Guidance on minimum requirements for high-integrity soil carbon markets in the UK
Version 1.0

Background

This document accompanies a draft report on minimum requirements for high-integrity soil carbon codes in the UK (Minimum Requirements). The Minimum Requirements were prepared to help shape the development of agreed standards for investment in soil carbon in the UK. They were developed with funding from the Environment Agency's Natural Environment Investment Readiness Fund (NEIRF), which seeks to create a pipeline of nature projects ready to operate on private sector investment and support innovation and development of high integrity ecosystem service markets. The report and this guidance document were prepared with input from the Environment Agency and in consultation with the policy officials from the UK and Devolved Governments to maximise policy relevance.

Introduction

This Guidance provides additional context and rationale to what is contained in the Minimum Requirements report. The Minimum Requirements provides criteria for evaluating Soil Carbon Codes, and is intended to be updated periodically as the market evolves. Users should ensure that they have the most recent version of both the Guidance and the Minimum Requirements. All capitalized terms are defined in the glossary at the end of both this Guidance and the Minimum Requirements. Some sections of this Guidance do not have background or context beyond what is in the Minimum Requirements. This guidance can be applied to all UK Soil Carbon Codes and is relevant to projects containing a single farmer to aggregated projects including multiple farms.

1.0 Governance Framework

Implementing the Minimum Requirements will require an Organisation to evaluate UK soil carbon codes (Codes), defining how evaluations are conducted, decisions reached, support given to Code developers and updates are made to the evaluation process.

2.0 Evaluation framework

All Codes evaluated under the Minimum Requirements need to meet the requirements in this section. Codes need to have a clear governance and ownership structure. This includes updates to the Code and a process for resolving disputes with the requirements of the Code. The Minimum Requirements should be seen as the minimum expectation for the governance and measurement, reporting and verification (MRV) of any Soil Carbon Code, however Codes are encouraged to go beyond these requirements, enabling them to differentiate themselves from other Codes operating in the UK.

2.1 Evidence Required for All Codes:

2.1.1 Quality of evidence underpinning eligible Practices, demonstrating the likelihood of soil carbon sequestration or emissions reduction in eligible project types/locations

There are many agricultural practices that are being promotes where the scientific basis is either limited or still evolving. Because carbon markets represent payments to implement practices that generate Net

Carbon Abatement, the scientific evidence supporting the effectiveness of the practices is critical. In addition, practices proposed for application in the UK must be shown to be effective in UK pedo-climate and agricultural systems. Some practices may be effective on crops or geographies that are not applicable to the UK. The evidence in the Minimum Requirements was written to allow maximum flexibility in the data to support a Code while maintaining scientific integrity, providing a range of alternative approaches providing they meet relevant standards of rigour, rather than taking a narrow, prescriptive approach.

2.1.2 Evidence from pilot projects to demonstrate the functionality and integrity of all key code structures and processes

Many pilot Codes have been designed without farmers or practicalities of agricultural practices in mind. These Codes have not been implemented by farmers and typically no credits have been issued by these Codes. Rather than evaluate Codes that have not been piloted with farmers, the Organisation implementing the Minimum Requirements will only evaluate Codes that have been piloted. Piloting does not mean that a project must have created and issued credits. However, it does mean that the registration, validation, MRV and governance processes have been tested and determined by farmers and farm advisors to be technically appropriate and practical across the proposed region of application.

2.1.3 Evidence for GHG emissions reduction and soil carbon sequestration

The carbon–nitrogen cycle associated with agricultural systems are complex. For example, implementing a practice that decreases methane (CH_4) emissions could have the potential to increase nitrous oxide emissions. Therefore, the Minimum Requirements state that Codes must include a comprehensive assessment of all GHG emissions associated with implication of a new practise. This includes changes to total SOC stock, rate of change in SOC stock, as well as emissions of CH_4, nitrous oxide (N_2O), and carbon dioxide (CO_2) from across the fields in the project.

2.1.4 Evidence that codes comply with UK legal and regulatory frameworks

A practice that is required to be implemented by UK laws and regulations should not be rewarded financially by Codes because this practice should have happened anyway and is therefore not additional. This is why all Codes require an assessment that projects comply with all relevant local, regional, national or UK laws and regulations. Furthermore, a project should not be able to generate revenue if they are not in compliance with laws and regulations that have an impact on the project. Some laws and regulations may not have a direct impact on Net Carbon Abatement and many minor infractions are common in complex farming systems. However, Codes need to establish clear criteria both for a review of applicable laws and regulations as well as a determination of what violations of laws and regulations would prohibit the generation of Soil Carbon Credits.

