Interreg
North Sea Region
Carbon Farming
European Regional Development Fund

EUROPEAN UNION

Final report

Valorisation of local carbon farming practices

presentation of the show cases in the Carbon Farming project

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Contents

Abbreviation list

C	: Carbon
CAP	: Common Agriculture Policy
CF	: Carbon farming
CF project	: Carbon Farming project
CO_2	: Carbon dioxide
CS	: Carbon sequestration
e.g.	: Exempli gratia; for example
etc.	: et cetera; and so on
ETS	: Europe trade emission scheme
EU	: European Union
GHG emissions	: Greenhouse Gas emissions
i.e.	: id est; in other words
MRV	: Monitoring – Reporting – Verification
SDG's	: Sustainable development goals
SOC	: Soil organic carbon
VCC	: Voluntary Carbon Credits
VCM	: Voluntary Carbon Market

Positioning of the final report

This final report should be considered as reference work and inspirational document when using carbon farming as a business model. In this report carbon farming is defined as a way of land use aiming at binding additional organic carbon in agricultural soils to relieve the climate. The report provides different levels of knowledge and experiences from the Carbon Farming project. It is possible that the reader may have other ideas and experiences.

On one hand, the reader can find very specific information on different show cases this consortium has been working on in section 2. A show case is a collaboration that has been developed within the Carbon Farming project and in which a farmer get paid for introducing carbon farming techniques by a compensator who in this way generates carbon credits. As can be seen in the table of contents, pictograms are assigned to the different show cases, which indicates the different target groups or sectors of the show case. In this way the reader can easily find the specific information he/she is looking for. The pictograms are explained in section 1.3.3.

On the other hand, the reader can also find experiences and lessons learned for the different types of business models (section 3) as well as general findings in regard to considering carbon farming as a business model (section 4).

In addition, we would like to refer to two related reports published by this consortium:

- **The report** 'Research of existing business models to valorise carbon sequestration', which is a literature study on relevant business models.
- **The white paper** 'Incentivising carbon farming; policy recommendations from the Carbon Farming project', which is both a literature study and a report based on experiences from the practical work that was done within the Carbon Farming project.

These two reports are additional and relevant information next to this final report.

We hope this final report will inspire the reader and will put different stakeholders into action! We believe this report is only the start of using carbon farming as part of a business model in Europe.

1 Introduction

Flower strip

1.1 The Interreg Carbon Farming project in brief

Our consortium of Dutch, Belgian, German, and Norwegian partners started four years ago to develop the Carbon Farming project (CF project). Local farmers are seen to be in the perfect position to deliver a positive impact on our climate challenges and can help to achieve the climate goals and emission reduction targets of the European Union (EU) by 2030 and climate neutrality in 2050. Through better soil management and carbon farming (CF) practices, farmers can sequester carbon (C) into their soil, caught from atmospheric carbon dioxide (CO_2).

CF is not only beneficial in the combat against climate change but has many other advantages. The protection and increase of soil organic matter content, also has a positive effect on soil life, soil water retention and soil fertility. Due to the deterioration of soil quality across Europe, the use of CF practices will become more crucial to counteract downward trends. Together with the improvement of soil quality, the resistance of the soil against extreme weather conditions increases, such as extreme droughts and heavy rainfall associated with climate change. In this way, future harvests can be more secured and unnecessary food losses are avoided. **CF is much more than a new way of agricultural management, it is a part of the solution to several challenges we face today, such as biodiversity loss, food security and climate change.**

The Interreg North Sea Region CF project was set up with two main goals. One is to enlarge the awareness of possibilities of CF, amongst farmers as well as in society. The other one is to motivate farmers to apply a more sustainable soil management, by developing new business models for implementing CF practices. We started by defining the most promising **CF measures** to overcome the lack of knowledge on how to implement CF practices. The outcome of this study can be consulted in the report: 'Inventory of techniques of carbon sequestration in agriculture soils'. In parallel with this study, a desktop research by all partners has been carried out onto the possible markets of carbon credits and the possibilities for the agricultural sector to valorise sequestered C. We identified **four potential business models** for farmers, namely: within the agri-food chain, outside the agri-food chain, at farm-level and including government institutions. How this research was conducted and how these business models were defined, can be read in the report: 'Research of existing business models to valorise carbon sequestration'.

The outcome of the study on the most promising CF measures and the defined business models were brought into practice in so-called **"show cases"**. These show cases are the result of four years of practical work in the CF project where collaborations between farmers and other stakeholders were set up to valorise CF practices and C sequestration. The process of setting up these collaborations and the results are discussed and evaluated in this final report.

1.2 Positioning of the show cases within the market of carbon offset

In order to valorise these CF practices, the existing system of **carbon offset** can be used. A carbon offset is a reduction in emissions of CO_2 or other GHG emissions made in order to compensate for emissions made elsewhere. This system to compensate with carbon offset is connected with a price, which has led to the carbon offset market. A carbon market price gives an economic incentive to polluting businesses to reduce and eventually discontinue their harmful activities contributing to climate change. In this way, carbon pricing aims to stimulate the development of new, greener, more efficient and low-carbon technologies. Currently, there is already a market that is based on the compensation of carbon dioxide (CO_2) or other greenhouse gas (GHG) emissions, this market is discussed further in this section. The new business models for the agriculture sector that were identified within this project are additional to this existing market, as they offer local offset possibilities.

Before continuing, we need to emphasize and clarify the type of carbon offset we aim for with the CF project. There are two types of markets for carbon offsets, **compliance** and **voluntary**:

- In **compliance** markets like the European Union (EU) Emission Trading Scheme (ETS), companies, governments, or other entities buy carbon credits in order to comply with mandatory and legally binding caps on the total amount of carbon dioxide they are allowed to emit per year. Within the cap, companies

receive or buy emission allowances, which they can trade with one another as needed. They can also buy limited amounts of international credits from emission-saving projects around the world.
The CF project does not aim to develop a system qualified for the compliance carbon offset market but focuses on the voluntary carbon market.

- This **voluntary** carbon market (VCM) demand for carbon offset credits is generated by individuals, companies, organisations, and sub-national governments who purchase carbon credits to mitigate their GHG emissions to meet carbon neutral, net-zero or even climate positive goals because of the benefits of carbon **removal**. The VCM is facilitated by certification programs (such as the Verified Carbon Standard, the Gold Standard, the Climate Action Reserve) that provide standards and guidance and establish requirements for climate action projects developers to follow in order to generate **carbon offset credits.**

All the show cases from the CF project are developed towards the VCM, but they are not yet certified climate action projects that support a change in soil management for climate friendly farming. VCM projects **reduce, remove or avoid** GHG emissions. In the following we want to highlight the **carbon removal offset credits** (Figure 1). This type of carbon credit means that the CO_2 is actually captured or removed from the atmosphere and stored in soils or biomass. Thus, carbon removal offset credits help to reduce the CO_2 concentration in the atmosphere, which is different from the conventional way of carbon offsetting, which focuses on reducing emissions. As the carbon credits generated by farmers can be considered as **carbon removal credits**, they can be an important partner for companies who want to be one step ahead to become **climate positive** and not only climate neutral, which is only possible through carbon removal.

Why won't we offer the opportunity to compensate through local projects in Europe?
An important trend noticed throughout the course of the CF project is that there is an increasing interest in **locally produced carbon (removal) credits**. Whereas in the beginning carbon credits were often generated by planting trees in developing countries, based on our project experience, **companies are now (in addition) looking for more local initiatives.** This is influenced by increasing questions about the reliability of these international 'far away' compensation projects and is reinforced by the increasing support and willingness of consumers to buy locally and support their local farmers and environment. In addition, they not only support the local farmers financially, but also provide local ecosystem services such as biodiversity and water storage.

Despite the increased awareness and willingness of the companies to start local CF projects with farmers, we have noticed how difficult it is. Existing **private** certification frameworks for the VCM, such as the Verified Carbon Standard, the Gold Standard, the Climate Action Reserve, make it challenging to enter a carbon market in Europe with CF projects, due to the following reasons:

- Their methodologies for CF practices, are rather limited and not always applicable in EU member states. Based on our experience, implementing and stimulating CF requests a region-specific approach, which is not provided by these exiting programs and need to be developed.

Figure 1: Infographic on voluntary carbon (removal) offset market and types of climate action projects

- In order to have your project certified according to these standards, a third party is needed to do independent auditing. Altogether, the offer of third parties in Europe that can audit agricultural projects is very limited.
- As today the voluntary carbon market does not have any governance body. At VCM, the entities that set the criteria for project certification and carbon credits generation – the standards – are purely private entities. Each standard establishes its own eligibility criteria for projects that it registers, as well as for entities that can obtain access to the registry and thus trade in carbon credits. The absence of governance entails difficulties in legal qualification of voluntary carbon units. In the European Union, carbon allowances under the EU Emission Trading System are classified under MiFID II as financial instruments. Voluntary carbon credits (VCC) are neither included in this qualification, nor assigned a unified definition across the European Union. Instead, each member state treats VCCs at its own discretion[1].

Yet these private certification frameworks are known to bigger companies and they are often confused that smaller local projects are not following these published standards. Therefore, the European Carbon Farming Initiative, is a very important development. The European Commission intends to set up an expert group on CF where 'Member States' authorities and stakeholders can share their experience with a view to exchanging and establishing best practices on CF, in particular on improving the quality of CF credits and Monitoring – Reporting – Verification (MRV) methodologies, to foster peer-to-peer knowledge exchange. In the communication of the Commission the development of an MRV standard is mentioned and it is announced that it will be developed by the end of 2022.

[1] EY, 2021, www.ey.com/en_pl/law/voluntary-carbon-market

Undersown of grass in corn

1.3 Framework of the show cases

1.3.1 General scope of a show case

Before we started developing show cases, we agreed on a definition that the show cases within this project should fulfil to ensure the continuity of quality: *"The show cases in this project are trials and/or implementations of business models that contribute to the carbon farming movement, are at least applicable in a specific region and involve different stakeholders who came to an agreement."*. In addition, we aimed to fulfil some criteria in each show case, for example, one of the stakeholders in the collaboration must always be a farmer or group of farmers and the business plan must be economically feasible. The show cases must be inspiring, and the collaboration must be transparent and with open knowledge. We agreed on this definition in order to set up as many showcases as possible that are economically relevant and have long-term value in practice.

1.3.2 Types of rewarding systems

We can describe three different types of rewarding systems that will return in each show case:

1. **Action based** means that the agreement relies entirely on scientific models or findings that quantify the potential of particular CS techniques to store C in the soil. In this approach, evidence is requested from the farmer that he has taken the predefined CS measures.
2. **Result based** is an approach whereby a baseline measurement in soils before the farmer starts implementing the CS techniques is done. The progress will be checked by a second measurement after x numbers of years. Based on the difference in soil C-stock between the two measurements the reward is paid.
3. The **hybrid system** is a combination of action based and result based and is most recommended by the partners. One part of the payment is received by the farmer for implementing a CS measure after the requested evidence has been provided. The other part of the payment is based on the amount of C sequestered in the soil verified by the measurements. This hybrid system combines the positive features of both systems. The farmer receives a part of the remuneration by implementing the CS techniques and the compensator has more certainty with evidence that carbon storage has taken place.

1.3.3 Types of show cases

We wanted to structure the document in a way that the reader can easily find the specific information he/she is looking for. As can be seen in the table of contents, the show cases are highlighted with a pictogram. This pictogram indicates the target groups or sectors in which the showcase operates.

During the development of the showcases and the writing of this final report, it became clear that it is not evident to categorise the different showcases into one of these four business models described in chapter 1.1. So, we subcategorised them according to the target of the show cases additionally. This can be a target group (compensator) or a sales channel. The matrix (Table 1) shows which target group can potentially be active in which business model. For example, the events sector can be active within the agri-food chain, outside the agri-food chain and in government institutions because events are organised by all three. Besides target groups, the matrix also shows possible sales channels. Sales channels are potential ways for farmers to sell their carbon credits and for compensators to buy carbon credits. The matrix can be used according to interest. The pictograms indicate in which target group or sales channel the show case operates or operated and is assigned throughout the text for a navigation according to interests.

	Target group of the business model					Sales channel	
	Consumer	Events sector	SME's and big companies	Landowner (non farmer)	Retail Sector	Platform	Label
Inside the agri-food chain		✓	✓	✓	✓	✓	✓
Outside the agri-food chain		✓	✓	✓		✓	
Government institutions		✓		✓		✓	
At farm-level (and short chain)	✓						✓

Table 1: the different possible target groups and sales channel provided by the CF project linked to the four business models defined by the CF project

	Consumer: end user of the agricultural product, with purpose outside business or professional activities
	Events sector: any event organised by a company or government institution where people come together
	SME's and big companies: With this category, we want to include all the compa-nies that do not belong to any other category.
	Landowners (non farmers): this category refers to companies and other entities that own ground.
	Retail sector: business that sells goods to the public in relatively small quantities for use or consumption.
	Platform (sales channel): An online platform is a place on the internet where supply and demand come together and the two are linked by a third party, the platform.
	Label: A label indicates that a product or service has been developed in accord-ance with certain quality criteria or standards.

