can only take place after at least 5 years of project implementation.</li> </ul> |
| FLBC            | <ul style="list-style-type: none"> <li>&gt; N/A since scheme does not reward emission reductions</li> </ul>                                                                                                                                                                                                                                                                                                                                                    |
| MoorFutures     | <ul style="list-style-type: none"> <li>&gt; ex-ante third-party verification</li> </ul>                                                                                                                                                                                                                                                                                                                                                                        |
| HSHF            | <ul style="list-style-type: none"> <li>&gt; No requirements on independent third-party verification (or validation)</li> </ul>                                                                                                                                                                                                                                                                                                                                 |
| Carbon Action   | <ul style="list-style-type: none"> <li>&gt; N/A since scheme is in pilot phase</li> </ul>                                                                                                                                                                                                                                                                                                                                                                      |

### Auditing and verification systems

#### Overseeing auditing and verification systems

As illustrated above, in most schemes verification is conducted by a third-party auditor as specified by relevant protocols and project types and methodologies. This approach is taken to ensure objectivity and avoid potential conflict of interest. For example, for CDM, as for other schemes (e.g. JI and VCS) the verifying Designated Operational Entity (DOE) is an independent auditor different from the DOE validating the CDM project registration phase. However, for CDM the requirement of different DOE verifiers and validators of project emissions reductions depends on the type of the project and for small-scale projects the same DOE can perform both procedures. Also, JI projects differ in regard to verification requirements and have been observed to depend on Track 1 or Track 2 project eligibility, host Party and auditor entities. For example, where a host country qualifies for Track 1, they are allowed full ownership of the JI project, which enables them to integrate JI into national, institutional and administrative structures in the most efficient way. With more requirements under Track 1 – the in-place GHG inventory and additional information needed within the track – and the identical requirements in Track 2 make streamlining easier for host countries (World Bank 2016a; Kollmuss et al., 2015). Further,

the Track 1 projects and verification are performed by AIEs with no requirements to international oversight for verification. This however has been criticised due to potential risks of inherent conflict of interest, poor performance of AIEs and has been observed to impact environmental integrity.

#### CCOP: Controlling and verifying auditors

CCOP verification also accredits and oversees the third-party verifiers and may perform site visit spot audits, which is also common by CDM auditors to ensure they perform adequately (World Bank, 2015). Furthermore, to limit and address potential conflicts of interest, CCOP ensure that verifiers only work with the same project operators for a limited time (i.e. six years after the project occurs the verifier can no longer continue to audit the specific project).<sup>21</sup> In addition to addressing issues of potential conflicts, CCOP makes use of sequential sampling in order to provide more accurate and detailed verification and data review due to the shifting requirements to measure trees for carbon. According to a U.S. Forestry project verifier this has resulted in more frequent inventory testing and stricter obligations for testing a forest plot, but at the same time highlights the rigorous standards and complications involved in verifying emissions in forests. The CCOP verification approach is different from other schemes, such as VCS in which there is not a statistical model in which to compare carbon stocks of the project for verifiers. Other schemes have taken a different approach to verification, such as the Australian scheme CFI and EFR which have introduced a rotation system of auditors much similar to the IACS control system implemented by many managing authorities in MS and is designed with the objective of ensuring objectivity of the audits.

#### No audits required

The NZ ETS and PFSI take another approach to verification by not requiring a third-party auditor. Despite independent third-party validation and verification not being required in NZ schemes, the government is permitted to run the audits and verify participants' compliance with regulations. However, project level verification is often done by a carbon agent with experience and knowledge in country-wide data on carbon stocks. As was observed in the stakeholder interviews, the use of carbon agents has several advances including higher measurement accuracy, lower monitoring uncertainty, and decreased effort for project participants. In NZ, carbon agents are independent experts accredited by the government and partially paid for by public money. They are usually professionals within forest or farm management with specific expertise, e.g. from farm extension services.

Furthermore, like with the VCS and the Australian schemes, various verification standards can be used interchangeably (such as the ACCUs, CERs, RMUs, Verified Emission Reductions (VERs) with their Gold Standard, and VCUs with their Verified Carbon Standard) which gives a flexibility and perhaps a healthy competitiveness between schemes. For such competitiveness to be healthy, the verification standards themselves, however, also will need to undergo external verification or certification. For example, the Gold Standard and the Verified Carbon Standard need to be held up against some common set of criteria

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<sup>21</sup> Confirmed in Interview.

ensuring a common minimum standard. This could be by following the ISO 14065 accreditation standard as in the case of the CCOP.

The European schemes rely on third party verification or has defined no practice for verification as several of them still does not issue credits.

### Lessons Learnt

- > Verification rules are relatively similar across the schemes, with the exception of NZ ETS and PFSI. However, variations between verification frequency, the verification quality, materiality provisions and the uncertainty modalities, among others, were observed across the schemes.
- > Under JI and CDM, auditors are appointed ('accredited') and for VCS and CFI there are other governance mechanisms in place aiming at controlling the risk of fraud in verification and auditing. It appears that some of these are imposing administrative costs (around 50% of total MRV costs) and delays on the approval process and the scheme owner. Cost saving avenues include the use of otherwise controlled documents (e.g. declarations under the CAP, farm accounts, ...), the use of a wide range of verifiers (e.g. including forest experts or Forest Stewardship Council (FSC) certifiers), and random verification as in the Gold Standard.
- > Carbon agents are pioneered by the NZ schemes, and are professionals that can act as expert intermediates that set up, run and prepare monitoring systems for verification. If subject to professional liability, they can to some extent substitute verification.
- > A low-cost way forward could be to allow several standards or verification schemes to compete for the auditing at project level. This can be facilitated by allowing several standards but must be overseen to avoid a race to the bottom in terms of quality. In practice, the competition could be supported by an exchange for auditors, where project developers can request a quote.

### 3.5.4 MRV costs

MRV costs are related to the costs due to data collection, measuring and installing monitoring systems, reporting and verification (international and auditing) and often constitute a significant share of the project budget.

#### Approaches for reducing MRV costs

Most of the carbon schemes and programmes include requirements for the development of detailed project and monitoring reports at the onset of the project implementation resulting in high costs related to reporting procedures in the early project development phase. Further, more accurate monitoring often comes with increasing costs and trade-offs between MRV costs and stringency in carbon offsetting schemes and programmes has been observed by several research papers and reports (e.g. Shishlov & Bellassen, 2016; Warnecke, 2014; Grimault et al., 2018; and Shishlov & Cochran, 2016). Therefore, project developers have sorted to minimise costs related to MRV without compromising

Potential trade-offs  
between MRV cost  
and uncertainty

measurement and monitoring precision and environmental integrity taking different approaches.

For example, MRV costs have been observed to be reduced in several CDM and VCS methodologies and projects by using stratification sampling. Furthermore, some projects have reduced MRV costs by the establishment of temporary plots and the division of a project specific monitoring system derived from statistical analysis, as is the case for the *Moldova Soil Conservation*<sup>22</sup> project previously mentioned. Another approach to reduce costs is by reducing the monitoring frequency.

#### New Zealand experiences

The NZ ETS and PSFI schemes use default emission factors and forest look-up tables to reduce the administrative complexity, uncertainty and costs, while the average across all small forests ensures higher consistency of emission reporting across other schemes. This approach effectively constitutes a small-scale project approach. However, using default table might not be an accurate representation of the carbon stock for forest owners as tables are not specific to a participant's forest (MPI, 2015). However, this approach to reduce MRV costs has been criticised by some farmers as the use of default look-up tables and the conservative average carbon stock values underestimate carbon sequestered and uncertainty.

#### Australian experiences

For AUS CFI and ERF measurement and monitoring costs were found as potentially limiting project development and participation, with particular focus on the calculation of soil carbon. In some instances, soil carbon is very complex as the cost of measurement and quantification of the exact carbon level is difficult. The World Agroforestry Institute provided a breakdown of the varying costs in measuring soil organic carbon (SOC) with measurement and mapping estimates alongside the stages of measurement (planning, data collection, laboratory measurement, data handling, and analysis). The overarching conclusion remains that measuring SOC is costly but is highly variable dependent on the exact scenario and area in question.<sup>23</sup> In the case of the European Scheme, HSHF, the cost of soil carbon was estimated to be EUR 230 for a 25-sample analysis at each farm to be borne by the farmer. The scheme owner (SPAR) is hiring and managing one MRV expert who is undertaking the same procedure at all of the +50 farms in order to ensure consistency and reliability. Via the fees paid per sampling by the farmer the cost of the MRV including the salary of the MRV expert is covered. This setup is a compromise solution that ensures farmers are relieved of the finding, hiring and contractual arrangements with MRV experts, but that they cover the MRV costs.

#### Independent validation

Besides practical costs of technical implementation and monitoring, additional costs arises from independent validation of a project and verification of results. For example, the CCOP scheme sought to reduce MRV cost by reducing reporting requirements and therefore do not require a validation report to reduce project costs. To keep verification costs down, the stringency of verification could potentially be adjusted to the significance of the ERs or sequestration at stake

<sup>22</sup> <https://cdm.unfccc.int/Projects/DB/SGS-UKL1216031019.22/view>

<sup>23</sup> <http://old.worldagroforestry.org/soc/index5.html>

following the concept and standards of materiality. Additionally, experiences from California, Australia and NZ and HSHL shows that outsourcing MRV related measurements and procedures to carbon agents can help project participants to save expenditures. The costs connected to hiring these consultants did outweigh the efforts in financial and time resources that participants spend on MRV. Furthermore, it was found to lower the risk of measurement mistakes and monitoring inconsistencies.

### Regional MRV standards

Some domestic and regional schemes apply global standards on MRV with prohibitively large costs arising from subsequent adaptation of MRV methodologies and loss of credited amount due to conservative default values. However, some schemes have developed regional adapted standards based on for example VCS standards. The MoorFutures mini scheme has developed their own methodology to reduce implementation and operational costs for small-to medium sized peatland rewetting projects. Projects can in theory use methods that are applied in other international peatland rewetting projects (e.g. under VCS or Gold Standard), but so far MoorFutures project developers have applied GHG emission profile (GEST) method as suggested by the scheme owners. Using the GEST method does not require additional assessment from the MoorFutures scientific advisory board during project validation. Operational costs related to validation, verification and certification are reduced by the involvement of independent experts, whose specific expertise allows more cost-effective processing with fewer errors. The LBC programme on the other hands, addresses MRV costs and uncertainty using the *discount principle* by discounting the carbon credits in proportion to the uncertainty of monitoring. This gives extra incentives, and a potential trade-off for the project owner to consider, e.g. as part of a cost-benefit assessment of MRV system complexity.

The standardised methodologies can include several alternatives for monitoring and verifying emissions reductions, aimed at letting project proponents set a cost/accuracy ratio which is optimal for them. The more accurate – and likely costlier – alternatives are rewarded by issuing exactly as many credits as estimated emissions reductions, while less accurate alternatives can only be applied at the expense of receiving fewer credits than the total estimated emissions reductions.

### Lessons Learnt

- > There is a trade-off between accuracy and costs of MRV in carbon offsetting schemes. Several approaches for minimising MRV costs have been observed throughout this study depending of the scale and type of schemes and projects and it is up to the project developer to identify and find way to minimise and overall challenges related to MRV costs.
- > Limited guidance exists on way to reduce MRV costs and it is therefore up to the project developers to estimate costs related to MRV and to identify approaches and opportunities to minimise these. The discounting principle is one way to upfront the crucial cost-benefits analysis and ask developers and investors to make informed decisions on the MRV system design.

- > Providing for example a list of approve guidelines to project developers on ways to minimise MRV costs could be useful to ensure that project developers can make informed decisions to weight the costs of increase monitoring accuracy against the potential amount of extra carbon credits generated.

## 3.6 Reward Mechanism

The majority of the schemes analysed in this study follow the Baseline & Credit approach, i.e. credits are issued by registries after results are monitored and verified. The results are measured in terms of emission reductions or removal enhancements in tonnes of CO<sub>2</sub>e. This chapter will compare the reward mechanism for results across schemes. The main financial reward comes from the climate change mitigation result and will be explored in section 3.6.1. However, some schemes incorporate non-climate related co-benefits into the reward mechanism which will be further explored in section 3.6.2.

### 3.6.1 Price mechanism

Most schemes analysed in this study generate carbon income through trading the achieved emission reductions/removal enhancements (credits worth one metric tonne of carbon dioxide equivalent (mtCO<sub>2</sub>e)) on a market. The price that project developers can attain varies greatly. This section explores the timing of credit issuance and different price setting mechanisms and their implications for both compliance and voluntary markets.

#### Marketing strategies

In the absence of a single marketplace for credits, finding a buyer for carbon credits is not straight forward. A credit once issued by a registry can be transacted several times either by brokers (without taking credit ownership) or retailers (who take credit ownership) before the end buyer acquires the credit and choses to retire it, claiming the offset's impact. Alternatively, scheme owners can market their offsets directly or large-scale project developers make use of their own marketing and advertising departments to identify and satisfy end buyers (Ecosystem Marketplace, 2017). Additionally, there is the possibility of the seller and buyer co-developing projects where credits have sometimes been referred to as primary credits, whereas buying verified credits at an exchange or after issuance is termed secondary credits.

#### Differences in carbon prices

Figure 3-2 illustrates the carbon prices achieved on different markets. It becomes obvious that whether credits are sold on compliance or voluntary markets, has a major impact on the price and on the range of prices. In 2016, prices in the voluntary markets ranged from USD 0.5 to more than USD 50 per mtCO<sub>2</sub>e with an average price of USD 3 per mtCO<sub>2</sub>e. The most relevant compliance markets for the schemes included in this study however achieved carbon prices between USD 6 and USD 13 per mtCO<sub>2</sub>e.

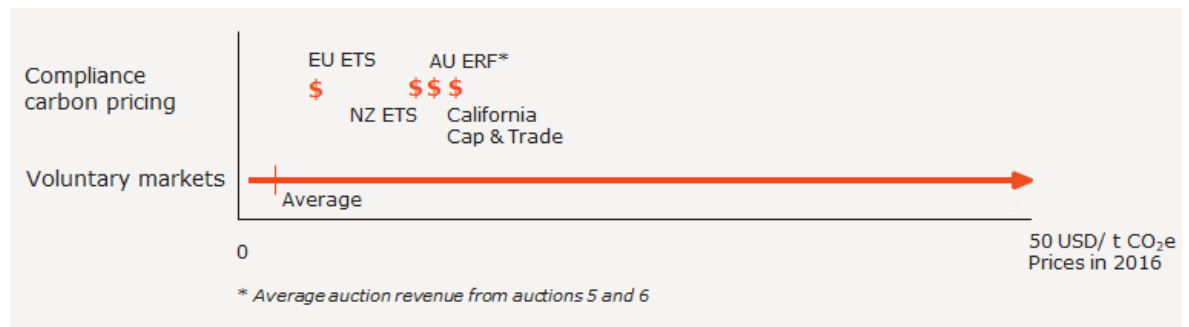


Figure 3-2. Carbon pricing on voluntary and compliance markets in 2016. Source: Own production based on Ecosystem Marketplace, 2017; World Bank & Ecofys, 2016.

The key to understanding the huge price range and general differences between prices across schemes, lies in how the price is determined. In general, prices could either follow market dynamics, be set by the scheme owner or bilaterally negotiated between seller and buyer *over the counter*. Table 3-10 provides an overview of how prices are set across the schemes.

Table 3-10. Price determination across schemes.

| Scheme          | Market prices | Negotiated prices | Fixed prices |
|-----------------|---------------|-------------------|--------------|
| CDM             | ✓             | ✓                 |              |
| JI              | ✓             | ✓                 |              |
| VCS             | ✓             | ✓                 |              |
| AU ERF          |               |                   | ✓            |
| NZ ETS and PFSI | ✓             | ✓                 |              |
| CCOP            | ✓             |                   |              |
| LBC             | ✓             | ✓                 |              |
| MoorFutures     |               |                   | ✓            |
| HSHF            |               |                   | ✓            |

### Market prices

#### Creating demand through regulation

The demand for credits in compliance markets is created by policies imposing emission reduction targets, i.e. the more ambitious national reduction targets, caps or environmental policies are, the higher the demand of compliance buyers. The most illustrative example is the CDM/JI and the demand created by the EU-ETS, thus creating a large and diversified demand. But when it became clear that the supply of CERs would soon exceed the allocated allowance under EU-ETS, the market collapsed. Another example is the case of Ukraine that had a large surplus of AAUs, thus did not have to consider overselling its emission reductions. Apart from leading to rather weak environmental integrity (see 3.4.3 on *Underlying Baselines*), the large surplus led to an oversupply of ERUs driving

the price down and affecting linked markets. As a reaction, NZ ETS closed their market for international credits.

Under a compliance scheme, policy makers can either decide to impose stronger caps or change the percentage of allowance that can be offset. That is to say that market participants are typically only allowed to offset a certain share of their allowance as scheme owners would like to encourage market participants to reduce their own reductions. In response to the social equity question raised concerning disadvantaged communities in proximity of polluting entities (see 3.10.2 on *Broader Benefits*), CCOP decreased this share and therefore the demand for CCOP offsets.

### Voluntary offsetting

Compared to the compliance markets, the demand for voluntary offsets has been much lower during the past 20 years, which in turns affects the average price. Yet, voluntary schemes offer the flexibility of rewarding participants for co-benefits, as for example with PFSI, VCS through additional certification and LBC through explicit bonuses. Buyers on voluntary markets often show interest in the climate and environmental integrity of offsets, since they are not obliged to comply with regulation, but purchase credits as a gesture of goodwill. Therefore, smaller voluntary markets will raise in importance as companies are interested in contributing to the local immediate environment and expect better quality projects, despite the higher cost of emission reductions.

#### Negotiated prices

The market dynamics revealed that the lion share of voluntary demand results from the purchase of high amounts of credits at a low price and that there are buyers willing to buy significantly higher prices for good-quality credits. This is partly mirrored in the market price, but often buyers sell their credits *over the counter* to the buyers. Credits from CDM and JI for example can either be sold on an exchange (at market prices) or via Emission Reduction Purchase Agreements (ERPAs) at negotiated prices. An interviewed New Zealand carbon forester works on behalf of an NGO and stresses that credibility and reputation of that NGOs places them in a good position when negotiating the price of their credits.

#### Fixed prices

With a change in government, the Australian carbon pricing mechanism was replaced by the ERF by April 2015 and the demand shifted from private to public. Instead of a market-based system, the government is purchasing credits to meet the national reduction target mainly through reverse auctions, i.e. sellers competing to sell their services to buyers. Having public demand (and fixed price contracts), has also proven its worth through stable reward throughout the project life span. The Australian contract length is usually seven years which might be insufficient for sequestration projects. The obvious drawback is that it relies directly on public money and therefore political will.

MoorFutures certificate prices are based on the costs of their production, i.e. calculated by dividing the costs of implementation, divided by the total amount of emission reductions over the project crediting period (EUR per mtCO<sub>2</sub>e) and

range from EUR 40-80. This is rather high compared to the global average price for avoided unplanned deforestation (EUR 4.2/mtCO<sub>2</sub>e) and the European average for Forestry projects EUR 15.6/mtCO<sub>2</sub>e (Ecosystem Marketplace & Forest Trends, 2017).

### Lesson Learnt

- > The free market for voluntary offsets is a buyers' market as in the absence of a centralised marketplace, sellers are competing heavily to sell credits and therefore achieve on average low prices. Fixed prices set by the scheme owner or over the counter deals can help to market good quality offsets from trustworthy project or scheme owners.
- > Increasing the emission reduction targets and creating a domestic demand for domestic offsets is a promising way of ensuring high enough prices and a large enough demand which are the most necessary key to success.
- > Direct public demand through auctions also breeds success as it promises fixed prices over a long-time span. However, demand has to be reliable and should not depend on election cycles.
- > Co-development of projects with both producer (farm or developer) and user of credits can allow for different pricing mechanisms, e.g. price premiums or ex-ante payments.

### 3.6.2 Price premiums for non-carbon benefits

Apart from the climate impact, projects can also contribute to broader environmental or socio-economic co-benefits depending on their design. Since such projects contribute to sustainable development beyond climate change mitigation, project proponents often achieve a higher reward linked to the co-benefits they achieve.

Whether co-benefits are considered and how these influence the price varies across the schemes considered in this study. The compliance markets CDM, JI, CCOP, NZ ETS and AU ERF do not consider co-benefits at all, as their doctrine is to achieve the effective emission reductions at the lowest cost possible.

#### Voluntary markets honour premium quality

In the schemes that operate on voluntary markets, price premiums for co-benefits are more common. The CDM project proponents that are operating in voluntary markets, as well as VCS and PFSI projects achieve price premiums that are bilaterally negotiated between seller and buyer. These negotiations are not grounded on quantified effects, rather certain projects are naturally associated with co-benefits, e.g. if a certain forest project area hosts an endangered species, thus offering enough grounds for the seller to negotiate. Voluntary buyers, as compared to companies that need to comply with an emission cap, are more likely to show broader interest in the socio-economic and environmental impact of a project and are thus willing to pay more.

The three European schemes LBC, MoorFutures and FLBC, include some socio-economic and environmental sustainability indicators in their MRV practices to quantify the impact that projects have on society and environment (see Table 3-11).

Table 3-11. Co-benefits that are included in the scheme's MRV and therefore form part of reward criteria.

|                  | Co-benefit/ Ecosystem service                     | LBC<br>Forestry | Moor<br>Futures | LBC<br>CARBON<br>AGRI |
|------------------|---------------------------------------------------|-----------------|-----------------|-----------------------|
| Socio-economic   | Creation of territorial economic added value      | ✓               |                 |                       |
|                  | Integration through employment                    | ✓               |                 |                       |
|                  | Air filtration in urban areas                     | (✓)             |                 |                       |
|                  | Local valorisation of harvested wood              | (✓)             |                 |                       |
|                  | Forest certification                              | ✓               |                 |                       |
|                  | Consolidation of forest management                | (✓)             |                 |                       |
|                  | Forestry insurance                                | (✓)             |                 |                       |
|                  | Nutritional Performance of animal product         |                 |                 | ✓                     |
| Soil             | Floor cleaning                                    | (✓)             |                 |                       |
| Biodiver<br>sity | Introduction of species                           | (✓)             |                 |                       |
|                  | Preservation of pre-existing biodiversity         | ✓               |                 | ✓                     |
| Air              | Air quality/ Ammonia emissions                    |                 |                 | ✓                     |
| Water            | Consideration of aquatic environments or wetlands | (✓)             |                 |                       |
|                  | Improvement of water quality                      | (✓)             | ✓               | ✓                     |
|                  | Groundwater enrichment                            |                 | ✓               |                       |
|                  | Flood prevention                                  |                 | ✓               |                       |
|                  | Improvement of biodiversity related to wetlands   | (✓)             | ✓               |                       |
|                  | Evaporative cooling                               |                 | ✓               |                       |
| Energy           | Energy consumption                                |                 |                 | ✓                     |
|                  | Renewable energy produced                         |                 |                 | ✓                     |

Due to the novelty of the LBC, there is limited evidence on how well the uptake from the seller's as well as buyer's side is. MoorFutures sells their credits at prices that are determined by the credit production costs, which entails MRV. Furthermore, scheme owners distinguish between standard and premium quantification approaches that differ in their precision but measure the same indicator. The MoorFutures price mechanism does therefore not consider how high the co-benefit achievement is but reacts to the associated MRV costs.

### Lessons Learnt

- > Quantifying broader socio-economic and environmental benefits can act as a safeguard and at the same time provide basis for a more elaborate reward mechanism.
- > Allowing for co-development of primary credits, can allow developer and buyer of credits to reduce costs and uncertainty, thereby fixing a price that is beneficial for both parties.
- > The quantification of socio-economic and environmental co-benefits to include price premiums in the reward mechanism may not be necessary as the required MRV costs drive the price up and evidence from certain domestic and international schemes proved that there are buyers willing to purchase credits with non-verified co-benefits.
- > The efforts required to measure socio-economic and environmental indicators vary greatly across indicators and scheme owners could take advantage of reporting requirements from other policies, e.g. the CAP.

### 3.6.3 Credit issuance and anticipated payments

In a result-based scheme, credits are issued based on verified emission reductions/removal enhancements. This implies that reward happens ex post, as project developers are only able to sell their credits once issued by a registry.

Ex post payments, however, can have different implications for different project types. Whereas avoided deforestation projects generate the majority of credits immediately after project start, the amount of carbon sequestered increases steadily with the growth of trees in reforestation projects. The associated lagging stream of revenues is the main structural barrier that has led to the limited uptake of reforestation activities under the CCOP U.S. Forestry Protocol. Reforestation implies a high upfront cost connected to site preparation, seedlings purchase and planting whereas benefits in form of credits occur only in far down the line.

#### Ex-post payment vs upfront costs

Some schemes tried to overcome this barrier with upfront payments. The forestry methodologies under LBC include anticipated units, i.e. carbon sequestration will be calculated for a 30-year basis and verification occurs every five years. Credits, however, will only be officially issued after verification.

Carbon Farmers under VCS' *International and Small Group and Tree Planting Programme* (TIST) programme in Kenya received a similar annual advance for the anticipated revenue from the VCU, eliminating the need for credit. Separating payments from official issuance seems reasonable to avoid shying away buyers. Anticipated payments, however, imply that in case of overestimation, carbon farmers/foresters have to pay back part of the reward. As a consequence of this potential risk, some unsettled HSHF farmers decided to forgo the bonus in the first place. As a reaction, SPAR recently introduced an alternative compensation option, consisting of a price increase per product unit that is calculated based on the extra work required for soil carbon sequestration. This payment option is at odds with the concept of result-based payments.

#### Lessons Learnt

- Anticipated payments are important to ensure cash flow for reforestation and other carbon sequestration activities. Annual payments based on estimated mitigation results is a simple process yet accompanied by the uncertainty and the risk for project participants to refund part of their carbon revenue.
- A blended approach where a significant proportion of total rewards are paid up front and the remaining share is paid later according to verification is a solution to avoid refunding. It further incentivises the scheme owner to ensure robust MRV.

### 3.7 Transparency & Evaluation

The KP invites Parties to share information policies and measures including ways to improve transparency and comparability. In the context of results-based carbon farming and forestry mechanisms, transparency refers to the extent to which information on an emission reduction activity is accessible and disclosed to the public. This includes information and argumentation on methodologies and assumptions applied in setting up baselines and MRV systems in establishing the emission reductions.

#### 3.7.1 Data availability & access

The degree to which scheme owners provide project-level data vary quite substantially and has implications for scientific research, evidence-based policy design and the attraction of interested potential participants and credit buyers.

There is a trade-off between transparency and knowledge sharing and the time and resources spent to provide and update data. In addition, scheme owners have to respect confidentiality of the participant's private data. The degree to which project-level data is available varies quite substantially and divides clusters into five different groups:

- **Extensive good-quality information:** VCS is the scheme that provides most information. The project database on [verra.org](http://verra.org) provides a full list of current projects, with the relevant documents uploaded. Under each project, VCS Registration, Issuance, Verification and other Documents can be

downloaded. The availability of detailed information is matchless among the schemes included under this study.

- > **Key documentation available:** The two KP flexible market-based mechanisms included in this study, JI and CDM allow public access to the project-level documentation, including PDDs, monitoring and verification reports. JI Track 2 projects have stricter documentation requirements than Track 1, but even for latter group, the scheme owners reacted to criticism and provided key documentation online. The documents uploaded under the projects revisited fulfilled however the bare requirements, not being as informative as project documentation under VCS. In addition, progress reports are missing so that it is difficult to assess the project success based on the available information. Similar to CDM and JI, the German mini scheme MoorFutures has PDD, monitoring and verification reports available. Further information can be requested.
- > **Registry and methodologies available:** The two domestic schemes ERF and CCOP restrict the access to project-level data, which is a substantial obstacle to assessing the scheme's overall development and success. When adjusting methodologies, the ERF scheme owner provides an explanatory note so that decisions can be understood. CCOP works with three different registries, each operating on a slightly different mechanism. Despite the provision of project data and relevant documents, the level of information per project is rather low, due to the compilation and communication of data. Standardisation allows for projects to list the same information, but the forms lack comprehensive description of the data as was seen in PDDs of projects under other schemes. In some cases, the verification reports are available to view through voluntary registries if projects are additionally listed under CAR, ACR, or Verra.
- > **No project-level information:** For the two schemes in New Zealand (NZ ETS and PFSI), HSHF and FLBC, neither a project register, nor project-level documentation is available. For NZ ETS, PFSI and HSHF standardised methodologies are also inaccessible. FLBC presents their methodology online and publish material for farmers to get informed and involved. The scheme owner further publishes summary reports per region and year on their webpage.
- > **Too early to say:** LBC has been launched in 2018 and currently two Basque Forestry projects are registered under the scheme. The scheme owners announce that a project registry will be available soon, but it remains unclear how much information will be shared.

#### International vs domestic

The information available on the European projects in question tended to be rather scarce, partly connected to the novelty of the project and partly due to the domestic focus. One exception is MoorFutures as most project documents were available online. Project-level data tends to be more accessible in the international schemes (CDM, VCS, JI), comparing to the domestically-centred schemes (NZ ETS, CFI/ERF, CCOP). In these schemes, information transparency has spurred research which probably helped these schemes in identifying and

addressing pitfalls and loopholes. It also provided the scheme with useful information on the cost-effectiveness of abatement technologies, allowing in some cases to upgrade from offsetting to large-scale instruments such as cap-and-trade. Indeed, some have argued that this “search-engine” function of offset schemes was at least as important as their direct climate mitigation potential.

### Voluntary vs Compliance

Apart from the geographical coverage, another pattern is visible when clustering the schemes according to project-level information availability. Schemes that operate on voluntary markets tend to provide more data, as they are dependent on attracting buyers, e.g. VCS and those CCOP projects that are also part of the Climate Action Reserve (CAR) and ACR. MoorFutures is another voluntary offset scheme that provides relatively detailed information and LBC is likely to follow these steps.

### Lessons Learnt

- > On the one hand, the availability of scheme-level and project level data is crucial to facilitate scientific research, evaluation & reviews, and maximise transparency as well as scheme uptake. On the other hand, the publication of project-level data might lead to data breach and the disclosure of private information. Scheme owners can compensate retention of project-level information by providing a complete registry, publish internal evaluations and provide project-level information upon request.
- > When deciding on the level of transparency, European scheme owners should bear in mind the novelty of results-based payment schemes and contribute with knowledge sharing to better and more broadly accepted schemes.

## 3.7.2 Stakeholder consultation

Including local stakeholder consultation processes in the project development and scheme life cycles can be an important means to ensure acceptance (see 3.10 on *Acceptance & Barriers*), transparency and identify potential adverse socio-economic and environmental impacts early in the process (see 3.9.1 on *Safeguards*). In turn, an integrated process renders the project more likely to yield effective mitigation results, as stakeholders are given an opportunity to voice concerns and propose alternatives. This section covers the rules and requirements of the different schemes on stakeholder consultation. The feedbacks and comments received during stakeholder consultations and any official evaluations are to be covered under 3.10 as well.

### Consultation on projects

The degree to which schemes include local stakeholder consultations in the project registration process varies. While CDM, VCS and MoorFutures require such consultations, JI Track 1 leaves it to the requirements of the host party and the remaining schemes under this study do not include any local stakeholder consultation. CDM even includes a 30-day commenting period in the project registration process, when global stakeholders can comment on the PDD, it is however not announced when this period starts so that only very informed

stakeholders were able to comment on projects. Some Designated Focal Point (DFPs) publish JI project information for public commenting prior to approval.

Including local communities in the stakeholder consultation meetings supports the project implementation and ensures that the participating communities are aware of the project activities and receive an adequate reward. Furthermore, the practices adopted through the project activities can be replicated in adjacent communities, resulting in expansion of project activity or rising awareness about the project. Under some schemes the project developers are not required to include the local communities, nor to carry regular stakeholder consultations as the country the project takes place in does not have appropriate regulation. This raises the question of not only transparency, but the overall integrity of the project activity.

#### Consultation on methodologies

The more standardised methodologies are, the less necessity there is for stakeholder consultations on methodologies. CCOP includes stakeholder consultation in the protocol development cycle and AU ERF has been criticised for not communicating clearly in relation to method prioritisation and development (Australian Climate Change Authority, 2017). It was proposed that stakeholders should be more involved in discussions revolving methodology development. The European projects offer good examples on stakeholder inclusion, e.g. the French schemes FLBC and LBC arrived at methodologies through stakeholder guided processes. The HSHF project and Carbon Action specifically articulate that farmers are the main soil experts and provide them with a lot of freedom and responsibility for the project success instead of prescribing top-down inflexible methodologies. The projects aim at creating networks among the stakeholders to exchange experiences and ideas.

#### Lessons Learnt

- > The involvement of stakeholders in the methodology development is beneficial for reaching at methodologies that find good uptake and giving ownership over scheme contents to the participants.
- > The standardisation of methodologies reduces the need of local stakeholder consultations that are costly and might delay the project kick-off. For large scale projects, local stakeholder consultations should still be included in the registry process to achieve the highest possible contribution to sustainable development.
- > On methodology development, farmers are important stakeholders and experts and could be closely involved.

### 3.7.3 Scheme evaluation & development

The evaluation of the schemes is typically centred around a structured and thorough review process. In a broad sense, NZ ETS and AU ERF have the most transparent processes for review that also have direct action to implement the amendments or recommendations. VCS has a structured review process similar to NZ ETS and AU ERF, yet JI and CDM have processes through which the

attempts at reforming the schemes are seemingly incremental and must pass through several bureaucratic layers. There have been no reviews as of yet or evaluations of the European schemes due to their rather recent establishment, but all have plans to update their methodologies and generally expand.

#### Review process

#### Public review, consultations and panels

The AU ERF and NZ ETS have publicly available reviews under which public review and consultation is also granted public access in an attempt to increase transparency. Since the AU ERF was established in 2014, there have been two major reviews conducted by the Climate Change Authority (the Authority), an independent statutory agency, in 2014 and 2017. Accordingly, the Authority is required to review the ERF every three years with the 2017 review covering crediting and purchasing. The safeguard mechanism within AU ERF is covered in the Authority's 2018 review of the *National Greenhouse and Energy Reporting* legislation. On top of all of this, the Authority also produced a *Special Review* in 2016 which focused on the operational aspects of the ERF (including integrity of emission reductions and administrative systems). In general, the AU ERF has a very extensive review process, yet restricted access to the scheme's project level data (see **Error! Reference source not found.** on *Australian Emissions Reduction Fund*). The NZ ETS has had three reviews of the scheme with changes and amendments incorporated into all three government agencies and their roles in the scheme. In the midst of these reviews, in 2011 the NZ government instated an independent panel to take over the review process. The VCS review system involves assessment to the existing and proposed methodologies, programme and project registration, and VCU issuance. The VCS Association (VCSA) annually and quarterly revises the projects and issues VCUs in the VS registry (VCS, 2017). Like most other schemes, the VCSA has launched a public consultation initiative where feedback on amendments to VCS guidance will be used going forward (verra.org, 2018d).

#### CCOP: Board and committee instead of reviews

CCOP has a centred approach to reviewing in the form of direct legislation under which the program is amended or updated. The changes to the offset program are directly related to the changes seen under the cap-and-trade programme. In 2017, the Assembly Bill 398 (AB 398) was enacted resulting in the extension of the cap-and-trade programme until 2030. Additional impacts from AB 398 on the offset program included the shift from compliance obligation allowance from 8 percent down to 4 percent between 2021 and 2025 and increasing up to 6 percent for 2026 to 2030. In addition, the amendments required that regulated entities must source at least half of their offset obligations from projects that provide proven and direct environmental benefits.

#### Expert or steering body evaluations

JI and CDM both have systems in place for evaluation which demands Meeting of the Parties to the Kyoto Protocol (CMP) Decisions. CDM produces annual reports to the CMP regarding CDM and also publishes regular reports to the CDM EB. The CMP publishes guidance to the CDM every year with the most recent decision published in 2018 (Decision 4/CMP.14).<sup>24</sup> The JI has a long history of reviews and regard to public input. From the outset of the programme, there have been calls for public input on almost all aspects of the guidelines including

<sup>24</sup> <https://unfccc.int/sites/default/files/resource/08a1e.pdf#page=6>

baseline setting and monitoring as well as the draft guidelines and draft JI PDD. Within the JI guidelines, it is stated that the first review of the guidelines shall be carried out no later than one year after the end of the first commitment period based on JISC and the Subsidiary Body for Implementation (SBI).<sup>25</sup> The SBI will further call on technical expertise drafted by the Subsidiary Body for Scientific and Technological advice. Similarly to the CDM and alongside the guideline review, the JISC produces annual reports summarising meeting and stakeholder consultations as part of a set of recommendations to the CMP. The review process is arduous and flows through multiple levels of consultation before resulting in a final product, one of which being the most recent review of the JI guidelines (Decision 5/CMP.12) where the COP, 'decides to conclude its review of the joint implementation guidelines without adopting any revisions to them.'

#### Review inputs drive scheme development

#### Review results and development

For some of the individual EU initiatives, reviews have provided concrete inputs for future development and priorities. Going forward, FLBC/LBC as well as Carbon Action all have plans to expand their methodologies and garner support at the project-owner level. LBC and FLBC are expected to merge as well as coordinate across methodologies. The programmes are both new and developed privately with continuous and constant input from the Ministry with regards to methodology development and more. The development of further methodologies is expected with the hope for additional input coming from the French Environment Agency. In general, across LBC and FLBC there is a need for development of a methodology for soil sequestration in forests as there is not sufficient academic research. In addition, developing a methodology for hedges or, broadly speaking, agroforestry is expected for the future of the schemes. Carbon Action is also a very new program with hopes for expansion and collaboration going forward. The goals of the programme up to this point have been to generate interest and paint a picture where the farmers are the drivers of the scheme. It is in its pilot phase with a major barrier being the need for funding.<sup>26</sup>

Beyond the 2017 amendments, several CARB-released technical papers have evaluated the possibility of expanding CCOP to include international sector-based credits. The Tropical Forest Standard (TFS) is evidence of this based on public review and comment but has not been implemented as of yet. The evolution of methodologies is entirely top-down, which has resulted in slow progress and infrequent updates to existing methodologies.

According to the 2017 review, the ERF is performing well, and, among other key recommendations, the Authority suggests that the government allocate additional funds to the department for collaboration across stakeholder groups as well as research organisations in order to incorporate additional methodologies for the land sector. For NZ ETS, the first and second reviews, conducted in 2008 and 2011, respectively, aimed to moderate the impact of price on the system. the third review started in 2015 and had two stages where

<sup>25</sup> [https://ji.unfccc.int/Ref/Documents/JI\\_proc01.pdf](https://ji.unfccc.int/Ref/Documents/JI_proc01.pdf)

<sup>26</sup> Confirmed in interviews.

the first stage involved the restoration of a one-for-one-unit obligation in non-forestry sectors and the second stage involved a change in post-2020 settings for unit supply, price management and linking. For NZ ETS, a major concern from stakeholders was the uncertainty surrounding policy development as well as the price of carbon. Both of these concerns can be alleviated with comprehensive evaluation of the scheme with recommendations for future iterations.

Currently the future for CDM and JI is unclear. Despite CDM's attention to transparency and publishing of annual reports, there is no concrete information regarding how the scheme will develop. The status in the next few years is entirely dependent on the outcome of the KP second commitment period. It may result in the Parties partially or eliminating the CDM as it is now.

#### Lessons Learnt

- > Transparency and evaluation should operate simultaneously. With a thorough review process, there is need to gather public opinion as well as academic research. Reviews should be made public alongside project data.
- > Reviews can be used for strategic prioritisation of limited development capacity, but this has been observed to work best when review are at a detailed and limited scope relevant for a particular activity or project type.
- > Increased policy transparency can also reduce political risk and render higher participation.

## 3.8 Permanence

Enhanced removals are potentially reversible, as carbon contained in forests and soils is vulnerable to human action or natural disturbances. Permanence refers to the risk of carbon reversal of credits generated by enhanced removals through sequestering carbon in forest or soil projects (Peskett & Brown, 2010b). Under the KP, permanence refers to GHGs that are removed for over 100 years. To account for different residence times across GHGs, emissions and removals should be measured in terms of Global Warming Potential over that time frame (GWP<sub>100</sub>), i.e. mtCO<sub>2e</sub>, in line with the KP (Noble et al., 2000).

This section deals with the different approaches to accounting for non-permanence and the resulting mechanisms that the schemes apply to mitigate the non-permanence risk, with emphasis on the different implications of anthropogenic and natural disturbances.

### 3.8.1 Non-permanence Risk tool

From temporary credits to long-term contracts and risk discounts, schemes applied a mix of different tools to control for the reversal risk inherent in credits from sink projects. This section compares the most common approaches across schemes.

### Temporary credits

CDM implemented non-permanence risk tool distinguishing between temporary and permanent credits. As shown in Figure 3-3, CDM has two types of temporary credits for sink projects; tCERs and ICERs which both need to be eventually replaced by permanent credits. As the replacement ratio is 1:1, CDM takes a rather conservative and restrictive approach assuming no additional value from temporary carbon sequestration (depicted in Figure 3-3). As a consequence, buyers were reluctant to buy temporary credits and these credits were not eligible to be traded on EU ETS. Evidence suggested that projects that generate tCERs were likely to be abandoned and that ICERs implied high implementation costs.

### Establishing long-term project contracts

A common approach of voluntary standards and domestic schemes is to establish a long-term project contract to ensure that the project proponent is committed to maintain the carbon sequestered in soil or forest. Figure 3-3 provides an overview of the respective contract lengths of sink projects under each scheme, ranging from 3-year supply contracts in the HSHF project to the 100 years and beyond span of the Australian ERF, PFSI, CCOP and MoorFutures that even transform project areas to protected biotopes after their lifetime.

