Helsinki-Uusimaa
Circular Valley

FINLAND – LOCAL SOLUTIONS ARE BORN HERE

Handbook

In Finland, cities, municipalities and regions act as innovation platforms. There is a culture of collaboration between the different levels of governance, and between the private and third sector, which are success factors in systemic change. The national Green Deal process is aligning the objectives and steering action towards common goals.

In this handbook, we have gathered best practices in circular economy in Finland to share with the rest of the world. It is produced by Helsinki-Uusimaa Circular Valley. The featured case articles serve as exemplary models of circular economy, with a particular focus on regional collaboration and public-private partnerships. These initiatives encompass implemented pilots, regional business collaborations, or other forms of innovative activities. The articles concentrate on themes related to construction, textiles, and industrial symbiosis.

Discover circular economy innovations in Finland – local solutions are born here!

Table of contents

The Green Deal: "The Winning Concept for Circular Transition"

Finland aims to become a world leader in promoting the circular economy, spurred on by both the recent Climate Act and the Circular Economy Strategy adopted by the Government. To turn circular economy ambitions into actions, Finland is now implementing a completely new kind of science-based Green Deal process, in which all stakeholders in society are consulted and committed to the goals after a multi-stage public consultation.

This model is unique in the world and is already seen as a success, as more than 90 different societal actors are still involved in the long-term work and committed to the process led by the Ministry of the Environment. The results of the Green Deal are visible in changes in the business sector and consumer attitudes, in the strategies of municipalities, businesses, and organisations, in funding applications and public procurement processes, and in changes in legislation, regulatory procedures, and financial incentives.

The purpose of the Green Deal is to accelerate the circular economy transition in Finland, but several companies and public sector practices have already risen to the challenge and become circular economy pioneers. These exemplary cases have been listed in this newly published Handbook. These examples all show bold new business models and often cooperation between the public and the private sectors, too. Regional sustainability goals and forward-looking new business practices have been achieved through shared visions, funding opportunities, a variety of projects, and supportive regulation. The Green Deal empowers and harmonises the work that has already begun.

The Green Deal Brings Actors Together

The underlying aim of Green Deal agreements is to achieve rapid results and concrete actions that contribute significantly to the well-being of society and the environment. The Green Deal is based on a comprehensive situational analysis of resource use and the effectiveness of circular economy policies, carried out by research institutes. Researchers have developed background scenarios to inform the process and to help the different societal actors to better understand which government-level actions can make an impact and lead to the implementation of low-carbon solutions. The implementation of the Green Deal requires the adoption of a national circular economy strategy throughout the administration and across all sectors. Operators can choose for themselves which goals they wish to commit to, and which measures to implement for that

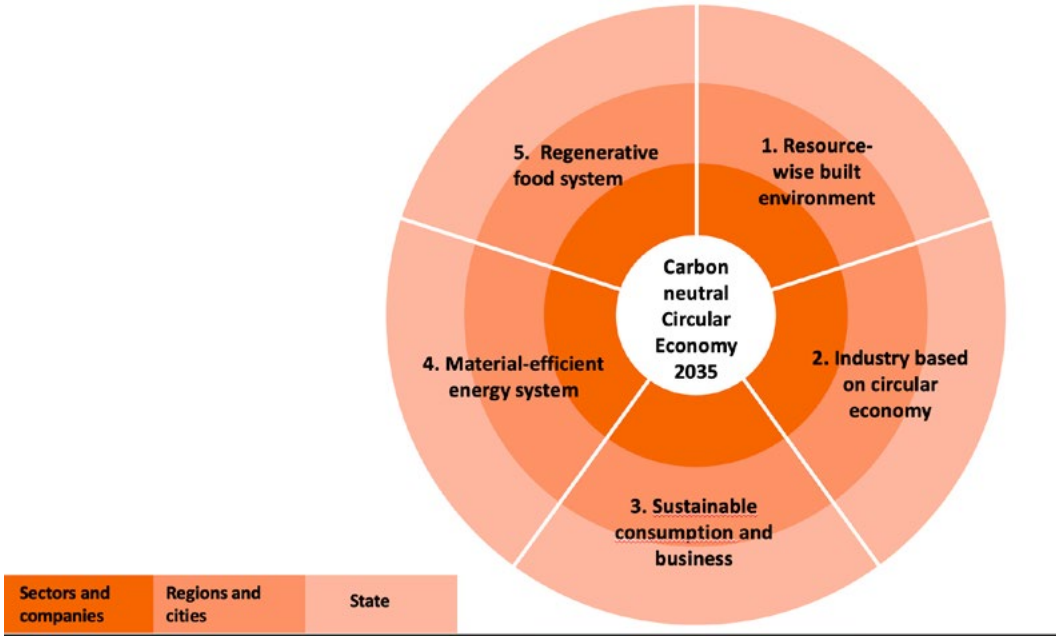
purpose. A significant impact can be achieved with a wide range of actors.

