



Research of existing business models to valorise carbon sequestration

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1 Introduction








Carbon Farming is a 3-year Interreg North Sea Region (NSR) project running from September 2018 until September 2021, involving seven partners of four countries (the Netherlands, Belgium, Germany and Norway). The overall objective of the project is to enable a transition in the agri-food supply chain by the adoption of carbon sequestration (CS) techniques throughout the North Sea Region, as a contribution to the greening of the agri-food production processes.

The NSR faces soil degradation and biodiversity loss resulting from present-day agricultural production processes relying on short-term results and profits. An increase in adoption of CS techniques in land management can help to reverse these negative trends and will play a crucial role in food security and climate change mitigation. Greening the food supply chain through carbon farming (CF) will restore the organic component of the soil; actively remove atmospheric CO₂, increase soil biodiversity, and provide better nutrient and water holding capacity for crops. Several CS techniques have been validated since a few years. At the moment the effectiveness of CS to improve soil fertility, water-infiltration and mitigate climate change is mostly demonstrated in scientific papers, but rather limited in practice. Organic farmers are already applying techniques in this field, and many farmers take already measures on a certain scale, but it is about applying more than 1 or 2 measures, as well as applying them in the most optimal manner. The next step to enable further transition would be by upscaling and demonstrating.

The NSR has strong interrelated food production chains, which lack a long-term vision on sustainable soil management and green production processes. Economic actors are however increasingly aware of the impact of their business and consumption patterns on the environment. Still, the existence of few sound, economically viable business cases and the focus on the long-term hinder rapid adoption of CS techniques. Not only farmers have a responsibility in this, but all supply chain actors should be involved in a way that farmers do not have to carry almost all the risks, as is often the case in the sector. Involvement throughout the integrated value chain is required to allow this progress to be sustainable and durable.

It is becoming increasingly clear which farming techniques have the biggest potential of improving CS on agricultural soils and that this potential and suitability of the different techniques is region-specific (see [**Inventory of techniques for carbon sequestration in agricultural soils**](#)). To put these techniques successfully into practice, a significant return on investment has to be guaranteed for farmers and other stakeholders investing time and money in these techniques. Therefore, economic and ecological viable business models using CS need to be defined first. This will allow us to utilise the potential of CF to green the food supply chain, restore the organic composition of the soil, increase biodiversity and store atmospheric carbon. The first step is to perform a desk study identifying existing business models that can be used as an example and source of inspiration for future similar initiatives. The dissemination of these examples to the different economic actors, authorities and consumers will increase their awareness of the potential of CF once incorporated in the agrifood production process.

Providing successful examples will be a key factor in progress towards greening the NSR agrifood sector. Possible strategies are:

-  Creating a viable market for crops that are beneficial for soil quality and CS
-  Promoting efforts in terms of sustainable food production towards consumers (for example using labels) to create a green image and create an added value to the produced products
-  Direct payments by government for farmers based on the actual reduced amount of carbon emissions due to adjusted practices
-  Develop a compensation system with carbon credits that can be traded among stakeholders
-  Creating direct financial advantages coupled to the efforts of farmers in terms of sustainable land-use practices (lower taxes, lower lease price)
-  Processing companies within agri-food chain paying higher prices to farmers who are producing in a sustainable way
-  ...

This study will elaborate more into detail the potential strategies and illustrate with specific business model examples.

Based on this information, this project will test and validate economically viable business cases for CS in the whole agrifood chain and its potential for third parties to compensate their environmental footprint.



2 Methodology for creating business models inventory

All partners were asked to search for business models with interesting elements for the valorisation of sustainable initiatives, being for example existing good practices on CF or actions to promote biodiversity,... and this both from their own country and abroad. For each of their identified business models, partners completed a table with a set of short questions describing its most important elements (Table 1). The filled in tables per selected case were made available to all partners using a central online data storage platform (Basecamp) accessible to all partners. This allowed other project partners to have a general understanding of these initiatives and use them as a source of inspiration in their search for relevant business models.

Table 1: Table to be filled in by partners for each identified carbon farming relevant business model.

Full title of concept/model/organisation (max. 20 words)
Working title (max. 20 signs)
Country/region
Short description (actors, revenue model, activitites...)
Why relevant in the frame of CF project?
References (site, article, person,...)
Prepared by (institution name)



3 Overview of inspiring examples

3.1 Four business model categories

Based on the inventory of business model examples we could distinguish four categories defined by the stakeholder acting as initiator of the business model. We noticed that in some cases the farmer himself was taking the initiative. In other cases other stakeholders were acting as the driving force. We could distinguish between actors from within the agri-food chain (retailers, processors,...), companies from outside the agri-food chain (for example travel agencies, event organisers,...) and the (local) government. These categories are visualised in the infographic (Figure 1) and a short description of these four categories is given below.