Table 2: explanation of the different pictograms

2 The show cases of the Carbon Farming project

In this chapter we will explain the different showcases developed within the project. The various partners: ZLTO, Boerenbond, Inagro, Bionext, 3N, NLRO and Thünen have each separately or together set up or guided collaborations to valorise the storage of carbon in a business model.

Essential soil organisms

Beernem

Opportunities for the covenant of mayors

Inagro, Belgium

Target group

Landowner (non farmer)

Context

This show case was developed within the framework of the covenant of mayors of the European Union, whereby each municipality sets the ambition to write down commitments to achieve the climate targets. CF is a valuable way for these municipalities to achieve their commitments. In this way, they not only achieve their commitments towards the European Union, but also provide a socio-ecological and economic service on local level, towards their own inhabitants and entrepreneurs.

Partners and collaboration

The municipality of Beernem is climate-minded and wrote down their commitments in the covenant of mayors of the European Union to reduce their CO_2 emissions with 40% by 2030. To achieve this goal, the municipality is always looking for opportunities and is well aware that different actions are necessary. When land in ownership of the municipality became available from leasehold, they contacted Inagro with whom they have good contacts. Inagro is a practical research institute in West Flanders (Belgium) and advises farmers and horticulturists on their way to innovation. Together with Inagro, Beernem saw a beautiful opportunity to use this land to compensate for the CO_2 emissions caused by the use of service vehicles of the municipality. In addition, Boerennatuur was contacted, which is an organisation for agricultural landscape and nature management in Flanders (Belgium). They offer expertise, to all farmers who want to work on agricultural landscape and nature management, individually or in groups (agro management groups). Through their local agro management group in the region, they helped to engage farmers.

The municipality was willing to let farmers cultivate the available land, thereby dropping the usual rent, on the condition that these farmers would apply CF techniques during the growing season. Under this scheme, they contribute to the compensation of the CO_2 emission caused by the municipality's car fleet and the farmer is allowed to use municipal land to grow crops.

A contract was signed between the municipality of Beernem and 10 local farmers for one year or one growing season. The arrangement was set on a short-term basis so the municipality continues to have full control over their land. With the start of 2022, they will go into the third year of the project, and extended the area with some hectares, and 2 additional farmers.

Techniques and methodology

Inagro defined in dialogue with the municipality for the different plots which technique had to be applied, taking into account the history and the location.

The suggested techniques are:

- Improved grass management (3,2 ha),
- Under sowing of grass in maize cultivation (2,33 ha),
- Cultivation of grass clover (2,5 ha)
- Enriched crop rotation, with winter cereal every third year as alternation with maize and grass (3 ha)

An open call was organized, giving all farmers from the municipality the chance to register for a parcel. The farmers had to indicate their preferred technique, as

well as a motivation of their participation. Based on the applications, the plots were assigned and the 10 farmers selected.

The collaboration is **action-based** and is supervised and monitored closely by Inagro and Boerennatuur. On the one hand, field visits take place and, on the other hand the agreement requests documents to verify the implementation of the CF techniques, such as seed invoices and photographic material of cultivation stages. The measures with their corresponding number of hectares represent the yearly storage of about 22 tons of CO_2 in the soil compared to the 80 tons of CO_2 emitted annually by the car fleet of the municipality of Beernem. With the project running for two years already, a total additional amount of about 39 ton CO_2 is stored. The amount of CO_2 stored by the farmers depends on the chosen CS techniques and is based on theoretical models.

Value proposition

Beernem is a 'farmers' municipality' and believes that farmers can be a part of the solution in the climate challenge.

The municipality has a positive approach towards farmers and supports research and innovation within the agricultural sector. Beside their support for the agricultural sector, with this CF project they also provide a local socio-ecological and economic service towards their own inhabitants and entrepreneurs. In this way they want to improve the link between farmers and society, by organizing a CF walking tour passing by the fields and showing the efforts done by farmers to contribute to the solution of the climate problem.

Conclusion

This showcase demonstrates the unique collaboration between farmers and municipalities who are joining forces to reduce greenhouse gas emissions locally in their own municipality. This can be seen as an ecological service to all the inhabitants of the municipality. In this way, it is possible to work locally on raising awareness among the inhabitants, farmers and municipal officials. This showcase not only increases awareness to local inhabitants, but it is also an example to other municipalities and government institutions to learn about the possibilities of the agricultural sector to contribute to the climate objectives.

From left to right: Claudio Saelens (alderman of agriculture of Beernem), Koen Debaets (farmer), Evelien Lambrecht (Inagro)

Biobeurs

Event sector meets local farmers

Bionext, Netherlands

Target group

Event sector

Context

This show-case demonstrates the possibilities of a collaboration between event organisers and local farmers. When organising an event today, CO_2 is still inevitably produced by essential services such as transport, lighting, heating, etc. Yet the organiser can choose to make the organisation of the event climate neutral or even climate positive. This is possible with the implementation of CF techniques by local farmers, who can store the remaining amount of CO_2 emitted by the organisation of the event back into the soil. In return the event organiser compensates for the costs of CF techniques taken by the farmer. These CF techniques are linked to an amount of carbon that is captured and stored in the soil. This amount of stored CO_2 can be used for the event's marketing campaign as sustainability is currently moving up the agenda. Especially for events on the theme of climate, CO_2 reduction and local food production, this is an opportunity to set a good example for other events.

Partners and collaboration

The Biobeurs is an annual organic trade fair in the Netherlands for organic producers and their products (https://www.bio-beurs.nl/). Each year, the fair may welcome around 10.000 visitors who are drawn by the wide variety of exhibitors and the extended workshop program about the organic sector. The fair is an important moment for the organic sector to share the latest knowledge and developments and to network with potentially interested parties. Every year, a theme is chosen that will be highlighted at the fair. At the 2020 edition, the theme was climate. Therefor the Biobeurs wanted to contribute and give a good example by compensating for the CO_2 emissions inevitable for organising the event. Bionext and the organisation of the Biobeurs set up a collaboration to offset the fair's CO_2 emissions by implementing CF techniques by local farmers. Bionext reached out to organic farmers around the location of the fair, Zwolle, to participate in this collaboration. Three agricultural farms joined the collaboration: Jeroen and Nieske Niemeijer, Harold Van Vilsteren and Joost and Sandra van Dam (Table 3). Bionext calculated the potential of CO_2 storage for each farmer based on scientific studies, the management plan drawn up by the farmer and the chosen carbon sequestration measures. The agreement was based on a one-year contract and was signed between the Biobeurs and the three farmers individually. The agreement stipulated that farmers were compensated after the farming season and after the measures had been taken. This provided the Biobeurs organisation the opportunity to pay out to farmers with the assurance that the carbon sequestration techniques were implemented.

Techniques and methodology

This show case is action based and the Biobeurs wanted to compensate for their emissions related to gas and electricity of the fair of the previous year, which was 75 tons of CO_2 in total. It was decided to pay the farmers a price per ton of CO_2 sequestered, but with a maximum total amount in value (€1.750). The potential of CO_2 sequestration was based on scientific values connected to different measures. Because the agreement was only signed for one year, no soil samples were taken as it is unlikely to measure carbon improvements within one year.

			
Farmer	**Jeroen and Nieske Neimeijer**	**Harold Van Vilsteren**	**Joost and Sandra van Dam**
Sector	Organic pig farm and arable farming	Organic dairy farm	Biodynamic dairy farm
Area	14 ha	100 ha	58 ha
Potential	36 ton CO_2	118 ton CO_2	132 ton CO_2
Measures	Permanent grassland Herbaceous grassland Compost Solid manure Crop residues	Permanent grassland Herbaceous grassland Compost Crop residues	Permanent grassland Herbaceous grassland Solid manure

Table 3: presentation of the three participating farmers of the show case: Biobeurs

The Biobeurs paid the farmers the amount of €65 per ton CO_2, with a maximum of €1.750 per farmer. All three farmers sequestered enough CO_2 to reach the maximum. The costs for the Biobeurs were therefore €5.250. The Biobeurs believed that they benefited from the positive attention obtained with this pilot.

The farmers received €1.750 each. The costs of the measures they had taken were not calculated. Working in this way directly with CO_2 storage was an eye-opener for them to learn which measures contribute to CO_2 storage in the soil. They also felt it was a good way to obtain positive attention for the farming sector as a whole.

Value proposition

From the Biobeurs perspective it was interesting to work together with these three farmers. The farms were located very close to the fair (local offsetting) and the fact that these were organic farms naturally suited very well to this organic fair. **For the farmers it was interesting to participate in this project to gain experience with the potential of CF.** Financially, but also with the positive attention it gained.

The relationship between the Biobeurs and the farmers was personal. It can be argued that the Biobeurs is the customer of the services (CS) provided by the farmers. There was personal contact, but Bionext had the more in-depth look on the farm and CS measures. The agreement was signed with a contract and this was made a festive event for all parties involved.

Conclusion

This showcase demonstrates the unique collaboration between farmers and municipalities who are joining forces to reduce greenhouse gas emissions locally in their own municipality. This can be seen as an ecological service to all the inhabitants of the municipality. In this way, it is possible to work locally on raising awareness among the inhabitants, farmers and municipal officials. This showcase not only increases awareness to local inhabitants, but it is also an example to other municipalities and government institutions to learn about the possibilities of the agricultural sector to contribute to the climate objectives.

Claire

Local CO_2 compensation platform

Belgium – ISP/BB

Sales channel

Platform

Context

Claire is an online platform where parties interested in the offset of carbon are brought together and matched with each other. These different parties consist of supply and demand.

On the one hand, there are the project providers that have the possibility to avoid or reduce CO_2 emissions. Claire wants to offer different types of projects on their platform that can include CF, energy investments or other new innovative technologies. On the other hand, there are the offsetting companies, these are the companies or organisations that want to compensate their inevitable CO_2 emissions by providing financial support to the project providers in their work to reduce CO_2 in our atmosphere. Offsetting companies can operate in different sectors: companies outside the agri-food chain, companies inside the agri-food chain, but also government structures such as municipalities and regional authorities. A platform like Claire makes the connection between supply and demand and provides the matchmaking for a good collaboration between these different parties *(Figure 3)*

Partners and collaboration

Claire is the first platform for local CO_2-compensation in Belgium. Currently, it only offers local Belgian CO_2 offset or removal projects. Claire stands for Clean Air and goes for 'local climate neutrality'. A year ago, Bart, Joris, Noah and Johanna joined forces to develop Claire. They were all well aware of the fact that we needed to 'step up a gear' in reducing our CO_2 emissions. They wanted to develop something that would benefit the whole of society, the private sector, schools, youth organisations, agriculture, nature, etc.

Claire offers a tailor-made solution for those who want to offset their emissions or realise their CO_2-reducing project. In other words, Claire connects offsetting companies with project providers. The project providers are schools, farmers, youth associations, nature associations, socio-cultural organisations, hospitals, care institutions, etc. An offsetting company pays through Claire for the CO_2 reduction or removal and the accompanying 'CO_2 impact package' to the project provider. He gets a certificate stating through which project he has compensated his CO_2.

To work out the methodology of the platform with the different sectors, Claire consulted suitable partners for each of the targeted sectors with the necessary knowledge and contacts. For the agricultural sector, Claire approached the Soil Service of Belgium (Bodemkundige Dienst van België, BDB) and Boerenbond (BB). As a spin-off of the Catholic University of Leuven, BDB is an independent research and consultancy institute for agriculture, horticulture and the environment in the broadest sense of the word. The BDB has an extensive and historical backward database in regard to soil carbon techniques and their potential to build up carbon. BB guides agricultural and horticultural companies in taking a new innovating direction at their business or business management. Boerenbond (BB) is also a partner in this CF project and has created a network of interested parties and gained knowledge of business models for land owners in the form of CF. Both BDB and BB have a signed agreement to collaborate and initiate carbon storage projects with farmers.

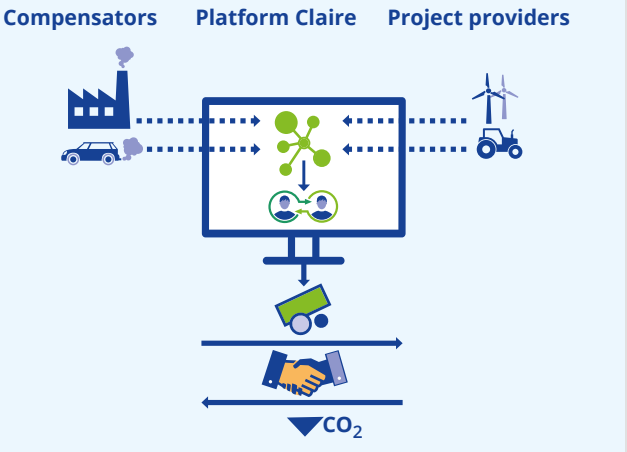


Figure 3: operation of the Claire platform

Together, the **three partners (Claire, Soil Service of Belgium and Boerenbond)** have been working for the past few months on a conclusive methodology and cooperation, which offers farmers the opportunity to offer their project via the platform. A farmer that wants to offer his project on the platform, needs to adhere to the methodology and rules. This year will be used to validate the practical and economic feasibility of this show case. The involved farmers also sign a contract with Claire, if their project is selected by a buyer (offsetting company).

