



AGREENACARBON PROJECT

Agreena

Document Prepared by Agreena ApS

Project Title	AgreenaCarbon Project
Version	1.1
Date of Issue	20 January 2023 this version of the document issued
Prepared By	Karolina Kenney, Tomasz Kowalczewski, Petros Georgiadis, Julie Karl Koch Fahler
Contact	Langebrogade 3F, 3. sal 1411 Copenhagen K Denmark +45 39 46 72 75 Karolina.kenney@agreena.com , www.agreena.com

CONTENTS

1	PROJECT DETAILS	4
1.1	Summary Description of the Project.....	4
1.2	Sectoral Scope and Project Type	6
1.3	Project Eligibility	6
1.4	Project Design	6
	Eligibility Criteria	6
1.5	Project Proponent	8
1.6	Other Entities Involved in the Project	8
1.7	Ownership	8
1.8	Project Start Date	8
1.9	Project Crediting Period	9
1.10	Project Scale and Estimated GHG Emission Reductions or Removals	9
1.11	Description of the Project Activity	9
1.12	Project Location	11
1.13	Conditions Prior to Project Initiation	12
1.14	Compliance with Laws, Statutes and Other Regulatory Frameworks	13
1.15	Participation under Other GHG Programs	14
1.15.1	Projects Registered (or seeking registration) under Other GHG Program(s)	14
1.15.2	Projects Rejected by Other GHG Programs	14
1.16	Other Forms of Credit	14
1.16.1	Emissions Trading Programs and Other Binding Limits	14
1.16.2	Other Forms of Environmental Credit	14
1.1	Sustainable Development Contributions	15
1.17	Additional Information Relevant to the Project	15
	Leakage Management	15
	Commercially Sensitive Information	15
	Further Information	16
2	SAFEGUARDS	16
2.1	No Net Harm	16
2.2	Local Stakeholder Consultation	16
2.3	Environmental Impact	18

2.4	Public Comments	19
2.5	AFOLU-Specific Safeguards	19
3	APPLICATION OF METHODOLOGY	19
3.1	Title and Reference of Methodology	19
3.2	Applicability of Methodology	20
3.3	Project Boundary	21
3.4	Baseline Scenario	23
3.5	Additionality	25
3.6	Methodology Deviations	30
4	QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS	30
4.1	Baseline Emissions	30
4.2	Project Emissions	30
4.3	Leakage	32
4.4	Net GHG Emission Reductions and Removals	33
5	MONITORING	34
5.1	Data and Parameters Available at Validation	34
1.2	Data and Parameters Monitored	39
1.3	Monitoring Plan	46
5.1.1	Quality Assurance and Quality Control	46
5.1.2	Field Inspections	47

1 PROJECT DETAILS

1.1 Summary Description of the Project

It is well established that agriculture is critical in ensuring food security around the globe. It is agreed and confirmed by the Intergovernmental Panel on Climate Change (IPCC) that the agricultural soils have a great capacity to store carbon in amounts greater than the emissions from the sector. The agricultural sector is getting increased attention from policymakers, not only due to challenges related to food security, but because the sector is becoming a critical player in climate change policy. The sector is responsible for almost 10% of all GHG emissions from the entire European Union (EU)¹, but at the same time has a massive potential to mitigate these emissions. The answer to unlocking the potential of the sector lies in regenerative agriculture practices which can enrich our precious life-sustaining soils - while also contributing to meeting the demands of a growing population. Serving as natural carbon sinks, soils they also hold immense potential to sequester carbon and mitigate the effects of climate change. More than 55% of the climate mitigation potential in the EU-27 agricultural sector lies in agricultural soil and manure management².

The AgreeenaCarbon Project (hereafter the “Project”) reduces agricultural greenhouse gas (GHG) emissions through the implementation of activities that are central principles of regenerative agriculture. The Project intends to help farmers transition to regenerative agriculture by applying sustainable agricultural land management practices (ALM) in order to maintain yields while ensuring long-term viability of their farms and land. Regenerative agriculture describes holistic farming practices that improve the soil fertility and enhance the storage of soil organic carbon (SOC) and ‘focuses on the regeneration of living soil, improved micro hydrology, and conserving biodiversity at all levels while enhancing inputs use-efficiency and ecosystem system services.’³ The AgreeenaCarbon Project assists farmers in the transition from conventional, intensive farming practices to ones that avoid soil disturbances and increase the amount of organic soil amendments all while reducing the use of synthetic fertilisers. The focal point of these practices is reducing tillage to reduce soil disturbance with the addition of the other activities as a combined suite of activities that contribute to soil fertility. The Project facilitates the transition through a carbon payment programme which provides economic incentives to change existing agricultural practices, described as project activities. The programme is located across Europe with a reach across Europe and is based in temperate climates.

¹ EEA. 2021. <https://www.eea.europa.eu/publications/data-and-maps/data/data-viewers/greenhouse-gases-viewer>

² European Parliament. 2022. Agricultural Potential in Carbon Sequestration. [https://www.europarl.europa.eu/RegData/etudes/ATAG/2022/699656/IPOL_ATA\(2022\)699656_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/ATAG/2022/699656/IPOL_ATA(2022)699656_EN.pdf)

³ FAO, 2021. Regenerative Agriculture: good practices for small-scale producers. <https://www.fao.org/publications/card/en/c/CB6018EN/>

The farmers joining the AgreeenaCarbon programme are primarily practicing conventional farming with intensive tillage, no cover cropping, removing or burying crop residues, and using synthetic fertilizers, herbicides and pesticides. The Project is designed to increase the adoption of sustainable ALM that result in the reduction of GHG emissions on croplands. These sustainable practices are ones that a new farmer can implement to join the AgreeenaCarbon programme. These ALM practices are reducing soil disturbance through reduced tillage, cover cropping, catch cropping, mulching of residues, reduction of synthetic fertilizers, and/or applying nitrification inhibitors. A more detailed description of these practices that will lead to an increase in soil organic matter (SOM) through carbon sequestration are 1) reducing tillage to lower soil disturbance and increase residue retention and carbon inputs; 2) leaving crop residues on top of the soil in order to improve nutrient cycling and soil quality; 3) planting a cover crop through the winter or all the way through to the next harvest to increase organic matter carbon inputs; 4) planting catch crops in between spring and winter crops; 5) reducing the rate of nitrogen fertilizer applied and switching from synthetic fertilizers to organic fertilizer (manure); 6) applying nitrification inhibitors to limit nitrification within the soil.

Within the Project is the AgreeenaCarbon platform which collects data from farmers including land ownership, field boundaries, historic farming practices (5-year lookback), soil type (sand, silt, clay), crop-types, and fertilizer inputs (N, K, pig slurry, etc.). During this process of data collection, continuous communication with farmers ensures that the data is accurate, and our internal verification process is very thorough and extensive. The platform gathers and monitors this data via farmer outreach, data collection, field inspections, soil sampling, data QA/QC, remote sensing inspections, modelling and quantification. Using many sources of data supports high quality and consistency of measurement for the Project. More on the process of checking data is presented in Section 5 on Monitoring.

The in-house remote sensing expertise sets the AgreeenaCarbon Project apart in the capabilities to track soil type, production, cover cropping, historical practices and more, using spatial pattern analysis and remote sensing-based detection. The combination of monitoring techniques generates a clear and accurate picture of the uptake of activities and the actual carbon removals they will generate. The remote-sensing models are constantly increasing in accuracy as they are combined with ground-truthing, where fields are physically checked and recorded.

The platform is used to collect data and facilitate the generation of credits under the VCS Methodology for Improved Agricultural Land Management (VM0042). This is a grouped project so there is a continual onboarding of farmers and the enrolment of specifically selected fields into the Project to be eligible to generate carbon credits. The farmer is contracted with Agreeena ApS for each field and each field is treated as a project activity instance (PAI). Each PAI is then submitted into the platform with the baseline scenario as well as the potential change in the SOC storage or decrease in GHG emissions.

This document serves to describe the Project design in detail and demonstrate its conformance with VM0042, thus informing the validation and verification process by outlining a clear plan for Project implementation.

1.2 Sectoral Scope and Project Type

Sectoral Scope: The project activity falls under the VCS Sectoral Scope 14 of Agriculture Forestry and Other Land Use (AFOLU).

AFOLU Project Category: Agricultural Land Management

Project Type: The project is a large project (greater than 300,000 tonnes of CO₂e per year reduced or removed) and a grouped project.

The project activity builds upon the VCS methodology VM0042 METHODOLOGY FOR IMPROVED AGRICULTURAL LAND MANAGEMENT, Draft, Version 2.0.⁴

1.3 Project Eligibility

The AgreeenaCarbon programme is eligible under the scope of the VCS Programme because it facilitates the transition of farmers to regenerative agriculture via improved ALM practices, which will result in a reduction in GHG emissions on croplands. Farmers will be rewarded to increase carbon stocks in soils and decreased emissions from soils. The contracts established with farmers and Agreeena outline in strict terms that the farmer has not deforested on their land for 20 years before the project start date. This project is voluntary as farmers can be freely enrolled to it, therefore reductions and removals expected to be achieved would not occur without it. The program enhances soil health which further enhances soil organic carbon storage and ensures permanence through long-term monitoring, reporting and verification.

1.4 Project Design

This project is a grouped project with multiple project activity instances (PAIs) across the pan-European geography.

Eligibility Criteria

The AgreeenaCarbon Programme is a grouped project with the boundary being the Pan-European continent and new project activities will be brought on in Europe. The program is structured in such a way that new farmers are recruited and enrolled subsequent to validation. There are several criteria for which new instances must adhere (Table 1).

Table 1. Eligibility criteria for new project participants in the AgreeenaCarbon programme.

⁴ This methodology version 2.0 is still under revision and was published for public comments in December 2021.

Regulatory Compliance	Project proponents must, at all times, adhere to all laws, regulations, and other binding mandates enforced by national legislation and is directly related to the activities of the program.
Project proponent	Project proponents shall own, have control over, or document effective control over the relevant GHG sources/sinks. Project participants shall provide a statement confirming that they have the right to cultivate the land and participate in the programme (by signing documents of Good Faith). Disregarding the land ownership, the project proponent must have operational right to the enrolled land. Both private, public, and tribal land ownership, or a combination, is accepted.
Definition of Boundaries	PAIs eligible to the program must be located within the geographical boundaries of the program as those indicated in the section titled Project Boundary. The Project, however, has pan-European coverage and it is intended that the regions of applicability will expand dynamically based on the project proponent portfolio.
Arable Land	The program focuses on agricultural management practices and therefore is applicable to fields identified as arable land as defined by Eurostat and by any other relevant, reliable and peer-reviewed public data. ⁵

Any new project instances will be thoroughly evaluated based on the following:

- 1) They meet the applicability conditions set out in Section 4 of the methodology VM0042 and the Applicability of Methodology.
- 2) Implement measures specified in the project description document (this document).
- 3) Apply technologies and/or measures consistently and in the same manner as other project activity instances, as specified in the project description report.
- 4) Are subject to the baseline scenario (see section on the Baseline Scenario) for the project activity and geographic area.
- 5) Pass the Additionality test (explained in Section 3.5 on Additionality) for the project area. For example, the new project activity will have been vetted to ensure that they fulfil the common practice test and experience institutional barriers that prevent them from entering the program without its existence.

