

SeAMK 

SEINÄJOEN AMMATTIKORKEAKOULU  
SEINÄJOKI UNIVERSITY OF APPLIED SCIENCES

# Carbon Neutrality

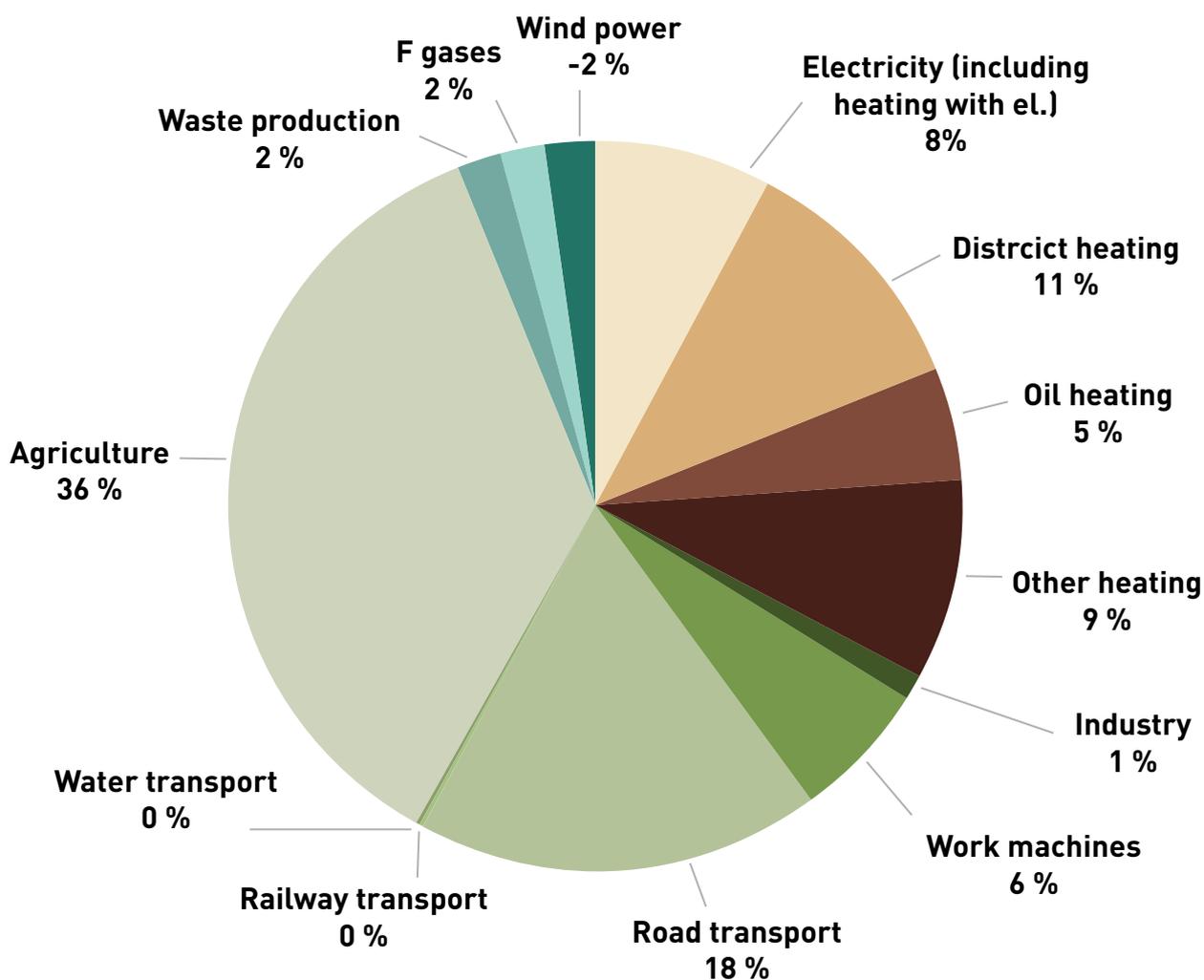


# Situation Analysis in South Ostrobothnia, Finland

Finnish carbon neutrality targets in food production system is highlighted especially in South Ostrobothnia. South Ostrobothnia is known as a food province with significant amount of food industry and agriculture. However, this is indicated also by relative high food production related carbon food print. It is estimated that ca. 36 % of the carbon emissions of the region is originated from agriculture (according to Finnish Environmental Institute in 2018). Consequently, South Ostrobothnia is developing climate resilient food production, emission reduction, and climate adaptation together with companies, universities and research organisations. SeAMK is supporting carbon neutral food production eg. by improving resource efficiency, enhancing renewable energy production in rural companies and by reducing soil originated greenhouse gas emissions.



