HUMUS+ Modell Ökoregion Kaindorf

Result-based contract solution - farmers follow recommended measures to build up humus (=soil organic matter) in soil, sequester CO_2 and receive a fee per ton of stored CO_2. Companies finance humus build-up and soil carbon storage by buying CO_2 certificates.

Summary

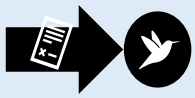
The HUMUS+program is a contract solution developed for voluntary trading of CO_2 certificates: Based on an initial soil sampling at the start of the contract (by a certified civil engineer and accredited national laboratory), farmers set own measures to increase the humus content in their soils. After a period of five to seven years (according to the farmers needs), humus content is determined again by a second soil sampling. An increase in humus content is converted into additional tons of CO_2 stored in soil. Farmers receive a success fee of 30€ per additional ton of CO_2 stored, which is financed by companies who voluntarily compensate their unavoidable CO_2 emissions. The amount of CO_2 purchased by the companies cannot be traded. After the payment, farmers must guarantee that the increased humus content remains in place for at least five years. This requirement is verified by a third soil sampling taken five years after the payment. Decreases in humus levels lead to partial or complete refunding of the success fee. Everything from contracts and the carbon verification to the emission trading is organized and managed by an Ltd belonging to the association HUMUS+. The association itself is responsible for an education program set up to educate and advice HUMUS+farmers on the measures set by them.

Objectives

- Main objective: humus (soil organic matter) accumulation and soil carbon sequestration
- Higher soil fertility – soil organic matter supports life in the soil, which is the basis for vital crops and reduces the need for mineral fertilizers and pesticides
- More reliable harvests through resilient crops – living soil supports resistant plants in the face of global climate change
- Keeping the soil in place – humus-rich soils rich are more resistant against erosion by heavy rainfalls, flooding or wind
- Humus-rich soils store lots of water, which helps to maintain stable yields during droughts
- Keeping the groundwater clean – soils rich in humus can fix more nitrate and prevent groundwater pollution
- Climate change mitigation through CO_2 fixation – soil organic matter contains about 60% carbon, hence building up soil humus removes CO_2 from the atmosphere and helps to mitigate global overheating

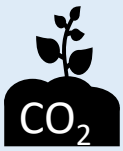
(A) HUMUS+farmers receive their success fees in a public ceremony.
(B) On-site know-how transfer during a field day. (C) Year-round education for HUMUS+farmers through the "HUMUS+Academy" workshops.

RESULT-BASED



The payment depends on a defined result (stored CO_2 as humus per hectare, measured)

PUBLIC GOODS

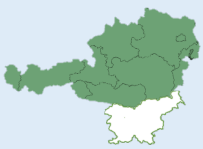


Climate regulation-carbon storage

Soil quality (and health)

LOCATION

AUSTRIA (Slovenia)



Participation in the contract solution is open to all farmers across Austria and Slovenia

CONTRACT

The result-based contract is concluded between individual farmers and the association HUMUS+ (The sales contract for emission trading is concluded between companies or private persons and an own Ltd. belonging to HUMUS+).

Contract conclusion:
Written agreement

Payment mechanism:
non-tradable emission certificates

Funding/Payments:

- The HUMUS+farmer receives a success fee of currently **30 € per ton of CO_2** sequestered in humus (i.e. two thirds of the certificate price, for legal reasons the absolute price per ton is not guaranteed).
- Companies pay **45 € per ton of CO_2**. The difference of 15 € (before taxes) remains with the Ltd. for administration of the contract solution.
- As of 2022, the association paid **500.000 €** to participating farmers.

Data and Facts - Contract

HUMUS+
Modell Ökoregion Kaindorf

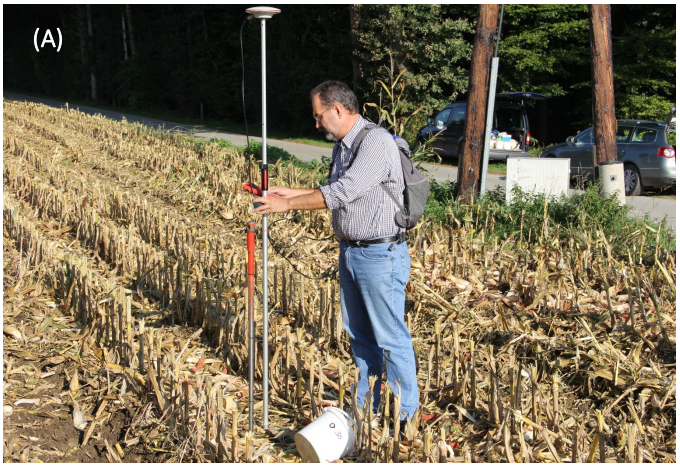
Participation:

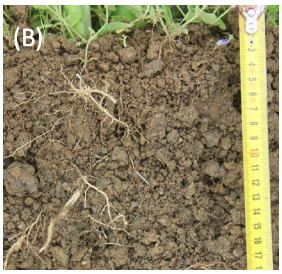
- Number of farms: approx. 380 farmers (June 2022)
- Area of implementation: 5.100 ha (June 2022)

Involved parties:

- **HUMUS+:** The non-profit association is coordinator of the humus built up program. It was a project amongst others implemented by the association Ökoregion Kaindorf and became its own association in 2021 due to its growth and success.
- Certificate trading: is handled by a Ltd. owned by the association. The Ltd. organizes the HUMUS+certificate trading and everything connected to it. All other aspects of the HUMUS+program (education program, consulting services) are handled via the association.
- Farmers**:** The program started in 2007 with three farmers. As of 2022, 380 farmers are participating. Farmers participation is now the restraining factor, as demand is higher than provision and certificates are currently sold out.
- Companies and private persons**:** HUMUS+certificates are bought by companies and private persons who aim to compensate their unavoidable CO_2 emissions.

Management requirements for farmers: HUMUS+ provides practical principles for humus accumulation in soil and suggests best-practices including use of cover crops, no-till practices, intercropping and compost application. However, there are no obligatory requirements such as mandatory management measures. Farmers are free in their choice of how to increase humus content on their fields.





(A) GPS-located soil sampling. (B) Crumbly soil structure after 3 years of humus build-up. (C) Traceable CO_2 storage is visualized via online field maps.

Controls/monitoring: The participating farmer commits himself only to pay for the first soil sampling. He/she can leave the program at any time up until a success fee has been payed after the second sampling. Then, the third sampling becomes mandatory. Each field registered for the Program is thus subject to a minimum of one soil sampling, which is carried out by a certified civil engineer. Soil samples are analysed for soil organic carbon, total nitrogen, pH_{CaCl2}, CAL-extractable phosphorus and potassium by the Department for Soil Health and Plant Nutrition, Austrian Agency for Health and Food Safety (AGES). In addition, samples may be analysed according to the method of Albrecht/Kinsey for exchangeable cations, total sulphur, available and total phosphorus as well as a range of trace elements (not mandatory). The first soil sampling determines baseline humus levels (25 GPS-located samples per field, mixed and analysed as a compound sample). A second sampling (success sampling) is conducted in the same manner five to seven years later to quantify changes in humus content. From the increase in humus, the total amount of CO_2 sequestered is calculated. The farmer can then claim a success fee of 30 € per ton of CO_2 sequestered (i.e. two thirds of the certificate price, for legal reasons the absolute price per ton is not guaranteed). After receiving the fee, the HUMUS+farmer has to guarantee the level of build-up humus for five years. This is controlled by a third sampling (control sampling). In case an increase in humus above levels from the success sampling is measured, farmers can claim further success fees and the program is prolonged for another five years. Decreases in humus content can lead to partial or complete refunding of the success fee. Farmers pay for all soil samples.

CONTRACT

Length of contract: Initially five to seven years; depending on the farmer's decision. If humus-build up is measured at the second sampling, the contract runs for additional five years when a third soil sampling takes place. Total length: ten to twelve years.

Length of participation in contract solution: In general, participation is open end. If there is a further increase in humus measured at the third sampling, the farmer can voluntarily renew/extend the contract and apply for a further success fee for the additional increase of humus content.

Start of the program: The HUMUS+program started in 2007.
End of the program: The program is still running.

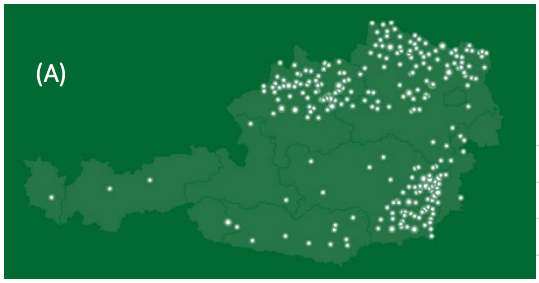
Renewal / termination:

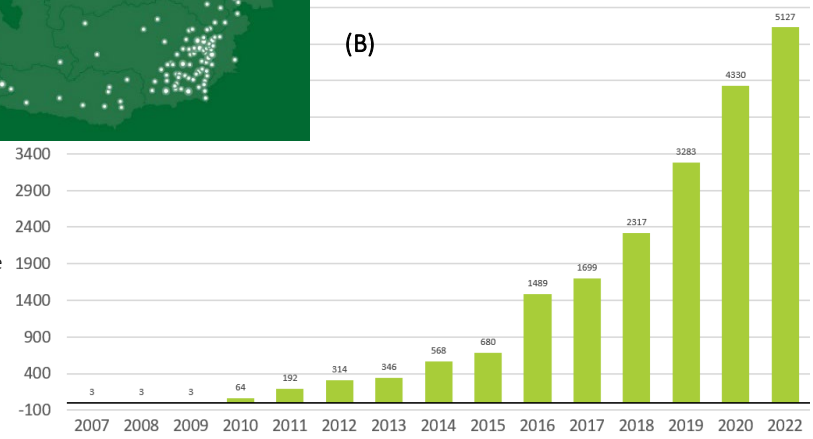
- **Renewal of the contract:** The option of renewal is regulated in the contract solution; the contract can be renewed easily.
- **Termination:** Termination is always possible, except in case a success fee has been payed after the second sampling. Then, the third sampling becomes mandatory.
- **Conditions of participation:** Farmers may take part with one or more fields, each between 1 and 5 ha in size. The farmers have to pay the initial soil sampling. Other than that, the farmers do not agree to any liabilities.
- **Risk/uncertainties of participants:** The main risk for farmers is not building up humus and therefore not receiving the success fee, even if there might have been investments and changes in management style. Another risk might arise from reduced demand in CO_2 certificates. However, this does not seem likely as demand has by far exceeded supply for years. In any case, the farmer is guaranteed two thirds of the certificate price as a success fee.
- **Links to other contractual relationships:** There is no direct link with other contractual solutions, and farmers are free to participate in other agro-ecological programs (e.g. CAP, ÖPUL, AMA, …). The farmers are bound to the HUMUS+Program though, meaning they cannot take part in a similar, privately organized program of humus build-up and emission certificate trading.

Context features

Landscape and climate: The HUMUS+program is not restricted to a special region in Austria, all farmers throughout Austria can participate. Through recent collaboration there are now also HUMUS+farmers in Slovenia and efforts are being made to expand the program further across Europe.

Farm structure: In general, the HUMUS+program is free for any agricultural management (except forestry), however up to now most of the farmers are arable farmers. There is no specific business type taking part regarding intensity, size, age of farmers, etc.





(A) Map of participating HUMUS+farmers all over Austria. (B) The total area enrolled in the HUMUS+program has risen to over 5100 ha up to mid of 2022

Problem description

The coordinator of the contract solution is the association HUMUS+ which is located in the Ökoregion Kaindorf. The whole region has set itself the goal of significantly reducing its CO_2 emissions to achieve net CO_2 neutrality. The change in agriculture towards monocultures, increased use of pesticides and intensive tillage in the last decades has led to a major loss of humus and thereby to the release of CO_2 into the atmosphere. There is a strong need for action to prevent the progression of climate change and to better prepare our soils for future climate effects.

Universität für Bodenkultur Wien
University of Natural Resources and
Life Sciences, Vienna

CONSOLE

SUCCESS OR FAILURE?

The HUMUS+program represents a successful contract solution. The number of participants clearly increased since its initiation in 2007 and is still increasing. On the demand side, the demand for certificates currently exceeds the provision by the farmers. Except for the payment for the initial sampling, there are no obligations for the famer in the program. Via the HUMUS+program, farmers moreover get access to educational events and network meetings to exchange with other farmers on the subject of sustainable soil management. There is huge potential for climate-regulation via soil carbon storage. Results so far show that humus accumulation and carbon sequestration removes CO_2 from the atmosphere in relevant quantities (on average 6 tons CO_2 per hectare and year). Through the result-based character of the payment, only the measured environmental success (CO_2 stored as humus) is paid.

Reasons for success:

- Farmers are free in their management decisions, the program only provides best-practice suggestions
- No liabilities for the farmer, except payment for the initial soil sampling
- Program is accompanied by educational measures and helps to connect farmers into a humus community
- Payment for the farmers comes from the private sector. Demand for certificates has greatly exceeded provision by the farmers for the last years.
- In addition to CO_2 sequestration, humus formation has further benefits for the farmer (soil fertility, etc.)