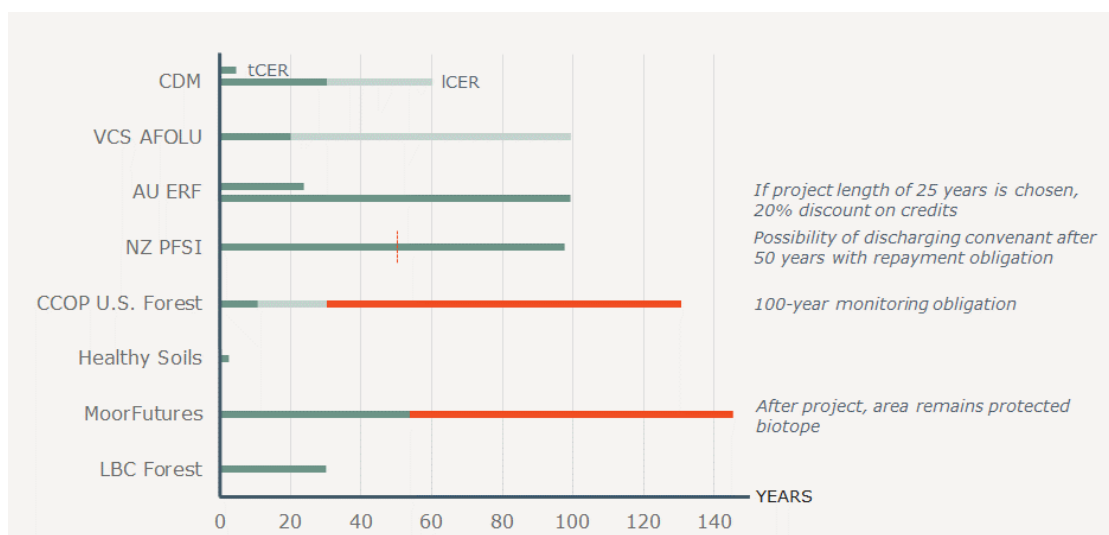


Figure 3-3. Overview of contract periods. Own representation: COWI, 2019. The lighter shades indicate ranges, e.g. VCS projects have a crediting period of between 20-100 years.

The Austrian HSHF project has an indefinite project lifetime. On the basis of 3-year contracts, farmers receive a bonus per mtCO<sub>2</sub>e which has to be paid back in case monitoring reveals a decline in carbon stocks. The recently introduced payment option per product however does not entail this liability anymore, thus the non-permanence risk remains completely unaccounted for, if farmers chose this option (see 3.6.3 on *Reward Mechanism*).

The orientation towards the 100-year benchmark of certain schemes reflects the Kyoto definition of permanence. However, Figure 3-3 also reveals that in general contract lengths differ quite substantially, thus not necessarily connecting to any notional definition of permanence. In addition, contract lengths are rather determined by practical limitations of how long one can expect private parties to engage in a contract (Murray & Kasibhatia, 2013). One example here are CCOP U.S. forestry projects that have to comply to the protocol's requirements for 125 years. The long timespan comes at uncertainties concerning opportunity costs related to future land- and timber-, and carbon-market developments, as well as concerns about long-term monitoring and verification expenses and liability, altogether shying away project proponents.

### Risk Buffer Account

Most of the schemes analysed in this study apply risk buffer accounts for sink projects, i.e. only a certain share of the generated credits is sold, whilst the remaining are held in a scheme-wide or methodology wide risk buffer account. In this case, project proponents bear the risks by foregone credits throughout

the project duration. Figure 3-4 shows that the different discounts applied across the schemes range from 5% (Australian ERF) up to 60% (higher range of VCS AFOLU). The buffer covers for both intended and unintended reversals; however, schemes usually apply penalties for intended reversals. For ACCUs generated through projects under the Australian ERF for instance, in addition to the rather small 5% risk buffer, the regulator requires relinquishment in case of significant reversal. The requirement does not hold if the reversal was due to natural disturbances with appropriate risk mitigation measures in place.

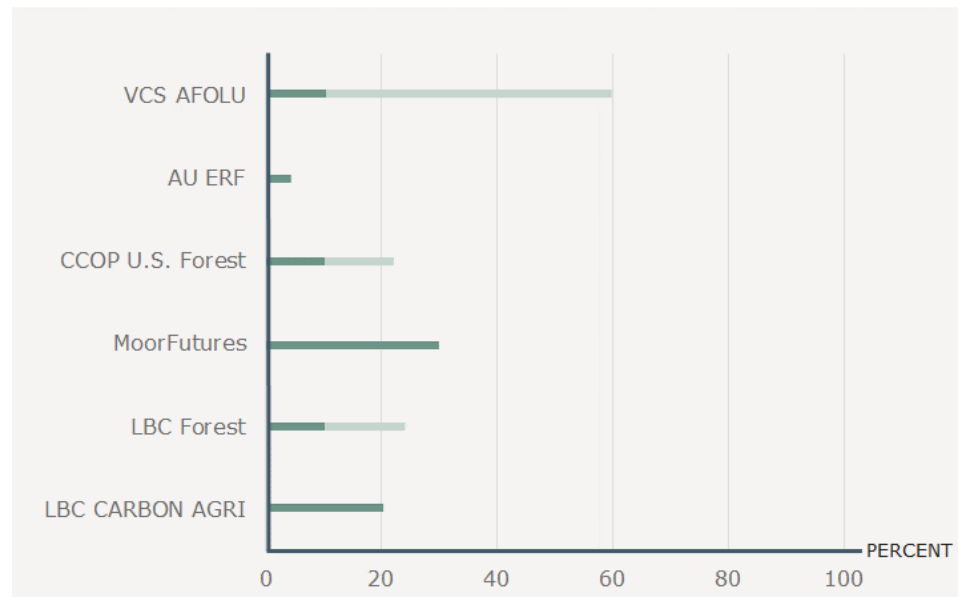


Figure 3-4. Different Risk Buffers applied across schemes. Own representation: COWI, 2019. The lighter shades indicate ranges, e.g. VCS projects pay between 10 and 60% of their credits to a Risk Buffer Account.

VCS Projects where permanence related risks did not materialise, are eligible for discharging of their buffer VCUs from the AFOLU pooled project buffer account, therefore giving an incentive for projects to continue monitoring over the long term. Where verification events occur at intervals longer than five years, a 15%-time release shall be compounded based on the number of five-year intervals that have passed since the last verification report was issued.

#### Non-permanence Insurance

The Risk Buffer Pools can be understood as project-specific insurance systems. An alternative not adopted by any of the analysed schemes is a Non-permanence insurance. A third-party insurer creates a portfolio of different projects such that the overall risk is limited. Such insurance might lead to a lower discount on credits and permit project proponents to settle the bill upfront which might be attractive for avoided deforestation projects where project owners gain the majority of credits in the beginning of the crediting period.

#### Determining the discount

A major limitation of risk buffer accounts and insurance like systems is that there is limited information on the reversal risk *ex ante*, therefore the determination of sound insurance premiums or buffer requirements is difficult,

beyond estimates for risk of fire. An interviewed project developer criticised the uniformity of risk factors across the U.S. and called for region specific risk factors. He used the comparison of Michigan, as a state with virtually no fire risk, and California, a state with high risk, as an example to prove his point. The recently launched LBC applied such region-specific risk factors to determine the discount. A minimum risk discount of 10% is applied in any case, and projects located in regions that are more prone to fire (according to Forest Code, Art. L133-1) receive an additional buffer top-up between 5-15%.

### Lessons Learnt

- Non-permanence is a risk, and addressing it is about sharing and distributing of the risk, and about defining what shall happen if the carbon sequestration behind the credit is reversed.
- Through the issuance of temporary credits scheme owners missed out on their climate change mitigation potential as buyers were shied away and projects were likely to be abandoned.
- Long-term contracts do not necessarily relate to the notional definition of permanence, ensure however that project owners retain sequestered carbon in soil and biomass.
- A risk buffer account is the most widely adopted non-permanence risk tool. With a risk factor determination that mirrors the actual assumed risk of the project, such approach will most likely ensure the environmental integrity of credits from sink projects.

### 3.8.2 Accounting for permanence

One approach that considers the possible non-permanence of removals is to account for net emissions, i.e. either the seller or the buyer is continuously liable for any subsequent reversal regardless of the cause of the emission and beyond project lifetime or crediting period (Noble et al., 2000).

#### Inclusion in National Inventories

Being implemented in Annex I countries, JI adopted this approach as enhanced removals from sink projects under JI will be captured in the host country's national inventory. In case of a reversal, the country that purchased units keeps the credits generated, leaving the non-permanence risk with the host country, regardless of the cause of the reversal. Enhanced removals achieved under Australia's ERF are contributing to their national targets, thus reversals are factored in the Australian inventory. This approach, however, is dependent on the preciseness and quality of the data to estimate the country's carbon pools. As stated in section 3.2.2 on *Policy context*, forestry project plots might be too small to be captured by satellite data, thus reversals do not always show. Furthermore, including voluntary schemes in national inventories might lead to double counting of credits that companies used to compensate their emissions and national efforts to reduce GHGs. The recent position formed hereto is

however that voluntary schemes can contribute to national targets without losing environmental integrity.<sup>27</sup>

### Inclusion in ETS

The New Zealand ETS is the only system that includes the forestry sector. Owners of pre-1990 forest land are obliged to register their land under ETS and pay units for deforestation emissions. Permanence, however, remains unaddressed in the NZ ETS, as clear fell harvesting is the common practice in New Zealand forestry sector. Pre 1990 forest owners are therefore still allowed to harvest without incurring liability if trees are replanted, and the forest is maintained.

### Lessons Learnt

- > In addition to sound non-permanence risk tools, the inclusion of results-based carbon farming schemes in national registries should be enhanced to further safeguard permanence.
- > The privately funded project Healthy Soils for Healthy Food shows that private companies are willing to pay for environmental benefits without policy action. It is however uncertain, how long the project will be continued and there is no mechanism to ensure the permanence of sequestered carbon. Public authorities should support the positive development of private actors engaging in climate action, yet there is a need to ensure that climate impact does not dwindle in the long-term.

## 3.9 Risk Assessment & Mitigation

The schemes' primary focus lies on mitigation outcomes and as analysed under 3.8 on *Permanence*, schemes should ensure permanence and limit threats that could negatively affect it. Yet, climate change interventions are never one-dimensional. There is a growing body of evidence on and examples of synergies and trade-offs between climate impacts and other environmental as well as social achievements. This section therefore concerns how schemes includes social and environmental safeguards, as well as deal with specific risks, including land tenure and market risks.

### 3.9.1 Social and environmental safeguards

Schemes need to consider social and environmental safeguards to identify, prevent and mitigate adverse impacts of a project. These safeguards act as a minimum standard that projects have to fulfil to ensure no negative consequences beyond positive climate impacts (Arens & Mersmann, 2018). Figure 3-5 illustrates the safeguard principles established under the Adaptation Fund's Environmental and Social Policy which are the most important and most commonly found. The figure additionally lists the most commonly applied tools to ensure safeguarding.

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<sup>27</sup> Confirmed in interview

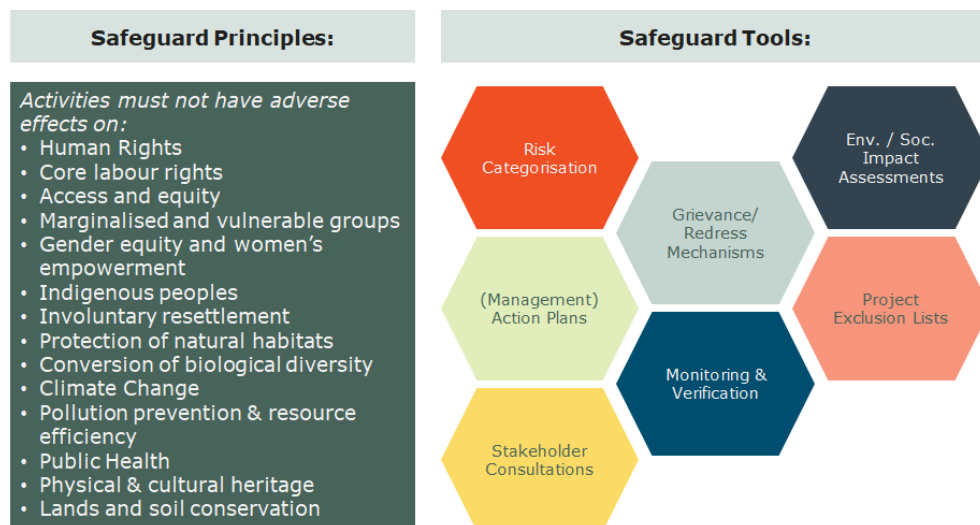


Figure 3-5. Overview of Safeguard Principles and tools for their Implementation.  
Source: Arens & Mersmann, 2018.

## Safeguard tools

Since projects may have very different potentials of having adverse environmental and social effects, a clustering into different **risk categories** and respective mechanisms to identify, address and mitigate risks is often used. The IFC Performance standards distinguish between three categories; Category A implying potential significant risks that are diverse, irreversible and unprecedented and Category C is applied when there are minimal or no adverse risks or impacts.

**Environmental and Social Impact Assessments** (ESIAs) gauge the effects of an activity and are ideally undertaken by independent consultants. Many countries and most financing institutions have guidelines that require different degrees of ESIs.

Once identified, **Management or Action Plans** contain how to address any negative effects, depending on the risk level and type mitigation measures can have different degrees of detail and plans can extend beyond project duration.

**Stakeholder consultation** (see 3.7.2 on *Stakeholder consultation*) are a powerful tool to ensure transparency and acceptance. Consulting the local communities affected by a project is also extremely important to identify and mitigate any negative effects the project may place on them at an early stage. In addition to local consultations, international stakeholder input might be helpful depending of the scope of the project and scheme as a whole.

**Grievance and redress mechanisms** or **appeals processes** can support conflict resolution over undesired side effects of an activity through mediation and recommendations.

**Monitoring** of negative impacts forms an important aspect of safeguarding as it provides an idea of the extent of the effect. Independent **verification** can contribute to enhanced credibility and accountability.

Finally, **project exclusion lists** are a powerful tool to *ex ante* exclude certain project types from being funded, as they are considered risky.

Risk mechanisms vary depending on the scheme and project characteristics (see Table 3-12) and can address issues related to sustainable development, reward mechanism, national/international political context and other social and/or economic factors that the project implementations could affect.

Table 3-12. Social and environmental safeguards across schemes.

| Scheme          | Social and environmental safeguards                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CDM             | <ul style="list-style-type: none"> <li>&gt; For sink projects: anticipated socio-economic and environmental impacts of the proposed A/R CDM project activity included in PDD, if considered significant an <b>ESIA</b> is required, alongside with monitoring and mitigation measures.</li> <li>&gt; Appeals process/grievance mechanism has been discussed but not agreed upon</li> </ul>                                                                                                                                                                                                                                                                                                                                   |
| JI              | <ul style="list-style-type: none"> <li>&gt; No social safeguards beyond national legislation</li> <li>&gt; Analysis of the environmental impacts of the LULUCF project in PDD, including transboundary impacts. If such impacts are considered significant by the project participants or the host Party, an environmental impact assessment (<b>EIA</b>) must be undertaken.</li> <li>&gt; Establishing an appeals process was part of the decision 6/CMP.8 for revisions of the JI Guidelines. No official process or revisions have been completed yet.</li> </ul>                                                                                                                                                        |
| VCS             | <ul style="list-style-type: none"> <li>&gt; Project proponents need to identify potential negative environmental and socio-economic impacts and propose and implement <b>mitigation measures</b>.</li> <li>&gt; Additional standards such as the Climate, Community &amp; Biodiversity Standards (CCBS) or Forest Stewardship Council (FSC) certification may be applied to demonstrate social and environmental benefits beyond GHG emissions reductions.</li> <li>&gt; <b>Appeals process:</b> Two-step process, whereby complaints are processed by the VCS Association and overseen by the CEO. If complainant is unsatisfied with the outcome, they may file an appeal (addressed and overseen by VCS Board)</li> </ul> |
| AU ERF          | <ul style="list-style-type: none"> <li>&gt; To prevent projects that might cause adverse outcomes for the environment or community, the scheme includes a <b>negative list</b> of activities not eligible under ERF, e.g. planting of weeds, establishment of vegetation on illegally or recently cleared land/drained wetlands</li> <li>&gt; <b>Appeals process:</b> Project proponent can seek an internal review of certain statutory decisions before going to the Administrative Appeals Trial</li> </ul>                                                                                                                                                                                                               |
| NZ ETS and PFSI | <ul style="list-style-type: none"> <li>&gt; No social and environmental safeguards beyond national legislation</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CCOP                           | <ul style="list-style-type: none"> <li>&gt; During adoption of the protocol, CARB conducts an <b>analysis</b> whether there is any <b>potential harm</b> connected to potential projects</li> <li>&gt; <b>EIAs</b> have to be performed if required by local, regional or national regulation.</li> <li>&gt; <b>Appeals process:</b> Disagreements among offset operators, verifiers and the Offset Project Registries may be appealed to CARB</li> </ul> |
| FLBC                           | <ul style="list-style-type: none"> <li>&gt; <b>Monitoring &amp; Verification:</b> Inclusion of socio-economic and environmental indicators in the farm audit/diagnostic</li> </ul>                                                                                                                                                                                                                                                                        |
| MoorFutures                    | <ul style="list-style-type: none"> <li>&gt; No social and environmental safeguards beyond national legislation</li> </ul>                                                                                                                                                                                                                                                                                                                                 |
| Healthy Soils for Healthy Food | <ul style="list-style-type: none"> <li>&gt; No social and environmental safeguards beyond national legislation</li> </ul>                                                                                                                                                                                                                                                                                                                                 |
| LBC                            | <ul style="list-style-type: none"> <li>&gt; <b>Monitoring &amp; verification:</b> Inclusion of socio-economic and environmental indicators in the methodology</li> </ul>                                                                                                                                                                                                                                                                                  |
| Carbon Action                  | <i>Not considered yet, scheme is at development stage</i>                                                                                                                                                                                                                                                                                                                                                                                                 |

The table shows that the majority of the schemes do not include dedicated social and environmental safeguard tools. The domestic schemes in New Zealand, Austria and Germany do not include any beyond national legislation. The two French schemes include socio-economic and environmental sustainability indicators and MoorFutures monitors different additional ecosystem services in their MRV, thus implicitly controlling for adverse impacts and allowing for price premiums for co-benefits (for more details and a detailed indicator list see 3.6.2 on *Price Premiums* and 3.11 on *Sustainability Indicators*). A negative list that excludes potentially risky projects, as implemented in Australia might be an effective and standardised approach to ensure environmental and social integrity, tailored to the national context of the scheme.

### Appeals process

The appeals process across the schemes varies in specificity and effectiveness. CDM and JI, for example, both have made commitments to develop a system for appeal, yet neither have published an update with such a system in their guidelines or legislative documents. A 2014 UNFCCC review of the JISC guidelines simply states, '*any decision taken by the JISC in accordance with these modalities and procedures may be subject to appeal by affected stakeholders, in accordance with provisions to be determined by the CMP,*' followed by no further instructions. In CCOP, filing an appeal is typically done between the project developer and the verifier, with the possibility for a project registry, e.g. CAR, acting as a mediator or 'informational resource' (Rosen & Bossi, 2011). Under VCS, the procedure for settling disputes and entering an appeals process are contained within an entire section in the VCS guidelines. In the case where an external party is required for the process, the VCS Board will still make the final decision. In addition, the VCS has a mechanism in place to file a complaint/appeal against the VCS procedures, rules, etc. In this way, VCS has multiple system checks against itself as well as against the other relevant

parties (verifiers, registries, etc.) providing a safeguard against fraudulent behaviour. The European schemes have no appeals process in place.

#### Lessons learnt

- › The majority of schemes included under this study do not include dedicated social and environmental safeguards.
- › Scheme owners have the possibility to include broader sustainability indicators beyond climate indicators to monitor and remunerate projects that exert well. Alternatively, scheme owners can develop a negative list to structurally exclude project activities that might have negative externalities.

### 3.9.2 Land tenure and local communities

Figure 3-5 from the previous section introduced the most common safeguard principles. Depending on the type, size and location of the project, different principles are at stake. From the analysis of selected carbon farming and forestry schemes, social risks related to land tenure seem to be apparent when conducting carbon farming and forestry projects. This section deals with how schemes deal with complex and uncertain land tenure and access rights.

#### Land tenure and bundles of rights

"Land tenure is the relationship, whether legally or customarily defined, among people, as individuals or groups, with respect to land." (FAO, 2002). There are different sources of rights – customary, statutory and informal cultural rights. Therefore, rather than focusing on *de jure* rights, schemes have to take *de facto* access into account, i.e. how people behave given a variety of constraints (Ribot & Peluso, 2003).

The rights over land and other natural resources can be described in terms of bundles, where various actors hold different combinations of rights over a resource, defining their level of access:

- › **Use rights** are rights to enjoy *direct and indirect benefits* from the land, e.g. the produce from cultivating the land, but also income from carbon credits;
- › **Control rights** determine the scope of use rights and include
  - Management*, i.e. regulating use and transforming the land;
  - Exclusion*, i.e. defining who has use rights;
  - Transaction*, i.e. managing the realisation of benefits;
  - Monitoring*, i.e. Monitoring the use of benefits and state of the resource;
- › **Authoritative rights** define control rights, including the *definition* of where and when rights apply and the *allocation* these rights (Sikor et al., 2017).

Schemes alter  
existing tenure  
regimes

It is assumed that the owner of a parcel of land holds the right to management carbon fluxes and pools and can sell the emission reductions or sequestered carbon. Yet, the concept of selling carbon is rather new consequently few

countries have regulations that define rights to sell carbon, i.e. ownership and transfer rights have to be clarified on a case by case basis. Often carbon rights go along with tree and land ownership, therefore land tenure can constitute a bottleneck to establishing effective offset projects (Peskett & Brown, 2010c)

Both international and domestic schemes are implemented in a context of complex land tenure systems and intervene in existing tenure regimes as new actors and new benefits are introduced. Diffuse land tenure has affected project activities under VCS and the New Zealand schemes (as concerns Maori land), as ownership claims hampered project activities. To ensure a seamless project development, VCS and AU ERF require secure land tenure and land holder consent. Proponents of ERF projects on indigenous lands may be required to negotiate an Indigenous Land Use Agreement with registered native title claimants, which can be a costly and time-consuming process. The New Zealand government aims to implement collective ownership, which could decrease or/and eliminate the risk of potential ownership disputes. In order to engage farmers and foresters in projects, they need to feel secure in their tenure.

#### Local communities

#### Loss of use rights

Under CDM and VCS, not only project activities but also local communities were impacted by changes in land tenure regimes. Land owners that leased their land to tenant farmers or granted local communities to use the land, deprived them from the use rights to engage in CDM (in *Korean Reforestation of abandoned dairy cattle grazing grasslands*) and VCS (in *TIST programme in Kenya*), thus impacting the farmers' and local communities' livelihoods significantly.

#### Lessons Learnt

- A scheme must ensure that projects are implemented on lands with secure ownership rights, even if this implies costly and rigid documentation requirements.
- Scheme owners need to carefully consider the bundle of rights that local communities have to identify and mitigate risks which can be achieved through local stakeholder consultations and inclusive project designs that consider use rights and have a benefit mechanism in place.
- Project developers must always involve and secure consent from all communities and landowner directly or indirectly impacted by the project activities.

### 3.9.3 Market risks and consequences for project proponents

In open carbon markets, price distortions or volatility are likely to occur and create economic risks for project proponents. Experiences of the international schemes CDM, JI and VCS, but also NZ ETS (with price volatility) unsettled project proponents that relied on the income from carbon credits to render their project viable (linked to financial additionality as discussed in 3.4.2 on *Additionality*). There are several risk mitigation mechanisms that are partly

related to the Price mechanism (see 3.6 on *Reward Mechanism*) and partly with the policies the scheme is embedded in (see 3.2.2 on *Policy context*).

### Mitigation of market risks

#### Mitigation through policy action

Schemes incorporated different mechanisms to mitigate these market imperfections. The New Zealand authorities closed their market for international units, which is however a short-term and isolationist solution. Market participants in California raised concerns that relaxing allowance will decrease demand for credits; as a response the authorities decided that from 2021 onwards 50% of all offsets have to be generated within the state of California.

In Australia, the absorption of CFI into the ERF created a demand that led to more stable prices and hence more project development. This inclusion might have mitigated the market risk explained above, but at the same time showcasing how projects are vulnerable to political uncertainty. The commitment of additional funds to reach the emission reduction target in 2030 was only made in February 2019. The CFI review remarked that uncertainty surrounding Australian climate change policy and inherent budgetary vagueness constitute a major risk for project developers to engage in carbon farming.

Asymmetric information regarding the market price of emission reduction units has also been identified as one of the major market risks for NZ ETS. The scheme has an NZU price management in place, which secures the optimal market operation, where the participants can meet the cost of liability directly from the government at price option of NZ\$25. Furthermore, the participants are allowed unlimited banking and are able to save the substantial amount of NZUs for future compliance. In addition to the price management, the NZ government aims to increase transparency and ease the access to the scheme and market information for the participants.

#### Mitigation through long-term contracts

The demand for CERs (CDM) was further stimulated through long-term contracts, which can be supported by purchasing programmes such as BioCarbon Fund (BioCF). BioCF purchases the CERs under long-term contracts from agricultural, afforestation and reforestation activities and provides technical support and up-front payments for the farmers. Such payments provide risk reductions for the participating farmers, by lowering the initial costs and providing direct reward (called primary credits, see 3.6.1 on *Price Mechanism*).

Long term contracts with price guarantees were also mentioned as an effective risk mitigation mechanism by market participants in New Zealand. Long-term commitments are however challenging considering the long project lifespan of Carbon Forestry. Here voluntary markets in particular companies with strong Corporate Social Responsibility (CSR) ambitions and public long-term goals of carbon neutrality can play a major role.

#### Mitigation through price premiums on co-benefits

The price premium paid for credits that favour environmental and socio-economic co-benefits could constitute a share of the price or a fixed premium on each credit, latter providing more security for the seller (see 3.6.2 on *Price*

*Premiums*). In any case, premiums are mostly bilaterally agreed between seller and buyer (except for LBC), therefore market mechanisms do not hold as such.

### Lessons Learnt

- > Policy action triggers demand for credits by capping emissions. The more rigorous environmental regulation is, the higher the demand for credits from both compliance and voluntary markets, resulting in higher price certainty and market stability.
- > On a scheme-level, environmental integrity has to be ensured through stringent methodologies to act as a natural price stabilator, as it prevents oversupply of credits that do not translate into real emission reductions/removal enhancements.
- > By supporting long-term contracts and the arrangement of premiums for co-benefits, scheme owners can mitigate market risks for scheme participants.

## 3.10 Acceptance & Barriers

Successful scheme implementation and its further development will highly depend on the number of barriers it faces, as well as the stakeholders' engagement and view of the scheme. This chapter compares schemes according to acceptance and barriers starting with the stakeholders' reactions to agricultural projects, technical capacity required for participation and barriers that are particularly apparent for smallholder farmers.

### 3.10.1 Stakeholder reaction to schemes

- > The schemes analysed under this study are chosen to provide a balanced picture of international and domestic results-based climate change mitigation schemes that made advances in carbon farming. This chapter is concerned with the reaction to the schemes, particularly from a carbon farming and forestry point of view.

#### Reaction from Farmers

The strong resistance from New Zealand and Australian farmer groups is linked to the pressure to reduce emissions under a compliance scheme in light of global competition and price advantages from farmers that are not subject to carbon pricing. Despite that, the NZ ETS with its all sectors, all gases ambition still aims at including agriculture into the scheme.

But even voluntary schemes cause initial reluctance and scepticism among farmers. In Australia carbon farming experienced an arduous start, which has been attributed to the initial policy risk (potential impact on the carbon price of the envisaged linkage with EU-ETS), the lack of methodologies, limited access to capital and information. In addition to these barriers, the Australian agricultural sector is ageing, therefore farmers are both reluctant to altering long established practices and engaging in projects with long lifespans. Scheme reviews revealed

however, that after the slow start, the Australian CFI has changed farmers attitudes towards climate friendly farming practices despite the prevailing conservativeness.

The Austrian HSHF project experienced a similarly slow start. The scheme owner reacted with enhanced promotion and once farmers realised that they were not forced to implement certain activities as long as the result (enhanced SOC) shows, the project sparked interest. Carbon Action has a similar approach and the interest that farmers showed towards becoming pilot farmers exceeded the expectations of the scheme owners.

Several schemes received the feedback that methodologies were too complex to be implemented by farmers themselves. ERF carbon farmers and New Zealand carbon foresters had positive experiences with carbon agents that assist with project registration, MRV and/or brooking credits. An alternative approach is the aggregation of several small farms, managed by one project developer that can assist with the technicalities. Both options are further elaborated on under 3.10.4 on *Barriers for smallholder farmers and foresters*. Experience from HSHF and FLBC showed that farmers will engage in a scheme, when they perceive that they will benefit financially from it. A FLBC advisor showed concern whether a lot of FLBC farmers would segue into LBC (applying the CARBON AGRI), as farmers felt that the opportunity costs are too high, and the credit income was not sufficient.

### Reaction from Buyers

The most apparent reaction towards removal credits from CDM sink project is the overall low demand for the credits being temporary. The eventual replacement with permanent credits and the capped demand at 1% of the 1990 emissions level of the Party created uncertainty and made credits from sink projects less attractive to buyers.

With advances in non-permanence risk tools (see 3.8 on *Permanence*) and the recent emerge of European voluntary schemes, sink projects became more secure and appreciated. A study on potential credit demand for a French voluntary scheme revealed that there was a high demand for locally produced carbon credits. Despite the few large buyers that seek low prices, the attractiveness of forestry and agricultural projects increases due to strong local association and specific co-benefits and the majority interested buyers purchase smaller amounts at higher prices.

### Lessons Learnt

- > Ambitions to include agriculture into NZ ETS have so far been curbed by the complexity of diffuse emission sources and relenting lobbying of sector representatives. This is problematic, since AFOLU contribute to about 24% of all anthropogenic GHG emissions. While the land sector on the one hand provides substantial mitigation potential, the sector can contribute towards carbon neutrality and the long-term Paris goal due to its sink function.

- The scheme design should ensure through participatory approaches, advisory and flexibility in terms of mitigation activities that farmers have the ownership of the project activities. This will reduce the resentments and scepticism towards public authorities.
- While ensuring environmental integrity, the bureaucratic processes from project registration to MRV have to be organised such that farmers perceive that they will still benefit financially from the project.
- Non-permanence risk should not be transferred to the buyers (e.g. through distinguishing between temporary and permanent credits) as this will make them reluctant to buy credits from the land sector. It is the duty of project proponents to ensure the longevity of credits, therefore they have to clear the risk.

### 3.10.2 Broader benefits for the society

Beyond immediate stakeholders, i.e. farmers and buyers, schemes can also affect the wider society through achieving broader benefits. In doing so, schemes receive a good reputation and acceptance.

#### Benefit sharing with local communities

International schemes run several land use and agricultural projects that concern lands used by local communities. Under 3.9.2 on *Social Risks*, connected issues concerning land tenure and use rights were discussed and an appropriate safeguard mechanism ideally assures that the livelihood of local communities is not jeopardised in the wake of project activities. Beyond risk mitigation, project developers under CDM, JI, and VCS sometimes include local communities in the project activities and shared benefits. Some projects under VCS pay a per-tree premium for maintenance in their reward mechanisms for local communities, thereby rewarding local communities and ensuring permanence. However, in most cases, although the local communities are included as means for reporting results, they can be excluded from the reward mechanism, i.e. not receiving any revenue from credits. Such exclusion can also occur due to high initial costs, where the ownership rights over the CERs belong to the investing entities and project participants. The reward for the communities then becomes the improvement in the socio-economic standing of the community through employment and additional provisional ecosystem services. The domestic scheme MoorFutures does not engage local communities but hopes to render rural regions in Northern Germany more attractive for tourism through landscape restoration and enhanced recreational value.

#### Reputation of offset credits

Offsets in compliance schemes suffer from bad reputation as high emitting companies can buy themselves free of emission reduction obligations. A high number of the emitting facilities are located in or nearby to low income areas. Facilities that receive allowances or purchase carbon offsets from GHG mitigation programmes are generally found to have the largest share of the total

emissions. Hence, there seems to be a trade-off between using offsets from CCOP and relieving disadvantaged communities from unclean air.

### Reinvesting the scheme revenue

While all schemes have to finance administrative costs related to scheme maintenance and continuation, some schemes reinvest part of their revenue to create broader benefits. A 2% levy on CDM credits is used to finance the Adaptation Fund and the revenue from CCOP auctions is reinvested through the Greenhouse Gas Reduction Fund (GGRF) with 60% of these funds permanently diverted towards sustainable communities, affordable housing and public transportation (including high-speed rail). In addition, 35% of the GGRF must be invested in projects that can be proven to assist disadvantaged communities.

### Lessons Learnt

- > Project developers that engage communities should ensure a fair benefit sharing mechanism which will further contribute to project's positive long-term impact and the scheme's overall reputation.
- > Compliance schemes have to take into account what role offsetting options play in terms of social equity and can mitigate adverse effects through controlling the quantity of credits that can be used for offsetting and reinvesting the revenue generated by the scheme into community development.

## 3.10.3 Technical capacity & training

- > There are two important technical capacity building aspects of carbon farming that should be considered. First, the effective change of practices towards carbon farming and forestry requires additional technical capacity and training if there are any new practices, tools, or machines to be employed. Secondly, the MRV of the mitigation results in terms of emission reductions/removal enhancements also demands that the farmer understands and to some extent masters new technologies. Both of these aspects increase the participation costs if borne by the project proponents. Whether or not capacities are built through training does not only determine the immediate project success but also ensures the longevity of projects and consequently mitigation efforts. Bilateral projects also have the potential to contribute to the diffusion of technologies, as JI projects in Russia and Ukraine showed.

### Inclusion of training costs

The two international schemes CDM and VCS state their contributions to sustainable development. In particular if carbon crediting is combined with development cooperation (i.e. through the BioCF, see 3.6 on *Reward Mechanism*), capacity building is included in the project design to ensure that farmers and local communities are trained sufficiently to perform practices such that carbon is sequestered/emissions are avoided. Some JI projects equally include expenses for training in their fixed costs. In all cases, the project developer is financing the training. As a consequence, when scheme

requirements are low and interests are merely financial, developers might economise on training expenditures, potentially lowering the mitigation effect.

The three schemes FLBC, Carbon Action and HSHF are either run by the private sector or heavily rely on the cooperation with private sector food processing or retail companies for providing finance for carbon farming training. In addition to this, FLBC cooperates with agricultural schools and experimental farms and Carbon Action ensures that farmers are involved in deciding on training structure and content.

### Demonstrating mitigation results

Once carbon farming practices are implemented, project proponents need to demonstrate the results through monitoring and reporting, and subsequent verification. Depending on the project constellation and the fragmentation of project activities (if one project developer is managing several small farms), the technical capacity and the standardisation monitoring might require substantial manpower and know-how. Under CCOP, some small-scale dairy farms decided against participation, as the upgrade to meet technical requirements for monitoring was too burdensome. The concern of some FLBC participants goes into the same direction as they fear that credits will hardly the time and effort required for monitoring (see 3.10.4 on *Barriers for smallholder farmers*). The level of technological advance at the farm is another important aspect. For farms that are already digital and keep data records, the adoption of a monitoring regime is not as demanding.

### Lessons Learnt

- Schemes must consider both the MRV capacity building and the technological capacity building. Whereas the former relates to Monitoring costs (see 3.5.4 MRV cost) and depends on the level of digital and technological preparedness, the former links to management practices and tools. In both cases, training will be needed.
- Training for MRV was found often to be included in the pricing of credits, at least under CDM, VCS, and partly JI.
- As regards training in new technologies, farm extension services are important stakeholders and collaborators. Some of the local EU schemes targeting private sectors credit buyers also included this sort of training.
- The scope of the geographical scheme has implications for the organisation of training for the project participants. Domestic schemes like FLBC and Carbon Action are able to organise farm advisory and can finance it through a levy on credits, whereas in international schemes, the project proponent needs to ensure that participants are prepared to do carbon farming and forestry as well as monitoring the results. Here the scheme owner has to ensure that sufficient training safeguards environmental and social integrity.

### 3.10.4 Barriers for smallholder farmers and foresters

#### Role of smallholder farmers

Whether farms can be considered small is relative and highly context specific. Globally, there are more than 570 million farms, more than 475 million are smaller than 2 ha (Lowder et al., 2016). In the EU-27, close to 12 million farms were surveyed in 2010. Of these, 49% operated on less than 2 ha and 67% less than 5 hectares (HLPE, 2013). While globally, the size of farm holdings is decreasing, the trend within Europe remains opposite (Lowder et al., 2016). In view of the large number of smallholder farms and their potential contribution to climate change mitigation, it is important that schemes are equally accessible for this group of potential participants, with the same applying for small-scale forestry. In light of climate change and the need to adapt farming systems, additional carbon income can contribute to income diversification, thus making smallholder farms more resilient to weather related risks.

Subsections 3.5.4 on *MRV costs* and 3.10.2 on *Technical capacity and training* hint already at two potential barriers that structurally put smallholder farmers and foresters at a disadvantage. This section focuses on these structural differences and how the different schemes mitigated them.

#### Big challenges for small farms

In all schemes, participants and scheme owners perceived barriers that prevent in particular small-scale projects from engaging in carbon farming or forestry.

#### Bureaucratic burden

For CDM, JI, AU ERF and the two New Zealand schemes, the long and inflexible registration processes discouraged small-scale projects from participating and as discussed under 3.4.1 *Methodology Development*. In addition, smallholder farmers that would like to propose a new methodology are likely to face financial and technical constraints, a reason why the CDM methodology on feed additives was adopted late and found only limited uptake despite strong potential.

#### Return on investment

Project developers seek to invest in projects that promise the highest expected returns, leading to choosing large-scale projects over small-scale opportunities. In addition, the substantial upfront investment expenditure and running costs for MRV etc. constitute a huge burden for small-scale project proponents under all schemes as costs are likely to eat up most of the expected revenue from carbon credits. A project with high initial carbon stock or large property size is thus more likely to have a higher return on investment and higher financial viability. Small-scale livestock farms to be registered under CCOP showed lower willingness to invest in technological equipment that is necessary to gain offset credits. Smallholder forest owners face disadvantages if they are interested in Integrated Forest Management under the CCOP U.S. Forestry Protocol. This is since the baseline for forest projects is determined by the regional common practice, which results in credit revenue generation at the outset of a project. Small-scale forest owners are less likely to surpass the baseline set by the regional common practice, making eligibility for the scheme unlikely. When the initial stocking is below the common practice, the baseline might be higher, which in turn punishes farmers that may already have sustainable practices in place and will not be able to go beyond the baseline to generate sufficient credits (see also Section 3.4.3 on *Underlying baselines*) (Ruseva et al., 2017).

Although an average regional practice reduces the complexity associated with determining project eligibility by making it easier for verifiers to manage projects, it makes it difficult for smallholders to compete with large timber producers or landowners. By creating an exclusion or allowing for aggregation across smaller forests, this issue could be eliminated and pave the way for greater uptake among small-scale projects (Kelly & Schmitz, 2016).

### Simplified Methodologies

Most larger schemes apply simplified methodologies for small-scale projects, e.g. CDM. As mentioned in 3.4.1 *Methodology Development*, CDM methodologies have either been directly applied by or inspired methodologies of other schemes, leading to the implicit distinction by project size in other schemes as well. The high degree of standardisation that characterise methodologies of CCOP, NZ PFSI and ERF, MoorFutures, LBC and the AU ERF (see Figure 3-1) lift part of the burden connected to baseline determination, additionality proof and MRV from the project owners, thus indirectly supporting small-scale projects. CDM (for small-scale), LBC, CFI and CCOP for example have positive lists with project types that are automatically considered additional and MoorFutures, NZ ETS and PFSI work with look-up tables when forests are below 100ha, thus reducing MRV costs. This approach has been criticised however, for being too conservative. In New Zealand, it has been observed that developers aggregate land from smaller forest owners that did not consider schemes profitable due to conservative default values. Once aggregated, the scheme permits the field measurement approach (FMA). Having said that, 60% of PFSI project participants own less than 50ha, implying that the scheme is still profitable for smallholder foresters that might appreciate the ease of using look-up tables.

### Aggregation and whole farm approach

CDM and VCS allow for a) aggregating several identical projects to one single project from a crediting perspective and b) applying several methodologies to one project (whole-farm approach). Both measures favour small projects for different reasons outlined below.

#### Aggregation of small projects

The aggregated project approach permits joint crediting of small, spatially fragmented GHG emission reduction activities and as mentioned above, this is also possible in New Zealand if the project owners own all parcels of land. Under CDM and VCS, however the project owner is not necessarily the landowner, rather are several land or farm owners jointly applying. CCOP considered adopting such an approach for rice farming projects, yet scheme owners decided against including this option, as the verification process of aggregated projects would be cumbersome. In addition, the drop out of one project partner jeopardises the success of the entire project, rendering aggregation a risky undertaking for project participants. VCS and other voluntary schemes overcame this drawback by allowing for partial credit pay-backs.

#### Whole-farm approach

CDM and VCS allow to use several mitigation activities for one project. This allows small farms to diversify their carbon income, thus increasing credits and reducing risks. The combination of several methodologies renders the approval

process of individual processes more work-intensive, therefore highly standardised schemes like LBC, AU ERF depart from this option. The CARBON AGRI method under LBC (developed based on results from FLBC) constitutes a whole-farm audit methodology for dairy farms, thus taking into consideration several mitigation activities on one farm.