2.2 Minimum requirements for code specification:

2.2.1 Additionality criteria (and how these allow stacking where they are met)

Additionality is defined as practices that are implemented by a farmer and are above and beyond “business as usual,” exceed the Baseline, and are not required by regulation. The Baseline scenario are the land use and management practices that were in place prior to the implementation of new Practices that result in Neta Carbon Abatement. Unfortunately, this definition excludes many progressive farmers who implemented practices before there was a Code or carbon market. These farmers deserve credit for their initiative. However, the carbon market is not the appropriate mechanism to reward these farmers.

Governments and civil society should work together to determine appropriate rewards for these farmers.

Farmers who have not implemented new Practices that result in Net Carbon Abatement may be hesitant for a variety of reasons including monetary compensation, social pressures, lack of knowledge, cultural customs, and business risk. Carbon markets have emerged to provide the incentive for farmers to implement practices that increase Net Carbon Abatement. The Minimum Requirement to determine if a project is additional is that the financial payment was part at least of the decision for the farmer to implement a new practice or practices.

Because carbon markets are a monetary driver of implementing change in agricultural Practices, a historic review of fields is necessary at the start of a project. This is to prevent farmers from reversing practices that were implemented in order to implement them again in the future to participate in carbon markets. This is called the Review Period. The Review Period needs to be prior to the starting date of the Baseline Scenario. If the Baseline is four years (the minimum required in the Minimum Requirements) and the Review Period is also four years (also the minimum required in the Minimum Requirements), project developers will need to collect eight years of historic field records. It is worth noting that the Review Period only needs to confirm that the practices that are part of the Crediting Period were not implemented during the Review Period.

2.2.2 Quantification of credits

Codes that generate Soil Carbon Credits need to take a conservative approach to quantification. The Codes need to consider the uncertainties in measurement and modeling in the process of awarding credits.

Codes may refer to the credits they generate as credits, offsets, units, certificates, or another term. While there are nuances in how these credits are used, ultimately, a Soil Carbon Credit represents the Net Carbon Abatement of one metric tonne of carbon dioxide equivalent (tCO_2e). How those Soil Carbon Credits are exchanged or traded can vary as long as the unit that is generated is equivalent to a tCO_2e.

2.2.3 Permanence

Permanence was one of the more challenging concepts encountered in the development of the Minimum Requirements. The balance that was struck was between the willingness of farmers to use Codes with the requirements to reduce atmospheric levels of CO_2. The Minimum Requirements set ten years as the minimum permanence period. As stated in the additionality section, there are many barriers farmers face in the implementation of new Practices and we did not want to add an additional barrier that would discourage the participation of farmers in agricultural soil carbon markets. According to our research of UK farmers, more than half of farmers are willing to accept a permanence period of ten years.[1]

Because this is a complicated and challenging requirement, Codes need to be clear about the permanence periods and requirements to protect and maintain permanence after the crediting period has finished. Codes should clearly communicate all their requirements, including those relating to permanence.

[1] Phelan, L., Champman, P., Ziv, G. (in review) Reconciling farmers' expectations with the demands of the emerging UK agricultural soil carbon market

2.2.4 Mechanisms to address unintended reversals of net carbon abatement

To maintain the permanence, Codes need to have a mechanism to replace Net Carbon Abatement that is lost as a result of events beyond the control of a farmer, such as floods and droughts. The most common options are buffers and insurance products.

Buffers are created by taking a portion of credits, typically between 5 and 20 percent, at the time of issuance and placing them in a separate account. This account is used to replace any credits lost during the permanence period resulting from unintended reversals.

Insurance products are third party contracts where the project pays an entity to cover any unintended reversals. These products either replace the reversed credits or compensate the purchaser of the credits so that the total Net Carbon Abatement remains the same.

2.2.5 Replacement of unintended reversals

Codes have flexibility in designing systems to replace credits that have been subject to unintended reversals. The Minimum Requirements provides details on the elements that must be considered in the compensation of reversals.

Codes can create buffer pools at a project, Code, or program level. Project level buffer pools protect individual projects from reversals. If the project buffer is exhausted, the project will need to implement additional measures to replace reversed credits. Buffers for all projects generated under a Code allow all projects to share in the buffer pool. The logic of this approach is that an unintended reversal, such as a drought, will not impact all projects and the buffer will be able to compensate for losses over the program. The broadest buffer approach is to include all nature-based credits in a single buffer pool. In this case, woodland, peatland, and soil carbon credits all contribute to the same buffer pool and any category of project can withdraw credits from the buffer pool. For example, an unintended reversal of a woodland project from a fire could be replaced by a Soil Carbon Credit.

