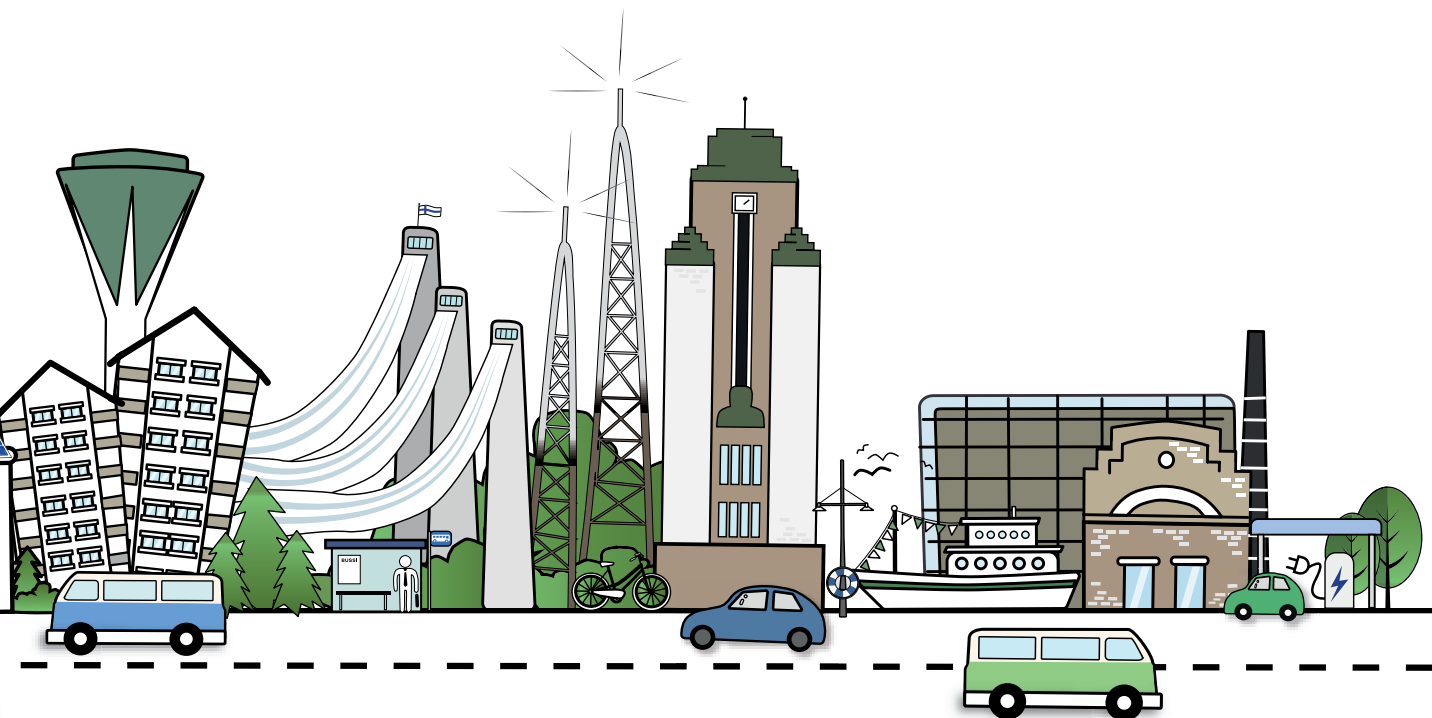


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Bio-based Circular Economy

Good Practices in Päijät-Häme

Bioeconomy means an economy that relies on renewable biological resources (e.g. crops, forests and animals) and their conversion into food, feed, products, materials and energy. Bioeconomy includes agriculture, forestry, fisheries, food, and pulp and paper production, as well as parts of chemical, biotechnological and energy industries. (EC 2012) Bio-based products are products that are wholly or partly derived from materials of biological origin (EC 2017a). Circular economy means closing the currently linear economy in a loop where the value of products, materials and resources is maintained in the economy for as long as possible (EC 2015). Bio-based circular economy

is the circular economy of bio-based materials, i.e. biological resources are managed and used in a way that the value of the materials is maintained at the highest level of utility in the economy for as long as possible.