### Involvement of farmers' associations, NGOs and Carbon Agents

To engage smallholder farmers and foresters in results-based climate mitigation, intermediaries are found to be useful and partly encouraged by scheme owners. The scheme participants in New Zealand and the landowners in Australia gained positive experiences with so called carbon agents, i.e. private consultants that support project proponents. How and to what degree intermediaries are involved large varies, taking different forms:

- > For the international schemes and the CCOP, farmers' or forest owners' associations, private consultancies as well as NGOs often act as **project proponents and support landowners with project management** in exchange for a certain share of the revenues. In this context, intermediaries often act as **aggregators** of smaller land or farm owners.
- > Intermediaries can **provide** some of the **upfront investment** (mostly time spent) to initiate the project and remove barriers for landowners, often experienced under Australia's ERF (Verschuuren, 2017).
- > Due to expectedly better market and topics insights, intermediaries are likely to take informed decisions on **methodology development**. Once accepted by the regulator, intermediaries have a vested interest in proliferating their methodology and encourage land and farm owners to implement proposed methodologies (see 3.4.1 *Methodology Development*). Farmers' and Foresters' association have a good position to promote methodologies among their members. The stakeholder guided process of developing forestry methodologies under LBC and the development of ERF's *Carbon Farming (Destruction of Methane Generated from Manure in Piggeries) Methodology Determination 2012* by Australia Pork are examples of methodology development by private companies.
- > Intermediaries can provide **training and advisory** to farmers, as experienced with FLBC and VCS.

### Lessons learnt

- > Bureaucratic burden and associated costs might impede small-scale project proponents from successfully registering their projects.
- > Scheme owners can assist project owners in overcoming technocratic processes and MRV through separate simplified methodologies for small-scale projects or through aggregation of smaller projects, at the expense of verification certainty and in combination with drop-out risk mitigation for project partners.

- Depending on the sector need, scheme owners can consider a whole-farm approach that enables farmers to gain credits from different mitigation activities, thus diversifying risks and increasing revenue. Such an approach might lead to higher MRV costs. In Europe data requirements could be streamlined with those under the CAP.
- The involvement of intermediaries might come at a money cost for the farmer, reduces however significantly time spent, resource requirements and opportunity costs. Intermediaries further spur sector uptake and involve smallholder farmers and foresters.

### 3.11 Carbon Farming Scheme Indicators

This section examines the indicators used by existing carbon farming schemes to evaluate the impacts of result-based carbon schemes, examining both climate impact indicators as well as broader sustainability indicators measuring environmental and socio-economic impacts. The chapter first outlines some criteria for selecting appropriate indicators. Based on a review of information available from existing carbon schemes as well as literature, a sustainability indicator framework is then proposed for measuring results and impacts of carbon farming schemes in Europe.

#### 3.11.1 Selecting indicators

- Given that climate actions have potential trade-offs and for other environmental and social objectives, broader sustainability assessment integrated within carbon farming scheme design can ensure that these trade-offs and synergies are accounted for, monitored, and communicated. In relation to the future CAP, sustainability indicators are a prerequisite for performance-based programming and monitoring. The challenge lies in selecting and operationalising indicators, which are robust, for which data is available, which are scalable from farm to project to national level, and where the cost of data collection and processing does not pose a barrier to their use.
- The choice of possible indicators for a sustainability framework is guided by the criteria outlined below. These are informed by the EU policy context, including the general and specific policy objectives of the future CAP (European Commission, 2018)<sup>28</sup>.
- In terms of the scope, the standardised framework for sustainability indicators for operationalising result-based carbon schemes should cover at least: climate and soil, water, biodiversity, plant and soil health, economic

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<sup>28</sup> The three general policy objectives are: 1) to foster a smart, resilient and diversified agricultural sector ensuring food security; 2) to bolster environmental care and climate action and to contribute to the environmental- and climate-related objectives of the Union; 3) to strengthen the socio-economic fabric of rural areas (COM (2018) 392 final).

and societal factors. This framework needs to be comparable to EU environmental and agricultural policy indicators. Going forward, this means in particular the post-2020 CAP Performance Monitoring and Evaluation Framework (PMEF), which will build on the current CAP period's Rural Development Common Monitoring and Evaluation Framework (CMEF)), as well as the European Environmental Agency (EEA) agri-environmental indicators. This will reduce the costs and enable better aggregation of results to EU level.

- > It is proposed that indicators are compatible with the GPGs of IPCC for setting up and maintaining GHG inventories. As a distinct and key element of the study is to give guidance on result-based schemes that deliver climate mitigation benefits (often equal to emission reductions or enhanced removal), the resulting emission reductions or removals from any scheme or project set up with the use of the guidance should be (easily) included in national GHG accounts. This is especially relevant for the calculation of the exact emission reduction or removal (using IPCC GWPs), and to ensure that activities and emission reductions or removals are classified and reported according to the IPCC emission categories which are used to structure GHG inventories and the Common Reporting Format tables.
- > Moreover, the indicators should meet the SMART criteria, i.e. they need to be:
  - > Specific
  - > Measurable
  - > Available/achievable in a cost-effective way
  - > Relevant for the scheme
  - > Available in a timely manner
- > Comparison of projects and aggregation of results and impacts requires the consideration of different scales, from farm level to project or scheme level, and to regional and/or national level. The starting point for the study is the implementation of carbon farming schemes, which requires measuring different types of impacts at farm and scheme level, enabling comparison between schemes. Therefore, an important criterion is also the upscaling potential, i.e. can the indicator be aggregated to the project level in the first instance, as well as integrated in national inventories for climate impacts, and in reporting / monitoring of other sustainability dimensions?
- > Finally, data availability and reliability are important considerations when considering potential indicators. Because climate results and impacts in most cases cannot be measured directly, indicators are usually based on calculations methods. At farm level, accredited carbon calculators can verify the climate effect. In some cases, carbon calculators can also integrate

indicators for other sustainability dimensions, including soil, water, biodiversity, and plant and soil health.

### 3.11.2 Climate indicators

#### Climate impact indicator - CO<sub>2</sub>equivalents

All carbon farming schemes reviewed use the same climate indicator: change measured in mtCO<sub>2</sub>e. This change is either net reductions of carbon emissions (relative to a baseline) as a result of the project (e.g. due to capturing and destroying methane emissions at a piggery) or a net increase in carbon stocks (e.g. due to afforestation). To calculate CO<sub>2</sub>e, the change in each of the GHGs is multiplied by its respective IPCC GWP values. These GWPs describe the effective radiative forcing of the gas, relative to carbon dioxide, i.e. how many units of CO<sub>2</sub> would result in the same warming over a set period as one unit of the gas. IPCC GWPs consider a period of 100 years. This methodology and assumption of time period enables different greenhouse gases to be summed into a common metric.

By presenting project climate impacts in CO<sub>2</sub>e, different projects can be easily compared, even when they target different climate activities and different greenhouse gases. This is evident in the review of existing carbon farming schemes, which include projects covering all relevant gases: methane, nitrous oxide, and carbon dioxide. The schemes also cover a wide range of climate actions, including examples from each of these types of climate actions: above-ground living biomass management (forestry), manure management, crop management, livestock/herd management, actions to reduce emissions from agricultural use of organic soils, and land use (see Table 3-13).

The use of carbon dioxide equivalents also simplifies aggregation of project climate impacts from lower scales up to national inventories, as shown by the reviewed carbon farming schemes (i.e. NZ ETS, CDM and JI). Aggregation of lower level (i.e. farm, project) up to national level should occur in line with the IPCC GPGs for setting up and maintaining GHG inventories. All reviewed schemes calculated their climate impact indicator (CO<sub>2</sub>e) in accordance with IPCC GPGs, enabling simple aggregation.

The IPCC GPGs for National Greenhouse Gas Inventories, “provide methodologies for estimating national inventories of anthropogenic emissions by sources and removals by sinks of greenhouse gases” (IPCC, 2006). The guidelines advise how to collect data on emissions per land use category (e.g. Grasslands), subcategory (e.g. Grassland Remaining Grassland), Carbon pool/other gas (e.g. Non-CO<sub>2</sub> from biomass burning or Soil Carbon). They also propose default parameter e.g. emissions factors, global warming potential of different gases, and how to calculate emissions. Before 2013-2014, parties were left with using 1996 guidelines for inventory purposes as the 2006 guidelines were only adopted by the COP17 in 2012. The dedicated Good Practice Guidance for LULUCF was adopted in 2003 and supports the interpretation and operationalisation of articles 3.3 and 3.4 of the KP.

**Revisions and updates** The IPCC guidelines have been subject to several revisions and updates, which has led to an expanding body of methodologies, practices and approaches that can be applied. Also, the scope of guidelines has expanded. In 2013, the KP supplement on accounting principles was published together with a supplement on the land category Wetlands, which among others includes wetlands managed, but not under agricultural use. In 2019, a Refinement to the 2006 Guidelines was adopted which reflected on advances in methodologies and incorporated scientific and practical inventory experiences and learning. The Refinement does not replace the 2006 guidelines but should be used in conjunction with the 2006 guidelines. The updated overview of available IPCC GPGs can be found at the homepage of the Task Force on National Greenhouse Gas Inventories<sup>29</sup>. Importantly, under the PA new accounting rules may apply, while Reporting rules (and thus most of the IPCC guidance material) are developed under the Convention itself and hence will remain in force. Para 31, of Decision 1/CP.21 requests the APA (Ad Hoc Working Group on the PA) to develop guidance for NDC accounting.

To meet the Good Practice requirements for reporting and accounting, carbon farming schemes must calculate emissions in line with IPCC guidance, applying IPCC GWPs and methods for calculation and ensuring that indicators enable reporting in line with the categories identified in the IPCC guidelines though there will be small changes for example to GWP values. Also, project developers should respect the land categories, take note of country specific or modelled emission factors, and could benefit from using the same activity data as national inventories.

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<sup>29</sup> <https://www.ipcc-nggip.iges.or.jp/public/index.html>

Table 3-13. Overview of Carbon farming schemes: including climate impact indicator and methodology.

| Scheme                                     | Indicator                                                                                            | Activities covered                                                                                                                                                                                                                                                                                                     | Scheme methodology                                                                                                                                                                                                                                                                                                | Scale                                                                                 | Can indicator be aggregated?                                                                                                                                                       |
|--------------------------------------------|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Clean Development Mechanism (CDM)          | Reduced emissions (CO <sub>2</sub> e) AND/OR change in carbon stocks (measured in CO <sub>2</sub> e) | <ul style="list-style-type: none"> <li>&gt; Above-ground living biomass management (forestry)</li> <li>&gt; Manure management</li> <li>&gt; Crop management</li> <li>&gt; Livestock/herd management</li> <li>&gt; Actions to reduce emissions from agricultural use of organic soils</li> <li>&gt; Land Use</li> </ul> | <ul style="list-style-type: none"> <li>&gt; Ex-ante methodology (developed by project and approved by CDM)</li> <li>&gt; Monitoring during project, verification /auditing</li> <li>&gt; Calculation of climate impact and payment at end of project</li> </ul>                                                   | Project scale. Also smaller (farm) scale for some projects to pay farmers/landowners. | Yes, in line with IPCC. CDM implementer change is recorded, then reductions sold as CERs to Annex 1 funders.                                                                       |
| Joint Implementation (JI)                  | Reduced emissions (CO <sub>2</sub> e) AND/OR change in carbon stocks (measured in CO <sub>2</sub> e) | <ul style="list-style-type: none"> <li>&gt; Above-ground living biomass management (forestry)</li> <li>&gt; Manure management</li> <li>&gt; Crop management</li> <li>&gt; Livestock/herd management</li> <li>&gt; Actions to reduce emissions from agricultural use of organic soils</li> <li>&gt; Land Use</li> </ul> | <ul style="list-style-type: none"> <li>&gt; Ex-ante methodology (developed by project and approved by JI)</li> <li>&gt; Monitoring during project, verification /auditing</li> <li>&gt; Calculation of climate impact and payment at end of project</li> </ul>                                                    | Project scale. Also smaller (farm) scale for some projects to pay farmers/landowners. | Yes, in line with IPCC. JI reductions are calculated within Annex 1 country and then sold to other Annex 1 funders as ERUs (note problems with additionality undermine acceptance) |
| Australian Carbon Farming Initiative (CFI) | Reduced emissions (CO <sub>2</sub> e) AND/OR change in carbon stocks (measured in CO <sub>2</sub> e) | <ul style="list-style-type: none"> <li>&gt; Above-ground living biomass management (forestry)</li> <li>&gt; Manure management</li> <li>&gt; Crop management</li> <li>&gt; Livestock/herd management</li> <li>&gt; Actions to reduce emissions from agricultural use of organic soils</li> <li>&gt; Land Use</li> </ul> | <ul style="list-style-type: none"> <li>&gt; Use methodology already developed and approved by govt.</li> <li>&gt; OR ex ante methodology developed by project and approved by CFI</li> <li>&gt; Monitoring during project</li> <li>&gt; Calculation of climate impact and payment at specified time(s)</li> </ul> | Project scale (which can be farm scale)                                               | Yes, in line with IPCC.                                                                                                                                                            |
| Verified Carbon Standard (VCS)             | Reduced emissions (CO <sub>2</sub> e) AND/OR change in carbon stocks (measured in CO <sub>2</sub> e) | <ul style="list-style-type: none"> <li>&gt; Above-ground living biomass management (forestry)</li> <li>&gt; Manure management</li> <li>&gt; Crop management</li> <li>&gt; Livestock/herd management</li> </ul>                                                                                                         | <ul style="list-style-type: none"> <li>&gt; Use methodology already developed and approved by VCS or under CDM/JI</li> <li>&gt; OR ex ante methodology developed by project and approved by CFI</li> </ul>                                                                                                        | Project scale (can be farm scale for some projects e.g. ITAA)                         | Yes, in line with IPCC. Projects are required to ensure that voluntary created credits are not double                                                                              |

|                                               |                                         |                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                  |                                              |                                        |
|-----------------------------------------------|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------------------------------------|
|                                               |                                         | <ul style="list-style-type: none"> <li>&gt; Actions to reduce emissions from agricultural use of organic soils</li> <li>&gt; Land Use</li> </ul> | <ul style="list-style-type: none"> <li>&gt; Monitoring during project, independent audit/verification</li> <li>&gt; Payment at realisation of climate impacts</li> </ul>                                                                                                                                                                                                                                         |                                              | counted as other emissions reductions. |
| New Zealand ETS and PFSI                      | GHG removals (tCO <sub>2</sub> )        | <ul style="list-style-type: none"> <li>&gt; Above-ground living biomass management (forestry)</li> </ul>                                         | <ul style="list-style-type: none"> <li>&gt; All methodologies pre-approved</li> <li>&gt; Foresters self-report re. activities (e.g. planting/removals), using standard numbers/field monitoring for large plantations</li> <li>&gt; Registry uses this info to annually calculate climate emissions/sequestration, makes payments</li> <li>&gt; Registry can audit foresters to check, with penalties</li> </ul> | Farm scale. Easily scaled to national level. | Yes, in line with IPCC.                |
| California Compliance Offset Program (CCOP)   | Reduced emission (CO <sub>2</sub> e)    | <ul style="list-style-type: none"> <li>&gt; Above-ground living biomass management (forestry)</li> <li>&gt; Manure management</li> </ul>         | <ul style="list-style-type: none"> <li>&gt; Use methodology already developed and approved by govt.</li> <li>&gt; Forestry: self-report during project, plus monitoring</li> <li>&gt; Manure: constant monitoring + self-reporting</li> <li>&gt; Annual calculation of climate impact and payment at specified time(s)</li> </ul>                                                                                | Project scale and farm scale.                | Yes, in line with IPCC.                |
| European Projects: Moor Futures               | Reduced emission (CO <sub>2</sub> e)    | <ul style="list-style-type: none"> <li>&gt; Rewetting of peatlands (reducing emissions)</li> <li>&gt;</li> </ul>                                 | <ul style="list-style-type: none"> <li>&gt; MoorFutures methodology in line with VCS.</li> <li>&gt;</li> </ul>                                                                                                                                                                                                                                                                                                   | Project scale.                               | Yes, in line with IPCC.                |
| European projects: UK Woodland Carbon Credits | Carbon sequestered (t CO <sub>2</sub> ) | <ul style="list-style-type: none"> <li>&gt; Above-ground living biomass management</li> </ul>                                                    | <ul style="list-style-type: none"> <li>&gt; Methodology is pre-approved</li> <li>&gt; Projects register and make a woodland creation project plan</li> <li>&gt; Projects plant trees and have project externally validated within three years</li> </ul>                                                                                                                                                         | Project scale                                | Yes, in line with IPCC.                |

|                                                          |                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |            |                         |
|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-------------------------|
|                                                          |                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>&gt; External verification of sequestration (every 5-10 years) and confirmation of voluntary carbon credits for sale</li> </ul>                                                                                                                                                                                                                                                                                               |            |                         |
| European Projects:<br>Carbon AGRI                        | Carbon gains (CO <sub>2</sub> e)<br>(combination of change in carbon intensity (kg CO <sub>2</sub> e/kg agricultural production and change in soil/biomass carbon stocks kg CO <sub>2</sub> e | <p>All activities decreasing emissions from cattle farms (milk or meat)</p> <ul style="list-style-type: none"> <li>&gt; Above-ground living biomass management (forestry)</li> <li>&gt; Manure management</li> <li>&gt; Crop management</li> <li>&gt; Livestock/herd management</li> <li>&gt; Actions to reduce emissions from ag. use of organic soils</li> <li>&gt; Land Use</li> </ul> | <ul style="list-style-type: none"> <li>&gt; Participating farms register and calculate baseline with help from advisor using farm carbon tool (CAP'2ER tool), identify project plan of climate actions</li> <li>&gt; Farmer implements climate actions and records MRV data</li> <li>&gt; After max 5 years, advisor evaluates impact of project plan (using carbon farm tool) to identify carbon impact</li> <li>&gt; Regulator verifies and pays farmer</li> </ul> | Farm scale | Yes, in line with IPCC  |
| European Projects:<br>SPARHealthy Soils for Healthy Food | GHG removals (tCO <sub>2</sub> )                                                                                                                                                              | <ul style="list-style-type: none"> <li>&gt; Soil management on mineral soils to increase SOC</li> </ul>                                                                                                                                                                                                                                                                                   | <ul style="list-style-type: none"> <li>&gt; Healthy Soils for Healthy Food – no methodology publicly available</li> </ul>                                                                                                                                                                                                                                                                                                                                            | Farm Scale | Yes, in line with IPCC. |

#### Climate indicators in CMEF framework

The current CMEF provides another source of climate focused indicators, specifically under the priorities P5d and P5e. These can be broadly put in two categories, and match with climate indicators for carbon farming i.e.:

- > Activity based indicators
  - > LU concerned by investments in livestock management in view of reducing GHG and/or ammonia emissions
  - > Absolute area (ha) and % of agricultural and forest land under management contracts contributing to carbon sequestration.
  - > % of agricultural land under management contracts targeting reduction of GHG and/or ammonia emissions
- > Impact indicators
  - > Reduced emissions of methane and nitrous oxide (measured in CO<sub>2</sub> equivalent)
  - > Reduced ammonia emissions (measured in CO<sub>2</sub> equivalent)
  - > Tonnes of CO<sub>2</sub>e saved from RDP supported projects, expressed as annual savings per project, aggregated across projects

### 3.11.3 Sustainability indicators

Climate actions cause impact beyond the climate. Often these impacts will be positive (co-benefits), for example, manure management can decrease nitrogen pollution of waterways. Some impacts might also involve trade-offs (negative externalities). For example, decrease in agricultural employment can result from land use change from agriculture to forestry, or technological mitigation on intensive livestock farms may further lock-in intensive production beyond the safe operating space in a given locality, or have negative impacts on animal welfare. Sustainability indicators enable the comparison of different costs, benefits, and potential trade-offs across carbon farming projects and schemes. The assessment of climate initiatives changes when the wider impacts as well as potential trade-offs are taken into account. In particular, when co-benefits are captured this can increase the motivation for climate action in agriculture. Alternatively, clearly setting out trade-offs may mean that some climate actions should not be promoted.

#### Non-EU Carbon Farming Schemes

Existing carbon farming schemes outside of the EU do not systematically consider and monitor broader sustainability indicators. As shown in Table 3-14, none of the non-EU schemes we reviewed rewarded projects for impacts other than climate impacts (as measured by CO<sub>2</sub>e). With the exception of one VCS project, none of the reviewed carbon farming schemes monitored or reported on broader sustainability indicators. This limits decision-makers' ability to compare

the different projects, as beyond changes in CO<sub>2</sub>e equivalent, there are no clear metrics to compare the broader impacts of the different projects.

Nonetheless, negative externalities and co-benefits are still considered and addressed mostly indirectly in the following ways:

- > **Co-benefits as “selling points”:** In many of the schemes (e.g. CDM, JI, VCS, PFSI, NZ), the project documents often highlight co-benefits to underscore the value of the project. Examples of general co-benefits often include poverty alleviation and increased employment. Projects also often list climate action-specific co-benefits, such as reduced odour (methane projects) or biodiversity conservation (afforestation projects). In these cases, no indicators are developed for the listed co-benefits, and no monitoring or reporting occurs. No mention is made of any potential negative externalities.
- > **Minimising negative externalities ex ante:** The Australian CFI does not have indicators to monitor or report on co-benefits or trade-offs. Instead, it seeks to minimise any negative externalities in the definition of the climate action methodologies. Only projects that are judged to be additional and do not to have significant negative impacts are approved and put on the “positive list”. Climate actions are put on the “negative list” when there is significant risk in resulting in negative externalities on biodiversity, or land availability, etc.. For example, planting weed species would be excluded (Kachi et al., 2014). Additionally, as in the CCOP scheme, projects are contractually required to comply with other regulations, such as regional and national resource management plans and regulations, or a requirement to meet “natural forest management criteria”. Here, rather than creating an indicator and monitoring for co-benefits, the emphasis is on meeting minimum regulatory requirements in order to avoid negative impacts.
- > **Choosing not to consider co-benefits:** In the case of Australian CFI projects, co-benefits are covered by other government programmes, i.e. the same projects can apply to a different scheme to receive biodiversity payment.

An example of a relatively complete broader sustainability indicator framework comes from the VCS project Katingan Peatland Restoration and Conservation Project, in Indonesia. There, as well as monitoring CO<sub>2</sub>e, two pre-developed indicator frameworks are applied to monitor broader environmental and social impacts. The CCBS framework is used for biodiversity co-benefits and the Sustainable Livelihoods Frameworks to measure socio-economic impacts. The project generates the data for these indicators through its own monitoring and surveys. They use the broader sustainability impacts as selling points for their project. The project is, however, solely rewarded for reduced carbon emissions (through selling carbon credits to investors).

#### EU Carbon Farming Projects

In the EU projects, non-climate dimensions are explicitly addressed by MoorFutures, HSHF, CARBON AGRI proposed methodology, and FLBC project. In the case of the first two projects, these include a reward mechanism and the

indicators are monitored (measured). In the case of the FLBC and CARBON AGRI methodology the impacts are estimated using the decision-support tool (calculator) that farmers can use to support them in choosing mitigation options. While the use of the calculator is currently not linked to obligation to implement the options nor a financial reward, the calculator could be used as a basis to issue a reward.

The HSHF project focuses on soil indicators (pH value, N, P, K, and organic matter). The reward is based on organic matter content, whereas the additional parameters are useful for fertilization planning, their use as proxies for other impacts is limited, unless the N value includes the N min value at the end of the growing season. This, however, is not apparent from the information available.

Table 3-14. Treatment of sustainability indicators in existing carbon farming schemes.

|                                            | Indicators measured/rewarded?                  | Broader sustainability indicators | Treatment of co-benefits/negative externalities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Broader sustainability indicator examples                                                                                                                                                                                                                                                                                 |
|--------------------------------------------|------------------------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Clean Development Mechanism (CDM)          | Projects rewarded solely on CO <sub>2</sub> e. | None                              | <ul style="list-style-type: none"> <li>&gt; Co-benefits (e.g. sustainability and socio-economic impacts) seem to be listed as selling points of the projects but are not measured or assessed.</li> <li>&gt; Negative impacts are not listed.</li> <li>&gt; No consistency: co-benefits are project specific</li> </ul>                                                                                                                                                                                                                                                                                    | General indicators include e.g. increased economic efficiency, employment, often poverty alleviation. Project-specific co-benefits differ by type: Methane project co-benefits include reduced odour, improved water and air quality, reduced disease, etc. Afforestation projects include biodiversity conservation etc. |
| Joint Implementation (JI)                  | Projects rewarded solely on CO <sub>2</sub> e. | None                              | > Same as CDM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Same as CDM                                                                                                                                                                                                                                                                                                               |
| Australian Carbon Farming Initiative (CFI) | Projects rewarded solely on CO <sub>2</sub> e. | None                              | <ul style="list-style-type: none"> <li>&gt; Broader impacts considered when methodology developed, not considered for specific projects. i.e. Approved project types are limited to those that are judged to be additional and to have no negative effects. Such project types are put on a "positive list". Project types that fail this test are on the "negative list" and will not be funded.</li> <li>&gt; Project level: Projects have to meet a couple of qualifying criteria re. sustainability before implementation (e.g. comply with water regulation). No indicators not monitored.</li> </ul> | Compliance with other local regulation (e.g. limit water availability impact).                                                                                                                                                                                                                                            |

|                                                              |                                                                                      |                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                              |
|--------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Verified Carbon Standard (VCS)                               | Projects rewarded solely on CO <sub>2</sub> e.                                       | None<br>Example exception: VCS-Katingan Project                                                                                                                                                                                                                     | <ul style="list-style-type: none"> <li>&gt; Differs by project.</li> <li>&gt; Generally, co-benefits are listed but not monitored.</li> <li>&gt; Negative impacts generally not covered. However, in some projects, (e.g. VCS ITAA), environmental impact assessments are run before the project to minimise/avoid negative impacts.</li> </ul>                                                                                                                                                 | Co-benefits examples depend on the specific project, but include increased soil fertility, high income for participants, higher social cohesion, reduced unemployment and poverty reduction. |
| VCS - Katingan Peatland Restoration and Conservation Project | Projects rewarded solely on CO <sub>2</sub> e. Other indicators monitored, reported. | <ul style="list-style-type: none"> <li>&gt; Sustainable livelihoods framework</li> <li>&gt; CCB 3<sup>rd</sup> edition for biodiv. monitoring</li> </ul>                                                                                                            | <ul style="list-style-type: none"> <li>&gt; The Katingan project used indicators to monitor and report on numerous co-benefits/negative impacts</li> <li>&gt; For net positive community benefits: Applied Sustainable livelihoods framework. For biodiversity monitoring: Applied CCB standards third edition</li> <li>&gt; Monitoring was carried out using a variety of field survey techniques, including local community interview surveys to assess hunting level and threats.</li> </ul> | Many. The matrix of example indicators draws on CCB 3 <sup>rd</sup> edition and sustainable livelihood framework.                                                                            |
| New Zealand ETS and PFSI                                     | Projects rewarded solely on CO <sub>2</sub> e.                                       | None                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>&gt; Generally, the PFSI and NZ ETS does not promote or discuss non-climate impacts. Instead, focuses exclusively on climate impacts.</li> </ul>                                                                                                                                                                                                                                                                                                         | None                                                                                                                                                                                         |
| California Compliance Offset Program (CCOP)                  | Projects rewarded solely on CO <sub>2</sub> e.                                       | None                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>&gt; Generally, broader sustainability impacts not considered.</li> <li>&gt; However, afforestation projects need to state how they will meet "natural forest management" criteria in their proposal, and annually report on how they have achieved this. This covers co-benefits such as planting native trees, mixed age class, planted to be resilient to climate change. No indicators.</li> </ul>                                                   | U.S. Forest Projects include "natural forest management criteria". Includes planting natives, climate resilience, mixed age class. Also, compliance with local laws and regulations.         |
| MoorFutures                                                  | Projects rewarded solely on CO <sub>2</sub> e.                                       | <ul style="list-style-type: none"> <li>&gt; kg N leaching per ha per year</li> <li>&gt; kg P per ha per year</li> <li>&gt; Flood water retention volume (m<sup>3</sup> s<sup>-1</sup>)</li> <li>&gt; Peak flood reduction (m<sup>3</sup> s<sup>-1</sup>)</li> </ul> | <ul style="list-style-type: none"> <li>&gt; As well as monitoring change in carbon emissions (CO<sub>2</sub>e)), the project also monitored and reported on changes in other ecosystem services. As well as generating carbon credits, the project investigated how changes in these other ecosystem-services could be accounted for as added value to the carbon credits.</li> </ul>                                                                                                           | Improved water quality, flood mitigation, increased groundwater storage, evaporative cooling, and increased mire-type cooling.                                                               |

|                                                                             |                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                             |                                                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>&gt; Total available amount of water (m<sup>3</sup>)</li> <li>&gt; Biotope value (score)</li> <li>&gt; Biodiversity indicator species (count)</li> <li>&gt; Evaporative cooling (units: annual energy balance in W m<sup>-2</sup> or kWh ha<sup>-1</sup> y<sup>-1</sup>)</li> </ul>                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                  |
| Healthy Soils for Healthy Food                                              | Soil organic carbon                                                                                                                                                                                                       | Soil indicators (pH value, P, K, organic matter content, and N)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <ul style="list-style-type: none"> <li>&gt; Except for the soil parameters no additional indicators were monitored.</li> </ul>                                                                       |                                                                                                                                                                                                                                                                                                                  |
| <p>Ferme laitière bas carbone</p> <p>AND</p> <p>CARBON AGRI methodology</p> | <p>Carbon storage, evaluated for permanent grassland, pastures, hedges, temporary grassland, crops, and grassland/crop rotations (measured in kg C/year)</p> <p>Net carbon footprint = GHG emissions - carbon storage</p> | <ul style="list-style-type: none"> <li>&gt; Water quality, in terms of eutrophication potential (measured in equivalent kgPO<sub>4</sub>)</li> <li>&gt; Air quality, in terms of acidification (measured in equivalent kgSO<sub>2</sub>)</li> <li>&gt; Biodiversity (measured in hectare equivalent of biodiversity, drawing on EFA elements and co-efficients)</li> <li>&gt; Nutritional performance, in terms of energy, protein, and animal protein (measured in terms of number of people fed yearly)</li> <li>&gt; Economic performance, in terms of productions costs, gross operating surplus/raw product</li> </ul> | <ul style="list-style-type: none"> <li>&gt; The decision-support tool enables farmers to estimate the wider environmental benefits beyond climate. These are not remunerated or paid for.</li> </ul> | <ul style="list-style-type: none"> <li>&gt; Nutritional performance (Nr of people fed / year)</li> <li>&gt; Maintenance of biodiversity (inventory of agro-ecological elements)</li> <li>&gt; Ammonia emissions (kg NH<sub>3</sub>/ha/year)</li> <li>&gt; Nitrogen balance surplus (kg N / ha / year)</li> </ul> |

|                         |                                                |                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |
|-------------------------|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
|                         |                                                | <ul style="list-style-type: none"> <li>&gt; Working conditions, evaluated through amount and arduousness of work.</li> </ul> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |
| UK Woodland Carbon Code | Projects rewarded solely on CO <sub>2</sub> e. | None                                                                                                                         | <ul style="list-style-type: none"> <li>&gt; No indicators for sustainability.</li> <li>&gt; However, Woodland Carbon Code projects are required to show (either through an Environment Impact Assessment or in their project planning documents) to demonstrate that the environmental impacts will be positive, including consideration of habitats, species, soil and water environments, as well as landscapes. In addition, project developers are encouraged to consider community and economic impacts.</li> </ul> | None |

### Sustainability indicators – other sources

In addition to the information on sustainability indicators in the existing carbon farming schemes, other sources were cross-checked for relevant sustainability indicators for climate actions, specifically relating to water quality; water quantity/flooding, biodiversity, other environmental, economic, social impacts. These sources complement the information on non-climate indicators that was obtained from the existing schemes. The resources examined are outlined below, an overview of the indicators according to thematic area (soil health, water quality and quantity, biodiversity, air, social and economic impacts) is given in the Appendix A.

### Common Monitoring and Evaluation Framework

The current Rural Development CMEF includes climate and broader environmental and socio-economic indicators.

The CMEF includes four types of indicators (European Commission, 2012):

- > Context indicators: provide information on general contextual trends with likely influence on policy performance (e.g. GDP per capita);
- > Output indicators: report the implementation of activities, e.g. number of farmers or farm holdings supported by payments or schemes;
- > Results indicators: measure direct and indirect effects of policy intervention (e.g. share of area under contract contributing to climate objectives);
- > Impact indicators: identify benefits beyond direct effects on beneficiaries, focusing on net effects (e.g. net reductions in emissions).

Of these, only “results indicators” and “impact indicators” are appropriate for result-based carbon schemes. Comparison of schemes is most feasible with result indicators, since these are scheme specific and not aggregated. They can measure the direct and immediate effects of implementing a scheme at farm level to determine the payment and verify that the result has been achieved. However, farm level result indicators cannot always readily capture the wider economic and societal impacts, i.e. they cannot be easily scaled up to sectoral and national level. If the aim is to measure and account for the impact of the scheme as a whole, and to feed the results in the monitoring of national and regional accounting framework for climate change and agricultural policy, the wider impact indicators are appropriate.

The future CAP will apply a slightly updated PMEF, which maintains the three sets of common indicators relevant for measuring performance: output indicators, result indicators, and impact indicators. The final list of these indicators is not yet available.

**Climate, Community  
and Biodiversity  
Standards Indicator  
Framework**

The CCBS focus on land management projects, including carbon farming projects. As well as monitoring carbon emissions, the framework includes indicators for social outcomes and for biodiversity (Richards, 2011; Pitman, 2011). The CCBS project was applied in one of the VCS projects reviewed in earlier sections of this chapter (Katingan). The indicators have been developed to be applied in projects worldwide, so are not closely aligned to the European data or other European indicators. There is a greater focus on poverty, health, and livelihood indicators.

**OECD Agri-  
Environmental  
Indicators**

The OECD has developed a set of agri-environmental indicators to be able to track and compare agriculture's impact on the environment at the national scale (OECD, 2013). As EU countries are generally members of the OECD, there is considerable crossover to EU indicators. While the focus on the national scale means some of these indicators are inappropriate for comparing projects, many of these indicators can be downscaled. There are no indicators on social impacts.

**EEA Agri-  
Environmental  
Indicators**

The EEA agri-environmental indicators monitor EU environmental concerns related to agriculture, especially those related to CAP. Accordingly, there is significant cross over with the CMEF indicators with integration of environmental concerns into the CAP at EU, national and regional levels. The indicators were proposed after 2006 Commission report, and originally featured 28 indicators. These indicators have been developed and implemented to different degrees, due to challenges in their calculation or data. Operational indicators (those with data since 2010) have been considered.

**Sustainable  
Development Goals**

The Sustainable Development Goals (SDGs) include a broad set of interdependent goals aiming to lift global social, economic, and environmental outcomes. To monitor the goals, the UN Statistical Commission agreed to a set of 230 indicators. As these indicators are meant to monitor progress at a global and national level, and to be general enough to be useful worldwide, few are specific enough for comparing carbon farming projects; those that are have been considered. The Gold Standard, which emerged from the need to ensure that CDM credits met sustainability standards, has developed a set of indicators and certification for carbon credits, which have begun to integrate contributions to SDGs.

**Sustainability indicator framework for carbon farming schemes**

The sustainability indicator framework for carbon farming schemes needs to cover both climate and non-climate impacts. Below the indicators are outlined according to this distinction. While there are a large number of potential indicators, we suggest that the focus for carbon farming schemes be placed on those that can be measured at farm

and aggregated to carbon scheme level, while having clear relation to the current CMEF and future PMEF framework.

The wide range of climate and non-climate indicators that can potentially be applied, depending on the context and focus of the scheme, require a range of necessary data, record-keeping, and are associated also with both time and costs for the actors involved. An important aspect in further operationalising carbon farming schemes within Europe is therefore to build as much as possible on existing available data, to streamline the indicator application with existing tools and reporting requirements (including those, e.g., related to the future CAP Farm Sustainability Tool), so as to avoid inefficiencies and reduce data collection as a barrier to the uptake of schemes and their monitoring (see, e.g. Mullender et al. 2017), as well as enable comparability between schemes and aggregation of results.

Keeping this in mind, the suggested indicators to be included in sustainability indicator framework are outlined below.

#### Climate Indicators

- > Main climate indicator: CO<sub>2</sub>e

In accordance with all the existing carbon farming schemes reviewed, it is proposed that European carbon farming schemes also use CO<sub>2</sub>e as the main climate impact indicator. However, there are also arguments for additional climate impact indicators, as explained below. In addition to reporting change in Co<sub>2</sub>e, the following indicators could be used:

- > Additional indicator 1: GHG specific indicators

All projects should also report on gas-specific impact (i.e. change in mtCO<sub>2</sub>) and change in mtN<sub>2</sub>O and change in mtCH<sub>4</sub>). While CO<sub>2</sub>e provides a reasonable methodology for comparing the different GHGs, there are differences in gas impact. A key difference is the timespan of their impact. The IPCC calculates that methane has a lifespan of twelve years.<sup>30</sup> While some of methane emitted today will remain in the atmosphere for a longer time, the majority will have dissipated through natural processes within eight years. CO<sub>2</sub> and N<sub>2</sub>O have much longer lifespans (hundreds of years and 114 years respectively). Given the different lifespans of the gases, if Europe's primary current focus is reducing long-life climate gases (or future climate temperature peaks), then projects that effectively decrease long-living N<sub>2</sub>O emissions may be relatively more valuable than those that reduce the equivalent short-lived CH<sub>4</sub> emissions. When projects only report CO<sub>2</sub>e information (calculated using standard IPCC GWP figures), this additional information is hidden. As the CO<sub>2</sub>e values are

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<sup>30</sup> <https://www.ipcc.ch/report/ar4/wg1/>

calculated based on the individual gases, there should be no additional cost to report on indicators of the individual gases.

> Additional indicator 2: Emission intensity of agricultural output

Additionally, projects should report on the change in carbon content per unit of output i.e. CO<sub>2</sub>e/kg product. The relative metric should differ per project, as different projects target different types of land use and therefore affect different outputs. If the carbon farming project targets pig farms, then the relevant metric would be CO<sub>2</sub>e /kg meat, whereas if the project targets dairy farms then CO<sub>2</sub>e /L milk. The motivation for including this metric is that when it comes to agriculture, Europe aims to maintain food production at the same time as reducing emissions. Accordingly, decreases in emissions intensity are desired, not simply decreases in emissions.

> Additional indicator 3: Cost efficiency of mitigation

In addition to absolute values (i.e. mtCO<sub>2</sub>e), projects should also report climate impacts in terms of € per mtCO<sub>2</sub>e, to understand relative cost-effectiveness of the project. Ideally, this should include both the costs of implementing the project and any change in income for farmers.

## Sustainability indicators

Depending on the scale at which impacts are evaluated, different types of indicators need to be used. For carbon farming schemes the focus is on indicators at farm and scheme level. Since the effects of carbon farming schemes cannot be easily separated from other influences, it is not straightforward to evaluate and scale up their effects at regional or sectoral scale. Their contribution to environmental, economic and social issues may also be limited depending on the size and extent of their application. Whereas the contribution of measures at micro-scale to wider scale socio-economic impacts at the macro scale (national or sectoral level) is more difficult to make, some biodiversity and water quality / quantity indicators can be more readily aggregated from farm to carbon scheme to regional / national level.

Indicators often express absolute values. When they can be related to a baseline or express efficiency, their usefulness to express environmental and socio-economic improvements increases (as above, for example, in emission intensity or cost efficiency).

Table 3-15 outlines a shortlist of possible sustainability indicators for carbon farming schemes. This list was defined using the following criteria:

> Is data easily gathered at the farm level?

- > Can the indicator be meaningfully aggregated from farm, to scheme to regional / national level?
- > Is the indicator compatible with the CAP Performance Monitoring and Evaluation Framework?
- > What is the data accuracy, consistency, reliability?

These indicators are well accepted as having explanatory power in measuring actual impacts (environmental and/or socioeconomic) or as proxy indicators for these impacts. They can also be directly measured or calculated at farm level; in many cases they can be derived from using existing farm data records that farmers collect for purpose of subsidy applications. These indicators can also be aggregated and are compatible with the PMEF framework for post 2020 CAP. They will be further examined in case studies to gather stakeholders' perspectives on relevance and feasibility in relation to carbon credit schemes.