The scenario work has resulted in recognising five areas of necessary change, the promotion of which is particularly relevant to Finland's climate goals and use of natural resources, and which have therefore been selected for the Green Deal: 1. A resource-conscious built environment; 2. Industry based on the circular economy; 3. Sustainable consumption and business practices; 4. A material-efficient energy system; and 5. A reforming food system. During this process, three circular economy scenarios will be developed to assess the impact on, for example, raw material consumption, carbon neutrality, and the economy.

Regions and municipalities can participate in the Green Deal with their own umbrella commitments to support and facilitate their region's transition to a circular economy. In addition to fostering cooperation, regions and municipalities can contribute to the process through various programmes and projects, land use planning, and public procurements. Municipal areas and cities shall also act as financiers of the circular economy, as development platforms, as drivers of innovation, and as developers of international cooperation. At a regional level, the Green Deal commitments may be included in regional planning documents. Regions can encourage the municipalities in their area to create Green Deal commitments and coordinate their creation processes, if necessary. This will ensure local involvement and commitment to the circular economy. These commitments will bring actors into close cooperation to strengthen competitiveness and to set a concrete example of how to transition to a circular economy.

Read more

ym.fi/en/circular-economy-green-deal



Finnish Green Deal for five sectors and key players.

Emmy: The resale value of clothing is becoming increasingly important

Emmy, an online recycled clothing store, not only extends the lifespan of clothes but also makes it easy for consumers.

"Customers are increasingly becoming conscious of the durability of clothing and its resale value," says Emmy's CEO **Timo Huhtamäki**.

At the heart of Emmy, lies the belief in clothes that endure over time, seamlessly transitioning from one wardrobe to the next.

Emmy allows consumers to sell their unwanted clothes via its online platform. Consumers simply send their unwanted clothing in, and once it's received, the items are inspected, photographed, and listed for sale on the online store. Emmy donates unsold clothing to charity or returns it to the seller.

Emmy is part of the Finnish Textile & Fashion association, and the Finnish Innovation Fund Sitra has recognised it as one of the most interesting companies on the Circular Economy list. The Swedish Norrsken Foundation has listed Emmy as being among the top 100 most important impactful start-ups in the Nordics. Business Finland has provided public backing to the company to foster its growth.

Business Finland has provided public backing to the company to foster its growth.

The negative perception of second-hand products is no longer an issue

There are numerous second-hand stores operating both in physical locations and online, and the industry is competitive. According to Huhtamäki, Emmy has a highly competitive role in two distinct markets. The goal is to convince consumers to sell their unwanted clothes through Emmy, with Emmy receiving a commission in return. Conversely, it is important to generate consumer interest and motivation to buy the products that are available for purchase on its website.

In addition to clothing, Emmy also sells shoes, bags, and sunglasses.

Emmy has almost achieved profitability due to the significant sales volumes, loyal customers, and high-quality clothing.

The company recognises the immense value of loyal customers, as they play a crucial role in spreading information about Emmy. The effectiveness of word of mouth has been proven yet again.

Huhtamäki goes on to explain that second-hand products are no longer associated with being cheap and worn out. Young people and young adults are particularly active in

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© Emmy

this movement. GlobalData, a research firm, reports that Generation Z, those born between 1997 and 2012, starts their search for clothing or other products in second-hand marketplaces whenever they need something.

Fashion brands are involved as well

Emmy was created in 2015 when the company's founders, **Hanna Autio** and **Markus Rautopuro** were parents of young children. They wanted to extend the lifespan of their clothing, but with the demands of family life, they didn't have time to browse through flea markets.

Huhtamäki says that mothers of young children are an important target audience for the company. Firstly, because they buy and sell their children's clothes at Emmy, and secondly, they also use the marketplace for their own clothing soon after that.

Emmy does not accept or sell fast fashion. The company favours products that are durable and have resale value. The most ethical garment remains in use for a long time in its original form.

Huhtamäki reminds us about the connection between longer lifespan and resource conservation. We can keep the CO_2 emissions from the garment industry in check and save clean fresh water by opting for sustainable clothing instead of fast fashion.

There is demand for an eco-friendly wardrobe not only here but also elsewhere, and Emmy is keeping an eye on international markets.

So far, Emmy has started operating in a brick-and-mortar store in Tampere in addition to online operations. Additionally, Emmy enjoys a favourable market position in Estonia.

In Central Europe, local players are active, but in Asia, the second-hand market is lagging behind. Huhtamäki estimates that the cultural shift there will take time. On the other hand, for example, China is tightening its environmental regulations, which hopefully will sooner or later mean an emphasis on sustainability – also in clothing.

Emmy plans to increase collaboration with fashion brands in addition to its expansion plans. Emmy already sells samples and returned items from many of these brands and aims to help brands extend the lifespan of clothing.

Changing habits is business

Huhtamäki remembers clothing shopping statistics off by heart. An American consumer buys 69 new garments per year, a Swedish consumer buys 56, and a Finnish consumer buys 34.

"Overproduction is massive, an estimated 100 billion garments are produced worldwide each year. Global clothing production would be enough for six generations. The amount of textile waste is so vast that there is reportedly a textile waste mountain in Chile that is visible from space."