Bio-based circular economy is in the core of the interregional project BIOREGIO (Figure 1). The project boosts bio-based circular economy through transfer of expertise about the best available technologies and cooperation models in six European countries. The project will improve regional policies and programs related to circular economy of biological streams. (Interreg Europe 2017a)

BIOREGIO

Interreg Europe



European Union
European Regional
Development Fund

Tweet!
#BIOREGIOproject

Regional circular economy models
and best available technologies
for biological streams



€
1.30 M
ERDF

Jan 2017
Dec 2021



Figure 1. BIOREGIO aims to share good practices in bio-based circular economy.
(made by Oona Rouhiainen 2017)

Definition of Good Practices

The BIOREGIO project consortium together with stakeholders has defined criteria of bio-based circular economy Good Practices for cooperation models or technologies. One of the key aims of the BIOREGIO project is to identify and collect these bio-based circular economy Good Practices from the six partner regions and share them on the Interreg Europe (2017b) Policy Learning Platform to be available for other regions in the EU.

BIOREGIO Good Practices have been proven successful in practice and fulfill the following criteria:

1. Promote circular economy - It has been shown that the traditional linear economic model of “take, make, dispose” needs to be revised. A restorative and regenerative circular economy (CE) provides the solution (Ellen MacArthur Foundation 2017; EC 2015).
2. Are related to biological materials i.e. bio-based materials - Bio-based materials are products consisting of substances originally derived from compounds existing in nature (EC 2017a).
3. Promote social and environmental sustainability, as well as economic growth - All three main aspects should be supported to reach sustainability: social, environmental and economical (EC 2017b).
4. Are resource efficient and economically feasible – The development towards a circular economy requires resource efficient but economically competitive solutions (EC 2015).
5. Minimise waste directly or indirectly according to the waste hierarchy - The waste hierarchy aims at getting maximum benefits from products and, at the same time, generating a minimum amount of waste. The preferred option is waste prevention, followed by reuse, recycling, recovery including energy recovery and as the last option, safe disposal (EC 2016).
6. Encourage closing the loops and emphasising longer cycles/cascades - In a circular economy, products and materials circulate at the highest level of utility (Ellen MacArthur Foundation 2017).
7. Preferably include joint actions (discussions/cooperation/business) among different stakeholders, e.g. RDI, government, companies and consumers – Cooperation is the key for functional circular economy (Ellen MacArthur Foundation 2014).
8. Are likely to be transferable and scalable in different European regions – Sharing knowledge and expertise about good practices is one of the aims of the Interreg Europe program (Interreg Europe 2017b).

Päijät-Häme Good Practices

Based on the definitions of the BIOREGIO Good Practices, good examples of circular economy solutions with bio-based streams in focus will be discovered in all project regions. These Good Practices include new technologies and solutions, cooperation models, networks and ecosystems. The regional stakeholder group in Päijät-Häme has detected seven Good Practices (Figure 2):

Bio-based Circular Economy Good Practices in Päijät-Häme, Finland

1. Effective municipal waste separation and collection - industrial symbiosis (Päijät-Häme Waste Management Ltd)

After appropriate processing, the municipal waste is recovered as recycled material or used in energy production, the share of municipal waste landfilled was 3 % in 2016

4. New possibilities in sorting waste - conveyor solutions (Ferroplan Ltd)

Smart conveyor solutions and systems for sorting waste

2. Utilisation of biowaste streams - bio-based industrial symbiosis (LABIO Ltd)

Biogas and fertilizer production from municipal biowaste, waste from food industry and sludge from wastewater treatment plants

