



### Climate-smart food production

The Qvidja organic farm is a pilot farm that follows the innovative principle, taking into account both nutrient recycling and carbon sequestration. The aim of the farm is to mitigate climate change and to increase biodiversity. In addition, emissions to Baltic Sea are minimized.

Cows, horses and sheep graze on the farm. Carbon sequestration and biological cultivation is the aim in the fields. All the fields (180 hectares) are on grassland, which aims to improve the structure of the land. The farm is gradually switching into a crop rotation with the emphasis on native species and nitrogen-binding plants.

In addition to food production, the farm has a biogas plant and a wood gasification plant, from where the gas is utilized in electricity and heat production. The farm also utilizes solar power.

Grass and manure from the farm are used as a feed for the biogas plant. The produced biogas is upgraded, after which biomethane can be used as a vehicle fuel or on heat and electricity production.

Biogas contains always around 40% of carbon dioxide. Instead of releasing it to the atmosphere, in Qvidja the carbon dioxide is fed to QPower's biological methanation pilot plant, which utilizes microbes to produce methane from carbon dioxide and hydrogen. Hydrogen for the pilot plant is obtained from electrolysis and from the wood gasification unit. Plant's efficiency is 82%, and at its best, the methane production can be doubled.

Digestate from biogas plant is used as fertilizer on the farm. By improving the soil structure and using recycled fertilizers according to plant needs, nutrient leaching is minimized and carbon sequestration in the fields is increased. All work is done for the climate and the Baltic Sea, biodiversity being the foundation for all actions.



Figures: Saija Rasi

#### KEY WORDS

Biomethane, carbon neutral agriculture

#### COUNTRY

Finland

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## ADDITIONAL INFORMATION

The key principle of Qvidja farm is to control climate change, and to protect Baltic Sea and biodiversity, and this is reflected in all practices and techniques used at the farm. One example of these practical control methods is plant-based carbon sequestration. The effectivity of carbon sequestration in farms is affected by the assortment of carbon-storing plants present in the farm. For example, both deep-rooted grasses and leguminous plants are excellent at absorbing and storing carbon. In addition to the assortment of plants, the method of harvesting has also an impact on the amount of stored carbon.

For instance, leaving grasses taller after cutting allows the plants to keep photosynthesizing and their roots recover more quickly from cutting. In the fields of Qvidja, the height of the grass has been left to 15 cm instead of the previous 10 cm, which has been documented to affect the duration of greenhouse gas emission release after the cutting. The carbon sequestration of grass is based on grass with number of growth cycles (perennial grass), continuous vegetation cover and on photosynthesis resulting in deeper and wider root system. The carbon bind by the roots is consumed by microbes present in the soil. The carbon bound by the dead microbes improves the humus content of the soil, which is directly reflected in growth conditions and the security of crop supply. In addition, it improves the tolerance of the arable land against the extreme weather conditions caused by climate change.

Grazing is also an effective method to improve the effectiveness of carbon sequestration of grass and plants. In Qvidja, cows, sheep and horses graze utilizing a hastened pasture cycle, where a large herd graze in a single grazing area only for a short time and then move all at once to another grazing area. This cycling allows the plants to regrow while also keeping the farm animals fed until the cycle is repeated. Agroforestry, a farming method where trees and bushes are cultivated alongside crops, is also an effective method of carbon sequestration. The broader biodiversity of plants in these farmlands also improves the balance of microbes and fungi that are beneficial for carbon sequestration. Over 700 ha of forest grow at the Qvidja farm, utilizing the continuous forest management method, where the trees are allowed to regenerate naturally. These agroforests contain different trees of different size and age and thus retain their biodiverse ecosystem better than typical cultivated forests. Wood obtained from thinning is used locally on the farm in the wood gasification process to produce heat and electricity.

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### ABOUT BRANCHES

**BRANCHES** is a H2020 “Coordination Support Action” project, that brings together 12 partners from 5 different countries. The overall objective of **BRANCHES** is to foster knowledge transfer and innovation in rural areas (agriculture and forestry), enhancing the viability and competitiveness of biomass supply chains and promoting innovative technologies, rural bioeconomy solutions and sustainable agricultural and forest management.



This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No. 101000375

### THE PARTNERSHIP