Huhtamäki emphasises the need for a comprehensive transition to a circular economy, encompassing all aspects of the industrial infrastructure including logistics, information systems, and legislation.

"We are transforming habits into businesses. The task is enormous, but it must be done," says Huhtamäki.

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An American consumer buys 69 new garments per year, a Swedish consumer buys 56, and a Finnish consumer buys 34.

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store.emmy.fi

emmystore.com/pages/about-emmy-clothing-company

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Innovating new business from end-of-life textiles

In Southwest Finland, solutions are being developed to ensure textile waste is returned to circulation. The municipally owned waste management company Lounais-Suomen Jätehuolto and the privately owned textile recycling company Rester have collaborated closely to establish a circular economy facility, which processes about a tenth of all textile waste in Finland.

The city of Paimio in Southwest Finland locates a facility for end-of-life textiles, the first of its kind in Northern Europe. There, old textiles are unwoven into fibers, which are then used to produce yarn and fabric, or made into recycled fiber for other industrial purposes.

The facility has been a result of close collaboration between the two companies, Lounais-Suomen Jätehuolto (LSJH) and Rester. LSJH, jointly owned by 18 municipalities in Southwest Finland, has been collecting post-consumer textiles since 2016. It also coordinates the collaboration of the national end-of-life textile collection waste facility network.

The privately owned Rester, on the other hand, originated in 2019 with the task of receiving end-of-life textiles from businesses, such as leftover textiles from hospitals and hotels, as well as industrial by-products. At the early stages of the venture, the company's founder, **Outi Luukko**, decided to lease shared premises with LSJH and the companies jointly opened a circular economy facility soon after.

© LSJH

Luukko emphasizes that for a circular economy company like Rester, it would have been difficult to start without public support.

Of the end-of-life textiles from LSJH's service area and other waste management facilities, approximately 10 percent are processed into fibers, and the same amount is directed for reuse. When sorted as a material fraction, 40–50 percent can be utilized. If textile material lacks outlets for reuse or is contaminated, it is used as energy.

Foundation for Circular Economy

Last summer, LSJH and Rester agreed on a deal in which Rester purchased the pilot-phase fiber opening line for end-of-life textiles from LSJH.

After the sale, LSJH has continued coordinating the nationwide end-of-textile collection waste facility network. Additionally, it sells sorted end-of-textile raw material to companies that utilize it.

According to Development Director **Teemu Jutila**, LSJH has always been and will continue to be a platform for growth of the circular economy. Moreover, it will continue to develop both the expertise and technology needed in sorting end-of-life textiles.

The company sorts household end-of-life textiles collected from all over Finland according to customers' needs. These may

include factors such as quality, color, material and its concentrations.

So far, excellent examples of products utilizing sorted end-of-life textiles come from the world of private business. For instance, a company called Pirtin Kehräämö has produced ECO-recycled wool yarns from LSJH's recycled materials for hobbyists, crafters and industries. Another company, Jokipiin Pellava, has manufactured durable towels from end-of-life cotton and linen textiles. Globe Hope has created yoga products from end-of-life textiles and recycled fibers.

LSJH intends to build a new textile waste facility, for which it has received investment grants from Business Finland to support circular economy initiatives. However, the exact timeline for the new facility is still uncertain as the European Parliament is expected to discuss and decide on producer responsibility for textile collection, which would also affect LSJH's future role and tasks.

Recycled Fiber for the Nordic Countries

Outi Luukko says that Rester will continue to be a pioneer in the circular economy in the city of Paimio and to offer businesses a responsible solution for recycling end-of-life textiles. The material produced by Rester replaces the use of virgin raw materials.

As a result of the second production line acquired from LSJH, Rester now can, with its additional capacity, meet the demand for recycled fiber not only in Finland but also in other Nordic countries in the near future.

Like LSJH, Rester also requires networks and partnerships. A notable example is its collaboration with the iconic Finnish design company Marimekko. This collaboration resulted in high-quality t-shirts made from textile production by-products. These t-shirts utilize surplus fabrics and textile waste from Marimekko's own textile printing and sewing operations.

Other significant clients also include Freudenberg/Vileda, Swedish Södra and Ewona, who, together with Rester, promote circular economy in the production of various end products.

The public sector as a valuable partner

Luukko emphasizes that for a circular economy company like Rester, it would have been difficult to start without public support.

"Collaboration with the public sector has helped us a lot and represented good partnership," says Luukko.

However, funding only from public projects and other programs is not enough to tackle the growing amount of textile waste. According to Luukko, more market driven demand is needed. The use of recycled materials must be increased in textile production, as it is the only way to develop and promote sustainability in the textile industry.

Read more

rester.fi/en

poistotekstiili.lsjh.fi/en

Successfully applying the principles of the circular economy to street works construction and land transfer

The Pirkanmaa region has gained positive experiences with implementing the circular economy in infrastructure renovation and land transfer projects. Public procurement plays a crucial role in driving the proliferation of the circular economy.