5. Grain Cluster - cooperation model

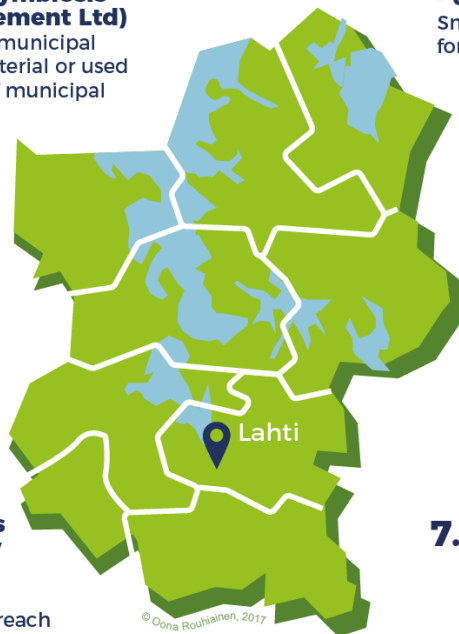
An active network for the grain producers and related industry in the region aiming at e.g. utilisation of bio-byproducts

6. Personal responsibility in saving resources - campaign and calculator (City of Lahti)

An ongoing challenge to stimulate the debate about resources and promote people's awareness to reduce their consumption of natural resources

3. Regional road map towards circular economy - strategy (ERDF project Kiertoliike)

Visualized state of art of regional material streams, cooperation to reach a regional joint vision and road map towards circular economy



7. Rescuing food from being wasted - mobile application (ResQ)

An application where left over food is announced on a webpage and citizens can "rescue" food from being wasted for half of the normal price

Figure 2. Päijät-Häme Good Practices (BIOREGIO 2017). (made by Oona Rouhiainen)

1. Effective municipal waste separation and collection - industrial symbiosis

The Päijät-Häme Waste Management company (PHJ), located in the Kujala Waste Treatment Centre, is the core of the Kujala industrial symbioses. Due to a sophisticated at-source sorting system, in 2016, only 3% of the total waste generated in the region was landfilled. PHJ's landfill gas is captured for energy use via the regional energy company and distributed directly from the landfill to PHJ's premises and to a nearby beverage producer. (PHJ 2017a; Vehviläinen 2017)

PHJ also collects energy waste, which is processed into a solid recovered fuel consisting of wood waste and household waste, for the nearby gasification power plant, to produce district heat and electricity for the Lahti region. The biowaste and sewage sludge are treated in the biogas and composting facility, LABIO. Biogas and digestate are further processed by companies in the area. (PHJ 2017a; Vehviläinen 2017)

Metal scrap is separated and forwarded for recycling and the gypsum plasterboard waste is sent for new plasterboard production. In the Kujala area, there are also companies which for example manufacture earthwork products from concrete waste and process roofing felt waste to raw material for asphalt production. (FISS 2015; PHJ 2017a)

2. Utilisation of biowaste streams - bio-based industrial symbiosis

The bio-based part of the Kujala industrial symbiosis is particularly interesting from the BIOREGIO point of view. The LABIO plant produces biogas and fertilizer from municipal biowaste, waste from the food industry, sludge from wastewater treatment plants and biodegradable material from farming, forestry,

fisheries etc. This plant is the largest biogas production and refining plant in Finland. (LABIO 2017; Savolainen 2017)

Biogas generated in the dry digesters is transported through the pipes to the nearby operator for upgrading and distribution in the gas network. The digestate is processed with other biowaste in the composting facility to produce compost, soil and other growing solutions. (FISS 2015; Savolainen 2017) The compost is further used in agriculture, cultivation and gardening.

3. Regional road map towards circular economy - strategy

The Päijät-Häme region has created a regional road map towards a circular economy, i.e. a regional circular economy strategy. The road map presents regional goals and actions to achieve the vision: "Päijät-Häme – the successful resource efficient region" by year 2030. The goals are related to material flows, bio circular economy, energy, new services and to the role of Päijät-Häme as a forerunner. (LAMK 2017)

The vision and the road map have been developed in a regional ERDF project through intense cooperation between stakeholders, e.g. the regional council, universities, municipalities and companies. The road map will be updated regularly. (LAMK 2017)

4. New possibilities in sorting waste - conveyor solutions

Conveyor solutions play a central role in promoting circular economy and developing the waste separation system of the Kujala Waste Treatment Center. The LATE sorting plant enables recycling of waste that has earlier been used for energy recovery. (PHJ 2017b) Ferroplan (2017), the supplier of the conveyor solution,

provided over half a kilometer of conveyors for the plant.