The most important principles for CF projects on Claire:

- **Project duration** of 3 years, which can be extended once by another 3 years
- **Compensation fee** today: €50/ton CO_2. In the future the goal is to follow offer/demand and thus a farmer can set his own pricing.
- **Commitment** of at least 10 years: 'I acknowledge that it is essential to apply these adapted agricultural techniques for at least 10 years'.
- Payments are made annually, **after implementation of measures, and validation of the implemented measures.** This is a hybrid action and result based show case.
- **Motivational and positive approach:** Baseline measurements (C-measurements in year 0) are requested for each participating parcel. After 6 years, there is an opportunity for bonus if new C-measurements indicate more storage than predicted!

Techniques and methodology

The three partners selected **10 CF sequestration** techniques (non-exhaustive list) and offer farmers to bring up new techniques which need to be underpinned with enough evidence. Therefore a scientific advisory committee is appointed. The current possible CS techniques available to choose from are:

- Sowing cover crops (meeting specific criteria for reaching highest potential) and/or undersowing of grass in maize (with lower C-storing potential)
- Applying harvest residues (winter and summer cereals straw)
- Breaking through of mono culture maïze by implementing cereals in rotation
- Converting arable land into permanent grassland
- Applying additional compost
- Applying stable manure
- Planting of wood borders
- Planting of trees
- Replacing perennial ryegrass with meadow clover
- Cultivation of lucerne/alfalfa

+ currently under evaluation:

- Adding wood chips (under construction)
- No tillage
- Miscanthus
- ...

Kris Heirbaut and Ginny de Meulemeester, participating famers

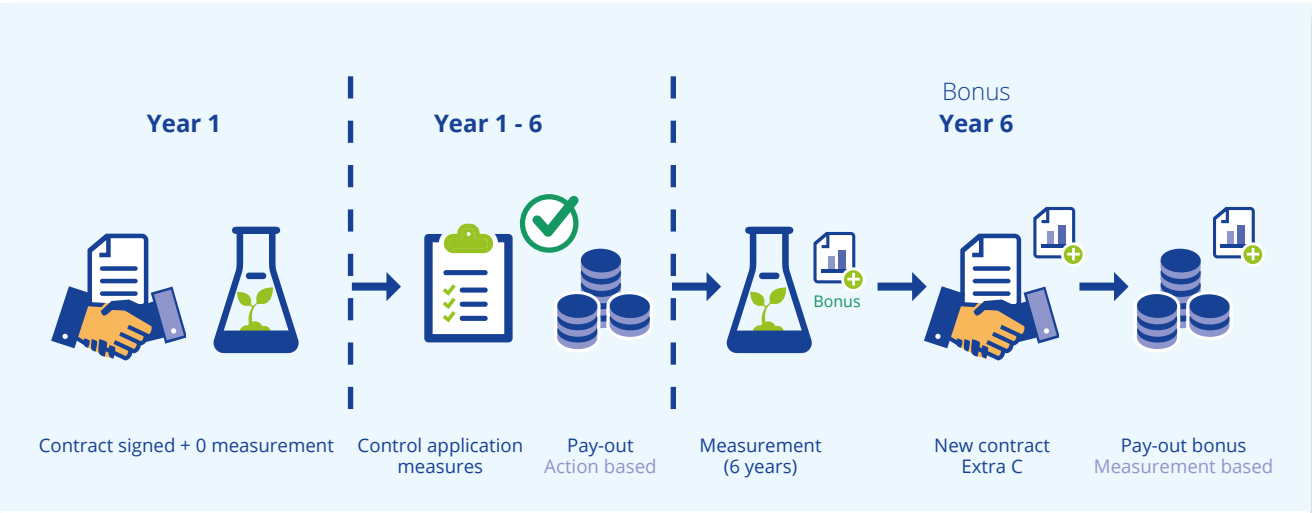


Figure 5: the different steps of this hybrid methodology of the show case Claire

The methodology is based on a scientifically based model (based on long term research) and potential storage quantities for each measure. We can say this is a hybrid model in which both predictions are made on potential storage, as well as C-measurements are carried out. First the farmer decides which parcels will be included. Next, the following steps are necessary *(Figure 5)*:

- Year 0: For each selected parcel a baseline measurement is needed (max. 2 years old, from an accredited laboratory).
- Year 1-6: Each year, a check/audit will take place, conducted by BDB. If the audit has confirmed that the measures have been implemented, the payment will be made to the farmer.
- Bonus, year 6: After 6 years, the farmer makes chance at a bonus if C-measurements indicate more storage than predicted! (accredited laboratory)

Value proposition

Claire is unique in Belgium. Contrary to other compensation platforms, Claire offers local projects. In this way, companies that want to compensate their GHG emissions, now have the option to projects close to them, to feel more connected and to even visit the project.

1 **Claire wants to be additional next to the compensation projects abroad,** because in addition to existing projects also local projects will be necessary to tackle climate change and reduce the GHG emissions in the most polluting countries. Claire uses short running contracts of three years, to stimulate companies to regularly review their CO_2-balance. As an additional benefit, the local economy improves, as well as local climate and biodiversity due to the other ecosystem services.

2 Another unique selling point, is that **Claire offers different types of projects.** Agricultural CF projects will be offered next to for example energy and construction projects (e.g. solar panels, insulation...).

Conclusion

The platform Claire offers opportunities to all sectors. For the agricultural sector in particular, they help to promote the transition to CF by raising awareness and offering financial support. In this way, they help to make the agricultural sector more robust to the consequences of climate change and to ensure more sustainable food production. More sustainable food production should also be seen as a service to the local population, along with ensuring more transparency in the carbon market and lowering the level of CO_2 in our atmosphere.

Windpark Krammer project

Upscaling the potential of Carbon Farming with support of an energy cooperative

ZLTO, Netherlands

Target group

SME's and big companies

Context

This show case was developed based on the belief of energy cooperative Zeeuwind that they, in addition to their main activity of exploiting renewable energy projects, also have a responsibility of taking care of the environment and combatting climate change. Zeeuwind believed to fulfil this responsibility by collaborating with farmers and providing them financial support to sequester carbon in agricultural soils. Following the initiative of Zeeuwind, a second energy cooperative joined: Deltawind.

Partners and collaboration

Zeeuwind is an energy cooperative in the Province of Zeeland, in the Southwest of the Netherlands.
Zeeuwind was founded in 1987 and has grown to a professional organization with over 2.800 members and 10 professional employees. The core vision of Zeeuwind is accelerating the transition to a sustainable society by producing renewable energy and reducing CO_2 emissions.

In 2019, Teus Baars, director of Zeeuwind, heard about the CF project and the possibility of farmers to sequester CO_2 in soils. A contact was made with ZLTO to explore the possibilities for collaborating with local farmers in the surrounding of Windpark Krammer. Windpark Krammer is situated in the south-west of the Netherlands in between three islands: Tholen, Schouwen-Duiveland (Zeeland) and Goeree-Overflakke (Zuid-Holland) and is the largest citizen-owned wind farm in the Netherlands, producing over 350.000 MWh of renewable energy per year. This wind park is owned by two cooperatives: Zeeuwind and Deltawind.

When Deltawind heard about this CF initiative, they also wanted to join. Deltawind is also an energy cooperative, similar to Zeeuwind and based on the island Goeree-Overflakkee in Zuid-Holland, just North of Windpark Krammer. It was founded in 1989 and has grown to a professional organization with over 2.200 members and 10 professional employees, comparable with Zeeuwind.

In collaboration with ZLTO, a partnership was concluded with Zeeuwind and 10 farmers and with Deltawind and 5 farmers, who were selected on the criteria of motivation, competence and commitment. The project was named Koolstofboeren Windpark Krammer, as both cooperatives are the owner of this Windpark and the funding of the project comes from this Windpark.

The collaboration is established over a period of 5 years in which the farmers apply CF techniques that are scientifically backed with data. In the agreement, each farmer applies at least three measures, two soil measures and one above-ground. The techniques used are equivalent to 30-50 tonnes of stored CO_2 per farmer per year. ZLTO signed collaboration agreements with Zeeuwind and Deltawind separately and also with the 15 farmers. ZLTO monitors whether the carbon sequestration techniques are implemented and reports this information to farmers and compiles this information to Zeeuwind and Deltawind. This intermediary approach lowers administrative burdens and monitoring cost, which is beneficial for both farmers (project provider) and Zeeuwind (investor).

Techniques and methodology

In collaboration with farmers, Zeeuwind, Deltawind and ZLTO a methodology has been developed to operationalize a CF project. The methodology has been built up from te ground and is based on the Dutch scientific research program Slim Landgebruik (Smart Landuse). This program has been initiated by the Dutch agricultural ministry. In this program the scientific institutes Wageningen University, Louis Bolk Institute and CLM study the possibilities of sequestering carbon in agricultural soils in order to meet Dutch climate goals in 2030: sequestering 0,5 Mton of CO_2 each year in mineral soils.

The methodology of ZLTO describes different components in order to successfully start a CF project **with** financial payments:

1. Carbon sequestration measures and CO_2 quantification
2. Monitoring and reporting
3. Payment
4. Risk analysis and risk management

This section briefly describes the most important parts of each component.

1 Carbon sequestration measures and CO_2 quantification

Based on scientific research from the Dutch *Slim Landgebruik* program the latest insights on carbon sequestration potential for different measures has been used as a basis for quantifying the amount of CO_2 a farmer is able to sequester in soil:

Soil measures:

- Reduced tillage
- No tillage
- Cover crops
- Compost
- Solid animal manure
- Permanent grassland
- Herb-rich grassland
- Crop residue

Above-ground measures

- Flower borders
- Agroforestry

The measures are fully described in the methodology to ensure the farmers understands the practical conditions whether a certain measure is related to carbon sequestration. An Excel format is used to help the farmer quantify the total amount of CO_2 sequestered.

Windmill park Zeeland

2 Monitoring and reporting

Farmers are guided at the start of the project by setting up a realistic and feasible CO_2 sequestration plan for five years. During the project farmers are organized in a knowledge group for self-monitoring and knowledge dissemination. This group is guided by ZLTO. The methodology also describes the yearly monitoring commitments and the sampling procedures.

3 Payment

Contracts between farmers and ZLTO define the conditions and requirements of both parties during the CF project. Farmers have a minimum contract of 15 and a maximum of 40 tonnes of sequestered CO_2 per year.

Payments are based on a hybrid scheme: 70% of the payment is effort-based and 30% is result-based. Each year the measures taken by farmers are monitored and related to the five year CO_2 sequestration plan. If measures are taken as planned, the farmer receives the effort-based payment, based on:
Amount of yearly contracted CO_2 x CO_2 price x 70%

By the end of the five year project samples are taken to analyse whether an increase in soil-organic carbon has been realized. When an increase is realized, the farmer receives the total result-based payment over the last 5 years.

4 Risk analysis and risk management

Several risk factors have been defined and described in the methodology, such as risk of force majeure situations and the possibility of not realizing the result based target.

Value proposition

In the Netherlands Deltawind together with Zeeuwind have been initiating the first CF project with direct payments for carbon sequestration and because of being the first pilot, the farmers, Zeeuwind, Deltawind and Windpark Krammer have gained a lot of attention, which was also an important reason for initiating the project.

For Zeeuwind and Deltawind there are several positive value points:

1 **Wind turbines do have a negative impact on local citizens and since most wind turbines are built in rural areas a lot of farmers face the negative impact directly.** By implementing a CF scheme into a business plan of a wind farm, local farmers will also gain a positive incentive when prepared to take sustainable farm practices.

2 **Another important reason for Zeeuwind and Deltawind to start a CF project is because it leads to** lower greenhouse gas emissions in Zeeland, and in this way creating a positive impact with co-benefits.

For farmers the most viable impact is a supporting scheme for implementing sustainable land use practices and receiving a (small) financial incentive for doing so.

Conclusion

Since the start of the pilot project with Zeeuwind and Deltawind the project partners gained very important practical knowledge on implementing a CF scheme in the Netherlands. This practical implementation knowledge is important for upscaling the business model of CF.

Most important conclusions on methodology:

- Hybrid scheme is highly preferable since a full result-based approach is scientifically uncertain, too cost-intensive and hard to realize in a five year period.
- Farmers focus on soil-quality and sustainable land-use practices for future food production. Stimulating these practices financially as well as by regulation and practical new knowledge is key.
- Higher carbon prices needed to stimulate farmers that are not the frontrunners.
- Overhead costs are high due to monitoring and sampling costs.

DKG de Keukenfabriek

Farmers contributing to climate goals of a private company

ZLTO, Netherlands

Target group

SME's and big companies

Context

This show case was developed in 2020 and started in the beginning of 2021. It was developed under the same principles of the Zeeuwind and Deltawind case. However some adaptations to the CF methodology have been made based on the latest scientific insights. DKG Group is situated in Bergen op Zoom, in the southwest of the Netherlands.

Partners and collaboration

DKG de Keukenfabriek is the manufacturer and group behind different successful kitchen brands: Bruynzeel and Keller. DKG designs and produces all kitchens in their factory in Bergen op Zoom and has over 750 employees. DKG has an ambitious Social Responsibility Policy and deploys ambitious climate goals. Since 2017 it produces climate neutral kitchens as a result of energy savings, renewable energy production, sustainable transport and unavoidable emissions are compensated with different VCS projects.

