



Transforming Municipality Districts into Learning Centres of Circular Economy

In partnership with the EIT Climate-KIC Circular Cities Project



Climate-KIC is supported by the
EIT, a body of the European Union





The aim of this publication is to showcase how different municipalities create innovation platforms where entrepreneurs, NGOs and community groups can turn different waste streams into new products, new design, new innovative ideas and how these efforts can generate work and at the same time minimise waste.

Transforming Municipality districts into Learning Centres of Circular Economy

Municipalities play a crucial role in the transformation towards a more circular economy. It is well recognised that a city's ability to identify and implement circular solutions at the district level will lead to job creation, a cleaner environment, new or rejuvenated industries, and competitiveness in global markets. The circular economy provides solutions for many environmental, economic and geo-political challenges that cities worldwide are facing.

Municipalities can take action by supporting locally rooted transitions with small and medium-sized companies. If they apply their economic resources through circular and innovative procurement models, they create incentives for companies to develop their business models and investments in a more circular direction.

Cities across the world are paying attention to the circular economy agenda, as it is increasingly acknowledged worldwide that cities are the key drivers of sustainable consumption and in realising a green transition. Cities across the globe echo; it is time to accelerate; reduce; reuse; recycle; rethink. Cities are ready to reconcile the seemingly opposing objectives of circular economy and replacing current practises by adopting a circular, restorative approach where nothing is considered waste.

The EIT Climate-KIC orchestrated Innovation Ecosystem programme is specifically looking for initiatives that facilitate the sharing of Circular economy innovation between cities, regions and urban networks on a global scale. This is the essence of the Circular Cities project.

The Circular Cities project is investigating how a city district and areas can be a transforming agent and create smart and sustainable neighbourhoods. The results of different Circular economy business concepts are anticipated to improve city management of buildings, construction and utility waste. Through productively utilizing household and industrial waste streams, Circular economy will increase the growing acknowledgement of "waste as a resource". This publication is a case catalogue showing 13 examples of how cities are achieving this transformation on a district and local neighbourhood scale.

City Districts as Testbeds to Fast Track a Circular City Transition

This EIT Climate-KIC funded programme targeting circular cities aims to aid city transitions towards zero waste economies through the sharing of knowledge and examples of circular use of natural materials in the built environment.

The conversion of waste and energy production into more circular loops will bring new job opportunities for companies and people. Companies increasingly see opportunities in circular economy business models, which allow them to capture additional value from their products and materials and to mitigate risks from material price volatility and material supply.

The new jobs will benefit the less educated members of the workforce as jobs will predominantly be created in the production sector (this could be jobs within bio-economy, waste- and energy efficiency and building

renovation). Employment for this segment is an asset to society as a whole.

The aim of this publication is to showcase how different municipalities create innovation platforms where entrepreneurs, NGOs and community groups can turn different waste streams into new products, new design, new innovative ideas and how these efforts can generate work and at the same time minimise waste.

Mapping Municipal Cases as Drivers for Circular Economy

Circular economy is a radical solution that advocates for fundamental changes in our current economic system and reduces the environmental burden on the planet. For cities, circular economy is a way to improve the quality of life for citizens by creating jobs and spurring innovation while reducing resource needs. A circular economy makes business sense by using new and emerging technology to create opportunities for innovation and the development of new products and production techniques.

This report gives an overview of how municipal cases can work as drivers towards a circular economy. There are many areas of action as well as different approaches by which municipalities can address and work with circular economy. This publication intends to showcase examples of specific circular economy hubs at a district and area level to explain how cities across Europe concrete circular economic concepts have been designed and executed, including a detailed explanation for the

potential circular economy business cases and technologies which can cascade circular business opportunities.

But what are the more concrete benefits of incorporating circularity as a planning instrument at city and district level and how can these, as well as potential negative effects, be assessed? What needs to be done on a municipality level to turn theory into practice, and what hurdles need to be overcome? How can current policies, alongside business and civil society initiatives, contribute to the transition? Answers to such questions will be addressed in the “Circular Cities” project, which can help policymakers, investors, businesses, consumers and civil society to find the most promising transition pathways.



For further information please contact:
Peter Vangsbo, EIT Climate-KIC
E: peter.vangsbo@climate-kic.org

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PRODUCT REUSE & REMANUFACTURE

The production of products and services require extraction of resources to supply materials, energy and to sustain labour. Products are created using extracted materials for manufactured parts and components before they are marketed and sold to consumers. Each of these steps increase the value of the product through the additive expenditures of materials, energy and labour utilized in the production process.

However, once a product reaches its end-of-use, the value created during the production process is completely lost due to current waste management practices.

Significant amounts of resources are wasted throughout the production process from extraction to disposal given the destruction of value in current end-of-use waste management scenarios as highlighted by Benton & Hazell in 2013. As a result, more primary resources are required in order to meet the ever-growing needs of society. However, over the past decade, there has been a dramatic increase in price volatility and in the supply risk of essential resources. This has a critical impact on environmental sustainability and economic prosperity, and it is a trend which is projected to continue.

Higher value preservation through reuse is needed. A circular economy restores products and components that have reached their end-of-use back to their original state, consuming a minimal amount of resources to deliver the same or improved function. In this way, the value of products is preserved at the highest level, reducing the risk associated with price volatility, resource scarcity, energy demand and environmental impact.

The following three cases from Gothenburg (SE), Hjørring (DK) and Berlin (GER) show different examples of how cities are supporting the circular transition by creating waste centres that accelerate the circular mantra "Reduce-Reuse-Recycle-Rethink".





Gothenburg, Sweden

CURE Pathfinder project – Centres for Urban Remanufacture

Who was the team?

The project was led by the Municipality of Gothenburg, Office for Sustainable Waste and Water. The personnel involved in the planning of the new recycling centres and the personnel who currently work at the recycling centre selling second hand material have been important participants. Additionally, the Chalmers University of Technology had a couple of part time researchers involved in the project.

Local stakeholders were identified and engaged in a local network meeting forming the idea of what a Gothenburg CURE should be. A consortium will be engaged for the implementation of the centres.

What was the vision/goals?

With a creative approach CUREs aim to find uses for materials that are currently not recovered, focusing on specific industrial and commercial waste (e.g. resources discarded from events, theatre plays, films, construction sites, large commercial houses, etc) as well as consumer products that are not covered by the current extended producer responsibility regulations (e.g. furniture, textiles). These centres aim to become a matchmaking arena to connect existing secondary materials to local needs, recovering in that way material resources locally. CUREs do not engage in material recycling, but rather in preparing materials and products for reuse and re-manufacturing, as well as reusing and re-manufacturing items.

The CURE idea was born from several inspiring projects, like Guldminen in Copenhagen, Material Mafia in Berlin, Återbruket in Gothenburg, as well as the FabLab and Makerspace movement.

What is the local waste recycling context?

Waste generation volumes are increasing in Sweden both on an individual and industrial level, with bulky waste accounting for large part of the increase in household

waste. On average, every inhabitant in Gothenburg discards around 401 kg/person (data from 2015). The treatment of household waste has 60% destined to incineration, 18% to material recycling and biological treatment respectively and 4% destined to landfills. The city counts with curbside collection for packaging waste (i.e. paper, cardboard, glass and metal packaging), but for non-packaging fractions, inhabitants are requested to discard the recycling fractions at one of 5 recycling centres available in the city, that are usually accessed by car.

How did you do it? (your approach)

Gothenburg city is planning to build a new recycling centre, so they were open for suggestions about how to also integrate waste prevention through reuse and remanufacture. Their recycling centre Ålelyckan already operates with a traditional second hand shop on the location, as well as a secondary material warehouse, so it seemed natural to take those ideas a step further when planning to build a new recycling centre. This pathfinder project provided with suggestions based on existing initiatives that engage in reuse and remanufacture, but also brought in the perspective and opinions of local actors in the field.

What was done? (activities)

The project did:

1. A review of existing initiatives in the field to learn from existing tacit knowledge.
2. A market analysis for Gothenburg, identifying relevant waste statistics and mapping local actors in the reuse and remanufacture scene.
3. Organized a local network workshop, to take in relevant actors input to what a Gothenburg centre would have and to explore possibilities for collaboration.

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What was achieved? (impact)

The initiative review resulted in an open source scientific article (still in the publication process). The market analysis was summarized in a report, that identified the opportunity of working with currently collected bulky waste fractions from the recycling centres, that currently are just destined to landfill, since no adequate recycling process exists. The municipality is positive about supporting such initiatives and talks of establishing a first workshop space by the currently existing secondary material shop at Ålelyckan were had by the end of the project.

What were the challenges?

Gothenburg is dominated by big industries, like Volvo, SKF, Stena and Saab. This means that most local designers work for these large industries, or in companies that provide services to the large industries. There is an incipient group of actors involved in reuse and remanufacture, but they have to compete with larger industries to allow for designers to engage resource recovery.