Insurance products operate on a similar approach to buffers. The primary difference is that insurance pools are composed of financial contributions rather than the contribution of credits. Like buffer pools, insurance pools need clear criteria to determine the cost of the insurance product and a process for compensating the buyer of the credit in the event of an unintended reversal.

2.2.6 Intentional Reversals

There are legitimate reasons a farmer may have that require the reversal of implemented practices. For example, farmers may need to till to maintain soil health. Codes should include provisions to determine how much Net Carbon Abatement is lost by an intentional reversal and a process to compensate buyers for the same quality and value of reductions. In addition, Codes need to ensure their approach results in no net harm to the environment. This is particularly true for intentional reversals. The credibility of the Code, the soil carbon market, and the carbon market rely on Codes that result in Net Carbon Abatement regardless of events that transpire, no matter how severe.

2.2.7 Assessing and accounting for leakage

When assessing and accounting for leakage, it is important for the Code to consider the boundaries of the project. There are two different types of leakage – activity shifting leakage and market shifting leakage. Activity shifting leakage occurs when a new Practice is implemented on one of a farmer's or project's field and a more intensive practice occurs on another field. For example, a farmer might reduce

the inorganic fertiliser used on a set of fields, but increase the amount used on others to hedge against potential decreases in yield (for more on sustained yield losses, refer to the Minimum Requirements). Activity shifting leakage can be addressed if all of a farmer's fields are included in a project even if all of the fields do not implement new Practices.

Market shifting leakage occurs when practices are implemented on a field within a project which then cause a field outside the project to implement more intensive practices to make up for the potential loss in yield from the fields on which the new Practices were implemented. Market shifting leakage could happen anywhere outside the project, including locations in countries thousands of kilometers away from the project. This type of leakage is nearly impossible to calculate or predict. To address these concerns, the Minimum Requirements requires Codes to "provide criteria for and prohibit a sustained and material reduction in yield compared to the regional average."

2.2.8 Accreditation

The independent verification of new Practices in a project are a critical component to ensure the quality of a project. This independent verification must be carried out by an accredited Validation and Verification Body (VVB). This body must be accredited by UKAS or the relevant National Accreditation Body for the county in which the project is located.

2.2.9 Appointment of validation and verification bodies/experts

Codes are required to maintain processes for the approval of VVBs. Codes should also maintain a list of approved VVBs and the time period for which they are approved. Because many VVBs also perform consulting services for participants in carbon markets, Codes should have a conflict of interest (COI) statement as a part of the documentation for every project.

2.2.10 Project validation and verification

All projects require an independent validation at the beginning of the project and an annual verification prior to the issuance of credits. The results of the verification or validation can be an approval or denial of the project, but may also be a conditional approval as long as certain updates, changes, or modifications are made to the project documentation. Conditional approvals are only appropriate if the project meets the general requirements of the Code and only needs minor updates to conform to the requirements. Significant deviations from the Code would not warrant a conditional approval.

The Code should provide guidance about the evidence necessary to support the validation or verification of a project. This could include the use of remote sensing, desk audits, and the review of a sample of project data. Codes should be clear about the requirements for the evidence, such as, the types of satellite images that are allowed or the conditions under which they can be used.

2.2.11 Stakeholder engagement by projects

The engagement of relevant parties is critical to the support of projects. This could include the farmer, landowner, local and regional regulatory bodies, and environmental groups. In addition to guidance about who should be included in the stakeholder process, the roles and authorities of the relevant parties should be clear. For example, under what circumstances could a project be prohibited based on the feedback of an environmental group?

2.2.12 Registries

Transparency is an important requirement for all participants in carbon markets. Registries provide multiple roles in the oversight of the market. They are typically not-for-profit organizations with a mission to oversee the generation and management of credits generated by Codes, at a minimum. Registries maintain databases of projects and their associated data, for example to prevent double counting and facilitate robust secondary markets. These databases provide transactional data, such as, how many credits have been issued, if the credits have been transferred between parties, how many credits have been retired, and how many credits are in the buffer account, if buffer accounts are used. The database is also a repository of all the documents associated with the project. This could include the initial listing documents, monitoring plans, annual monitoring reports, verification opinions, and maps of projects.

