



## Carbon Farming

The North Sea region (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 Carbon Sequestration (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 CO<sub>2</sub>, increase soil biodiversity, and provide better nutrient and water holding capacity for crops.

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 are indispensable. The results of an elaborated desk study identifying existing business models that can be used as an example and source of inspiration for future similar initiatives can be found [here](#). In what follows, we give a short summary of the four categories of business models identified, as well as an inspiring example for each of the categories.

Four categories of business models were identified, defined by the stakeholder acting as initiator. These categories are visualised in the infographic (Figure 1) and a short description of these four categories is given below, followed by an example.

### Models within the agri-food chain

Often enterprises from within the agri-food sector, such as processors of milk and vegetables, retailers, distributors, etc. are the ones taking the initiative to make their business more sustainable. To achieve this they are starting cooperatives 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.

### 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 as soil enhancement techniques. In return the company is allowed to claim the additionally sequestered carbon.

### 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.

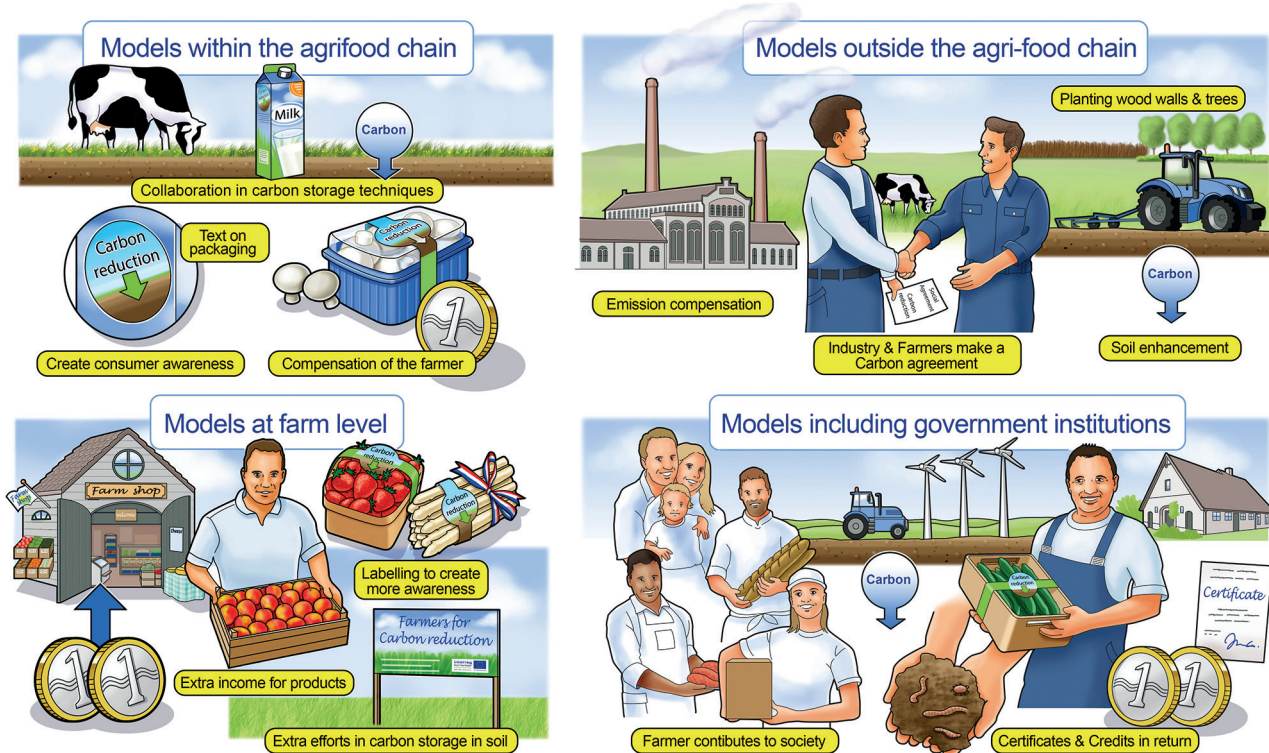
## Models including government institutions

Climate mitigation and adaptation is high on the agenda of national and regional governments. Also, a lot of municipalities, provinces, cities, etc. 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 e.g. environmental care and climate change action.