In collaboration with ZLTO, a partnership was concluded with DKG and two farmers who were selected on the criteria of motivation, competence and commitment. The collaboration is established over a period of 5 years in which the farmers apply CF techniques that are scientifically backed with data. In the agreement, each farmer applies at least three measures, two soil measures and one above-ground. The techniques used are equivalent to at least 15 tons of stored CO_2 per farmer per year. The collaboration agreement is signed between DKG and ZLTO and between ZLTO and the farmers. ZLTO monitors whether the carbon sequestration techniques are implemented and reports this information to farmers and compiles this information to DKG. This intermediary approach lowers administrative burdens and lowers monitoring cost, which is beneficial for both farmers (project provider) and DKG (investor).

Techniques and methodology

A methodology has been developed to operationalize the CF project. The methodology has been updated, based on the Dutch scientific research program Slim Landgebruik (Smart Landuse), which was initiated by the Dutch Ministry of Agriculture. Within the framework of this research program the scientific institutes Wageningen University, Louis Bolk Institute and CLM study the possibilities of sequestering carbon in agricultural soils in order to meet Dutch climate goals in 2030: sequestering 0,5 Mton of CO_2 in mineral soils each year.

The methodology of ZLTO describes different components in order to successfully start a CF project with financial payments:

1. Carbon sequestration measures and CO_2 quantification
2. Monitoring and reporting
3. Payment
4. Risk analysis and risk management

This section briefly describes the most important parts of each component.

1 Carbon sequestration measures and CO_2 quantification

Based on scientific research from the Dutch Slim Landgebruik program the latest insights on carbon sequestration potential for different measures has been used as a basis for quantifying the amount of CO_2 a farmer is able to sequester in soil, see Figure below.

Soil and production related measures:

- Reduced tillage
- No tillage
- Improved crop rotation
- Cover crops
- Compost
- Solid animal manure
- Permanent grassland
- Herb-rich grassland
- Crop residue

Above-ground measures

- Flower borders
- Agroforestry
- Nut, fruit or other nutrition trees
- Line planting, hedges and yard trees

The measures are fully described in the methodology to ensure the farmers understand the practical conditions whether a certain measure is related to carbon sequestration. An Excel format is used to help the farmer quantify the total amount of CO_2 sequestered.

2 Monitoring and reporting

Farmers are guided at the start of the project by setting up a realistic and feasible CO_2 sequestration plan for five years. During the project farmers are organized in a knowledge group for self-monitoring and knowledge dissemination. This group is guided by ZLTO. The methodology also describes the yearly monitoring commitments and the sampling procedures.

3 Payment

Contracts between a farmer and ZLTO define the conditions and requirements of both parties during the CF project. The two farmers have a maximum contract of 15 tonnes of sequestered CO_2 per year.

Payments are based on a hybrid scheme: 70% of the payment is effort-based and 30% is result-based. Each year the measures taken by farmers are monitored

Tree	Stems per hectare	Accounted CO_2 sequestration in CF pilot (tCO_2/ha/year)[2]
Willow	15,000	1.3
Low-stem apple	2,200	1.2
High-stem apple	125	2.2
Walnut	100	3.0
Poplar	100	4.9

Emission free production

and related to the five year CO_2 sequestration plan. If measures are taken as planned, the farmer receives the effort-based payment, based on:
Amount of yearly contracted CO_2 x CO_2 price x 70%

In 4 and 8 years from the start of the project, samples are taken to analyse whether an increase in soil-organic carbon has been realized. When an increase is realized, the farmer receives the total result-based payment of the first five years.

4 Risk analysis and risk management

Several risk factors have been defined and described in the methodology, such as risk of force majeure situations and the possibility of not realizing the result based target. Furthermore an evaluation after 3 years together with farmers, DKG and ZLTO is scheduled in order to see whether the project will be extended and/or expanded.

Value proposition

For DKG there are several positive value points:

1 **The most important reason for DKG to start a CF project is because of the local character and possibility to invest in a Dutch project, rather than investing in aproject abroad.** It creates more local awareness, is more transparent and stimulates the local environment.

2 **The second reason is the possibility to invest in a removal project, rather than an emission reduction or avoided emission project.** A removal project has the potential to eliminate CO_2 from the atmosphere and in this way truly reach net-zero as a company, since more CO_2 is removed from the atmosphere than emitted in a certain year.

3 **The last reason to invest** is that CF has more potential co-benefits, such as water retention and biodiversity and thus has more impact than any other compensation project.

For farmers the most viable impact is a supporting scheme for implementing sustainable land use practices and receiving a (small) financial incentive for doing so. Added to this the participating farmers are very motivated to show to society that by doing CF they can too address the problem of climate change.

Conclusion

Since the start of the pilot project the project partners gained very important practical knowledge on implementing a CF scheme in the Netherlands. This practical implementation knowledge is important for upscaling the business model of CF.

Most important conclusions on methodology:

- Hybrid scheme is highly preferable since a fully result-based approach is scientifically uncertain, too cost-intensive and hard to realize in a five year period.
- Farmers focus on soil-quality and sustainable land-use practices for future food production. Stimulating these practices financially as well as by regulation and practical new knowledge is key.
- Higher carbon prices are needed to stimulate farmers that are not the frontrunners.
- Overhead costs are high due to monitoring and sampling costs.

Lidl Belgium

From farm to fork

Belgium – ISP/BB

Target group

Retail Sector

Context

The agri-foodchain is operating in a fast-emerging environment. All parts of the agri-foodchain need to work together towards a common goal: less climate impact of their products. Lidl is committed to address its climate footprint from farm to fork. Research shows that most of the emissions associated with food products occur at the beginning of the chain, in the primary sector. Lidl wants to tackle this together with all parts of their agri-foodchain and help farmers in the transition, because the costs are short term, while the benefits will only be felt later. In Flanders alone, 'carbon farmers' could store up to 18.3 million tonnes of CO_2 under their arable fields over several years. That corresponds to 13% of the total emissions of the agricultural sector in the past 20 years. Moreover, this type of regenerative agriculture improves soil quality, water management and biodiversity. In time, this will also benefit the harvest.

Partners and collaboration

To facilitate farmers in the transition to carbon farmers, Lidl started a consortium with the Soil Service of Belgium, Rikolto, Boerenbond and Boerennatuur Vlaanderen. The consortium represents the entire agricultural chain - from field to plate. Through the organisation of learning networks and by using field experiences and academic research, other farmers can also be put on the road to becoming carbon farmers.

Together, the partnership will guide fifteen farmers over a five-year period to make carbon storage an essential part of their business operations. The Soil Service of Belgium (BDB) and Boerennatuur Vlaanderen will provide direct guidance to the farmers. The BDB will also monitor their carbon footprint. Rikolto will help look for opportunities to scale up, communicate to the outside world and share the results with its extensive network. Boerenbond will take the lead in exploring different possibilities for a business model for the farmers. Meanwhile, the involved farmers will receive a refund from Lidl during this five year period. As initiator, Lidl has the final responsibility and the supermarket chain is supporting the project financially.

This collaboration entails:

1. Guidance for farmers: The partnership will involve 15 farmers from within the Lidl supply chain and provide 1-to-1 guidance and monitoring, support in field work and keeping tracks of the farmers' expenses (pioneer farmers' support).
2. Set-up of learning networks: The partnership is convinced that there is already valuable knowledge and experience among farmers. Therefore this pilot has set-up moments of trainings and sharing of information and experiences through learning networks.
3. Develop a business model: During this 5 year pilot, the involved farmers will receive a refund for made costs. In addition, the consortium will also look into developing a compensation system for carbon storage. They will explore possible sources of financing both from interested companies that want to compensate their CO_2 emissions as well as (future) subsidy possibilities with governments.
4. 15 Belgian farmers who want to join the project. The pilot phase starts in Flanders and will later be extended to Wallonia.

Techniques and methodology

Menu card with possible CS techniques was developed, containing 11 possible techniques with a description of the benefits of the measures, on how to apply the techniques, an estimation of the effects on climate and environment as well as the potential carbon sequestration. The current possible CS techniques available for farmers to choose from are:

- Sowing cover crops (meeting specific criteria for reaching highest potential) and/or undersowing of grass in maize (with lower C-storing potential)
- Rotation with organic matter supply
- Temporary grass-herbs strip
- Permanent grass-herbs strip
- Applying harvest residues (winter and summer cereals straw)

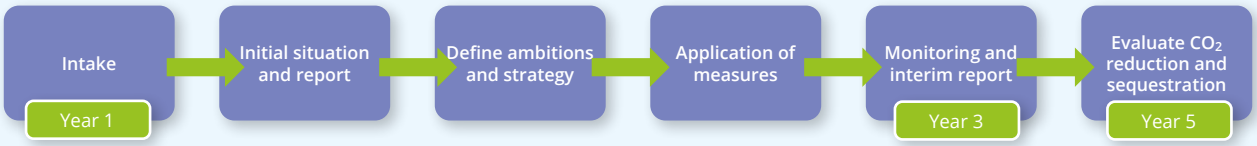


Figure 6: The different steps of the 1-on-1 support and monitoring

- Applying stable manure
- Applying additional compost
- Replacing perennial ryegrass with meadow clover
- Cultivation of lucerne/alfalfa
- Planting of wood borders
- Application of processing residues from wood borders
- Planting of trees

The participating farmers will be guided 1-on-1 and monitored. During this guidance, the partners will collect data and motivate farmers to reduce their CO_2 emissions. This guidance runs for 5 years. The different steps entail *(see figure 6)*:

- an initial intake interview,
- a calculation of the starting situation of the farm,
- a look at the emissions of the farm together with the farmer. By this we will draw up a plan with the farmer to set his goals and how he can achieve them by taking certain actions on his farm.

Partnership Lidl Belgium case

- in between checks whether the farmer has taken the planned measures to reach the goal, for example the use of certain (renewable) fuels. We check whether the farmer has taken the planned measures to reach the goal, for example the use of certain (cover) crops, organic fertilisers, the use of artificial fertiliser and the planting of hedgerows.
- two and five years after the first measurement, we evaluate whether the farmer has achieved the predefined goals. This evaluation will be based on the monitoring tool developed by the Soil Service of Belgium.

In regard to specific fieldwork additional support is provided by Boerennatuur.

- Preparation and support for the application of measures. This can include preparation of a draft plan, a technical file with proposal of planning and actions, a calculation or required materials and assistance on purchase.
- Follow-up of the preparation

Value proposition

Lidl wants to be a sustainable leader with a positive impact on their people and planet. Today, for example, one in five products at Lidl already carries a sustainability label and the aim is to increase sales of sustainable products by 10 per cent every year. Lidl is committed in addressing its climate footprint from farm to fork. Therefore, they want to take steps in all parts of their supply chain and facilitate their suppliers along the way. In their sustainability report, they identified 4 steps: (1) Agriculture and raw materials (2) Supply and processing (3) Own operation (4) Customers.

Lidl is clearly coming out as a retailer that works towards sustainability. Therefore, initiating this pilot project on carbon farming is an important puzzle piece for Lidl to reach their sustainability goals. Lidl Belgium has been **communicating** a lot on their sustainability goals. Not only in their retail chains, but as well in mainstream media to show to the broader public they are working together along their supply chain towards sustainability.

Conclusion

This partnership (Lidl, Soil Service of Belgium, Boerennatuur, Rikolto and Boerenbond) will collaborate for the coming 5 years on guiding farmers in the supply chain of Lidl towards more sustainable practices, entailing carbon farming, with special attention for the costs and benefits. Since these efforts also benefit society, the partnership is striving for a business model as a compensation for the extra efforts in the agricultural sector. A thorough 1-on-1 guidance of the farmers is included, as well as calculations, monitoring and measuring.

Planting of willow trees

Nieuw Groen

Local CO_2 compensation for individuals

Bionext, The Netherlands

Target group

Consumer

Context

This show case demonstrates that individual consumers as well as companies can offset their CO_2 emissions by financially supporting CF practices. In this way a direct connection is made between farmer and consumer. During this show case, an online platform was developed, Nieuw Groen, where consumers and companies can choose to financially support several projects offered by farmers in the form of food forests and agroforestry in exchange for reducing their CO_2 emissions.

Partners and collaboration

Bionext project manager Heleen Klinkert was looking for ways to compensate the 5 ton CO_2 emissions that went along by flying oversea from the Netherlands to India and back with her husband Sandeep. Inspired by the CF project, Heleen asked on Twitter the question if there were farmers who had a valid plan on how to sequester the emitted CO_2 of Heleen and Sandeep. They wanted to do this as individual citizens. Via this channel Heleen came in contact with Conny van den Top. Conny has dairy cattle and organic laying hens. She has a free range area for the chickens which she wanted to use for a walnut plantation with 80 walnut trees. Based on scientific studies this amount of walnut trees can sequester 80 tons of CO_2. The agreement was settled between Heleen and Conny of 5 ton of CO_2 and thus 5 walnut trees.

Out of the first agreement between Heleen and Conny, Nieuw Groen was developed. Nieuw Groen is a 'climate broker' and consultant for the voluntary carbon market. A platform where collaborations like

Heleen klinkert and Conny van den Top. The partners of the collaboration

the one between Conny and Heleen are facilitated. Nieuw Groen is looking to match more initiatives with small and medium sized enterprises and individuals in the future. Next to agroforestry initiatives, initiatives that focus more on soil measures to increase CO_2 sequestration will play a bigger role in the future. A local and personal connection between buyer and seller will stay key to the platform.