Next steps

This initiative was only a pre-study, the project team wants to apply for a Demonstrator, where these centres can start operating.

City Contact Details

Isabel Ordóñez
Co-Project lead
+46 735721077,
isabel.ordonez@chalmers.se,

Summary

The project explored the possibility of establishing centres for urban remanufacture (CURE) in Gothenburg in Sweden that estimates the potential benefit that can be gained. The CUREs are aiming to bring stakeholders together in a urban context and to simulate remanufacturing of urban waste streams from the building sector. CURE are analysing physical places in Berlin and Gothenburg and networks of actors in each of the cities that provide, experiment and eventually reuse or re-manufactures secondary material. These centres intend to increase the usage of local secondary material and redirect waste volumes into value creation activities.

Time period

Aug 2018 – Dec 2018

Information source

The CURE project webpage

Hjørring, Denmark

REPOS project – People, preservation, purpose: Reuse of large household appliances

Who was the team?

The municipal project REPOS was initiated by AVV and supported by The Nordic Council of Ministers. The cooperating actor was the entrepreneurial private company, The Green Appliances, who performs the refurbishment of the appliances. The company was initiated as a start-up through the project REPOS. It is the first of its kind in Denmark, and results from this practical experiment can be used to inspire and inform future projects and initiatives on WEEE repair and reuse.

What was the vision/goals?

The purpose of the REPOS project was to develop and test a new system for collection, preparation for reuse and sales of used electrical appliances (excl. refrigerators/freezers) which are collected at municipal utility sites in order to develop a system to organise and integrate this in the Danish/Nordic WEEE system.

What is the local waste recycling context?

AVV receive 500 ton of appliances (excl. refrigerators/freezers) yearly with a hypothetical potential of approx. 1,300 reusable appliances yearly. The estimate was to collect, refurbish and sell 100 appliances per month. However, only 73 per month was collected and after screening them, only 33 were fit for reuse. With further tests and reparations, the estimate had down-scaled from 100 to 17 sellable appliances per month. Hence, a better system for the collection was needed. Development of a better collection method is currently being developed.

How did you do it? (your approach)

AVV manage 18 utility sites and thus organises the collection of waste from 100,000 citizens in the two

municipalities Hjørring and Brønderslev. AVV's role in the project was to organise a gentle collection of the appliances, to preserve the ability for reuse.

Improve reuse of the electrical appliances was the goal of the project, in order to reach one of the circular economy principles of extending the lifecycle of products.

As utility centres and municipalities are not allowed to enter marked competition beyond waste, it is a win-win situation to collaborate with organisations, private entrepreneurs and companies, along with other municipalities and communities.

*AVV receive 500 ton of appliances yearly
with a hypothetical potential of approx.
1,300 reusable appliances yearly.*

What was done? (activities)

As AVV was already collecting WEEE, the first task was to establish a workshop in which the appliances could be tested, repaired and cleaned by The Green Appliances. The items must live up to certain criteria to maintain a good quality, e.g. only appliances with an Energy Label of B or above are sellable. A registration system for collecting and managing data and reports was also developed. This is necessary to keep Elretur (the collective scheme) and the authorities informed on WEEE data.

The sales process is arranged through AVV's existing thrift shop. The used appliances are offered with a warranty period of 6 months and a customer right for complaints for an additional 18 months.

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What was achieved? (impact)

The main results are the collection of new insights into how the WEEE management system can be organized in a way that enables reuse, not just recycling. The practical experimentation has provided new knowledge about:

- the market for used appliances
- legal barriers
- skills and methods required
- how to build up a collaboration between municipal and private actors

Other benefits are the environmental benefits from moving the appliances up the waste hierarchy and enabling people outside the labour market to acquire meaningful employment and building up of skills.

What were the challenges?

The challenges were of systemic and organisational character. There were uncertainties about the cost-benefit of the price and time invested in the reparation vs. the sales value of the appliances. The unclarity of the regulations on waste and its ownership, along with producer responsibility, also caused some concern. It was learned that a more delicate reception and transportation was required to achieve the goal of reusing 15% more of the 1,300 disposed appliances. It is possible to drive a profitable business.

Next steps

The project's results can be used by other municipalities and cities to organize similar repair and reuse activities. The report on the initiative is to be published in 2019.

City Contact Details

Kristina Overgaard Zacho, Project Assistant at AVV
+45 9623 6644
koz@avv.dk

Summary

The city of Hjørring initiated a project to increase repair and reuse of large household appliances in collaboration with a private appliance repairer. Waste from Electrical and Electronic Equipment (WEEE) is one of the most increasing waste flows in Europe. In the Danish system, WEEE is collected for recycling at municipal collection sites, and so far, no preparation for reuse activities exist as a waste management option.

Time period

March 2018 - November 2018.

Information source

AAV (Affaldsselskabet Vendsyssel Vest I/S), The municipal waste management company in Hjørring. Webpage.

De Grønne Hvidevarer (The green Appliances) a private appliance repairer. Webpage.

REPOS project – read article and watch video here (in Danish).

Berlin, Germany

CURE Pathfinder project – Centres for Urban Remanufacture

Who was the team?

TU-Berlin Chair for Circular economy and Recycling Technologies led the project.

Material Mafia, a social business, was the main project partner.

Circular Berlin and OMA cafe were other actors engaged.

Local stakeholders were identified and engaged in local network meeting and workshop forming the idea of what a Berlin CURE should be.

What was the vision/goals?

CUREs aim to find uses for materials that are currently not recovered with a creative approach helping redirect waste volumes into value creation activities. It focuses on specific industrial and commercial waste (e.g. resources discarded from events, theatre plays, films, construction sites, large commercial houses, etc.) as well as consumer products that are not covered by the current extended producer responsibility regulations (e.g. furniture, textiles). These centres aim to become a matchmaking arena connecting existing secondary materials to local needs recovering material resources locally. CUREs do not engage in material recycling, but rather in preparing materials and products for reuse and re-manufacturing, as well as reusing and re-manufacturing items.

The CURE idea was born from several inspiring projects, like Guldminen in Copenhagen, Material Mafia in Berlin, Återbruket in Gothenburg, as well as the FabLab and Makerspace movement.

What is the local waste recycling context?

In the city of Berlin, about 1,1 million tonnes of waste were collected and treated in 2016. 75% of the waste comes from households and businesses, which are

waste fractions covered by the obligation to be handed over to the public-law waste management company, the Berliner Stadtreinigungsbetriebe (BSR). In addition, some waste fractions are collected separately, including waste wood (10%), used textiles (3%), scrap tires (about 2%), electronic scrap (1%) and scrap metals (1%). Bulky waste is collected via pick-up or at recycling yards of the BSR and amounts to approximately 55.000 tons.

A large proportion of the waste from households and businesses that needs to be disposed of correspond to organic waste (about 50%). However, this waste stream also contains amounts of textiles, metals and plastics that should not be neglected. The direct reuse and remanufacture of these fractions is currently prevented by contamination with organic waste as well as missing sorting stages before recycling.

Substantially only about 8% of the annually generated waste in Berlin are recycled at the end. Re-use and remanufacture of products are not covered by the waste statistics because products and materials already recovered in these ways never reach the “waste status”.

How did you do it? (your approach)

The project was run by the project team at TU-Berlin, in collaboration with the above-mentioned project partners. Local city authorities were contacted and participated in the local network meeting and workshop. Additionally, a follow up meeting with actors from the Berlin Senat was held.

What was done? (activities)

The project has developed a review of existing initiatives in the field to learn from existing tacit knowledge along with a market analysis for Berlin, identifying relevant waste statistics and local material intensive commercial activity.

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A local network workshop was hereafter organised, to get input from relevant actors to what a Berlin centre should include and to explore possible collaborations. The meeting was a success with more than 70 participants from different sectors.

What was achieved? (impact)

The review of initiatives resulted in an open source scientific article (still in the publication process). The market analysis was summarized in a report, that identified the opportunity of initially focusing on discards from fair and congresses held in the city (Berlin has an average of one fair every other day). These waste streams have been in use for a few days and therefore tend to be of good quality. Additionally, it was identified that 'the material intensive creative branch' in Berlin is large enough to be an interesting material re-user target.

What were the challenges?

Many of the identified active actors in the reuse and remanufacture field operate independently, whereas the idea of a common centre was welcoming. The challenge now lies in finding the right location and implementation plan on how to establish and manage such a centre in a way that it nurtures the synergies between these actors, rather than including some while excluding others.

Next steps

This CURE project was only a pre-study and the project team now wants to apply for a demonstrator to make the ideas of the centres operational.