## Business models for Carbon Farming

Reduce or compensate for CO<sub>2</sub> emissions by storing carbon in the soil by applying soils management techniques at farmer's level.



**Figure 1.** Infographic visualising the four different categories of business models, as identified by the Carbon Farming project partners, aiming at reducing or compensating CO<sub>2</sub> 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.

For each of the identified categories, an inspiring example is given below.



# Climate neutral milk by 2021 Programme of AH and Royal A-Ware (The Netherlands)



## Context

In 2017 Albert Heijn started their 'climate, nature and biodiversity programme' together with their supplying dairy partners Royal A-Ware and Dairy Cooperative Deltamilk with the aim of realizing a closed and thus more transparent production chain to make dairy and cheese production more sustainable. This programme uses the logo 'Better for Cow, Nature and Farmer' in the supermarket. In the first years of the program, good results were achieved in the field of animal welfare and biodiversity. For the extra efforts, dairy farmers receive a premium in addition to the milk price. In 2020 AH and Royal A-Ware added a new challenge to this programme: to achieve climate neutral milk by 2021. Important element to achieve this climate neutral milk is carbon sequestration in the soil.



## Concept

The renewed program aims to achieve climate-neutral milk from the farm by 2021. Here, the emission of greenhouse gases on the farm is neutralized by the sequestration of CO<sub>2</sub> by the grass in the soil. Over time, the fixation in the soil will exceed the emissions on the farm. Furthermore, a number of basic principles have been included in the program, such as permanent grassland that cannot be ploughed and what is partly sown with herbs and / or clovers. Additional conditions are: maximum of 2,5 unit cows per hectare and maximum of 18.000 liters milk; concentrate should come from the EU28 and should be GMO free.



## Benefits

- Additional carbon will be sequestered.
- Farmers will be compensated for their efforts. They can get an additional price of € 0,05 per liter milk on top of the price for 'meadow milk'.



## Impact

Approximately 300 dairy farmers now supply the milk that is exclusively processed by Royal A-ware and Deltamilk into Albert Heijn products bearing the "Better for Cow, Nature and Farmer" logo. This concerns 40% of the Albert Heijn own-brand products on the dairy shelf with the 'Better for Cow, Nature and Farmer' logo, such as milk, buttermilk, yoghurt, Gouda cheese and Zaanlander cheese.



## Parties involved

- Dairy farmers, supplying milk to Royal A-Ware and Dairy Cooperative Deltamilk
- Royal A-Ware
- Deltamilk
- Albert Heijn



## Other interesting information

Website: <https://www.royal-aware.com/nl/over-royal-a-ware/nieuws/albert-heijn-streeft-naar-klimaatneutrale-melk-van-de-boerderij-in-2021/164>



Model outside the agrifood chain:

# Soil & More Impacts (SMI) (Germany)



## Context

The price you pay for food in the store doesn't cover the hidden costs of producing them e.g. caused by ground water pollution and climate change. Instead, these are paid for by society — through the ever-increasing costs of health care and health insurance. It's not only about the production of food but the entire chain from field to fork which has to be taken into consideration.



## Concept

Biomessen organizes local organic trade shows. In order to offset their event's emissions they started a cooperation with local farmers via improved farming practice. They worked with 7 farmers accounting for a total of 1849 hectares. SMI assessed the carbon sequestration potential through management interviews with farmers and soil samples. During a period of 5 years, 75% of the sequestered potential on their farms is sold by the farmers to Biomessen as carbon credits, with 25% kept as "security" until re-sampling. This income allows the farmers to improve their practices and realise their carbon sequestration potential.