Emission sources in South Ostrobothnia in 2018  
(kilotonnes of CO2 eq)



# Competence of SeAMK

## SeAMK & RDI

Seinäjoki University of Applied Sciences (SeAMK) is a multidisciplinary institution of higher education and an efficient actor in education and research, development and innovation (RDI) in the region of South Ostrobothnia in West Finland

The RDI (research, development and innovation) activities of SeAMK are focused on multidisciplinary core expertise areas, which are congruent with the strategic focal areas of the University Consortium of South Ostrobothnia. The aim of the RDI activities is to support business operations requiring high-level expertise. The volume of annual outside research financing is about 5 million euros. Every year, more than 90 people contribute to the RDI activities of SeAMK. The learning process and the research, development and innovation (RDI) process are the core processes. They are backed by the process of strategic management and leadership and by the support process. Internationality is integrated into all of these processes.

## The School of Food & Agriculture

The School of Food and Agriculture is one of the four faculties that offers Bachelor's degree Programmes (Agriculture and Rural Enterprises, Food and Hospitality, Food Processing and Biotechnology) and Master's degree programme (Food Chain Development). SeAMK Food and Agriculture considers that circular economy skills shall be a part of education of food professionals. Curriculums deal with the sustainable food systems, especially how to minimize carbon footprint in food chain.

SeAMK Food Experts' RDI Group consists of 40 food researchers, of whom eight are PhDs and three Docents at the University of Helsinki. In addition to strong applied research, the group influences the development of the food chain by training entrepreneurs and experts, and by participating in regional, national and international work in the food sciences. SeAMK is especially interested in cooperation with international partners. We are interested in developing our food chain through international partnerships. Projects concerning sustainable food chain and improving climate resilience are warmly welcome!

## Carbon Neutrality in SeAMK Food

Carbon farming i.e. farming practices which increase the sequestering of atmospheric carbon to the soil and fields, is a cross-sectional topic in all our education of agronomic education. In addition, the understanding of agriculture's role in carbon sequestration and the carbon footprint of food production and processing is taught to all students in The School of Food and Agriculture. RDI-projects of this topic are also carried out increasingly. Especially we have a project with pilot farms which apply carbon sequestering actions on their farms.

Our special competence in this area is to create and provide education in open space -format (campus online) for all, interested in topic. South-Ostrobothnia is an area with intensive milk and meat production and considerable share of the cultivated fields are on peatlands. In addition, the region plays an important role for local and national food security. Therefore our connections to local farms create an excellent platform for pilots of innovative on-farm actions with data collection and analyses (e.g. biomass, carbon flux). In addition, we introduce and develop management techniques for carbon farming on fields (including peatlands) and animal production as well as renewable energy production (biogas, sun power) as a part of low-carbon agricultural management.

## Development Projects and Activities

### Climate warriors (on-going)

The goals of the climate warrior's project are to find out solutions on the farm level for intensification of the carbon sequestration, the efficient use and recycling of nutrients and managing the risks caused by climate change. The project also wants to improve the whole brand of the agriculture and demonstrate it in a positive way based on the facts how agriculture could absorb the carbon to the soil and that way give solutions for the mitigation of the climate change.

The results of the project will be to form a network of pilot farms whose experience and cultivation techniques of carbon farming will be utilized. Along with the project the knowledge about carbon farming possibilities and benefits will increase among different production sectors of farmers. The results of the project are actively communicated through social and traditional media. The project also organizes field days during the growing season, where the results of the carbon farming are introduced. Videos and photos from pilot farms are made available to everyone on the project's website.

## Regional just transition fund (JTF) plan for South Ostrobothnia

There has been a debate going on this year on peat production and climate change. Energy peat is considered to be a fuel with a high emission factor. The aim is to reduce the use of energy peat in order to mitigate climate change in national level. Southern Ostrobothnia is one of the world's most important energy peat production areas. Peat production is one good example of the affected sectors. For this reason Just Transition Fund (JTF), has been set up as part of the EU's Green Deal to support the sectors most affected by emissions reductions. The Regional Council of South Ostrobothnia has started to prepare a regional JTF plan in September 2020. The Council has signed a co-operation agreement with Seinäjoki University of Applied Sciences (SeAMK) to prepare the plan. SeAMK currently has both expertise in the field and project activities that support the work.