Nieuw Groen connected Conny to several other companies and individuals, which covered the costs of the planting of 75 walnut trees, on top of the 5 that were planted to cover the emissions of Sandeep and Heleens' travel.

After the agreements with Conny van den Top, Nieuw Groen started as an official platform and multiple other initiatives offered their CO_2 sequestration on the platform. So far, most of the projects include some kind of agroforestry.

Heleen and Sandeep planting a walnut tree

Techniques and methodology

Agroforestry is the technique used in the first agreement between citizen and farmer that initiated the show case. Agroforestry is the inclusion of trees within an agricultural system.

The calculations for CO_2 sequestrations are based on recent scientific publications. It is estimated that walnut trees can sequester an average of 1 ton of CO_2 in a tree lifetime. This is based on a conservative estimation of the carbon stored in biomass of the tree above and underground and in the soil. Different measures can be used to form a project on Nieuw Groen. The latest scientific data is used to calculate the CO_2 sequestration of agroforestry and food forest projects.

Value proposition

Nieuw Groen tries to link projects on the farm level to individuals and SME that want to invest in a local agreement. This personal connection is important in the mission of Nieuw Groen. By doing so, the buyer of CO_2 has the opportunity to see the extra benefits the investment in CO_2 sequestration provides. Such as landscape, biodiversity and animal welfare.

On the Nieuw Groen website, the farmers that offer projects to invest in, are given the chance to tell their story. On the webpage, for each project it is also stated how much CO_2 will be sequestrated when the project is completed and therefore what the share is of the individual investments. This gives a very tangible result for the buyer in CO_2 compensation.

Conclusion

For companies and individuals cleaning up their emissions with a local initiative, they form a personal connection with the farmer and are given an opportunity to take climate action in their own neighbourhood. In this way they can see the investment of their payment directly.

The participating farmers are able to form new connections with actors outside of the agri-food supply chain, to make the climate challenge one that is societal, not only agricultural. It connects parties with the farm in new ways and make them look at the farm beyond just seeing it as a place where food is produced.

Oat flakes

Klim, the climate label

Thünen Institute of Organic Farming, Germany

Sales channel

Label

Context

This Klim show-case presents an approach to financially reward farmers for the adoption of CF practices through the sales of **climate labels**. By using the label firms can demonstrate commitment for the program and climate protection. The fees for the label and the financing of farmers in this business model are based on expected amounts of C-sequestration calculated in CO_2. Climate labels can be used in marketing and consumers attention can be drawn to the positive story of the product.

Partners and collaboration

Thünen Institute met the emerging initiative Klim in the open workshops from the INTERREG NSR CF project in Germany and followed their development. For illustrating the activities in the co-creation of new business models within the project, Thünen Institute labelled oat flakes that were produced with additional regenerative practices with the Klim Label as a prototype. Costs for this were covered by the Thünen Institute and the Klim initiative. Grains from the field experiments of the Thünen Institute of Organic Farming with oats with under-sown clover-grass were processed by pupils of a local milling school.

Klim is a start-up in Berlin who developed the

Oats under¬sown with clover grass and packaged oat-flakes

label and promotes regenerative farming techniques amongst farmers (https://klim.eco/). An app is available for participation and knowledge exchange in the network. At present, 600 farmers have already registered on the application (Nov 2021).

The Klim programme is mainly action-based. The participating farmers are rewarded for establishing regenerative practices that are suitable to enrich and protect organic carbon in soil. More biomass growth and its direct incorporation or recycling in the farms' soils compared to the situation before is key element of all CF practices that are addressed. Reasonable estimates from scientific literature for possible carbon sequestration with different agricultural measures are used to calculate possible CO_2 offsets.

This show case was conducted as an example for other farmers and to increase awareness on action-based labelling. Thünen Institute used this example at lectures and workshops with farmers and consumers in the project.

The Klim Label for consumers

The Klim App for farmers

Techniques and methodology

Farmers may choose which measures they wish to apply from a pre-selected list. In addition, the farmer himself can choose how many of his parcels of land will be included in the programme. Used techniques to improve soil carbon enrichment in the Klim programme are, e.g.:

- Cover crops, catch crops
- Agroforestry
- Flowering strips
- New planted hedges
- Greening bare fields

By easy access and networking, Klim wants to motivate as many farmers as possible to start using CF techniques. Farmers are asked to take photographs of the parcels of land during the various stages of cultivation to verify and to monitor the implementation of the measures. Once the implementation of the measures has been confirmed, the farmer will be paid for his provided services. The amount depends on the chosen CF techniques and area of their implementation.

Value proposition

In the project this show case represents a market chain approach.

The first oat flakes packaged under the Klim label was illustrative. The show case helped to spread knowledge of CF techniques and possible business models among farmers. In parallel Klim explored the possibilities towards marketing of the label and started to develop a production chain from carbon farmers, over retailers to consumers. Retailers and processors have the chance to offset their carbon footprints. They support farmers in the transition by buying CO_2-certificates based on the estimates of carbon sequestration for certified farming practices by Klim and can use the label in marketing. Consumers support this way of production by buying the labelled products and services.

Conclusion

The use of the Klim label offers the possibility for retailers and other firms to show their commitment in climate protection and transformation of agriculture to more regenerative practices. CO_2 compensation on a private level is possible. The label fees are used to support farmers in their efforts to contribute to climate change mitigation. The action-based approach and the simple access to the program allows an easy participation for farmers. Networking via App and the label itself will trigger motivation.

Province of West-Flanders

Inagro, Belgium

Government institutions

Context

The province of West-Flanders saw the realisations of the municipality of Beernem, working towards climate neutrality by collaborating with the farmers sequestering carbon in the soil, and was interested to know more about this. They contacted Inagro, as facilitator of the initiative in Beernem, to get to know more information and insight in the possibilities of a similar initiative on the level of the province.

As province, West-Flanders supports different initiatives in the area of climate projects, and is also doing efforts to reduce the emissions of the province, on different levels. In this way, they were interested to know more about the potential of CF.

Partners and collaboration

First, we got a talk with the coordinator of climate actions of the Province, together with a regional agricultural coordinator of the province.

We were looking for possibilities to compensate emissions of the province, taking into account the emissions on different levels, such as own car fleet, emissions by private cars of personnel, energy usage of provincial patrimony. Different scenarios were calculated, taking into account the surface and budget needed.

The results of this exercise were presented to the deputy of climate of the province, and he agreed to allocate some budget, if we could further elaborate the methodology.

We decided to start with a small-scale pilot project, compensating the emissions of the provincial car fleet. This is about 140 ton CO_2 to be compensated.

In the mean time, contract has been drafted between the province and 10 farmers of the province for one growing season. The arrangement has been set on a short-term basis so the province has the possibility to change in function of the needs. Also, if everything is working well and there is budget available, there is willingness to elaborate this for a longer period, and also for bigger area and hence for the compensation of more emissions.

The collaboration is action-based and is supervised and monitored closely by Inagro. The application of the measures will be checked by Inagro through invoices, pictures and field visits. The amount of CO_2 stored by the farmers depends on the chosen techniques and is based on theoretical models.

Techniques and methodology

Inagro defined in dialogue with the province which techniques to apply. **They decided to support the following techniques:**

- Cover crops and underseed grass in maize
- Usage of additional compost
- Adapted grass management
- Maximal usage of solid organic fertilizer
- Enriched crop rotation, for example introducing a winter cereal every third year as alternation with maize and grass

A subsidy regulation was elaborated, indicating a.o. application criteria, application procedure, subsidy criteria, selection criteria, budget available and pay-out procedure.

Once this document was approved in the Provincial council, an open call was organized, giving all the farmers from the province the chance to sign up, and receive a subsidy of 50€/ton CO_2 stored. They could indicate their preferred techniques, and were asked for a motivation why they should be selected.
With this project, we aim to store about 140 ton CO_2 on a yearly basis, which equals the emissions of the provincial car fleet. We decided to start with a one year project. 10 farmers showed interest, equalling a potential of about 450 tons CO_2 stored, so a selection

had to be made. In the regulation was stipulated that in case of oversupply, the area per farmer would be limited to 10 ha, in order that as many farmers as possible could make use of the budget.

The remuneration is based on models. Farmers stepping into the project, are also asked to provide the carbon level in their field (max 2 years old), to enable follow up after 5 years, in case the pilot project will be extended in time.

Farmers were also asked to become member of a learning network.

Value proposition

The objectives of the subsidy regulation are to;

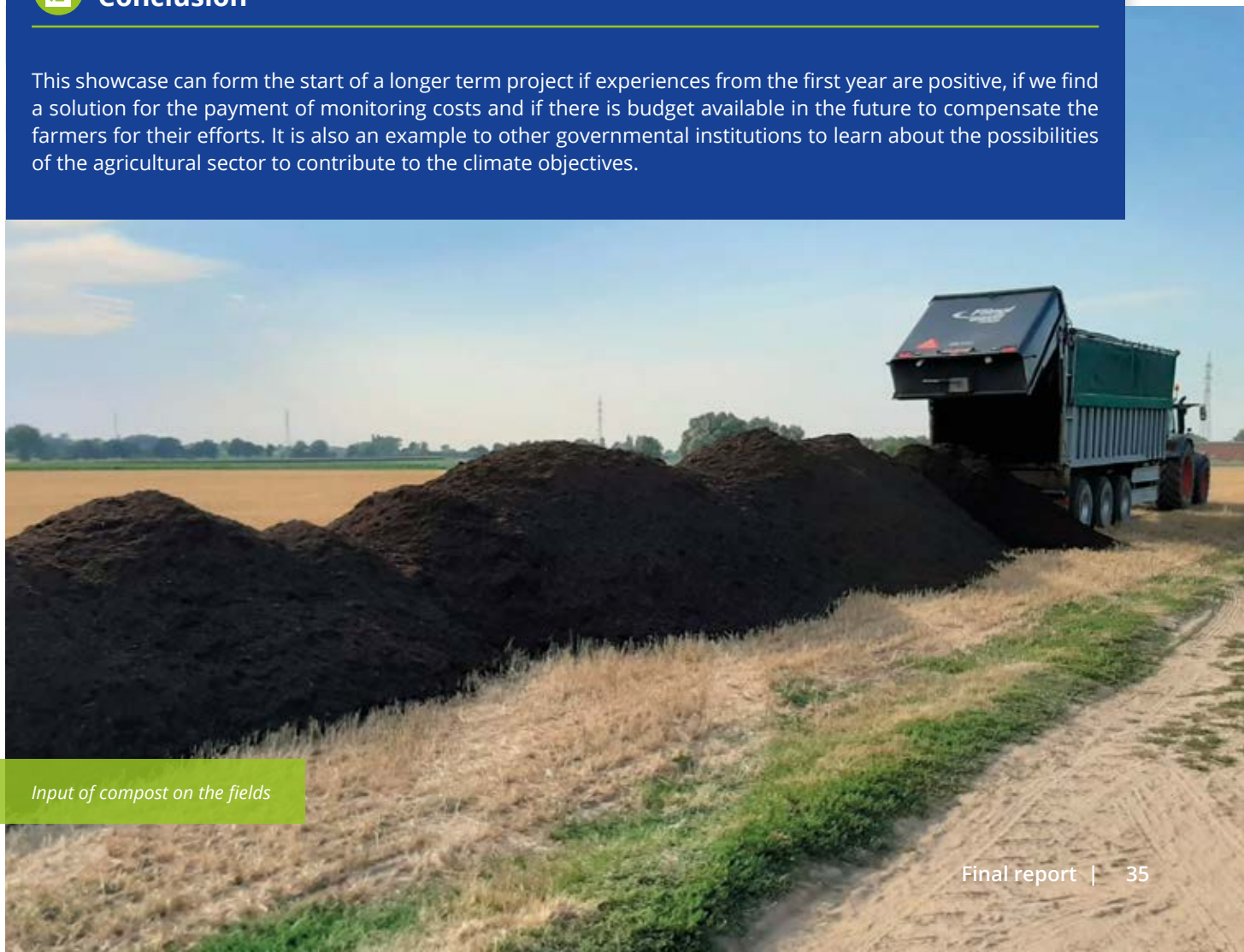
1. **compensate locally the emissions of the provincial car fleet** by sequestering CO_2 sustainably in agricultural soil, and in this way contribute to the realisation of the climate objectives

2. **sequester more carbon in the soils, leading to a higher soil fertility,** more resilient crops, more biodiversity, less erosion and an improved water holding capacity of the soil. By sequestering carbon in the soil, the sector is also more resilient for the impact of climate change.

Those two objectives are high on the agenda of the province West-Flanders, which is the agricultural province of Belgium. Policy wants to support the farmers in this direction. Farmers value this approach, and are happy that they can get a subsidy for the efforts they do in the frame of the climate change, as well as improving the status of the soil, which requires some investments of the farmers.

Conclusion

This showcase can form the start of a longer term project if experiences from the first year are positive, if we find a solution for the payment of monitoring costs and if there is budget available in the future to compensate the farmers for their efforts. It is also an example to other governmental institutions to learn about the possibilities of the agricultural sector to contribute to the climate objectives.



Input of compost on the fields

Virgenes

Community-Supported Agriculture (CSA) farm - "sell your story"!