The desire was to renovate a crucial street, Yliopistonkatu in the city of Tampere, Pirkanmaa, by taking the circular economy into account. The street construction project was part of the Sustainable Neighbourhoods Partnership Model initiative, which aimed, among other objectives, to improve material circulation.

Simultaneously, the city's objective was to establish the first circular economy procurement model through a public infrastructure contract in Finland. The project stakeholders wanted to include circular economy principles from the planning stage to the selection of implementation methods. It will be determined whether or not the circular economy can be implemented for the actual construction project during the planning phase.

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Senior expert **Karoliina Tuukkanen** from the Circular Economy Development Centre in Pirkanmaa explains that construction industry representatives were interviewed to explore the integration of circular economy principles into their operations and identify ways to further promote its progress.

Tuukkanen says that "public procurement turned out to be a clear bottleneck." Businesses believe that a circular economy in infrastructure contracts will not advance unless clients create opportunities for it.

70% recycled material

If the street had been renovated traditionally (replacing all the layers of the structure), this would have meant excavating 8,000 cubic metres and using 13,000 cubic metres of aggregate materials. This would have required around one thousand truckloads of material in total.

An estimation was made in advance to determine whether to renew just the surface layers of the street. The project proved to be worthwhile since the functional structural layers didn't require replacement. Additionally, compared to traditional renovation, it saved 6,000 cubic metres of excavation and an equal amount of aggregate materials.

© Circular Economy Development Centre in Pirkanmaa

Approximately 70 percent of the project consisted of recycled materials. The curb stones, granite tiles, and cobblestones were completely recycled. Almost one third of the pavements and footpaths were retained.

Regional impact: The completed model facilitates further progress

The results from the street work have been so impressive that the procurement criteria used in the project have since been used in several infrastructure contracts in Tampere.

The development of criteria for the first circular economy infrastructure project was much more labour-intensive compared to a traditional project. However, now that the model is ready, others can leverage it to facilitate their own procurement processes.

Of course, taking the circular economy into account will require additional effort before it becomes the new norm in the construction industry. However, companies have the willingness and readiness to participate.

"Recycling of materials has been a common practice for construction companies for a long time. It is worth recycling materials as much as possible, as it is ultimately cost-effective," Tuukkanen says.

Applying circular economy criteria to land transfer

The City of Tampere has been at the forefront of land transfer, implementing circular economy principles. The pilot initiative was carried out in the Kissanmaa district, with the construction sector being urged to deliver an ambitious plan for a circular economy. The city wanted the building to have a smaller carbon footprint than usual. The emphasis was on using building components in their existing form, not solely relying on recycling them.

Simultaneously, the city sought to promote the development of circular economy solutions in the building construction sector.

While preparing for the land transfer, great

importance was placed on working together with businesses. The city established circular economy goals, and it was the companies' responsibility to devise strategies to meet these goals.

The land transfer competition winner, Pohjola Rakennus, will be constructing a residential building that promotes the principles of the circular economy. The company's plan emphasised the use of recycled building components.

Project Development Manager **Janne Kivimäki** at Pohjola Rakennus explains that the land transfer process was completely unique for the company. Pohjola Rakennus wanted to be involved because it was interesting, but also because the location of the site and the development of the circular economy were of interest to them.

"We didn't want to promise the moon, but wanted to be realistic," Kivimäki says.

City officials were unfamiliar with using the circular economy as a criterion for land transfer. Kivimäki is happy about the building inspection authority's flexibility with the builder during project implementation. In the past, it was not mandatory for all building components to have a CE marking in all aspects, for example. Instead, the eligibility of the components could be demonstrated on a site-specific basis.

Kivimäki is part of the UURAKET project promoting reusable building components. The participants have been considering, among other topics, whether it would be beneficial to create a shared marketplace for these construction materials. And if this is done, who would be suitable to run it and be accountable for the materials' quality? The marketplace should function reliably, without burdening city and municipality building inspection authorities with eligibility matters.

The Kissanmaa building will serve as a valuable learning opportunity for Pohjola Rakennus, showcasing the technical and economic complexities of using circular economy solutions in construction.

Public procurement plays a crucial role in driving the proliferation of the circular economy.

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Carbonaide: From a public sector incubator to the global market

Carbonaide makes concrete production climate-friendly and transforms the built environment into carbon sinks. The company's technology is of interest to both the construction industry and the public sector in Finland and abroad. Carbonaide collaborates with four cities and research institutions to create new business opportunities and update their carbon neutrality strategies.

Carbon sinks created from concrete

A small municipality located in Päijät-Häme, Hollola, experienced thrilling moments in early 2024 when Carbonaide's technology made its first commercial run at the Rakennusbetoni- ja Elementti Oy factory. This was not just any industrial run, as Carbonaide built the world's

first industrial-scale production line capable of carbon-negative concrete production.

Carbonaide was founded just a little under two years ago. **Jonne Hirvonen**, Carbonaide's Chief Operating Officer acknowledges that the company has been pleasantly and positively surprised by the rapid progress. Although the construction industry is experiencing a downturn, the company's start has been encouraging, and both the industry and the public sector are closely monitoring its operations with interest.