New project activities will:

- 1) Occur within the boundaries of the European continent.
- 2) Comply with at least one complete set of eligibility criteria for the inclusion of new project activity instances (as described above).
- 3) Will be included in the monitoring report with sufficient information on technical, financial and geographic aspects to demonstrate compliance with the eligibility criteria and enable sampling from the validation/verification body.

⁵ Eurostat, 2019. Glossary: Arable Land. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Arable_land

- 4) Be validated at the time of verification.
- 5) Include signed documents from farmers attesting that participants have the right to cultivate the land for each project activity which will be held by AgreeenaCarbon and specified in the Benefits Contract.
- 6) Have a start date that is the same or after September 2020.
- 7) Be eligible for crediting from the start date of the instance through to the end of the crediting period (only).

1.5 Project Proponent

Organization name	Agreeena ApS
Contact person	Karolina Kenney
Title	Policy and Program Analyst
Address	Langebrogade 1, 3. Sal 1411 Copenhagen K, Denmark,
Telephone	+45 31 35 88 71
Email	Karolina.kenney@agreeena.com

1.6 Other Entities Involved in the Project

There are no other entities involved in the project development of the Project outside of the AgreeenaCarbon employees, contractors and advisors.

1.7 Ownership

Agreeena ApS is the project proponent and has ownership of the carbon credits through contracts with the farmers.

1.8 Project Start Date

The project start date is September 2020 which was the date where activities to generate GHG emission reductions and removals began via the AgreeenaCarbon program. The farmers began activities for harvest in 2021 which were the first project activities. This is when the Project recruitment process began to encourage farmers to begin implementing sustainable practices and transition to conservation agriculture. The project activities and project data were validated and verified at the end of 2021 according to ISO Standard 14064-2.

1.9 Project Crediting Period

The project crediting period is September 1, 2020 to September 1, 2030 totalling 10 years.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	
Large project	X

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
2021	172,136 tCO ₂ -eq
2022	650,000 tCO ₂ -eq
2023	1,600,000 tCO ₂ -eq
2024	1,600,000 tCO ₂ -eq
2025	1,600,000 tCO ₂ -eq
2026	1,600,000 tCO ₂ -eq
2027	1,600,000 tCO ₂ -eq
2028	1,600,000 tCO ₂ -eq
2029	1,600,000 tCO ₂ -eq
2030	1,600,000 tCO ₂ -eq
Total estimated ERs	13,622,136 tCO₂-eq
Total number of crediting years	10 years
Average annual ERs	1,362,213.60 tCO₂-eq

1.11 Description of the Project Activity

There is no REDD+ component to the project and the project is not located within a jurisdiction covered by a jurisdictional REDD+ program.

The program has four objectives of issuing certificates based on real and measurable carbon removals, maintaining the permanence of the removals, selling the certificates to buyers through a strict buyer screening process, and achieving climate-related benefits from regenerative agriculture. The program aims to achieve its objectives by facilitating access to direct specialized advice to the participants, to guarantee that the adopted practices are correctly implemented, and the carbon sequestration of the field is maximized throughout the transition. The program will accelerate the transition to regenerative agriculture by providing a direct economic incentive to the project proponent, through its first objective, the establishment of a carbon payment program. The environmental objectives that come from regenerative agriculture are a central focus of the program and include improving soil health, enhancing resilience of crops and land to water scarcity, and improving biodiversity.

The establishment of a carbon payment program will be achieved through the issuance of carbon credits (certificates) that correspond to the GHG reductions and Carbon removals achieved throughout the transition from conventional agriculture to regenerative agriculture. The certificates will be available for sale in the voluntary carbon market and will function as carbon offsets and insets to the buyers.

The third objective will be achieved by ultimately selling the issued certificates to buyers with an intent to offset their emissions. It is fundamental for the program to seek for certificate buyers who already have a GHG reduction (or ESG) policy and do not seek to offset their emissions solely through the carbon market. This will be checked through a screening of the climate policy of the certificate buyers. Furthermore, Verra discourages the sale of the issued certificates in secondary markets to eliminate the risk of trading the certificates to prevent double counting. The AgreeenaCarbon Project puts special focus on tracking and avoiding double counting through clear guidelines and tracking. In cases where secondary sales have been identified, the certificates will be cancelled.

The program must ensure that the project participants that are interested in participating are eligible to the admittance criteria. Furthermore, the program is applicable in areas where GHG emissions would remain constant or increase in the absence of the project practices.

The methodology is applicable under the condition that projects introduce or implement one or more new project activities to pre-existing agricultural management practices. A new project activity is defined as the cessation of a pre-existing practice (e.g., no tillage), adoption of a new practice (e.g., adoption of land management practices that reduces the GHG emissions and increase the carbon sequestration in the soil), or adjustment to a pre-existing practice that is expected to reduce GHG emissions and/or increase GHG removals (e.g., reduction of fuel usage). The specific project activities being incentivized in the program are described in the Table 2 below.

Table 2. List and description of the methodology's project activities applicable in the projects

No.	Project Activity	Description
1	Reducing soil disturbance through, e.g. reduced tillage	Reduced mechanical soil disturbance decreases the emissions of carbon dioxide (CO ₂), nitrous oxide (N ₂ O) and methane (CH ₄) by preventing further plant and microbial decomposition. Science-based evidence shows that reduced tillage practices will increase SOC. A positive result from reducing tillage is the reductions in the use of fuel and energy due to a decrease in pass overs with machinery.
2	Applying cover crops	Cover crops are dedicated crops that are seeded just after harvest and last through late winter. They are re-seeded before seeding of the cash crops to create green cover, which brings more organic amendments to the soil and provides a protective layer on the soils to prevent erosion and loss of soil moisture. Planting and growing green cover significantly reduces the nutrient losses and risk of soil erosion. Stronger aggregate stability and increased Carbon input improves soil health and contributes to the build-up of soil organic carbon. The practices include reducing winter and summer fallow frequency.
3	Applying catch crops	Planting and growing crops immediately after harvest that reduce nutrient loss. The crops are non-harvested.
4	Mulching and distribution of the crop residues	Residues of the planted crops are left on the field to provide field cover, in order to reduce erosion, improve the soil structure and increase the carbon inputs in the soil.
5	Application of Organic Fertilizers	Organic fertilizers such as animal manures and composts can increase soil carbon contents. It improves soil physical attributes and nutrient availability. The contribution can improve plant productivity which in turn can turn to carbon removals. The addition of organic fertilizers will effectively lower the synthetic fertilizer use.
6	Nitrification Inhibitors	Addition of dedicated substances in the soil that aim at preventing the mineralization of fertilizers derived nitrogen.

1.12 Project Location

The spatial extent of the project boundary encompasses arable lands with mineral soil that are eligible for implementation of the VM0042's proposed project activities. The activities therefore can be applied to a broad range of climatic regions. Currently the AgreeenaCarbon project instances are located on the European continent.

A KML file has been uploaded along with this project design document which include a sample of fields in the UK which are used as a basis for running and testing our remote sensing model.

1.13 Conditions Prior to Project Initiation

Has the land been cleared of native ecosystems within 10 years of the project start date?

☐ Yes

☒ No

The ecosystem type spans the pan-European geography so falls within numerous categories. The map of Europe with the climatic zones is listed below. Further is the soil classification map of Europe from ESDAC. The ecosystem type can be shown in the Köppen-Geiger map below from 1980 to 2016.

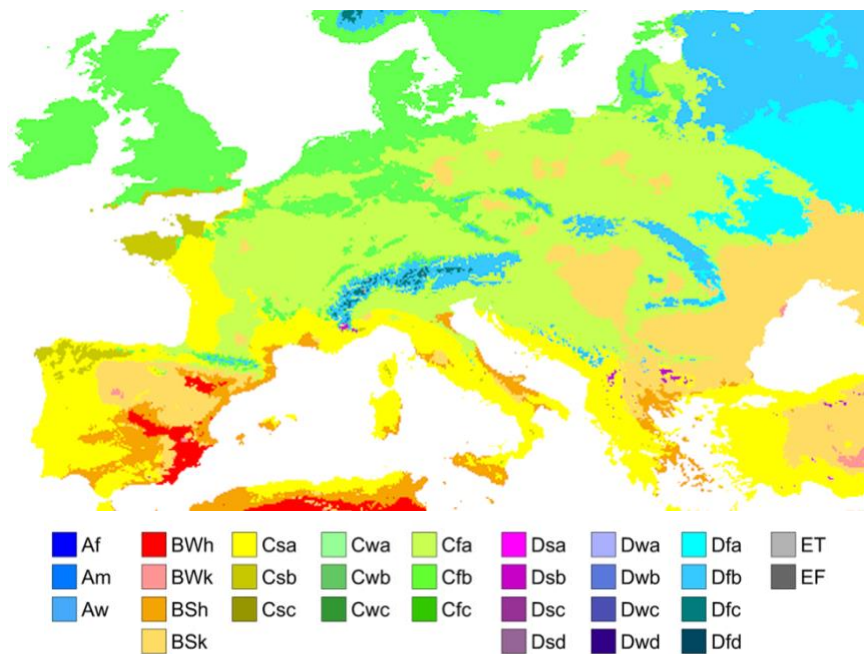


Figure 1. Köppen-Geiger climate classification map present day (1980–2016) for the pan-European geography.⁶

⁶ Beck, H.E., N.E. Zimmermann, T.R. McVicar, N. Vergopolan, A. Berg, E.F. Wood Present and future Köppen-Geiger climate classification maps at 1-km resolution *Scientific Data* 5:180214, doi:10.1038/sdata.2018.214 (2018)

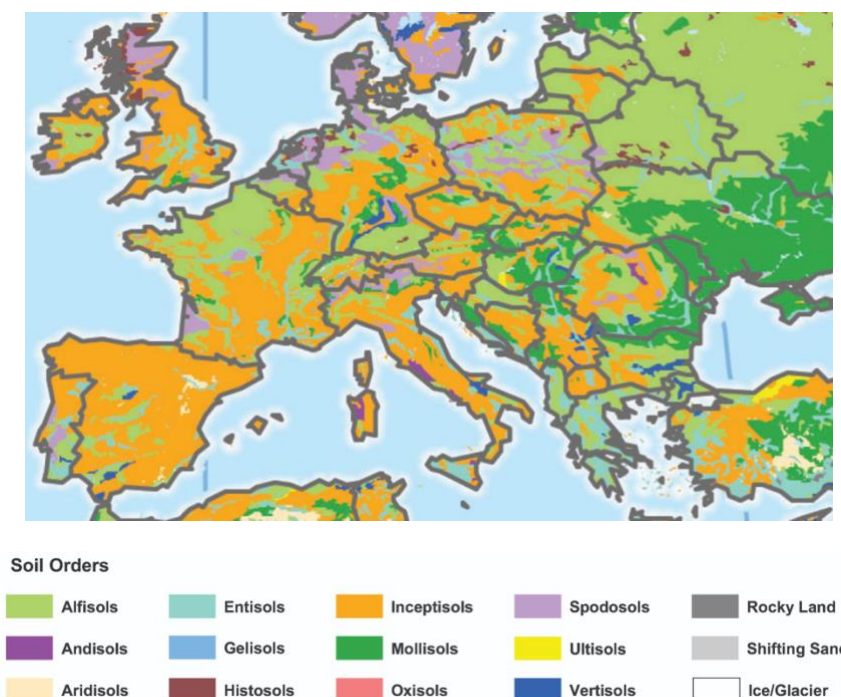


Figure 2. Soil classification map for the pan-European geography.