City Contact Details

Isabel Ordóñez, CURE Project lead
+49 1778662650
isabel.ordonez@tu-berlin.de

Summary

The CURE Pathfinder project explores the possibility of establishing a Centre for Urban Remanufacture (CURE) in Berlin. CUREs are the physical place and network of actors that provides, experiments and eventually reuses and/or re-manufactures secondary material. The project will estimate the potential benefit it may generate and engage a consortium to implement such a centre.

Time period

Aug – Dec 2018

Information source

The CURE project webpage

SUSTAINABLE LIVING & CONSTRUCTION

Integrated planning is essential for the realization of a circular future. It has been estimated that 75% of global infrastructure required by 2050 is not yet in place today. Furthermore, building materials account for around 40–50% of an office building's carbon footprint (producing cement and steel accounts for nearly 80% of all energy used during construction). The remaining 20% are used for transporting materials removing waste and energy consumption on-site. If the construction sector continues to use these construction methods, it will have heavy consequences for the natural environment, air quality, resource availability, public health and ultimately on the economy.

Buildings can and should be designed to enable easy reuse or repurpose of materials up to their maximum lifespan. By using "material passports" listing the quantity and quality characteristics of all materials whenever a building is constructed can stimulate recovery, recycling or reuse when the building is eventually demolished. With more integrated planning of construction and demolition projects, used materials can easily feed into new buildings. Therefore, cities need to test new types of circular construction, which provide incentives for builders to take a more holistic and systemic approach to the design, construction, maintenance, operation and the end-of-life of buildings.

The following three cases from Trondheim (NO), Malmö (SE) and Maribor (SLO) show different examples of how cities are supporting circular and sustainable living by setting new boundaries for circular construction.





Trondheim, Norway

Experimental housing at Svartlamon

Who was the team?

Trondheim Municipality is the regulator and land owner. Svartlamon Housing Association is a non-profit organization that leases the land and most of the buildings at Svartlamon from the municipality and rents them out to the residents. There are approx. 300 inhabitants at Svartlamon for the time being.

Two architecture students from the Norwegian University of Science and Technology (NTNU) took the initiative to start a self-build project on the site. The architectural concept was a result of a long participatory process with residents at Svartlamon. Five self-builders were selected out of more than 20 applications.

What was the vision/goals?

Already in 2001, Trondheim City Council has approved Svartlamon as an experimental urban ecological area, which is until now the only one of its kind in Norway. The ambitious regulation plan, approved in 2006, encourages “new sustainable solutions within management, rehabilitation and new buildings, with a focus on low cost and resource use on every level of the process”. This ambition laid the foundation for this unique experimental housing initiative.

What is the local waste recycling context?

According to the Municipal Plan for Waste and Waste Reduction 2007-2016, within the construction sector, the amount of waste per square meter of both new and renovated building should be reduced; at least 80% of construction waste should be sorted for recycling and residual clean building materials should be reused or disposed properly. The plan is being revised for the period 2018-2030.

How did you do it? (your approach)

In 2013, two architecture students decided to try to make a concept for a self-build project on a site at

Svartlamon, regulated for “experimental building”. After some intensive participatory processes, the architectural concept was approved and a group of self-builders were selected in 2014. The students then continued to develop the project together with the self-builders through workshops, meetings and interviews. The concept was later turned into a building application and approved. The first foundation stone was laid in September 2015 and the buildings were accomplished in 2017. It has been a lot of dispensations from the Norwegian Building Code, which was granted due to the area’s special regulation as an urban ecological trial area.

What was done? (activities)

The self-builders have had a common framework to deal with, including size, shape, construction, ventilation, use of materials and the pursuit of ecologically well-functioning solutions. They have also had great freedom and collaborated on everything from foundation to structures such as walls and ceilings. When the common structures were done, they worked further individually on their own homes. The self-builders may rent the houses from Svartlamon Housing Foundation at a low price and stay there for as long as they want.

What was achieved? (impact)

The building project has a very tight budget of 3 million NOK, which gives a square meter price of about a quarter of what can be expected for new construction projects in Norway. This is only possible with all the voluntary work and creative use of building materials. The foundation, bearing structure and isolation materials are new, otherwise all the facade and interior were built extensively with used or discarded materials, including windows and doors. This brings the five houses unique aesthetics. With a process focused on empowerment the self-builders participated actively in co-creating



their own living environment, rather than just being passive consumers.

What were the challenges?

Reuse was taken in as a key element during the development of the architectural concept. During the building phase, the experience was that extensive reuse was rather time-consuming since the building materials often required more preparation and cleansing. This is a clear disadvantage of reuse for professional builders, especially since it is not worthwhile in monetary terms.

After the project received some publicity, it was not as difficult to get materials for reuse. However, demolishing for reuse was also time-consuming. The construction site had to allow much flexibility and storage. It is an ambiguous situation that it so cheap to discard usable materials today, which is a great barrier for reuse. As "Time is money" it became a discussion about value creation.

Next steps

Svartlamon is currently unique in Norway. The self-build project has demonstrated that alternative models are possible. There have been numerous open days and site visits organised. How do we go from alternative to mainstream? What kind of business models can be developed in order to facilitate reuse of building materials based on lessons learnt? There is still a lot to explore.

City Contact Details

Hanne Aaserud, Climate Advisor,
Trondheim Municipality
hanne.aaserud@trondheim.kommune.no

Summary

Svartlamon is the first urban ecological trial area in Norway. It is regulated by the municipality for experimentation and trial. Five experimental houses at Svartlamon were planned and built by architect students and building users, demonstrating frugal use of resources, creative reuse and intensive community participation.

Time period

2013-2017

Information source

[Project description](#)

About reuse in this project: Gjevt med gjenbruk på Svartlamon

[About Svartlamoen](#)

Malmö, Sweden

Sege Park – Urban district for circular living

Who was the team?

Fastighets- och gatukontoret, FGK (FGK develops and manages municipal property) FGK is the leading facilitator of the dialogue between the developers and the city.

Miljöförvaltningen (Environment Department of Malmö) The department is part of the dialogue between the city and developers and has produced the sustainability strategy for the area.

E.ON. (Utility Company) Collaborates with the city of Malmö in order to construct a system of smart grids for both electricity and heat for optimisation based on e.g. price, carbon dioxide emissions and power usage. The district heating network should be able to and heat for optimisation based on e.g. price, carbon dioxide emissions and power usage. The district heating network should be able to handle lower temperatures than the current standard dictates.

VA SYD (VA Syd is the municipal waste management company) The company collaborates with the municipalities and E.ON. around development of i.e. improved recycling of waste and sewage, local co-utilization and reuse of goods, bio and hydrogen solutions for buildings.

Private developers/builders play an essential role in the process, as they will build/rebuild the majority of the new houses. The idea is to engage citizens in different aspects of the process along the way.

What was the vision/goals?

For the City of Malmö, the testbed in Sege Park is under development to become an international flagship on a district level within the sharing economy. The municipality is cooperating with all the actors who invest in the district, including the builders, to develop new forms of housing and business models.

The Sege Park project has an overall focus on sustainable development, in terms of energy production, energy efficiency, sharing economy initiatives, minimization of parking lots, etc. The area will provide the city of Malmö with 700 new housing entities, whilst at the same time working as a test ground for exploring the opportunities for building and planning in sustainable ways.

The vision is to establish large-scale systems such as open stormwater management, local energy sources, smart electricity grids and self-sufficient street lighting that coincide with small-scale investments in, for example, bicycle pool, car pool, recycling centre and greenhouses. Car traffic is to be minimized and a fine-meshed network of infrastructure for pedestrian and bicycle traffic is being built, which also links the district closer to the city centre.

Homes, businesses and public services will emerge in an old, attractive park environment. The area serves as an experimental workshop for sustainable city planning, with the hope to inspire prospective projects in and outside Malmö.

What is the local waste recycling context?

Sharing economy is integrated into the physical development of the city.

How did you do it? (your approach)

The property of the Sege Park location is owned by the municipality. In order to meet the sustainability ambitions, the construction assignment was based on a tender with great emphasis on sustainability criteria in the selection of the winning construction companies.

During the long development phase representatives from the municipality meet with those who have received land referral once a month to discuss different



themes – design, sharing economy and energy solutions, etcetera.

What was done? (activities)

The role of the municipality has been to use procurement as a vehicle to grant the property of Sege Park to developers with high sustainability ambitions. The municipality continuously facilitates the dialogue between developers and the city in order to make the park as sustainable as possible.

The City of Malmö has for many years been conducting so-called building developer dialogues in several development projects, where representatives from the municipality facilitate dialogues with the selected developers in the projects. The purpose is to guide and inspire the developers to aim high and to achieve end-results showing the path for sustainable urban construction. The procedure of such dialogues is that a group of builders and developers (10-15 people) meet and discuss the opportunities to achieve good solutions at a systemic level and learn from each other. The concept has proven to be a constructive way of working and is therefore being used in Sege Park to facilitate the high sustainability goals.