3.1.1 Models within the agri-food chain

Often enterprises from within the agri-food sector, such as processors of milk and vegetables, retailers, distributors,... are the ones taking the initiative to make their business more sustainable. To achieve this they are starting cooperations with farmers applying successful CS techniques. Companies can use this approach in a convenient way in their marketing campaigns, for example by mentioning this on the packaging of their products. This way they illustrate to their customers how they are contributing to the climate change challenge the agri-food sector is facing and at the same time they increase the awareness among consumers concerning the need for a more sustainable food production. The added value to their products then partly flows to the farmers receiving a higher price for their products or receiving a direct payment for their additional efforts.

3.1.2 Models outside the agri-food chain

More and more companies and organisations focus on climate and sustainability in their business model. These are not necessarily active within the agri-food sector itself. A lot of them are already increasing their efforts in terms of sustainability, but sometimes it is impossible for them to become climate neutral due to inevitable emissions. Some of these companies are looking for alternatives to compensate for these emissions. Possibilities are endless and depend on the creativity of the company. A commonly applied model these days is for example planting trees or investing in more sustainable energy production/use in developing countries. However, there are also opportunities on a local scale within the agri-food sector. Companies can make a 'Carbon agreement' with a farmer and invest in ways for the farmer to take actions in sequestering carbon, such soil enhancement techniques. In return the company is allowed to claim the additionally sequestered carbon.

3.1.3 Models at farm level

Farmers can also take initiatives to make their products more sustainable by themselves without involvement of any other stakeholder. In most cases farmers focus on the 'story' behind their products and are selling their (labelled) products through short-chain marketing. By openly communicating on their sustainable farming techniques (for example ways to increase carbon storage in their soils) towards their customers they count on the increasing willingness of consumers to pay a little extra for their sustainable products. A classic and generally known example of such a business model is the 'organic' label.

3.1.4 Models including government institutions

Climate mitigation and adaptation is high on the agenda of national and regional governments. Also, a lot of municipalities, provinces, cities, ... are developing climate action plans to compensate for their emissions. The application of CF is therefore often actively promoted by government institutions. Two main strategies can be defined. First, when proven beneficial for the society and environment, governments can pay farmers directly for the ecosystem services they are providing as a consequence of their sustainable farming techniques. Second, systems where the government is intervening in carbon credit trading and the follow-up of the efforts by farmers in terms of carbon storage are another viable option. These systems allow farmers to design their own projects aiming at increasing carbon storage. Following approval of their project, farmers then receive carbon credits which they can sell to companies or organisations looking for alternative ways to compensate for their carbon emissions. In both cases governments would be promoting the implementation of sustainable CS techniques in modern farming. Another interesting route to be explored for the future is the Common Agricultural Policy (CAP), that can create incentives for farmers, through legislation or funding, stimulating carbon sequestration techniques. The policy will play a fundamental role in developing a fully sustainable agricultural sector that supports a.o. environmental care and climate change action.

3.2 Classification identified business models

All the collected and described business models were assigned to the according category and further analysed in terms of their experience (**Table 2**). A distinction was made between practices that are already running and hence have ample experience, and practices that are rather in a conceptual phase with less experience, or with limited experience in the field of CF in specific.

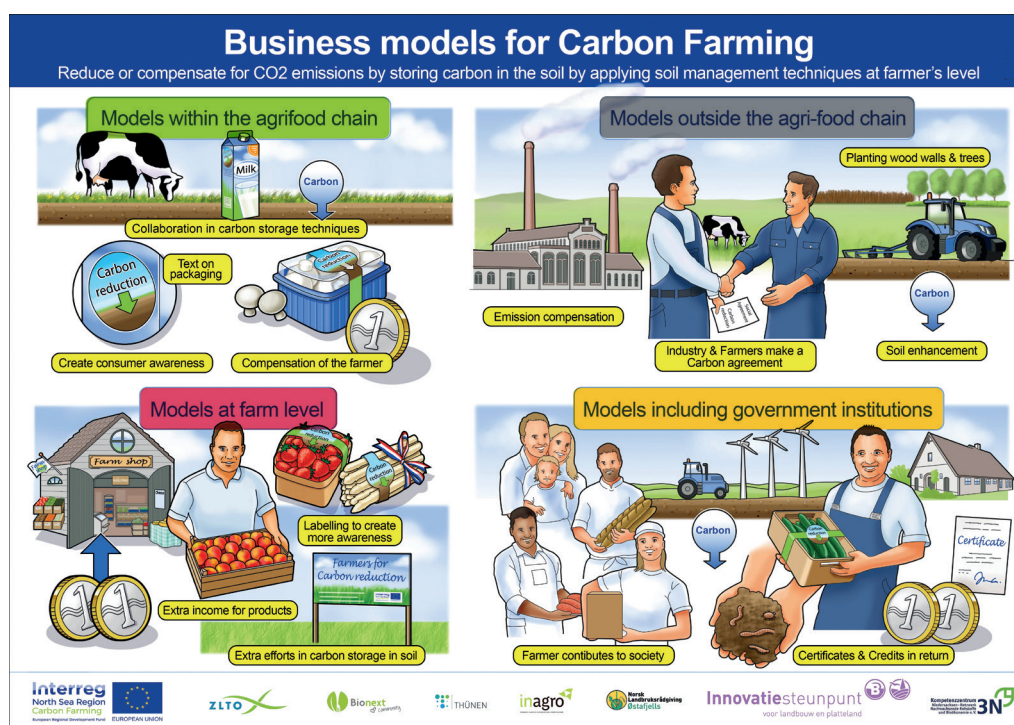


Figure 1: Infographic visualising the four different categories of business models, as identified by the Carbon Farming project partners, aiming at reducing or compensating CO₂ emissions by storing carbon in the soil by applying soil management techniques at farmer's level. Differentiation is made mainly based on the level of involvement of the government or other stakeholders.