Table 3-15. Sustainability indicators for carbon farming schemes.

| Indicator                                                                                                                            | Explanation                                                                                               |
|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| Climate impact                                                                                                                       |                                                                                                           |
| CO2 equivalents (CO <sub>2</sub> e)                                                                                                  | Can be aggregated from farm to scheme / national level, compatible with PMEF and national GHG inventories |
| GHG specific indicators (CO <sub>2</sub> , N <sub>2</sub> O, CH <sub>4</sub> )                                                       | Can be aggregated from farm to scheme / national level, compatible with PMEF and national GHG inventories |
| CO <sub>2</sub> e/kg product                                                                                                         |                                                                                                           |
| Soil Health                                                                                                                          |                                                                                                           |
| Total organic carbon content in arable soils (t), monitored through sampling                                                         | PMEF impact indicator, captured LULUCF inventory, Farm/project/ national                                  |
| Percentage of forestry/agricultural land under management contracts to improve soil management and/or prevent soil erosion (% or ha) | Compatible with PMEF, indicative that practices providing benefits for soil health are applied            |
| Air                                                                                                                                  |                                                                                                           |

|                                                                                                                                |                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ammonia (NH <sub>3</sub> ) emissions                                                                                           | Compatible with PMEF, can be assessed at farm level, indicative of pressure from livestock production on air quality                                                                                                      |
| <b>Water</b>                                                                                                                   |                                                                                                                                                                                                                           |
| Gross Nitrogen Balance (GNB-N, kg N/ ha/ year), calculated                                                                     | Compatible with PMEF, provides an indication of the potential nitrogen surplus agricultural land (kg N per ha per year) and thus pressure on water resources.                                                             |
| Percentage of agricultural/forestry land under management contracts to improve water management (%)                            | Compatible with PMEF, indicative that practices providing benefits for soil health are applied                                                                                                                            |
| Water abstraction in agriculture, the volume of water which is applied to soils for irrigation purposes (m <sup>3</sup> )      | PMEF compatible, data available from farm records, beyond reduced water abstraction is also indicative of overall                                                                                                         |
| Efficiency of water use (m <sup>3</sup> water used/standard unit of output)                                                    | PMEF compatible, can be calculated, efficiency reduces pressures on water resources                                                                                                                                       |
| Percentage of irrigated land switching to more efficient irrigation system (%)                                                 | PMEF compatible, can be calculated, efficiency reduces pressures on water resources                                                                                                                                       |
| <b>Biodiversity</b>                                                                                                            |                                                                                                                                                                                                                           |
| Share of agro-ecological elements (landscape features, including hedgerows) on the farm (% or ha)                              | Compatible with PMEF, requires additional information gathering, is feasible to gather at farm level if not included directly in the MRV for the scheme, indicative of diversity / availability of habitats at farm level |
| Percentage of forest or other wooded areas/agricultural land under management contracts supporting biodiversity, %, calculated | Compatible with PMEF, indicative that practices providing benefits for biodiversity are applied                                                                                                                           |
| Agricultural area under NATURA 2000 (% or ha)                                                                                  | Compatible with PMEF, can be derived from farm / official records, indicative of existing biodiversity at farm level                                                                                                      |
| Share of UAA under organic farming (% or ha)                                                                                   | Compatible with PMEF, indicative of crop diversity, absence of pesticide use, beneficial practices for biodiversity                                                                                                       |
| <b>Socio-economic</b>                                                                                                          |                                                                                                                                                                                                                           |

|                                                                                                     |                                                                                                                                                                                          |
|-----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Jobs created in supported projects                                                                  | Compatible with PMEF, derived from farm records                                                                                                                                          |
| Total number of participants trained in climate friendly (agro-ecological) approaches and solutions | Compatible with PMEF, derived from farm records, training on how to integrate agro-ecological practices and business solutions to add value on the basis of implementing these practices |

## 4 Barriers and solutions for implementation of result-based carbon farming schemes in the EU

Chapter 3 demonstrates the complexity of setting up and designing result-based carbon farming schemes, as well as challenges and key lessons learnt. The analysis identified multiple insights that can be drawn upon for how to set up and design successful carbon farming schemes within the EU. Applying these insights to develop guidance for scaling up result-based carbon farming schemes in the EU, however, requires various considerations and adjustments to the specificities of the EU. These specificities include the farming systems and farm structures, governance and policy context, data availability etc. The schemes to be developed, whether private or public, need to be compatible to operate within the EU policy and governance framework. Regulators / administrators need to develop solutions to establishing and efficiently operating schemes within the EU context.

In this chapter we explore barriers and solutions specifically for setting up result-based schemes in the EU. To develop the chapter, we first identified potential options for result-based schemes in the EU. Drawing on existing examples (see Annex A) and desk-based research, four potential options were identified: whole farm carbon audit, peatland restoration, afforestation, agroforestry, and sequestration of soil organic carbon on mineral soils. These were proposed drawing on the criteria of mitigation potential, compatibility within EU farming systems, and potential for scalability of these schemes. A schematic description of these options was prepared, along with questions relating to practical barriers and potential solutions for scaling up these within the EU context. The scheme options and key questions were presented and discussed at a stakeholder roundtable on 'Carbon Farming Schemes in Europe' took place in Brussels on October the 9<sup>th</sup>. The roundtable was attended by 75 stakeholders, followed by further 364 external viewers via web stream (see for a summary of take-aways Appendix G). Moreover, interviews with experts were conducted before and after the roundtable. Roundtable participants and interviewees included regulators and stakeholders involved in existing carbon farming schemes (e.g. MoorFutures, CarbonAGRI, Woodland Carbon Code, among others) and experts with specific knowledge relevant to design elements (e.g. on farm data, farm carbon audit tools, MRV). The stakeholder consultations served to validate initial results and to gather additional input. The full list and summary of interviews is included in Appendix F. The results of the workshop are summarised in Appendix G.

The chapter is structured as follows: section 4.1 summarises key messages from the analysis of barriers and solutions. Section 4.2 is organised by design element (e.g. governance, eligibility and coverage, MRV, etc.). For each design element, we have

identified cross-cutting barriers commonly faced by result-based schemes and for each, we present a table of practical barriers faced by carbon-farming schemes, and listed solutions applied in existing schemes. We contextualise each table by linking to key lessons learned from the scan of international and EU schemes (i.e. chapter 3 conclusions) and by identifying how these conclusions are augmented by our practical barrier/solution analysis. We also identify open questions that will be picked up and addressed in the case studies. Section 4.3 concludes by outlining the selection of scheme options to be further investigated in Task 3 case studies. In this way, the chapter provides a bridge towards case studies in Task 3 and developing guidance on setting up result-based carbon farming schemes in the EU under Task 4.

## 4.1 Key messages from the barriers/solutions analysis

Barriers are any aspect in the design of a scheme or its implementation that limit their success. Success of a scheme can be defined in terms of the scheme delivering significant additional and permanent climate impact (either through sequestration and storage or by avoiding emissions that otherwise would have occurred) and doing so efficiently. Efficiently implies that the overall benefits of the scheme (i.e. benefits of reduced GHGs plus co-benefits) are balanced against the costs (total costs of design and implementation, including transaction costs, and that the scheme avoids any negative externalities, which could include environmental impacts such as biodiversity loss or social issues and inequalities).

Two main types of barriers exist: (a) barriers limiting farmer uptake of the scheme or (b) barriers that limit the schemes ability to effectively and efficiently deliver climate impact. Barriers to farmer uptake refers to barriers that would limit farmer participation in the scheme (either directly or by increasing transaction costs for farmers). The second type of barrier concerns barriers that limit the scheme's ability to incentivise additional, actual, and permanent sequestration of carbon or avoided emissions, and that this is done efficiently, i.e. considering social costs and benefits (including environmental and social externalities). The climate impact may be impeded by barriers such as loopholes, inconsistent policies, leakage or negative externalities.

To focus our discussion, we limit our attention to barriers that arise due to scheme design rather than other factors which are beyond control for the scheme-designer. For example, while barriers to the uptake of schemes by farmers are very diverse and complex (for example, Knowler & Bradshaw, 2007), we limit our analysis to those barriers that could be reduced through scheme design choices.

Many barriers are general, cross-cutting barriers that are faced by result-based carbon farming schemes, regardless of the focus of the scheme or type of farming system that they target. Other barriers are scheme-specific, in that they are only a challenge to specific types of schemes (i.e. only schemes targeting peat soil management, or only schemes targeting increased afforestation).

The assessment of barriers and solutions for successful result-based carbon farming schemes is presented in detail in section 4.2. Here we draw out key conclusions and overarching themes that cut across the different design elements for carbon farming schemes. These key themes are: 1) the central challenge of Measurement, Monitoring, Reporting and Verification (MRV); 2) how to design schemes to foster farmer uptake; and 3) for market (credit) schemes, ensuring credit demand through scheme integrity.

These overarching barriers manifest in different ways and to different complexities in accordance with the specific context and type of climate scheme. Scheme designers will have to come up with solutions to each of these challenges in order to deliver climate impact.

#### 4.1.1 Robust, effective MRV is the central challenge

MRV refers to measuring, monitoring, reporting, and verifying the overall climate impact of farmer's climate actions, i.e. changes in carbon/GHG sequestered or emitted. Result-based climate schemes depend on robust MRV: this is the foundation that enables farmers, regulators/administrators, and any external market participants to set baselines and confidently quantify climate impacts of individual actions (i.e. the "result" part of result-based schemes).

It is important to keep costs of MRV down, as they reduce the net benefit of climate actions (i.e. if costs of MRV outweigh the value of the carbon reductions). Additionally, schemes need to minimise MRV costs borne by farmers, as these transaction costs will reduce farmer uptake and therefore the climate impact of a voluntary scheme.

MRV poses challenges in terms of cost and methodological complexity, especially related to carbon storage. Two broad solutions have been identified: first, it is an option to compromise on accuracy and scientific developments. If schemes can accept greater uncertainty regarding the exact climate impact achieved by participants, then MRV costs will be lower. Different schemes balance this trade-off in different ways: Some monitor and reward participants based on easily observable actions taken, rather than quantified climate results. Others compromise accuracy by applying simpler MRV methodologies (e.g. based on few, easy-to-collect data). Second, it is an option to apply differentiated requirements: Stricter MRV requirements can be set for

participants who are expected to have higher climate impacts, as the impact of uncertainty would be higher and as they have capacity to offset MRV costs. In a similar vein, stricter MRV can be incentivised by penalising simple MRV methods with applying conservative estimates of emission factors.

Scientific developments and increased data collection are also working to reduce MRV costs, though this is scheme-specific, and many promising innovations are still under development. Farm carbon audit tools (e.g. Cool Farm Tool, Solagro, FaST) deal with the challenge of complexity by using whole-farm input data to measure GHG impacts (and other indicators), and under some conditions deliver robust GHG impact results. Other schemes draw on diverse data sources and scenario development to enable baseline setting in the absence of farm-level GHG emission data, e.g. using historical photos, IACS data. Here, farm-level reporting is still required. For the challenging MRV topic *soil carbon*, new methods such as remote infrared monitoring, which is being researched related to the Australian ERF, and new national datasets such as the German Soil Survey, offer potential for the future.

### **EU data to support monitoring, reporting and verification**

EU datasets are available in relation to land use, land use change and soil parameters. The Copernicus Sentinel-derived data offers some opportunities to support MRV of result-based carbon farming. Most importantly, the different uses have already been developed for the purpose of compliance verification in the Integrated Administrative and Control System (IACS) under the CAP (EU Commission et al 2018; Bertaglia et al 2019). A key element of this system is the Land Parcel Identification System (LPIS) which uniquely identifies land parcels in space and time, using aerial photography and high precision satellite imagery from Copernicus Sentinel to extract land use information. The use of this already processed data contained in LPIS for the purpose of private / market-based carbon farming schemes is currently limited by the data protection regulations in Member States as it contains geospatially specific information on private property. The data, however, could potentially already be used by schemes where the regulator/administrator of the scheme is a public administration. Through the satellite imagery used in LPIS, CAP Managing Authorities can, for example, detect:

- > Land cover and land use change (e.g. change from cropland to grassland, to forest, presence of wetlands etc.).
- > Certain types of management practices, such as the presence of crops, ditches in the landscape, eligibility of land in terms of whether it is cultivated or not, when land is ploughed, when grass is cut. Data accuracy is quite high for crops, as a distinction is possible even between different crops.

- > They can also distinguish between irrigated and non-irrigated land in dry conditions (to detect the irrigated areas without necessary water authorizations), or land degradation.

The Sentinel data enables detecting several farm level climate actions, such as inclusion of legumes or cover crops as part of crop rotation, conservation of grassland, conversion from arable to grassland, and inclusion of temporary grassland in crop rotation. This geospatial information has potential to be used as part of MRV where these practices are involved.

However, Copernicus Sentinel resolution of 10m (with weekly recurrence) is not detailed enough to monitor many of the climate actions on its own. For example, it cannot reliably detect changes in hedgerows or landscape features. Detailed accounts of linear landscape elements are not feasible with remote sensing. For this, high-resolution remote sensing data (up to 50cm resolution) would need to be applied, which is not available free of charge. In the future, using artificial intelligence, it could be potentially feasible to identify landscape features, but this is not yet operational, and it would be costly.

Moreover, Sentinel data also cannot see farm management practices related to livestock, e.g. manure application, or synthetic fertiliser application, or detect the level of detail to distinguish a multi-species grassland from single species grassland. Finally, remote sensing cannot detect soil organic carbon levels in a reliable way, which requires ground-truthing and combinations with on-the-ground surveys. Therefore, a regulator / administrator of the scheme would need to rely on ground-truthing to complement this data. Some activities are already ongoing in this respect.

For example, there is potential to combine Copernicus data with geo-tagged and time-stamped photos from farmers, which would be evidence of taking actions at certain times. Currently, this approach has been piloted in a few MS for Pillar 1 payments (IT, ES, DK, MT, BE-F). From 2020, this approach is likely to be mandatory. Extending this approach to Pillar 2 payments is more difficult (e.g. using less fertilizer, buffer strips less than 10m, or grassland management (absence of cutting) are not detectable).

Moreover, satellite imagery data has been ground-truthed through the LUCAS survey (Land use and coverage area frame survey). Some current limitations to the use of LUCAS data for purpose of monitoring, verification, and reporting of carbon stocks are:

- > LUCAS survey implies significant costs and results in data points for soil organic carbon that are much too coarse for farm level use. For example, the LUCAS grid is 2x2 km and the sample for SOC has between 22 – 23,000 points, which lacks

representativeness at farm level. Moreover, LUCAS data is collected without informing the landowner, which sets legal limitations on its use.

- > Uncertainty / limit to accuracy in changes between time series (e.g. fake changes in stable landscape features). For example: "The consistency of observations of the same transect from one survey to the next one (e.g. 2012 to 2015) still contains a number of fake changes. This happens only for a low proportion of transects, but this is enough to disturb the estimation of changes for a feature that is essentially stable in the EU. The efforts Eurostat has made on the observation rules to avoid fake changes seems to be still insufficient: the surveyor is asked to check with the help of images (e.g. the field documents or the landscape pictures of the previous survey) when an apparent change results from the comparison of both observations, but this remark might get lost in the transmission chain headquarters-contractor-national coordinator-trainers-surveyors. The complexity of the instructions to enumerators probably gives a hand to the loss of the message."

In conclusion, whereas there is potential to use EU remote sensing data and survey data for monitoring above ground carbon stocks, there are currently several limitations in the available technology and capacities to monitor farm-level changes with respect to both carbon stocks and emissions. The data therefore needs to be complemented with farm-level data to be ground-truthed. At present, the most feasible option to gather the input necessary to calculate changes in emission sequestration and avoided GHG emissions at farm level, is reliance on farmer-recorded and reported data on these management activities. The farm carbon audit tools play a key role here.

A large number of carbon audit tools are available at present, although there is variation in the coverage and robustness of these tools. There are a number of tools that are deemed technically suitable for farm-level carbon audits, enabling sufficient robustness, comprehensiveness and clarity of documentation (Cool Farm Tool, JRC Carbon Calculator, Carbon Agri CAP2er are also more broadly applicable in the EU). There are, however, also shortcomings of these tools in certain respects (for example, the JRC Carbon Calculator addresses GHG emissions, while other impacts on ES and biodiversity are not quantified, though acknowledged in the mitigation recommendations; it also does not set baseline and potential performance targets against which to assess farm performance). The development of the FaST tool prototype for the new CAP framework offers another potential tool to explore for the purpose of carbon farming schemes, although it has a more limited scope and focus on nutrient management.

Moreover, farmer-led crowdsourcing of data has already had interesting examples that can be used as inspiration. The example used in the CAP Pillar 1 pilot projects where

farmers are collecting and submitting geo-tagged and time stamped data is illustrative. Another example is to have a systematic approach to soil sampling to capture and monitor SOC changes both at farm and regional level (see, for example, <https://growobservatory.org/>).

Result-based carbon farming schemes can produce useful bottom-up data on what is feasible to achieve at farm level, across geographic zones, farming systems, and management approaches. Farm level monitoring and bookkeeping can provide important learning experiences and a baseline for monitoring trends and effects of carbon farming. This data can be pooled and used as evidence / input for Member States to set up targets at regional / national level. If carbon audit data is collected on a carefully selected sample of farms, it could also provide a good learning ground for accounting purposes. Improved understanding of the link between management options and measured SOC levels and better activity data on farm management would be important for improving greenhouse gas accounting.

#### 4.1.2 Designing schemes to support farmer uptake

In voluntary schemes, a key barrier to carbon farming is farmers' participation. Hence, barriers which farmers' face in their effort to take up carbon farming schemes need to be considered carefully. These barriers can arise as a result of decisions regarding each of the design elements, i.e. they are not limited simply to decisions regarding MRV but are pervasive throughout all elements of scheme design. This also means that these barriers need to be considered at each stage of scheme design, so that they can be minimised. Given the importance of achieving significant farmer uptake for these voluntary schemes to have climate impact, it can be worth trading off other objectives to lower farmer transaction costs. Our analysis identified numerous solutions that can be applied to minimise these barriers to farmer uptake throughout scheme design.

Barriers to farmer uptake arise in two main areas. **First, increased transaction costs** are a barrier to farmer uptake; farmers are likely to face significant costs (financial and labour power) particularly in the initial phase of schemes. Such increases are caused by changes in farming practices and additional MRV requirements which may require more training, complex whole-farm changes in farming techniques, the need of further advisory services and additional administrative efforts. If perceived costs exceed perceived advantages or income streams, farmers may be unable to participate in carbon farming schemes. **Second, uncertainty and complexity** of carbon farming schemes and their integration into existing legislations and farming practices may act as a further deterrent to uptake. Uncertainty within the context of result-based schemes primarily stems from insufficiently understood or difficult to measure relationships between climate actions and outcomes. Here, the farmer bears

the risk of shouldering the costs of climate actions while being uncertain whether these will lead to the required results and hence rewards. This is exacerbated by external influences which may reverse climate actions. For example, wildfires may cancel out carbon sinks. Uncertainties may also be caused by the design of the reward scheme. For instance, market-based schemes come with price fluctuations, while non-market-based schemes depend on funding situations and political will.

Concerning increased transaction costs, we identify scheme design solutions that can lower, cover, or alter perception of farmer costs (both financial and labour power).

**Costs can be lowered** through various mechanisms, especially pertaining to administration and to MRV as well as by offering flexibility. Administrative efforts can be decreased by aligning the scheme with other policies such as CAP or by allowing smaller farms to group together and act as a single project, reducing collective administrative costs. Administration costs can be reduced by aligning the scheme with other policies as an important step to avoid doubling-up work. Drawing on existing experience, simplified methodologies and technological progress offers further opportunities to decrease costs of MRV. Similarly, compliance testing can be designed in cost-effective, smart ways, for example by randomised compliance testing of only a few participants (potentially hand in hand with higher fees for non-compliance to incentivise action) or by limiting tests to high risk candidates. Flexibility mechanisms can also play an important role to lower costs. For instance, schemes can offer several tiers of ambition or require different actions and MRV for differently sized farms. Alternatively, **administrators/regulators can bear costs** for farmers as a way to boost participation. Finally, apart from lowering and covering costs, schemes can also aim at **changing awareness** around carbon farming so that additional costs appear in a different light. This can take the form of awareness raising around the importance of climate action or providing information around co-benefits of carbon farming practices, thereby shifting farmers' perceptions.

Concerning uncertainty and complexity, several possible solutions exist, ranging from identifying funding institutions with longevity insurance, or involving national inventory authorities which could establish a central credit registry. If a market-based scheme is chosen, hybrid elements may be included, such as price floors or fixed prices, which increases reward certainty for farmers. Furthermore, farmers can be supported by advisors who are experienced in dealing with uncertainty and complexity. This work should start at the scheme design phase. An important point is furthermore to include farmers in the design of the scheme so that unnecessary or particularly damaging sources of uncertainty are excluded from the start. Farmers can also be supported in their dealing with uncertainty and complexity. For example, farmers should be provided with opportunities to learn how best to incorporate carbon farming practices into their routines; training and education are fundamental here. Similarly, efforts need to be taken to make information on carbon farming accessible and exhaustive. It

is furthermore important that the scheme fits farmers' needs which can be supported by including farmers and other stakeholders in the scheme design.

### 4.1.3 Designing carbon farming schemes to ensure credit demand

#### Creating demand via markets

Market-based (credit) carbon farming schemes are attractive options, as they offer a clear mechanism for crowding in private finance to fund climate action. In market-based schemes, a credit is issued for every unit of GHG they avoid or reduce. These credits can then be sold to any actor who wants to offset their own emissions. In this way, private actors pay farmers to take climate actions. However, the success of these schemes is dependent on demand for offsetting credits and thus on the fungibility and reliability of the credit. Therefore, credit demand is crucial, as low or uncertain present or future demand decreases the price of credits, decreasing incentives for farmers to act, and ultimately undermining the entire scheme.

Our barriers/solutions analysis indicates that scheme design can influence credit demand through ensuring environmental integrity. That is, the scheme must deliver credible, additional and permanent climate impact. Buyers must be able to trust that each credit is a robust proxy for 1t of CO<sub>2</sub>-e reduction. Our analysis identifies numerous ways to increase customer trust in the scheme:

- MRV which is backed by good science has an important role to play in ensuring that the scheme delivers robust and variable climate impact.
  - Multiple schemes use external independent auditors to validate climate impact. In international schemes in particular, where there is potential for mismatch of local regulator incentives and environmental integrity, independent international auditing seems essential; for EU schemes, the EU Commission could play a useful role here.
  - Some schemes only offer ex-post payments, ensuring that farmers are only rewarded for actual, verified climate impact. Where schemes make ex-ante payments, stricter on-going MRV requirements are the norm, such as long-term monitoring plans including the potential for on-site visits to ensure ongoing compliance. In the case of the NZ ETS and Woodland Carbon Code, this is matched with the potential for significant penalties if schemes are audited and found not to be in accordance with their commitments. However, as noted in the discussion regarding farmer uptake above, there are potential trade-offs between MRV certainty and farmer transaction costs (and uptake): schemes will need to weigh these trade-offs given their particular context.

- > Risk measures also have an important role to play to ensure that there is actual and permanent climate impact to match every credit sold.
- > Making conservative assumptions helps buyers know that credits are not being oversold (e.g. using conservative emissions factors, conservative baseline scenarios).
- > Some schemes explicitly discount the expected emissions to account for scientific uncertainty or to act as a buffer against any future reversals of sequestration (e.g. if a climate action is expected to deliver 100 t CO<sub>2</sub>-e reductions, then farmers receive 80 t worth of verified emissions credits).
- > Long-term contractual commitments or project plans may also help convince buyers that carbon sequestration will be permanent.
- > Risk measures are particularly important for projects dealing with carbon storage (e.g. agroforestry, schemes for organic and non-organic soil carbon).
- > If schemes only reward avoided emissions, these permanence and risk issues are less significant.
- > In addition to these above-mentioned points, schemes can support credit demand by ensuring that there is robust and transparent registry for recording verified credits and their sale.

However, scheme-design alone is insufficient to ensure demand for credits produced in the scheme. Indeed, many aspects of credit demand are outside the scope of scheme design and are instead driven by higher-level policy decisions, particularly in regard to national, EU, and international climate ambitions. Other high-level policy decisions will also affect the demand for individual scheme credit demand, including the eligibility of different offset credits to meet climate obligations in different sectors and across borders. Scheme designers need to align with international and national standards, for example related to national inventory requirements or sustainable finance requirements. However, beyond aligning the scheme with existing standards, many of these higher-level drivers of credit demand are outside their level of influence.

#### Other scaling up opportunities

In addition to finding workable solutions for the design elements of carbon farming schemes as outlined in this report, other scaling up mechanisms are also important for further supporting wide-spread deployment of result-based carbon farming schemes. These mechanisms may involve creating demand through public policies (e.g. through setting targets under the CAP, public procurement, or other targets set in the climate policy framework), or creating financing mechanisms, demand creation through food

supply chains or even bio-economy (for example, for alternative climate friendly products). Upscaling mechanisms tied to demand for products or end-users of products are not the focus of this report but will be referred to as illustrative examples in preparing the guidance under Task 4.

## 4.2 Barriers and Solutions by Design Element

The barriers analysis is structured in accordance with Chapter 3, that is, we present general barriers and solutions organised by the scheme design elements: governance (1.2.1); coverage and eligibility (1.2.2); baseline and additionality (1.2.3); MRV (1.2.4); rewards (1.2.5); permanence and risk mechanisms (1.2.6). To ease interpretation, for the governance, coverage and eligibility, baseline and additionality, MRV, and permanence and risk sections, we further divide the design element table into two, in accordance with the two above-mentioned overarching types of barriers identified: a) Barriers related to farmer uptake and b) barriers to achieving the goal of carbon sequestration & avoided emissions. For the discussions of barriers related to the design element rewards, we split the barriers into those faced by all reward schemes, those only faced by market (credit) based schemes, and those faced by non-market schemes.

The tables present barriers in the left column. In the middle column, for each barrier, we identify solutions to the barrier arising from existing schemes. The right-hand column identifies open questions related to the barrier or solutions, which will be picked up in the case studies under Task 3. For most barriers, there are multiple potential solutions, some of which are complementary and some of which are exclusionary. Which solution will be most appropriate depends on the specific context of the scheme, and upon other design element decisions (i.e. they interact). The tables are structured so that the reader, faced with a specific design element challenge, can jump to that design element, consider potential barriers, and see potential solutions. The tables include references to the scheme/project where the barrier or solution was identified, so that the reader can find more information about the example in the scheme/project descriptions in Appendix E.

As related barriers and solutions crop up under different design elements, some barriers and solutions are repeated under different design elements.

### 4.2.1 Governance

Governance refers to the institutional setup for the scheme design and mechanisms for their administration and involves choices on administrative procedures and oversight of schemes, institutional capacities and interactions

among different actors involved in operational activities, as well as costs of administration, communication activities and interactions with the surrounding policy and EU context.

#### Link between schemes and targets

Chapter 3 showed that there is no one-size-fits-all approach to governance across existing carbon farming schemes. Instead, the selected governance options vary, reflecting the different objectives and requirements of the scheme. In particular, a key design decision is whether the schemes are voluntary, or compliance schemes are linked to national targets. This influences the flexibility scheme designers have when it comes to other design elements (e.g. MRV), with voluntary schemes generally allowing for more flexible governance settings. Moreover, another central issue for governance is managing the risks of double counting. Schemes need to design registries that will either record mitigation in accordance with international GHG accounting standards to contribute to national targets, or record voluntary offsets purchased by companies to ensure these national inventories do not double count mitigation producing offsets and the reductions claimed by offset purchasers.

#### Addressing issues related to issuance and use of Carbon Farming credits

An important aspect of governance of result-based Carbon Farming is to ensure credibility and integrity of the mitigation results obtained and ensure consistency with and compliance with policy targets. Typical issues, as seen from the previous assessment, will be to prevent double-counting and define and control fungibility. To this end, an overview assessment of double-counting and fungibility issues related to issuance of Carbon Farming credits in the EU (under current rules, LULUCF Regulation 841/2018) is provided in this section.

#### Double counting

The two issues are related, but different. Double counting concerns the risk of multiple use of the same emission reduction or carbon sequestered, whereas fungibility (in this context) concerns regulatory restrictions on certain sectors or entities on the use of carbon farming credits. The two issues are related where an entity imposed to a sector or individual compliance target for which Carbon Farming credits are not compliant decides to use a one such credit to meet a voluntary target different from its compliance target. This situation is particularly relevant for private entities in the EU-ETs or non-ETS sectors.

#### Double counting Using the same result twice

Double counting can result from two situations. First, where a private entity claims to have reduced emissions by using credits issued by another entity to offset own emissions, but where the actual emission reduction or carbon sequestration is also registered and accounted by the MS in which the emission reduction or sequestration takes place. Second, double counting can take place where two private entities use the

same credit. This situation can arise if there is no registry of credits and credits are on-sold/traded. This situation can be mitigated by imposing a registry with personal accounts and developing fraud preventive measures.

The main issue relating to the first situation is the MRV system (addressed later in 4.2.4) and whether all involved MS reporting and accounting systems are able to detect, and track issued credits and their use. This would usually require certain instructions to or obligations for individual projects to inform the relevant government entity. Such instructions should be stipulated in the governance system of a scheme. The recommended way of avoiding double-counting issues is by setting up registries common to all schemes existing in a MS and ensuring that in reporting and accounting towards EU and UNFCCC that technical corrections in the accounts are made that reflect the exchange of credits between sectors (or MS). On this matter, the scheme owner aiming to set up a scheme must liaise with national inventory officials as part of the governance design process.

### Fungibility

In an EU setting, with sector wide targets (EU-ETS and non-ETS) jointly ensuring that the EU meets UNFCCC commitments, fungibility of Carbon Farming credits is largely defined by EU legislation. The main issues related to fungibility and double counting are assessed in the below overview table. The table is structured after issuer and user of a credit and their sectoral and MS allocation, and concerns the situation where an emission reduction or carbon sequestration (here labelled Removal Unit, RMU) is obtained as a result of an activity as part of a result-based Carbon Farming Project, a specific ER or RMU is issued in accordance with the governance system in place and transferred to another entity for use towards a self-imposed voluntary target. The assessments provided concern complications between voluntary and compliance regimes and targets. The nature of the compliance target is implicit in the user sector as listed in the left-most part of the table. For the ETS sector there is an entity level target, for the non-ETS there is a MS level target, and for the LULUCF sector there is a zero net-emissions target.

### Traffic lights

For each cell, a traffic light code is assigned to both fungibility and double-counting, indicating the feasibility of the specific issuer-user combination. The traffic light colour coding is presented in Table 4-1 below.

Table 4-1. Traffic light code for fungibility and double-counting indicators.

| Traffic light colour | Situation | Recommendation |
|----------------------|-----------|----------------|
|----------------------|-----------|----------------|

|               |                                                                                                       |                                                                                                                                                         |
|---------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Green</b>  | No fungibility concerns or no double-counting risk.                                                   | Issuance and use of credits for this marked is recommended.                                                                                             |
| <b>Yellow</b> | Fungibility concerns or risk of double counting, however the concern/risk can be mitigated/addressed. | Governance system needs to specifically address issues by restraining or defining issuance and use of credits.                                          |
| <b>Red</b>    | Fungibility not allowed by EU regulation or prohibitive high risk of double counting.                 | Not recommended to proceed with issuance of credits for this user. Changes in regulation or specific government backed conversion of credits necessary. |

#### Overview table content

In Table 4-2 the short assessments in each cell explains what issues the particular combination of issuer and user of Carbon Farming credits in theory would face. The overview table assumes that the MS reporting and accounting systems (of both issuer and user MS if relevant) can identify or is informed of the credit issuance. The information on fungibility of credits and double counting is crucial for the governance design of any scheme as the demand for credits and therefore the pricing and market strategies would depend on this.

The guiding principle that can be drawn from the table is that exchange of credits between sectors and between MS complicates matters. Also, under current rules, use of credits from managed forest land outside of the LULUCF sector in the issuer country adds complexity and needs careful consideration and coordination with the authority responsible for LULUCF accounting. These two constraints however both limit the demand for Carbon Farming credits and are therefore major barriers for implementation at the EU scale.

Table 4-2. Accounting issues which users and issuer of Carbon Farming credits could hypothetically face.

|                          |         |      | Issuer by UNFCCC reporting category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------|---------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| User by EU MS and sector |         |      | Agriculture (CRF 3)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | LULUCF (CRF 4)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Same MS                  | LULUCF  |      | <p>Situation example: A forest owner wants to use ER from improved manure management on the neighbouring farm to compensate for deforestation on the forest estate.</p> <p><b>Fungibility:</b> Under article 12(1) of the LULUCF Regulation, where accountable emissions exceed accountable removals a MS may delete annual emission allowances to compensate for net-emissions in the LULUCF sector. Under these circumstances, and provided MS authorities recognize use of an ER, it would be feasible to compensate deforestation with manure management ER in accounting towards EU.</p> <p><b>Double-counting:</b> If calculated according to consistent principles and in accordance with MS methodology, no risk of double-counting.</p> | <p>Situation example: A forest owner wishes to offset deforestation emissions with afforestation within own premises.</p> <p><b>Fungibility:</b> No issues</p> <p><b>Double-counting:</b> If calculated according to consistent principles and in accordance with MS methodology, low risk of double-counting. Issue of timing is crucial, as afforestation credits must be issued ex-post to compensate for immediate emission from deforestation. If credits are used are based on past afforestation already used in accounting by MS towards past target, the forest owners claim may cannot be reflected in national accounting in order to avoid double-counting. Needs case specific assessment. If credit is based on improved soil management leading to carbon sequestration in soils, double-counting is less likely.</p> |
|                          | Non-ETS | Agri | <p>Situation example: Farmers wanting to offset increasing emissions from increased livestock herd (enteric fermentation) with ERs resulting from improved manure management at neighbouring farm.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <p>Situation example: Farmer seeks to offset increasing emissions from increased livestock herd (enteric fermentation) with credits resulting from reduced logging at neighbouring private forest.</p> <p><b>Fungibility:</b> At MS accounting level, this exchange is conditional and dependant on the conditions for flexibility set out in the LULUCF Regulation (841/2018),</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

|  |     |                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--|-----|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |     |                       | <p><b>Fungibility:</b> Does not interfere with MS target compliance.</p> <p><b>Double-counting:</b> No risk of double counting.</p>                                                                                                                                                                                                                                                                                                                                                     | <p>article 13. Provided these are met by the issuing MS, the exchange can be fungible, however subject to a quantitative restriction at MS level. Scheme owner should seek advice at with entity responsible for LULUCF accounting. The exchange is <u>not</u> available to the MS where credits arise from all other land accounting categories than manage forest land.</p> <p><b>Double counting:</b> Same issues as for the above cell (LULUCF to LULUCF)</p>                                                                                                         |
|  |     | O<br>t<br>h<br>e<br>r | <p>Situation example: A retail chain wants to offset emissions from energy use by helping its dairy suppliers improve manure management on farm.</p> <p><b>Fungibility:</b> As both issuer and user are within the non-ETS, there is no fungibility issue. However, in the GHG emissions from the retail chains energy use takes place in the energy sector (EU-ETS) and is therefore not offset in national accounting.</p> <p><b>Double counting:</b> No risk of double-counting.</p> | <p>Situation example: A bus company seeks to offset combustion emissions with credits from rewetting of wetlands</p> <p><b>Fungibility:</b> For wetland credits there is no issues, however if credits originate from improved forest management the restrictions of the LULUCF regulation apply to the MS.</p> <p><b>Double counting:</b> Same issues as for above cells, if credits arise from afforestation.</p>                                                                                                                                                       |
|  | ETS |                       | <p>Situation example: A major energy utility company producing power from coal financing biogas from manure at farms in exchange of credits for avoided methane emissions.</p> <p><b>Fungibility:</b> The energy company cannot use credits for compliance under ETS. Thus, using credits for compliance towards a self-imposed target would create two-parallel inconsistent accounts.</p> <p><b>Double counting:</b> There would be two inconsistent accounts (compliance and</p>     | <p>Situation example: A paper-mill offsetting residual emissions from onsite energy production for process use with credits from improved forest management in forests supplying the mill.</p> <p><b>Fungibility:</b> The paper mill cannot use credits for ETS compliance, and the MS cannot transfer LULUCF based credits into the ETS.</p> <p><b>Double counting:</b> There would be two inconsistent accounts (compliance and voluntary) where the voluntary account would claim a credit that would most likely be used by the MS for non-ETS target compliance.</p> |

|  |  |                                                                                                                                     |  |
|--|--|-------------------------------------------------------------------------------------------------------------------------------------|--|
|  |  | voluntary) where the voluntary account would claim a credit that would most likely be used by the MS for non-ETS target compliance. |  |
|--|--|-------------------------------------------------------------------------------------------------------------------------------------|--|

### Inter-MS trade in CF credits

The assessments in the above table concerns exchange of credits between sectors within a MS. In case credits would be traded between MS, between two private entities where the issuer would participate in a Carbon Farming Scheme, the same fungibility and double-counting issues would prevail. For inter-MS trade the complexity of coordinating with GHG accounting body across borders may be prohibitive and should be considered by the scheme owner. A pan-EU registry, and an associated requirement for any scheme to notify the GHG accounting body in the user MS would address this.

Lastly it is noted, that the above tables do not assess fungibility of credits when sold to non-EU users, e.g. if traded as part of the Verra to a user in e.g. the US. This analysis may be relevant for a scheme owner, in case it targets third-country markets.

### Other EU specific and CAP related governance barriers and solutions

Turning towards the potential design of EU schemes, we identified eleven key barriers related to governance, and 27 unique solutions. These are outlined in the table of specific barriers and solutions presented below. The key messages are:

- > Numerous barriers identified are due to the relative **novelty** of the scheme and would be expected to decrease once administrators have further examples to work from and farmers become more familiar with result-based schemes. This is already apparent in the variety of solutions to challenges identified in the existing EU schemes. In the interim, administrators should implement suggested solutions to this challenge, including sufficient resources and time for training, encouraging intermediaries (carbon agents, farm consultants), involving stakeholders in scheme design, maximising transparency, and sharing lessons-learned through clear documentation and by drawing on existing networks.
- > Scheme designers need to be mindful that decisions made regarding scheme governance can significantly affect **transaction costs** borne by farmers. To minimise these costs and ensure high uptake in voluntary schemes, scheme designers should consider enabling different tiers of participation for different participants, grouping of smaller participants to share fixed costs, encouraging intermediaries, and budgeting resources for farmer outreach and training. While

this may increase costs borne by administrators, these are crucial to lower farmer transaction costs and increase farmer uptake.

- > A key challenge is **aligning schemes with existing agricultural and environmental policies**. To ensure farmer uptake, costs of scheme administration need to minimise, and impact mitigation maximised. Furthermore, scheme designers must consider other regional, national, and European policy settings. The settings most important depends on the specific focus of the scheme. A universal challenge/opportunity is alignment with the Common Agricultural Policy. At a minimum, to ensure environmental integrity of the scheme and to lower costs for scheme administrators and farmers, scheme designers need to be aware of related CAP measures. Solutions identified include, where possible, aligning MRV requirements with CAP (e.g. data reporting, timing), and including exclusion criteria or financial additionality requirements to avoid double-funding or double-counting.

### CAP Green Architecture

The renewed commitment for increasing the EU's climate ambition for 2030 and 2050 across all sectors including food and agriculture as advocated in **the European Green Deal**<sup>i</sup> and the forthcoming Farm to Fork Strategy demonstrates the potential for the EU policy framework to play a key role in fully operationalising Carbon Farming initiatives across the EU. Moreover, the Commission's proposals for the CAP 2021 to 2027 stipulate that at least 40% of the policy's overall budget should go towards climate action.<sup>ii</sup> Despite these high-level ambitions, many questions remain as to how the post-2020 CAP can be fully utilised by carbon farming initiatives to reach the EU's and Member State climate goals and associated environmental objectives and targets. Under the Commission's proposals,<sup>iii</sup> Member States will be required to set out their priorities for climate action in national CAP Strategic Plans (CSP) - as one of nine objectives for reformed policy including a clear plan of action. Central to the CSP will be the programming of the CAP's so-called green architecture.

A number of experts<sup>iv</sup> have assessed the merits and potential of the new green architecture. Some of these aspects are considered here in the context of carbon farming initiatives.

### Eco-schemes and other agri-climate-environment measures

Of particular relevance to the operationalisation of carbon initiatives are the mandatory instruments supporting land management outcomes, which Member States would be required to programme under the reformed CAP. This includes the newly proposed eco-schemes in Pillar 1 as well as the well-established agri-environment-climate measures in Pillar 2. These instruments are designed to

create incentive-based voluntary schemes for farmers and/or other land managers (where applicable). Member States would be able to target, and tailor prospective carbon farming schemes supported under these instruments to their climate and other environmental needs provided they can demonstrate how they will contribute to EU climate objectives and corresponding targets. The introduction of the eco-scheme essentially extends the Pillar 2 AECM concept to Pillar 1. The main difference between the two instruments is that eco-schemes are 100% financed from the European Agricultural Guarantee Fund (EAGF) under Pillar 1 whereas as the well-established AECMs are co-financed using the European Agriculture Fund (EAFRD) under Pillar 2 and national and/or regional funds. The potential relationship between two instruments and carbon farming initiatives as a means of making an active contribution to EU climate goals and targets are set out in.

Table 4-3. *Potential relationship between the eco-scheme and other AECM and carbon farming initiatives*

|               | CAP POLICY INSTRUMENT                                               |                                                                         | ISSUES RELEVANT FOR CARBON FARMING INITIATIVES                                                                                                                                                                                                                                                                                                                                                             |
|---------------|---------------------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Scheme type   | Eco-scheme: Schemes for the climate and the environment - (Art. 28) | AECM: Environment, climate and other management commitments - (Art. 65) | Management-based and results-based or hybrid schemes can be designed and implemented using both instruments. Currently, AECMs covers a smaller proportion of the total UAA - about 25% in 2007-2013 - whereas direct payments, where the eco-scheme derives, cover about 90% of UAA. This means that scheme can potential be targeted at scale, but consequence could a reduction in the level of ambition |
| Beneficiaries | 'Genuine' farmers                                                   | Farmers and land managers                                               | The eco-scheme can only be targeted at farmers who meet the 'genuine' farmer definition whereas AECMs are open to a broader cohort of potential beneficiaries.                                                                                                                                                                                                                                             |

|                      |                                                                                                                                                                                          |                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Eligibility criteria | Fulfilling the genuine farmer, eligible hectares criteria defined by the Member States, other selection criteria could also be defined by the Member States                              | Achieving the one or more of the CAP specific objectives, other selection criteria could be defined by the Member States | Potentially provide greater scope for targeting payments. However, eligibility criteria can sometimes undermine effective targeting of desired farmers and land managers and encourage the destruction of landscape elements                                                                                                                                                                                                                                                |
| Contract duration    | Annual or multiannual                                                                                                                                                                    | Multiannual up 5 to 7 years or more                                                                                      | AECMs have been since the 1980s to support management-based schemes and more recently results-based schemes. The eco-scheme can offer more simplified annual contracts. Multi-annual contracts for eco-schemes are also possible, but they are not the norm for implementing direct payment support. It uncertain how continuity between different programming periods could be guaranteed to facilitate the implementation of long-term contracts e.g. up 30 years or more |
| Fund                 | EAGF (Annual, 100% EU financed)                                                                                                                                                          | EAFRD (Multi-annual, EU and nationally co-financed)                                                                      | 100% financing available under the eco-scheme may be attractive for Member States who has limited resources within their own national exchequer. As a direct payment, the eco-scheme budget is organised on an annual basis. Currently, spending allocations must be used in a specific calendar year and cannot be rolled over in contrast to AECMs where spending is organised on a multi-annual basis                                                                    |
| Payment calculation  | Full or partial compensation for cost incurred/income foregone (including opportunity costs), or fixed top-up payment to the basic income support (based on Member States justification) | Full or partial compensation for cost incurred/income foregone (including opportunity costs)                             | The potential to take account of opportunity costs in the AECM payment calculation has not been fully utilised The eco-scheme offers move flexibility to calculate payment including the option of a top-up payment. Variable payments are also through results-based schemes under AECMs                                                                                                                                                                                   |

Underpinning the green architecture is conditionality, which sets out the basic standards (GAECs) and requirements (SMRs) which are similar to the current cross compliance that farmers and land managers in receipt of area and animal-based payments must comply with. The GAECs are particularly relevant to carbon farming with a number directly targeted at climate change objectives and set the reference level or baseline for carbon farming schemes. Other GAECs can directly or indirectly impact the baseline for carbon farming schemes although their primary aim is to address other environmental and climate objectives (see Table 4-4).