The agricultural industry is one of the largest sectors in Europe and in the EU, where around half of the land is farmed. In 2017, the EU agricultural industry produced an output value of EUR 427 billion of which 50% came from crops and the rest from livestock and other secondary activities.⁷ The size of farms in the EU is relatively small at an average of 16 hectares per farm in 2013 and only 15% of farms in total are this size or larger.⁸ Most of the arable land in the EU is used for general field cropping (16.4%) followed by production of cereals, oilseed, and protein crops (15.2%) and olives (7.6%). One hundred and seventy-three hectares of land was used for agricultural production in 2016 with almost three quarters of the agricultural land focussed in six member states: France, Spain, Germany, Poland, Italy and Romania.

Outside of the EU, the historic land use practices are similar and some of the EU data can be extrapolated to the UK, as some of the data is prior to Brexit. In the UK, like the rest of Europe mainly grows wheat, barley and oats. In Moldova, agricultural land covers 59% of the country's total land area of which 55% is used for annual crop product production (maize, wheat, sunflower, barley, oilseed, soybean, sugar beet) and has highly fertile chernozem soils (black soils).

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

Project activities will follow all applicable legal and regulatory requirements across the different countries in the programme. Due to the unique nature of the AgreeaCarbon Project, such that it covers different countries within and outside of the EU, there is an internal policy tracker to

⁷ <https://copa-cogeca.eu/europeanfarming>

⁸ Eurostat, 2018. Farms and farmland in the European Union – statistics.

identify any regulations for which the project proponents might be subject to. There are no laws that prevent the implementation of these practices in Europe. Agreeena is aligned with national policies along with farmers who as part of the program work closely with advisors and stakeholders to ensure that everyone has the most up to date information on the regulatory sphere.

The EU agricultural sector has been promoted by the Common Agricultural Policy (CAP) environmental and climate-related measures for farmers which are equivalent to the practices promoted throughout the regenerative agricultural practices. However, the current system does not provide sufficient incentives to apply a full set of regenerative practices and do it in a long-term perspective which increases the permanence of stored carbon.

The Farm to Fork strategy also is recognized as a step towards improving the sustainable food systems, however, the Agreeena program is additional to the current policy framework and ensures that the proper practices are applied jointly in a permanent manner to enhance the agricultural soils as a carbon pool. The regulations differ across Member States and will also be different with the new CAP in 2023. All of the member states' CAP implementation policies (National Strategic Plans) have been mapped and tracked internally in order to ensure compliance with the EU market.

Outside the EU, the relevant statutes and regulations are tracked such as the Sustainable Farming Initiative in the UK. Relevant laws, statuses, and regulatory frameworks will be addressed as the project expands to other regions, and as all regulations evolve over time.

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

The project has not been registered nor is seeking registration under any other GHG Program.

1.15.2 Projects Rejected by Other GHG Programs

This project has not been rejected by any other GHG program.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The project is not part of an emissions trading program or any other mechanism that includes GHG allowance trading.

1.16.2 Other Forms of Environmental Credit

The project has not sought or received another form of GHG-related credit, including renewable energy certificates.

1.1 Sustainable Development Contributions

As the project is subject to multiple national jurisdictions, there is no singular national sustainable development priority. The AgreeenaCarbon Program has reviewed the UN Sustainable Development Goals (SDGs) and aligns with several of the SDGs namely, SDG 2: Zero Hunger (indicator 2.4 proportion of land under sustainable agriculture), SDG 12: Responsible Consumption and Production (indicator 12.6 encourage sustainability in companies), SDG 13: Climate Action (indicator 13.3 improve knowledge transfer) and SDG 15: Life on Land (indicator 15.3 restoration of degraded land).⁹

1.17 Additional Information Relevant to the Project

Leakage Management

The AgreeenaCarbon Programme follows the VCS methodology requirements dictating that ALM projects shall quantify leakage emissions associated with the displacement of pre-project activities, unless deemed *de minimis*. The definition from VCS on carbon leakage is net changes of anthropogenic emissions by GHG sources that occur outside the project or programme boundary and are attributable to the programme. By following the VCS definition, carbon leakage could occur when the project participant applying the AgreeenaCarbon program activities would create a situation where an increase of emissions from agricultural practices from other farmers elsewhere would be observed. According to VM0042, there are two potential areas of carbon leakage that could occur in the AgreeenaCarbon Project: market leakage and manure leakage. Market leakage is related to potential decrease in productivity and manure leakage is the use of manure as a new source of fertilizer that has not been identified in the baseline.

Taking actions to reduce carbon leakage to minimal levels is an inherent feature of the AgreeenaCarbon program. We fully comply and implement the VM0042 requirements on leakage directly and therefore make every effort to avoid and prevent leakage. Further information and quantification of leakage is presented in Section 4.3 Leakage.

Commercially Sensitive Information

Commercially sensitive information, program sensitive information and sensitive information as defined in the VCS Program Definitions v4.1 (20 January 2022) document, has been excluded from the public version of the project description.

All contractual matters between project proponent and farmers has been taken out of the report to protect the privacy of the farmers including management data, soil sampling and financial information.

⁹ https://unstats.un.org/sdgs/indicators/Global%20Indicator%20Framework%20after%202022%20refinement_Eng.pdf

Further Information

No additional information needed for this section.

2 SAFEGUARDS

2.1 No Net Harm

When farmers adopt the outlined ALM practices there is an inherent benefit in comparison to the business-as-usual scenario. These types of practices deliver measurable climate benefits, which Agreeena tracks and verifies during the QA/QC process and through remote sensing technology. Soil health improvement practices, as they result in changes in farmer behaviour, can impact the area around the PAIs. Both co-benefits and negative impacts should be taken into consideration in the program. AgreeenaCarbon, through the contracting and onboarding sessions, provides farmers with the relevant information on compliance with the program and national regulations.

Some of the potential negative impacts from conventional farming include higher susceptibility to climate events such as drought. Without regenerative agriculture, there are higher inputs of synthetic fertilizers which come with higher inputs of nitrogen into groundwater. The EU has made efforts to reduce nitrogen pollution through the Nitrates Directive and has put limits on application of fertilizers. Harmonization with the EU nitrates directive is also a standard procedure for countries outside of the EU such as Eastern European countries. Many outside countries have introduced best agricultural practices in zones that are vulnerable to nitrate pollution. The UK has the Code of Good Agricultural Practice for Reducing Ammonia Emissions to store and properly apply organic manures. Farmers in the EU are also expected to follow statutory management requirements (SMR) that cover public, animal and plant health, animal welfare and the environment. In addition to the SMR, farmers that receive Common Agriculture Policy support must follow the standards on good agricultural and environmental condition of land (GAEC).¹⁰ These standards are put in place in order to prevent soil erosion, maintaining soil organic matter, maintaining permanent grassland, protecting biodiversity, and protecting and managing water. Besides limiting synthetic fertilizers and encouraging the input of organic fertilizers instead, regenerative agriculture also increases carbon sequestration and plant productivity.

2.2 Local Stakeholder Consultation

The farmers participating in the AgreeenaCarbon Program are doing so voluntarily and by committing to the program are bound by the Benefits Contract to implement ALM practices. The AgreeenaCarbon program was developed at the onset with farmer input, including employing farmers as direct advisers to new farmers entering the program for educational purposes.

¹⁰ Council Regulation No. 2021/2115 <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R2115&from=EN>

Constant communication and access to advisers is part of the design of the program so that any changes in practices or updates to PAIs will be tracked and risks mitigated if identified.

Agreena also engages with local partners to get a better understanding of the regional and cultural context and ensure that there is the possibility to communicate in the language of a new market. We work closely with partner organizations, from co-ops to regional water utility companies, where we provide guidance and alignment on the programme, methodologies, processes and interpretation with national or regional agricultural regulation requirements. Most recently, Agreena has collaborated with the Danish Embassy Trade Council in Central and Eastern European countries to facilitate the connection and consult with local agricultural stakeholders, market experts and farmers prior to market entry (see Figure 3). AgreenaCarbon has also recently partnered with Danish Agro and Baltic Agro Lithuania, Estonia, and the largest agricultural co-op in Finland to educate teams and generate a dialogue with the partner stakeholders working closely with farmers prior to market entry (see Figure 4).



Figure 4. Workshop between AgreenaCarbon and the Danish Embassy in Hungary with local agricultural experts and stakeholders.



Figure 5. Meeting with representatives from Danish Agro to meet with local Danish farmers.

AgreenaCarbon has also engaged a Carbon Advisory Board as an external counsel of experts working in soil science, European and global climate policy and land use. The board provides direct guidance and consultation to support and advise on monitoring, reporting and verification of the program as well as alignment with regulatory and policy frameworks. In line with the carbon advisory board, AgreenaCarbon has been developing a farmer's advisory board to bring the program in line with the local context.

To guarantee that the program is fully coherent, it applies five main principles to addressing relevant external bodies, namely: clear communication, individual support, rigorous policies, independent verification (See Table 3). The program also ensures that these principles are applied to each of the admitted projects.

Table 3. AgreenCarbon Programme Communication Guidelines.