In 2015, a sustainability strategy for Sege Park was adopted with sharp goals for the sustainability ambitions in the area. The City of Malmö along with E.ON. and VA Syd have jointly developed focus, ambitions and common aims for achieving the goals of the strategy through a climate and circuit arrangement. The City of Malmö, together with VA Syd and E.ON. have established common objectives for three focus areas: energy, waste and water and sewage. Together, they will work to achieve the goals in close cooperation with builders and other actors.

Summary

An old hospital area in the outskirts of Malmö is being transformed into a modern testbed for sustainable living and sharing economy initiatives. It will be an area where housing and businesses find commonality when it comes to cultivation and sustainable solutions. The cultural-historical environment is preserved while the area is a technological spearhead.

Time period

2015-2025

Information source

Sege Park project webpage and project description on the city of Malmö's webpage.

Land guidance program for Sege Park:
Markanvisningsprogram för Sege Park

Sustainability Strategy for Sege Park:
Hållbarhetsstrategi för Sege Park

Sege park included as a case in the SHARING
CITIES

What was achieved? (impact)

The project is still in the planning and development phase. The actual process of rebuilding Sege Park begins in 2020.

One of the exploratory companies with which Malmö Municipality cooperates is Godsinlösen from Staffanstorp. They are a good example of a company that finds and creates new opportunities in a circular economy. In collaboration with several of the country's major insurance companies, Godsinlösen saves useful resources from becoming waste, including damaged mobiles and computers. They bring in the broken units, repair them and sell them at a lower price compared to new ones. Now they are expanding their business model. Godsinlösen have earned somewhat of an umbrella function for different sharing activities in Skåne.

It is not just about passive contexts but also about active services – partly of simpler types such as tailors, and partly more complex types such as laundry shops. So far, the conceptualization work has resulted in some seventy different sharing functions

What were the challenges?

How do the City of Malmö structure the sharing economy structurally into the properties being built? How do we shift functions from private homes – laundry, workshop, meeting areas – and make them public or semi-public so that they can be shared with more people? These are some of the issues that the city planners from Malmö Municipality together with the local builders are exploring together.

In a city where 45 percent of the population is defined as having a "foreign background", it is natural that integration issues are high on the agenda. The sharing economy can help in many ways. One example is that a better range of shared spaces and functions in homes makes it cheaper to live, mainly because a family can

live comfortably in a smaller space. Another example is that the sharing economy creates jobs.

Malmö, like many other cities, has a structural production of waste in society today. Cars are idle 90 percent of the time. Many people, especially those who live in villas, often have more space at home than they need. Over 30 percent of the food we eat is wasted. All of this creates room for entrepreneurship that can provide job opportunities in the future and need to be considered when new district in cities is refurbished and designed.

Next steps

Malmö city is using Sege park to explore whether sharing can be a tool for living within planetary boundaries while keeping within reasonable monetary limits.

If any cities build in an environmentally friendly way it is often rather expensive! Sege park would like to explore if sharing can be a tool that allows for new construction of high standards from both a quality and natural resource point of view and if it can also be made cost-effective for residents. If people cannot afford to live sustainably, then how can any city in the world call its operation sustainable?

City Contact Details

Pernilla Andersson, project manager
Fastighetskontoret (real estate office).
pernilla.andersson@malmo.se , Tel. 040-34 17 81



Maribor, Slovenia

CINDERELA – Resource efficient construction sector

Who were the team?

The project was carried out by Nigrad d.d. The preparation and implementation of CINDERELA is running in close collaboration with the Municipality of Maribor project office and other departments as well as local companies with involvement and inputs from the general public. It is funded by the HORIZON 2020 EU program.

What was the vision/goals?

The overall goal is to locate and utilize input materials for the recycled aggregates, building composites and recycled soil from local activities in our urban area. It is based on the "Strategy for the transition to circular economy in the Municipality of Maribor" adopted by the city council along with the defined pillars of the Maribor's Wcycle project.

The CINDERELA project directly addresses this challenge by providing cheap, locally available, durable and environmentally friendly SRM from side stream construction products.

What is the local waste recycling context?

The construction sector is the largest consumer of raw materials and utilises more than 50% of all extracted materials. The challenge is that this sector is generally considered to be conservative with application of innovative technologies, materials and services, especially in the use of SRM. Nevertheless, there lies great potential as it is estimated that more than half of all extracted materials could be reintroduced in construction of buildings and infrastructure.

How did you do it? (your approach)

The project wanted to address the recognized problems with the construction sector in the city.

The application for the CINDERELA project for HORIZON 2020 was prepared as part of the activities of the Wcycle Institute of Maribor. The consortia consists of thirteen recognized international partners where Nigrad was given one of the most important roles of project preparation and implementation.

What was done? (activities)

Nigrad and the Wcycle network are both owned by the Municipality of Maribor and are therefore closely connected on the strategic level through the engagement in the municipal Circular economy strategy. The municipality provides guidelines to its public companies, agencies and institutes and seek to transform their activities from a linear to a circular approach by offering them different kinds of support.

The challenge is that this sector is generally considered to be conservative with application of innovative technologies, materials and services, especially in the use of SRM.

What was achieved? (impact)

The direct results of the project will be a demonstration of recycled soil and recovered material in used practice. Based on recipes from the Slovenian National Building and Civil Engineering Institute, Nigrad will experimentally prepare about 5,000 m³ of recycled soil, produce



approximately 300m of roadways from recycled building side streams, and prepare models for mixing waste soil. Finally, the project will build a demonstration facility from recycled materials with a gross area of approximately 150 m² for project presentations purposes and subsequent for use of the operations of the Department for Material Resource Processing.

What were the challenges?

The greatest challenges are bureaucracy. Obtaining building permits, regulations around production facilities and the introduction of new, innovative materials as building composites has been stagnant. Nevertheless, with a little patience, those barriers will be overcome.

Next steps

After getting the results of the pilot project in three years, the city of Maribor will consider scaling up if the positive effects are considerable.

City Contact Details

Nigrad d.d. A: Zagrebška cesta 30, 2000 Maribor
Brina Novak, brina.novak@nigrad.si

Summary

The Cinderella project seeks to unlock the potential for resource efficient construction in urban areas by using secondary raw materials (SRM) produced from different waste streams from local sources. The recovery products will then be used in the construction sector as recycled aggregates and innovative composite materials.

Time period

June 2018 - June 2022

Information source

Visit H2020 project fact sheet

Nigrad.d.d. (public utility company primarily owned by the Municipality of Maribor).

WASTE SYSTEMS

It is well recognized that if our resources are depleted, growth, job creation and competitiveness will also be compromised, and negative environmental impacts will be generated. Turning waste into a resource has been the goal for many European cities in the last 10 years. Still, only around 1/3 of the waste generated in cities are recycled, whereas the rest is incinerated or stored at landfills. One of the key objectives in the EU Circular Economy Package is to recycle more in order to have more “resourceful waste”. Recycling is a pre-condition for the circular economy.

EU legislation act as a driver for cities, governments and industry to improve waste management, stimulate innovation, limit the use of landfilling and creates incentives to change consumer behaviour. The European Commission is constantly making proposals to revise EU legislation on waste set clear targets for recycling and establishing an ambitious and credible long-term path for waste management in the European Union.

The following two cases from Maribor (SLO) and Trento (IT) are two examples of how cities can create concrete waste centres that promote reuse and work toward closing the loops of all fractions of municipal waste, thus securing waste systems that support the circular transition.





Maribor, Slovenia

Sorting plant for mixed municipal waste

Who was the team?

The municipal waste management is handled by the company Snaga (The Municipality of Maribor owns 94 % of the company). This project is approved and financed by the City Council of Maribor.

What was the vision/goals?

The main incentive was to alter the ratio of recycled waste compared to the amount of waste passed on to fractions categories of incineration and disposal. The goal is to exceed the average recycling ration in Slovenia and hereby live up to the circular strategy for municipal waste management of Maribor.

What is the local waste recycling context?

Today we still take natural resources for granted, although more than 60 % of natural ecosystems have already been degraded.

The bulk of mixed municipal waste brought to the sorting centre goes through the plant and is sorted into three main groups: fractions suitable for recycling, a light fraction which is handed over for incineration in a heating plant and a heavy fraction which is disposed.

About 373 kg of municipal waste per citizen is collected each year in Maribor. Before this new sorting system 60 % of all collected municipal waste were already recycled.

How did you do it? (your approach)

The circularity ambition in the municipal waste management systems required a new technological approach adjusted to the meet environmental and economic goals.