NLRØ, Norway

Target group

Consumer

Context

This show case is an example of the potential of CF practices in short-chain and farm sales. In the short-chain sales, the relationship between farmer and consumer is much more based on common visions regarding sustainable agriculture and environmental issues, than when the products are sold via retail. This gives the farmer the possibility to create awareness among his customers and increase knowledge about his strategies regarding soil health and carbon sequestration. In this way, the farmer can link the price of his products to implementation of CF techniques.

Partners and collaboration

Virgenes Farm is a farm in southern Norway surrounded by the river Numedalslågen- and is run by Tore J. Wirgenes. The farm was originally a conventional grain and potato farm. However, they experienced the direct consequences of global warming, when heavy rainfall caused the river to burst its banks and flood a large part of the farm - more and more frequently. Under the guidance of Norwegian agricultural advisory service (NLRØ), they changed their farm management, step by step, to a CSA farm with a wide variety of productions. NLRØ is a partner in this project and has monitored the soil health and advised on multi paddock grazing on the farm. At present, the farm has hens, cattle, pigs, grains, potatoes, grassland and a wide range of seasonal vegetables on a total of 28 hectares. The business model is made up of shareholders on one hand, and independent buyers on the other. The shareholders are regular customers who pay an annual fee in exchange for food products. This way the farmer is less vulnerable for crop failure. Independent customers can also order food packages in advance and collect them from the farm or from a collection point. Using this customer system, Tore J. Wirgenes promotes the CF techniques he implements on his farm via the farms website, social media and other channels, and is able to charge a higher price for his products.

The farmer Tore J. Wirgenes actively informs and involves people with regards to soil health and climate issues, thus customers know what they contribute to.

Grazing guidelines for good management [2]

A well-planned and managed grazing system requires close attention to the needs of the pasture plants and the livestock. **Following these basic guidelines will help prioritize some of the most essential elements for success:**

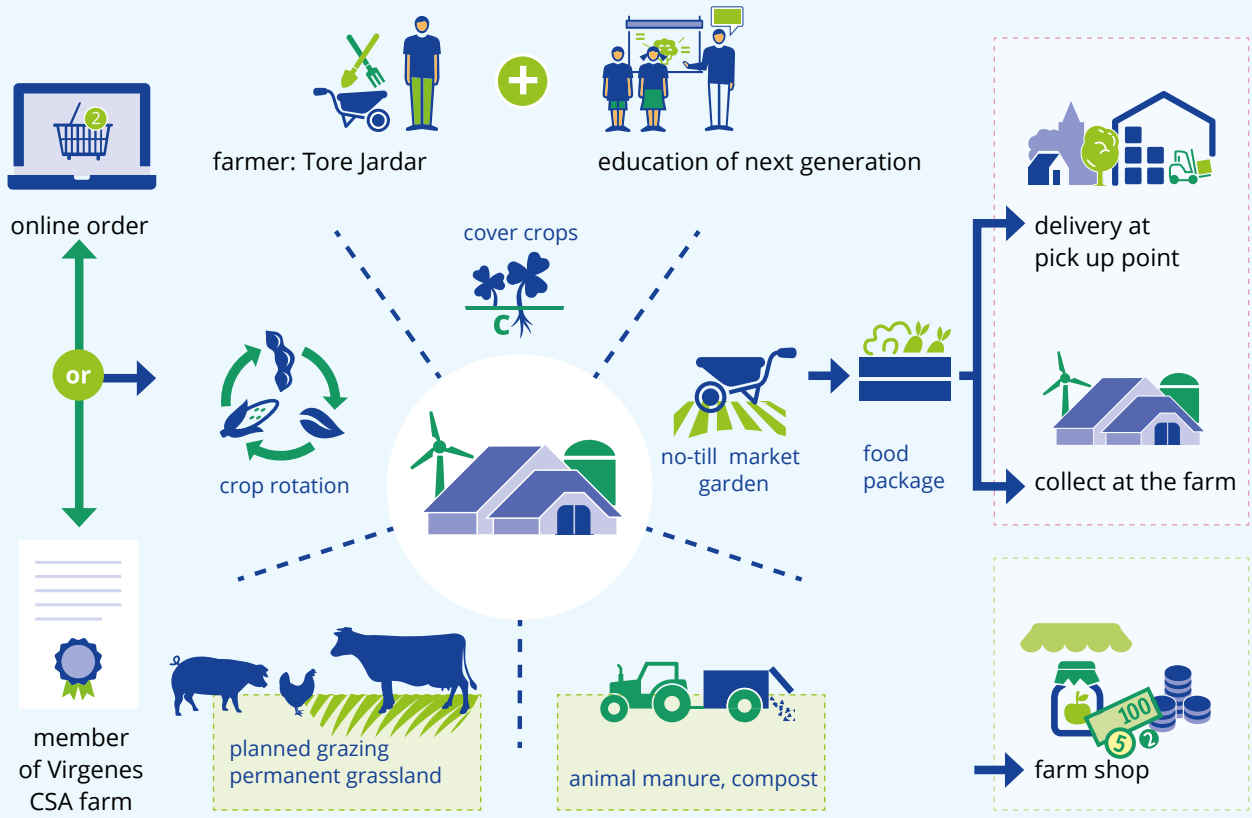
- Have a grazing plan!
- Allow plants enough time to fully regrow and recover after each grazing.
- Graze livestock in each area for a relatively short time to prevent regrazing.

Farmer Tore at his farm 'Virgenes' in Norway with his cows used for planned grazing

[2] Sarah Flack (2019), *The art and science of grazing.* Chelsea Green Publishing.

Virgenes farm in proces

At the farm Virgenes



The farmer Tore J. Wirgenes actively informs and involves people with regards to soil health and climate issues, thus customers know what they contribute to.

Techniques and methodology

At baseline the soil at the farm had a low content of soil organic carbon and organic matter The potential to sequester CO_2 is large due to the low content of organic matter. The following CF techniques are used to achieve this:

- Adaptive multi paddock planned grazing
- Crop rotation
- Compost
- Cover crops
- Animal manure
- Permanent grassland
- No-till marked garden

Based on scientific studies and calculations[3] the prognosis for the potential of carbon sequestration using these techniques is 4 tons of CO_2 for each hectare each year. This means that the Virgenes farm with its 20 hectares of arable land can sequester 80 tons of CO_2 each year. The content of carbon in the soil is being monitored at Virgenes farm.

Value proposition

The farmer informs the CSA shareholders and other customers about the benefits of running the farm using CF practices for:

- the soil and soil health on the farm and
- the whole ecosystem in general

This gives the consumer knowledge about 1) the origin of the food, 2) that he/she contributes to sustainable agriculture. This does not only concern the food products, but also a set of values that are important to the customers.

The information shared is used to:

- sell CSA memberships and
- obtain a higher price for the products

[3] Muligheter og utfordringer for økt karbonbinding i jordbruksjord» Rasse D et al. NIBIO RAPPORT 2019, VOL 5, NR 36, p 80

Conclusion

This showcase proves an important point, the Virgenes case shows that a farmer can live off an income from 28 hectares of farming land in the North Sea Region. It is possible to base your income on a wide variety of local farming products and not have to connect to a wholesale or retail company.

It is inspiring to see that they have not invested in expensive machinery at Virgenes farm. Instead they invest in future generations by having trainees from different agricultural institutions included in running the farm.

The Virgenes showcase adds to the agricultural sector by increasing local awareness and knowledge about sustainable agriculture and the importance of handing over the soil in a good condition for future generations.

To be able to see the positive changes in your local environment gives hope and inspiration, thus local initiatives are important to combat climate change.

3 Evaluation and conclusion of the identified business models based on the show cases

As discussed earlier in chapter 1 “introduction", four different business models have been defined within the CF project: **within the agri-food chain, outside the agri-food chain, governmental institutions** and **at the farm**.

The full report on how we defined these business models can be found in the report research of existing business models to valorise carbon sequestration. Throughout the project, while developing the different show cases and negotiating with the different stakeholders, we have gained experience from many different situations. In this chapter we summarize these experiences and conclude and discuss the benefits and bottlenecks we faced with each business model.

3.1 Business models within the agri-food chain

A business model within the agri-food chain, means that the compensation of CO_2 is happening between a farmer and a compensator active in the agri-food chain. Such a compensator can be active in agricultural supplies, retail and food processing or other actors of the agri-food chain. There are two types of collaborations in this business model: without a connection between the farmer and the compensator or the famer is part of the same chain as the compensator.

3.1.1 Benefits and opportunities

Sustainable collaboration (people, profit, planet) within the agri-food chain can bring a win-win for all parties and creates a clear story to the end consumer.

1. **More and more consumers are looking for local products in addition for sustainable products.** CF practices can be a puzzle piece in this. This puzzle also includes animal welfare, biodiversity and healthy food. With a good and balanced collaboration within the agri-food chain, a larger volume of CO_2 compensation can be achieved and thus a bigger impact. Note that if you want every partner of the collaboration to fully and voluntarily participate, it must be a fair agreement for all partners. Collaboration in the agri-food chain is a long-term investment in which customer trust can be strengthened.

2. **This gives a more complete story** of the climate efforts made by the agri-food chain, including the farmers, to get sustainable food on the table.

3. This **long-term investment** is not only rewarding towards the consumers, but CF also leads to more resilience for extreme weather conditions due to climate change. Harvest yields will be less uncertain thanks to CF and it creates more local food security and thus more local ensured supply for the agri-food company, which is important for all the partners within the food chain.

4. Agriculture and food production have **climate targets** to achieve: the EU wants the land use sector to be climate neutral by 2035. CF helps the food sector to reduce the carbon footprint and become climate neutral.

3.1.2 Potential bottlenecks

Different partners within this project sat together with actors active within the agri-food chain, retailers, processors as well as agricultural suppliers. Those actors are well known with farmers, as they are either their client or their supplier. This means those companies are more involved and informed on agricultural practices. They are used to get in contact with farmers and to work with them. This means, those actors often don't see CF as a new service which can be supplied by farmers, but they rather see CF as if belonging to their food chain and the farmers as a client/supplier that they need to support or advice.
This leads to the following bottlenecks;

1. The potential compensator often does not see carbon farmers as a potential local voluntary compensating project for their business, as they are part of their carbon footprint. **They have difficulties to see the farmer separately from the product and its related carbon footprint** (e.g. for a food processor or retailer the primary product a farmer delivers, or for an agricultural supplier the agricultural supply farmers purchase). They often claim that reducing the carbon footprint is part of the regular 'licence to deliver'.

2. **There will probably always remain a certain uncertainty about the exact potential of CF.** Different factors will influence this (weather conditions, starting point, soil type, combination of techniques, etc.). Therefore, continued research on new techniques and combination of techniques remains very important. Yet, there is already long-term research, scientific evidence and different existing models to predict the CS potential. In addition there are ways to cope with the margin errors, for example to predict the potential in a conservative way.

3 **We feel that this uncertainty and need for continued research is a bigger issue** or excuse for stakeholders active in the agri-food chain. Many of the discussions we had with that type of stakeholders became very technical and evolved into a new small-scale project with some additional research, instead of an actual business model for the farmer that refunds the farmer for their efforts. It takes much more time to reach an agreement for collaboration and an actual compensation of the company through a CF project from a farmer.

4 The larger companies often employ agronomists themselves to guide farmers, making them want to tackle the topic of CF themselves, which is good for CF but which makes it more difficult to start projects with an independent party who can **watch over the balance of the collaboration.**

5 In addition, there are also bottlenecks and challenges for farmers in a business model from this set-up. **The relation between farmers and other stakeholders in the agri-food chain is often fragile and depending on contracts and standards.** Often farmers are reluctant to collaborate on CF with their buyer/client, as they are afraid that these CS practices will become the new standard in the future and thus the initial reimbursement will disappear after a few years.

6 **In discussions within the agri-food chain, transparency for a fair refund for the added value of CS is very important.** A transparent price calculation might be a solution for this, to which all parties agree and feel comfortable with. Also a distinction in the fee farmers receive for their primary product and the new fee they receive for the service of CS is helpful for the progress.

3.2 Business models outside agri-food chain

A business model outside the agri-food chain, means that the compensation for CO_2-emissions is happening between a farmer and a compensator who is active outside the agri-food chain. Increasingly, companies are looking for methods to make their business less impactful on climate change, as well as on the environment. Society and policy makers also expect companies to work on the sustainable development goals (SDG's) and to report their efforts.

Those companies often must compensate their unavoidable emissions and do this by financially supporting existing projects, often in developing countries. In contrast to companies inside the agri-food chain, a lot of work had (and has) to be done on creating awareness on CF and explain what it is and how it works. It was challenging in the beginning of the project to get these companies from outside the agri-food chain interested on the topic of CF.

3.2.1 Benefits and opportunities

Once you are at the table and have a good and to the point sales pitch on CF, companies are less in need of very detailed information on the technicalities in comparison with stakeholders within the agri-food chain.

1 **However, they feel the need to work with sort of an independent organisation** to confirm the methodology and the effectiveness of the proposed measures (e.g. a scientific advisory committee or an accredited organisation).

2 **These companies usually have no business connection** with the agricultural sector and can thus see the service the agriculture sector provides by storing carbon in the soil separately from the main activity of the farm. In this way, there is more certainty for the farmer that this is an additional business model on top of their current business activities and there will be no link with the price of their product. This independency can remove some of the reluctance on the farmer's side.