Clear Communication	The program seeks to always ensure a clear communication with project participants and other local stakeholders, regarding the program's values, objectives, rules, and guidelines.
Clarity/truthfulness	The program will ensure clarity on its' policies and procedures and assumes and expects that participants and other bodies involved directly or indirectly in the program will act in the same manner.
Individual support	Project participants will be supported through the program and guided towards agricultural advisor for optimal project design.
Rigorous policies	The program seeks to build solid policies and terms for the implementation of individual projects that adhere to local regulations, and to the values of the program. The policies and terms of the program will therefore ensure permanence, compliance with local laws and regulations, and mitigate risks through Verra's risk assessment tool.
Validation and Verification	The program is to be validated and verified by an approved third-party auditor. Furthermore, based on the monitoring and validation report, validation of processes and systems (RP510), an independent verifier must verify all validated net GHG effects prior to issuance. This is an essential step to secure the sale or trade of carbon certificates.

2.3 Environmental Impact

AgreenaCarbon does not anticipate net harm to the land and/or the community, on the contrary anticipates only benefits through improvement of land and farmer income. Regenerative practices that are implemented as a result of the program will impact the environment through improving soil health, reducing soil erosion, improving water and air quality, and enhancing biodiversity. We conduct internal assessment of risks and impact on the environment prior to

market entry and align with local regulations and EU policy, as per the regulatory surplus requirements as well. All EU environmental regulations are considered in this regard and are followed closely.

2.4 Public Comments

Public comments will be taken into account when the project has been listed as under validation in the Verra carbon registry.

2.5 AFOLU-Specific Safeguards

The AgreeenaCarbon programme's advisers are on call with the farmers participating in the programme during any working hours and works regularly with key partners in the regions of the programme. The partners ensure that local stakeholders are actively involved and that the farmers and local community, if applicable, are taken into consideration. All property rights and ownership are established clearly at onboarding into the programme and specified in the Benefits Contract.

Agreeena regularly attends fairs and public events to educate new farmers on the potential benefits and risks associated with changing agricultural practices. There is an information email and telephone number on the Agreeena website www.agreeena.com to make sure that stakeholders are able to contact the advisers and get the answers they need.

As stated in the Section 2.2 on Local Stakeholder Consultation, AgreeenaCarbon is actively involved with agencies and stakeholders connected to the local area. AgreeenaCarbon also follows closely with new regulations and any new environmental standards that may come into play within the Voluntary Carbon Market and is strictly adhering to the latest requirements around additionality, permanence, leakage, etc.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

VM0042: Methodology for Improved Agricultural Land Management, Version 2.0, 21 December 2021, Sectoral Scope 14, revised version

Additional Tools:

- VCS Standard, version 4.2 – 20 January 2022
- VCS Program Definitions, version 4.1 – 15 April 2022
- VCS Program Guide, version 4.0 – 20 January 2022

- Registration and Issuance Process, version 4.1 – 20 January 2022
- AFOLU Non-Permanence Risk Tool, version 4.0 – 19 September 2019
- VMD0053 Model Calibration, Validation, and Uncertainty Guidance for the Methodology for Improved Agricultural Land Management, version 1.0 – 19 October 2020

3.2 Applicability of Methodology

The AgreeenaCarbon Programme will meet the applicability conditions of VM0042: Methodology for Improved Agricultural Land Management, Version 2.0, 21 December 2021, Sectoral Scope 14, revised version. The activity will include the adoption of new or implementation of changes to ALM practices of which are included in VM0042. This list is non-exhaustive and may expand over time:

1. Reduce soil disturbance through, e.g. reduced tillage
2. Apply cover crops/catch crops
3. Mulch and distribute the crop residues
4. Apply organic fertilizers
5. Apply nitrification inhibitors

Through the direct onboarding of farmers and partners, there is close coordination in establishing a baseline and making sure that the pre-project conditions are correctly input. This allows for a proper understanding and estimation of the baseline condition and what a change in practice will constitute, i.e. estimated removals from switching to no tillage. The onboarding and communication process for farmers is as follows:

Table 4. Communication and onboarding process for farmers to ensure pre-project conditions and accuracy of inputs.

Month	Communication Strategy
January - March	Outreach and Onboarding: • Calls and events • Issuance support
April – August	Closing contracts Outreach and Onboarding
August – December	Add field strategies Submit actuals Support verification Field inspections

In the AgreeenaCarbon Project, the conditions prior to the project start are the same as the baseline scenario presented in the Section 3.4 on Baseline below which includes conventional

land practices and intensive tillage practices, single application of synthetic fertilizers and no winter or spring cover crops or catch crops. The AgreeenaCarbon Programme ensures several aspects prior to addition into the programme (Table 5).

Table 5. Applicability conditions prior to entry into the AgreeenaCarbon Programme.

Criteria	Explanation
Boundaries	The projects are uniquely identified by spatial boundaries.
Eligible Crops	Crops eligible for growing in projects under this methodology can be provided separately.
Soil Type	Project activities must be implemented on land with mineral soils (organic soils are not eligible in the program)
Land Use	Project activities must be implemented on land that is cropland and remains cropland throughout the crediting period. (Introduction of perennial crops, fallow, temporary grazing fields in cropland is allowed where it can be credibly demonstrated prior to project validation that the integration of perennial crops (e.g., grasses, legumes) crops into annual is planned as part of a rotation in a long-term agricultural management system)
Deforestation	The project is not created on land that was subject of deforestation within a 20-year period prior to the project start date.

Through the combination of approaches including calculations, soil sampling and modelling, we are implementing the best available practices for MRV and checking data accuracy. Through the use of in-house remote-sensing-based technology for MRV, the AgreeenaCarbon project utilizes remote sensing to verify that the data input by farmers is accurate. Through field boundary detection and delineation, we can track accuracy of the PAI boundaries. Catch and cover crop presence/absence metrics are used to determine whether cover crops have been implemented and have a 95% accuracy for detection. Tillage as well as crop type classification can be detected as well via aerial imaging. The robust MRV practices using remote sensing with AgreeenaCarbon along with desk review and field inspections and soil sampling result in data that is accurately input as well as verified.

3.3 Project Boundary

This Chapter describes the GHG sources that the methodology accounts for from the sources and pools calculated for estimating GHG emissions removals and reductions.

The project extends to the incorporation of project activities that aim to reduce GHG emissions from croplands and must be able to quantify effects from the three main GHGs in relation to agricultural production: Carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). Emission reductions and removals through transitioning to CA practises covers three GHG categories:

1. SOC stocks (SOC): Carbon sequestered in the soil – improving carbon stocks through reduction of tillage intensity, adoption of cover crops and other factors.
2. Indirect Emissions (Ind.Em.): refers to emissions that result from the mineralization of carbon and nitrogen (CO₂, CH₄ and N₂O). Indirect N₂O emissions consist of emissions from leaching and runoff, and emissions from N volatilisation.
3. Fuel & Energy (F&E): Emissions from combustion of fossil fuel (lower machinery intensity) and energy required to produce synthetic fertilizers and pesticides.

The project extends to several activities, focused on reducing emissions and increasing removals in the soil carbon pool followed by different biochemical processes as shown in Table 6 and the respective GHGs are generated through the following processes.

Table 6. GHG Sources Included in the project boundary for the Baseline and Project scenarios.

Source		Gas	Included?	Justification/Explanation
Baseline/Project	Carbon Stock Changes	CO ₂	Yes	Project activities will result in carbon stock changes: tillage, res. mgmt., cover crops, org, amendments. The SOC is quantified as a change in the pool.
	Residue Management	N ₂ O	Yes	Residue management by leaving residues of planted crops on the field in order to reduce erosion, improve soil structure and increase carbon inputs in the soil.
		CH ₄	Yes	Crop type (n-fixing species)
	Soil Emissions	N ₂ O	Yes	Emissions from soil will come about as a result of fertilizer emissions, soil background activity, organic input, nitrification inhibitors and crop type (n-fixing species)
	Energy Use	CO ₂	Yes	Fuel emissions will be reduced due to less machine use on the field and a decrease in pass overs
	Crop protection (combustion)	CO ₂	Yes	Application of crop protection result in some emissions from production and will be accounted for at scale as a reduction in crop protection will improve the emissions.
	Nitrification inhibitors	N ₂ O	Yes	Application of inhibitors is expected to reduce nitrification and increase fertilization and productivity.
	Biomass burning	CO ₂	No	Biomass burning will not occur as part of the project activity
		CH ₄	No	

Source	Gas	Included?	Justification/Explanation
	N ₂ O	No	
Woody biomass	CO ₂	No	The project activity does not occur on forested land

Project activity will take place in only some parts of the project boundary cover pan-Europe. The map below shows the land cover and crop-type cover across the project boundary.

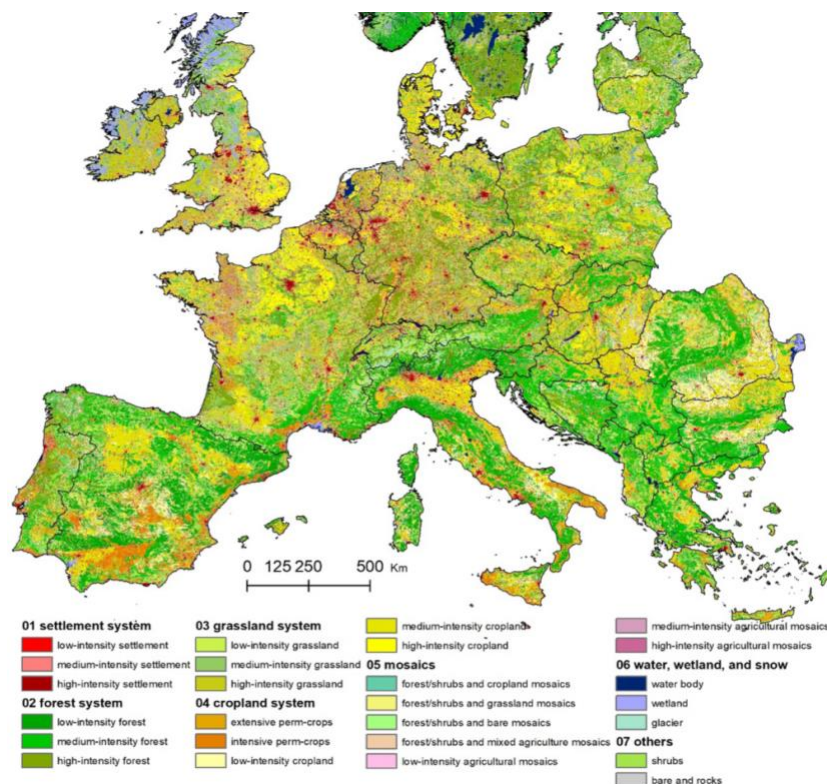


Figure 6. Distribution of land systems in Europe 2020.¹¹

3.4 Baseline Scenario

The baseline scenario represents the activities and GHG emissions that would occur in the absence of the project activity. Continuation of pre-project agricultural management practices is the most plausible baseline scenario. The baseline is used to set a reference value of GHG emissions reductions and removals which will later be used to compare against the GHG emission reductions and removals that will be emitted after adoption of the new project activities. For each project (i.e., field), practices applied in the baseline scenario are determined applying a historic 5-year look-back period to produce the baseline. A 5-year look-back period has been selected in order to capture project activities throughout an entire crop rotation, as a typical crop rotation

¹¹ Dou, Y., Cosentino, F., Malek, Z. et al. A new European land systems representation accounting for landscape characteristics. *Landscape Ecol* 36, 2215–2234 (2021).

normally will not exceed 5 years. The baseline is calculated on a consistency basis, meaning that if a specific management practice is not implemented consistently, then the most intensive/energy-demanding practice is registered in the baseline. For each project, information on site characteristics and agricultural management practices must be determined, per the requirements presented in Table 7.