The owners of the Code are responsible for choosing a registry for their Code and maintaining and updating their Code. They are also responsible for reviewing and approving any variances to the Code requested by projects.

2.2.13 Know your customer (KYC) and anti-money laundering checks

Because Codes are market-based mechanisms, there is the potential for the participation of fraudulent parties in the market. This is why the Minimum Requirements require that Codes include processes for the identification of market participants prior to the exchange of money.

2.2.14 Co-Benefits

Many of the practices included in Codes provide benefits beyond Net Carbon Abatement. The reduction of the rate or changes in the form of fertiliser could improve water quality. The implementation of no till could create habitats that increases the biodiversity of organisms in the soil. Codes should evaluate such co-benefits, attempt to quantify them, and provide recognition for those projects that do provide additional environmental benefits.

2.2.15 Resale of carbon units

No additional guidance.

2.2.16 Crediting period

Crediting periods have been created by Codes to allow projects certainty of the requirements for multiple years. If the requirements in a Code change frequently, it is burdensome for developers to generate credits for a project and creates uncertainty about the potential revenue that the farmer could generate. Allowing projects to use a version of the Code for multiple years provides certainty in the development of credits and allows farmers to quantify their revenue over the Crediting Period.

2.2.17 Land ownership

Land ownership in the UK is complicated with a wide range of land tenancy and rental agreements for the use of farmland well as different landowner-farm manager operations. Codes should include guidance and processes for projects that are implemented on fields which may change hands during the Crediting Period or Permanence Period, through sale, tenancy, or rental changes.

2.3 Minimum requirements for MRV

2.3.1 Data collection and recordkeeping requirements

No additional guidance.

2.3.2 Construction of baselines

The Baseline of a project does not need to be flat or linear. However, the baseline should be evaluated for every representative area of the project, through modelling and measurement. The baseline could increase or decrease over time depending on the trends for a given field in absence of the interventions implemented by the project. To generate credits, Codes should award credits based on the difference between the baseline scenario and the project scenario.

2.3.3 No net harm

Just as Codes should evaluate the co-benefits associated with the implementation of new practices, they should also evaluate the potential trade-offs of the practices. For example, the application of sewage sludge to fields could contain microplastics and pharmaceuticals, which decreases the soil health of the field. Another example of evaluation of no net harm are changes in fertilizer application that impact water quality and fish populations. A comprehensive consideration of harms to the field or the region should be part of the development of Codes and the implementation of projects.

2.3.4 Soil testing requirements

Quantification of the SOC stock (t ha^{-1}) requires the measurement of both soil organic carbon content (SOC%) and soil fine dry bulk density (g cm^{-3}) to defined soil depths (cm).

Combustion elemental analysis is the globally recognised method to quantify SOC% on sieved soil (<2mm) with removal of soil inorganic carbon content prior to combustion. This provides a direct measurement of carbon by the production of CO_2 from the combustion of a soil sample at high temperatures. This differs from loss-on-ignition which is a method commonly used to measure soil organic matter content.

Soil fine dry bulk density (g cm^{-3}) is the measure recommended in IPCC guidance (2019) for SOC stock assessments. This is different from total soil bulk density which is used as a common measure of soil compaction. Soil fine dry bulk density is calculated from the mass of sieved soil (< 2mm) in a known volume of soil taking into account soil moisture content and the volume of stones (> 2mm).

In both instances, other methods can be used if it can be demonstrated, prior to use in the project, that they have been adequately calibrated to the 'standard' methods outlined above with prediction uncertainty reported and accounted for in the quantification of credits.

Because there are a wide range of soil sampling approaches, the Minimum Requirements do not recommend specific sampling approaches. Codes may specify soil sampling requirements based on appropriateness to the practices, crops, and geography included in the Code. Sample sites should be randomly selected across the project but should consider the differences in geography and cropping systems to obtain representative samples. Approaches such as stratification may be included if the Code developer considers that they will provide greater accuracy to the quantification of Net Carbon Abatement from the project.

The measurement of soil carbon stocks should be carried out to depth, ideally below the influence of management to ensure that changes in both SOC% and soil bulk density can be accounted for. Equivalent soil mass (ESM) should also be applied in monitoring for change in SOC stocks to ensure that changes in bulk density do not over- or under- estimate changes in soil carbon stocks.

Laboratories that are used to analyze soil samples under a Code should have the appropriate and relevant ISO accreditation for analyses being conducted. For example, most Codes are expected to require the use of ISO 10694:1995 on soil quality analysis.