## Hybrid decentralized energy production solutions in rural Southern Ostrobothnia (HYBE) (on-going)

Climate change and decrease of rural population will pose challenges for the future supply of energy to rural companies. Climate change is increasing extreme weather events, causing disruption, especially for rural energy supply. On the other hand, maintaining energy networks can be expensive in a sparsely populated area as people are moving to cities. This project will provide more information on hybrid solutions for decentralized renewable energy production for rural businesses. Initially, the project will draw up a road map for energy production and risk measures in the rural areas of Southern Ostrobothnia. Subsequently, information on the potential of different hybrid systems will be deepened and finally the information generated will be implemented in the project area.

## Agrotechnology for effective use

The aim of the project was to enhance the competitiveness and environmental protection of the local farms by increasing the skills of the farmers to use the new agrotechnology. In addition, the aim was to encourage them to invest for the machines which ease and boost their work and improve the farm economy. The project period was 2017-2019.

## DigiFarm – farms towards digi time (on-going)

The aim of the project is to increase the knowledge of the local farmers about new agricultural technology and improve their readiness to use new technology. As a result, the farmers who have participated the happenings of the project, will understand steering technology, digital features and the possibilities connected to data use related to use of machines. They are also ready to spread the information to other farmers.

## Fresh forest-chips for farm-level heat production -EIP project (on-going)

EIP project is a European Innovation Partnership project. The project is aiming at developing and piloting farm-level heating plants (400-500kW) to use fresh forest-chips. EIP group collect field information for the topic and organize workshops and excursions. The boiler manufacturer constructs a new heating plant system for the use of fresh forest-chips at farm level. Also the reduction of CO<sub>2</sub>-emissions of farm-level heating plants will be detected. The dissemination of the results is mainly via EIP-AGRI. The final results and experiences are available at the end of the project in 2021.

## Carbon footprint calculator for poultry farms

The project aims to develop a carbon footprint calculator for poultry farms. In particular, the project aims to raise awareness of farms' own carbon footprints. The aim of the project is to produce a generally accepted, functional and easy-to-use calculator to evaluate farm-specific carbon footprint of poultry production. This allows farms to review and reduce their own carbon footprint in the long run so that the economic profitability of operations is not negatively affected.

## TURNEE: Forest in peatlands -solutions to control emissions and increase carbon sinks

The goal of Finland is to be a carbon-neutral country by the year 2035. However, about 1/3 of the land area of Finland consists of peatlands, mainly drained peatlands, with high soil emissions. That is why the role of the Finnish peatlands is great in mitigation of climate change. The project is especially important in South Ostrobothnia as there is intensive land cover by peatlands. By measuring and modelling, the project is aiming at producing climate-wise land-use alternatives especially on tree-covered peatlands. The role of the after-use of peat extraction areas is important in this project. The project schedule is 2021-2023.

## Wasteless- Reducing food waste in public kitchens

The aim of the Wasteless project is to reduce food waste in public kitchens by developing concrete tools for avoiding food loss in South Ostrobothnia. For example, an optimization of food cycle and the creation of operating models that provide the ability to observe and manage food loss for people working in the food services. The project also creates new recipes and tests electronic ordering systems. Furthermore, understanding the economic impacts of food loss can be seen as a broader result of the project.

## Key Experts

**Kari Laasasenaho, PhD** (Environmental Technology) is working as a RDI expert at School of Food and Agriculture. Laasasenaho's special skills are bio- and circular economy, renewable energy, environmental technology, and sustainable development in the food chain. He has over 5 years of experience in research and development projects. He also has biology and earth science teacher qualification and practical experience on organic farming. He has several professional and scientific publications in the field.

**Jori Lahti, MSc agr.** (Agrotechnology) is working as a lecturer for agrotechnology at School of Food and Agriculture. In addition, he has experience in project management and sales. His main focus is related to precision farming, Measurement technology Environmental technology, Energy and agriculture as well as Agricultural robotics. He is interested in farming, agricultural technology and the business activities revolving around them.