Table 2: Overview of identified business models divided in the four previously defined categories. Business models indicated with '*' are in the experimental phase and/or have limited experience with carbon farming in practice. Others are running projects with ample experience. More detailed information for each business model can be found by **clicking on the name of the business model**. By clicking on the name, you will be directed to the further elaboration within this text and, if possible, directed to the website. The names in the text are underlined with the color(s) of the model(s) shown below.

Business models divided into categories according to initiator			
Models within the agri-food chain	Models outside the agri-food chain	Models at farm level	Models including government institutions
Climate neutral potato*	Biobeurs*	Stichting Veldleeuwerik*	Valuta voor Veen*
Potato processor*	Energy cooperative*	Marketing of fava beans	CAP*
Organic wholesaler*	Wij.land*	Eco-farming for eco-beer/bread	Water Authority*
Fibershed*	TravelEssence	Flowering stripes	Forest Carbon Partnership Facility
Climate neutral foodboxes*	Carbon insetting	Zespri	Humusaufbau Okoregion Kaindorf
Foqus planet	Dutch trading system sustainable energy		Land lease
Zero Net Carbon	Nijmeegse 4-daagse Climate Neutral		Nori
Farm Brothers Soil Fund	Trees for all		Carbon Farming Initiative
	Treecological		Payment for Ecosystem Services
			Platteland in de bloemetjes
			Farmland bird friendly cover crops

3.3 Quick scan of the identified business models and main barriers




Business models at farm level

In total 33 business models were identified by the project partners. Only five of them belong to the category of business models initiated at farm level. This does not necessarily mean that farmers are not interested in CF techniques. There are however some important **barriers** holding back farmers to start to invest in CF techniques. At the core of each of these barriers is usually the uncertainty of return-on-investment for the farmer. For example:

-  The farmer needs to sell his story to processors and retailers and persuade them to pay extra for the added value of his sustainable products. This is not an easy task for most farmers as marketing is not their core business. For farmers with their own farm shop this could be easier as they are in direct contact with consumers. Customers of farm shops usually belong to the category of people that attach importance to local and sustainable food production and are willing to pay extra for these products.
-  In some areas, like Flanders for example, a lot of farmers are leasing their land and are not the land owner. CS is a long-term process. Investments in CF techniques are largely paying off in the long-term when the improved soil quality is resulting in higher crop yields. For farmers leasing land there is no guarantee that they will be the ones enjoying the benefits of their efforts.
-  Setting-up a CF business model by themselves could yield an administrative burden for farmers.
-  Lack of a market for carbon sequestering crops
-  Farmers are reluctant to implement CF-techniques, because they are afraid that the extra efforts will be considered soon as the new normal, without extra payment

Models within agri-food chain, outside agri-food chain and including government institutions

When taking a closer look at the other three categories (models within agri-food chain, outside agri-food chain and including government institutions) we see that the total number of identified business models belonging to each of them is largely comparable and remarkably higher than the number of business models initiated at farm level. We did however notice a difference among these other categories when looking at the level of experience with viable CF business models. Five out of eight business models from within the agri-food chain were still in development or in the experimental phase. For the models outside the agri-food chain and the models including government institutions this was three out of 9 and three out of eleven, respectively. Some possible explanations for this:

-  EU policy is forcing local governments to take action concerning climate mitigation
-  Governments are not depending on the market as much as farmers and companies and do not to make direct profit.
-  In response to increasing climate awareness of consumers and stricter requirements coming from the government, some larger industries than the agri-food sector with a bad reputation in terms of climate impact are looking for opportunities to give themselves a greener image




4 Solutions to overcome barriers on farm-level as suggested by the identified business models

The business models identified in this study show alternatives and solutions to overcome CF barriers for farmers and other stakeholders.

4.1 Farmers' cooperative

1. A farmers' cooperative can be one of these solutions.

 **Marketing of fava beans** In Germany a group of farmers founded **the FAVA-TRADING GmbH & Co. KG**. The goal of the cooperating farmers was to create a market for fava beans. The extension of crop rotation with these legumes is a very effective tool to augment humus in soils and hence increase CS this way. However, the limited market for legume products in Germany and the strong competition of import was holding farmers back to cultivate these crops. This farmers' cooperative constructed a processing plant, supported by the European ELER-programme, and successfully created a market (including export) for fava beans making the production of fava beans now economically viable for German farmers. Their company functions as the link between farmers and buyers, so farmers do not need to search for buyers themselves.