"Generally, obtaining funding is more challenging, as investors are more cautious and invest smaller amounts. For us, the situation is good because money is allocated to sustainable solutions."

The company is currently involved in the Carbon Chain project funded by Business Finland, together with research institutions and several cities. The project investigates sources and users of biogenic carbon dioxide.

Finnish cities Espoo, Vantaa, Lahti, and Lappeenranta are closely involved in the project because they want, among other things, to create new regional business opportunities.

The cities are eager to update their carbon neutrality strategies to take into account the impacts of capturing biogenic carbon dioxide as well. In addition, their aim is to create new regional business opportunities including new start-ups.

Plans for commercialising the innovation

Concrete is one of the most widely used materials in the world, and its carbon dioxide emissions are significant. Thanks to Carbonaide's technology, the built environment can be transformed from an emission source to a carbon sink. This, of course, interests the public sector, which is struggling with its carbon goals.

Carbonaide's technology offered to manufacturers of concrete products enables the production of low-carbon or even carbon-negative concrete by incorporating carbon dioxide into its composition. At the same time, the need for the traditional binder, namely cement, decreases: it can be replaced with new binders. In concrete production, cement is the largest source of carbon dioxide.

The carbon dioxide utilisation and storage method was developed at the state-owned VTT Technical Research Centre of Finland, and Carbonaide is commercialising the innovation. The company was part of VTT's science-based incubator, which aims to assist in commercialising research and technology into spin-off companies.

"The industry has shown great interest in low-carbon and carbon-negative concrete," Hirvonen says.

Initially, products manufactured with Carbonaide's technology will be marketed in Finland, but due to strong interest, the company is also eyeing other Nordic countries and Central Europe.

Thanks to Carbonaide's technology, the built environment can be transformed from an emission source to a carbon sink.

Currently, Carbonaide's only production unit is the one in Hollola, but there are plans to increase production. In the coming years, Carbonaide is planning to open ten new production units in the Nordic countries.

Opportunities for a variety of products

Carbonaide's technology has been driven by the rise in cement prices, which has not subsided even during the recession. The price increase, along with tightening regulations and growing environmental awareness in the concrete industry, makes Carbonaide's technology increasingly attractive.

Carbonaide has announced its goal to capture approximately 500 million tons of carbon dioxide annually. This amount represents 10 to 20 percent of the global concrete market. According to Hirvonen, the goal is very realistic, as the tonnage may exceed the original target.

Hirvonen justifies his view by saying that "we have the potential to expand the technology to include more concrete products than originally estimated."

According to Hirvonen, there are numerous opportunities.

Carbonaide has announced its goal to capture approximately 500 million tons of carbon dioxide annually. This amount represents 10 to 20 percent of the global concrete market.

Read more

carbonaide.com

Public funding

- Carbonaide commercialises carbon utilisation and storage technology, that has the potential to reduce the carbon footprint of concrete – even to carbon-negative.
- Thanks to the technology, carbon dioxide is used as a raw material and bound into a new product.
- In addition to the construction industry, the public sector is also interested in the company's technology. Funders of Carbonaide include VTT Technical Research Centre of Finland, Vantaan Energia, Business Finland, Startup Fund Joensuu, and Lakan Betoni.

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City of Helsinki: Circular economy drivers in the construction industry

The City of Helsinki wants to promote the circular economy through its own cluster programme. The programme has a specific focus on the construction industry with pilot programmes carried out in partnership with property owners and developers.

Public entities can take a significant role in nurturing circular economy initiatives within the construction industry. In such a situation, networking becomes a crucial task. A public entity is well placed to bring different stakeholders together. The city serves as

an impartial entity, dedicated to fostering cooperation and mutual learning through pilot programmes rather than attempting to sell anything.

This is at least the view of the City of Helsinki, where the reuse of construction sector demolition materials is currently a matter being tackled in their circular economy cluster programme, with experiments and pilot programmes being conducted. The city welcomes all entities, researchers, universities and businesses of any size, wanting to make a concrete contribution to the circular economy to join the programmes.

"Our strengths are our own procurement and operations. We have the opportunity to influence the promotion of the circular economy in land allocations and zoning processes," says the City of Helsinki project manager, **Mira Jarkko**.

It is possible to set criteria for land sales to reduce CO_2 emissions from building materials and promote recycled products, for example. It is also possible to set conditions for earthworks, for example, regarding the use of recycled materials or recycled aggregates.

The city is piloting circular economy zoning regulations, such as mandating the production of renewable energy. The city has taken a broader approach to its zoning regulations, incorporating energy matters, stormwater management, and including green spaces.

The entire city will serve as a testing site

Helsinki identifies itself as a city-sized testing platform where companies and product development actors work together with the city to experiment with and innovate products and services. The construction sector receives special attention when it comes to developing the circular economy.

Fresh circular economy solutions will be tested soon. The city has sought products and services that encourage the reuse of building components or materials through an innovation challenge.