*Table 4-4. Mitigation potential of proposed GAEC standards.*

| Main issue     | GAEC standards |                                                                                                                                                                                          | Relevant cluster                                                                     | Mitigation potential |
|----------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------|
| Climate change | <b>GAEC 1</b>  | Maintenance of permanent grassland as a general safeguard against conversion to preserve carbon stock*                                                                                   | Grazing systems                                                                      | ✓                    |
|                | <b>GAEC 2</b>  | Preservation of carbon-rich soils such as peatlands and wetlands (New)                                                                                                                   | Reduce emissions from agricultural use of organic soils                              | ✓                    |
|                | <b>GAEC 3</b>  | Ban of burning arable stubble to maintain soil organic matter, except for plant health reasons                                                                                           | Crop management                                                                      | ✓                    |
| Water          | <b>GAEC 4</b>  | Establishment of buffer strips along water courses                                                                                                                                       | Above-ground living biomass management (landscape features, agro-forestry, forestry) | ✓                    |
|                | <b>GAEC 5</b>  | Use of Farm Sustainability Tool for Nutrients (New)                                                                                                                                      | Crop management; grazing system                                                      | ✓                    |
| Soil           | <b>GAEC 6</b>  | Tillage management to reduce the risk of soil degradation, including slope consideration in order to ensure minimum land management reflecting site-specific conditions to limit erosion | Crop management                                                                      | ✓                    |
|                | <b>GAEC 7</b>  | No bare soil in most sensitive period(s) to protect during winter                                                                                                                        | Crop management; grazing system                                                      | ✓                    |

|                             |                |                                                                                                                                                                                                                                                                                                                                                                |                                                                                      |   |
|-----------------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---|
|                             | <b>GAEC 8</b>  | Crop rotation to preserve soil potential (New)*                                                                                                                                                                                                                                                                                                                | Crop management                                                                      | ✓ |
| Biodiversity and Landscapes | <b>GAEC 9</b>  | Maintenance of non-productive features and area to improve on-farm biodiversity. This includes a minimum share of agricultural area devoted to non-productive features or areas, the retention of landscape features, a ban on cutting hedges and trees during the bird breeding and rearing season and optional measures for avoiding invasive plant species* | Above-ground living biomass management (landscape features, agro-forestry, forestry) | ✓ |
|                             | <b>GAEC 10</b> | Ban on converting or ploughing permanent grassland in Natura 2000 sites to protect habitats and species (New)                                                                                                                                                                                                                                                  | Grazing systems                                                                      | ✓ |

Source: Own compilation based on the Commission's Proposals for a new Regulation on CAP Plans and expert judgement.

Notes: \*GAEC supersedes existing greening obligation.

Under the conditionality, managing authorities are required to define standards and requirements in terms of their contribution to their identified needs. As a result, the baseline may differ from Member State to Member State because of the inclusion of additional national or regional legislation often aligned to other EU environmental objectives, e.g. different farmland types and farms being situated in designated areas such as Nitrogen Vulnerable Zones (NVZs) and Natura 2000 areas. This adds a certain level of complexity in defining the baseline. Baseline requirements should be sufficiently demanding to enable a measurable contribution to all the environmental and climate objectives where the cost of the outcome is borne by the farmer or land manager. Any changes to the baseline (particularly in the first years of implementation) may also affect the content of voluntary schemes. While conditionality provides the legal baseline for the eco-schemes and the other AECMs, it is also relevant for the design and implementation of public and private carbon farming initiatives.

#### Other CAP instruments

Eco-schemes and other AECMs can be complemented by policy support for training and advice and innovation uptake, including pilot projects. Relevant instruments include knowledge exchange and information (including the Farm Advisory Service – FAS to some extent) as well as cooperation, in particular operational groups under the European Innovation Partnership.

| Barrier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Open questions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Governance: Barriers to farmer uptake</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <p>Introducing new, independent result-based carbon farming schemes can <b>double up administrative requirements for farmers</b>.</p> <p>This is a problem as it creates additional administrative effort and cost<sup>31</sup>, and increases transaction costs for farmers, which can lower participation. This is also relevant in the EU context given the administrative complexity of the CAP, and the need to align new schemes clearly in relation to the CAP without increasing farmers' administrative burden.</p> | <ul style="list-style-type: none"> <li>&gt; Schemes can have <b>different tiers of ambition</b> for different participants, with differing requirements in terms of reporting detail, MRV, etc. This lowers the transaction costs for some participants sensitive to these transaction costs, e.g. small participants. For example, <b>Carbon Agri</b> has two levels of analysis: farmers can choose to set their baseline at a detailed (approx. 150 piece of input data) or basic (approximately 20 pieces of input data plus conservative default assumptions) level. <b>Woodland Carbon Code</b> requires less detailed baseline data for small projects. The <b>New Zealand ETS</b> for forestry only requires larger participants (&gt;100ha) to submit to onsite visits and measurements; smaller projects can apply simpler (look-up table) method to keep costs lower.</li> <li>&gt; To minimise additional administrative efforts, new schemes should be designed to <b>align with CAP (and other relevant policies)</b> as much as possible. In particular, where possible, align MRV indicators and reporting/data needs with CAP requirements and timelines. This takes time to coordinate and advance.</li> <li>&gt; Use <b>carbon agents</b> (farm advisors, consultants) to decrease transaction costs, who can help by aggregating, sharing knowledge, supporting MRV etc. These middlemen were seen as trustworthy and expert intermediaries in <b>California CCOP</b>. Farm consultants are also important intermediaries in the <b>CARBON AGRIC</b> scheme, where they help farmers apply the farm carbon audit tool, while at the</li> </ul> | <ul style="list-style-type: none"> <li>&gt; How can data and reporting requirements within the scheme draw on information already collected within the CAP payment applications; and other data available to paying agencies (e.g. LPIS)?</li> <li>&gt; How do you minimise data collection without compromising robustness? Where is the level of uncertainty that is acceptable? E.g. are look-up tables a good approach (e.g. NZ ETS forestry)?</li> <li>&gt; Are Look up tables at the moment – how to progress</li> </ul> |

<sup>31</sup> Note: the question of who these costs fall on depends on scheme design decisions. For example, administrative costs can fall on farmers (e.g. higher data collection and reporting obligations) and/or on regulators/administrators (e.g. monitoring, data validation costs). Who actually bears these costs depends on the design of the scheme. For example, the scheme could provide for funding for farm consultants to gather data, in which case these additional costs would be borne by the regulator/administrator; alternatively, the farmer could be required to gather and report additional data themselves, in which case they would bear cost. For this reason, in this table, we identify costs without always specifying upon whom they fall. In all cases, these costs are a barrier to maximising farmer uptake and/or schemes achieving efficient, effective climate emission reductions.

| Barrier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Open questions                                                                                                                                                                                                                                           |
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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <p>same time teaching/informing participants about the scheme. They are also identified as key success factors in the Australian ERF</p> <ul style="list-style-type: none"> <li>&gt; Enable <b>grouping of smaller farms</b> into one larger project (e.g. <b>Woodland Carbon Code</b>, <b>California CCOP</b>; <b>VCS</b>). This can decrease the per-farm transaction costs, by sharing registration and organisation costs across all group participants.</li> <li>&gt; In particular, highlighting <b>co-benefits</b> of climate actions (including those that benefit farmers e.g. economic benefits, productivity, time saving). This was effective in CDM and VCS projects.</li> </ul>                                                                                                                                                                               | <p>towards more result-based schemes</p> <ul style="list-style-type: none"> <li>&gt; How to plan for scheme evaluation and enable it to evolve over time? E.g. scheme audit?</li> </ul>                                                                  |
| <p>It is challenging to <b>communicate to consumers</b> the additional (social) value of output produced in carbon farming schemes.</p> <p>This a challenge for schemes as if consumers are unwilling to pay/unaware of additional value of output associated with results-based scheme (or lower social costs of production), they will not be willing to pay higher prices for climate friendly production (lowering incentives for farmers) or will be less willing for the government to fund such schemes.</p> | <ul style="list-style-type: none"> <li>&gt; <b>Consumer education</b> can be a part of the schemes. For example, the <b>WWF/SPAR Healthy Soils</b> project informs customers using labelling on produce grown on soils associated with the scheme. The <b>MoorFutures</b> scheme enables site-visits to participate areas as useful ways to increase knowledge and acceptance.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <ul style="list-style-type: none"> <li>&gt; What are the best mechanisms for lifting consumer awareness and willingness to pay?</li> </ul>                                                                                                               |
| <p><b>The novelty and complexity</b> of result-based carbon farming schemes can be a barrier to farmer participation.</p> <p>This is a problem, as in voluntary schemes, these sorts of transaction costs will decrease farmer participation and overall scheme impact.</p>                                                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>&gt; Given the relative novelty of these schemes, <b>awareness raising</b>, training, outreach, etc. are an important part of scheme design and implementation. This can include clear websites and guidance material (e.g. <b>Woodland Carbon Code</b>). In addition, <b>MoorFutures</b> identified the importance of demonstration farms to provide on-the-ground examples of impacts.</li> <li>&gt; Use <b>carbon agents</b> (farm advisors, consultants) to decrease transaction costs, who can help by aggregating, sharing knowledge, supporting MRV etc. These middlemen were seen as trustworthy and expert intermediaries in <b>California CCOP</b>. Farm consultants are also important intermediaries in the <b>CARBON AGRI</b> scheme, where they help farmers apply the farm carbon audit tool, while at the</li> </ul> | <ul style="list-style-type: none"> <li>&gt; What stakeholder networks can be engaged and built on?</li> <li>&gt; How can schemes best align with CAP and other policies to increase participant familiarity/decrease demands on participants?</li> </ul> |

| Barrier                                                                                                                                                                                                                                                       | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Open questions                                                                                                                                                                                                                                                                 |
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|                                                                                                                                                                                                                                                               | <p>same time teaching/informing participants about the scheme. They are also identified as key success factors in the Australian ERF.</p> <ul style="list-style-type: none"> <li>&gt; Enable <b>grouping of smaller farms</b> into one larger project (e.g. <b>Woodland Carbon Code</b>, <b>California CCOP</b>; <b>VCS</b>). This can decrease the per-farm transaction costs, by sharing registration and organisation costs across all group participants.</li> <li>&gt; <b>Involve stakeholders</b> in the design phase to ensure co-ownership. This should include participants as well as other stakeholders. As well as increasing stakeholder buy-in, their knowledge/perspective should also support regulator/administrators to design more effective schemes.</li> </ul>                              | <ul style="list-style-type: none"> <li>&gt; What kind of knowledge sharing, cooperation, tools can be used to increase farmer engagement and acceptance, e.g. farm group certification, farm groups etc.?</li> </ul>                                                           |
| <p>Any <b>farmer mistrust</b> of regulators/ administrators is a barrier to farmer take-up.</p> <p>This is a problem, as in voluntary schemes, these sorts of transaction costs will decrease farmer participation and overall scheme impact.</p>             | <ul style="list-style-type: none"> <li>&gt; Maximise <b>transparency</b> wherever possible, including communicating the real impacts of the scheme (including non-climate benefits for farmers).</li> <li>&gt; <b>Involve stakeholders</b> in the design phase to ensure co-ownership. This should include participants as well as other stakeholders. As well as increasing stakeholder buy-in, their knowledge/perspective should also support regulator/administrators to design more effective schemes.</li> <li>&gt; <b>Research/implementation projects</b> can prepare the ground for wider scope and increased farmer uptake. For example, the increased popularity of the <b>Ferme Laitière Bas Carbone</b> project was triggered by the success of the forerunner <b>LIFE Dairy Carbon</b>.</li> </ul> | <ul style="list-style-type: none"> <li>&gt; How much information on costs and impacts are farmers willing to share? How can data be anonymised to increase willingness?</li> <li>&gt; What stakeholder networks can be engaged and built on to foster farmer trust?</li> </ul> |
| <b>Governance: Barriers related to achieving the goal of carbon sequestration &amp; avoided emissions</b>                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                |
| <p>Result-based schemes may have higher <b>setup and operating costs</b> for the administrator/regulator than management-focused measures. This is due to their novelty (i.e. initial design and implementation costs) and ongoing costs (e.g. higher MRV</p> | <ul style="list-style-type: none"> <li>&gt; If a scheme rewards participant with <b>credits</b>, a subset of these can be sold and set aside to cover administrative/regulator costs, or a portion of the proceeds can go towards covering regulatory costs. For example, the <b>Woodland Carbon Code</b> charges a fee of 9 pence per carbon credit and charges commercial buyers of units £400. These proceeds can help offset any additional regulatory costs.</li> <li>&gt; To <b>lower regulator costs</b>, rather than taking all responsibility (and cost) of developing approved methodologies for emissions reductions, the regulator can</li> </ul>                                                                                                                                                    | <ul style="list-style-type: none"> <li>&gt; How to cover and minimise additional costs of establishing and implementing these schemes? What to consider when</li> </ul>                                                                                                        |

| Barrier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Open questions                                                                                                                                                                                                                                                                                                                                                                                           |
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| <p>requirements, administrative requirement of calculating rewards etc.).</p> <p>This is a problem for the success of the scheme if limited budgets and time leaves regulators /administrators unable to fully support, monitor, review and revise climate action.</p>                                                                                                                                                                                                                                                                                                                  | <p>allow stakeholders to create project methodologies. In the <b>Australian ERF</b>, stakeholders can create project methodologies that they would like to have validated and then apply to earn credits. The regulator then assesses and validates the methodology. Participants can then apply this methodology and receive validated emissions reductions credits for implementing it. The regulator then still has a role in monitoring and verifying the application of the methodology, but not in methodology design (a similar approach is applied to develop new <b>VCS</b> projects and in <b>Label bas Carbone</b>).</p> <ul style="list-style-type: none"> <li>&gt; Might set <b>minimum</b> threshold for area that can be certified (for example, in <b>MoorFutures</b> the expected emission reduction must be greater than 5 tons per hectare per year). This ensures that administrative effort is not expended on low-impact projects.</li> <li>&gt; To decrease setup costs, the Commission should support and facilitate <b>knowledge sharing between existing schemes</b>. Workshops, discussion documents, case studies, etc. can support institutional learning and lower setup and design costs and improve overall effectiveness and efficiency of later schemes.</li> </ul> | <p>thinking about covering the costs?</p>                                                                                                                                                                                                                                                                                                                                                                |
| <p>In schemes involving multiple jurisdictions, it can be challenging to avoid conflicting policies and to ensure consistent governance and <b>align incentives of local regulators with the overall aim of environmental integrity</b>. This is demonstrated by the <b>Joint Implementation scheme</b>, where national regulators had incentives to approve national schemes, which in part lead to awarding of reduction credits of low quality (i.e. non-additional).</p> <p>A related issue is the challenge of robustly integrating GHG impacts into national GHG inventories.</p> | <ul style="list-style-type: none"> <li>&gt; Schemes need to <b>coordinate management with other national policy</b>. This can be a benefit that saves the scheme from having to set all regulation. For example, <b>Woodland Carbon Code</b> relies on the UK Forestry Standard to ensure permanence.</li> <li>&gt; Central and/or <b>independent external supervision/auditing</b> can be applied to protect integrity of the overall scheme (i.e. auditing responsibility lies outside host country). For example, <b>VCS</b> has independent third parties validate and verify projects, as does <b>Label bas Carbone</b>.</li> <li>&gt; To ensure coordination and consistency and avoid contradictory policies, scheme management can be clearly <b>coordinated through one regulatory agency</b>. As in the <b>MoorFutures</b> project, for example, the regulatory agency holds primary responsibility but aims to ensure all relevant ministries and other stakeholders are involved and well-informed.</li> </ul>                                                                                                                                                                                                                                                                            | <ul style="list-style-type: none"> <li>&gt; Which ministry/ department should be responsible for schemes? What kind of setup is required at national level to ensure coordination and integrity?</li> <li>&gt; What should the role of the Commission be in relation to national and regional schemes?</li> <li>&gt; If linking to national inventories, how should coordination be governed?</li> </ul> |

| Barrier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Open questions                                                                                                                                                                                                                                                                                       |
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| This is a problem as it can undermine the integrity of the scheme, including reducing demand for credits.                                                                                                                                                                                                                                                                                                                                                                                                               | <ul style="list-style-type: none"> <li>&gt; To solve national inventory integration issues, the <b>national inventory authority</b> should be involved in scheme design. They could establish an offset registry, issue offsets to project owners, and keep track of where they are used. They would then have the knowledge to make the correct withdrawals in the national GHG accounts before closing accounts. Some schemes (e.g. Woodland Carbon Code) require that all buyers and sellers are based in the UK, to simplify national inventory impacts.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li>&gt; How should climate action data be recorded to simplify integration into national GHG inventory?</li> </ul>                                                                                                                                               |
| <p><b>Multiple and contradictory policy goals</b> may be a barrier to successful increase of carbon avoided and sequestered. For example, EU food production-related policies may incentivise maximising food production, which may conflict with carbon farming schemes that aim to reduce agricultural GHG emissions.</p> <p>This would be a barrier to carbon farming schemes, as these other policies may offer contradictory incentives for farmers, limiting the scheme's ability to deliver climate impacts.</p> | <ul style="list-style-type: none"> <li>&gt; Schemes need to <b>coordinate management with other national policy</b>. This can be a benefit that saves the scheme from having to set all regulation. For example, Woodland Carbon Code relies on the UK Forestry Standard to ensure permanence.</li> <li>&gt; Using different indicators can also be a solution to the specific challenge of a trade-off between incentives for reduced carbon emissions and food production. For example, rather than using the commonly applied absolute indicator (such as t CO<sub>2</sub>-e), which can incentivise a decrease in production, schemes could reward participants related to their <b>change in carbon efficiency</b>. For example, the reward could be calculated as the improvement in carbon efficiency (g CO<sub>2</sub>-e per kg meat produced) multiplied by the amount of output produced (in t) (e.g. <i>Ferme laitière Bas Carbone</i>). This would encourage increased carbon efficiency without incentivising a decrease in production, however, it may result in an increase in absolute emissions.</li> </ul> | <ul style="list-style-type: none"> <li>&gt; Which policies need to be considered?</li> <li>&gt; What are the policy, political, socio economic drivers (direct and indirect) promoting action?</li> </ul>                                                                                            |
| Given the many agricultural and environmental policies, a potential barrier is managing <b>double funding</b> . This occurs when farmers are paid twice from different policies/schemes for the same action, e.g. if they planted hedgerows and received a payment under a results-based carbon farming scheme and also received an additional payment under CAP.                                                                                                                                                       | <ul style="list-style-type: none"> <li>&gt; Include <b>contractual requirement</b> that exclude farmers from receiving double-funding. For example, the scheme could exclude mixed financing (for example, MoorFutures does not allow that public funds are used on the same land for which certificates are sold).</li> <li>&gt; Apply <b>financial additionality test</b> such that farmers only receive payment if they would not otherwise take action (including CAP and any other payments). Financial additionality tests of this sort are applied by <i>Label bas Carbone</i> and <i>Woodland Carbon Code</i>.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <ul style="list-style-type: none"> <li>&gt; How significant a risk is double funding in different scheme types?</li> <li>&gt; What mechanisms / rules are needed to avoid double-dipping?</li> <li>&gt; Is it possible to split payments such that a farmer gets some up-front funding to</li> </ul> |

| Barrier                                                                                                                                                                                                                                                                                                                                                | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Open questions                                                                                                                                                                                                                                                        |
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| This is a problem as these actions may not be additional (i.e. would overstate the impact of the action). They would also increase the cost of the scheme.                                                                                                                                                                                             | <ul style="list-style-type: none"> <li>&gt; <b>Discount</b> the payment to farmers who also receive payments for other schemes. For example, the <b>CARBON AGRI scheme</b> discounts emissions reductions by 20% if they also participate in a related energy saving certificate scheme</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | cover implementation costs (e.g. through CAP) and then a later reward related to climate impact? If so, what would be the mechanism?                                                                                                                                  |
| A lack of <b>institutional capacity</b> limits the ability of regulators (at national and regional level) to set up, implement, and monitor effective and efficient schemes. This is a problem, as result-based carbon farming schemes are complex, and without this expertise, scheme establishment will be slow, and schemes will be less effective. | <ul style="list-style-type: none"> <li>&gt; Schemes should plan for this challenge, and <b>reserve time and budget to build institutional capacity</b> (making use of existing institutions and funding streams where feasible and effective). This includes training internal staff, as well as either outsourcing responsibilities to external farm advisors or training /approving validators and farm consultants, as necessary.</li> <li>&gt; <b>Case studies</b> and external guidance based on existing experience with these sorts of schemes can provide some support for regulators.</li> <li>&gt; Workshops and <b>other knowledge and experience exchanges</b> related to carbon farming schemes support effective design and implementation.</li> </ul> | <ul style="list-style-type: none"> <li>&gt; What existing networks can be built on?</li> <li>&gt; What are the gaps in institutional capacity, and how can these best be addressed?</li> <li>&gt; What kind of capacity building needs to be put in place?</li> </ul> |
| For countries to be able to recognise reductions achieved under result-based schemes, <b>the reporting needs to be consistent with national accounts and IPCC methodologies.</b>                                                                                                                                                                       | <ul style="list-style-type: none"> <li>&gt; Schemes need to ensure that the scheme follows the national inventory in regard to applying the same and consistent default factors for emissions or removals, the same or higher resolution data, respect land use and spatial data categories, and similar assumptions/projections for baselines and reference levels.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li>&gt; How can sub-national schemes and reporting be designed so that reductions can be included in national reporting?</li> </ul>                                                                                               |
| <p>Participants may <b>be averse to publishing data on climate action effectiveness and personal cost data</b>, as they may view this as sensitive or likely to affect future payments.</p> <p>This could be a problem for schemes, as this information would be very useful for optimising scheme design/supporting the design of later schemes.</p>  | <ul style="list-style-type: none"> <li>&gt; Schemes can <b>require participants to make this information available</b> to the regulator/administrator as part of the rewards mechanism to support learning.</li> <li>&gt; In the <b>Ferme Laitière Bas Carbone</b> project, farm-level results from CAP'2ER are only available for the owner, however the administrator of the scheme published case studies with environmental diagnostic results for eight farms including resulting actions to improve their performance.</li> </ul>                                                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>&gt; How concerned are stakeholders about the privacy of this data?</li> </ul>                                                                                                                                                 |

### 4.2.2 Coverage and eligibility

Coverage and eligibility describe who can participate in the scheme and what climate actions the scheme recognises. Schemes often restrict participation by geography or farm type or apply other eligibility restrictions to either decrease costs or increase certainty.

Chapter 3's review of international scheme design identified that geographic and sectoral focus is a key governance decision to take, which often flows from the geographic scale of the scheme designer. Chapter 3 also concludes that limiting coverage and eligibility, either by geography or to specific sectors or climate actions, means schemes can develop more targeted MRV methodologies, baselines, and eligibility tests, which can increase certainty and decrease costs. Chapter 3 also identified that coverage and eligibility restrictions affect the scheme's perceived environmental integrity, for example when it comes to environmental externalities, which, in turn, affects the prices paid for their offset credits.

- > Turning towards potential design of EU schemes, we identified two key barriers related to coverage and eligibility, and seven unique solutions. These are outlined in the table of specific barriers and solutions presented in the below. The key messages are:
- > Restrictive coverage and eligibility is a barrier to farmer uptake. However, restrictive coverage and eligibility enables scheme designers to design more specific and simpler schemes targeting particular farm types, which can reduce uncertainty of scheme emissions reductions and transactions costs faced by farmers, which could in turn increase uptake.
- > Where the cost of incorporating participants into schemes is high (i.e. transaction costs), scheme designers can set thresholds for participation and in this way restrict eligibility to high-impact participants. This will increase overall scheme efficiency but may exclude participants with a small individual but large collective climate impact.
- > Negative externalities pose a challenging barrier to delivering socially beneficial GHG reductions through result-based carbon farming schemes. Existing schemes sometimes use coverage and eligibility limits to avoid climate actions likely to have negative side effects or promote those with additional co-benefits. Other solutions include relying on other policies, additional MRV, or additional top-up payments.

| Barrier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Open questions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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| <b>Coverage and eligibility: Barriers to achieving the goal of carbon sequestration &amp; avoided emissions</b>                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <p>For some participants, the additional costs of <b>monitoring and verification are high</b> compared to the expected emission reductions.</p> <p>This is a problem because it would not be cost effective for the regulator/administrator to include them in the scheme.</p>                                                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>&gt; Eligibility / selection criteria can be set to exclude the types of participants who it is not cost-effective to include. For example, in the case of MoorFutures the expected emission reduction must be greater than 5 tons per hectare per year.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <p><i>This barrier is investigated in Case Study Template section 7a.</i></p> <ul style="list-style-type: none"> <li>&gt; Given scheme context, what are the long-run annual and one-off administrative costs of including a participant, and how can relatively expensive participants be excluded?</li> </ul>                                                                                                                                                                                                                                                                                                     |
| <p>Some <b>climate actions can cause negative externalities</b> in some contexts (e.g. loss of biodiversity or loss of local jobs). This is a particular risk when carbon farming schemes are compartmentalised, i.e. focus exclusively on one climate action or on GHGs, without considering broader impacts on the farm and environment.</p> <p>This is a problem, as negative externalities decrease the overall social benefit of climate actions, even considering the benefits of climate impact.</p> | <ul style="list-style-type: none"> <li>&gt; Schemes can require participants to <b>also comply with other national or regional policies</b> to avoid negative externalities, e.g. Woodland Carbon Code requires participants to comply with the UK Forestry Standard, which includes sustainable forestry requirements.</li> <li>&gt; The scheme can identify and exclude climate actions or contexts that are likely to have negative externalities. E.g. The Australian ERF scheme has a list of <b>excluded offset activities</b>, which cannot be approved due to their impact on biodiversity, water conservation, employment, etc. These activities would not be rewarded with emissions reductions credits.</li> <li>&gt; Schemes can contractually require participants to <b>monitor co-benefits/negative externalities</b>. This data can be monitored to identify negative externalities before they become significant. Additionally, for market-type schemes (see "rewards" section), externalities/co-benefits can also be recorded on the credit, which can then be rewarded/penalised by the market. For example, MoorFutures has developed methodologies for MRV of externalities including water quality and biodiversity impacts. These are recorded on credits as well as emissions reductions, so that they can theoretically be recognised and rewarded by credit buyers with higher credit prices.</li> </ul> | <p><i>This barrier is investigated in Case Study Template section 5a.</i></p> <ul style="list-style-type: none"> <li>&gt; For each scheme, which climate actions should be excluded from the scheme (and under what conditions)?</li> <li>&gt; Are co-benefits rewarded? If so how and which? What are the risks of not doing so and the opportunities of doing so?</li> <li>&gt; How can negative potential consequences for the environment be controlled?</li> <li>&gt; How can a link be made to both environmental and other co-benefits on farm e.g. agronomic co-benefits, farm resilience, etc.?</li> </ul> |

| Barrier | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Open questions |
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|         | <ul style="list-style-type: none"><li>&gt; For market-type schemes (see “rewards” section), schemes can <b>monitor the impact on externalities/co-benefits</b> and include this information on the credit, which can then be rewarded by the market. For example, <b>MoorFutures</b> has developed a method for monitoring impact on water quality, biodiversity etc. and list this information when selling project-specific credits. <b>Woodland Carbon Code</b> has a simple qualitative co-benefits impact.</li><li>&gt; Some schemes use farm carbon audit tools to apply a <b>whole-farm approach</b>, which includes all climate actions and carbon flows (at least all that can be calculated using the tool). Farm carbon audit tools can also calculate impact on co-benefits/negative externalities. In these schemes (e.g. <b>CARBON AGRI</b>), rather than focussing just on climate impacts, the tools estimate the combined impact of multiple management changes on multiple indicators. This can enable negative externalities to be identified and managed.</li><li>&gt; To incentivise climate actions with co-benefits, regulators/administrators could pay <b>top-up payments for farmers who implement actions that also positively affect other EU priorities</b> (e.g. biodiversity protection, reducing nitrogen leaching, increasing water efficiency).</li></ul> |                |

### 4.2.3 Baseline, additionality, and leakage

Chapter 3 identified that additionality could be assessed in four different ways: environmental additionality (i.e. does the activity lead to lower emission levels than business as usual), financial additionality (i.e. does the activity lead to higher costs or relatively lower profitability than otherwise), technological additionality (i.e. does the activity accelerate technological adoption), or legal additionality (e.g. does the activity go beyond existing legal obligations). Chapter 3 concluded that schemes should apply multiple definitions of additionality to ensure that only additional actions are rewarded. Otherwise, environmental integrity will decrease, and costs increase. With regard to baseline setting, chapter 3 identified that baselines set using emission intensity rather than absolute emissions can result in increasing overall emissions. Chapter 3 also identified that baseline setting can be carried out in two ways: a standardised way (often using historical data), where the same method is applied to all participants, or an individualised approach, where each participant's baseline setting is customised. Customised approaches are more costly and less objective but can reduce windfall effects common to standardised methods. A combination of customised and standardised approaches may be optimal.

As identified in chapter 3, baseline and additionality settings are the key policy tool for addressing carbon leakage, which refers to the displacement of economic activities that directly or indirectly shift GHG emissions from a jurisdiction with GHG constraints to another jurisdiction with less GHG constraints, reducing or reversing the GHG impact.

Turning towards the potential design of EU schemes, we identified five key barriers related to baselines, additionality, and leakage, and eighteen unique solutions. These are outlined in the table of specific barriers and solutions presented in the below. The key messages are:

- > The trade-off between enabling farmer uptake and ensuring environmental integrity that is implicit in any **baseline setting decision** is a key design challenge, which is made more difficult by a lack of data. Existing EU schemes identified a number of potential solutions, including combining multiple data sources across multiple years, using pilot schemes to gather data and/or consider baseline setting as part of scheme development, involving external auditors to ensure integrity, and offering differentiated baseline setting options, such that larger participants are subject to individualised baseline setting to increase certainty.
- > To ensure additionality, schemes apply **financial as well as environmental additionality** tests to only pay for actions that would not have occurred without reward. Given the challenge and expense of identifying additional impact, other schemes chose to address this by discounting reward payments, i.e. only paying a proportion of estimated reductions, as some are assumed to be non-additional.
- > **Leakage** of emissions to jurisdictions covered by the scheme was another key barrier, concerning both leakage within one farm (i.e. reduction in GHG-producing activity in part of the farm that is covered by the scheme

leads to an increase in activity elsewhere on the farm) or between farms covered by the scheme and others. To minimise leakage within farms, schemes can place contractual obligations on farmers, or they can expand scheme coverage, e.g. by applying whole farm rather than specific climate action approaches. Addressing leakage from within to outside the scheme is more difficult and dependent on external policies. As a more feasible solution, schemes can attempt to estimate leakage and then discount rewards, accordingly, thus ensuring additionality.

| Barrier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Open questions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| <b>Baseline and additionality: Barriers related to farmer uptake</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <p>A challenge for schemes is setting “fair” rules for setting baselines that <b>also incentivise additional emissions reductions</b>.</p> <p>Arbitrary historical baselines (e.g. set 2 years prior) combined with natural farming variation can lead to adverse selection i.e. a bias towards non-additional reductions. E.g. farms who had below average emissions in the baseline year would receive a low baseline, meaning they are less likely to participate, as their baseline is unrealistically low relative to their actual current output. At the same time, other farmers who had above average emissions in the baseline year receive artificially high baselines. They would therefore be more likely to participate, as even without taking additional actions, their current/future emissions will be below the baseline. These reductions are non-additional.</p> <p>Conversely, setting baselines based on current or near future emissions can incentivise farmers to artificially boost current emissions so they receive a higher baseline. This is a problem, as the “reductions” below this inflated baseline and their actual baseline emissions are not additional.</p> | <ul style="list-style-type: none"> <li>&gt; If <b>historical data</b> is used to set baselines (e.g. NZ ETS-forestry), baselines should be set using an <b>average of multiple years of data</b>, to minimise impact of natural variability in farming. This will increase the likelihood that the baseline is a close match for the actual average emissions of the farm, incentivising additional actions to reduce emissions (that can then be rewarded).</li> <li>&gt; Baselines can also be set using <b>sectoral averages</b>. This would ensure that those farms who were first movers (i.e. who already have very climate efficient farms) will have a baseline set above their current level, meaning they will be rewarded for continuing to manage their farm efficiently. This also would ensure that laggards (those farms who have not previously managed their farm climate efficiently, who have higher than average baseline emissions) are not rewarded for introducing management changes that are already standard for similar types of farms.</li> <li>&gt; If baselines are set based on <b>current/near future management, independent auditors and/or farm consultants</b> can be involved in baseline setting to ensure they are accurate and unbiased. This approach is applied in partial-farm schemes such as Australian ERF, VCS, or MoorFutures, where external auditors assess the proposed project baseline before approving any project.</li> <li>&gt; Using scenarios to set <b>forward-looking baselines</b> can be a solution. MoorFutures uses scenarios to set such baselines and pays rewards relative to reductions against these baselines rather than relative to an arbitrary year. Forward-looking baselines can incorporate trends (e.g. in emissions per unit of output, animal number trends etc.). These trends could be based on previous 5-10 years of average data where that is available.</li> </ul> | <ul style="list-style-type: none"> <li>&gt; What principles and processes should be followed when setting baselines? Should MRV and baseline setting be made stricter, so that uncertainty and adverse selection decrease, even though this would increase transaction costs?</li> <li>&gt; Are sectoral baselines acceptable to participants (rather than individual farm baselines) and how can adverse selection be minimised to ensure</li> <li>&gt; Should trends be included in baselines or should these reductions be rewarded?</li> </ul> |

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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>&gt; <b>Mandatorily include all farms.</b> This does not address arbitrary baseline setting but it will avoid adverse selection, as it ensures that the average values used (e.g. emissions factors, costs etc.) are also the average values for the participants. For example, the <b>NZ ETS</b> mandatorily includes all foresters with trees planted post-1989 in the scheme.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Baseline and additionality: Barriers to achieving the goal of carbon sequestration &amp; avoided emissions</b>                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <p><b>Lack of data availability</b> specific, results data (e.g. current/past GHG emissions/sequestration data or sufficient data for accurate GHG estimation). This means that regulators are unable to set either the sectoral or individual farm baselines (because there is a lack of data from a large number of farms about existing farm or sectoral level emissions).</p> <p>This is a problem for scheme design as without baseline data it is challenging to identify level of impact and incentivise further action to decrease emissions.</p> | <ul style="list-style-type: none"> <li>&gt; Where sectoral data is missing, launch <b>pilot schemes</b> as a first step to gather farm-level or regional data. This can inform later schemes, where the pilot scheme data can be used to set regional/sectoral baselines.</li> <li>&gt; <b>Data collection for baseline setting can be the first step for a scheme.</b> For example, farms develop a baseline scenario i.e. expected land use (and emissions) that would occur without the scheme, and based on this, estimate the baseline carbon emissions. The <b>MoorFutures</b> methodology proposes the use of maps, photos, aerial photographs, publications and stakeholder statements for identifying the most probable baseline scenario. Field visits and expert opinions should be integral part of this process (MoorFutures, 2017b).</li> <li>&gt; Baseline emissions can also be estimated based on current or past farm management data using a <b>farm carbon audit tool</b>. For example, the <b>CarbonAGRI</b> scheme uses the CAP2'ER tool to determine baseline emissions based on the farm carbon audit tool's inputs, which includes herd characteristics (number, age, type), feed (grass, additional feed), geographic factors (soil, slope, rainfall averages), manure management, as well as other factors (Leinonen, et al., 2019).</li> <li>&gt; Where baseline data is only missing for a small number of farms, their baseline can be set using an <b>average for "similar" farms</b>. For example, <b>California CCOP</b> forestry sets baselines relative to "common practice" in the local area.</li> </ul> | <ul style="list-style-type: none"> <li>&gt; If scenarios or farm carbon tools are used to set baselines, how can costs be kept low whilst ensuring adequate accuracy? What is the role for consultants or ex post audits?</li> <li>&gt; Are farm carbon audit tools accurate and/or unbiased across different farm types/geographies?</li> <li>&gt; If baselines set based on "similar" farms, how is "similar" defined?</li> </ul> |
| <p>Given that regulators do not know about farmer plans, it is <b>challenging to ensure that farmer</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                               | <ul style="list-style-type: none"> <li>&gt; Regulators can apply <b>financial additionality tests</b> and only reward projects that would not have taken place without the financial support of</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                     |

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| <p><b>actions are additional</b>, i.e. they would not have taken the action without the scheme.</p> <p>Non-additional actions are a problem as they as the farmer is being rewarded for actions that they would have taken anyway, which raises the cost of the scheme and overstates its climate impact.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <p>the reward-based scheme. For example, the <b>Woodland Carbon Code</b> requires participants to calculate the net present value of planting woodlands on their land both with and without the income from carbon credits. They only fund projects where planting is made economic by credits (i.e. would be negative NPV without credits). This can be made stricter, such that rather than assessing the project as a whole, the farmer is required to break the project plan down into constituent parts and only those elements (or areas) are funded that are individually additional.</p> <ul style="list-style-type: none"> <li>&gt; To decrease the likelihood or scale of non-additional reductions, regulators can <b>discount reward payments</b> (i.e. pay for less than their estimated reductions, as they expect some are non-additional). In <b>MoorFutures</b>, this is achieved by always applying the principle of conservativeness e.g. baseline scenarios are set conservatively (assuming relatively low emissions), and conservative default values are assumed for emissions measurements, i.e. underestimating GHG fluxes in baseline scenario and overestimating in project scenario.</li> </ul>       | <ul style="list-style-type: none"> <li>&gt; Is financial additionality an unnecessary burden for participants?</li> <li>&gt; Are financial additionality tests realistic in non-project-based schemes, i.e. can it be applied in a whole farm scheme where numerous management options are applied together, or is this too complex?</li> </ul>                                                                                                                                                                                                                                                                      |
| <p><b>“Leakage” of emissions within one farm</b> (i.e. from the part of the farming operation covered by the carbon farming scheme to an uncovered part) undermines additionality. For example, if a farmer is paid for the climate impact of a partial-farm actions (e.g. for ending productive livestock and afforesting some part of their farm, but instead of reducing overall livestock numbers they increase stocking on another part of the farm), then total farm emissions have not decreased as much as the estimated partial-farm reductions.</p> <p>This is a particular risk when schemes <b>compartmentalise</b> i.e. focus exclusively on one climate action or one GHG. Such compartmentalisation of carbon farming schemes fail to capture other GHG changes that result</p> | <ul style="list-style-type: none"> <li>&gt; Contractually <b>obligate the farmer to report any increase in emissions</b> on land/management not included in the scheme. If any change does occur, the farmer would have to assess the GHG impact of this. This would be subtracted from the expected GHG impact, decreasing the payment received to ensure additionality, as in the <b>Woodland Carbon Code</b>, and through use of scenarios in the <b>MoorFutures</b> project.</li> <li>&gt; Some schemes use farm carbon audit tools to set baselines and measure additionality at a <b>whole-farm scale</b>. These tools which includes all climate actions and carbon flows (at least all that can be calculated using the tool), and assess the farm as a unit, including both the farm/management where climate actions will occur, as well as the rest of the farm (which would be expected to be managed unchanged). This would provide enough information to only reward new actions that were not previously being taken. These farm carbon audit tools aim to capture interaction effects and also report on multiple GHGs. Whole-farm schemes are examples of this approach, e.g. <b>LIFE Beef Carbon</b></li> </ul> | <ul style="list-style-type: none"> <li>&gt; If discounting payments to account for market leakage, what method should be used to quantify appropriate discount?</li> <li>&gt; Are there other options to minimise and/or account for leakage?</li> <li>&gt; Given the climate actions a scheme is incentivising, is it reasonable to assume a net zero change in other (non-covered) farm emissions? If not, how can these changes be accounted for and/or managed against?</li> <li>&gt; Related to the specific climate actions incentivised by the scheme, what options are there for measuring and/or</li> </ul> |

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| <p>from the climate action. Soil carbon poses a particular challenge, as this can be affected by management changes but can be expensive or complex to capture impacts.</p> <p>This is a problem as the reward for the partial-farm action is greater than the actual climate impact, and climate impact is overstated.</p>                                                                                                                                                             | <p>uses a farm carbon audit tool to develop a whole farm baseline and project plan to evaluate current GHG emissions and climate action impact.</p> <ul style="list-style-type: none"> <li>&gt; Alternatively, schemes could <b>identify</b> additional areas of the farm/farm management that are likely to be affected by the incentivised climate action, which are also <b>likely significant sources of emissions</b>, and require for these too to be included in baselines and in monitoring. For example, in the <b>Woodland Carbon Code</b>, all major areas of emissions, including tree biomass (above and below ground), litter and deadwood, non-tree above and below ground biomass, and soil (following Woodland Carbon Code) are identified as significant. At a minimum, participants are required to identify existing trees and calculate their sequestration under baseline (i.e. tree biomass), if the expected net change in the other elements is zero. <p><b>Label bas Carbone</b> attempts to minimise the risk of compartmentalisation inducing leakage by developing a <b>holistic approach</b> to managing all carbon farming schemes under a central label. This could avoid compartmentalisation by ensuring that the regulator has an overview of multiple scheme types, which can support them to manage across the border of different schemes or methodologies.</p> <ul style="list-style-type: none"> <li>&gt; <b>Other national regulations</b> can also act to limit within farm leakage. For example, nutrient limits can limit expansion or intensification of farming, decreasing the likelihood of leakage.</li> </ul> </li></ul> | <p>managing soil carbon impacts (at low cost)?</p>                                                                  |
| <p><b>“Leakage” of emissions from farms inside the scheme to farms outside the scheme.</b> This could occur either due to a direct shift of animals from an in-scheme farm to an out-of-scheme farm or due to “market leakage”. Market leakage occurs when many farmers reduce output as a result of the carbon farming scheme, which leads to increased market prices for output that induce additional farming activities to occur elsewhere (outside the carbon farming scheme).</p> | <ul style="list-style-type: none"> <li>&gt; To avoid market leakage affecting additionality, regulators could <b>discount the rewards</b> paid to farmers to reflect the overall market impacts of their emissions reductions, e.g. if market impacts were expected to raise emissions elsewhere equivalent to 20% of those reduced within the scheme, payments should be reduced by 20%.</li> <li>&gt; To avoid leakage to other farms, <b>all farms could be mandatorily included in the scheme</b>. Alternatively, carbon farming schemes could be supported by other policies, such as carbon border taxes.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <p>&gt; How are questions of leakage identified, assessed and mitigated against? What are the leakage concerns?</p> |

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| <p>This is a problem, as the in-scheme reductions are at least partially offset by this leakage, meaning the actual climate impact is smaller than the reductions in the scheme.</p> |  |  |
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#### 4.2.4 Monitoring, Reporting, and Verification

Monitoring, reporting, and verification (MRV) refers to the measurement to how participants' climate actions and GHG emissions are reliably measured, how they are required to report these to authorities, and how authorities verify their accuracy. MRV is integral to result-based carbon farming scheme, as it is the step that quantifies the impact of climate actions, i.e. the result. Monitoring refers to the collection of data necessary to calculate GHG emissions. Reporting establishes how participants are required to record and communicate monitoring data to relevant authorities and/or government entities. Verification refers to the process of establishing the truthfulness and accuracy of reporting.