Table 7. Requirements required from farmers at the onset of the project to determine the baseline scenario.

	Registration	Field definition	
Field Identification	Name	Coordinates	
	Address	Field Size (ha)	
	Zip Code		
	City		
	Country		
Soil Characteristics	Soil Texture	Fine / Medium / Coarse	
	Soil pH	pH class range	
	Soil Moisture	Moist / Dry	
	Drainage condition	Good / bad	
Field History	Cultivated	Y/N	
Management Practices	Crop Rotation	Y/N	
	Tillage Practice	Process	Direct Seeding / Tillage
		Machinery used	Disk drill / Strip till / Harrow / Subsoiler
		Percent of soil disturbed (calc)	Depth of tillage (cm) Distance between tines (cm) Thickness of tine (cm)
	Residue management	Burned ¹² / Removed / Mulched	
	Cover/Catch Crops	Cover Crops until Winter Cover Crops until	

¹² NOTE: Burning of Residues is not allowed in the EU, therefore, the estimation of GHG emissions resulting from biomass burning, will only be calculated as part of the baseline's emissions in non-EU countries, where such practices are allowed.

		Spring Catch Crops	
	Organic Fertilization	Synthetic Mixed Organic	
	Crop Protection	Y/N	
	Nitrification Inhibitors	Y/N	

The GHG emissions removals and reductions are calculated using all parameters identified Table 6. The questionnaire for retrieving data regarding historic land management practices are provided separately.

The program retains the right to modify and update the baseline of already enrolled projects following major updates in methodology or in cases where new local or regional regulations are enforced with an impact to the structure and functions of the program.

3.5 Additionality

AgreenaCarbon uses the definition of additionality identified in VM0042 the project method states that a project proponent must demonstrate a regulatory surplus, identify barriers that would prevent the implementation of agricultural practices and establish that the adoption of the suite of proposed project activities is not common practice. In brief, the three-step process for determining additionality is accounting for regulatory surplus, identifying barriers and conducting the common practice test.

The Project's additionality test takes particular care to ensure that the regulatory surplus analysis, the barrier test and the common practice test that the program is going above the 'business-as-usual' scenario or the baseline, as defined in Section 3.4. AgreenaCarbon identified institutional barriers as barriers to the uptake of the programme.

Step 1: Regulatory Surplus

The Project follows the regulatory surplus analysis requirement from VCS and conducts a country-level analysis in which it operates. This is done prior to a new market entry and in its current state, has demonstrated regulatory surplus thus far.¹³

¹³ The full regulatory analysis will be provided upon request, but is eliminated for this version of the PDD.

The regulatory surplus shall be understood as a confirmation that the program activities are not mandated by any enforced law, statute, or another regulatory framework that is valid in the country or region where the program operates. The set of rules and laws defined by the program operates on the basis of the scope of effect of the program. In the case of the Project, this is referred to the regulations related to agriculture, environmental protection, and climate change-related policies.

The AgreeenaCarbon program is operating in a pan-European context covering both EU countries and countries outside of the EU. The countries within the EU are mainly covered by the Common Agricultural Policy (CAP) which provides common standards and rules for the member states. In this regard, the regulatory surplus will be an assessment of two groups of countries: the EU countries and non-EU Countries.

For EU countries the assessment would build mainly on current obligations specified by the regulations that are forming the CAP. The CAP has an internal mechanism called cross-compliance, which sets a threshold of basic rules to which farmers must comply in order to receive EU income support. The rules are aggregated into two groups:

- Statutory management requirements (SMR), which apply to all farmers whether or not they receive support under the CAP;
- Good agricultural and environmental conditions (GAEC), apply only to farmers receiving support under the CAP. The GAECs are beyond the statutory requirements.

Applying the built-in regulations in CAP provides the possibility to standardize the analysis approach and define the requirements that farmers are obligated to comply with and to determine the additionality of the program in the regulatory share. In the case of non-EU countries, the analysis is based on regulations that correspond to the principles provided for in the CAP that is in force in the EU.

Step 2: Identify Barriers

During the second step the project proponent must determine the barriers (e.g., cultural practices and social norms, attitudes and beliefs) to the proposed change(s) in agricultural management expected to reduce GHG emissions and/or increase GHG removals that prevent the implementation of the change without the intervention of the project proponent and the resulting revenue from the sale of VCUs.

Below, the institutional barriers are presented with evidence from peer-reviewed research and further verified by a consultant.¹⁴ Several studies are cited as evidence that have surveyed farmers from across Europe, which can be translated into the AgreeenaCarbon context as it is operating in a pan-Europe. It can be said that the Baltic and Eastern European states are even

¹⁴ The consultant is from Agrovit, a Danish firm with which Agreeena has partnered to provide technical advice to farmers.

more likely to have some of these barriers than the countries studied from delayed accession into the EU.¹⁵

1. Traditional equipment and technology

While many farmers are willing to invest in new technologies, regenerative agriculture requires the purchase of new equipment that combines different functions (e.g. direct seeders) and will not sell on at the same value as when it was purchased. This represents a high risk and the purchase of brand new equipment which is not easily mitigated by farmers taking on regenerative agriculture practices.

In Europe, barriers to the adoption and diffusion of technological innovations for climate smart agriculture were identified and analysed. Beyond the obvious economic barriers to uptake, other barriers included regulatory, behavioural, organisational, market, and social. Poor access and availability of practical farming information, lack of readiness by farmers and the need for additional training to use new equipment are all standing in the way of full diffusion of climate-smart technologies.¹⁶

The main transformation that farmers must undertake within the AgreeenaCarbon Programme and a fundamental principle of regenerative agriculture, is the conversion from conventional tillage to reduced/no tillage. As a result, the need for entirely new machines is necessary for those starting out as conventional farmers. The speed at which farmers must change often puts them in a black box if they are required to acquire new machinery, as it also is dependent on soil type and crop rotation. For this matter, education about the equipment and which machine to buy also takes resources and time. Further actions beyond reducing tillage are combined and also require a shift in the farming methods and technology used on-farm. For example, additional seeding for cover and catch crops can mean higher labour and overall input costs.

2. Risk and uncertainty

In a study done by SURE farm for the European Commission¹⁷ covering 11 countries in the EU, including the UK (2017 it was found that farmers with arable and perennial crops, such as those included in the AgreeenaCarbon Project, have higher perceptions of risk and resilience and take more risk management actions than in other types of farms. In addition, the uncertainty of new technologies, precision agriculture and the variation and influence of new research on ecological aspects of production still poses a high risk to many. In the study, the ranking of perceptions of risk and resilience can provide evidence that a farmer's

¹⁵ [https://www.europarl.europa.eu/RegData/etudes/STUD/2015/540374/IPOL_STU\(2015\)540374_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2015/540374/IPOL_STU(2015)540374_EN.pdf)

¹⁶ Long, T. B., Blok, V., & Coninx, I. (2016). Barriers to the adoption and diffusion of technological innovations for climate-smart agriculture in Europe: evidence from the Netherlands, France, Switzerland and Italy. *Journal of Cleaner Production*, 112, 9–21.

¹⁷ <https://www.surefarmproject.eu/wordpress/wp-content/uploads/2019/04/SURE-Farm-D.2.1-Report-on-farmers-perception-of-risk-and-resilience-capacities.pdf>

motivation to transition to regenerative agriculture would only occur once assured of a reliable income and providing a food supply.

Some of the main barriers identified by farmers in a research article on farmer adoption of soil GHG mitigation practices in the Western Europa, were economic challenges, practical challenges, temporal risks, and compliance with regulatory requirements. Interviews with farmers revealed that the lack of certainty about how policies will change has impacted their decision making. For example, several farmers cited the potential ban of glyphosate in some countries, which is currently integral to clearing weeds in reduced/no tillage systems.

3. Grower perceptions of change

Identifying whether growers are open to new ideas and change in their farms can in part be presented in the amount of agricultural programmes that include courses on carbon farming or regenerative agriculture. Organic agriculture has dictated the discourse on environmental protection in agriculture in the EU and has driven much of the subsidies coming from the Common Agricultural Policy (CAP). Practices that are central to regenerative agriculture are becoming more common and are gaining attention across the EU and globally but still a very small portion of farmer education is devoted to regenerative activities.

In the EU, one educational program stands out, which provides free virtual lectures to stakeholders interested in learning more about regenerative agriculture.¹⁸ The program was launched in Germany, Greece and Belgium which, although having a ripple effect to other countries, is not centred in the AgreeaCarbon Project countries. In Denmark, one of our main markets, there is only one farmer school¹⁹ that specifically teaches about regenerative agriculture and is not focussed on the climate or biodiversity aspects.²⁰ This could be representative to other countries within which we operate with most likely even less focus on the environment, as Denmark has strict environmental regulations.

There are three levels of agricultural training, according to the European Parliamentary Research Service, which are practical experience, basic agricultural training through an apprenticeship, and full agricultural training for the equivalent of at least two years. Eurostat data from 2013 reveals that most farmers obtain their training through practical experience alone (69.8%) with only 8.5% receiving full training.²¹ This value has grown over the last 10 years but the data also indicates a disparity between countries that have joined the EU after 2004, where they are even more likely to have practical experience as their basis. Farmer groups and unions are common and many farmers participate in farmer communities to share knowledge. If regenerative agriculture is not prevalent in a farmer group, the knowledge spread will be slower and less likely to reach farmers who are only familiar with conventional systems of production.

¹⁸ <https://regagri4europe.eu/>

¹⁹ <https://regenerativ.dk/den-regenerative-jordbrugsskole/>

²⁰ This information has been confirmed by an expert agronomist from Agrovit.