**Risto Lauhanen, D.Sc.** (Agriculture and Forestry) is working as a RDI senior expert at School of Food and Agriculture. His special skills are multiple-use of forestry, wood-based energy, wise-use of peatlands and sustainable development in the food chain as well as circular economy. Lauhanen has over 30 years' experience in research and about 20 years' experience in education. Lauhanen has over 300 different publications in the field. Lauhanen is also an adjunct professor at the University of Helsinki.

**Arja Nykänen, PhD agr.** (Soil Science and Environment) is working as a lecturer for soil science and plant production at School of Food and Agriculture. She has 27 years of experience widely in agricultural sector, mainly as a researcher and RDI-project manager, but also in advisory sector, administration and business. Her main focus has been in organic food and farming and nutrient management. Publications in agricultural science: 12 peer-reviewed articles, 51 articles in international journals, 76 articles in domestic journals and 74 other publications.

**Juha Tiainen, MSc for.** (Forest Technology) is working as a lecturer for agrotechnology (mainly in plant production), forestry, farm energy management and bioenergy at School of Food and Agriculture. In addition to 30 plus years of working professionally in Finland, he has experience in working abroad in developing projects (Zambia and Namibia) and special guest lecturing (USA- California). His main focus and personal development area is related to utilizing drones in agriculture and forestry. He has as a main hobby radio-controlled UAV. He is a private forest owner.

**Iida Viholainen, MSc.** (Agroecology) is working as a RDI expert at School of Food and Agriculture. She works as an expert in climate resilient food chain. Her special skills are agroecology, climate smart agriculture, agroforestry and carbon footprint calculators. She has experience in working abroad in agricultural and forestry development projects in Tanzania and Vietnam. She is interested in developing international partnerships and strengthen sustainability of food chain.

**Anna Kirveslahti, PhD** (Chemistry) is a project manager/R&D expert at the school of Food and Agriculture. Her body of research spans in the fields of surface science, materials and physical chemistry and circular economy, within which namely, side stream valorization (biomasses, chemical industry, plastics) and lifecycle assessment. At heart a researcher, she has also executed several development projects and has experience in project management and teaching. She has written several publications in international peer reviewed journals.

## Relevant Publications

Alasaari, K., Lahti, J. & Tiainen, J. 2020. Getting the vegetation index in plant production: Experiences from South Ostrobothnia, Finland. Publications of Seinäjoki University of Applied Sciences B. Reports 153. 45.

Laasasenaho, K. 2019. Biomass Resource Allocation for Bioenergy Production on Cutaway Peatlands with Geographical Information (GI) Analyses. PhD thesis. Tampere University, Faculty of Engineering and Natural Sciences Finland. Tampere University Dissertations 191. Available: <https://trepo.tuni.fi/bitstream/handle/10024/118517/978-952-03-13890.pdf?sequence=2&isAllowed=y> (5.12.2019)

Laasasenaho K, Lensu A, Rintala J. 2016. Planning land use for biogas energy crop production: The potential of cutaway peat production lands. Biomass Bioenergy 85:355–362.

Laasasenaho K, Lensu, A. Lauhanen, R., Rintala, J. 2019. GIS-data related route optimization, hierarchical clustering, location optimization, and kernel density methods are useful for promoting distributed bioenergy plant planning in rural areas. Sustainable Energy Technologies and Assessments 32:47–57. doi:10.1016/j.seta.2019.01.006.

Laasasenaho K, Renzi F, Karjalainen H, Kaparaju P, Rintala J, Konttinen J. 2020. Biogas and combustion potential of fresh reed canary grass grown on cutover peatland. Mires and Peat Volume 26 (2020) Article 10. 9 pp. DOI: 10.19189/MaP.2019.OMB.StA.1786

den Herder, Burges P., Mosquera-Losada, M.m Herzog, F., Hartel, T., Upson, M., Viholainen, I. and Rosati, A. 2015. Preliminary stratification and quantification of agroforestry in Europe.

Nevalainen, P.; Kinnunen, N.; Kirveslahti, A.; Kallinen, K.; Maunula, T.; Keenan, M.; Suvanto, M. (2017) Formation of NH<sub>3</sub> and N<sub>2</sub>O in a modern natural gas three-way catalyst designed for heavy-duty vehicles: the effects of simulated exhaust gas composition and ageing. Applied Catalysis A: General, 522. DOI: 10.1016/j.apcata.2017.12.017

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