The idea of the sorting plant was born almost a decade ago. In the meantime, technology has advanced making it possible to make use of super modern technology, which exhibits exceptional and unique effects in waste separation not only in Slovenia, but in the entire South-Eastern European region.

It took a lot of political work to persuade the city council that circularity is the only right path. The turning point came when the previous mayor put the recycling plant on his top 5 priority projects list.

The circularity ambition in the municipal waste management systems required a new technological approach adjusted to the meet environmental and economic goals.

What was done? (activities)

The municipality plays a significant role in decision making at Snaga, where all process phases needs approval from the city council.

The city communities in near proximity to the plant were brought into hearings on various steps in the process.

What was achieved? (impact)

The previous waste management system of mixed municipal waste in Maribor was privatized. The new system has three major waste groups: recyclable fractions, high calorific fractions and a s. c. heavy fraction, which is equivalent to a third of the residual waste which was previously disposed. The waste which is separated into



pure fractions becomes usable and can therefore be reintroduced on the market.

The sorting plant is justifiably called the largest and most important investment in the history of Snaga. With the new sorting plant, Maribor has taken the lead in the transition of Slovenia towards circular economy in addition to being important for the quality of life in Maribor.

The project is financed through tax money.

What were the challenges?

The key challenge was to adapt the changes in an unpredictable market of secondary raw materials. Maribor was forced to look into new recycling technologies since China stopped importing plastics from abroad last year.

Next steps

The municipality of Maribor wants to expand the process of waste treatment to other waste streams and is not satisfied only by achieving good results on mixed municipal waste. The city will continuously aim to close the loops of all fractions of municipal waste and secure some of them in closed urban loops. The next target is biological waste.

City Contact Details

SNAGA, družba za ravnanje z odpadki in druge komunalne storitve, d.o.o.
Nasipna ulica 64, SI - 2000 Maribor
info@snaga-mb.si

Summary

The new sorting plant works to sort out useable materials from mixed municipal waste to make recycling possible. Extremely precise sorted waste is divided into three main groups: fractions suitable for recycling, light and heavy fraction. The Wcycle model looks for solutions and technologies to process the heavy fraction further, with the aim to completely avoid waste disposal.

Time period

July 2018 – July 2019 (testing phase)

July 2019 onwards (fully operational)

Information source

Snaga (centre for the preparation of secondary raw materials) webpage

Trento, Italy

Greencycle: Introducing a Circular economy system to Alpine Space to achieve low carbon targets

Who was the team?

Greencycle is an Interreg Alpine Space funded by the European Regional Development Fund. It is carried out by the Municipality of Trento, Environment Service, with the other project partners and collaborating with local enterprises, associations and institutions.

The Municipality has involved citizens through different initiatives to create awareness on production and consumption culture.

What was the vision/goals?

Differentiated waste collection is of high priority in the City of Trento (>80%), but the amount of wastes produced remains stationary and some waste fluxes are undervalued or untreated.

The municipality decided to integrate a Municipality Strategy Plan including new operative targets to reduce consumption and wastes, promote reuse and exploit local resources by including circular economy initiatives.

What is the local waste recycling context?

The waste footprint in Trento is approximately 464 kg per person

How did you do it? (your approach)

The Municipality of Trento analysed the existing local sustainable policies and practises, and organised meetings with local stakeholders to identify needs and to develop ideas.

What was done? (activities)

The City of Trento is implementing the following activities:

- map and promote services for repair, re-use and swap of household goods in the territory
- evaluation of new solutions to improve the circularity of goods and materials (e.g. creation of a re-use centre and a new recycling plant for pulp and paper) collaborating with the Province and the Waste Management Agency
- map and promote the different actors of the short supply chain to promote a more sustainable food production and consumption, collaborating with University, food producers and associations
- development of a circular economy platform to map resources, gather data, monitor the circular economy situation in the territory, exchange information about materials and circular economy business activities, create a network between public and private entities. Collaboration with Trentino Digitale (local ICT enterprise) and the other project partners

The municipality decided to integrate a Municipality Strategy Plan including new operative targets to reduce consumption and wastes

What was achieved? (impact)

The project will have a positive:

- ecological impact (waste prevention, reduction of transports and food wastes, recovery of materials)
- social impact (social integration, the increase of critical consumption, support for the less well-off people)



- economic impact (reduction of landfill costs, new green jobs, new “circular” activities, promotion of the local workers)

What were the challenges?

Collect the data, bureaucracy and contacts

Next steps

Yes.

City Contact Details

Lara Bustros

Trento Municipality

lara.bustros@comune.trento.it

Summary

Trento defined and adopted a political circular economy strategy to promote circular economy initiatives in the municipality. A new specific role inside the PA was created to facilitate the implementation of this strategy and to set a network with other administrations, citizens and enterprises through a web platform.

Time period

2016-2019

Information source

Stakeholder network map

Project webpage

ENGAGEMENT HUBS AND URBAN LABS

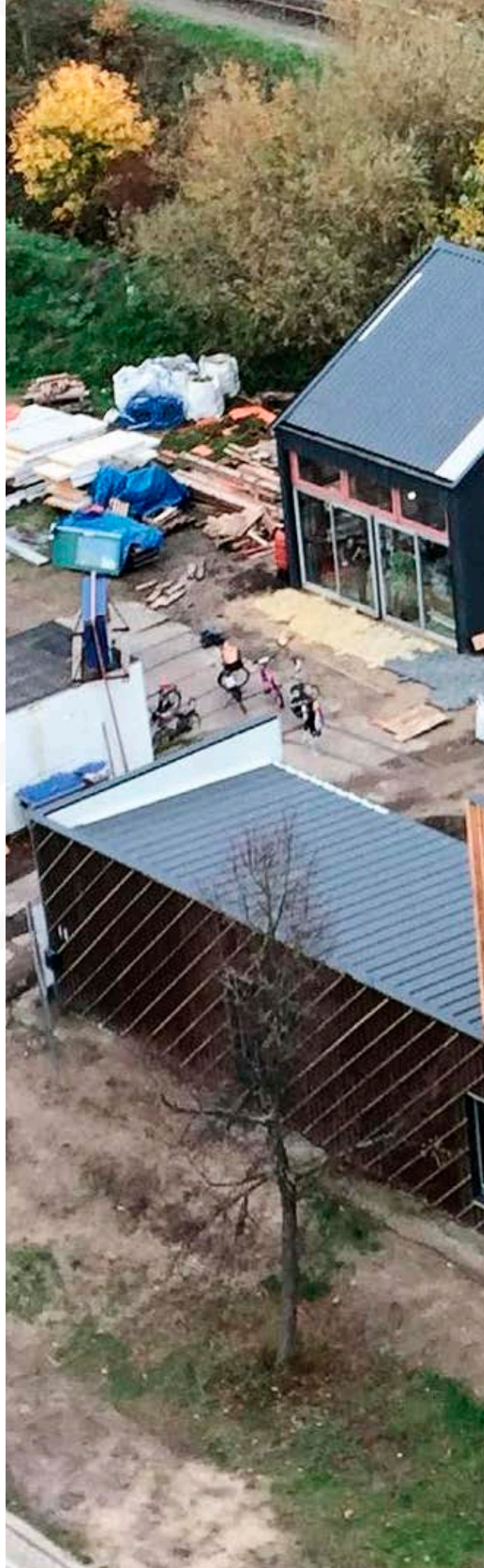
Most municipalities have a vision and strategy for how they will develop in the future. These visions help shape, direct and give directions to more specific plans and policies both at city as well as on district level. A well-written and defined vision makes it clear to all departments of the administration what to keep in mind when putting it into practice on a daily basis. To secure a circular transition, it is important to showcase concrete action and to get the general public onboard for the long-term vision to succeed. This is the purpose of engagement hubs and urban labs.

For this reason, many cities create physical places to showcase ongoing initiatives supporting the overall strategy masterplan in order to encourage local engagement and inspire citizens and community groups to participate in the circular city transition.

Due to the close proximity of citizens, retailers and service providers' engagement hubs and urban labs lend themselves particularly well to circular business models. Cultural trends and city lifestyles play a vital role in the circular transition. If municipalities can encourage entrepreneurs, creative individuals and small producers to become early adopters of working with various circular concepts, the benefits of the circular economy can later be picked up more broadly to create an identity of the city.

The circular economy can enhance an area's economic mix by increasing levels of employment and business diversity as well as by enabling further innovation. This can be achieved while improving the climate-resilience of the city and reducing its carbon footprint, which will have long term benefits for the cities.

The integration of practical circular economy hubs that support circular thinking is starting to become acknowledged for making things smarter, cleaner, cheaper and more resource efficient on an individual level. The four following cases from Trondheim (NO), Copenhagen (DK), Helsinki (FIN) and Utrecht (NL) showcase different ways of integrating circular economy principles into the operational models of municipal administration.