Chapter 3 identified reliable, affordable monitoring as the central challenge of result-based carbon farming schemes. It identified that GHG measurement is generally determined by technology, which is constantly developing, as shown by progress with GIS and satellite data over the last ten years. Despite this, participants commonly face significant transaction costs associated with MRV, which reduce farmer uptake and undermine the social benefit of schemes. Chapter 3 identified that a key trade-off exists between accuracy and costs of MRV, meaning that if uncertainty can be accepted, costs can be reduced. Examples of this include increasing reporting and verification flexibility (e.g. regarding timing) or applying differentiated requirements to different types of participants. Overall, chapter 3 concluded that limited guidance exists for minimising MRV costs, and that scheme designers would have to take decisions to achieve this based on their specific context.

Building on this analysis, we assessed barriers related to MRV faced by existing schemes and the solutions they applied. We identified four common barriers and fifteen solutions, which are presented in the table below. Key messages are:

- 1 All schemes face trade-offs between MRV costs and uncertainty. While the reviewed schemes did not identify a solution to this barrier, they did identify different ways to balance this so that farmer uptake could be increased without significantly increasing uncertainty (and decreasing environmental integrity). For example, some schemes set differentiated MRV, where smaller or less risky participants face lower requirements (and costs). Others incentivise participants to bear costs of more certain MRV by rewarding this with less conservative emissions factors.
- 2 Many schemes face potentially avoidable high verification costs because they require on-site visits. Solutions to this include an auditing approach accompanied by high fines, where only randomly selected or high-risk participants are audited, lowering overall costs but still incentivising accurate reporting.
- 3 Reliable and affordable MRV is particularly challenging for soil carbon. As a solution, some schemes avoid the high costs associated with soil carbon by excluding it from schemes or use simplified but conservative MRV methods, which increase uncertainty. Technological developments show some promise for the future.

| Barrier                                                                                                                                                                                                                                                                                                                                                                      | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Open questions                                                                                                                                                                                                                                                                                                                                                                        |
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| <b>Monitoring, Reporting, and Verification: Barriers to farmer uptake</b>                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                       |
| <p><b>Requiring all farms to meet the same high MRV requirements is consistent but can increase costs.</b></p> <p>This is a problem as it raises the cost of the scheme for the regulator/administrator. This can also be a problem for individual farms, as it increases transaction costs, decreasing their incentive to participate and ultimately decreasing uptake.</p> | <ul style="list-style-type: none"> <li>&gt; <b>Regulator bears cost of MRV</b> for farmers to set baseline, to support uptake. For example, in the <b>CARBON AGRI</b> scheme, farmers receive farm consultant support to gather and analyse initial data. Farms are also supported with a farm consultant to evaluate ex post climate impacts.</li> <li>&gt; Set <b>stricter MRV requirements for large farms/projects than for smaller farms/projects</b>. For example, <b>NZ ETS</b> requires forests over 100ha to have on-site measurements; smaller forests use default emissions tables (for dairy/beef, this could apply for climate actions related to soil carbon, agroforestry, and/or manure management).</li> <li>&gt; Offer more detailed MRV as an option, and otherwise <b>require only low-cost MRV combined with conservative assumptions</b>. Farms are <b>incentivised to bear the costs of more detailed MRV</b>, as this would enable them to apply more accurate (and less conservative emissions factors), which would result in higher estimated climate impact (and accompanying payment). This also lowers overall cost, as farms that do not want to do detailed MRV can apply low-cost, simpler option. e.g. <b>MoorFutures</b> applies the GEST method, which uses observable proxies (e.g. plant community) to estimate GHG fluxes.</li> <li>&gt; Record keeping requirements and MRV timelines should be <b>aligned with those for CAP</b>, to minimise additional costs.</li> <li>&gt; <b>Technological developments</b> could also offer a solution in the future. For example, remote sensing may offer potential for relatively low cost MRV.</li> </ul> | <ul style="list-style-type: none"> <li>&gt; Given specific context of the scheme, how much MRV is necessary to have adequate certainty and scheme integrity at acceptable cost?</li> <li>&gt; How can MRV best be aligned with CAP to decrease costs?</li> <li>&gt; What technological developments are likely and how can these be used to achieve low-cost reliable MRV?</li> </ul> |

| Barrier                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Open questions                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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| <p>It is challenging to identify the <b>optimal regularity of MRV</b>. This is important as MRV is costly and time consuming for regulators and farmers, so raises cost of scheme and decreases uptake.</p> <p>At the same time, the impact of climate actions can depend on their timing (e.g. wintering off of animals on concrete pads has larger impact in rainy months), so MRV is important for ensuring the integrity of the scheme.</p>                               | <ul style="list-style-type: none"> <li>&gt; Where climate impact depends significantly on timing, <b>schemes can require farms to regularly record data</b>, but only require them to report occasionally (e.g. every 5 years), unless audited.</li> <li>&gt; Where climate impact depends less on short-term timescales (e.g. afforestation, peatlands), only require MRV every 5-10 years e.g. MoorFutures.</li> <li>&gt; Some projects have <b>multiple ambition levels</b> with corresponding levels of detail, reporting requirements, and accuracy e.g. NZ ETS, Woodland Carbon Code.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li>&gt; How time-dependent is the impact of the climate action?</li> </ul>                                                                                                                                                                                                                                                                                                                                                         |
| <b>Monitoring, Reporting, and Verification: Barriers for achieving the goal of carbon sequestration &amp; avoided emissions</b>                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <p><b>Monitoring soil carbon is costly and/or uncertain.</b> This is a problem as many climate actions can affect soil carbon stores (including actions incentivised in agro-forestry or whole-farm schemes). Failing to account for soil carbon impacts can undermine or understate actual climate impact of climate actions.</p> <p>This is a barrier as this entails either high-cost soil carbon monitoring or potentially high uncertainty of actual climate impact.</p> | <ul style="list-style-type: none"> <li>&gt; Some farm carbon audit tools include soil carbon impact in their calculation, without requiring soil samples or additional monitoring. For example, the CARBON AGRI scheme uses the CAP2'er tool, which models soil carbon effects. However, these estimates may be uncertain/low accuracy.</li> <li>&gt; A simple but potentially unrealistic assumption is to assume net zero impact on soil carbon.</li> <li>&gt; <b>Simplified methods</b> that estimate soil carbon based on easily observed characteristics can also lower costs. For example, the MoorFutures project applies the GEST (Greenhouse Gas Emission Site Type) method, which provides a global warming potential value for different land types and soil moisture class and depth (see Joosten et al 2015), accompanied by reporting on land use and management. This method applies conservative estimates of GHG reductions.</li> <li>&gt; <b>Technological developments</b> could also offer a solution in the future. For example, infrared technology offers potential and Germany's recently completed Soil Condition Survey demonstrates the potential to use such a survey for monitoring</li> </ul> | <ul style="list-style-type: none"> <li>&gt; How significant are soil carbon changes likely to be, and therefore to what extent should they be monitored?</li> <li>&gt; How accurate are carbon farm tools or other methods at capturing soil carbon?</li> <li>&gt; How to increase robustness for monitoring changes in SOC? What technological developments are likely and what impact will they have on costs and reliability of soil carbon measurement?</li> </ul> |

| Barrier                                                                                                                                                                                                                                                                                                 | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Open questions                                                                                                                                                                              |
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|                                                                                                                                                                                                                                                                                                         | (the survey captures all agricultural land in an 8km raster, with sampling up to 1m depth and satellite imagery used).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                             |
| <p><b>Verifying that climate actions have taken place</b> and that the climate impacts are rewarded is important to protect the integrity of the scheme.</p> <p>However, this can be expensive for the regulator and/or introduce additional transaction costs for participants, decreasing uptake.</p> | <ul style="list-style-type: none"> <li>&gt; Despite costs, many schemes nevertheless require <b>ex-post third party verification</b>. E.g. California CCOP only pays out credits once an independent verifier has visited the forestry site.</li> <li>&gt; To decrease costs of verification, schemes can only require third-party verification if a participant is <b>randomly selected for auditing</b>, combined with large fines if found to be cheating. This threat of auditing and fines can incentivise honest reporting. e.g. NZ ETS.</li> <li>&gt; OR Along with random auditing, <b>third party verification can be mandatory for "high risk" participants</b> i.e. those considered likely to file false returns. For example, this could include first-time participants or large participants. For example, in NZ ETS-forestry, MRV requirements are differentiated between large and small forests.</li> </ul> | <ul style="list-style-type: none"> <li>&gt; What level of auditing and fines is necessary to incentivise compliance?</li> <li>&gt; How do you define high/low risk participants?</li> </ul> |

#### 4.2.5 Reward mechanism

Reward mechanism refers to the scheme's structure for paying participants for achieving results. This includes whether participants are rewarded with direct payments or credits, how prices are determined, and the timing of payments.

Chapter 3's review found that there was significant variation in the prices participants receive across different existing schemes. This depends in part on whether the scheme is voluntary or compliance-based and whether prices are determined in an open market, negotiated, or fixed. Given that prices are the key incentive for participants, scheme designers need to select reward settings and foster credit demand that promote higher prices, so as to incentivise uptake and overall scheme success. Chapter 3 illustrated that price premiums can be achieved if schemes also deliver broader socio-economic and environmental benefits. In addition to whether a market or non-market mechanism is applied, the timing and certainty of payments is important for participants, who may face significant up-front costs and thus be averse to uncertain rewards or ex post payments. Accordingly, chapter 3 recommends considering up-front payment of a significant portion of expected returns.

Here, we separate our analysis of barriers and solutions related to rewards mechanisms according to three types of schemes: barriers faced in market schemes, barriers faced in non-market schemes, and barriers faced in both.<sup>32</sup> Key messages are:

- > Relative to **non-market schemes, market schemes** shift uncertainty from managing authorities to participants, which is a barrier to uptake. A second significant barrier is their higher complexity, both for participants and managing authorities. Despite this, they are attractive due to their ability to crowd-in private finance. To counteract the downsides of non-market schemes, training and outreach are important, as well as the use of external registries and allowing third parties to negotiate between participants and the market.
- > Regardless of whether a scheme reward participant using market or non-market mechanisms, existing schemes can **mitigate the downsides of either mechanism**. For example, schemes can reduce reward uncertainty for participants in market schemes by setting price floors and ceilings, as in the NZ ETS, or allowing direct negotiation of prices to cover costs in MoorFutures. In non-market schemes, reverse auctions can mitigate the barrier to regulating authorities of sourcing adequate funding.
- > Regardless of whether the scheme has a market or non-market reward mechanism, the issue of **timing** remains a barrier. An ex-ante payment scheme benefits participant and is likely to increase uptake, as upfront payments decrease payment uncertainty and circumvents the barrier posed by upfront costs. However, this increases risk for the managing authority or

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<sup>32</sup>In market schemes, participants receive credits for reductions which must then be traded for payment; in non-market schemes, participants receive a direct payment

credit buyer, due to decreased permanence incentives and a shift of uncertainty away from the participant. The reverse is true for ex-post payments. Existing schemes (e.g. SPAR/WWF) found reward uncertainty was a significant barrier to participant uptake.

| Barrier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Open questions                                                                                                                                                                                         |
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| <b>General reward mechanism barriers (i.e. barrier for both market and non-market reward schemes)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                        |
| <p><b>Timing of rewards:</b> If payments are made ex ante, based on expected climate impacts, this can increase uncertainty of actual climate impacts and decrease permanence incentives.</p> <p>If payments are only made ex post, once impacts can be verified, then this can cause cash flow problems for participants, who may therefore not have enough money to pay for up-front investment costs. Furthermore, ex post payments depending on results come with risks for farmers.</p> <p>This is a problem since it lower farmers' uptake of voluntary schemes if cash flow problems are conceived as problematic or too uncertain (as seen in SPAR/WWF Healthy Soils for Healthy Food project).</p> | <ul style="list-style-type: none"> <li>&gt; <b>Ex-post payments may be more appropriate for options where the immediate benefits for farmers are more visible</b> (e.g. in the case of resource efficiency gains) rather than where the up-front costs are very high. Ensuring sufficient farm advisory support to motivate uptake will help.</li> <li>&gt; A <b>hybrid scheme</b> might address the problem, where the farmer receives some payment up front to cover the costs of gathering new information/training and the cost of set-up cost, and then the rest of the reward is result-based.</li> <li>&gt; <b>When the costs of implementation will be offset within 7 years, link payments with CAP payments.</b> Payments linked to annual application and payment of subsidy. This would be calculated based on the sequestration in that given year, based on assumptions in initial project plan, and then any adjustments that arise following MRV. If participant was overpaid (i.e. MRV shows sequestration is lower than expected in project plan), then later CAP payments will be decreased until overpayment equalised (and vice versa if underpaid).</li> <li>&gt; The SPAR/WWF Healthy Soils for Healthy Food <b>project switched from ex post rewards-based payments to an ex ante activity-based payment.</b> This shifts the risk from the farmers to the administrators of the project, who can then monitor the performance of the scheme to ensure that overall payments are in line with results.</li> </ul> | <p>What options are available to ensure that timing of payments both contribute to robustness of the scheme (credibility of emission reductions / sequestration) and does not limit participation?</p> |

| Barrier                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Open questions                                                                                                                                                                                                                   |
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| <b>Specific barriers for market (credit) schemes<sup>33</sup></b>                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                  |
| <p><b>Barriers for farmers arising in market-based schemes:</b> Market-based rewards can pose challenges for <i>farmers</i>, including:</p> <ul style="list-style-type: none"> <li>• Uncertain rewards (due to fluctuating market prices for credits)</li> <li>• Additional complexity (due to the requirement for farmers to interact with buyers or markets)</li> </ul> <p>This is a problem for schemes as these transaction costs can decrease farmer uptake.</p> | <p><i>If advantages of market schemes do not outweigh disadvantages, non-market schemes may be more appropriate (see non-market scheme discussion below).</i></p> <ul style="list-style-type: none"> <li>&gt; Market-schemes can be designed to decrease reward uncertainty for farmers. Potential solutions include: <ul style="list-style-type: none"> <li>a) Set <b>price ceilings or floors</b> to manage market. For example, the <b>NZ ETS</b> will set a price floor going forward in the same way that it already has set a price ceiling of \$25. This reduces participant uncertainty.</li> <li>b) Rather than selling credits at a market rate, the scheme could allow projects to <b>sell credits at a pre-defined price</b>. This price may be set according to the farmer's income needs. For example, in MoorFutures, each project sets its own credit price to ensure they cover the costs of reductions, meaning the only uncertainty is whether they will find a buyer for the credits (rather than whether the open market price will cover costs).</li> </ul> </li> <li>&gt; To solve complexity, <b>farmers should be supported with training, advisers, and middlemen</b>. Training and stakeholder support groups can also be useful to initiate farmers into the scheme. Third party middlemen can play similar roles, simplifying market schemes for farmers by coordinating purchases from them. In the Australian ERF, middlemen and advisors were identified as important success factors.</li> </ul> | <ul style="list-style-type: none"> <li>&gt; Should market management be centralised (e.g. by EU or through EU guidance/ settings)?</li> <li>&gt; What role should EU/administrator/regulator play in managing prices?</li> </ul> |

<sup>33</sup> Defined as schemes where rewards are determined by the market rather than set by regulator/administrator e.g. credits or offset markets)

| Barrier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Open questions                                                                                                                                                                   |
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| <p><b>Barriers for regulators/ administrators arising in market-based schemes:</b> Market-based rewards can pose challenges for regulators/administrators, including:</p> <ul style="list-style-type: none"> <li>• High complexity (due to their novelty and the different rewards structure to traditional regulatory management)</li> </ul> <p>This is a problem as it increases costs.</p> <p>In addition, regulators face barriers related to:</p> <ul style="list-style-type: none"> <li>• uncertainty over credit ownership, e.g. due to a lack of reliable and robust registry (which can decrease demand for credits)</li> <li>• A lack of external demand for credits.</li> </ul> <p>A lack of demand for credits undermines market rewards, as prices will be lower, which decreases incentives for farmers to act.</p> | <p><i>If advantages of market schemes do not outweigh disadvantages, non-market schemes may be more appropriate to meet farmers' needs (see non-market scheme discussion below)</i></p> <ul style="list-style-type: none"> <li>&gt; To <b>solve the problem of complexity</b>, regulators/administrators should look to existing examples and case studies, as well as guidance. Budget should be set aside for staff training.</li> <li>&gt; To tackle the problem of <b>uncertainty over credit ownership</b>, schemes can <b>use an external carbon credit registry</b> to monitor ownership and trades, such as is done by <b>Woodland Carbon Code</b>, who use the Markit Environmental Registry system.</li> <li>&gt; <b>Credit demand</b> is increasing with trust in the integrity of the scheme, i.e. buyer belief that the scheme is delivering additional and permanent climate impacts. This in turn depends on all of the other design elements discussed in this table.</li> <li>&gt; <b>Local community links and outreach can also support credit demand.</b> For example, MoorFutures has been successful in selling peat rewetting credits at relatively high prices (&gt;€40t) to regional businesses. In part, this is due to co-benefits, as well as community links. Woodland Carbon Code also fosters buyer-to-seller relationships (rather than anonymous, fungible credits).</li> </ul> | <ul style="list-style-type: none"> <li>&gt; What elements are necessary for carbon credit registry creation? What tools and existing examples can act as inspiration?</li> </ul> |
| <p><b>Barriers for external participants arising in market-based schemes (e.g. buyers of credits):</b> Some participants or marketplaces for credits see credit <b>price information as sensitive</b>, and do not want to make this public.</p> <p>This could be a problem for schemes, as generally, clear information on prices supports efficient operation of markets, encouraging new participants to buy/or sell credits, and decreasing transaction</p>                                                                                                                                                                                                                                                                                                                                                                    | <ul style="list-style-type: none"> <li>&gt; Some marketplaces do <b>not make price information or exact number of credits sold public</b>, e.g. <b>PURO</b>.</li> <li>&gt; Some schemes make credit prices and volumes fully visible, e.g. <b>Woodland Carbon Code</b>. This <b>transparency supports integrity</b> of the project, as well as full information for the market, but may be a barrier to buyers who would prefer to remain anonymous.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>&gt; For market-based schemes, should full information be revealed or will this limit participation?</li> </ul>                           |

| Barrier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Open questions                                                                                             |
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| costs. At the same time, full disclosure may dissuade sellers or buyers from participating.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                            |
| <b>Specific barriers for non-market schemes<sup>34</sup></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                            |
| <p><b>Barriers for regulators/ administrators arising in non-market schemes:</b></p> <p>The key challenge posed by non-market schemes for regulators/administrators is <b>securing long-term, reliable funding</b> for ongoing rewards for farmers (i.e. non-market schemes are defined by farmers receiving set rewards for climate impacts from regulator/administrators; given long-run nature of e.g. peat, afforestation impacts, long-term funding is important).</p> <p>This is a problem as public budgets are limited and this expense could be significant.</p> <p>A related challenge is that if carbon farming <b>scheme payments are to be funded by CAP, the seven-year CAP funding cycle is a barrier</b> to regulators/administrators credibly committing to long-run payments necessary to induce long-term mitigation/ sequestration (e.g. afforestation, soil carbon, significant investments with long payoffs). This is a problem, as the uncertainty may reduce uptake.</p> | <p><i>If advantages of non-market schemes do not outweigh disadvantages, market schemes may be more appropriate to meet farmers' needs (see market scheme discussion above)</i></p> <ul style="list-style-type: none"> <li>&gt; Even where the participant receives a set payment, the <b>regulator can still sell or auction off the reductions as offsets</b>. In this way, the regulator/administrator would act as a middleman. They would pay a set rate for the reductions and could then sell these as validated offsets to private individuals/organisations, who want to offset their emissions.</li> <li>&gt; The regulator (or other central third party) could hold a <b>reverse auction to purchase GHG</b> sequestration/reductions at the lowest price. Only approved projects would be able to participate (i.e. projects that have already created an approved ex ante project plan). They would then offer "bids" to the regulator, which would detail how many GHG fluxes would be reduced (in t CO<sub>2</sub>-e) and at what price. The regulator would then close contracts with the lowest price offers up to a set budget or set amount of GHG flux reductions. E.g. Australian ERF.</li> <li>&gt; If the government considers their whole budget (or whole climate budget), then the <b>benefit/cost ratio</b> of paying for agricultural GHG reductions may be high. i.e. relative to other sources of climate impact, agricultural offsets can be quite cheap.</li> <li>&gt; <b>To circumvent CAP 7-year cycle, for implementation will be offset within 7 years, link payments with CAP payments.</b> Payments linked to annual application and payment of subsidy. This would be calculated based on the sequestration in that given year, based on assumptions in initial project plan, and then any adjustments</li> </ul> | <ul style="list-style-type: none"> <li>&gt; Where can this funding be sourced e.g. through CAP?</li> </ul> |

<sup>34</sup> Defined as schemes where the farmer receives a set reward (e.g. €x per t CO<sub>2</sub>-e avoided).

| Barrier | Solution                                                                                                                                                                                                                                                                                                                                                                                                            | Open questions |
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|         | that arise following MRV. If participant was overpaid (i.e. MRV shows sequestration is lower than expected in project plan), then later CAP payments will be decreased until overpayment equalised (and vice versa if underpaid). Alternatively, a mix of CAP and alternative funding could be used (e.g. CAP payments could cover up-front costs, while other funding sources could guarantee long-term payments). |                |

#### 4.2.6 Permanence, risk and flexibility mechanisms

Permanence refers to how schemes manage the risk of carbon reversal, i.e. reversals of GHG sequestration or storage in forest or soils which were incentivised (and rewarded) by the scheme.

Chapter 3 identified that schemes focused on removals are potentially reversible, as carbon contained in forests and soils is vulnerable to human action or natural disturbances. Different schemes manage this risk differently and to differing degrees. Many schemes require participants to sign long-term contracts. Most schemes use risk buffer accounts, where a portion of expected GHG reductions are retained to cover non-permanence risk. Chapter 3 also identified that permanence risks are closely related to the reward mechanism, with permanence being an attribute important to support credit demand, and in the other direction, reward structure setting incentives for permanence.

Our analysis of barriers faced by existing schemes related to permanence, risk, and flexibility mechanisms identified three key barriers, and twelve implemented solutions. Key messages:

- > Non-permanence risk arises in two ways: 1) due to unintentional reversal of GHG reductions (i.e. outside of the participants' control) and 2) participants' negligence or intentional action (i.e. within the participants' control). These risks should be managed differently. Both risks must be managed to ensure environmental integrity of the scheme.
- > Existing schemes manage permanence risk related to unintentional reversals using carbon credit reserves/buffers. These can be set up to simply withhold a set percentage of expected GHG reductions. They can also be set up to incentivise less risky/more certain reductions by setting different retention percentages for different types of reductions or participants or requiring additional buffers to cover specific risks (e.g. peat fire).
- > To manage permanence risk arising due to participant negligence/intentional action, schemes rely on contractual obligations and participant buy-in. The Woodland Carbon Code scheme requires participants to make up or buy credits in the case of intentional reversal. Other schemes use long-term contracts, and rely on contract law, to incentivise ongoing adherence with scheme requirements. Long-term project planning and actions that support ongoing participant buy-in also reduce these non-permanence risks.

| Barrier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Open questions                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| <b>Permanence, risk and flexibility mechanisms: Barriers to farmer uptake and achieving the goal of carbon sequestration &amp; avoided emissions</b>                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <p><b>Carbon storage reversal/annulment can occur due to unintentional reversal that is outside of the participant's control</b> (e.g. fire, drought, disease).</p> <p>This is a particular challenge to carbon storage/sequestration e.g. soil carbon, carbon stored in woody matter through afforestation (as opposed to avoided emissions).</p> <p>This is a problem for schemes as it would undo the climate impact of the scheme. This can also affect uptake, as participants would be less likely to participate if they might be punished for actions outside their control.</p> | <ul style="list-style-type: none"> <li>&gt; Develop a “<b>carbon credit reserve</b>” or a ‘<b>buffer</b>’ to account against unintentional reversal. Farmers are only paid for a proportion of the carbon sequestered, with a portion put aside as a buffer. This buffer ensures that, even in the case of a reversal (or uncertain MRV), the amount of reductions that farmers receive payment for is achieved. There are multiple ways to implement a buffer:</li> <li>&gt; a) - A <b>general % of expected credits can be retained as a buffer</b>. E.g. the Australian CFI retains 5% of generated carbon credits as a buffer, just to cover general uncertainty and/or unintentional reversals. Another example is given by the <b>Woodland Carbon Code</b>, a set level (20%) of the expected carbon sequestration is put aside into a buffer account in the form of credits (each covering 1 t CO<sub>2</sub>). If monitoring shows that a farmer's sequestration is below the level expected under the plan, buffer credits equivalent to the loss are put on hold, and a plan is made with the farmer to recover these within a reasonable period of time (e.g. 10-20 years). If at the next evaluation their sequestration is still below the expected level, these credits would be cancelled, if not, they would be released back to the buffer. If the relative loss was avoidable, the farmer would be obliged to restock the buffer account fully at their own cost. If the relative loss was unavoidable, they would only have to pay for any losses beyond what would be covered by their pre-existing buffer (note this is dependent on using credits rather than payments). The buffer account is administered by the regulator. If payments of money rather than credits were used, the buffer account described in (a) could still be applied. Payment equivalent to 20% of the expected sequestration could be retained from farmers in the form</li> </ul> | <ul style="list-style-type: none"> <li>&gt; What legal structure would enable penalties for unintentional reversals?</li> <li>&gt; How can this be implemented without increasing transaction costs so much that participants do not want to participate? Also, what % buffer is appropriate?</li> <li>&gt; Given complexity of estimating non-permanence risk, how can insurance be implemented at reasonable cost?</li> </ul> |

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|  | <p>of buffer “credits”. These could then be managed equivalent to (a), with the alteration that farmers would have to pay the set price that they received to restock credits.</p> <ul style="list-style-type: none"> <li>&gt; b) - The MoorFutures project <b>has an implicit buffer</b>, which it achieves by developing multiple scenarios, and only rewarding the climate impacts calculated using more conservative assumptions. This difference between the rewards a farmer would receive under the conservative assumptions and what they would receive under more conservative assumptions forms an implicit buffer. This implicit buffer will grow the more uncertain or risky the project (where the gap between a conservative and non-conservative scenario will be greater).</li> <li>&gt; C) a) <b>‘A specific risk buffer’</b>: A set percentage of the expected GHG impact (and payment/credits) is set aside as a buffer to cover specific risks e.g. those posed by peat fires, such as in VCS peat rewetting projects. This adds an additional and conservative buffer to cover this specific independent risk. In California CCOP, <b>risk factors are calculated for each project</b> (farm) based on management, financial, social, and natural disturbance risks. According to Ruseva et al., (2017), risk factors, i.e. the allocation to the buffer account ranged from 10.5% to 21.2%.</li> <li>&gt; Instead of a buffer account, risk of reversal can also be addressed using <b>insurance</b>. Here, rather than the payment for soil carbon being reduced, farmers are held liable for any decrease in carbon storage and are obliged to take out insurance against it. This can empower farmers to act to reduce risk, as they would face lower premiums.</li> <li>&gt; <b>Schemes could reward long-term carbon storage separately from short-term avoided carbon</b>. Carbon storage payments could occur after longer time periods, to ensure permanence e.g. California CCOP, CDM, JI, all only pay after climate gains have been realised (for California, 25-30 years after trees have been planted).</li> </ul> |  |
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| <p><b>Carbon storage reversal/annulment can occur due to participant negligence or intentional action i.e. within participant control.</b></p> <p>This is a particular challenge to carbon storage/sequestration e.g. soil carbon, carbon stored in woody matter through afforestation (as opposed to avoided emissions).</p> <p>This is a problem for schemes, as participants may have incentives to reverse carbon storage or lack incentives to reduce this risk, which would undermine integrity of these schemes and undo the carbon gains.</p> | <ul style="list-style-type: none"> <li>&gt; <b>Make farmers liable for any decreases in carbon storage</b> i.e. they are required to pay for the decrease in carbon storage at the same rate that they received payment (e.g. NZ ETS- forestry). MRV is key here: as well as identifying total reversal, MRV needs to be sensitive enough to identify when sequestration is lower than expected due to poor management.</li> <li>&gt; The <b>project planning process</b> (and its administrative and legal requirements) forms a safeguard against the risk of reversal. In MoorFutures and California CCOP, participants are required to make a plan that covers at least 30-100 years (depending on the project specifics), and <b>contractually commit to this long-term plan</b> to qualify for credits. These plans can include commitments to managing soil and ensuring that forests are managed in a long-term manner. For example, the NZ PFSI has 100-year contracts.</li> <li>&gt; <b>Schemes could reward long-term carbon storage separately from short-term avoided carbon.</b> Carbon storage payments could occur after longer time periods, to ensure permanence e.g. California CCOP, CDM, JI, all only pay after climate gains have been realised (for California, 25-30 years after trees have been planted).</li> <li>&gt; To protect against reversal, <b>project land can be purchased by a new owner without commercial ambitions</b>, who is committed to the GHG (and ESS) protection goals e.g. public entity or NGO. The funds for the purchase can be raised through the expected GHG credits that the project will earn. Permanence can then be protected through covenants on the land (e.g. NZ PFSI) or other changes to the ownership structure that limit the risk that management alterations are reversed.</li> <li>&gt; <b>Participant buy-in</b> is central to protect permanence. In the WWF/SPAR project they highlight the economic efficiency gains associated with climate actions to the participant farmers, and also use the scheme as a way to build understanding and community around climate friendly agriculture (as in the WWF/SPAR project), both as a way to lift buy-in.</li> </ul> | <ul style="list-style-type: none"> <li>&gt; What legal structure would enable penalties for intentional reversals within voluntary schemes?</li> <li>&gt; How can this permanence be protected without increasing transaction costs so much that participants do not want to participate?</li> </ul> |
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| <p><b>Changes in project methodology and how GHG fluxes are calculated</b> could result in changes to estimated climate impact of projects over time (i.e. at regular reassessments), changing the estimated GHG impact and (potentially) the credits or payment received.</p> <p>This is a problem for schemes, as current schemes are being designed with considerable uncertainties in methods, tools, etc. As understanding increases over time, schemes should adjust - but this can be challenging to plan for fairly. Given current uncertainties, there is also the risk of maladaptation.</p> | <p>&gt; <b>Short-term projects lifetimes</b> allow for regular updating of methodologies etc. e.g. CARBON Agri contracts are for 5 years, which are then renewable. A potential downside is a lack of incentives for permanence.</p> | <p>&gt; How can permanence be ensured with short contracts?</p> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|

## 4.2.7 Scheme-specific barriers and potential solutions

In addition to the general barriers and solutions identified in previous sections 4.2.1 - 4.2.6, our analysis also identified barriers and solutions that are scheme-specific, i.e. they arise due to specific attributes of the scheme type. We identified significant scheme-specific barriers and solutions related to two of the scheme types we identified as part of our research, Scheme 1 - Livestock carbon audit tool scheme and Scheme 2 - Peatland rewetting scheme.

| Barrier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Scheme-specific barriers and solutions: Scheme 1 – Livestock Carbon Audit Tool Scheme</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <p><b>MRV:</b> Running farm carbon audit tools can be complicated and beyond the ability of some farmers. This is a problem, as the whole farm audit scheme depends on these tools for calculation of carbon emissions. Farmers can also use these tools to model different management options, which can identify new ways of managing the farm at lower emissions; if they lack these skills, they cannot use the tools to identify optimal management.</p> <p>&gt; A contradictory challenge also exists there is also the risk that farmers can "game" the carbon audit tool by varying inputs to maximise expected reductions in ways that are unrealistic. This is a problem as the actual emissions reductions would be less than the "gamed" tool suggests.</p> | <p>&gt; Farmers are supported by farm consultants to run the farm carbon audit tool. For example, in the CARBON AGRI scheme, farmers receive farm consultant support to gather and analyse baseline data, and to evaluate ex post evaluation of the climate impact. In this way, the farmer is trained. Accuracy is ensuring by the certified consultant, who supervises and certifies application of the farm carbon audit tool.</p> <p>&gt; Alternatively, farmers apply the farm carbon audit tools themselves. The farmer's resulting carbon action plan could then be checked by a professional consultant/local regulator to ensure that it looks reasonable. As long as it looks reasonable, the farmer self-regulates (with recording requirements and threat of audit). If it is looks unreasonable, a certified consultant is required to support.</p> |
| <b>Scheme-specific barriers and solutions: Scheme 2 – Peatland rewetting</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <p><b>Coverage and eligibility:</b> Additionality for peat rewetting can be undermined through ecological leakage, when the rewetting has a negative ecological effect on neighbouring ecosystems that are hydrologically linked, decreasing storage on another area outside the project area.</p> <p>&gt; A related challenge is that the climate impact of a peat rewetting project can be undermined by actions outside the project area, e.g. excess water abstraction on neighbouring lands reducing project rewetting.</p>                                                                                                                                                                                                                                        | <p>&gt; Ecological leakage can be controlled for in the same way as market leakage i.e. this can be considered during project design and any leakage deducted from expected impact and reward. MoorFutures includes this type of leakage calculation in scheme design.</p> <p>&gt; Alternatively, add a buffer area around project area, i.e. exclude this buffer area when calculating expected change in GHG fluxes. This will decrease GHG payments and may also decrease ecological leakage, if peat rewetting is limited to inside the buffer area.</p>                                                                                                                                                                                                                                                                                                     |

| Barrier                                                                                                                                                                                                                                                                                                                                                      | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>&gt; Risk management measures can also be applied to manage the risk that actions on neighbouring areas affect project climate impact, i.e. implicit or explicit reserves can also consider these impacts.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <ul style="list-style-type: none"> <li>&gt; <b>Coverage and eligibility:</b> A potential barrier is identifying peatland. Without knowing what land is peat, it is unclear what areas to declare eligible for the scheme.</li> </ul>                                                                                                                         | <ul style="list-style-type: none"> <li>&gt; For regionally focussed schemes, mapping can occur before schemes are approved. For the MoorFutures project, they mapped regional soils, identifying peat soil, transitional peat bogs, and the depth of peat soils.</li> <li>&gt; Full peatland maps may not be necessary: instead, prospective projects can have soil sampled to identify pre-intervention peat depth. Only land meeting a minimum peat depth would be eligible to participate.</li> <li>&gt; At a national level, Germany's recently completed Soil Condition Survey (10 year project) demonstrates the potential of linking satellite images with sampling. The survey has taken 1m depth soil samples of all agricultural land at a raster of 8km plus satellite pictures (3104 sample points).</li> </ul> |
| <ul style="list-style-type: none"> <li>&gt; <b>Reward:</b> CAP payments offer conflicting incentives to rewetting peatland. Under current regulations, farmers who rewet peatland will miss out on a €300/ha/yr CAP payment. This is a problem for farmers, as their net payment for rewetting peatland is lower, lowering incentives and uptake.</li> </ul> | <ul style="list-style-type: none"> <li>&gt; Payments need to be high enough to offset this loss of income. In the MoorFutures scheme, participants sell credits at a price that will cover their costs, including lost income.</li> <li>&gt; Paludiculture (i.e. wet agriculture/forestry) offers potential productive use of wetlands, increasing farmer incomes after rewetting (and thus increasing incentives to rewet) (Wetland Energy Project, 2015). Paludiculture is not subsidised by CAP.</li> </ul>                                                                                                                                                                                                                                                                                                              |

## 4.3 Case study selection and introduction

Our analysis of barriers and solutions earlier in this chapter acts as a bridge between the higher level analysis in chapter 3, which summarises existing international experience with result-based carbon farming schemes worldwide and in Europe, with the more practical, on-the-ground focus of Task 3's case studies. This section introduces each of the five case studies. It also explains why case studies were selected, including their significance concerning European agriculture and their potential in terms of climate impact. Building on the open questions identified in the barriers and solutions analysis, this section identifies the key issues to be addressed in each case study.

### 4.3.1. Selection of case studies

The aim in case study selection was to identify potential scheme types that 1) deliver significant and efficient climate impact, and 2) could be up-scaled (scalability). Under these overarching criteria, we considered the following aspects:

- 1 Deliver significant and efficient climate impact
  - > **Significant climate impact:** each scheme exhibits potential in terms of the total impact on GHG emissions or sequestration. This depends on both the scale of current emissions that would be addressed by the scheme, and the scheme ability to significantly decrease emissions if a scheme is implemented.
  - > **Cost-effective:** each scheme exhibits good "value for money" in terms of the expected cost of GHG reductions.
  - > **Socially and environmentally efficient:** each scheme incentivises climate actions that have the potential to deliver environmental co-benefits.
  - > **Broad coverage:** collectively, the five case studies exhibit potential to be widely applied across the different bio-geographic and socio-economic contexts across Europe.
- 2 Scalability
  - > **Swift progress would be possible:** the schemes exhibit potential to be quickly progressed, either through implementation of a scheme at the regional scale, or in stepwise approach by developing pilot schemes or projects to identify solutions to significant barriers. Here, wherever possible, we focussed on existing scheme-types.
  - > **Responsive to result-based schemes:** result-based schemes depend on MRV to measure the impact of climate actions. Accordingly,

the selected schemes have potential MRV options that could be implemented within a carbon farming scheme.

Based on these criteria and supported by research into existing international and EU result-based carbon farming schemes, we selected five case studies. Table 4-5 below summarises the evidence concerning these principles for each case study. These proposed case studies were presented at the 'Carbon Farming Schemes in Europe' Roundtable on October 9th, 2019 (see description of the workshop and its results in Appendix G). One of the key outcomes of the roundtable was an overall agreement that the discussed case study options cover the main opportunities for carbon farming within the European context.