²¹ [https://www.europarl.europa.eu/RegData/etudes/BRIE/2017/608788/EPRS_BRI\(2017\)608788_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2017/608788/EPRS_BRI(2017)608788_EN.pdf)

4. Grower Identity

In farmer interviews, personal mindset was one of the key barriers that stood out in their transition to regenerative farming. Personal mindset is one of the ways in which farmers feel they are not ready to transition to a different management system such as regenerative agriculture. For many farmers, being a pioneer in the farming space can be prohibitive as the risk of failure can have drastic impacts on their livelihood. Being the first to test out new equipment has the potential to result in failure and can take many years to come back from. Some farmers have said that they feel as though they are already conscious of the environment as they are using organic amendments on their farms.

Behavioural and psychological barriers are heavily at play in European countries and it is often that farmer communities and unions can dictate grower identity.²² Studies show that farmers are also willing to shift a more productionist identity to one that is more conservationist in group settings, i.e. willingness to adopt can also come from outside influence. In addition, conservationist identity can be spurred with the right type of incentive mechanism or scheme, such as price premiums, subsidies or carbon credits.²³

Step 2: Common Practice Test

The common practice test is the tool that is most widely recognized by the international community for additionality. A stringent implementation of the common practice test is important for a program to ensure that there are no outside requirements or pressures on project owners to implement these project activities, making them novel. In accordance with the method for common practice from VM0042, a project proponent must determine whether the proposed activity or suite of activities are common practice within the spatial boundary of the project. Following the threshold determined by the CDM Methodological Tool: Common Practice²⁴ and VM0042, common practice is defined as a certain practice having greater than 20% adoption in a specific region.

The applicability condition for entering into the Agreeena program is switching to reduced or no tillage. An individual activity (reduced tillage) with an adoption rate less than 20% is always considered additional. VM0042 requires that evidence must be provided through publicly available information contained in census or other government data. Agreeena provides evidence through Eurostat (2021) for projects enrolled in the EU and supplemented by the National GHG Inventory Reports (submitted to the UNFCCC). In the case that evidence on a single proposed activity or suite of activities is not available, the program will use reference values from other regions with similar geopolitical characteristics or consult with a qualified independent local

²² Skaalsveen, Kamilla, Julie Ingram, and Julie Urquhart (2020): *The role of farmers' social networks in the implementation of no-till farming practices*. Agricultural Systems, 181 (2020). [https://eprints.glos.ac.uk/8239/3/8239-Skaalsveen-\(2020\)-The-role-of-farmers-social.pdf](https://eprints.glos.ac.uk/8239/3/8239-Skaalsveen-(2020)-The-role-of-farmers-social.pdf)

²³ Sulemana, I., & James, H. S. (2014). Farmer identity, ethical attitudes and environmental practices. *Ecological Economics*, 98, 49–61. doi:10.1016/j.ecolecon.2013.12.011

²⁴ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-24-v1.pdf>

expert²⁵. According to the VM0042, evidence for additionality can be extracted from independent research sources.

VM0042 states that if, e.g., reduced tillage rates, in the countries covered in the program are greater than 20%, the project must include a proportionally higher ratio of other activities with lower adoption rates to bring the weighted average of the proposed project activities below 20%. In addition, if a project is already implementing an activity, e.g., reduced tillage, prior to project start, the common practice test will be undertaken for any new activities that are started. For project activities that are non-additional at a country level, a weighted average between that activity and one or more other activities (suite of activities) will be calculated to get a new weighted average adoption rate to reassess additionality. If two types of activities are new in the project, they will then be assessed by the weighted average adoption rate, as specified in VM0042, and will receive certificates for both activities. For example, if a country-wide existing adoption rate is 40% for reduced tillage and 10% for cover-cropping, the existing adoption rate for lands combining these two practices as a suite would be 40% multiplied by 10%. Therefore, the weighted average of the two would result in an adoption rate of 4%. The suite of activities in the example above is below 20%, and therefore both activities will be eligible for certificate earning. If this still results in non-additionality (greater than 20%), the program will test at a regional (NUTS3) scale for an individual activity.

3.6 Methodology Deviations

It is not intended for there to be methodology deviations in the AgreeenaCarbon Project.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Soil Organic Carbon

According to methodology VM0042, section 8.1, table.5, and section 8.2.1, soil organic carbon stocks will be calculated based on the proposed “Quantification Approach 1: Measure and model” method following Equation 2.

AgreeenaCarbon will be modelling SOC stock changes using the Rothamsted carbon model (RothC V.26.3) which is a widely acknowledged and commonly used model for modelling carbon stock in agricultural soils.

²⁵ A signed attestation from a 3rd party expert stating that the proposed project activity is not common practice will act as a replacement to missing data.

RothC is a Process-based model for the turnover of organic carbon in non-waterlogged topsoils that allows for the effects of soil type, temperature, moisture content and plant cover on the turnover process. It uses a monthly time step to calculate total organic carbon (t ha⁻¹) on a years to centuries timescale.

The baseline scenario for each project is determined by applying a 5-year historical look-back period, as that is the time a complete crop rotation will typically last. For determining the baseline of each project, all pre-project agricultural management practices are reported and used to project a scenario for the crediting period using RothC.

The quantification of GHGs in the baseline will be validated and calibrated in accordance with the VMD0053 requirements.

CO₂ from fossil fuel:

Carbon Dioxide emissions occurring from stationary combustion of agricultural vehicles within the project boundaries will be calculated according to methodology VM0042, section 8.2.3 and quantified under Quantification approach 3, using equations 4 and 5.

CO₂ from woody biomass:

Woody biomass is not included in the project boundary.

CH₄ from soil methanogenesis:

Soil methanogenesis is not included in the project boundaries as the program does not operate on water-logged or temporarily water-logged soils.

CH₄ from enteric fermentation:

Methane (CH₄) from enteric fermentation is not included in the project boundaries as the program does not operate in grasslands or permanent pasture lands.

CH₄ from manure deposition:

Methane (CH₄) from manure deposition is not included in the project boundaries as the program does not operate in grasslands or permanent pasture lands.

CH₄ from biomass burning:

Methane (CH₄) from biomass burning is not included in the project boundaries as the program does not allow for such practice.

N₂O from use of nitrogen fertilizers and nitrogen fixing species:

Nitrous Oxide (N₂O) from use of nitrogen fertilizers and nitrogen fixing species within the project boundaries will be calculated according to methodology VM0042, section 8.2.8 and quantified under Quantification approach 3, using equations 12 to 21.

N₂O from manure deposition:

Nitrous oxide (N₂O) from manure deposition is not included in the project boundaries as the program does not operate in grasslands or permanent pasture lands.

N₂O from biomass burning:

Nitrous oxide (N₂O) from biomass burning is not included in the project boundaries as the program does not allow for such practice.

4.2 Project Emissions

The quantification of GHG emissions and removals for each project will be estimated in accordance with methodology VM0042, section 8. All GHG emission and removal quantification approaches applied in the baseline, will also be applied in the project scenario, with the sole difference being the adopted new practice implemented in the project.

4.3 Leakage

The project does not cause GHG emissions to change outside of the project boundary as a result of adopted practices or changes to existing practices. According to methodology VM0042, AgreeenaCarbon Project will implement leakage management activities as outlined in the section on Leakage Management. The scenarios that will be tracked for leakage are as follows:

1. Account for organic amendments outside the project area

When carbon applications are obtained from outside the project area that were not in the historical baseline period, there are several cases in which a deduction must be applied. The AgreeenaCarbon Project flags cases during the internal quality check process in which the manure or compost applied is not produced on-site, the manure is not from an uncontrolled anaerobic lagoon, pond, tank or pit, or when the manure or biosolid is documented to have been used as a soil amendment. In these cases, the deduction is then applied and is calculated based on Equation 29 in VM0042.

2. Decline in productivity

As is stated in VM0042, market leakage is likely to be negligible yet the quantification methods that are outlined in VM0042 Section 8.4.3 are used by the Project and data are collected at the point of harvest. VM0042 requires that the productivity calculations need to be completed every ten years, but AgreeenaCarbon conducts a yield analysis every year to track farmer output and any major declines in productivity are flagged. To ensure leakage is not occurring, the following will be completed every ten years in accordance with the methodology:

Step 1: Using yield data will use Equation 30 to calculate the average with-project productivity of each product to average pre-project productivity of the same crop product. If it has been found that productivity has improved stayed constant or declined by less than 5% no further action is needed. If there is a reduction greater than 5% then Step 2 must be completed.

Step 2: Determine whether it is a short-term change in productivity repeat Step 1 calculation excluding data input from the first three years of project implementation. If the decline is still greater than 5% then Step 3 must be taken.

Step 3: Determine whether the result of a loss in yield is due to a combination of factors such as different practice changes, crop type, soil type, or climatic zone. If it is found that a combination of factors then the combination of factors must be removed for future iterations of that project instance.

4.4 Net GHG Emission Reductions and Removals

The Net GHG emissions reductions and removals are calculated in line with the VM0042 requirements in Section 8.5. Using Equation 32 to quantify gross t CO₂e reductions and removals with reductions quantified under Equation 33 and removals under Equation 34. Carbon dioxide emissions are quantified using Equations 39 – 42, methane emission reductions are quantified using Equations 43 – 47, nitrous oxide emission reductions using equations 48 – 50.

In the table below, and at this stage, leakage emissions are estimated at zero as productivity decline (loss of yield from year to year) can be assessed in a ten-year period according to the VM0042 methodology. The monitoring and calculations of this element of leakage will be low and close to zero. It is difficult to forecast the values of organic amendments that come from off-farm and are expected to be in very low ranges.

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
2021	154,444.21 t CO ₂ -eq	-17,692.45 t CO ₂ -eq	0	172,136.5 tCO ₂ -eq
2022	530,531 t CO ₂ -eq	-149,325 t CO ₂ -eq	0	679,856 tCO ₂ -eq
2023	1,200,000 t CO ₂ -eq	-400,000 t CO ₂ -eq	0	1,600,000 tCO ₂ -eq
2024	1,200,000 t CO ₂ -eq	-400,000 t CO ₂ -eq	0	1,600,000 tCO ₂ -eq
2025	1,200,000 t CO ₂ -eq	-400,000 t CO ₂ -eq	0	1,600,000 tCO ₂ -eq
2026	1,200,000 t CO ₂ -eq	-400,000 t CO ₂ -eq	0	1,600,000 tCO ₂ -eq
2027	1,200,000 t CO ₂ -eq	-400,000 t CO ₂ -eq	0	1,600,000 tCO ₂ -eq
2028	1,200,000 t CO ₂ -eq	-400,000 t CO ₂ -eq	0	1,600,000 tCO ₂ -eq
2029	1,200,000 t CO ₂ -eq	-400,000 t CO ₂ -eq	0	1,600,000 tCO ₂ -eq
2030	1,200,000 t CO ₂ -eq	-400,000 t CO ₂ -eq	0	1,600,000 tCO ₂ -eq
Total	10,284,975.21 CO ₂ -eq	-3,367,017.45 CO ₂ -eq	0	13,651,993 tCO ₂ -eq

5 MONITORING

The data collection undergoes a QA/QC check through pattern analysis and remote sensing. The data and parameters that have been flagged as non-conforming will undergo a thorough communication process with the participant to understand where the flag is coming from and whether the project instance can remain in the program.