The innovation challenge attracted a diverse group of companies, including start-ups and publicly traded Finnish and foreign companies.

Only the most promising pilot proposals were selected to proceed:

- A method for safely removing tiles attached with adhesive without damaging them (Kiilto Family).
- Combining a digital circular economy platform with practical building expertise for building component reuse (ZupplySite and Spolia Design).
- A platform service that supports users in selecting sustainable building and surface materials (Materialisting).
- A process for reusing acoustic panels (Saint-Gobain Ecophon).
- AI-powered design software (Studio MPRA Architects and Make a BIM).

The circular economy cluster continues collaboration with the selected companies. The challenges are specifically related to the development project in Vattuniemi, Lauttasaari, where they actively seek methods to promote a circular economy through demolition and material circulation.

The aim is for entities other than the City of Helsinki to use the solutions developed in the pilots. Generating new circular economy-based businesses in construction is another important goal.

Property owners and developers work together to carry out the pilots.

What kind of expertise does reuse require?

Helsinki is about to launch another exciting innovation challenge, in collaboration with the KIRA growth programme, featuring pilot projects. The programme is updating expertise and operational models in the industry, accelerating experiments, development projects, and export initiatives.

©Vesa Laitinen

The goal of the innovation challenge is to emphasise the perspective of property owners and developers and to examine their requirements for implementing a circular economy in the construction sector. This involves identifying the knowledge or services needed to reuse building materials and what criteria should be taken into account in procurement.

A concept for a storage building for outdoor sports facilities in Helsinki was sought through a recent design competition in collaboration with the Department of Architecture at Aalto University. The storage building should be built using building components and materials from the city's own demolition sites.

The goal was to find a replicable solution to replace shipping containers used for temporary storage. They are not large enough to store the machinery and equipment needed at sports facilities.

The competition-winning entry, Lippa, received praise from the jury for its flexible use of material flows. Additionally, it stands the test of time and functions reliably in a range of environments. The construction of the first storage facility will commence soon.

The circular economy cluster programme has existed for nearly three years, and it has become clear that the collaboration between public entities and businesses is fruitful.

"The circular economy becoming 'business as usual' in the construction industry still has a long way to go.", reminds Jarkko.

Read more

testbed.hel.fi/en/circular-economy

ECO3: The main hub for bioeconomy and circular economy knowledge in the Pirkanmaa region

Collaboration between the public sector, businesses, education, and research in Pirkanmaa's circular economy area drives the development of the circular and bioeconomy. The collaboration between the public and private sectors in Pirkanmaa has been successfully demonstrated through a publicly owned platform company.

Recycling is at the forefront of the ECO3 area of Pirkanmaa. Wastewise, a company in the region, is one of the actors working on the development of a new pyrolysis technology for chemical recycling. The goal is to ensure that even the most complex waste streams circulate as new raw materials. The company focuses on plastic waste that cannot be mechanically recycled.

What is ECO3 and why does the company operate specifically in the ECO3 area?

ECO3 is a circular economy hub located in Nokia, Pirkanmaa. The city of Nokia and its development company, Verte Ltd, develop bio-economy and circular economy business innovations on an industrial scale in co-operation with companies and researchers. ECO3 also serves as a test ground. Verte is the platform company focused on the circular economy field.

Wastewise Group's CEO **Kaisa Suvilampi** says that operating in a collaborative area is meaningful and important. For instance, the shared platform provides a way to gather information about ongoing funding projects. The entrepreneur also values the regular joint meetings of the local actors.

"Sharing resources provides a very tangible benefit. Operators don't have to invest in a truck scale, for example; they can simply purchase that service from a nearby neighbour. You can also borrow tools temporarily from a neighbour".

Sharing resources provides a very tangible benefit.Operators don't have to invest in a truck scale, for example; they can simply purchase that service from a nearby neighbour.

© ECO3

Using collaboration as a learning tool for the public sector

Verte's CEO **Sakari Ermala** explains that the circular economy area secures an operating site for its companies and the needs of the circular economy are taken into account in land use and planning.

"Additionally, we aim to promote the market for bio-economy and circular economy products and services through public procurement".

The public sector is frequently a customer of companies in the area, particularly in the field of infrastructure construction.

On the other hand, through extensive collaboration, the public sector gains a deeper understanding of the daily operations of companies in the circular and bio-economy. As an illustration, the approval procedures can be made more efficient, along with gaining a clearer comprehension of market shifts, growth prospects, and value chains.

Ermala is particularly pleased that the ECO3 concept has succeeded in demonstrating how well the public and private sectors work together through a publicly owned platform company.

He highlights that the key tasks of the platform company in driving the large-scale growth of bio-economy, circular economy, and green transition can be condensed into three actions: enabling, developing, and accelerating.

Over the past ten years, the ECO3 circular

ECO3 concept has succeeded in demonstrating how well the public and private sectors work together through a publicly owned platform company.

economy area or has made remarkable progress and is now recognised as a key player in advancing circular and bio-economy initiatives on a national scale. The current area spans 120 hectares and is managed by 40 operators.