*Table 4-5. Case study selection rationale.*

| Case study           | Criterion 1: Potential to deliver significant and efficient climate impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Criterion 2: Scalability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
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| Livestock farm audit | In 2015, the agricultural sector was responsible for approximately 10% of Europe's GHG emissions (excluding LULUCF). Of this 10%, enteric fermentation accounts for 42% and manure management for 15 % (with the majority of the remainder related to agricultural soils) (Fernandez et al. 2015). Numerous climate actions have been identified that can reduce agricultural GHG emissions through on-farm management, including herd management and feeding, animal waste management, crop management, consumption of fertiliser and energy, and carbon storage actions, among others. Potential for decreased emissions is demonstrated by Ferme laitière bas carbone project (aims to reduce carbon footprint of French dairy farms by 20% (2015-2025)) and LIFE Beef Carbon (projected GHG footprint decrease of 7-16% in French, Spanish, Irish, Italian Beef farms). This builds on existing decreases: from 1990-2012 agricultural GHG emissions fell by 23% (Eurostat, 2018). | Existing livestock farm audit projects and schemes demonstrate the potential scalability of this type of scheme. Within the EU, the French CARBON AGRI methodology has been approved, using the CAP2'ER farm carbon audit tool. With the help of consultants, farmers apply this tool to identify actions to avoid GHG emissions or increase carbon storage (relative to a baseline), which when implemented, are verified and can be sold as voluntary GHG reductions. Reductions are measured in terms of carbon intensity per unit of output. International examples also offer potential insights for upscaling. These are generally partial-farm (i.e. project-based) that reward farmers/projects who apply specific pre-approved methodologies e.g. the Australian Carbon Farming Initiative's Beef Cattle Herd Management methodology or numerous VCS projects. Projects and regulations managing agricultural nutrient pollution (e.g. New Zealand's Taupo Nutrient Trading Scheme, numerous USA examples) also offer models for monitoring and governing diffuse agricultural pollution. |
| Peatland rewetting   | Peat soils are rich repositories of carbon: while they cover only 3% of the world's surface, they hold 30% of the world's soil carbon, which is twice that stored in all of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Results-based peatland rewetting schemes already exist and show potential for upscaling. For example, within the EU, LIFE projects on peat rewetting in the UK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

|              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              | <p>the world's forests (IUCN, 2019). European peatlands have been steadily degraded through draining, erosion (often fuelled by unsustainable agriculture and forestry), and fuel extraction (Peters and van Unger, 2017). Peatland covers 5.8% of Europe (Tanneberg et al., 2017). Protection and restoration of peatlands is seen as potentially cost-effective climate change mitigation strategy.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <p>and Finland have progressed understanding and methodologies. The German MoorFutures project has been selling voluntary carbon credits from peat rewetting since 2010 (the five existing or completed projects have expected lifetime GHG flux reductions of 68889t/CO<sub>2</sub>-e). Landowners can register peatland rewetting projects (with a life of 30-100 years), and then rewarded in voluntary carbon credits equivalent to the project's expected impact on GHG fluxes (i.e. relative to a baseline without the project). An updated version of the methodology also quantifies water quality, flood protection, groundwater, biodiversity, and evaporative cooling co-benefits, which can be bundled with the voluntary carbon credits, potentially boosting prices that buyers are willing to pay. The MoorFutures methodology builds on existing voluntary international examples, such as VCS.</p> |
| Agroforestry | <p>Agroforestry is the practice of integrating woody vegetation (trees or shrubs) with crop and/or animal systems (e.g. hedgerows, grasslands with scattered trees, low intensity meadow orchards, etc.) Agroforestry can offer multiple benefits, including supporting biodiversity, increasing resilience to climate change and improving water resource management. It also offers significant potential as a carbon sink to mitigate climate change. Agroforestry offers significant potential impact within Europe. It is estimated that implementing agroforestry in the EU could "lead to a sequestration of 2.1 to 63.9 million t C a<sup>-1</sup> (7.78 and 234.85 million t CO<sub>2</sub>eq a<sup>-1</sup>) depending on the type of agroforestry. This corresponds to between 1.4 and 43.4% of European agricultural greenhouse gas (GHG) emissions" (Kay et al., 2019). The recent EU H2020 research project AgForward concluded that there is significant potential for expansion of agroforestry in Europe.</p> | <p>Existing results-based afforestation schemes already exist which offer opportunities for expansion. Within the EU, the Woodland Carbon Code offers a model of a voluntary offset scheme. Landowners can register afforestation projects that, after validation, then earn credits that can be sold to offsetting companies. To date, 266 projects covering 17,394ha have been registered, with expected carbon sequestration of 6.2million tCO<sub>2</sub>. International examples include voluntary schemes such as the California CARB Forest Offset scheme and New Zealand Permanent Forest Sink Initiative (PFSI), and the mandatory New Zealand Emissions Trading Scheme. Label bas Carbone has developed methodologies for afforestation, coppicing, and forest restoration. Similar approaches could also potentially be adapted to focus on agroforestry.</p>                                            |

|                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Soil carbon sequestration on mineral soils</p> | <p>The topsoil in Europe's agricultural land stores approximately 51 billion t CO<sub>2</sub>-e. This is equivalent to more than ten times the EU's annual GHG emissions. Changes in agricultural soil carbon will significantly affect the EU's ability to meet climate goals. Studies indicate potential for additional sequestration as well as the importance of maintaining current stocks (no tillage of grassland or land take). For example, a French study indicates technical potential for +1,9 ‰ of additional storage in France for all agricultural and forestry land at national scale, with the potential in arable land at 5.2 ‰, and 3.3% for agricultural land as a whole (Sylvain et al, 2019). This potential is theoretical, regionally and soil type specific and may vary significantly. The French study identifies additional storage in particular for arable land and temporary grasslands.</p> | <p>The existence of international and European schemes for soil carbon sequestration shows potential for upscaling. Our research also identifies that there is potential to make useful progress on barriers. In Europe, existing projects include the Healthy Soil for Healthy Food project in Austria, a cooperation between SPAR (a private supermarket chain), 59 farmers, and WWF Austria where farmers receive rewards for growing produce in a manner that increases soil carbon. In Finland, more than 100 farmers have been involved in the Carbon Action project, which aims to identify soil-carbon accumulating practices effective on all farms, with monitoring. The French 'Ferme Laitière Bas Carbone' project also promotes soil carbon on dairy farms. Internationally, the Australian Emissions Reduction Fund has developed a measurement-based soil carbon methodology, building in part on VCS project examples.</p> |
| <p>Grasslands</p>                                 | <p>Grasslands are a significant sink of carbon within Europe. The recent IPCC Land report identified that soil carbon sequestration and croplands (i.e. through reduced grassland conversion to cropland and improved grazing land management) offers a potential annual GHG mitigation opportunity of 0.4–8.6CO<sub>2</sub>-e (IPCC, 2019). In addition to climate impacts, sustainable grassland management can deliver significant co-benefits including biodiversity conservation, and improved soil productivity.</p>                                                                                                                                                                                                                                                                                                                                                                                                  | <p>Existing research projects and schemes offer evidence that grasslands schemes can be progressed and up-scaled. For example, the Terraprima, Medinet, and Avoin schemes offer useful examples for developing MRV and managing trade-offs. The Finnish Climate Action scheme and Portuguese Carbon Fund offer examples for enabling factors for developing schemes, and how to link grasslands into broader policy approaches to incentivise different types of carbon farming, including reward schemes. Grasslands schemes focussed on biodiversity outcomes are an additional inspiration.</p>                                                                                                                                                                                                                                                                                                                                         |

#### 4.3.1 Description of the case studies

Below we introduce the focus of the case studies and key challenges that will be examined. These will continue to develop as the case study work progresses.

### Livestock Farm audit

This case study will explore how result-based schemes can be designed using a whole farm audit approach to carbon farming, with a focus on livestock farms. The audit approach can include all climate actions that are captured by a farm audit tool. Current tools (such as the Carbon AGRI CAP2'ER, JRC Solagro, or CoolFarmTools) have well-developed methodologies for capturing avoided emissions arising from livestock farm management changes, including herd management and feeding, animal manure management, crop & grassland management, consumption of fertilisers and energy, among others. They can also include carbon storage through agroforestry and soil carbon, though these are less robust and adjustable to regional circumstances. As agroforestry and soil carbon elements are the focus of other case studies, this case study will focus on the livestock components of the methodology, whilst still highlighting key issues related to integrating carbon sequestration into the whole farm carbon audit approach. The overall aim of the case study is to develop an example of an implementable livestock scheme that a managing authority could pick up and build their own scheme upon.

Key challenges: 1) how reliably and robustly can farm audit tools cover the range of biophysical conditions and are applicable to farming systems with differing intensity levels (e.g. from intensive dairy and beef systems to more extensive systems sheep farming); 2) establishing cost-effective MRV across different geographies/contexts; 3) identifying "fair" baselines upon which to reward additional reductions; 4) establishing institutional and advisory support for the schemes.

### Peatland rewetting

The scheme incentivises peatland rewetting to decrease GHG emissions and increase carbon storage. The envisioned scheme is a voluntary project-based scheme (i.e. operates at project not farm unit scope). This incentivises the rewetting of peatland (and resulting retirement of managed land into non-intensive uses – see options below). In practice, this could include blocking drainage ditches or gullies (using peat, rocks, plastic dams or wooden dams), planting flood-resistant vegetation in ditches to slow water flow, blocking underground channels or peat pipes, building raised embankments or berms (elongated mounds of peat or rows of straw bales) to retain water, inserting dams (e.g. straw bales) below the peat surface to slow subsurface drainage, switching off drainage pumps, or restoring inflows, among other actions (Taylor et al. 2018). With support from consultants, project managers develop ex-ante project plans that dictate how the project area will be managed for a minimum of 30-100 years. The project plan includes forward-looking scenarios that cover the lifetime of the project: a baseline scenario (i.e. what would happen without the rewetting project, capturing expected baseline land use emissions) and a conservative project scenario (i.e. what would happen if the project was applied, making conservative assumptions). Expected lifetime GHG fluxes are calculated for each scenario, and project managers receive credits equivalent to the difference (i.e. for the expected result of the project). The project plan also establishes MRV, which is carried out into the future to ensure project plans are followed and expected GHG fluxes are achieved.

Key challenges: 1) long timescales (e.g. MoorFutures requires 30-100-year plans), 2) the challenge of ensuring permanence; 3) establishing cost-effective MRV across different geographies/contexts.

### Agroforestry

Agroforestry offers considerable carbon sequestration potential. Potential impactful climate actions include new agroforestry, preventing loss of farmland trees, management of existing woodlands, hedgerows, woody buffer strips and trees on agricultural land. These generate soil carbon and additional above-ground biomass as a carbon store and a potential resource – average sequestration rates (including above and below ground material) vary from 1 tonne C per ha per year to 4, with outlying figures around 6. The total depends on the context, age of stand, agroforestry system and woody species in question. Indeed, estimates of additional carbon sequestration vary depending system e.g. silvo-agriculture versus silvo-pastures systems and context i.e. species, cycle and harvesting regime. The most suitable, beneficial and acceptable system will depend on existing systems and the nature of farms (e.g. in Sweden riparian strips are much more likely to be accepted on more intensive farms than other forms of agro forestry) and markets for associated products. Alongside identifying appropriate MRV, reward mechanisms, and measures to ensure permanence, this case study will investigate targeting to identify the best systems for different farm types based on environmental and economic conditions, and how to manage transition.

Key challenges include: 1) long timescales; 2) relatedly, the challenge of ensuring permanence; 3) reward mechanisms that sufficiently cover participants' costs, given the relatively low potential climate impact (and reward) per ha.

### Soil Carbon Sequestration on mineral soils

The focus of a scheme for soil carbon sequestration would be on arable land (cropping systems), but the approach can also be applied to livestock and mixed farms that manage grasslands and to horticultural land. The overall potential, existing schemes and the attention given to SOC in climate discussions warrant a case study and exploration of the scheme option for upscaling in the EU. However, it is important to note that there are opposing views on whether result-based payments for SOC are desirable and a central question is how result-based payments can be designed as feasible carbon credit schemes and under what conditions in the EU. The case study will investigate the potential design a results-based scheme where farmers are paid for carbon sequestered in soil based on the measurement at the beginning of the commitment period (baseline measurement) and sampling/measurements following regular intervals. These intervals can be set as flexible intervals with a minimum, and then calculating the difference between pools at a given point in time. The approval of carbon sequestration credits depends on the implementation of at least one of the identified eligible soil management activities. Eligibility/non-eligibility is defined also in relation to different farming systems. The scheme design can build on the measurement-based soil carbon methodology under the Australian Emissions Reduction Fund. The payments can be made in intervals,

either as a fixed price payment per additional tonne of CO<sub>2</sub>/ha sequestered or in forms of carbon credits to be sold.

Key challenges include: 1) expense and uncertainty of measuring soil carbon (i.e. baseline and additionality); 2) difficulty of monitoring soil carbon; 3) reversibility of soil carbon gains (e.g. changes in management and/or changes in climatic conditions). In general, there are relatively high knowledge gaps relative to the other schemes.

### Grasslands

This case study will explore the potential and implementation design of result-based payment schemes for the delivery of climate benefits through grassland management, which can maintain and increase soil organic carbon (SOC) storage. This includes the ongoing management of existing grasslands and the replacement of annual cropland by grassland, and marginal arable lands, including sloping land or shallow soils, which are especially suitable for grassland restoration. Climate benefits differ depending on the soil type, previous land use and subsequent management practices (e.g. fertilizer input and grazing intensity). To ensure permanence, grasslands need to be maintained for a long period of time, typically for decades, with minimum disturbance (cultivation and re-seeding will release some of the carbon that has been sequestered).

Key challenges include: 1) expense and/or uncertainty of monitoring carbon sequestration; 2) permanence offers a particular challenge due to long scales; 3) co-benefits and trade-offs related to grassland restoration and maintenance.

## 5 Conclusions on EU implementation

**Result-based carbon farming** refers to schemes, mechanisms or policies where land managers interfere with carbon pools, flows and greenhouse gas (GHG) fluxes at farm-level with the purpose of minimising climate change, and are rewarded on the basis of the results that they deliver. This is seen as a means to more directly link the use of public funds (the payments) to the results that those funds are intended to deliver, increasing effectiveness and efficiency by offering farmers flexibility in how to achieve climate impact, and also opening the door to new funding streams for agricultural climate action.

This report reviewed and analysed existing international and EU result-based carbon farming schemes to make recommendations on how result-based carbon farming schemes can be designed to deliver effective and efficient climate impact in Europe. In addition to discussing policy context and institutional and governance issues, the report provides an overview and assessment of how different existing carbon farming schemes (and related projects and policies) have been designed and implemented. Result-based carbon farming schemes are constructed out of multiple design elements, including governance, coverage and flexibility, baseline and additionality, MRV, reward mechanism, transparency and evaluation, permanence and risk assessment and mitigation. To enable comparison across the different schemes and to support the design of effective schemes in the future, the report makes general conclusions related to each crosscutting design element in turn, as well as collating a set of tables that identify barriers to impactful and high uptake schemes, and potential solutions to overcome them. These barriers and solutions to implementing result-based carbon farming schemes in Europe were identified by investigating existing international and European carbon farming schemes, a roundtable with European experts, and further interviews and research.

We identify five key messages for mechanism designers and administrators seeking to support their uptake and upscaling:

### 5.1 Robust, effective MRV at acceptable costs

**MRV** refers to measuring, monitoring, reporting, and verifying the overall climate impact of farmer's climate actions. Result-based schemes depend on robust MRV: this is the foundation that enables farmers, regulators/administrators, and any external market participants to set baselines and confidently quantify climate impacts of individual actions (i.e. the "result" part of result-based schemes).

The most significant MRV challenge is cost: **MRV** costs reduce the net benefit of carbon farming schemes overall, and farmers bear them as transaction costs, reducing farmer uptake – and therefore the potential overall impact of the scheme. As MRV costs are correlated with the need for environmental certainty, a key solution to MRV cost is to **accept some degree of environmental uncertainty**. Different existing schemes balance this trade-off between MRV costs and environmental uncertainty differently: some estimate expected change

in emissions using observable proxies, while others require stringent on-site sampling – this trade-off must be balanced considering local objectives and context, including data availability and MRV options available. If the scheme aims to develop carbon credits or otherwise crowd-in external funding, the level of demonstrable environmental integrity must be high, potentially requiring stringent MRV and limiting this potential trade-off.

**Scientific developments and increased data collection should increase MRV accuracy and reduce MRV costs over time.** Farm carbon audit tools (e.g. CAP2Er, Cool Farm Tool, Solagro, FaST) use whole-farm input data to measure GHG impacts (and other indicators); the livestock case study will investigate under what conditions deliver robust GHG impact results. EU remote sensing data (e.g. Copernicus Sentinel data) and survey data (e.g. LUCAS data) can be used to monitor above ground carbon stocks, although there are currently several limitations in the available technology and capacities to monitor farm-level changes with respect to both carbon stocks and emissions, requiring farm-level data to be ground-truthed. Innovations such as remote infrared monitoring, which is being researched related to the Australian ERF, and new national datasets such as the German Soil Survey, mean that this situation could change quickly. The case studies will explore in depth the specific MRV barriers and solutions per scheme type (e.g. peatlands or livestock). To have impact, these MRV innovations must reduce MRV costs, and not just improve accuracy.

## 5.2 Design schemes to minimise farmer transaction costs and ensure farmer uptake

Voluntary schemes depend on farmer participation: any barrier to farmer uptake – whether it is complexity, uncertainty, time or financial cost - limits the impact of the scheme. In addition to MRV, these barriers arise as a result of design decisions throughout the scheme.

**Schemes must be designed to minimise farmer transaction costs.** These means that farmer costs of baseline setting, MRV (e.g. data collection, complex administrative requirements, on-site verification, etc.) should be minimised or borne by the scheme, to reduce prohibitive costs for farmers. Existing schemes have identified solutions to transaction costs: 1) aligning administration and MRV with existing policies and data availability; 2) enforcing compliance through random audits or targeted audits of high-risk participants plus non-compliance fines rather than comprehensive verification; 3) administrators bearing costs e.g. of baseline setting.

**Uncertainty and complexity will also reduce farmer uptake.** Farmers will avoid risk, so uncertain rewards (e.g. due to fluctuating carbon credit prices) or uncertain results of their actions (e.g. due to MRV uncertainty) will reduce uptake. Carbon farming schemes are already novel and relatively complex; schemes must provide farmer education and ongoing support to reduce farmer costs of learning and participation to ensure uptake. To reduce reward uncertainty, some mechanisms make hybrid payments, where farmers receive

payment for actions plus a top-up, or mechanisms guarantee a set price per tonne of carbon reduced, rather than providing credits. Farmer training and education, as well as involvement in scheme design, supports reduced complexity.

Uptake will also be supported by farmer and farm consultant involvement in scheme design and ongoing evaluation and management. In the long-term, climate action will be best served by farmer education and by growing farmer support and understanding of the need for and opportunities of climate action. Schemes should highlight multiple benefits of climate actions (including cost efficiency savings, increases in soil and farm productivity, etc.) to build farmer commitment.

### 5.3 Carbon credit markets: Designing schemes to ensure credit demand

Market-based (credit) carbon farming schemes, where emissions reduction or sequestration are translated into sellable carbon credits or certificates, offer a clear mechanism for crowding in private finance to fund climate action. However, they pose additional challenges, as their success depends on demand for the credits produced. This demand in turn depends on a high degree of trust in the environmental integrity of the reductions (i.e. that the credits are a credible, additional and permanent proxy for 1t of CO<sub>2</sub>-e reduction).

Schemes can be designed to support credit demand, but a key challenge is that **market schemes may require prohibitively expensive MRV**. While stringent MRV backed by good science, including external verification and certification, can be central to credit demand, demonstrating this environmental integrity can require extensive (and expensive) MRV and stringent contracts, which may in turn fatally reduce farmer uptake. Our analysis identifies other, additional ways to increase customer trust in the scheme: 1) buffer accounts, long-term contracts, and discounting of credits to ensure that each credit is matched by actual and permanent climate impact to match every credit sold; 2) strong interpersonal relationships or institutional reputation; 3) transparency, including credit registry.

### 5.4 National and EU policy plays a decisive role in upscaling

**EU policy settings shape carbon farming schemes**, in particular the Common Agricultural Policy. CAP settings affect scheme design. For example, to avoid double-funding climate actions (where a farmer is paid under CAP and then additionally for the same action), carbon farming schemes will need to consider future CAP conditionality (in the form of Good Agricultural and Environmental Conditions (GAECs) and Statutory Management Requirements), along with national and regional policy settings when establishing baselines against which additional emissions reductions/sequestration can be measured. The future CAP will also offer opportunities for upscaling, for example through

the mandatory instruments supporting land management outcomes, which Member States would be required to programme under the reformed CAP (including the newly proposed eco-schemes in Pillar 1 as well as the well-established agri-environment-climate measures in Pillar 2), which could be used to implement carbon farming schemes. However, CAP can also limit upscaling, for example if farmers will see reduced CAP payments for altering land use, for example if peatlands were to be rewet and removed from productive agriculture.

**Other EU policies are also important.** For example, the inclusion of the LULUCF sector into the EU GHG target architecture after 2020 means that all voluntary carbon farming schemes should be recognised in the host country's national GHG inventory and reporting would need to ensure that reductions were not double-counted (i.e. countries could not recognise both the reductions and the credits created) or to manage inter-Member State trading. EU and Member State public procurement policies and regulations on credit eligibility can support output produced on participant farms or to support credit demand. Clearly, schemes must be designed to align with EU policy settings; conversely, if the EU wishes to promote carbon farming, policy (especially CAP) impacts on carbon farming must be considered.

## 5.5 Using sustainability indicators for carbon farming schemes

The actions incentivised by result-based carbon farming mechanisms will have broader impacts than just on GHG fluxes, also causing externalities both positive (e.g. cost efficiency improvements, reductions in nitrogen leaching) and negative (e.g. reduced farm output). To ensure that schemes induce net positive impacts, it is important to monitor and evaluate the broad impact of schemes at a scheme-level and individual farm-level using sustainability indicators.

Based on existing mechanisms and on existing sets of agri-sustainability indicators (such as EU Rural Development CMEF Indicators, SDG Indicators, OECD and EEA agri-environmental indicators, and others), we identify a list of potential indicators. Different indicators will be relevant for different schemes, depending on local objectives and the types of farms and climate actions involved. The selection of indicators to apply should also consider cost and practicality issues, including whether data can be easily gathered at the farm level, whether the indicator can be meaningfully aggregated from farm, to scheme to regional / national level, whether it is aligned with existing/future policy contexts (e.g. CAP Performance Monitoring and Evaluation Framework), and with reference to data accuracy, consistency, and reliability.

Table 5-1. List of proposed list of sustainability indicators.

| Proposed list of indicators |                                                                                |
|-----------------------------|--------------------------------------------------------------------------------|
| Climate impact              | Climate impact: CO <sub>2</sub> equivalents (CO <sub>2</sub> e)                |
|                             | GHG specific indicators (CO <sub>2</sub> , N <sub>2</sub> O, CH <sub>4</sub> ) |

|                |                                                                                                                                      |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------|
|                | CO <sub>2</sub> e/kg product                                                                                                         |
| Soil health    | Soil Total organic carbon content in arable soils (t), monitored through sampling                                                    |
|                | Percentage of forestry/agricultural land under management contracts to improve soil management and/or prevent soil erosion (% or ha) |
| Air            | Ammonia (NH <sub>3</sub> ) emissions                                                                                                 |
| Water          | Gross Nitrogen Balance (GNB-N, kg N/ ha/ year), calculated                                                                           |
|                | Percentage of agricultural/forestry land under management contracts to improve water management (%)                                  |
|                | Water abstraction in agriculture, the volume of water which is applied to soils for irrigation purposes (m <sup>3</sup> )            |
|                | Efficiency of water use (m <sup>3</sup> water used/standard unit of output)                                                          |
|                | Percentage of irrigated land switching to more efficient irrigation system (%)                                                       |
| Biodiversity   | Share of agro-ecological elements (landscape features, including hedgerows) on the farm (% or ha)                                    |
|                | Percentage of forest or other wooded areas/agricultural land under management contracts supporting biodiversity, %, calculated       |
|                | Agricultural area under NATURA 2000 (% or ha)                                                                                        |
|                | Share of UAA under organic farming (% or ha)                                                                                         |
| Socio-economic | Jobs created in supported projects                                                                                                   |
|                | Total number of participants trained in climate friendly (agro-ecological) approaches and solutions                                  |

## 5.6 Next steps

This task 1 and 2 report sets the groundwork for the next steps of the carbon farming project and has identified open questions. In task 3, five case studies will build on this report by investigating how to practically design a result-based carbon farming mechanism under five thematic focuses (agroforestry, peatlands, livestock whole farm carbon audits, soil carbon, and grasslands). The barriers and potential solutions identified in this report help to ensure that the case studies will avoid already identified barriers and dead ends, and that they incorporate scheme design lessons already learned elsewhere. This report and the task 3 case studies will be the basis of the summary guidance document in task 4.

## Appendix A Overview of potential sustainability indicators

| Indicator                                                                                                                                 | Source/example                                                              | Scale                  | Comment                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|------------------------|------------------------------------------------------------------------|
| Soil Health                                                                                                                               |                                                                             |                        |                                                                        |
| - Total organic carbon content in arable soils (t), monitored through sampling                                                            | CMEF impact indicator                                                       | Farm/project/ national | Limited data availability, as requires costly monitoring.              |
| - Mean SOC concentration in arable land: g/kg, monitored                                                                                  | CMEF impact indicator                                                       | Farm/project/ national | Limited data availability, as requires costly monitoring.              |
| - Soil erosion by water: Estimated rate of soil loss by water erosion (t/ha /year), modelled at EU scale                                  | CMEF impact indicator                                                       | National               | Modelled at broad scale, field level monitoring very costly            |
| - Soil erosion by water: Estimated agricultural area affected by a certain rate of soil erosion by water (ha, %), modelled at EU scale    | CMEF impact indicator                                                       | National               | Modelled at broad scale, field level monitoring very costly.           |
| - Percentage of forestry/agricultural land under management contracts to improve soil management and/or prevent soil erosion, %           | CMEF: Pillar II RDP Results indicators and complementary results indicators | Project/ national      | Relatively poor indicator of soil health or results of climate actions |
| - Agricultural land affected by water and wind erosion classified as having moderate to severe water and wind erosion risk (ha), modelled | OECD Agri-Environmental Indicators; EEA Agri-Environmental Indicators       | National               | Modelled at broad scale, limited data, low precision, costly.          |
| - 15.3.1 Proportion of land that is degraded over total land area, %                                                                      | SDGs                                                                        | Project/ national      | A composite indicator                                                  |
| Water Quality                                                                                                                             |                                                                             |                        |                                                                        |

|                                                                                                                                       |                                                                                               |                        |                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| - Gross Phosphorus Balance (GNB-P, kg P/ ha/ year), calculated                                                                        | CMEF Impact Indicators; OECD Agri-Environmental Indicators; EEA Agri-Environmental Indicators | Farm/project/ national | Relatively good data and relatively good proxy for agricultural impact on water quality; however, actual impact depends on local context. |
| - Gross Nitrogen Balance (GNB-N, kg N/ ha/ year), calculated                                                                          | CMEF Impact Indicators; OECD Agri-Environmental Indicators; EEA Agri-Environmental Indicators | Farm/project/ national | Relatively good data and relatively good proxy for agricultural impact on water quality; however, actual impact depends on local context. |
| - Groundwater & Freshwater quality: % of monitoring sites in 3 water quality classes (high, moderate and poor);                       | CMEF Impact Indicators; OECD Agri-Environmental Indicators                                    | National               | Good proxy for water quality but data less available.                                                                                     |
| - Percentage of agricultural/forestry land under management contracts to improve water management, %                                  | CMEF: Pillar II RDP Results indicators and complementary results indicators                   | Project/ national      | Limited proxy for water quality and low precision.                                                                                        |
| - Nitrate, phosphate and pesticide pollution derived from agriculture in surface water, groundwater and marine waters (%), calculated | OECD Agri-Environmental Indicators                                                            | National               | High precision but poorly linked to climate action, low data availability.                                                                |
| <b>Water Quantity</b>                                                                                                                 |                                                                                               |                        |                                                                                                                                           |
| -Flood water retention volume (m3), modelled                                                                                          | Moor Futures                                                                                  | Project                | High precision but low data availability and high cost.                                                                                   |
| -Peak flood reduction, m3 per second, modelled                                                                                        | Moor Futures                                                                                  | Project                | High precision but low data availability and high cost.                                                                                   |
| - Total available amount of water (m3), modelled                                                                                      | Moor Futures                                                                                  | Project                | High precision but low data availability and high cost.                                                                                   |
| - Water abstraction in agriculture, the volume of water which is applied to soils for irrigation purposes (m3), monitored/survey      | CMEF Impact Indicators                                                                        | Farm/project/ national | Relatively high data availability and precision.                                                                                          |
| - Efficiency of water use (m3 water used/standard unit of output), calculated                                                         | CMEF: Pillar II RDP Results indicators and complementary results indicators; SDGs             | Farm/project/ national | Relatively high data availability and precision.                                                                                          |

|                                                                                                                                  |                                                                             |                        |                                                                           |
|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|------------------------|---------------------------------------------------------------------------|
| - Percentage of irrigated land switching to more efficient irrigation system (%), survey                                         | CMEF: Pillar II RDP Results indicators and complementary results indicators | Project/ national      | Low data availability, limited proxy.                                     |
| - Agricultural freshwater withdrawals (m3), survey                                                                               | OECD Agri-Environmental Indicators; EEA Agri-Environmental Indicators       | Farm/project/ national | Relatively high data availability and precision.                          |
| - Irrigated land area (ha), survey                                                                                               | OECD Agri-Environmental Indicators                                          | Farm/project/ national | Relatively low precision.                                                 |
| - Irrigation water application rate (L/ha of irrigated land), calculated                                                         | OECD Agri-Environmental Indicators                                          | Farm/project/ national | Good data availability, relatively high precision.                        |
| - Share of irrigated areas in UAA, %, calculated                                                                                 | EEA Agri-Environmental Indicators                                           | National               | Low precision.                                                            |
| - 6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources, %                        | SDGs                                                                        | National               | Medium data availability and precision                                    |
| <b>Biodiversity</b>                                                                                                              |                                                                             |                        |                                                                           |
| - Farmland bird index, index, monitored                                                                                          | CMEF Impact Indicators                                                      | Farm/project/ national | Good proxy but relatively low data availability and accuracy/consistency. |
| - percentage of Utilised Agricultural Area farmed to generate High Nature Value (HNV), %                                         | CMEF Impact Indicators                                                      | Project/ national      | Medium data availability, low-medium proxy                                |
| -Share of ecological focus area (EFA) in agricultural land (% , ha)                                                              | CMEF: Pillar I results indicators                                           | Project/ national      | Medium data availability, low-medium proxy                                |
| - Percentage of forest or other wooded areas/agricultural land under management contracts supporting biodiversity, %, calculated | CMEF: Pillar II RDP Results indicators and complementary results indicators | Project/ national      | Medium data availability, low proxy                                       |
| - The status of High Conservation Value species, monitored                                                                       | CCB indicators                                                              | Farm/project/ national | Low data availability, medium proxy                                       |
| - Area with high conservation value species (ha), calculated                                                                     | CCB indicators                                                              | Farm/project/ national | Low data availability, medium proxy                                       |

|                                                                                                                                               |                                    |                        |                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|------------------------|----------------------------------------|
| - Change in invasive species populations (e.g. number, status), monitored                                                                     | CCB indicators                     | Farm/project/ national | Low data availability, medium proxy    |
| - Number/frequency of threats to biodiversity in project area                                                                                 | CCB indicators                     | Farm/project/ national | Low data availability, medium proxy    |
| - Populations of a selected group of breeding bird species that are dependent on agricultural land for nesting or breeding (index), monitored | OECD Agri-Environmental Indicators | Farm/project/ national | Low data availability                  |
| - Agricultural land cover types – arable/ permanent crops/pasture areas (ha), survey                                                          | OECD Agri-Environmental Indicators | Farm/project/ national | Relatively poor proxy for biodiversity |
| - Agricultural land under agri-environmental measures as share of UAA, % or ha, survey                                                        | EEA Agri-Environmental Indicators  | Farm/project/ national | Relatively poor proxy for biodiversity |
| - Agricultural areas under NATURA 2000, % or ha, survey                                                                                       | EEA Agri-Environmental Indicators  | Project/ national      | Good data availability and proxy       |
| - Share of AAU under organic farming, %, survey                                                                                               | EEA Agri-Environmental Indicators  | Farm/project/ national | Medium proxy for biodiversity          |
| - Utilised agricultural area by land cover types, %, survey                                                                                   | EEA Agri-Environmental Indicators  | Farm/project/ national | Relatively poor proxy for biodiversity |
| - Share of estimated high nature value (HNV) farmland in (UAA), %, survey                                                                     | EEA Agri-Environmental Indicators  | Farm/project/ national | Medium data availability, good proxy   |
| - 15.1.1 Forest area as a proportion of total land area, %                                                                                    | SDGs                               | Farm/project/ national | Relatively poor proxy for biodiversity |
| - Populations of a selected group of breeding bird species that are dependent on agricultural land for nesting or breeding (index), monitored | OECD Agri-Environmental Indicators | Farm/project/ national | Low data availability                  |
| <b>Other</b>                                                                                                                                  |                                    |                        |                                        |
| - Evaporative cooling (units: annual energy balance in W m-2 or kWh ha-1 y-1), modelled                                                       | Moor Futures                       | Project                | Low data availability, high cost       |

|                                                                                                                                                                                                                |                                                                             |                        |                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|------------------------|----------------------------------------|
| - Pesticide sales, in tonnes of active ingredients (t), sales data                                                                                                                                             | OECD Agri-Environmental Indicator, EEA Agri-Environmental Indicators        | National               | Imprecise                              |
| - Mineral fertiliser application, rates (kg/ha) of N and P, survey                                                                                                                                             | EEA Agri-Environmental Indicators                                           | Farm/project/ national | Medium data, medium precision          |
| - Livestock density and grazing livestock density, units per ha, survey                                                                                                                                        | EEA Agri-Environmental Indicators                                           | Farm/project/ national | Medium precision, medium data          |
| - Shares of UAA managed by low, medium and high intensity farms, %, survey                                                                                                                                     | EEA Agri-Environmental Indicators                                           | Project/ national      | Medium data, low precision             |
| - Specialisation of farms (crop/livestock/mixed-specialist), %, survey                                                                                                                                         | EEA Agri-Environmental Indicators                                           | Project/ National      | Medium data, low precision             |
| - 2.4.1 Proportion of agricultural area under productive and sustainable agriculture, %                                                                                                                        | SDGs                                                                        | Project/ national      | Low consistency, data, precision       |
| Economic                                                                                                                                                                                                       |                                                                             |                        |                                        |
| - Rural GDP per capita, PPS, calculated                                                                                                                                                                        | CMEF Impact Indicators                                                      | Project/ national      |                                        |
| - Agricultural factor income (€) (i.e. total income for all factors of production)                                                                                                                             | CMEF Impact Indicators                                                      | National               | Good data                              |
| - Rural employment rate (%) (Employed persons aged 15-64 years and 20-64 years as a share of the total population of the same age group in thinly populated areas (used as proxy for rural areas), survey data | CMEF Impact Indicators                                                      | Project/ national      | Medium data and precision              |
| - Agricultural entrepreneurial income (€) (i.e. factor income - wages etc.)                                                                                                                                    | CMEF Impact Indicators                                                      | Farm/project/ national | Good proxy, precision, medium data     |
| - Total factor productivity in agriculture (e.g. total outputs vs total inputs, as indices)                                                                                                                    | CMEF Impact Indicators                                                      | Project/ national      | Difficult to interpret, calculate.     |
| - Change in agricultural output on supported farms/AWU, (%), calculated                                                                                                                                        | CMEF: Pillar II RDP Results indicators and complementary results indicators | Farm/project/ national | Good proxy for efficiency, medium data |

|                                                                                                                                                                 |                                                                                             |                        |                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|------------------------|------------------------------------------------------------------|
| - Jobs created in supported projects, survey                                                                                                                    | CMEF: Pillar II RDP Results indicators and complementary results indicators                 | Farm/project/ national | Jobs are a poor proxy for improved economic outcomes.            |
| - Increase in employment                                                                                                                                        | CCB indicators                                                                              | Farm/project/ national | Jobs are a relatively poor proxy for improved economic outcomes. |
| - Agricultural production volume (index), calculated                                                                                                            | OECD Agri-Environmental Indicators                                                          | National               | Difficult to calculate, interpret.                               |
| Social                                                                                                                                                          |                                                                                             |                        |                                                                  |
| - Degree of rural poverty (%), calculated (The indicator is defined as the share of population at risk of poverty or social exclusion in thinly populated areas | CMEF Impact Indicators                                                                      | Project/ National      | Low precision                                                    |
| - Total number of participants trained                                                                                                                          | CMEF: Pillar II RDP Results indicators and complementary results indicators; CCB indicators | Project                | Relatively low cost, limited data                                |
| - Percentage of rural population covered by local development strategies (%), calculated                                                                        | CMEF: Pillar II RDP Results indicators and complementary results indicators                 | National               | Low precision, relatively poor proxy for results                 |
| -Percentage of rural population benefiting from improved services / infrastructures (%), calculated                                                             | CMEF: Pillar II RDP Results indicators and complementary results indicators                 | Project/ national      | Low precision, relatively poor proxy for results                 |
| - Decline in general rate of poverty in community (%), survey                                                                                                   | CCB indicators                                                                              | Project/ national      | Low data, medium proxy                                           |
| - Change in rural population (number), survey                                                                                                                   | CCB indicators                                                                              | Project/ national      | Good data, medium proxy                                          |
| - Agricultural training of farmers less than 35 years old (basic/full), %, survey                                                                               | EEA Agri-Environmental Indicators                                                           | Project/ national      | Low proxy, medium data                                           |
| - 5.5.2 Proportion of women in managerial positions, %                                                                                                          | SDGs                                                                                        | Project/ national      | Low cost data, medium proxy for equity.                          |
| Air                                                                                                                                                             |                                                                                             |                        |                                                                  |

|                                    |                                                                                                                                                                            |                        |                                       |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------------------------------|
| -Ammonia (NH3) emissions, modelled | CMEF Impact Indicators; CMEF: Pillar II RDP Results indicators and complementary results indicators; OECD Agri-Environmental Indicators; EEA Agri-Environmental Indicators | Farm/project/ national | Good proxy, medium data and precision |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------------------------------|

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## Appendix C Abbreviations

|        |                                                     |
|--------|-----------------------------------------------------|
| AAUs   | Assigned Amount Units                               |
| AB 32  | Assembly Bill 32                                    |
| AB 398 | Assembly Bill 398                                   |
| ABMS   | Activity-based monitoring system                    |
| ACR    | American Carbon Registry                            |
| ACCU   | Australian Carbon Credit Unit                       |
| ACoGS  | Avoided Conversion of Grasslands and Shrublands     |
| ADEE   | Australian Department of the Environment and Energy |
| ADEME  | French Environment and Energy Management Agency     |
| AFOLU  | Agriculture, Forestry and other Land Use            |
| AIEs   | Accredited Independent Entities                     |
| APC    | Avoiding Planned Conversion                         |
| APDD   | Avoiding Planned Deforestation and/or Degradation   |
| APWD   | Avoiding Planned Wetland Degradation                |
| ARD    | Afforestation, Reforestation and Deforestation      |
| ARR    | Afforestation, Reforestation and Restoration        |
| ASLGF  | Association Syndicale Libre De Gestion Forestière   |
| AUC    | Avoiding Unplanned Conversion                       |
| AUDD   | Avoiding Unplanned Deforestation and/or Degradation |
| AUWD   | Avoiding Unplanned Wetland Degradation              |
| BAU    | Business-as-usual                                   |
| BB     | Brandenburg                                         |
| BioCF  | BioCarbon Fund                                      |
| CAP    | Common Agricultural Policy                          |

|       |                                               |
|-------|-----------------------------------------------|
| CAR   | Climate Action Reserve                        |
| CARB  | California Air Resources Board                |
| CCBS  | Climate, Community & Biodiversity Standards   |
| CCI   | California Climate Investments                |
| CCO   | California Carbon Offset                      |
| CCOP  | California's Carbon Offset Program            |
| CCRA  | Climate Change Response Act                   |
| CDM   | Clean Development Mechanism                   |
| CEAs  | Carbon Estimation Areas                       |
| CERs  | Certified Emission Reductions                 |
| CFI   | Australian Carbon Farming Initiative          |
| CIDP  | County Integrated Development Plans           |
| CITSS | Compliance Instrument Tracking System Service |
| CIW   | Conservation of Intact Wetlands               |
| CM    | Cropland Management                           |
| CMEF  | Common Monitoring and Evaluation Framework    |
| CMP   | Meeting of the Parties to the Kyoto Protocol  |
| COP   | Conference of the Parties                     |
| CPA   | CDM programme activity level                  |
| CSR   | Corporate social responsibility               |
| DFP   | Designated Focal Point                        |
| DNA   | Designated National Authorities               |
| DOE   | Designated Operational Entity                 |
| DTA   | Default Table Approach                        |
| EAGF  | European Agricultural Guarantee Fund          |

|        |                                               |
|--------|-----------------------------------------------|
| EB     | Executive Board                               |
| ECC    | Environmental Climate Corps                   |
| EEA    | European Environmental Agency                 |
| EIA    | Environmental Impact Assessment               |
| EITE   | Emission Intensive Trade Exposed              |
| EPA    | Environmental Protection Authority            |
| ERA    | Extended Rotation Age/Cutting Cycle           |
| ERDF   | European Regional Development Fund            |
| ERF    | Australian Emission Reduction Fund            |
| ERPA   | Emissions reduction purchase agreement        |
| ESD    | Effort Sharing Decision                       |
| ESR    | Effort Sharing Regulation                     |
| ERU    | Emission Reduction Unit                       |
| ESIA   | Environmental and Social Impact Assessment    |
| ETA    | Emissions Trading Association                 |
| EU     | European Union                                |
| EU-ETS | EU Emission Trading Scheme                    |
| FCPF   | Forest Carbon Partnership Facility            |
| FIA    | Forest Inventory and Analysis Program         |
| FLBC   | Ferme Laitière Bas Carbone                    |
| FM     | Forest Management                             |
| FMA    | Field Measurement Approach                    |
| FOIA   | Freedom of Information Act                    |
| FSC    | Forest Stewardship Council                    |
| GAEC   | Good Agricultural and Environmental Condition |

|             |                                            |
|-------------|--------------------------------------------|
| GCF         | Governors' Climate and Forests Task Force  |
| GEST        | GHG emission profile                       |
| GFCM        | Global Forest Carbon Mechanism             |
| GGRF        | Greenhouse Gas Reduction Fund              |
| GHG         | Greenhouse gas                             |
| GM          | Grazing Land Management                    |
| GPGs        | Good Practice Guidelines                   |
| GWP         | Global Warming Potential                   |
| HSHF        | Healthy Soils for Healthy Food             |
| IACS        | Integrated Administration Control System   |
| IFM         | Improved Forest Management                 |
| IPCC        | Intergovernmental Panel on Climate Change  |
| ITL         | International Transaction Log              |
| JI          | Joint Implementation                       |
| JISC        | Joint Implementation Supervisory Committee |
| JNR         | Jurisdictional and Nested REDD+ framework  |
| <i>KACP</i> | <i>Kenya Agricultural Carbon Project</i>   |
| KP          | Kyoto Protocol                             |
| LBC         | Label Bas Carbone                          |
| LDC         | Low Development Country                    |
| LRTAP       | Long-Range Transboundary Air Pollution     |
| LtHP        | Low-Productive to High-Productive Forest   |
| LtPF        | Logged to Protect Forest                   |
| LULUCF      | Land Use and Land-Use Change and Forestry  |
| MA          | Marrakesh Accords                          |

|                     |                                                        |
|---------------------|--------------------------------------------------------|
| MBPS                | Management-based payments scheme                       |
| MfE                 | Ministry for the Environment                           |
| MPI                 | Ministry of Primary Industries                         |
| MRR                 | Mandatory Reporting Regulation                         |
| MRV                 | Monitoring, reporting and verification                 |
| MS                  | Member States                                          |
| mtCO <sub>2</sub> e | Metric tonne of carbon dioxide equivalent              |
| MTES                | Ministry of Ecologic and Solidary Transition           |
| MV                  | Mecklenburg-Vorpommern                                 |
| NDCs                | Nationally Determined Contributions                    |
| NPV                 | Net-present value                                      |
| NWI                 | National Water Initiative                              |
| NZ ETS              | New Zealand Emission trading Scheme                    |
| NZU                 | NZ Emission Reduction Unit                             |
| OPO                 | Offset project operator                                |
| OPTF                | Offsets Protocol Task Force                            |
| PA                  | Paris Agreement                                        |
| PDD                 | Project Design Document                                |
| PFSI                | Permanent Forest Sink Initiative                       |
| PMEF                | Performance Monitoring and Evaluation Framework        |
| PoA                 | Programme of Activities                                |
| PSE                 | Performance Standard Evaluation                        |
| Q&A                 | Quality assurance                                      |
| QELRO               | Quantified Emission Limitation or Reduction Objectives |
| RBPS                | Results-based payment schemes                          |

|             |                                                                              |
|-------------|------------------------------------------------------------------------------|
| RDPs        | Rural Development Programmes                                                 |
| REDD        | Reduced Emissions from Deforestation and Degradation                         |
| REDD+       | Reduced Emissions from Deforestation and Degradation in developing countries |
| RIL         | Reduced Impact Logging                                                       |
| RMUs        | Removal Units                                                                |
| ROW         | REDD Offset Working Group                                                    |
| RWE         | Restoring Wetland Ecosystem                                                  |
| SALM        | Sustainable Agricultural Land Management                                     |
| SBI         | Subsidiary Body for Implementation                                           |
| SH          | Schleswig Holstein                                                           |
| SIS         | Safeguards Information System                                                |
| SMR         | Statutory Management Requirements                                            |
| TFS         | Tropical Forest Standard                                                     |
| <i>TIST</i> | <i>The International and Small Group and Tree Planting Programme</i>         |
| UNCBD       | United Nations Convention on Biological Diversity                            |
| UNFCCC      | United Nations Framework Convention for Climate Change                       |
| VER         | Verified Emission Reduction                                                  |
| VCS         | Verified Carbon Scheme                                                       |
| VCSA        | VCS Association                                                              |
| VCU         | Verified Carbon Unit                                                         |
| VOCAL       | Voluntary Carbon Land Certification                                          |
| VVB         | Validation and Verification bodies                                           |
| WCI         | Western Climate Initiative                                                   |
| WDR         | Wetland Drainage and Rewetting                                               |
| WRC         | Wetlands Restoration and Conservation                                        |