3 Another strength of **this business model is it operates across sectors and connects the agriculture sector and other stakeholders in society.** Such a collaboration can increase awareness of the positive opportunities of the agricultural sector and their efforts to reduce climate change. E.g. a compensator could decide to have their employees visiting the farmer, or to provide them with a food box and information on this collaboration.

4 By going outside the agricultural sector, a **whole new market of potential buyers** can be reached for the service the farmers provide.

3.2.2 Potential bottlenecks

In this case, you have the challenge to overcome the unknown. Many companies still do not know the concept and benefits of CF. Therefore, it takes a lot of time and energy to convince companies of the suitability of CF practices to achieve their mandatory or voluntary predefined sustainability goals. In addition, they have a higher need for certification to ensure that the project they are financially supporting is effective.

1 Companies are familiar with **certification frameworks** (such as ISO and Gold Standard) and place their trust in these for making their investment. This need for certification is not only for projects in the agricultural sector, but also applies to projects in other sectors. In addition, the question may be asked what happens to the costs of these audits and who will cover it. The answer to this question must be defined in advance in the methodology and agreement of the collaboration.

2 **Price setting** has to be an issue of detailed discussion in a collaboration between two different sectors. The missing link creates the risk that the cost of the investment for the farmer increases, but the price of the global carbon market does not. In addition, the highly competitive world prices may influence the decisions of the participating companies. Whereby carbon prices per ton CO_2 are much lower in developing countries than in Europe. To respond to this challenge of price setting, it is crucial that the knowledge of the co-benefits associated with local CO_2 offsets is thoroughly communicated, for example in the form of soil quality, biodiversity, reduction of flood risks, and food security.

3 **Some companies outside the agri-food chain in need of high volumes to compensate for.** This can lead to two issues when looking at CF as their solution. The first is that local carbon credits from CF practices are more expensive than carbon credits from projects in developing countries and the second is the difficulty to cover this high volume on a local scale by CF practices.

Yet there is a possible answer to this bottleneck. CF should be seen as a part of the total compensation package a company is putting together. E.g. a compensator could partially choose to offset on local level (which will be probable higher in cost, yet delivers many co-benefits) and partially on projects executed in developing countries (which are lower in price, but deliver no local connection and benefits).

3.3 Business models including government institutions

During the project, the possible roles for the government institutions were looked at from different angles. One does not necessarily preclude the other. A government can play different roles. In addition, the role can differ depending on the area of control (municipal, regional, national, European, etc.):

Subsidiser

The government can be considered as a **subsidiser**, this can be in the form of subsidies via the CAP, governmental funds or other funds. Changing to CF brings costs in the first place. Governments could consider supporting this transition by providing extra financial support to CF practices. We want to remark that we consider the current subsidy channels where carbon storage is linked to other sustainability programmes, such as the CAP, as already existing and thus not as a new or additional revenue model as these means already go to the farmers. So, if governments want to support CF, additional grants are needed.

Compensator

Governments have climate targets as well just like companies they also emit GHGs and can therefore act as a **compensator**. In our experience local governments very much like the idea but are far from paying farmers for CS. For example, many municipalities have signed the covenant of Mayors. The Covenant of Mayors was launched in 2008 in Europe with the ambition to gather local governments voluntarily committed to achieving and exceeding the EU climate and energy targets. We learned that some municipalities showed interest in CF because of this covenant. Yet it stays difficult to actually work towards a business model for farmers with them.

Certification body

The government can be seen as a kind of **certification body** that might provide a certificate for farmers. The extent of the governmental role can vary greatly. Governments can support credibility by creating certification schemes/ standards, but they can also take it a step further and take responsibility for other steps, such as developing methods themselves, providing audits, keeping a register of carbon credits, etc..

For example, in the case of **Label Bas Carbon**, the government administers the national code and provides rules on additionality, link with greenhouse gas inventory, spatial scope (France), required elements for methodologies scope (France), elements required for methods, constraints for demand side, auditor. The government in other words certifies local and additional projects, which guarantees the avoidance of emissions and carbon sequestration in a financially efficient way and according to a political program.

This report was written at the start of 2022, currently we learned that the European Commission will come forward with a legislative proposal by the end of 2022 to develop a regulatory framework for the certification of carbon removals based on robust and transparent carbon accounting to verify and authenticate their authenticity.

Land owner

Governments can have a double interest when they are land owners, as can be seen in the show case of Beernem. Many municipalities have land in ownership that they often lease to farmers. In this case, municipalities could for example offer a reduction on the lease in return for a more sustainable management by CF practices.

In our project, we did not dive into all the potential roles a government could play and limited ourselves to the more local and small scale governmental options which we came across in our project.

3.3.1 Benefits and opportunities

Governments have the means and opportunity to work on long-term processes and are thus able to guide the sector into a certain direction. Governments can to engage in long-term agreements with farmers for CF practices and thus help the sector to a more sustainable food production and soil quality. This ability to work with long-term agreements in combination with a transparent communication gives assurance to the community, but also to the farmers.

1. In addition, **transparent communication by government institutions** can ensure that a large group of people is aware of the opportunities of the agricultural sector in the battle against climate change.

2. Besides inspiring individuals, **governments can also be an example** for other companies with unavoidable CO_2 emissions to become climate-neutral or even climate-positive.

3. Governments often have **climate targets** (see introduction of this section) and are interested to cover and use of the role of carbon sequestration as measure to reach the European/national/regional climate targets. We should consider this as a win-win for healthy soils and climate protection and make use of the potential of CF.

3.3.2 Potential bottlenecks

The possibilities of governments to financially support the agricultural sector in implementing CF techniques should be divided, as mentioned above, into support via subsidies and compensating for their own CO_2 emissions. For the last one, we refer to the bottlenecks of the business models outside the agri-food chain (3.2.2.). It is arguable whether there is an added value in supporting farmers financially through subsidies as they are already very dependent on this type of income (e.g. the CAP). However, maybe it is better to see these subsidies as public support for public goods, provided by the agricultural sector. Because farmers are providing important services to society. Special grants for CF could be introduced as additional to the CAP because the current payment system of CAP is designed to guarantee an income for all farmers and not specifically for CF.

1. This leads to the potential bottleneck of how to **blend different levels of funding.** Who deciding which subsidies and/or private compensation can be combined?

2. **Care must be taken to ensure that the subsidy payment complements the private market instead of conflicting,** e.g. double counting. Yet current subsidies are insufficient for many farmers to add CF in their decision making. As long as CF (and current carbon stocks in agricultural soils) is not used for governmental targets.

3.4 Business models at farm level and short-chain sales

This business model includes the sale of products directly on the farm or via short chain supply, without the involvement of any other stakeholders. In most cases farmers focus on the 'story' behind their products by openly communicating on their sustainable farming techniques towards their customers. These sustainable farming techniques can be storing of carbon in soils for the benefit of soil health by implementing CF practices. The farmers are counting on the willingness of their customers, including both individuals and possibly retailers, to pay a fair price for their products.

3.4.1 Benefits and opportunities

1. A large advantage of this revenue model on-farm and short chain sale, is that **the farmer is in control of the process.** He is completely free to choose techniques and management in a site specific way. He is not bound by measures imposed by other stakeholders and is free to choose the price premium his products.

2. By being in direct contact with customers, **farmers can opt for transparency** instead of expensive audits and certifications. This cost is then avoided, and not part of the price setting.

3. Another **opportunity is to collaborate with other farmers** selling other products in the same area. In this way the customers can buy several products in the area, and marketing / communication cost may be split. This business model also strengthens the local farming community and is by all means transparent, the customers can come and see for themselves on the farm operations.

3.4.2 Potential bottlenecks

1. **Selling a story is a time-consuming and costly,** e.g. by communication work such as creating a website, writing texts, taking photographs. The farmer needs to communicate the actions, and the actions taken can observed by visiting the farm. In this way the customer is given full transparency, and the opportunity for involvement and contribution to sustainable farming practices. Selling a story is a complete separate line of business that, in this case, is not done by external stakeholders. Therefore, this business model should not only include the costs of implementing CF techniques but also communication costs.

2. Another bottleneck is **price setting.** The price is linked to the products, and CF techniques might not be considered a separate service by the public or by costumers. This may mean that the added value to the products and increase on price, not immediately linked to the CF techniques if this is not properly communicated by the farmer. With increasing the price of the products for the invisible added value the service need to be explained, understand and accepted by the customers. It is a challenge for the farmer to determine the price increase for implementing different CF techniques, and for the customer to gain insight into which expenses this price increase covers.

3. It should also be noted that **short food supply chain is not an option for all farmers,** due to different reasons such as the location of the farm, and the ability and/or willingness to communicate about farming practices.

4 General findings

4.1 Opportunities

CF practices have a lot to offer. Through improved agricultural practices, farmers can contribute to our climate challenges and will improve and protect soil health, but to do so we need to incentivise as many farmers as possible to start with CF or to keep up or intensify the good work. Farmers can offer an important climate service which helps them to make this transition towards sustainable climate friendly farming, when they are paid for this service. Implementing CF measures in the existing farming system, can be a first step in the right direction.

4.1.1 The idea of carbon farming is spreading rapidly

This project started in 2018, a time where CF was not as high on the agenda as it is today. Of course, there were already some local developments in this topic, e.g., the valuable work in France towards the Label Bas Carbone and the private project on Humus Aufbau in Austria. Yet, on both policy level and public interest, the awareness has increased significantly since 2020, as the first roundtable on CF practices from the European Commission was in the end of 2019. This public interest and the fact that CF became noticed and picked up by more mainstream media, was an important and necessary boost for the set-up and success of our show cases.

We want to emphasize this fact, as it was meanly in the last year of our project that the actual business interest grew for CF. The framework and the environment for working on the topic of CF along with the interest in it, has changed immensely over the course of our project. Therefore, our show cases do not yet meet all the expected standards of today and the future. Yet, we were able to set-up interesting collaborations from which both farmers, researchers and policy makers can learn valuable lessons. Thanks to the fast-developing positive interest in the CF topic, more farmers are also becoming increasingly aware of the benefits and opportunities of CF.

4.1.2 New business models for farmers

It needs to be said that the carbon market is an entirely new potential business model for farmers, which is very distinct from the current business model of supplying food and biomass. Therefore, it puts completely new demands on the farmers for this new value chains. For individual farmers it is a challenge to enter this new market and meet new and complicated requirements. That is why intermediaries are very much needed in many business models. However we can also conclude that organising farmers for instance in a new cooperative supplying CS to different markets (inside and outside the agrifood chain) is an option. A farmer's cooperative has the advantage that the position of the farmer is at the core of the initiative. This should also be strived for in intermediary projects. Another option is a construction with a position of farmers in the intermediary.

4.1.3 Advantages of local carbon farming projects

Carbon sequestration (CS) techniques should be a basic principle in the agricultural sector. Already today there are many farmers who would like to apply more sustainable practices, but either they are not familiar with them or they do not have the financial resources to apply CF measures and monitor soil carbon concentration. By covering part of the costs, more farmers will have the opportunity to incorporate these CF practices and implement them on their farms. Altogether, carbon credits can play a role in accelerating the transition of common agriculture to a more sustainable and resilient farming management (towards regenerative agriculture: restoring our ecosystems). As set out in section 1.2 Positioning of the show cases within the carbon offset market, CF projects, deliver many unique co-benefits in comparison to other, more known, compensation projects. To attract investors/buyers/compensators towards CF practices, we learned it is important to also highlight the co-benefits in your value proposition. You can either valorise these co-benefits by (1) using them in your sales arguments, or (2) by also defining a monetary value for them. In our project we limited ourselves towards (1). In other words, it is key to highlight your unique selling points (USPs) in comparison with other offset programs.

Advantages of local carbon farming projects

1 It is important to emphasize that **CF projects are 'carbon removal' projects,** whilst other projects are about reducing or avoiding emissions. CO_2 is actually captured or removed from the atmosphere and stored in soils or biomass. Thus, carbon removal offset credits is decreasing the CO_2 concentration in the atmosphere. The carbon credits generated by farmers can be considered as **carbon removal credits,** and farmers can be an important partner for companies who want to be one step ahead to become **climate positive** and not only climate neutral, which is only possible through carbon removal.

2 Storing carbon in soils (and biomass) is one of the **"negative emission technologies"** which have to be applied in addition to the measures to reduce and avoid greenhouse gas emissions to achieve climate goals. As compared to technical approaches for the extraction of CO2 from the air and to store it in geological formations belowground, CF measures have useful side effects (see below) and can be regarded as **no-regret solutions!**

3 CF as a s**ustainable way of agriculture** and the aspired increase in soil organic matter content, also have positive effects on soil life and thus biodiversity, on soil water retention capacity and thus on resilience to climate extremes and on soil fertility and production capacity and thus on a sustainable food supply.

4 **Our show cases are local CF projects. The value of local CO_2 sequestration is not only a financial support to the local agricultural sector, but is also beneficial for the local community, food security, environment, etc.** Often local companies are compensating their emissions through projects abroad, mostly in developing countries. Local CF projects can be offered next to these existing projects. E.g. a compensator could choose to partially compensate unavoidable emissions through local CF projects and partially abroad. Carbon offsetting could become something happening 'next door' and is more tangible, as well as it creating a closer connection within the local community, between companies, employees and farmers.