 **Stichting Veldleeuwerik** business model from the Netherlands, however, shows that the farmers' cooperative approach is not always successful. Within '**Stichting Veldleeuwerik**' arable farmers were working together on making food production more sustainable. They did this together with suppliers, advisors and buyers. This company created a sustainability label built around soil care and based on several indicators such as soil fertility, soil loss/erosion, nutrients, biodiversity,... The Veldleeuwerik certificate did not necessarily mean an extra monetary value to the produced products, but was also considered relevant for farmers in market access. Unfortunately '**Stichting Veldleeuwerik**' has, after almost 18 years, ceased to exist as from January 2020 as they were not able to find new investors. An example illustrating the important financial barrier for farmers as mentioned above.

4.2 Short term financial advantages

The strategy of creating short term financial advantages as described above, could successfully provide the needed incentive for farmers to start with CF. These short term financial advantages can come in very different forms, for example through the reduction of taxes. Regional governmental **Water authority**, collecting taxes from citizens within their region, could lower these taxes for farmers who apply (CF) techniques that improve soil structure, increase water holding capacity of the soil and maintain water quality levels. Farmers get a financial advantage this way and the water authorities lower their costs due to more sustainable farming methods. This possibility is being researched by Bionext in the Netherlands.





The '[farmland bird friendly cover crops](#)' business model shows another creative approach. In this business model farmer receive the seed mix for their cover crops, a very efficient way of sequestering carbon, for free if they are sowing a very specific mix (aimed at providing food for farmland birds during winter) following some specific guidelines. The seed mix in this case is paid by a governmental institution aiming at increasing farmland biodiversity. This relatively small financial incentive has proven to be enough for farmers to choose for this farmland bird friendly cover crop seed mix. Other direct and short term financial advantages for farmers could be realised through the [CAP \(Common Agricultural Policy\)](#) or [Payment for Ecosystem Services \(PES\)](#). The CAP could create incentives for farmers through legislation or funding by direct payments for those implementing CS techniques. As CS is a part of PES, this could also be an interesting option to provide short term financial advantages of CF for the farmers.

4.3 Carbon credits business models

One promising way of creating a viable business model using CF is the use of carbon credits that can be traded between stakeholders. In these models, stakeholder A is paying stakeholder B to reduce CO₂ emission or to increase CS. In exchange, stakeholder A can claim the amount of reduced CO₂ emissions to compensate for their inevitable carbon emissions.

When looking at the identified business models we see that business models based on carbon credit trading are usually initiated by or involving governments and larger companies outside the agri-food sector. This can be explained by the higher complexity of these business models. Nevertheless, voluntary local carbon projects are increasing. This is partly a result of the development of national carbon certification frameworks allowing local projects to benefit from a credible MRV (measuring, reporting, validating) framework and domestic emissions reduction (Cevallos et al., 2019).

Some examples of identified business models based on carbon credits:

-  [Valuta voor Veen](#) project in the Netherlands was founded by two NGOs (Noardlike Fryske Walden and the Friese Milieu Federatie) and addresses the current local practice where water levels at Dutch peatlands are lowered to partly use them for dairy farming. Oxidation of the dried peatlands leads to increasing CO₂ emissions. In the project they aim for farmers to voluntarily rise the groundwater level. Associated costs are being compensated by local companies and citizens buying carbon credits. This system has been brought into practice since January 2020.
-  [Humusaufbau Ökoregion Kaindorf](#) in Austria creates humus certificates that can be bought by local enterprises. The certificates are based on the difference in measured amount of soil organic material between the starting point and another measurement after three years. A network of farmers (the humus academy) is providing additional technical support to participating farmers.
-  [Nori](#) in the USA aims at facilitating the carbon credit certification process for all stakeholders. [Nori](#) connects buyers, suppliers and verifiers in the carbon removal marketplace. The platform ensures easy and more reliable carbon accounting, reduces transaction costs for buyers and sellers and enables a secure payment process.
-  [Carbon Farming Initiatives](#) is an example of a successful voluntary carbon offset scheme in Australia. It is an integral component of the Emissions Reduction Fund and allows land managers to earn carbon credits by changing land use or management practices to store carbon or reduce greenhouse gas emissions.

- 🌱 **Carbon insetting** business model by Soil & More Impacts wants to create a win-win model by both increasing productivity of the soil and reduce emissions. Suppliers are paid for sustainable practices that also reduce carbon emissions. Via carbon credits an agri-food company can compensate its CO₂ emissions. At the same time they secure their supplies by improving productivity of the soils.
- 🌱 **Forest Carbon Partnership Facility (FCPF)**, a global partnership of governments, businesses, civil society and Indigenous People is piloting payments for verified emission reduction. The goal is to provide incentives to reduce emissions while protecting forests and conserving biodiversity.