Throughout, uncertainty associated with the use of sampling and analytical methods and mathematical approaches should be documented and considered in the quantification of credits.

2.3.5 Soil carbon and GHG emissions modelling requirements

No additional guidance.

2.3.6 Data retention

No additional guidance.

3.0 Glossary

- **Additionality:** Practices implemented by a farmer that are above and beyond "business as usual," exceed the baseline, and are not required by regulation.
- **Baseline scenario (Baseline):** The land use and management Practices that were in place prior to the implementation of Practices. The baseline (or reference) is the state against which change is measured.
- **Buffer Pool:** A holding account of Soil Carbon Credits used as a general insurance against unintended reversals of Net Carbon Abatement.
- **Carbon dioxide equivalent (CO_2e):** The quantity of a given GHG multiplied by its total Global Warming Potential. This is the international standard unit for comparing the degree of warming which can be caused by different GHGs.
- **Calibration:** The process of confirming that a model can reliably predict the project environment under consideration by comparing model outputs with empirical data from and / or representing the project environment.
- **Code:** A standard, methodology, protocol, or scheme that quantifies, monitors, reports, and independently verifies Soil Carbon Credits.
- **Crediting Period:** The time period during which Soil Carbon Credits are generated.
- **Discounting:** The practice of issuing less credits than are quantified to be conservative and ensure that the project is a net benefit to the climate.
- **Greenhouse Gas (GHG):** Carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulphur hexafluoride (SF_6), hydrofluorocarbons (HFCs), or perfluorocarbons (PFCs).
- **Insurance:** Products or mechanisms purchased by the project to protect against Unavoidable and Intentional Reversals of Soil Carbon Credits.

- **Intentional Reversal:** Any reversal that is due to the project's negligence, gross negligence, or willful intent within the project boundary.
- **Leakage:** This refers to an increase in GHG emissions or a loss in SOC that occurs as a result of the project's activities but beyond the scope and/or boundaries of the project's quantification of Net Carbon Abatement, e.g., crop yield reductions or intensification of land management.
- **Monitoring:** The process of collecting data, tracking and analysing information over time and overall implementation progress, with the purpose of providing information for reports.
- **Net Carbon Abatement**: SOC stock increases, reduced SOC stock loss, soil derived GHG emission reductions or a combination thereof.
- **Permanence period:** The time period following the crediting period in which soil carbon is retained.
- **Practice:** A change made on a field that is intended to increase Net Carbon Abatement in a project.
- **Project:** A Project is a set of specific fields and/or farms where specific new Practices are implemented using a clearly defined and quantified Baseline. All these requirements must be defined in the Code. All fields managed by the farmer must be included in a Project, but new Practices do not need to be implemented on all fields.
- **Project Boundary:** The fields or the area of land within the geographic boundaries of a project.
- **Reporting:** The document prepared prior to the issuance of Soil Carbon Credits includes quantification of SOC stocks, GHG emissions and monitoring results. Reporting should be done in a public and transparent manner.
- **Resale / trade (of credits)**: Soil Carbon Credits can be exchanged between entities after issuance by a registry and until the credits are retired.
- **Retirement (of credits)**: The transfer of a Soil Carbon Credit to a retirement account. Retirement is a permanent state where the Soil Carbon Credit cannot be transferred or retired again.
- **Review Period**: The period of time prior to the Baseline scenario where the implementation of Practices is evaluated. Projects that implement new Practices during the Review Period are ineligible for crediting.

- **Soil Carbon Credits:** A fungible instrument that represents the increase in soil SOC stock, and/or decrease SOC stock loss and/or reduce GHG emissions from agricultural soils. Credits are measured in metric tonnes of carbon dioxide equivalent (CO_2e).
- **Soil Organic Carbon (SOC) stock:** The total amount of organic carbon measured or modelled in the soil for a given area and depth within a project, measured in ton/ha.
- **Unavoidable Reversal:** The loss of Net Carbon Abatement quantified through Soil Carbon Credits resulting from actions not in the direct control of farmers, such as natural disasters including drought, extreme temperatures, fire, and floods which can release GHGs and/or reduce SOC stocks.
- **Validation (model):** The process of evaluating the performance of model predictions relative to empirical data.
- **Validation (project):** The review and approval that a project meets the requirements of a Code.
- **Verification:** The third-party, independent process used to ensure that a project's GHG emissions or emission reductions have met the minimum quality of the Code for calculating and reporting GHG emissions and emission reductions.