5.1 Data and Parameters Available at Validation

Data / Parameter	Project location
Data unit	Geographical coordinates (Latitude/Longitude)
Description	It is the basic parameter required to define the area of the project.
Source of data	The data are coming from the project participant based on physical placement of field location using google maps pin. Received geographical coordinates will be further utilized in field boundary and size detection.
Value applied	The data are retrieved based on the statement from the project participant. The value is further utilized and checked by additional processes.
Justification of choice of data or description of measurement methods and procedures applied	The project participant provides a google maps pinned location with exact designated geographical coordinates. The Agreeena system is designed for the ease-of-use for the project participant, therefore we utilize freely accessible and commonly used technology (e.g. google maps and a smart phone). This data is used further to draw the project boundaries and identify the central point of the field.
Purpose of Data	Calculation of baseline and project emissions.
Comments	The system for collection of data is designed to be straightforward and has received positive feedback from project participants.

Data / Parameter	Project boundaries
Data unit	Polygon
Description	It is the basic parameter required to define the exact area of the project activity instances.

Source of data	The field boundaries are detected using a deep learning algorithm that uses satellite imagery as the inputs. Imagery from the Sentinel 2 constellation is used, namely the bands: • B02 (Blue) • B03 (Green) • B04 (Red) • B08 (Visible Near Infra-red) These bands are used as they span the visible spectrum and are frequently used to detect the biochemical properties of plant matter. The bands have a ground sampling distance of 10 meters, meaning each pixel is 10m x 10m. This is sufficient to detect most fields above a size of 1ha. Given a pixel in 10m² the larger the field boundary the smaller the introduced error. To train the deep learning model, field boundaries were annotated over multiple regions across Europe. With this we have an accuracy metric Intersection Over Union (IoU) ²⁶ of 0.7, which is considered as a highly accurate result. We collect images from over the entire growing season and use the model to estimate the field boundaries at each time step.
Value applied	The boundaries are drawn using the remote sensing technology are the final to be applied.
Justification of choice of data or description of measurement methods and procedures applied	Frequent collection of images throughout growing season has numerous benefits. Firstly, images at a given time step can be partially or fully occluded by cloud and cloud shadow. Using multiple dates ensures we can always detect a field boundary even when a single date is cloudy. Secondly, a field varies in its appearance over a growing season. Therefore we can aggregate their outputs over the season to give the most likely field boundary for the season. The field boundary detection model is run over an entire region/country at the end of the growing season. Given a project participant field location we can retrieve the field boundary intersecting that point. The field boundary area is compared to project participant reported field area size. The following logic is applied below to flag fields for quality assurance, whereby the field boundaries are visually inspected and corrected or the project participant is contacted.
Purpose of Data	Calculation of the polygon and the area of the PAI.
Comments	N/A

²⁶ [https://pro.arcgis.com/en/pro-app/latest/tool-reference/image-analyst/how-compute-accuracy-for-object-detection-works.htm#:~:text=The%20Intersection%20over%20Union%20\(IoU,around%20the%20ground%20reference%20data.](https://pro.arcgis.com/en/pro-app/latest/tool-reference/image-analyst/how-compute-accuracy-for-object-detection-works.htm#:~:text=The%20Intersection%20over%20Union%20(IoU,around%20the%20ground%20reference%20data.)

Data / Parameter	Feld size
Data unit	Hectares [ha]
Description	<i>It is the crucial basic parameter required to define precisely the area of the project boundaries and the exact field area. If the area is not matching with our verification process, it will be flagged based on the difference between what is reported and what is detected using remote-sensing. The precise measurement of the field boundary and the area is crucial for the accurate quantification of the carbon sequestration and GHG emissions in further steps.</i>
Source of data	The data are coming from the project participant and are cross-checked with the data from remote sensing and are captured in the field boundary detection process (See parameter on Field Boundary).
Value applied	The data from remote sensing will be treated as final value.
Justification of choice of data or description of measurement methods and procedures applied	The data is gathered and validated based on the project participant's statement. The statement may be confirmed by administrative documents presented to the Agreeena customer success officer. In case of any discrepancy in the data the assessments of administrative documents are taking place.
Purpose of Data	Calculation of baseline and quantification of GHG emissions and carbon sequestration.
Comments	Based on current experiences, there has been no large discrepancies between data received from farmers and the values detected by the remote sensing technologies.

Data / Parameter	Soil characteristic -Soil texture & pH
Data unit	Coarse-Medium-Fine & unitless
Description	Soil texture can determine the structure of the soil and can determine the health and productivity of the plants that are in the soil.
Source of data	The data are coming from the project participant.
Value applied	The values provided by project proponent are the final data
Justification of choice of data or description of measurement methods and procedures applied	The type of soil texture and the level of pH parameter play an important factor for calculation the potential of carbon sequestration by soil. The values are monitored on a random sample of fields that is selected for field inspections.

Purpose of Data	Defining the baseline and for the quantification of GHG emissions and carbon sequestration.
Comments	In combination with field inspections, Agreea is conducting random soil sampling in order to improve the accuracy of the carbon quantification model.

Data / Parameter	Soil moisture
Data unit	Moist/Dry
Description	Soil moisture impacts the soil organic carbon and is monitored as part of data collection and baseline validation.
Source of data	The data are coming from the project participant.
Value applied	<i>The values provided by project proponent are the final data</i>
Justification of choice of data or description of measurement methods and procedures applied	The information on the soil moisture on the field is an important parameter that influences the potential of carbon sequestration by soil. The values are monitored on a random sample of fields that is selected for field inspections.
Purpose of Data	Defining the baseline and for the quantification of GHG emissions and carbon sequestration.
Comments	The data is cross-checked via the EU soil database and LUCAS database for increased accuracy.

Data / Parameter	Fertiliser application
Data unit	Kg/N/Ha
Description	Amounts and type of fertilizer that are applied to the field per year by project participant.
Source of data	Data are gathered directly from project participant. Values are checked when a fertilisation management plan is available.
Value applied	The values from the fertilisation management plan are the ones taken as final.
Justification of choice of data or description of measurement methods and procedures applied	The level and periods of applying the fertilisers on the field can be the sources of the emissions of GHG and therefore need to be well monitored. The fertilisation management plan is in most cases an official document that is required by the government and is seen as official documentation/proof.

Purpose of Data	Defining the baseline and for the quantification of GHG emissions and carbon sequestration.
Comments	

Data / Parameter	Deforestation
Data unit	Yes or No
Description	Whether deforestation occurred on the land in the last 20 years. It is defined using the FAO definition of forested land.
Source of data	The data are coming from remote sensing analysis.
Value applied	If the land was converted to arable land and deforestation occurred the project becomes ineligible for the program
Justification of choice of data or description of measurement methods and procedures applied	The parameter is as a one defining if the project is eligible or not. The assessment of the parameter is to check if the project has not been created on the land that was used as a forest in the last 20 years.
Purpose of Data	Determining if the project is eligible to enter into the program and meeting the AgreeenaCarbon Project requirements.
Comments	

Data / Parameter	Retrospective Soil disturbances (5 years back)
Data unit	Determination of past project activity, i.e. conventional tillage, reduced tillage or no tillage
Description	This parameter monitors the tillage methods of the project participants to determine the baseline.
Source of data	The soil disturbances are detected using machine learning algorithms that use satellite imagery as the input. Imagery is used from both the Sentinel 1 and Sentinel 2 constellations. The Sentinel 2 sensor is a passive sensor meaning it detects light reflected from the sun. The band used in the model primarily describes biochemical properties of organic matter. The Sentinel 1 sensor is active meaning that it transmits pulses of radiation in the microwave region of the spectrum. This sensor can penetrate through clouds and soil and primarily describes the physical properties of substances.

	The bands have a ground sampling distance of 10 meters, meaning each pixel is 10m x 10m. The model was developed using a time-series of images captured between October-April. The sentinel 1 and 2 bands are stacked together and passed into the model. Over the course of the past five years using the series of annual satellite photos.
Value applied	Level of soil disturbance
<i>Justification of choice of data or description of measurement methods and procedures applied</i>	This is to check the history of the field in terms of the soil disturbances. This is used for the additionality test. The parameter is monitored by Satellite imagery. This is to set up a proper baseline.
Purpose of Data	This parameter is used to define the baseline and to provide input for the additionality test.
Comments	

1.2 Data and Parameters Monitored

Data / Parameter	Application of fertilisers
Data unit	Kg of nitrogen (N), phosphorous (P), and potassium (K) applied per hectare
Description	This parameter is monitoring the use of fertilisers with the distinction of the type, i.e., organic and/or synthetic. In the case of Organic fertilisers, the monitoring is focused on the fertilisers applied to the files. It should not exceed 170 kg/ha due to EU regulation with EU regulation taken as the standard for countries outside of the EU.
Source of data	Data is entered by project participant
Description of measurement methods and procedures to be applied	This data comes from project participant who have a record of the amount of fertilizer they are applying to their given PAI.
Frequency of monitoring/recording	Annually
Value applied	In the case of Organic fertilisers, the monitor is focused on the fertilisers applied to the files. It should not exceed 170 kg/ha

Monitoring equipment	Farmer data and when available, the fertiliser management plan.
QA/QC procedures to be applied	The given values are crossed by the verification values as a standard value of application of fertilisers for particular type of crop. Also verified with official fertiliser management plan.
Purpose of data	This parameter is monitored to gather data on the amount of organic matter deposited on the fields. This is the key aspect in quantifying the source of GHG emissions in agricultural soils.
Calculation method	The data from project participant is fed into the carbon quantification model.
Comments	The majority of the project participants in the AgreeenaCarbon programme possess fertiliser management plans as a standard required for large-scale farms across Europe.

Data / Parameter	Yield
Data unit	Tonnes per ha (of the wet weight) of the crop output.
Description	This parameter is used to assess the quantity of the biomass based on the scientific-based coefficients collected by publicly available peer-reviewed data tables specified per crop. This data is collected at the moment of harvest.
Source of data	Data is input from the project participants based on measurement on-farm as a standard procedure by project participants. The parameter is crucial to assess the productivity of the field.
Description of measurement methods and procedures to be applied	In most modern farms, the harvesters measure the amount of grain/ crop output automatically during the harvest. Most modern tractors have in-built weight scales.
Frequency of monitoring/recording	Annually immediately after harvest. Will be monitored again if the project participant plants catch crops for harvest.
Value applied	The value received from the farmer is cross-checked with publicly available peer-reviewed data on default ranges for the crop type and the region where the PAI is located.
Monitoring equipment	Reported directly from project participant who uses certified weight scales.