Trondheim, Norway

City libraries as platforms for repair, exchange and lend

Who was the team?

The initiative was a collaboration between the Trondheim City Library and the Department of Environment in Trondheim Municipality.

What was the vision/goals?

One of four development goals for Trondheim is to become a sustainable city where it's easy to live an environmentally friendly life. It is stated in Climate Action Plan 2017-2030 that Trondheim aims to contribute to the Circular economy by increasing material recycling to at least 60% by 2025 and to 65% by 2030.

What is the local waste recycling context?

In average, 340 kg of household waste per inhabitant was generated in Trondheim in 2017, this amount has decreased in recent years. About 30% of household waste in Trondheim is now material recycled and the goal is to reach 50% by 2022.

The Municipal Waste Plan 2018-2030 aims to further increase reuse in private households (5% by 2030) and the municipal organisations (25% of furniture, equipment or similar).

How did you do it? (your approach)

Since 2012, Trondheim Municipality has initiated several lending centres for sports equipment in collaboration with sport clubs and voluntary centres. Later on, this initiative was extended to plant seeds, pro tools and e-bikes for transport through the municipal libraries. The "repair, exchange and lend" project in Trondheim City Library is financed through the Trondheim Municipality's climate budget executed by the Dept. of Environment. Since 2018, the municipality offers grants for activities that promote reuse and repair.

What was done? (activities)

Trondheim City Library consists of one main library in the city centre and six libraries in various districts. Through the "repair, exchange and lend" project, the libraries arrange exchange days for toys and clothes, workshops for repairing bikes, furniture, electronics and textile, courses about redesign and cooking courses to reduce food waste in addition to other lectures and debates.

In average, 340 kg of household waste per inhabitant was generated in Trondheim in 2017, this amount has decreased in recent years.

What was achieved? (impact)

In 2018 (from May to December), 24 events were held in all seven branches of Trondheim City Library, reaching more than 500 participants. The library has received very positive feedback from the participants. Several responded that they were surprised that the library has such events, and some started to follow the library on social media to get informed about similar events. The library engaged competent lecturers and course holders who are both knowledgeable and good communicators. Establishing city libraries as platforms for sustainable lifestyles has a much larger outreach. This initiative may also contribute to stimulate the reuse market and create job opportunities for the "fixers".

What were the challenges?

Even though the response was positive, the biggest challenge for 2018 was marketing and recruiting participants. Trondheim City Library promoted the events

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through their own social media channels and printed posters, but it didn't seem that all potential participants were reached. They have gradually started to cooperate more with the environmental organizations in the city, who can share the events with their members.

Next steps

Many of the events implemented in 2018 were so successful that the library has plans to repeat them in 2019, while others probably have to be adjusted somewhat and possibly organised differently.

City Contact Details

Hanne Aaserud, Climate Advisor
Trondheim Municipality
hanne.aaserud@trondheim.kommune.no

Summary

Libraries are already in the reuse business. In addition to books and media, libraries in Trondheim have extended their services to lending out pro tools and e-bikes for transport and organizing repair workshops and toy exchanges. They have become a platform to promote sustainable lifestyles.

Time period

April 2018 - December 2019

Information source

Articles in Trondheim2030.no such as:
Spar miljø og lommebok med å låne utstyr
Gjør gammelt til nytt på Fiksefest

Copenhagen, Denmark

Circular South Harbour

Who was the team?

The Technical and Environmental Administration of Copenhagen Municipality (Teknik- og miljøforvaltningen) played a central role by adopting a master plan for circular economy in the City. The administration chose the location of this new circular economy centre to be in the South Harbour district. The Integrated Urban Renewal Initiative is part of the administration who engage local stakeholders and establish supporting projects.

Aalborg University is a key stakeholder in the project. It is vital as a large local company employing some 500 staff and engaging 3,500 students, but moreover an important actor as a centre for research in circular economy solutions.

Local NGOs (Red Cross, SydhavnsCompagniet and Opzoomerne) are part of upcycling and retailing in the project and has been very active in the development.

AKB is the largest local retail land lord and has integrated circular economy in their strategy and are now supporting start-ups which have evolved in the area.

Local citizens have been directly part of steering committees and working groups both producing strategies and adopting plans and projects.

What was the vision/goals?

The vision for The Circular South Harbour is for the area to be a leading living lab for circular economy. The vision is based on the local tradition for re-cycling and up-cycling, which makes circular economy a natural and strong local asset.

What is the local waste recycling context?

In 2016, 183,000 tons of household waste was collected. Out of this, 36% was recycled, 63% burned and 1% deposited. The expectation is that households in 2018 collectively produce 184,000 tons of waste. Out of this, 45% is expected to be recycled, 54% burnt, while 1% is deposited or specially treated (Source: RAP24).

How did you do it? (your approach)

The project engaged local stakeholders in conversations on local assets at an early stage, where circular economy stood out as a particularly local stronghold. In order to open up for new and innovative business opportunities, a call for possible new industry ideas was created. As part of this process the living lab was established to strengthen the local network.

Local citizens have been directly part of steering committees and working groups both producing strategies and adopting plans and projects.

"In the beginning re-cycling, thrift shops and up-cycling were regarded as a sign of poverty and the decline of our neighbourhood. Now there is a local pride of the district as a forerunner in the circular economy"

What was done? (activities)

During the process, a series of working group meetings for the local stakeholders were conducted. To engage a broader, international audience, an ambitious conference was made and a showroom for the three start-ups of the project was established. Currently the project is

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helping the start-ups establish themselves in the neighbourhood as light house examples.

What was achieved? (impact)

The following goals were achieved:

- Initiated three start-ups
- Opened a show-room
- Created a network/living lab
- Connected actors in South Harbour with a European network
- Empowered local actors

What were the challenges?

The process of co-creating networks and constructing a local eco-system of actors has been challenging. The main lesson learnt was acknowledging the time and resources needed to engage local communities and mobilize actors exceeded all expectations.

Next steps

The key project actors are continuously developing plans to continue and expand the scope of the South Harbour living lab.

City Contact Details

Integrated Urban Renewal Initiative South Harbour,
Technical and Environmental Administration
omfsydhavnen@tmf.kk.dk

Summary

The South Harbour is a very diverse neighbourhood with new commercial and domestic districts emerging side by side with old and more disadvantaged areas. Centred around a university, a circular economy living lab with emphasis on social inclusion is constructed to bind the South Harbour area better together.

Time period

2015-2019

Information source

Project description on EIT Climate-KIC's webpage.

Circular Economy Hub South Harbour
Facebook site.

Helsinki, Finland

Smart Kalasatama

Who was the team?

Smart Kalasatama is part of the Six City Strategy, which develops open and smart city services in the areas of the six largest cities in Finland (Helsinki, Espoo, Vantaa, Tampere, Oulu and Turku). The project has received funding from the European Regional Development Fund, the City of Helsinki and the Ministry of Employment and the Economy. The project was granted follow-up funding for 2018–2020 from the City of Helsinki Innovation Fund.

The project is coordinated by Forum Virium, which is the city of Helsinki innovation company. It develops new digital services and urban innovations in cooperation with companies, universities, other public sector organizations and Helsinki residents.

Smart Kalasatama is developed flexibly and through piloting, in close co-operation with 200 + stakeholders including residents, companies, city officials and researchers.

What was the vision/goals?

In the Helsinki city strategy 2017–2021 it is stated the following:

“Helsinki takes its own responsibility for the prevention of climate change seriously and ambitiously. Emission reductions and circular economy projects will be carried out in Helsinki in tandem with the business community and residents. Helsinki wants to increasingly actively serve as a platform for interesting and successful innovations that generate new potential exports.”

The city of Helsinki strives to be carbon neutral by 2035. The Carbon-neutral Helsinki 2035 Action Plan, which has been approved by the City Board in December 2018, outlines how the emissions reductions may be achieved in practice.

The goal will be achieved by reducing the greenhouse gas emissions in Helsinki by 80 per cent. The remaining 20 per cent will be compensated for by Helsinki taking care of implementing emissions reductions outside the city. The most significant sources of greenhouse gas emissions in Helsinki are the heating of buildings, electricity consumption and traffic.

A total of 147 actions were recorded in the Action Plan. There are 30 actions for traffic and transport and 57 actions for construction. There are 60 additional actions, which are related to consumption, procurements, sharing and circular economy, reduction of residents' carbon footprint and the advancement of Smart & Clean business.

There are several actions related to circular economy in the Action Plan, one of which is the creation of a citywide roadmap for circular and sharing economy. The kick-off event for the roadmap work was arranged in May 2019, and the roadmap work will be completed by the end of 2019. The roadmap aims to set clear and compact footsteps for the city of how to implement circular economy into its actions and operations.