## Benefits

Biomessen asked SMI to help compensate the carbon emissions produced by their events. Instead of buying carbon credits from somewhere else to offset emissions, SMI supported them to 'inset' their emissions within their own supply chain, compensating for emissions whilst improving the farming and climate resilience of the related producers.

The fact of having those regional partnerships saves cost for certification and verification, as the approach is very transparent and the local farms can be visited at any time.



## Impact

The original assessment allocated between 0.2 and 5.1 tonnes of carbon sequestration potential per farm per hectare per year. Resampling in 2019 reconfirmed the majority of the original assessments.

Through this "insetting" process the farmers are rewarded for their environmental protection services. Soil productivity and resilience is enhanced and the client has a transparent and traceable story which makes additional certification possible, but not always necessary.



## Parties involved

- The farmer has to dedicate her/himself to put the additional improvement measures into practice, and to maintain them for min. 5-10 years.
- a company or person has to buy the carbon credits
- an experienced consulting company like SMI has to do the C modelling and central administration of carbon credits; Soil samples can be taken by trained field personnel
- a soil lab has to do the analysis for soil grain fractions, pH and Soil organic carbon



## Other interesting information

Revenues depend very much on the project. The costs are also depending on the client's requirements relating to determination of baseline and monitoring over time.

[https://www.thuenen.de/media/institute/ol/Aktuelles\\_Veranstaltungen/Dokumente/CarbonFarming-Vortrag\\_8\\_\\_Inka\\_Sachse\\_SoilandMore.pdf](https://www.thuenen.de/media/institute/ol/Aktuelles_Veranstaltungen/Dokumente/CarbonFarming-Vortrag_8__Inka_Sachse_SoilandMore.pdf) +  
<http://www.soilandmore.com> +  
<https://coolfarmtool.org/coolfarmtool/>



## Model at farm level:

# Virgernes andelsgård (Norway)



## Context

Virgernes is a relatively small family driven farm in Norway with less than 30 hectares of land. Most of the land is placed in a flood risk area and loss of soil (and crops) due to water erosion has had a great impact and makes it even more difficult to live of such a small farm. The farmer has changed his strategy regarding soil management to protect his soil from water erosion, enhance soil structure and fertility, enrich biodiversity and to sequester carbon. He has found new sales channels to increase the farms income to be able to live of the farm production.



## Concept

The farmer uses carbon sequestration (CS) techniques such as adaptive multi paddock grazing (cows, hens and pigs) in the flood risk area, crop rotation, no-tillage market garden with compost and cover crops. To achieve a higher price for the products, he distributes vegetables, meat and eggs directly through Community-Supported Agriculture (CSA-model) and REKO-ringen (network for direct sale). The CSA-consumer pays in advance and shares the risk with the farmer. The farmer involves the shareholders in the production and harvesting and informs the consumers on CS-techniques.



## Benefits

Additional carbon is being sequestered and the loss of soil through water erosion is minimized. The soil structure, biodiversity and total production is enforced. The grazing system enables a larger and more diverse life stock and a higher quality of the products. The quality and freshness of the vegetables is better than in the supermarket since the consumers harvest themselves or purchase them directly. The CSA-customers work voluntarily in the market garden and harvest their own share.



## Impact

The farmer is actively spreading his knowledge about CS through his big network and on social media. The income of the farm has increased and has become more predictable. The farmer can now live of the farm and even employ others. The farm has a higher total production due to improved techniques and higher soil fertility. Soil samples has been taken and the carbon stock and soil health will be monitored further.



## Parties involved

- The REKO-ringen customers order directly online and the farmer brings the products fresh from the farm. Direct sales give a higher price.
- CSA shareholders pay annually in advance, participate in the field work, harvest their own share, and have a close relation with the farmer.
- NLRØ advises the farmer.
- Berit Nordstrand: doctor, author and blogger visits the farm and spreads his story.
- Nordic Savory Hub monitors the ecosystem and biodiversity in the grassland.