Buyers from carbon credits are possibly very diverse ranging from individual citizens to multinational companies from a range of sectors. A few examples coming from this study:

- 🌱 **Organic wholesaler** is interested to compensate for their unavoidable CO₂ emissions by paying for carbon sequestered by their local suppliers (farmers).
- 🌱 **Energy cooperative** that focuses on green energy from local sources, is buying carbon credits to compensate for the CO₂ emissions related to their supply of natural gas.
- 🌱 **Nijmeegse 4-daagse climate neutral** organisers of festivities are more and more looking for ways to compensate for their inevitable CO₂ emissions. The Nijmeegse 4-daagse (four days marches) for example is an event that compensates its carbon emissions through investing in sustainable energy at farms in the region. Carbon credits could be an interesting option as well for these type of organisations willing to cooperate with farmers to achieve climate goals.

An important trend noticed here is that there is an increasing interest in **locally produced carbon credits**. Where in the beginning carbon credits were often required by planting trees in developing countries, companies are now looking for more local initiatives. This is influenced by the increasing support and willingness of consumers to buy locally and support local farmers. It can be very interesting for companies to use their investment in local carbon offset projects in their marketing campaigns. This is illustrated by the business model of Ökoregion Kaindorf. Also the Dutch Energy Cooperative illustrates this attention shift towards more local carbon offset projects. Currently they are buying carbon credits from a wind energy project in India, but they stated that they would rather compensate locally.

A suggestion to stimulate this trend even more could be to create an added value to carbon credits when they are produced locally, meaning that the same amount of sequestered carbon results in more credits when sold locally.

Dutch trading system sustainable energy. A similar approach is used in the Netherlands with the system of green certificates used to prove that energy is 'real' green energy. The certificates are tradeable (comparable to carbon credits) and a guarantee of origin. For every MWh of green energy produced, 1 GvO (Dutch abbreviation of Guarantee of Origin) is created. Despite every GvO is representing the same amount of sustainable energy, the GvO's can have different values in different regions or depending on the source that generated the energy. This system could be translated to the context of carbon credits as well.

Besides providing a promising type of business models, several important **challenges** in the development of a successful carbon credits trading system are experienced by the identified business models:

- 🌱 Working with carbon credits requires an accurate quantification of the amount of carbon that is captured in soil or vegetation. Measuring carbon from soil samples comes however with inaccuracies. Several studies mention the difficulty of measuring soil C concentration and report large differences in measured concentrations depending on the used measuring techniques (Kempeneers et al., 2017; Cevallos et al., 2019). This can also give problems to determine the baseline used to calculate yielded carbon credits. More accurate measures are possible, but are very expensive and could raise the price for carbon credits significantly.

- 🌱 How to determine the correct carbon price? There is not one fixed price for carbon storage. This will always be an exercise to find the right balance. It certainly depends on the region, offer and demand, raw material prices, climate, etc. The Carbon Farming project wants to develop business models that are tailor made, depending on the involved companies and/or organisations. The study by Cevallos et al. (2019) noticed large differences in price when comparing different regions. Prices in EU carbon projects are usually higher (average 13 €/tCO₂, ranging from 6 – 110 €/tCO₂) compared to prices on international markets (average 4,6 €/tCO₂, ranging from 0,4 – 72 €/tCO₂)
- 🌱 CS is a long-term process, therefore credits need to be defined ex-ante based on the applied CF techniques and the region. This provides the initiator of the business model with the necessary funding to start such a long-term project. There is an inherent risk to this as it is possible that the CF system does not meet expectations and CS is lower than expected. This can be due to overestimation of the CS capacity of the technique, but as well as due to sudden reemission of carbon into the atmosphere after natural disturbances like fires, storms,... (Cevallos et al. 2019). The application of a 'discount rate', an amount of credits kept aside until a verification process has been carried out, offers a solution to the first scenario. Ökoregion Kaindorf for example is putting one third of the sale revenue aside until a third control sample after 5 years is taken. The creation of a buffer pool, where a part of the carbon units is retrieved from every project and put aside indefinitely in a common pot, could function as a source of insurance for the second scenario.
- 🌱 Costs for certification of carbon credits (the actual amount of sequestered carbon must be monitored and verified by an accredited verifier) are proportionally higher for smaller projects. For example, Ecoregion Kaindorf is paying MRV (Measuring, Reporting, Verification) costs in advance and this cost is covered when humus certificates are sold. A CO₂ certificate costs €45, of which €15 goes to overhead and €30 to the farmer.
- 🌱 The double-claiming issue, (in which efforts are claimed in the frame of the national inventory, as well as by the buyer of the credit) slowed down the development of voluntary carbon projects in Europe (Ivleva et al, 2015). Fortunately, the situation is changing as a growing number of actors from voluntary markets are admitting that double-claiming is not a threat to environmental integrity and that projects could just as well help contribute to national targets (Cevallos et al, 2019).






4.4 Incentives by retailers and processing companies

When specifically looking at the identified business models initiated **within the agri-food chain**, we see that the larger retailers and processing companies can have a big influence on the level of implemented CF techniques by individual farmers. They can do this by:

1. **creating a direct financial incentive** such as higher prices for products coming from carbon sequestering farming practices,
2. **offering access** to alternative interesting marketing opportunities or
3. **investing in research** in the field of CS. Some examples coming from this study illustrate this.