QA/QC procedures to be applied	The value that has been provided is checked to see if it is fitting to the range of standard yields on the particular crop and the region where the PAI is located. If not, it is flagged and verified with the project participant.
Purpose of data	This parameter is used to assess the quantity of the biomass and as an input the carbon quantification model.
Calculation method	N/A
Comments	

Data / Parameter	Crop type
Data unit	English agricultural crop name
Description	Parameter to determine the crops that are being grown on a given PAI.
Source of data	Data is received from project participants
Description of measurement methods and procedures to be applied	Cross-check between the accepted crop-type list which is verified via field inspections. The eligible crop-type list is defined in the program methodology.
Frequency of monitoring/recording	Annually
Value applied	English agricultural crop name
Monitoring equipment	Physical check during field inspections.
QA/QC procedures to be applied	Cross-check between crop-type list and the crops submitted by project participant
Purpose of data	This parameter is monitored to check the correctness of data submitted on the platform by the project participant. Also, it supports verifying if the cultivated crops are eligible for the program.
Calculation method	
Comments	

Data / Parameter	Soil disturbances – Reduced till or no tillage
Data unit	Conventional / Reduced / No tillage
Description	The parameter is used to determine the proper and eligible level of soil disturbance throughout the project period.
Source of data	Project activity is reported from the project participants and further verified using remote sensing data.
Description of measurement methods and procedures to be applied	The soil disturbances are detected using machine learning algorithms that use satellite imagery as the input. Imagery is used from both the Sentinel 1 and Sentinel 2 constellations. The Sentinel 2 sensor is a passive sensor meaning it detects light reflected from the sun. The band used in the model primarily describes biochemical properties of organic matter. The Sentinel 1 sensor is active meaning that it transmits pulses of radiation in the microwave region of the spectrum. This sensor can penetrate through clouds and soil and primarily describes the physical properties of substances. The bands have a ground sampling distance of 10 meters, meaning each pixel is 10m x 10m. The model was developed using a time-series of images captured between October-April. The sentinel 1 and 2 bands are stacked together and passed into the model. Ground-truthing is used in addition to verify the remote sensing output.
Frequency of monitoring/recording	Periodically
Value applied	The value applied is the level of soil disturbance
Monitoring equipment	Assessment of the satellite imagery
QA/QC procedures to be applied	The data is cross-checked with remote sensing technology and the tillage detection tool. In addition it is randomly monitored by field inspections and ground-truthing.
Purpose of data	The type of tillage is directly linked with the assessment of the soil disturbances which lie at the core of the AgreenaCarbon program.
Calculation method	N/A
Comments	

Data / Parameter	Application of cover crops
Data unit	Detection of fields with cover crops (Yes or No)
Description	Determining cover crops and for how long planted. Following the AgreeenaCarbon Project rules, the project participant can choose to what extent and for how long they are planting cover crops. There are three sub-parameters monitored: - Winter cover crops seeded post-harvest in September/October - Spring cover crops seeded in early Spring or - Catch crops seeded immediately after harvest and grown up until the planting of the winter cash crop.
Source of data	Periods of application of the cover crops are provided by the project participant. They are further checked using remote sensing technology.
Description of measurement methods and procedures to be applied	The Normalize Difference Vegetation Index approach is used to detect the green cover on the field. The over is detected using machine learning algorithms that use satellite imagery as the input. Imagery is used from both the Sentinel 1 and Sentinel 2 constellations. The Sentinel 2 sensor is a passive sensor meaning it detects light reflected from the sun. The band used in the model primarily describes biochemical properties of organic matter. The Sentinel 1 sensor is active meaning that it transmits pulses of radiation in the microwave region of the spectrum. The bands have a ground sampling distance of 10 meters, meaning each pixel is 10m x 10m. The model was developed using a time-series of images captured between August and April. The sentinel 1 and 2 bands are stacked together and passed into the model. Ground-truthing is used in addition to verify the remote sensing output.
Frequency of monitoring/recording	Periodically (at least four times per season). It is checked at least four times between August and December and from February until April.
Value applied	Utilizing the outcomes from the frequency of monitoring (at least four times), it can be verified that a project participant has planted cover crops.
Monitoring equipment	The data is cross-checked with remote sensing technology. In addition, it is randomly monitored by field inspections and ground-truthing.

QA/QC procedures to be applied	The cover crops are monitored by the remote sensing technologies, to indicate their presence. Not to be mixed with the cash crops and there are safeguards in place in order to not confuse the cash crops with cover crops.
Purpose of data	This parameter is used to assess the amount of the organic amendments to the soil and as an input to the carbon quantification model.
Calculation method	N/A
Comments	This is one of the major inputs for determining the amount of carbon sequestration in a certain period.

Data / Parameter	Residue management
Data unit	Detection of residue management (whether it is Mulched, Removed, or Burned)
Description	The parameter determines the amount of post-Harvest residues left on the field. Depending on the action of the project participant, the residues might be mulched or removed. Burning is strictly prohibited by the AgreeenaCarbon programme. This parameter is monitored to check if the project proponent properly registered the activities related to the post-harvest residues.
Source of data	The data is provided by the project participant and checked via field inspections.
Description of measurement methods and procedures to be applied	This parameter is monitored with physical checks.
Frequency of monitoring/recording	Annually
Value applied	The value applied is in accordance with the information received from the project participant.
Monitoring equipment	N/A
QA/QC procedures to be applied	If during the field inspection, a discrepancy is found between input from the project participant and what is found during the inspection, changes will be made to the carbon quantification process.

Purpose of data	This parameter is used to assess the amount of the organic amendments to the soil and as an input to the carbon quantification model.
Calculation method	N/A
Comments	This is one of the major inputs for determining the amount of carbon sequestration in a certain period.

Data / Parameter	Application of nitrogen inhibitors
Data unit	Applied/Not applied
Description	Nitrogen inhibitors are the chemicals responsible for blocking and delaying the oxidation of the nitrogen. This is a means of mitigation of emissions of NO ₂ from the soils.
Source of data	Data is provided by the project participant.
Description of measurement methods and procedures to be applied	This is checked if the project participant can demonstrate that they purchased the inhibitor. It can be assumed that if it has been purchased, it is being applied on-field. Invoices are checked.
Frequency of monitoring/recording	Annually
Value applied	The information whether the inhibitor has been applied, is input into the carbon quantification model.
Monitoring equipment	Verifying invoices
QA/QC procedures to be applied	This parameter is monitored during the field inspection (upon selected number of fields across the program) where inspectors would be checking the proof of purchasing this product.
Purpose of data	This parameter has an influence on the quantification of the GHG emissions from the field.
Calculation method	N/A
Comments	N/A

1.3 Monitoring Plan

In this chapter the monitoring plan has been described. It contains the description of the fundamental elements of the monitoring, parameters that are measured during the monitoring cycle, Quality assurance and quality control (QA/QC) applied procedures. The chapters also introduce the soil sampling approach as well as description of the field inspection campaigns. When a farmer engages with Agreeena they are required to provide the most accurate data necessary for monitoring and accountability. The following actions are the elements in the monitoring system.

1. **Validation Meeting:** Refers to the initial process performed by the farmer adviser team, where the project participant's understanding of the program policies and procedures are determined via a video meeting. During this step, the team will validate the field locations to ensure against double claiming, and correct if needed.
2. **Remote Sensing:** Through the remote-sensing technology, the parameters are being validated and verified through analysis of the high-resolution satellite images taken from Sentinel 1 and Sentinel 2 satellites. Through ground-truth data and satellite imagery, the model improves its quality and accuracy. Both the ground-truthing data points and the satellite images are continuously gathered to feed the model to create conditions for machine learning. This provides ongoing improvement in the accuracy of the model. The remote sensing is being utilized to check all the parameters related to field boundary, field size, field coverage and management practices.
3. **Quality Assurance (QA):** Refers to process in which the historical activity data of the past 5 years is assessed against remote sensing data to validate the baseline for the project. This is done utilising a flagging algorithm that will identify potential over/ under estimations that could occur with incorrect selection combinations. If an outlier is identified, the QA officer will perform an interview with the project proponent to correct or confirm the data entry.
4. **Quality Control (QC):** Refers to the evaluation of project information and performance data to determine if the outcomes are in-line with the program requirements.
5. **Field Inspections:** Refers to the in-person visit to the field and verifying if the activities reported by the project proponent to the platform are reflecting the activities that are visible on the field level. The field inspections will take place in spring and in autumn. Following each inspection period, an outcomes report will be produced.
6. **Soil Sampling:** Refers to the process that the program deploys to improve the modelling accuracy for the underlying project. The program includes soil sample results that have been provided via an approved official soil laboratory report indicating the SOC (%), SOM (%), and if available bulk density.
7. **Annual Assessment Report:** Refers to a summary report that will outline the assessed procedures, variables, and outcomes of the projects of the program.

5.1.1 Quality Assurance and Quality Control

The process of QA enables the program to ensure that the project proponent has a clear understanding of the program's policies, objectives, eligibility criteria, and that the project proponent has fully understood the aspects related to the data they are required to fill in. During these steps, the platform can partially infer the project proponent's understanding of the program's procedures, eligibility, and objectives. The monitoring system is designed to perform

QA on the project proponent throughout the stages of registration, field definition, as well as field strategy

QC is the monitoring process that describes the monitoring of input data of the project proponents. It is carried out to verify that all participants adhere to the policies and regulations of the program. Field management practices reported on field actuals and field size reported on field definition are submitted to the program for Quality Control. Once the program receives the field actuals, the program Quality Control Officer will initiate the assessment procedure.

5.1.2 Field Inspections

Field inspections serve as additional means of improving the accuracy of data are direct inspections of the fields. The program is to undertake a series of on-site field inspections of projects within the program portfolio. The campaign of field inspections would be divided into two rounds in the spring and autumn. The reason for this is just to create more possibilities to detect any kind of irregularities that may have happened on project level. The field inspections will be conducted by an externally hired independent agricultural advisor who is accompanied by a representative from the Customer Success Department. The inspections will keep the standard formula by keeping the same inspection forms with the list of questions and areas to be checked.

The purpose of these inspections is to confirm and verify that the data uploaded by the project proponent is correct, and to verify flagged parameters for both verification of data and calibration of the Monitoring process. The outcomes of the inspections would be integrated into the Agreea IT platform. A summary of the inspections will be indicated via a summary report submitted with the Monitoring Report. The field inspection campaign will be conducted annually.