SWOT analysis

Main Strengths

1. The contract solution is easy to understand.
2. Possibility of an additional income for farmers
3. Implicit social component (awards, networking, training, image..)
4. No prescribed and obligatory management measures; Farmers can freely and flexibly decide on management measures to achieve the Program goals (i.e. increase humus content)

Main Weaknesses

1. Full flexibility in the management measures can lead to wrong decisions (e.g. application of organic and synthetic fertilizers not based on plant and soil demand procure high N losses)
2. Farmers risk to not achieve changes in humus contents even if management changes and/or investments have been carried out
3. Considerable costs for setting up the program;

   Need to bridge the gap between project start and the first sales of emission certificates
4. Up to now implemented on only a small area; high potential of growth.

Main Opportunities

1. Raising climate awareness of society
2. Result-oriented approaches in the new CAP
3. Humus accumulation as an adaptation to climate change
4. Increasing demand for emission certificates e.g. from the private sector

Main Threats

1. Slow process of humus accumulation, binding period in contracts for farmers quite long.
2. Climate change might affect rates of humus accumulation
3. Companies might lose interest in certificates
4. Unharmonized carbon prices can lead to a poor competitiveness against other emission traders
5. Risk of trade offs and discussions, if measures for humus accumulation result in effects on other public goods, (e.g. quality of groundwater, biodiversity, etc.)

Horizon 2020
European Union Funding
for Research & Innovation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 817949. The results presented reflect only the authors' view, the Agency is not responsible for any use that may be made of the information it contains.

Main external factors influencing success

Political/governance, economic/market, social, technological, legal and environmental factors can all have a strong impact on the success of contract solutions. In this case study an in-depth analysis found that the following, selected factors were of specific importance.

Online field maps as a supporting tool:

CO_2 storage is visualized via online field maps. The documentation of the plots is supported by a specifically developed database.

The database contains information about

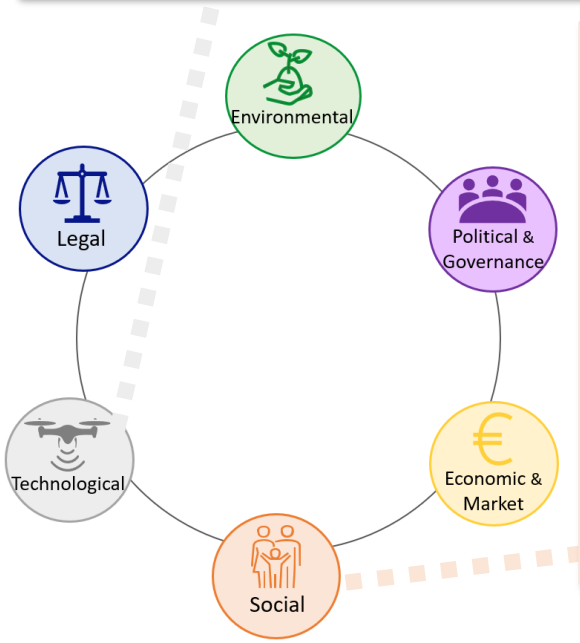
- the farm,
- the humus plots,
- soil samples and certificates.

It enables georeferencing of the humus plots.

GPS-supported soil sampling:

Soil sampling is GPS-supported which ensures that initial soil samples and soil samples for the measuring of results are located in the same spot.

online field maps



Implicit social components are included in the case study:

(1) HUMUS+farmers receive their **success fees** (via a cheque) in a **public ceremony**. A picture of the farmers is published in local newspapers, which increases social recognition.

(2) The program helps to network farmers into a humus community by hosting a **regular meeting** "HUMUS+Stammtisch", where farmers exchange their knowledge and experiences with humus accumulation.

(3) The program fits the recent social discussion on climate change, e.g. driven by initiatives such as Fridays for Futures. Entering the program is perceived as being "part of the solution" for both farmers and buyers.

Developments in the HUMUS+Program since 2020:

- Due to growing interest of farmers as well as companies, HUMUS+ became its own association in 2021. The new program manager now is Mag. Jochen Buchmaier who has a strong background in permaculture and regenerative measures such as agroforestry and key-line design.
- A collaboration with Slovenia was successfully built and around 30 local HUMUS+farmers are already working according to the suggestions of HUMUS+ to successfully build up humus and regenerate soils in Slovenia. A lot of interest is also coming from other countries in Europe to collaborate and extend the HUMUS+program.
- The area included in the program rose to more than 5000 ha of land that is now managed sustainably aiming to regenerate the soil, build up humus and store CO_2 in the ground.
- A new advisory program was developed to supply HUMUS+farmers with in-depth-knowledge over the course of a whole year.
- Due to the growing number of similar programs, it is becoming necessary to define quality standards and improve cooperation between stakeholders. HUMUS+ is therefore initiating a Consortium for regenerative agriculture and carbon farming.

Additional page added June 2022