A large part of these business models are still in development or in the experimental phase.

- 🌱 **Foqus Planet:** The Dutch farmer cooperative Friesland Campina producing and selling dairy products from over 18,000 farmers from the Netherlands, Belgium and Germany introduced **the Foqus Planet** programme. The price you get as a farmer for your milk is depending on your efforts in terms of animal welfare, climate, circularity and nature. They reduce the price they pay for the milk to their farmers and the money saved in this way is used to pay an additional price to farmers who are producing in a more sustainable way.


-  **Potato processor:** A large potato processing company in the Netherlands is willing to financially reward potato farmers that are doing well in terms of sustainable soil management. The project is in an initial phase, where they are working with eight Dutch growers and are working on the creation of a monitoring system and suitable indicators.
-  **Climate neutral foodboxes:** working with organic products coming from local farmers has the ambition to further reduce the ecological footprint of the foodboxes by focusing on working with farmers that apply CS techniques.
-  **Zespri** (New Zealand), one of the world's leading horticultural companies specialised in kiwifruit, recently invested in a major study to understand carbon storage. As a farm with sustainability as one of the important company values, they promote the efforts they do in the field of CF towards consumers.
-  **Fibershed** (USA) aims at creating a vibrant local market for climate beneficial textiles and at encouraging CS in fiber-producing agricultural systems. They created an incentive for local small to mid-scale fiber producers to adopt CS techniques through producing a product with added value. Consumers are willing to pay extra for these products.
-  **Zero Net Carbon:** Yoghurt producing organisation Danone (Belgium, UK) targets **Zero Net Carbon** by collaborating with other players within the agri-food chain (farmers, suppliers, customers and local communities) to work among others on CS
-  **Climate neutral potato:** A supplier of a restaurant chain contacted a Dutch arable farmer to produce a 'climate neutral potato'. This restaurant chain sees this as part of their green and sustainable chain. The farmer is currently looking into potential ways to grow such a **Climate neutral potato** using CF techniques.

4.5 Other ways of valorising CS techniques: CF as part of a broader story

Besides the carbon credits trading system, several other ways to valorise CF techniques are shown by the business models in this study. A substantial part of the business models is focussing on improving soil quality and increasing biodiversity on farmland. Instead of measuring the actual level of carbon being sequestered, they reasonably assume that implementing these techniques in modern farming will automatically result in an increased CS. The business models in this study show that this approach is attracting a large range of stakeholders situated within and outside of the agri-food chain, but as well as individual farmers or citizens.

Assuming that the implementation of CF measures will increase CS or that a better soil quality is capturing more carbon, makes it easier for the initiator of a business model. Moreover, the biodiversity- and landscape-approach often provides an attractive story companies and primary producers can use in their marketing. In these cases the return-on-investment for companies and producers is the greener image of their business. This is a strategy that usually pays off in a more indirect way on the longer term as climate-awareness among consumers is increasing and making them choose more frequently for businesses with a more climate-friendly image.

This study offers some nice inspiring examples of business models aiming at improving landscape and biodiversity, and at the same time enhancing CS:

-  **Flowering stripes** business model in Germany is based on consumers being willing to directly invest in flowering stripes. Wildflower stripes mainly focus on insect biodiversity, but without any doubt they are enhancing the soil carbon content due to the variety of plant species and the reduced management of the land, especially in perennial stripes.

A local farmer founded a company that is selling these flower stripes to citizens and companies who are willing to pay for a flowering landscape on local farms. Prices are nearly €20 per 25 m² (about € 7900 per ha), meaning that the flowering stripes are considered as a real 'crop' by the farmer.

- 🌱 **Wij.land** aims at restoring carbon sequestering peat meadowlands as they are a typical Dutch landscape. These peat meadows are experiencing degradation by farming practices as drainage and dewatering. Wij.land is testing and facilitating long-term forms of cooperation between farmers and nature organisations, that enable farmers to transition to more sustainable practices on these lands.
- 🌱 **TravelEssence** is a travelling agency from the Netherlands that is specialized in travels to Australia and New-Zealand. They aim at compensating for the inevitable CO₂ emissions of their customers' flights. They do this, among others, by planting trees in the Te Urewera rainforest of New-Zealand.
- 🌱 **Treecological** is a similar example from Belgium that turns travels into trees. On the website, you can easily calculate the CO₂-emission of your trajectory by car, plain, bus, train or your household emissions, and compensate it afterwards by choosing a project.
- 🌱 **Trees for All** is a Dutch Foundation giving companies and individuals the possibility to reduce their environmental footprint by investing in tree-planting projects in the tropics (Uganda and Bolivia).
- 🌱 **Platteland in de bloemetjes** is a Flemish project that increased environmental awareness and social cohesion in rural areas by investing in cooperation between local (groups of) farmers and rural citizens with regard to biodiversity. Two flower seed mixes were developed, one for individuals, as well as one for interested farmers.
- 🌱 **Land Lease:** As mentioned earlier the large proportion of farmers leasing land in certain regions is a problem for the implementation of CF as the benefits are especially situated on the long-term. The business model '**Land Lease**', however, offers a creative solution for this issue. The **governmental institution** 'Green Development Fund Brabant' is a land owner leasing land to farmers. They give priority to farmers who practice good water and soil management and use farming practices that promote biodiversity. Farmers need to prove this by presenting official certificates. This approach could be fine-tuned for CF practices in specific, where priority in land lease is given to farmers applying CF techniques or these farmers could get a discount on land lease prices.