What is the local waste recycling context?

313 kg of municipal waste/person/year in 2016, of which 48% was utilized as material and 51% as energy. 1% was landfilled.

Information source: <https://www.pksjatevirrat.fi>

How did you do it? (your approach)

The core idea of the smart city at Kalasatama is easy everyday life. Projects are user centric, encourage resident participation and focus on service design.

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The vision for Smart Kalasatama is to become so resource-wise that residents gain an extra hour of free time every single day.

Kalasatama is a living lab, a practical test and development laboratory for innovative services.

The project portfolio comprises a group of ventures and projects implemented by the city, companies, organisations and other stakeholders.

Sustainable development, energy efficiency and waste re-use are the cornerstones of Kalasatama's development. The intelligent energy systems project by Helen, ABB and Fingrid works on Kalasatama's smart grid and its co-products, such as an electric car network and energy storage.

The new vacuum-based waste removal system, Imu, is already operational. Kalasatama – just like the rest of Helsinki – is investing heavily in opening up public data and making the most of it. The aim is to utilise the data in city services, for example to provide information about local air quality or car-sharing options nearby.

District-wide co-operation is encouraged by organising events for residents and establishing collaboration networks. The Kalasatama Innovators' Club unites small and large companies, city officials and resident innovators to make the district even smarter together.

The Smart Kalasatama Programme for Agile Piloting accelerates Smart City innovation by procuring prototypes to real city environments to be co-created with citizens.

As part of the Six City Strategy, Smart Kalasatama also co-operates with other Finnish test-beds to create a nation-wide network of innovation platforms. To boost Finland's competitiveness, the six cities offer testing

Summary

Smart Kalasatama, a brownfield district in Helsinki is a vivid Smart City experimental innovation platform to co-create smart&-clean urban infrastructure and services. Smart Kalasatama is developed flexibly and through piloting, in close co-operation with 200 + stakeholders including residents, companies, city officials and researchers. Kalasatama district will offer a home for approximately 25,000 residents and jobs for 10,000 people by 2035. The vision of Kalasatama is that smart services save one hour of citizen's time every day.

Kalasatama Urban Lab, which opened around the new year 2019 in Kalasatama district, acts as a shared urban development space for the city as well as companies and residents, and offers a place where developers can meet, hold events and network.

Time period

2014-2020

Information source

[Smart Kalasatama web page](#)

[Kalasatama Urban Lab](#)

[The cookbook for Agile Piloting](#)

[The Carbon Neutral Helsinki action plan](#)

[Helsinki City Strategy 2017-2021](#)

environments for companies, academia and other actors to run their research, product development and innovation in real-life settings.

What was done? (activities)

The city of Helsinki aims to act as a platform for circular and sharing economy solutions and encourage projects that promote climate change mitigation and circular economy.

The carbon-neutral future of energy services is being built in Kalasatama. In this model, smart-grid area, the user of electricity can also be its producer. The grid will be enabling real-time smart metering, electric vehicles network and new storage solutions for electricity. A solar power plant already exists in the hood and the whole district is connected to the district heating and cooling grid.

Smart Kalasatama program is running an ambitious innovation platform, where more than 25 innovative infrastructures and building projects are on-going. In addition to that, Smart Kalasatama is hosting innovative agile experimentation projects, where mainly start-ups co-develop their new smart solution prototypes with the residents in the district. For instance, several projects related to smart waste management, smart minigrids and mobility as a service (MaaS) are experimented.

During spring 2017, Kalasatama had a set of climate positive pilots that were tested in relation to resource efficiency and energy behaviour. Five individual pilots experiment on the areas of green solutions, electric cars, parking, local solar power production and reducing consumer's carbon footprint using real-time calculator within households.

Time will be saved by improving the flow of traffic and logistics, as well as guaranteeing first-rate local services and flexible facilities for remote working.

Smart Kalasatama drives innovation on different levels:

- Experimenting smart services in real life with residents
- Bringing together big and small companies, entrepreneurs, research, public sector, and people
- Initiating new projects and business development
- Running agile piloting programme for start-ups

What was achieved? (impact)

Time is city residents' most precious resource, which is why Smart Kalasatama aims to manage time efficiently, too. The vision, created together with local residents

and other stakeholders, is for everyone to gain an extra hour of free time every day.

Valuable time is spent daily on queuing up, grocery shopping and commuting. Smart services improve both quality of life and time management.

Time will be saved by improving the flow of traffic and logistics, as well as guaranteeing first-rate local services and flexible facilities for remote working. The extra hours can be spent on activities that bring happiness, whether that means relaxing in the local park, cooking with your children, studying or dance classes. The objective is to deliver services to people rather than vice versa, reducing daily commuting.

What were the challenges?

When it comes to agile piloting, which is one aspect of the Smart Kalasatama project, time has been a challenge. It is always challenging, when we talk about maximum six months long time period for a development project. This is the case especially if there is a goal for connecting something with the city infrastructure even lightly. It is however important and good to challenge city through experiments like this to become more agile, as well as identify the barriers that go hand in hand with each experiment and theme.

Sometimes the challenge is that the small players of agile piloting have limited resources, for example to take their service model to the next level during the piloting.

During this programme, the total amount for each procurement (8 000 €) is after all quite small.

Next steps

In the Jätkäsaari district in Helsinki a piloting round with a mobility focus opened during spring 2018.

Other Finnish large cities are currently running their own piloting programs, eg. Espoo (digital services and wellbeing) and Oulu (school).

City Contact Details

Development Manager at Forum Virium
Kaisa Spilling
Tel. +358 40 744 8831
kaisa.spilling@forumvirium.fi

Climate Expert at city of Helsinki Environment Services
Mira Jarkko
Tel. +358 40 3341629
mira.jarkko@hel.fi

Utrecht, the Netherlands

Werkspoorkwartier: Creative circular manufacturing

Who was the team?

The redevelopment is carried out by the actual businesses and property developers in Werkspoorkwartier, assisted by the Utrecht knowledge institutes (Utrecht University, Utrecht University of Applied Science and HKU University of the Arts Utrecht). A range of City departments are involved: City Planning and Spatial Design, Economic Affairs, Environment and Healthy Living and the City Works Department (responsible for waste collection). Other stakeholders are all existing businesses in the area and the citizens of the surrounding neighbourhoods.

What was the vision/goals?

The objective for Werkspoorkwartier is to enhance the business climate of the business park, (re)developing the area to a leading location in Utrecht with space for creative and circular manufacturing companies, with an increase in the area of business locations by 10,340 m² and a related employment growth of 244 fte. (full time equivalent) at start-ups, participating companies and other companies in Werkspoorkwartier.

What is the local waste recycling context?

No specific waste recycling targets have been set. The Hof van Cartesius (a shared office space) is built from 90% reused construction material.

How did you do it? (your approach)

The project is a collective initiative of a number of local businesses and the knowledge institutes. A (re)development proposal for ERDF-funding was prepared with the involvement of a large group of local stakeholders (including various Municipal Departments) and presented to the ERDF authorities (City of Utrecht and the Management Authority of ERDF West NL).

Prior to drafting the project, the Werkspoorkwartier business area was targeted by the municipality as one of the areas where redevelopment was needed to enhance the business climate and to create new employment opportunities. Key factor in the project was the presence of local businesses who were striving to develop circular and creative businesses in the area.

Currently, Werkspoorkwartier is being redeveloped in line with the area vision and the objective of the ERDF project.

What was done? (activities)

In 2012, the municipality presented an 'area vision' for Werkspoorkwartier, a document describing the current situation of the area and a vision for the future. This document can be seen as the starting point of all development activities in the area.

What was achieved? (impact)

Currently, Werkspoorkwartier is being redeveloped in line with the area vision and the objective of the ERDF project. A new collective 'Hof van Cartesius', built fully from circular building material, is under construction (first phase realized). Three existing buildings are redeveloped into work space for creative and circular businesses: de Werkspoorfabriek (manufacturing), Campus Werkspoor (IT) and de Vrijhaven (creative entrepreneurs). More than 1,000 m² business locations and over 40 fte. have been added to the area, with much more to follow in the coming years.

ENGAGEMENT HUBS AND URBAN LABS



Werkspoorkwartier was awarded 'best NL circular business area' in the ABN AMRO CE challenge 2018.

What were the challenges?

A key challenge was to get the first developments moving – the Hof van Cartesius building. Circular development of buildings from used materials, following a 'material driven design' approach was new for the city (in term of building permits needed) and financiers (in terms of financing re-use of materials).

A key lesson for the process was for the team to be persistent, develop a vision from the bottom-up and keep this vision in mind during every step of the development.

Next steps

The development of Werkspoorkwartier will continue for the next 2 to 3 years. Lessons will be used for the (re) development of other business areas.