## Other interesting information

The end consumer is already paying a higher price for certified organic food. The CS-techniques alone give an additional income of approximately 25% in total due to enriched soil fertility and higher total production. The goal for the farmer is to get the same price for selling his products as to the supermarkets. With direct sales he gets a better price. The consumer is also willing to pay for the insight and understanding of the food production and "to be a part of the solution".

This business model requires more manual work and is still dependent of volunteer labour but has the potential for increased income.

The direct sales and interaction with the consumers requires good organisation and communicational skills.

<http://www.virgenes.no>

<https://www.facebook.com/Virgenesgard>





## Context

The objective of the label 'Bas Carbone' is to contribute to the fight against global warming in France. The label was created by the Ministry of Ecological and Solidarity Transition, in collaboration with different partners.

The initiative wants to support the set-up of voluntary projects in the field of reduction of greenhouse gas emissions and carbon sequestration that go beyond the current regulation and common practice.

The label wants to answer the demand on voluntary, local compensation of greenhouse gas emissions. Communities, companies, and even citizens, are ready to remunerate actions beneficial for the climate on a voluntary basis, for example to offset their residual emissions. To get involved, these potential funders want the quality and environmental integrity of projects to be labelled. 'Label bas carbone' offers them these guarantees and thus makes it possible to direct funding towards virtuous projects for the climate and the environment.



## Concept

Projects promoting carbon sequestration by agriculture are emerging in recent times. 'Label bas carbone' helps companies and communities to buy carbon credits from farmers. In order to be able to remunerate the tonnes of CO<sub>2</sub> equivalent avoided or sequestered, quantification in a reliable and transparent manner is required. This is the primary role of the label, since it is a framework for monitoring, reporting and verifying greenhouse gas emission reductions, achieved voluntarily by natural or legal persons in various business sectors.

The label's second role is to ensure the traceability of funding, via its register, to ensure that the same tonne of CO<sub>2</sub> avoided or sequestered is not funded, used or sold more than once.



## Benefits

The label sets up an innovative and transparent framework offering prospects for financing local projects to reduce greenhouse gas emissions or sequester carbon. It thus makes it possible to support the ecological transition at the territorial level, by rewarding virtuous behaviour going beyond usual practices.

The project 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.



## Impact

Impact can be measured by the number of projects and their potential reduction of tonnes. Currently, there is one project labelled within the field of agriculture, but a lot of initiatives are under development. The current project has enabled 391 breeders to engage in improving their practices to reduce their greenhouse gas emissions and increase carbon storage. The reduction potential is 71,000 tonnes of CO<sub>2</sub>.



## Parties involved

- The Ministry of Ecological and Solidarity Transition
- Independent auditors, working on behalf of the authority
- Financing parties: Communities, companies, and even citizens
- Project leaders or agents submitting projects, individual or collective
  1. Project leaders or agents asking for labelling their project
  2. decision on validation by authority
  3. Implementation of project + finding financing parties (responsibility of project leader/website can support alignment of supply and demand)
  4. verification of project by independent auditor
  5. emission reductions entered in register



## Other interesting information

The price per tonne of carbon for labelled projects is the result of an contract between the project promoter and the financier. For the first agricultural and forestry projects, the price of the carbon credit is around 30 to 40 € / ton.

Project leaders assess the costs relating to the implementation of the project as well as the expected emission reduction volume in order to determine a minimum price acceptable. It depends on: volumes of emission reductions sought by the financier, cost of works or investments and self-financing capacity of the project leader, size of the project, co-benefits present, etc.

The method is based on the use of the CAP'2ER® calculation tool to quantify the carbon sequestered at the scale of the farm.

[https://www.i4ce.org/wp-core/wp-content/uploads/2020/06/Guide-pédagogique\\_LBC-Mai-2020.pdf](https://www.i4ce.org/wp-core/wp-content/uploads/2020/06/Guide-pédagogique_LBC-Mai-2020.pdf)