Despite progress being made, there is still work to be done to achieve the desired outcome of expanding the area and promoting cooperative activities. The intention is to take the needs of heavy industry and the critical infrastructure in industrial production into consideration.

The transition towards sustainable practices presents significant prospects for the circular and bio-economy, which must be addressed immediately.

Extensive collaboration with cities

Wastewise Group has successfully addressed and continues to address the challenge of transitioning to a more environmentally friendly approach. In addition to ECO3, the company joins forces with the public sector to tackle the challenge in alternative ways. Kaisa Suvilampi is pleased with the recent completion of the pilot project in collaboration with Business Tampere. The company conducted a pilot to evaluate how a problematic plastic waste stream interacts with their processes.

"While we are still waiting the final results, it appears that we have the ability to convert these plastics into oil effectively".

Suvilampi says that attitudes towards the circular economy have completely changed over the past couple of years. Among various factors, this is reflected in the demand, there would be a much larger market for Wastewise products than what the company is able to offer. She points out that all plastic oil produced by the company will undoubtedly be sold on the market.

The waste plastic used by the company comes from industry and consumer packaging. However, a large portion of the plastic still ends up being incinerated, and there is significant pressure to increase its recycling capacity.

Wastewise needs to continuously develop its operations because the plastic waste coming to the production facility is not homogeneous. There is constantly more to learn as the quality of plastic waste varies.

Wastewise and its partners are currently focusing on the pre-treatment of consumer packaging plastic as one area of development. The aim is to redirect the waste stream towards more efficient mechanical or chemical processing instead of incineration.

Read more

www.wastewise.fi

eco3.fi

© Kilpilahti

Kilpilahti chemical industry business park is transitioning to environmentally-friendly practices

Systematic collaboration between companies and public entities accelerates the green transition. The transformation of Kilpilahti chemical industry business park in the city of Porvoo into a world-class bio-economy and circular economy cluster requires extensive and innovative collaboration.

Kilpilahti functions as an empowering collaborative ecosystem, where participants work together to advance the bio-economy and practice resource conservation by using industrial waste and by-products as raw materials. Companies also exchange materials to minimise waste. Borealis Polymers,

a member of the international Borealis Group, is one of 40+ companies operating in the Kilpilahti area.

Although the collaboration between companies in Kilpilahti thrives, the public sector plays a significant role as a facilitator. Funding from Business Finland assists when international companies like the Borealis Group choose where to conduct research and invest.

Companies which hold similar perspectives collaborate closely

Borealis Polymers is a key player in the SPIRIT programme, which promotes a more sustainable future for the plastics industry. Borealis has received funding from Business Finland for the programme, the production and use of more sustainable plastics.

The programme is scheduled to continue until 2025, during which the entire plastic ecosystem and value chain will actively collaborate. **Jaakko Tuomainen**, the head of Borealis's SPIRIT programme, highlights that, even though the programme is only at its midpoint, it may have achieved its most significant breakthrough : extensive discussions with ecosystem partners have indicated just how many Finnish companies think alike and work towards the same goal. The circular economy is increasingly becoming a systematic part of the way companies do business.

The programme objective of Borealis is to replace a third of Porvoo's fossil raw materials with renewable or recycled alternatives by 2030. In addition, the target is to change production processes to be carbon neutral by 2045 and establish a true circular economy for plastics.

Tuomainen believes that plastic generated in Finland should be effectively circulated within the country as part of the local circular economy. The Kilpilahti area plays a central role in solving the Finnish plastic challenge.

Moving forward, effective collaboration and public support will be needed also in the future. Tuomainen points out that no single company has the resources or expertise to manage the entire circular economy value chain without well-functioning collaboration and public support .

Getting the Largest Possible Group Involved in the Change Process

Kilpilahti is currently recognised as one of Finland's largest sources of emissions, as stated by **Jenni Juuvinmaa**, a business developer at Posintra. The area's green transition and its success have significant national implications.

> **Although the collaboration between companies in Kilpilahti thrives, the public sector plays a significant role as a facilitator.**

© Kilpilahti

The transition is strongly supported by the announcement by Neste, the largest player in the Kilpilahti business area, that it will gradually transform the Porvoo refinery into a refinery for renewable and circular economy solutions. Neste is the world's largest producer of renewable aviation fuel, renewable diesel, and renewable raw materials for the polymer and chemical industry.

Posintra's role as the regional economic development company and development partner for Porvoo is to offer services and mentoring to assist in area development. The development company is highly familiar with the area and understands the requirements of its stakeholders with over two decades of experience. This is also supported by the ongoing STRIIM programme, which pilots a new type of collaboration model.

Posintra is owned by associations and municipalities in the region, as well as companies and business organisations. Posintra's strength lies in its extensive network of expertise, encompassing the cities and municipalities of Eastern Uusimaa, various banks, educational institutions, insurance companies, prominent businesses, and entrepreneur organisations. Posintra's clients have access to a network of experts.