## Appendix D Glossary

|                                         |                                                                                                                                                                                                                                                                 |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Additionality                           | Reductions in emissions or enhancement of removals that are additional to reductions that would occur in the absence of a project activity.                                                                                                                     |
| Afforestation/<br>Deforestation         | The direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or the human-induced promotion of natural seed sources.                                                 |
| Assigned Amount<br>Unit (AAU)           | A tradable 'Kyoto unit' or 'carbon credit' representing an allowance to emit greenhouse gases comprising one metric tonne of carbon dioxide equivalents calculated using their Global Warming Potential.                                                        |
| Baseline                                | The baseline is the level of emissions against which change is measured, as a result of project activity. To get credit for emissions reductions, a project must lower emissions below the established baseline.                                                |
| Baseline & Credit<br>Instrument         | Market-based mechanism which rewards ex-post i.e. based on measurable results of the implemented project compared to the baseline.                                                                                                                              |
| Business-As-<br>Usual (BAU)<br>Scenario | The land use and emissions profile for a carbon project area prior to intervention, serves as a bench mark to measure the impact of mitigation actions. Also referred to as "baseline."                                                                         |
| Cap-and-Trade                           | A policy system for controlling GHG emissions by which an upper limit is set on the amount a given business or other organization may produce, but which allows further capacity to be bought from other organizations that have not used their full allowance. |
| Carbon agents                           | Carbon service providers are private businesses, independent of government, who assist land managers to participate and comply in certain carbon farming schemes.                                                                                               |
| Carbon Farming                          | Carbon farming refers to anthropogenic interference with carbon pools, flows and greenhouse gas (GHG) fluxes at farm-level with the purpose of minimising climate change.                                                                                       |
| Commitment<br>period                    | A period of time in the KP (or in a post-Kyoto agreement) when countries are asked to meet certain commitments related to national emission reduction targets.                                                                                                  |

|                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Conservative baseline                | A conservative approach to the construction of the baseline scenario, meaning GHGs from the previous land-use cannot be included in the baseline.                                                                                                                                                                                                                                                                                                                                |
| Credit producer                      | Usually referred to in the realm of a credit producer geography refers to a carbon credit generator, i.e. project owner.                                                                                                                                                                                                                                                                                                                                                         |
| Credit user                          | A credit user is a buyer of carbon credits from carbon producers under voluntary or compliance carbon crediting schemes.                                                                                                                                                                                                                                                                                                                                                         |
| Double counting                      | Situations where a single GHG emission reduction or removal is used more than once to achieve mitigation targets                                                                                                                                                                                                                                                                                                                                                                 |
| File card                            | The file cards are in place for reference throughout the document covering all aspects in detail for each individual covered scheme.                                                                                                                                                                                                                                                                                                                                             |
| Host Country                         | A country where a JI or CDM (or REDD) project is physically located. A project has to be approved by host country to receive CERs, ERUs or VCUs.                                                                                                                                                                                                                                                                                                                                 |
| Hybrid scheme                        | An approach of partial auctioning and free allocation of some emission allowances common in cap-and-trade markets.                                                                                                                                                                                                                                                                                                                                                               |
| Leakage                              | The unexpected loss of anticipated carbon benefits due to the displacement of activities in the project area to areas outside the project, resulting in carbon emissions. Leakage can negate some or all of the carbon benefits generated by a project. Although not often acknowledged, leakage can also be positive, if best practices are adopted outside of the project area and gain widespread use e.g. the displacement of logging due to forest conservation activities. |
| Linkage                              | Provision for interchangeability of permits, credits, or both between and among cap-and-trade and emission-reduction- credit systems.                                                                                                                                                                                                                                                                                                                                            |
| Monitoring, Reporting & Verification | The collection of data and information at a national (or sub-national) level, and performance of the necessary calculations for estimating emission reductions or enhancement of carbon stocks and associated uncertainties against a reference level.                                                                                                                                                                                                                           |

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| Market-based incentive  | The use markets, price, and other economic variables to incentivize the reduction or elimination of environmental externalities.                                                                                                                                                                                                                                                                                 |
| Methodology             | Documents that define all of the parameters and operations required for the calculations of emission reductions or removals from a carbon offset project during its lifetime. CCOP refers to <i>Methodologies</i> as <i>Protocols</i> .                                                                                                                                                                          |
| Mitigation              | The term used to describe any action seeking to reduce the amount of greenhouse gases released into the atmosphere by human-related activities. Such actions might include reducing our use of fossil fuels and changing the way we use land - such as by reducing our rate of land clearing and deforestation and increasing our rate of reforestation.                                                         |
| Permanence              | The risk of reversal that emission removals by sink projects, e.g. entailing afforestation/reforestation or soil sequestration activities. Sequestered carbon can either be released by anthropogenic activities or through natural disturbances                                                                                                                                                                 |
| Project Design Document | The document(s) that describe the design of a project and the ways in which it meets each of the requirements of the CCB Standards.                                                                                                                                                                                                                                                                              |
| Protocol                | See <i>Methodology</i>                                                                                                                                                                                                                                                                                                                                                                                           |
| Reforestation           | The direct human-induced conversion of non-forested land to forested land through planting, seeding and/or the human-induced promotion of natural seed sources, on land that was forested but that has been converted to non-forested land. For the first commitment period, reforestation activities will be limited to reforestation occurring on those lands that did not contain forest on 31 December 1989. |
| Removal Unit (RMU)      | A tradable carbon credit or 'Kyoto unit' representing an allowance to emit one metric tonne of greenhouse gases absorbed by a removal or Carbon sink activity in an Annex I country.                                                                                                                                                                                                                             |
| Results-based           | Result-based has been used to make a distinction between making payments to land managers on the basis of the results that they deliver, rather than the management actions that they pursue.                                                                                                                                                                                                                    |

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| Voluntary offset | A carbon offset which is purchased by a concerned individual or business out of choice, not as a result of regulation. |
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## Appendix E Considered projects

| Scheme | Project                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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| CDM    | <ul style="list-style-type: none"> <li>&gt; Reducing Methane Emissions and Improving Productivity in the Ugandan Dairy Sector Through Strategic Feed Supplementation</li> <li>&gt; Gold Farm Livestock Corporation Methane Recovery and Electricity Generation</li> <li>&gt; AWMS Methane Recovery Project, implemented in various locations</li> <li>&gt; Oceanium mangrove restoration project</li> <li>&gt; Small-scale and low-income community-based mangrove afforestation project on tidal flats of three small islands around Batam City</li> <li>&gt; India Sundarbans Mangrove Restoration</li> <li>&gt; Bayer Tabela Direct Seeded Rice (DSR) in Java: Reduction of Methane Emissions by Switching from Transplanted to Direct Seeded Rice with Adjusted Water Management</li> <li>&gt; Methane avoidance in rice cultivation</li> <li>&gt; Moldova Soil Conservation Project</li> <li>&gt; Improving Rural Livelihoods Through Carbon Sequestration by Adopting Environment Friendly Technology based Agroforestry Practices</li> <li>&gt; Carbon Sequestration in Small and Medium Farms in the Brunca Region, Costa Rica (COOPEAGRI Project)</li> <li>&gt; CDM Project for Forestry Restoration in Productive and Biological Corridors in the Eastern Plains of Colombia</li> <li>&gt; Nerquihue Small-Scale CDM Afforestation Project using Mycorrhizal Inoculation in Chile</li> <li>&gt; Agro-forestry Interventions in Koraput district of Orissa</li> <li>&gt; Reforestation of Abandoned Dairy Cattle Grazing Grasslands in Korea</li> </ul> |
| J1     | <ul style="list-style-type: none"> <li>&gt; Romania Afforestation of Degraded Agricultural Land Project (J10380)</li> <li>&gt; Carbon sequestration via afforestation in Siberian settlements, Russian Federation (J10771)</li> <li>&gt; Reduction of CO2 Emissions by Systematic Utilization of No-till Technology in Agriculture at LLC "Ahrodar LTD" (J10917) [Track 1]</li> <li>&gt; Reduction of CO2 Emissions by Systematic Utilization of No-till Technology at Ltd "Obriy-MTS-Rozdylna" Farmlands (J10849)</li> <li>&gt; Reduction of Greenhouse Gas Emissions by Application of No-till Technology at LLC "Vishva Ananda" Farmlands (J10850)</li> <li>&gt; Reduction of CO2 Emissions by Systematic Utilization of No-till Technologies in Agricultural Industry (J10860)</li> <li>&gt; Reduction of Greenhouse Gas Emissions by Application of No-till Technology at LLC "Sintal Agro Trade" Farmlands (J10864)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

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|                          | <ul style="list-style-type: none"> <li>&gt; Reduction of Greenhouse Gas Emissions by Application of No-till Technology at Private Joint Stock Company "Rise-Maksymko" (JI0911)</li> <li>&gt; Reduction of Greenhouse Gas Emissions by Application of No-till Technology at LLC "Koziiivske" Farmlands (JI0918)</li> <li>&gt; Reducing of CO2 emissions by regular use of No-till technology in agricultural production of PJSC "Agro-Soyuz" (JI0810)</li> <li>&gt; Reducing of CO2 emissions by regular use of No-till technology in agricultural production of LLC "Agricultural enterprise "Agropromtehnika" (JI0811)</li> <li>&gt; Climate protection by efficient manure management and biogas (JI0528)</li> <li>&gt; Biogas Utilization for Generating of Electricity and Heat at the Farms of Ukrainian Dairy Company Ltd. (JI0598)</li> <li>&gt; Utilization of Bio-Gas for Heat and Power Generation at Pig Farms of Chervona Zirka Farming (JI0523)</li> </ul> |
| California Cap-and-Trade | <ul style="list-style-type: none"> <li>&gt; Carbon Demonstration Project Angeles National Forest</li> <li>&gt; Forest Carbon Partners – Eddie Ranch Improved Forest Management Project</li> <li>&gt; Northwoods Improved Management Project</li> <li>&gt; Finite Carbon - The Forestland Group Champion Property</li> <li>&gt; Fair Oaks Dairy</li> <li>&gt; Duke Carbon Offsets Initiative - Loyd Ray Farms</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| VCS                      | <ul style="list-style-type: none"> <li>&gt; Katingan Peatland Restoration and Conservation Project</li> <li>&gt; India Sundarbans Mangrove Restoration project</li> <li>&gt; Kenya Agricultural Carbon Project</li> <li>&gt; Bethlehem Authority Improved Forest Management Project</li> <li>&gt; TIST Program in Kenya (grouped)</li> <li>&gt; ITAA afforestation on degraded grasslands under extensive grazing</li> <li>&gt; Anaerobic digestion at Animalia Genetics Ltd., Cyprus</li> <li>&gt; BRASCARBON Methane Recovery Project BCA-BRA-03</li> <li>&gt; COMACO Landscape Management Project</li> </ul>                                                                                                                                                                                                                                                                                                                                                         |
| PFSI                     | <ul style="list-style-type: none"> <li>&gt; Coatbridge Revegetation of Indigenous Forest</li> <li>&gt; Green Growth Revegetation on Indigenous Forest</li> <li>&gt; Native Forest Restoration Trust Honeymoon Valley Landcare Trust</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| NZ ETS                   | <ul style="list-style-type: none"> <li>&gt; Green Growth Pine Plantations</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Australian CFI           | <ul style="list-style-type: none"> <li>&gt; Berrybank Farm – Methane to Energy Project</li> <li>&gt; Kia Ora Piggery Methane Capture and Destruction Project</li> <li>&gt; Bindaree Carbon Project 2015</li> <li>&gt; Tallawang Carbon Sequestration Project</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

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|  | <ul style="list-style-type: none"> <li>&gt; Stanley Farms Mallee Plantings projects #1, #2 and #3</li> <li>&gt; Bongers Greycliffe-Jambin Wetland</li> <li>&gt; Paraway Pastoral Beef Herd Management Project</li> <li>&gt; CPC Beef Herd Project</li> <li>&gt; Grounds Keeping Carbon Project</li> <li>&gt; Evercreech Plantation Forestry Project</li> <li>&gt; Orana Farm Healthy Soils Project</li> <li>&gt; Central Arnhem Land Fire Abatement (CALFA) Project</li> <li>&gt; Moombidary Forest Regeneration Project</li> <li>&gt; Carbon Conscious Carbon Capture Project 2</li> <li>&gt; Yaloak Estate Soil Carbon Project</li> </ul> |
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## Appendix F List of interviewees

*Note: This study is primarily based on a literature review of peer-reviewed publications, reports and analyses, data from relevant project databases and, where applicable, on a thorough review of project documents, e.g. design documents, methodologies, and progress reports. On the more recent and smaller domestic schemes, literature was scarce, therefore the authors additionally relied on semi-structured interviews with policy experts, decision makers, verifiers, carbon agents and project owners. At the possible expense of subjectivity, the inputs from interviews provide a clear and more detailed picture.*

| Name               | Position and questions discussed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Time               |
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| Ole Emmik Sørensen | <p><i>Policy Expert that has been deeply involved with CDM.</i></p> <p>The interview questions were based on the insights and challenges that were found during the review of the CDM projects. During the interview the following issues with the CDM were identified:</p> <ul style="list-style-type: none"><li>&gt; Difficulty in <b>ensuring additionality</b> due to emission inventory that was predetermined</li><li>&gt; The MRV process is expensive and difficult and there is <b>mistrust between stakeholders</b> as far as governance goes</li><li>&gt; The <b>rate of return</b> is a major issue and is an overall problem with justifying CDM as a whole</li><li>&gt; Overall <b>miscommunication</b> issue and problems with uptake</li></ul> <p>Provided insights and advice for EU case going forward such as reduction in MRV requirements, specific inventories for each country, as well as creating a forum to help with issues of communication, etc.</p> | 07/03/19;<br>15:00 |

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| <p>Sam Wagstaff and Paul Ryan</p> | <p><i>Land and Outreach Branch, Climate Change Division of the Australian Department of the Environment and Energy, with main responsibility being ERF policy oversight and Methodology development</i></p> <p>Asked about the incorporation of <b>CFI into ERF</b> with the history of Australian government including the carbon tax abolishment, CFI, and the resulting ERF to incorporate more sectors (shift from private to public).</p> <p>Switch to question about methodologies and how the vegetation projects are mainly Australian focused with energy related projects more similar to the international schemes. In addition, the uptake of projects is based on financial viability and more methodologies have more uptake than others which is how the government structures its selection of <b>farm level mitigation actions</b>. Knowledge about uptake is evolving with new studies and information and scientific expertise is key for methodologies.</p> <p>Benefits of <b>carbon agents</b>:</p> <ul style="list-style-type: none"> <li>&gt; Help smaller farms join the scheme</li> <li>&gt; System of checks within the relationship as well as businesses will only hire carbon agents with a good reputation</li> <li>&gt; Agents provide information and operate on different parts of the scheme helping with information gathering</li> </ul> <p>Last point: investment in streamlining and making MRV more efficient for soil carbon.</p> | <p>27/03/19;<br/>7:30</p> |
| <p>Ollie Belton</p>               | <p><i>Private consultant works as a climate agent/intermediary for 200 private costumers under PFSI and advises the government on ETS</i></p> <p>Discussed mainly about the PFSI and the reasons for why it stopped. He gave an overview of the <b>barriers with PFSI</b> and what can be learnt from these barriers for the new scheme. Some of these barriers included:</p> <ul style="list-style-type: none"> <li>&gt; Participants lack confidence in the scheme due to the price volatility</li> <li>&gt; Compliance was quite difficult due to many small farms</li> </ul> <p>Discussion about permanence and additionality in reference to the PFSI (anything after 1990 under PFSI was considered additional as it is the base year). Smaller discussion at the end regarding <b>carbon agents</b> and that ETS relies on self-compliance.</p> <p>Asked about the change in switching from KP units to domestic units in the second stage of the KP:</p> <ul style="list-style-type: none"> <li>&gt; NZ was forced to stop due to the integrity of the international units</li> <li>&gt; Lack of quality in units due to lower restrictions on purchased ERUs</li> </ul> <p>Due to the fact that the KP units were no longer viable once NZ went domestic, foresters mostly were stuck with worthless units without warning</p>                                                                                                                                   | <p>03/04/19;<br/>8:00</p> |

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| Elizabeth Heeg and Simon Petrie | <p><i>Elizabeth is manager at the Ministry for Primary Industries (Operational Policy) with responsibility for forestry regulatory policy and implementation and Simon manages land registration and unit issuance processes.</i></p> <p>Overall discussion of ETS and the <b>discontinuation of PFSI</b> as well as the effect on <b>indigenous land</b> and the Maori. Reasons for new scheme include the ability for smaller farmers to participate and earn for maintained forestland.</p> <p>Key lessons learnt from the ETS:</p> <ul style="list-style-type: none"> <li>&gt; Increase in <b>usability and accessibility</b> to make it more available for those who could be informed about the benefits about the program</li> <li>&gt; Diversity of stakeholders is quite important to the scheme</li> <li>&gt; <b>Price changes</b> highly effect participation</li> <li>&gt; Finding a way to ensure that land that is bought or sold that is under ETS is still held accountable is key for the future</li> </ul> <p>Trying to find a happy balance in MRV between accuracy and ease of use</p> | 03/04/19;<br>22:00 |
| Cassandra Drotman               | <p><i>Accredited lead verifier for CCOP projects (livestock and rice cultivation)</i></p> <p>Extremely thorough description of the <b>verification process</b> as well as the role of CARB. Discussion was centered mostly around verification and very detailed steps from signing up to the final project approval. Key details of information were how the verification process could maybe deter certain projects due to the delays and drawn out process. Also brought up the issue of smaller farms not being able to uptake the scheme and how <b>aggregation</b> is not really a possibility.</p> <p>Small discussion about <b>non-financial benefits</b> such as environmental/social benefits and there is nothing specific in CARB methane methodology that discusses the benefits. She talked about the general benefits that would come from methane projects such as job creation and education.</p>                                                                                                                                                                                         | 16/04/19;<br>15:00 |
| Catherine Weber                 | <p><i>Accredited lead verifier for CCOP projects (livestock)</i></p> <p>Discussion that refrained from the technical questions of verification as we received that information from Cassandra Drotman. Centred around livestock projects and the fact that small and medium dairy farms are closing and the only dairy farms in scope of the scheme are large farms (there is an odour score required to get a permit). Many dairies have digesters in place at the start of the scheme (becoming mandatory in California) so are eligible under early action. This may cause an issue with additionality as well as <b>leakage</b> because farms are moving to Idaho to avoid the Californian requirement and then become eligible for the scheme (non-additional as would have been required to anyway in California).</p> <p>Brought up the issue of <b>monitoring and sampling</b> and how the process should be cheaper in order to see more</p>                                                                                                                                                      | 16/04/19;<br>16:00 |

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|                       | uptake. Also said that clients were disappointed to see Ontario leave the scheme.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                    |
| Christie Pollet-Young | <p><i>Accredited lead verifier for CCOP projects (U.S. forest)</i></p> <p>Discussion centred around U.S. Forestry, as she is a lead verifier for forestry. Specialised expertise needed for forestry and for the verification there are two main parts: the review of documentation and then there is the on-site visit (forest management, stratification and ownership). The field-based, sequential sampling has a very structured review system. <b>Sequential sampling</b> is prescriptive and rigorous of forests inventory and is stricter than other protocols and measuring trees for carbon is a huge change in the industry. It means people are doing inventory more often. Plots cannot be older than 12 years.</p> <p>The VCS grouped project is a system in which <b>aggregation</b> may work, but from verification point of view aggregation would be very difficult as it would involve multiple sources of verification and making a judgment on multiple sites with the function of crediting as a group would be very difficult.</p> <p>Industrial project owners are additional and can take the risk for the economic gain. If the mechanism didn't exist, the conservation organisation wouldn't have been able to fund and buy the land.</p> <p><b>Urban Forestry projects</b> are not viable because lack of credits and revenue. Hope is that the projects could be done at a very low cost. Until there is money allocated to measurement from California, there won't be projects any time soon.</p> | 17/04/19;<br>18:00 |
| Seth Baruch           | <p><i>Seth is the CEO of Carbonics, a company designed to streamline the registration and methodology process for offset project developers. He has worked on numerous methodologies within CDM and now works primarily in the voluntary market in California.</i></p> <p>Seth Baruch has had extensive experience in <b>methodology development</b> and the discussion was mostly centred around methodologies in CDM and California. Benefits between <b>Top-down vs. Bottom-up</b> were identified including the diversity that bottom-up allows. With regards to more specific details, he was asked about additionality and mentioned VCS and ACR are better for assessing additionality than CDM.</p> <p>Also asked about the <b>voluntary vs. compliance programmes</b> in California. He explained that the compliance program is very top-down and very limited with regards to protocol. Voluntary market has more experimentation and is more open. Freedom to develop different types of approaches. Voluntary market is a little bit oversupplied. Different varieties of different types of projects.</p>                                                                                                                                                                                                                                                                                                                                                                                                           | 23/04/19;<br>18:00 |

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| Liz, Geoff and Scott Adams | <p><i>Farming Family for over 100 years having multiple land uses including grapes, honey, sheep, beef, timber forestry, and carbon forestry. They have over 360 hectares of indigenous forest registered under PFSI.</i></p> <p>Overall discussion surrounding the beginning of their participation in the schemes, the barriers they encountered and what implications the various changes in the NZ scheme had on their land. Joined PFSI because of permanence and biodiversity (water quality). They have a good relationship with their climate agent and the help they receive with the default tables and PFSI units is necessary and does not include someone telling them what to do with their land. Mention of price fluctuation with regard to how often they receive rewards.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 03/05/19;<br>8:00  |
| Andrew Davis               | <p><i>Investor owning multiple forests registered under either the PFSI or ETS including planted forests and indigenous regeneration. Andrew has been involved in carbon forestry for almost a decade.</i></p> <p>Andrew is a private forest owner who relies solely on income from credits. He buys established forestland in order to begin earning credits as soon as he purchases and registers the land. The registration process he said is smooth and does his own measurements which are always accepted to the scheme. In discussing <b>barriers</b>, he mentioned the price of carbon dropping to 2 NZ dollars and the fact that in order to purchase land you need a fair amount of <b>initial capital</b>. This makes it difficult for individual investors like him to enter the scheme. One improvement he thought would be good for the scheme is the inclusion of a mechanism such as a price floor that would help when the price fluctuates. It is his main source of income and so it left him exposed.</p> <p>Discussed the <b>difference between ETS and PFSI</b> over the span of the interview and he said the main difference is the credits and the harvesting restrictions under PFSI. Mentioned <b>ford contracts</b> as well that acts as a stabilizer for price fluctuations.</p> | 06/05/19;<br>9:30  |
| Olivia Herzog              | <p><i>Programme Officer Sustainable Food and Sustainable Business Development WWF Austria</i></p> <p>Due to limited information on the Healthy Soils for Healthy Food project, the interview constitutes the main source of information of the file card A.9 and was centered around questions concerning</p> <ul style="list-style-type: none"> <li>&gt; governance structure and responsibilities;</li> <li>&gt; the recruitment of Austrian "humus farmers" and plans of inclusion to other countries;</li> <li>&gt; the selection of activities that will result in enhanced SOC content;</li> <li>&gt; MRV and who is bearing the costs;</li> <li>&gt; the mitigation of socio-economic and environmental risks;</li> <li>&gt; stakeholder reaction.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 06/05/19;<br>15:00 |

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| <p>Laura Höijer</p>   | <p><i>Content director Baltic Sea Action Group that initiated the Carbon Action project</i></p> <p>History and the onset of the Baltic Sea Action Group. How it came about and how the financial reward will look like for farmers in the future:</p> <p>Plan is to work closely with <b>CAP and private market</b> as well. Many different sectors in place that could help with the project and research. In 2 years maybe, there will be an approach to verify carbon. No model yet, they need the scientific work behind building a model.</p> <p>Major lesson learned: find motivation for farmers to work with this. The companies are already quite willing to scale up this program and seem to understand that there is a win-win behind the program (financial as well as biodiversity aspect). They are waiting for the farmers to show their support. They want the farmers to be the heroes in order to show a positive spin.</p> <p>With regards to MRV, Valio is the biggest milk producer and is coaching carbon farmers and educating about carbon farming and measurement of carbon for reward. Training started in April (5,000 farmers now) and has been very helpful as the Group is small and does not have capacity to conduct all training.</p> <p>Asked about selection for <b>mitigation activities</b> such as reduce tillage, crop rotation, etc. They were picked during training programs and by research from scientists who have been farmers themselves even and international schemes. Want to work more with carbon farming approaches due to lack of funding and could have potential to work with other initiatives.</p> <p>Discussion about policy context – CAP and EU policies and how their group can fit into the larger picture. Very eager to have results and cooperate with more programs and larger policies.</p> | <p>07/05/19;<br/>9:15</p>  |
| <p>Joshua Strauss</p> | <p><i>Vice President Bluesource, project developer for the North American carbon market</i></p> <p>Bluesource typically chooses <b>improved management projects</b> as reforestation or avoided conversion projects are more difficult to generate credits right away (time for regrowth). Discusses how buyers of credits are willing to pay more for projects where there are benefits that go beyond the financial ones (biodiversity management etc.) Small mention of aggregation and how it is difficult for compliance. Went onto the discussion of international scheme inclusion and Quebec program. It is hard across Canada/US borders to sell and share projects due to political reasons. Believes inclusion of <b>REDD</b> could be good but only if the integrity of the credits remains.</p> <p>Asked about <b>risk factors and leakage</b>. Looked at risk across the U.S. with risk percentages and then take off that amount from credit issuance. He believes that this could be much more specialised based on region. For example, they are taking same forest fire deduction in Michigan as</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <p>07/05/19;<br/>19:30</p> |

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|                     | <p>California which does not make sense. Currently <b>default factors</b> and they update the protocol every 5 years but not necessarily the default factors. You can get a deduction from these default numbers if you prove you have special practices in place that prevent these risks. Buffer pool is registry wide insurance scheme.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                      |
| Sandy Crichton      | <p><i>Trust Manager for Native Forest Restoration Trust where 7,000 hectares of forest is maintained</i></p> <p>Crichton is the trust manager owning 7,000 hectares across NZ where main income source is carbon income and the rest is fundraising. Most money goes towards possum and pest management. Discussed the <b>selection process</b> for land where the main criteria are ecological value and connectivity to other lands within the trust. Relies on <b>community support</b> to volunteer to maintain the land – Honeymoon valley land care for example does working days to take care of the land.</p> <p>The trust became aware of the fact that <b>PFSI would be incorporated into ETS</b> so applied for ETS credits before this happened. Had difficulties as well under PFSI where they were overrewarded credits that had to be paid back in the next crediting period.</p> <p>The issue now is that they always have eager buyers for their units so obtaining more credits the better and would like to see ETS have a method to rank credits to make them more attractive to buyers (more <b>permanent credits</b>, etc.). The trust puts a QE2 <b>covenant</b> on the land meaning that it will never be developed. PFSI had a covenant that was removed under ETS so incorporating a new permanence safeguard like this would be helpful. A positive with ETS is that forest owners will not be required to have their own <b>insurance</b>, the government will cover things like forest fire.</p> | 09/05/2019;<br>8:00  |
| Jean-Baptiste Dolle | <p><i>Head of Environmental Service section, Institute for Livestock Farming (idele)</i></p> <p>Very detailed description of idele and the development of two projects for carbon crediting. These projects along with another, Ferme laitière Bas Carbone, led to Carbon Agri, a methodology to assess carbon emissions in a whole farm approach as the first agricultural methodology developed in France. Initial uptake was difficult, but with education able to spark interest especially due to efficiency improvement. There are 45 mitigation practices with 45% being cost-effective. The project would allow for the merging of small farms to participate.</p> <p>Data comes from CAP Direct Payment applications along with the national inventory in France.</p> <p>Going forward the project aims to develop a payment system for farmers and encourage more farms to participate as well as to mobilize financing on a larger scale (already 6 countries involved).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 26/07/2019;<br>11:30 |

|                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                              |
|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| <p>Samuel Danilo</p>                                 | <p><i>On-Farm advisor for CBEL, responsible for the section, "Technic, Strategy, Systems, Farm economics and Performance indicators"</i></p> <p>Discussion about choosing appropriate <b>mitigation actions</b> through farm visits 6-12 times a year. Has extensive knowledge about the farms within the program and provided insight into measuring environmental and financial benefits. He says that socio-economic benefits are the most difficult to measure. The current estimation model is difficult to understand with regards to <b>carbon sequestration methodology</b> and needs improvement going forward for farmer support. In general, the model they are using CAP'2ER has demonstrated that there has been major improvement in nitrate management with diet being the most common mitigation action.</p> <p>Going forward, Samuel thinks that continued education is important for actions beyond what is already being done to be adopted by farmers and the ones that don't prove to be economically effective will not be easy to put in place. Discussion of future with regards to lack of funding for the project and the need for <b>private sector involvement</b> as well as the development of a methodology.</p> | <p>31/07/2019,<br/>14:00</p> |
| <p>Julia Grimault<br/>and Gabriella<br/>Cevallos</p> | <p><i>I4CE, Territories and Climate</i></p> <p>Large overview of the I4CE history as well as plans for the future and expectations from the programme. Started with how the programme went through many iterations before being finalized through the help of stakeholders and the Ministry. Made clear that this was not developed as another private scheme, but as a policy tool. Made sure the Ministry was involved through every step of the development process.</p> <p>Discussed what led to the details specified in the forestry methodology and expected uptake of the programme itself. The buyers are most likely to be big companies without an offsetting focus as offsetting as it has the image of greenwashing (only in France). The discussion of methodologies led to a few sources and options regarding hedges and how to credit them with a few small programmes attempting methodologies currently.</p> <p>The main issues of the programme are still going to be to update the MRV costs issue, streamlining communication regarding the benefits of offsetting, as well as the determination of the price of CO<sub>2</sub>e.</p>                                                                                     |                              |

## Appendix G Carbon Farming Schemes in Europe – Roundtable 9<sup>th</sup> October 2019

The 'Carbon Farming Schemes in Europe Roundtable' was used to gather expert stakeholder input on different carbon farming schemes and respective barriers as well as potential solutions. Based on this stakeholder consultation, a range of carbon farming schemes were chosen, and fiches were developed for further exploration and testing in case studies (chapter xxy).

More than 75 stakeholders came together at the Carbon Farming Schemes in Europe Roundtable on the 9<sup>th</sup> of October 2019 in Brussels. The presentations and discussions explored existing examples of relevant European schemes and projects and discussed how these could be scaled up across Europe. The Roundtable offered a chance for stakeholders to discuss the most promising options for result-based carbon farming schemes in Europe, with the aim of informing the further exploration of carbon farming scheme options in Europe.

The 75 stakeholder participants came from across Europe and represented NGOs, farming associations, local, national, and European governments, science, and industry, while representing the leading academic, policy, and practical experts on this topic. In addition, live web streaming enabled a further 364 external viewers to follow discussions and to raise questions. There was overall agreement that the discussed scheme options cover the main opportunities for carbon farming within the European context. The selection of case studies is further validated by participant's interest in continuing to contribute to the project in the case study phase or to remain informed (see Figure 1).

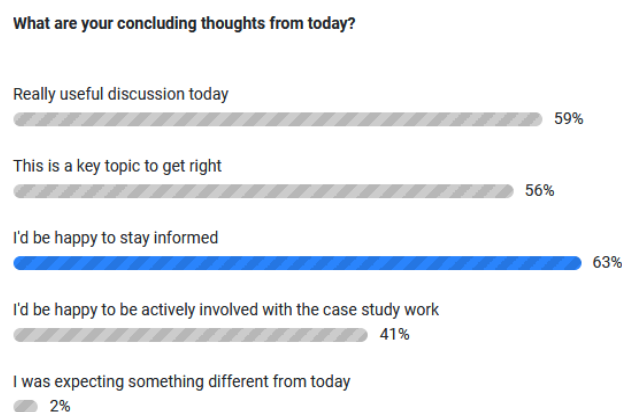
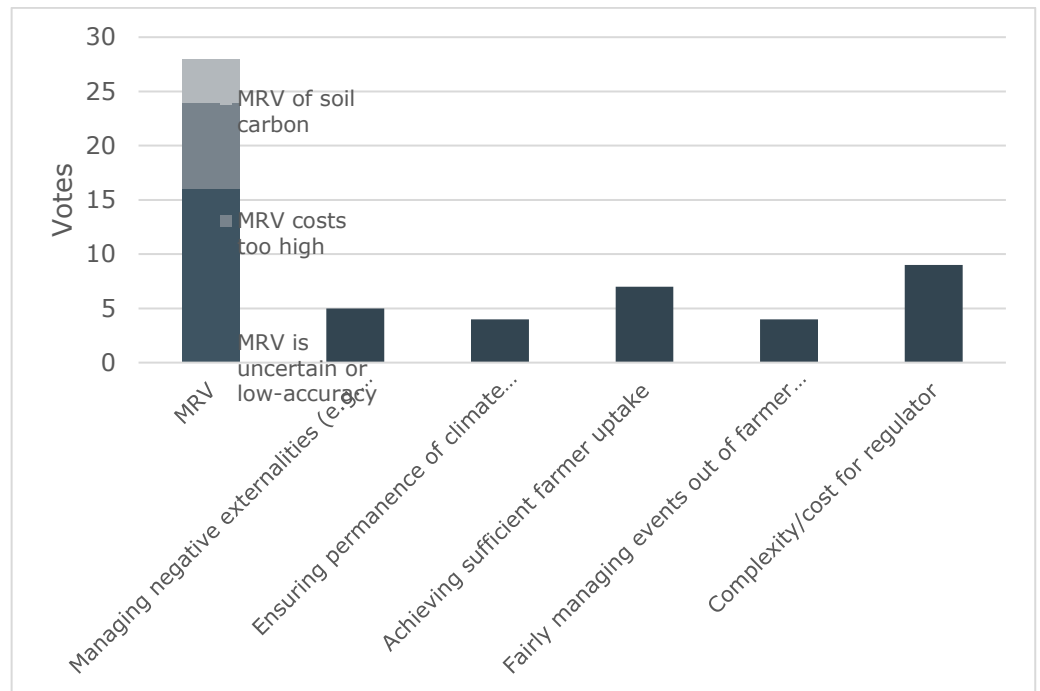


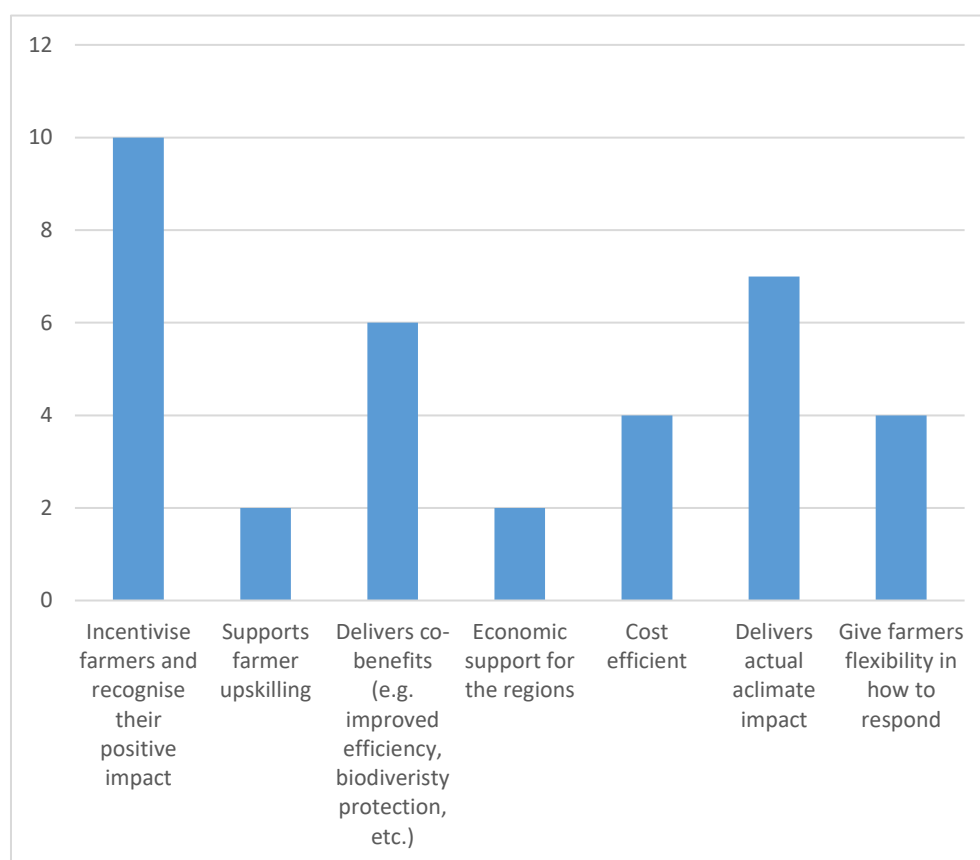
Figure 13 Roundtable participant survey results.

Carbon farming workshop participants also validated the selection of main barriers and solutions. As well as in the expert presentations on existing schemes, participants were asked to identify key challenges posed by carbon farming schemes. Figure 2 groups their open responses into overarching themes. They identified that measurement and monitoring, reporting, and verification (MRV) posed the biggest challenge, both in terms of accurately measuring the impact of climate actions, and the costs of doing so; soil carbon MRV was separately mentioned by four participants. They also identified that beyond MRV, carbon farming schemes pose new, complex, and potentially expensive challenges for the regulator/administrator. The third most commonly identified challenge was achieving sufficient farmer uptake, i.e. getting farmers engaged, trained, and participating.



*Figure 7 Main challenges/barriers for result-based carbon farming schemes (with breakdown of specific MRV challenges), identified by Roundtable participants.*

Carbon farming workshop participants also delivered a positive message regarding general potential benefits of result-based carbon farming. Figure 3 categorises the main advantages identified by Roundtable participants. The main advantage was seen to be that it incentivises climate-friendly farming and recognises and rewards farmers for their socially beneficial actions. A second key advantage is that result-based carbon farming will deliver actual, verified climate impact. The ability of such schemes to incentivize win-win actions that deliver environmental co-benefits, including biodiversity and improved farm efficiency was identified as a further advantage scoring highly.



*Figure 8 Main advantages of result-based carbon farming schemes, identified by Roundtable participants.*

As well as validating the preparatory work conducted in Task 2 before the Roundtable, the workshop discussions and expert presentations also provided details on barriers faced in different existing schemes and identified potential solutions, as well as pressing issues to be explored in the case studies. These will be discussed in the next sections.

<sup>i</sup> European Commission (2019). The European Green Deal. Brussels, 11.12.2019 COM(2019) 640 final

<sup>ii</sup> EU climate tracking is done using markers, adapted from the OECD's so-called assistance tracking 'Rio markers' to quantify financially how different policy measures make a make a significant (100%), a moderate (40%) or insignificant (0%) contribution towards reaching climate change objectives. In its opinion on the Commission's CAP draft legislation the European Court of Auditors has been critical of how the contribution of certain policy measures to climate mitigate and adaptation - in particular basic income support instruments - has been justified as making a clear contribution without a clear evidence base. See ECA (2018). Opinion No 7/2018: concerning Commission proposals for regulations relating to the Common Agricultural Policy for the post-2020 period. Luxembourg: European Court Auditors.

- iii European Commission (2018). Proposal for a Regulation establishing rules on support for strategic plans to be drawn up by Member States under the Common agricultural policy (CAP Strategic Plans) COM/2018/392 final - 2018/0216 (COD)
- iv For further information see Meredith, S., and Hart, K. CAP 2021-27: Using the eco-scheme to maximise environmental and climate benefits. Report by IEEP for IFOAM EU, Brussels. Pe'er G et al. (2019). A greener path for the EU Common Agricultural Policy. *Science* 365, 449-451; Lampkin et al. (2020). Using Eco-schemes in the new CAP: a guide for managing authorities. IFOAM EU, FIBL and IEEP, Brussels.