We also identified a few examples of how companies from within and outside the agri-food chain are stimulating the application of organic farming as a way to increase CS and mitigate climate change. Again this is based on the general assumption that organic production improves soil quality. The larger the organically farmed area, the more CO₂ is potentially stored in agricultural soils. Models based on this approach are promising. They are relatively easy to use, as you can make use of an already existing system: organic farming. For the farmer, a premium price is already received for organic products.

Stimulating organic farming can be done in several ways and by actors within and outside the agri-food chain, as the business models below show:

- 🌱 **Biobeurs** is a yearly Dutch Organic Fair. The organisation of the fair is looking into ways to compensate for the energy use and related CO₂ emissions of the fair. Local organic farmers could be compensated for the carbon they sequester. In Germany, the comparable initiative Biomesse is already working with carbon farmers in a compensation scheme.
- 🌱 **Farm Brothers soil fund** is a producer of organic cookies aiming at having a positive impact on agricultural soils. They invest in a soil fund created by themselves, which invests that money in 'Stichting Grondbeheer'. The latter is a Dutch foundation that buys conventional land and leases it to organic growers. Farm Brothers communicate about healthy soils on their packages and website. This communication directed to consumers is an important part of the model.
- 🌱 **Eco farming for eco-beer/bread** in which eco-farmers supply eco breweries or eco bakeries. Soil carbon enrichment by use of compost and cattle manure is being financed by higher prices for the high quality produce which at the end is being sold to health-conscious consumers.

Concluding remarks on business models

Documenting and sharing Good Practices allows people and organisations to learn from the experiences of others. The knowledge attained can be turned into action and thereby enables entities to increase their capacity to improve results.

5 Elaboration of inspiring business models by means of example





Context

Farm Brothers is a producer of organic cookies. Besides focusing on a high quality product, they focus on having a positive impact on agricultural soils. They do so by investing in a soil fund they created themselves. The soil fund invest money in Stichting Grondbeheer. A Dutch foundation that buys conventional land and leases it to biodynamic growers. Making the general assumption that organic production improves soil quality. Besides that, they communicate about healthy soils on their packages and website. In this way they hope to increase awareness about soil quality at consumers and other companies.



Concept definition

The larger the area farmed organically, the more CO₂ is potentially stored in agricultural soils. By helping farmers that are interested in becoming organic, or organic farmers that want to expand, it is expected that more CO₂ will be sequestered. Communication directed to consumers is an important part of the model.



Impact

The soil fund can have impact by helping Stichting Grondbeheer buying conventional land and leasing it to organic farmers, increasing the land managed organically. Depending on the farm management of the organic farmer, soil quality, including carbon levels will increase. This impact is not measured directly in this model, but assumed.



Cons & Barriers

1. Assuming that soil carbon will increase with organic farming methods is an assumption. Risk of generalizing.
2. Companies that want to invest, have to support organic farming
3. Because of the high land prices in the Netherlands, this model is a very expensive way to change farm management on one hectare.



Solutions

1. Individual stories of farming methods of participating farmers are written down. Scientific data shows the general trend of higher soil carbon levels in organic soils.
2. Communication will be really important. Clear concise story, backed by scientific data.
3. A change in the model could be made to help farmers partly, but not completely, with buying land or converting to organic.



Benefits

The model is relatively easy to use, as you can make use of an already existing system: organic farming. For the farmer, a premium price is already received for organic products. Studies have shown that organic farming can lead to higher soil carbon levels. The concept also focuses on more advantages than just CO₂, also biodiversity and general soil quality are included in the story. Organic companies can also promote organic in general in this way, increasing their market.



Necessary partners

- **Stichting Grondbeheer:** organization is needed who buys land and leases it
- **Companies willing to invest in soil fund:** companies like Farm Brothers needed that invest directly, without a direct revenue stream coming in
- **Consumers:** needed to value the story behind a company investing in agricultural soils and willing to pay a premium price for this
- **Science:** providing data to back up the claims of the advantages of organic soils.



Cost structure

Farm brothers has to invest in communication and pays 0,5% of their revenue to the soil fund. This money goes to Stichting Grondbeheer. The main cost is then the land bought by Stichting Grondbeheer.



Revenue streams

The consumer buying Farmer Brothers cookies is currently paying for a tasty, healthy and environmentally friendly product. Farmer Brothers tries to make the consumer also soil conscious and trying to make the consumer willing to pay an extra price for the whole story (soil, health, environment, taste). The (organic) farmer working with Stichting Grondbeheer is able to lease land for a relatively low price.