Thus, when entering the existing carbon market, it is important to find a way of communicating those co-benefits in a clear and simple manner as an additional benefit, also in comparison to other types of carbon credits programs.

4.2 Challenges

4.2.1 The need for support

For individual farmers it is hardly possible to enter this new CF market and face the various new and complicated requirements that are related to public and private CF schemes. For this reason, it is useful for farmers to have some assistance or guidance. This assistance can be for example validation of carbon credits, connecting farmers with buyers and/or in creating projects of size to improve cost and benefits.

There are different possibilities to set-up these assistance services from different perspectives and interests;

- From a farmers' cooperative or organisation, e.g. our show cases of ZLTO (e.g. Windpark Krammer,...)
- From a private (investor) perspective, e.g. our show case Claire
- (partially) set-up on policy level, e.g. Stichting Nationale Koolstof (NL) or Label Bas Carbone (FR)

Often the above-mentioned levels, interact and overlap. For example, in the Stichting Nationale Koolstofmarkt, we see that this was initiated partially on Dutch policy level but is now implemented as a private platform. Another example, in the show case Claire, farmers interests are represented by the local farmers association Boerenbond. They advise the importance of a construction in which the interests of farmers are also represented. We also notice that there is a difference in provided services. For example, some act as intermediaries, offering full assistance to the farmer (e.g. Claire and ZLTO), while others provide a single service such as certification labels (e.g. Label Bas Carbone (FR)).

In general, we noticed there is a high motivation to reach sustainable farming at local level. Yet, when scaling-up or making it economically feasible on the long term, the consortium learned that there is need for an intermediary organisation. Some of our show cases therefore worked towards a platform as an intermediary, providing all the services that farmers and buyers need. Because of our experiences with collaboration on platforms, we will elaborate on this a bit more to highlight interesting learnings, benefits and potential bottlenecks to sort out.

The concept of a platform as a business model to trade carbon credits from compensation or storage projects is rather new in regard to C sequestration in agricultural soils. In general, we can define a carbon platform as **'a trading place where supply and demand for carbon credits can connect with each other'**.

A platform at least needs three main involved parties:

A project provider

A company/NGO/organisation/... that can offer an amount of avoided or stored tons of CO_2. The final boundaries are set by the platform itself.

A project buyer

A company or a private consumer that wants to compensate for its unavoidable emissions (tons CO_2) by buying carbon credits from a supplier.

The platform

Acompany/intermediary that is:

- in control of the projects that are provided on the platform
- in control of the monetary transfers (buyer > platform > supplier)
- provides a solid framework, that ensures validated projects and no double counting

Benefits and opportunities of a local platform or intermediary

Initially, at the start of the CF project, the concept of a local platform was not included in our approach. Yet, along the project execution, we experienced that a certain 'upscaling' is necessary to be able to develop economically sustainable business models for farmers. A platform can offer the benefit of scale and is mainly connected to our second business model in which farmers want to sell carbon credits to other parties.

1. **A platform is an overarching/umbrella body** that offers many benefits to both the supplier as compensator (demander), such as:
   - long-term guarantees
   - credibility
   - a professional approach
   - insurance (e.g. if one of the involved parties cannot meet the agreements)
   - possibility for tailor made work (the platform can bundle different projects to meet the buyers request)
   - ...
2. **It creates a strong support base** that ensures recognition, as it gives visibility to local projects, which leads to showing the story behind the tons of CO_2.
3. By creating a platform, **financial feasibility increases,** as you can trade more tons CO_2 for a same fixed cost. The costs are spread over more projects and compensators.
4. In the end, a platform should **lead to less administrational burden** for all parties, as it is easier to automate/digitalise because of bigger scale.
5. **A local platform plays a societal role**, as it connects farmers with new companies and creates a closer link with society. For local companies' carbon compensation is now also becoming something from 'next door' and is more tangible, as well as it can create a closer connection between companies, employees and farmers.
6. Last but not least, a **local platform stimulates local economies and climate impact.** Especially in regard to CF it stimulates also: soil health, soil resilience, biodiversity, water quality, etc.

Points of attention

At the moment there are already platforms operating and more are being set up. Each one of them want to involve farmers in their business in their own way. As a project, we want to make the reader aware of pitfalls. CF will only succeed if farmers are convinced from the benefits on the short and long term and their position is safeguarded. Intermediaries or platforms are indeed a supporting factor in making CF scalable, yet, they have to find a feasible business model for all involved parties. In order to be able to change to CF, farmers have to invest, make costs and have more risks, therefore a decent reward for this important climate service to make this change is needed.

From the project experience we can only suggest some of the necessary services a platform or intermediary needs to provide, such as:

1. The essence of a platform, is to **provide sales** for the CF projects.
2. It is suggested for local platforms to **provide direct contact** between project provider and compensator. In this way, the strength of the local aspect is leveraged.
3. **Transparency** in the business model and refunds for the different involved parties is stimulating the trust between.
4. **Farm specific advice and support** on the carbon sequestration measures can be invigorating.
5. A platform can also **relieve the involved parties from administrative burden** throughout the process, by facilitating in every step.
6. Another suggestion is to **build a network of knowledge** (parties that provide the latest learnings from research, policy updates, etc.) and support (e.g. involve sectoral representatives, investors, ...). A way to do this, could be by setting up a steering committee.

4.2.2 Methodology

When setting up methodologies, several challenges may emerge that need to be carefully thought through beforehand;

1. Correct **measurements and the certification** of the carbon stored in the soil
2. Choosing a **reward system** that fits the project and allows both parties to benefit from the results.
3. Ensuring that **a good price** is set for both parties of the agreement.

4.2.2.1 Principles of carbon certification

There are some main principles for compensators that need to be tackled when you want to sell carbon credits: **Additionality, permanence, transparency and suitable measurements.** Regarding CF, some of these principles are not always as straightforward as they are. A general challenge for CF in Europe, is the lack of a standardised Monitoring – Reporting – Verification (MRV) system. Rewarding systems for maintenance of SOC for farmers with good management of mineral arable soils who already reached good levels and protect it in their soils are not developed. Yet it is an important task for farmers and landscape managers to maintain existing C-sinks. The protection of carbon in peat soils and carbon in permanent grassland is very effective for climate protection and can be tackled with special restoration and protection projects.

Additionality:

In the discussions within our show cases we have encountered different **types of additionality**. Therefore, we want to make the reader aware of the different interpretations that there may be between the interlocutors:

- The scientific approach of additionality of carbon storage means that more CO_2 must be extracted from the atmosphere and sequestered as C in soil compared to the situation before. This means: C flows that are already existing to agriculture at the start of CF contracts cannot be counted, also redirection of organic matter from fields or farms without CF programs to fields or farms taking part in CF programs is not suitable. The origin and additionality of the biomass must be known and documented to tackle this issue.
- Financial additionality: without the money from the project, CF measures would not take place. This means that the measures to build up SOC would not be taken, if the funding for them would not be offered by the compensation project. Accordingly, a SOC increase resulting from obliged cover crops can in this case not be calculated for a mitigation project, even if extra money will be provided by it;
- Additionality compared to main stream agriculture: thus, additional to what is customary or what is legally required;
- Also, the issue of leakage is generally important for the climate effect of a changed management. Storing more carbon in one place should not lead to lowering SOC on other places or to increase the emissions of other greenhouse gases on-site. Additional emissions of N2O by increased N-turnover in soils might be such an effect, when fertilisation is not properly adapted. Also, emissions from additional fossil fuel demand for carbon farming measures can change the greenhouse gas balances of the new

management.

Permanence:
Another critical point is the **permanence** of the SOC-increase, as SOC can degrade quickly. E.g. external factors such as increasing temperatures and inadequate soil tillage can have an impact. The implementation of agroforestry systems (C-storage in woody biomass) and the application of biochar from pyrolysis (with proofed additionality of biomass) are more easy to calculate and offer more permanence than SOC enrichment by biomass in common agricultural turnover which is prone to soil respiration and dependent on constant biomass supply and/or permanent changes in management.

Transparency:
A VCM still requires reporting and proof that measures were applied, in other words **transparency and communication are very important.** A substantiated and correct methodology is important, audit by an independent intermediary organisation/company of the methodology is necessary, as well as a control/ verification on project level. In addition, a strong point of the CF project is the local aspect, which can bring extra transparency and communication possibilities through compensator and project provider. At the end all C sequestration activities are local, need local truth but have a global dimension.

Measurements:
The measurements of carbon in the soil are complicated and expensive. In addition, these measurements often have a large margin of error and, as a result, small changes in carbon concentration cannot be measured. This error margin is caused by, among others, variability in the field, during sampling and during chemical analysis. A minimum of 0.1% increase or decrease in SOC concentration is needed between two measurements to observe a difference. For example: a top layer of 30 cm might weight 4000 ton/ha. To get 0,1% more carbon in this top layer, 4 ton/ha C-stock must be added. This is a large amount of input of organic material, for which time is needed and permanence must be granted.
In addition, it is difficult to choose a **proper baseline** for the measurement of the success: It's not always clear that the SOC would be stable without the project. In many cases it might decline or even increase without the project. For example, for the installation of solar panels the avoided CO_2 emissions are easier to calculate.

4.2.2.2 Rewarding system

As briefly mentioned in the introduction there are 3 types of approaches in regard to the reimbursement: action-based, result-based and a combination of these two, called hybrid system.

Action-based:
In an action-based approach, the concept is that the farmer is reimbursed based on taken actions, such as the CF measures. The benefit of action-based methodologies is that it is especially interesting for farmers with already high C content in their soils. This is of importance, as we should be aware to not neglect farmers whom have already carried out many efforts to build up their carbon content. Soils that are already high in C content, are more difficult to increase. Yet, the catch of action based is that the storage of C is 'potential' (based on scientific long-term research of course) and depending on the way how CS measures are applied, as well as external factors as weather conditions, etc. Therefore a certain inspection and verification is necessary to ensure measures are taken in a way they should. In an action-based system no specific numbers can be demonstrated and in this way there is margin for doubt and discussion.

Result-based:
In a result-based system, the concept is that the farmer is reimbursed based on carbon measurements in soil and C-stock calculations. The most known way of measuring is by SOC-laboratory analytics of soil samples, but also remote sensing might be an option when sufficient accuracy can be technically reached in future. But farmers who are currently already doing well and have high carbon contents in their soils, are likely to get excluded from result-based systems because there is a ceiling for carbon storage in the soil. Another problem is that a farmer has to wait a long time for his reimbursement, as you need a minimum of 5 years in order to be able to measure significant increases in C content. In addition, there is also no control over some of the factors that influence the C storage. Yet, a result-based system avoids any discussion on the actual stored C, in contrary to the action based system. Buyers find this more interesting, but for farmers the opposite is true.
Conclusion: There is need for hybrid approaches

We have taken this into account in the development of various show cases. For example, some cases partially pay out based on actions and partially pay a remaining refund after 5 years based on actual soil measurements. Another example is to use the C measurements as a motivating factor, e.g. in the bonus concept of Claire.

4.2.2.3 Price setting

At the start of our project, as well as in our white paper, we pointed out that an economic incentive for farmers remains important to accelerate the use of CS techniques. Farmers must invest today and repeat this annually, even though the benefits, such as a sustainable productive yield and an increased resilience against extreme weather conditions, only pay off in the long term and some of the measures entail more

risks. They may need financial support to cover the cost of the implementation of these CF measures and for monitoring the amount of C in their soil. Moreover, they deserve a reimbursement for this effort to society. The valorisation of C sequestration motivates the famers and can thereby accelerate the movement of this new way of agricultural practices.

As is the case for any local business model in regard to carbon sequestration, **cost price remains one of the biggest challenges.** Local carbon offset often means a higher price than abroad (e.g. reforestation projects in developing countries). Therefore, marketing and showing the unique selling points are a key to success. CF as well as in general a local carbon market evolved a lot these recent years and will evolve much more the coming years. At this moment it is difficult to already draw clear findings.

Price-setting based on the costs on the farm is complicated and very diverse and farm/region specific. Therefore, most of our show cases shipped between the current carbon market prices and the discussions with farmers. The price still needs to be high enough to be sufficient for farmers to participate in an engaged way and to feel appreciated for their efforts.

At this moment, price-setting is still depending a lot on what the farmer dares to ask (and on how good he is at explaining the added value) and what the buyer is willing to pay. We learned that the interest for local compensation is growing, yet there is a long way to go in order to get the concept of CF more known and accepted. In this new market there is still a lot of opportunity to set a price yourself (of course within certain limits), but then it is also important that the added value of local carbon credits is properly explained.

Another point of discussion is how to sell your stored carbon as a farmer. There were many discussions on whether the refund should be included in the product of the main activities of the farmers, or it should be seen as a separate service the farmer provides. The consortium aimed at all interested companies (also outside the food chain) and we wanted to approach them in the same way on this topic. The consortium believes, in order to make CF known to a broad public and seen as a full option for compensation, the refund for the carbon stored by a farmer should either be a separate revenue stream or as part of the price for the primary product but then transparently visible in the price calculation. The main principle is that it should be transparent, concerning the amount of tons CO_2 sequestered and the payment for this.

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