Read more

www.kilpilahti.fi/en

STRIIM Programme

- The STRIIM (Strengthening Regional Industrial Innovation Model) project is piloting, amongst other things, new collaboration methods to strengthen the regional industrial innovation model. The project facilitates mutual communication, brings stakeholders together, and identifies fresh opportunities for collaboration.
- The project's goals also include developing a local circular economy concept for plastics and providing insights into strengthening the production processes and business conditions for stakeholders. The stakeholders in the region have a shared interest but do not compete with each other.
- The STRIIM project has received co-funding from the Uusimaa Regional Council's "Supporting Sustainable Growth and Vitality in Regions" grant.

SPIRIT Programme

The programme is divided into four research and development areas, which are:

- Conversion of fossil raw materials into renewable and recycled raw materials
- Enablers of the green transition: design for recycling, reuse, recycling concepts, standardization
- Creation of efficient systems for large-scale mechanical and chemical recycling of plastics
- Carbon-neutral production of plastics through electrification, green hydrogen and renewable energy.

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The circular economy has taken a leading role in the business activities of start-ups

Many new Finnish companies are making the circular economy their core business mission. However, scalability would pose significant challenges without public backing.

Eliminating plastic waste from the world's waters

RiverRecycle is turning plastic waste found in the world's most contaminated rivers into a business. Its floating booms installed in rivers collect and transport plastic waste to waste treatment facilities. Building materials, among other things, can be made from waste that is usually considered worthless.

RiverRecycle's booms clean rivers in Indonesia, Ghana, India, the Philippines, and next up in line is Bangladesh. The interest in plastic waste collection has been increasing due to the economic benefits associated with it.

The idea is for local residents to recognise the possibilities of reusing waste, leading to a change where trash is no longer dumped in the river but instead delivered directly to waste management services and further waste management facilities. At that point, river booms will no longer be needed, but there is still a long way to go until then. The world's polluted rivers will need more of RiverRecycle's cleaners for many more years.

Read more: www.riverrecycle.com

Converting brewery waste into plastic

Granulous, a bio-plastic start-up, produces compostable plastic substitutes using food industry by-products. The bio-composite utilises brewery waste and spent grain, produced globally in millions of tons annually.

Granulous, in partnership with VTT (Technical Research Centre of Finland), has created a bio-based alternative to plastic. It can easily replace fossil materials without any changes to production. The material properties closely resemble those of conventional plastics.

Granulous' plastic alternative can be used in the production of various items, including dishes, toothbrushes, and phone cases.

© Granulous

Read more: www.granulous.com

Meat alternatives derived from carbon dioxide

Solar Foods uses captured carbon dioxide and electricity-produced hydrogen to create Solein, a food protein. Additionally, the production requires naturally sourced single-cell microbe – livestock or agriculture is needed.

This innovation serves as a raw material for the food industry and can replace milk, meat, and eggs in different food products.

Producing Solein reduces the need for land in food production, and its carbon footprint is estimated to be 1/100th of meat.

Solein has been manufactured at a pilot factory in Espoo since 2018 and its proper production will start at their factory in Vantaa. Concurrently, the production of Solein will grow to meet commercial demands as the plant is expected to produce 120 tonnes of this new food protein annually. Solar Foods' factory is the world's first of its kind.

Read more: solarfoods.com

Niimaar: Recycled furniture

Niimaar is on a mission to improve plastic recycling. The company's services extend beyond designing sustainable furniture to include support for other businesses in rethinking, reusing, and keeping valuable materials in the cycle. Niimaar provides a comprehensive selection of customised sustainability services for organisations and businesses. These services include material review and audit, sustainability reporting and guidance, circular action plans for sustainable packaging, roadmaps, and workshops.

Read more: niimaar.com

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TWICE: Resell, rent, subscribe, and buyback online

TWICE Commerce is a circular commerce platform that generates new business revenue for customers through online store solutions enabling new forms of transactions. The platform enables the conversion of one-time sales into ongoing revenue through various options, such as selling and reselling, subscriptions, and product rentals. The new feature facilitates buyback or trade-in schemes for customer engagement over time and inventory restocking. The company has a worldwide customer base and secured 3.8 million euros in seed funding last autumn.

Read more: www.twicecommerce.com

Converting CO_2 into alcohol

Aircohol, a Finnish growth company, has created a technology that allows the conversion of CO_2 produced during alcohol industry fermentation into alcohol and other raw materials.

The company's technology can reduce global emissions by using recycled CO_2 as the main raw material, eliminating the need for raw materials from the fields. This will cut the carbon footprint of the entire traditional raw material chain and reduce deforestation

The innovative technology is built upon a patented plant-based bioprocess, where the primary raw materials go back to the alcohol industry to produce new beverages. The food, feed, pharmaceutical, and cosmetics industries can use the by-products of this process, such as protein, fats, antioxidants, and vitamins.

The company's technology is integrated into an existing brewery or distillery production process. Brukett, a

© Aircohol

beverage manufacturer, is already using the technology at their production facility in Fiskars, Uusimaa. The company is in talks with the world's leading alcohol manufacturers to facilitate the delivery of the new technology.

Read more: aircohol.com

circularvalley.fi

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