Context

In the region of Kaindorf in Austria, they locally support arable farmers to sequester carbon in mineral soils, by creating humus certificates. The certificates are based on the difference in measured amount of soil organic material at point 0 compared to 3 years later. These certificates can then be bought by local enterprises to compensate for their own CO₂ emissions. In this way farmers are motivated to work on increasing the carbon content in their soils and they also get technical support through a network of farmers (a humus academy). The project is part of the Ökoregion program, a wider program to promote sustainable initiatives in the region.



Concept definition

The concept is based on voluntarily CO₂ payments, valued by certificates. Certificates are created by farmers sequestering carbon in their soils and organizations willing to pay for this service by buying certificates.



Impact

The impact of the project is created by increasing carbon content of the soils of participating farmers. This impact is measured by analysing soil samples 2-5 years after the start of the project. Besides that, impact is created by increased awareness at the general public of carbon sequestration in soils as a tool for climate mitigation.



Cons & Barriers

1. It's a challenge that increasing soil carbon is a long term process that can take multiple years.
2. Measuring carbon from soil samples comes with high inaccuracies. It's harder to improve the carbon levels when you start with high carbon levels.
3. Companies in the region have to be willing to pay for certificates.
4. Farmers have to be willing to change their practices for a relatively small financial incentive.



Solutions

1. Farmers have to wait a few years to receive the money and a third measurement is taken after five years to secure the sequestration.
2. The inaccuracies are taken for granted. Farmers that start with high carbon levels have bad luck.
3. Because it's a regional project, there is a high willingness of local companies to support local farmers.
4. By introducing the Humus Academy as part of the project, farmers are motivated to take measures, even without the direct financial incentive.



Benefits

The farmer receives a direct financial benefit by increasing its soil organic matter content. CO₂ certificates are easy to use for communication purposes of the buying party. Because the system is voluntarily, the required accuracy of measurements is limited.



Necessary partners

- **Farmers:** have to invest in soil carbon and join humus academy
- **Companies:** willing to invest in certificates
- **Consumers:** have to show interest in the CO₂ certificates
- **Regional government:** Facilitate the process and communication
- **Other:** A party has to create a platform where sellers and buyers of certificates meet



Cost structure

Managing the platform, taking soil samples and measuring carbon content of the samples are the costs. A CO₂ certificate costs €45, of which €15 goes to overhead and €30 to the farmer.



Revenue streams

Value is created directly by farmers by receiving money for the CO₂ certificates. The company buying certificates has to be willing to pay for another party (local farmer) sequestering carbon. The consumer using that company should be willing to appreciate that effort. This process is hard to measure.

Carbon Farmers Initiative – Carbon Farmers of Australia

www.cleanenergyregulator.gov.au

CARBON
FARMERS OF
AUSTRALIA

Context

The Emissions Reduction Fund (ERF) provides incentives for emission reduction activities across the Australian economy. The Government has committed to reduce Australia's emissions to five percent below 2000 levels by 2020. Carbon farming initiatives are an important aspect in this fund. Carbon Farmers of Australia have been pioneers in the farm-based offsets industry

Concept definition

The Carbon Farming Initiative (CFI) is a voluntary carbon offsets scheme. It is an integral component of the Emissions Reduction Fund and allows land managers to earn carbon credits by changing land use or management practices to store carbon or reduce greenhouse gas emissions.

Impact

Carbon Farmers of Australia assists farmers to realise the win/win solution of improving soil carbon which improves water holding capacity and soil structure while being paid to take carbon from the air.

Cons & Barriers

1. Complex nature of projects
2. How to control everything?
3. An ERF contract it is a binding contract to deliver what was bid at auction. If for any reason there is an under-delivery in any year, the project proponent may be liable to provide credits from somewhere else.
4. How to estimate forward abatement contract?

Solutions

1. CFA offers advice on Trading, Programs, Contracts, Suppliers, and Carbon Farming
2. The Clean Energy Regulator (CER) oversees the programme.
3. Provision of tools to calculate.

Benefits

Carbon Farmers of Australia assists farmers to realise the win/win solution of improving soil carbon which improves water holding capacity and soil structure while being paid to take carbon from the air.

Necessary partners

- **ERF Participants** submitting projects
 - **Australian government**
 - **Secondary market**
 - **Clean Energy Regulator** (CER oversees programme)
- Apply to register project; Contractual arrangement to sell ACCUs to the government when successful at ERF auction or sell to secondary market

Cost structure

Cost of audits

Revenue streams

- Once ACCUs have been transferred to the Clean Energy Regulator account, farmers are paid at the price agreed to at auction and set out in the contract.
- ACCUs can also be sold on the secondary market
- Average price per ACCU sold in auction: \$11.97

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northsearegion.eu/carbon-farming/

Partner organisations:



EUROPEAN UNION



Carbon Farming is a promising way to slow down climate change and to increase the fertility of our agricultural land. In this way, Carbon Farming contributes to regional and national climate goals.