The sorting plant, built in 2016 with an annual capacity of 65 000 tons, supplements the sorting of waste when it is not possible at the source, e.g. when handling construction and mixed waste as well as waste generated by industry. The plant separates fibers, plastics and various metals that can be recycled or further processed to achieve an effective material-recycling rate. (PHJ 2017b)

5. Grain Cluster - cooperation model

The Päijät-Häme Grain Cluster (2017) is a cooperation network of the local grain value chain. It brings together all actors in the region, from grain producers to industry and retail, from large international companies to small craft companies, e.g. oat mills, breweries, a malt producer and over 1000 farms. The cooperation model was created in 2003 and it is exceptional on an international scale. The activities are coordinated by LADEC, Lahti Region Development Company. (Päijät-Häme Grain Cluster 2017, Kivelä 2017) Funding of the cooperation is covered by the member companies but also partly from the ERDF project financing. (Kivelä 2017)

The cluster companies look for synergies, product development and circular economy solutions. Since 2010 bioethanol has been produced from the side streams of cluster companies like bakeries, breweries and mills (St1 2009). According to Kivelä, currently new possibilities in carbon dioxide recovery from bakery and mash processes, as well as more effective possibilities in using biowaste through e.g. logistics are developed in an ERDF project. The cluster collaboration has also succeeded in developing new innovative food products. (Kivelä 2017)

6. Personal responsibility in saving resources - campaign and calculator

The “Tonnilähti” material footprint calculator is an online-based tool for consumers to calculate their material footprints. It has been developed in cooperation with several companies and public organisations in the Päijät-Häme region. (Tonnilähti 2017)

The material footprint expresses the total amount of natural resources used during the life cycle of an observed product, service or other unit. The respondent answers questions about issues such as housing, consumption, food, free time, holidays and transportation. The short test shows the person’s material footprint compared with the sustainable level, the average Finnish footprint and the target values set for 2030 and 2050. The respondent can also commit to reducing his/her footprint. (Järvelä 2017)

7. Rescuing food from being wasted - mobile application

In food services, a huge amount of food ends up as biowaste. Thus, the environmental impact of food production is significant. (Kosseva 2013) The ResQ service saves food from turning into waste, helps local businesses get better results and supports the environment. In the application (ResQ 2017), restaurants announce their leftover food and citizens can “rescue” food from being wasted for half of the normal price. The user interface shows the doses available depending on location and diet settings. Almost 500 restaurants have registered for the service in Finland. In 2016, around 10 000 portions/month were sold, and in 2017, the number increased to 30 000 portions/month. The service also operates across Europe. (Evinen 2017)

Figure 3. The Päijät-Häme Grain Cluster - BIOREGIO
Good Practice of local grain value chain including the
farmers. (photo by Oona Rouhiainen)



Discussion

The Good Practices found in the Päijät-Häme region reflect the definitions of the BIOREGIO Good Practices in versatile ways. They promote bio-based circular economy and all of them include joint actions and cooperation between different stakeholders. They are transferable to other regions and can serve as examples. However, one of the challenges in the region is to minimize waste according to the waste hierarchy. Even if only 3% of the waste is landfilled, there is more to be done in developing

the reuse of products and recycling of them as material prior to energy recovery.

Experts of the Interreg Europe Program will evaluate the recognised BIOREGIO Good Practices of the Päijät-Häme region. After the evaluation, the accepted practices will be available in the freely accessible online Policy Learning Platform database (Interreg Europe 2017b).

This article reflects the authors' views; the Interreg Europe programme authorities are not liable for any use that may be made of the information contained therein.

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