City Contact Details

Tony Schoen,
Utrecht Sustainability Institute
a.j.n.schoen@uu.nl

Marin Zegers
City of Utrecht
m.zegers@utrecht.nl

Summary

The project focuses on redevelopment of an existing industrial business park through the renovation of historical industrial buildings (from heavy steel industry) and on the realisation of new buildings. Focus is placed on the principles of Circular Economy, both for the buildings and businesses/start-ups (predominantly SME's) who are attracted to the area.

Time period

2017-2021

Information source

Project www.efro-wsk.nl

EU commissioner Karmenu Vella (Environment) on Twitter: "The @hofvancartesius which I officially opened as part of the #EUGreenweek #Utrecht is a perfect example of economically viable #circulareconomy In action – I strongly recommend visiting if you are in #Utrecht"

FOOD AND AGRICULTURE

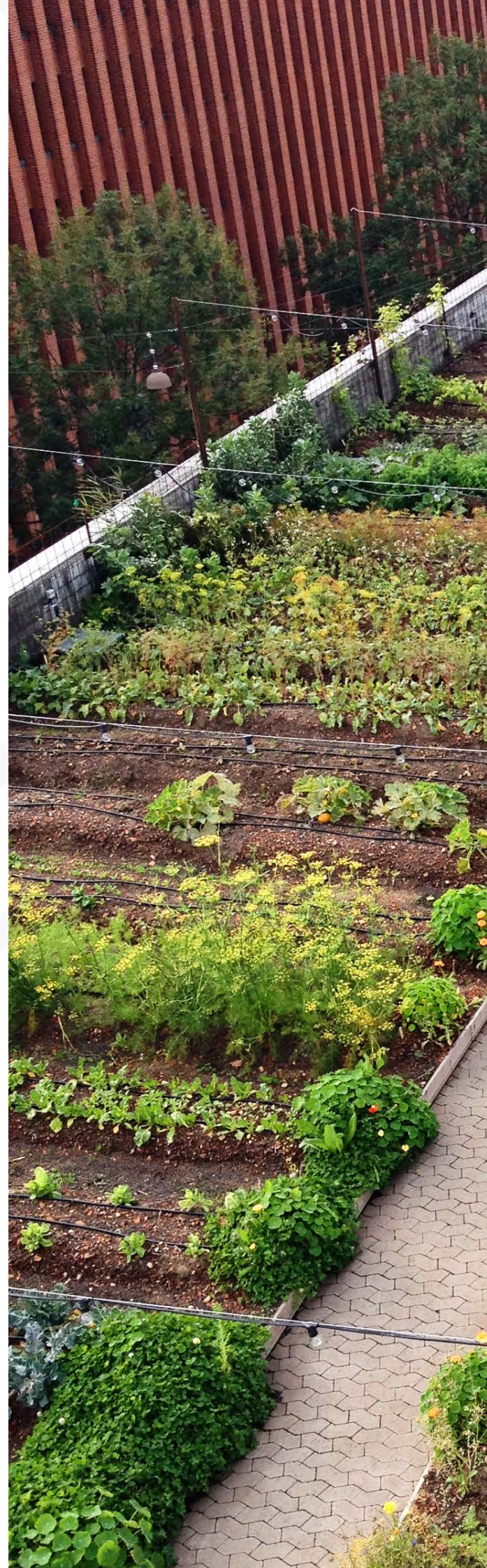
Significant amounts of land, water and energy are consumed in the process of growing, processing and transporting food that eventually goes to waste. It then ends up at landfills where it releases the global warming potent methane, which exacerbates the greenhouse effect.

Circular approaches to food waste are logistically complex due to food's perishable nature. However, food that is unwanted but still edible can be reused as feedstock for new production, donated elsewhere or used as feed for livestock. In 2016, France became the first country that requires their supermarkets to donate unsold food instead of throwing it away. France also requires companies to report statistics on food waste and for restaurants to make takeaway bags available.

Cities across Europe are seeing that organic waste can be collected and treated for secondary use. Solutions range from community composting to large-scale anaerobic digestion. The City of Copenhagen composts 70% of its organic waste. In San Francisco they distribute 600 tonnes of composted organic waste per day to local farmers and gardeners who grow produce and sell it back to the city. Amsterdam has distributed educational material that encourages household composting and set up drop-off sites for community composting. The City of Glasgow has outlined nine circular strategies specifically for food and beverage. With a focus on creating industrial symbioses within the food production sector, they include solutions for heat recovery, anaerobe digestion, local protein production, aquaponic, nutrient recovery, bread to beer, fermentation and high value cascading.

Circular economy approaches in the food sector are not, however, only about enforcing the food waste hierarchy. Opportunities also exist in the area of agriculture and urban farming that can create closed loop food systems for the city. Growing fruit and vegetables in an urban setting both reduces transport (with its associated congestion, air pollution and carbon emissions) and provides healthy activity within a community setting. It can also provide job opportunities within a commercial setting.

The two following cases from Aarhus (DK) and Maribor (SLO) showcase different ways of integrating circular economy principles into the urban food system.





Aarhus, Denmark

From Grounds to Gourmet (Fra Grums til Gourmet)

Who were the team?

The From Grounds to Gourmet (FGG) initiative is established as an member-driven cooperative with a team of 7-8 people who, on a voluntary basis, drive the project forward in all its different phases.

The project made a user agreement with the technical department of the Municipality of Aarhus on using some unused land at the harbour.

The project has been realised by voluntary work and broadly financed by different Danish funds.

What was the vision/goals?

The main objective of the FGG project is to highlight the potential in making closed resource-loops. Industrial symbioses and circular economy models could with great benefits be used in dense cities around the globe, to produce healthy and local food and businesses. In this case it is done by reusing and upcycling a nutritious resource: coffee grounds, that would otherwise just have been burned off.

The mushroom growing case is inspired by the 'Blue Economy' by Gunter Pauli.

What is the local waste recycling context?

Sorted waste in Aarhus in 2018:

Plastic: 800 tons

Metal: 5,32 tons

Paper and cardboard: 13,9 tons

(Source: The Aarhus Municipality Waste Management.)

In the FGG project, the aim is to also enhance the focus on the potential of reusing the bio-waste as a resource, which is currently not on Aarhus' agenda.

How did you do it? (your approach)

The FGG project was started by ten green enthusiasts trying to contribute to the city's sustainable development and green transition through many years of passionate and idealistic work. It gained political interest, mainly by starting up a large number of citizen-driven initiatives initiated by the NGO 'Mejlgade Lab', revolving around waste as a resource, reusing rain water, etc.

The Technical Department in the Municipality of Aarhus was a key player in achieving a location to build the mushroom farm at Pier2 at the harbour of Aarhus.

What was done? (activities)

A local mushroom farm at Pier2 at the harbour of Aarhus has been built in two rebuild shipping containers, which have been equipped with the necessary hardware etc. to grow oyster mushrooms on organic coffee grounds. The coffee grounds have been collected in the nearby city centre at stakeholders such as the Museum of Aros and the Scandic Hotel, who both have a green focus for their enterprises. The gourmet mushrooms are then sold to a nearby Michelin restaurant called Domestic.

This is done to make a closed loop, where residue products are reused and upcycled into a high-value product.

What was achieved? (impact)

The FGG has proven that it's possible to grow gourmet mushrooms from organic coffee grounds, thereby reusing a nutritious waste resource to make a high-value product which is being used at a local Michelin restaurant.

From Grounds to Gourmet recently won the largest food award in Denmark – Salling Food Award 2018, initiated by the Food Organisation of Denmark. Furthermore, FGG has an active part in the city development at the harbour



of Aarhus – Pier2, where the 'Mejlgade Lab' has suggested to establish a permanent eco-park that invites and inspires its users to engage and get knowledge regarding circular economy and the 17 UN Sustainable Development Goals.

What were the challenges?

There has been many obstacles and practical challenges in the learning process of how to grow oyster mushrooms. But it has been a great learning process for the whole team gaining new knowledge on mycelium (mushroom spores), constructing, running a farm etc.

Next steps

The Next steps for the project are to optimize the mushroom production and make the business even more sustainable by using solar panels, planting green roofs, collecting rain water etc. Further steps would also be to develop the business plan and to start new similar projects to investigate how to create products where mycelium is used to make building blocks, insulation, packaging etc. Research has already been made where 'mycoremediation' has been tested for cleansing polluted soil and water.

City Contact Details

Jonatan Marcussen,
Mejlgade Lab project manager and From Grounds to Gourmet co-founder
jonatan@mejlgadelab.dk , Phone: +45 27412056

Summary

The overall objective of the project is to highlight the potential of an industrial symbiosis from coffee grounds to gourmet food. It is built on a circular economy case, where collected coffee grounds are reused and upcycled for locally growing delicious and sustainable gourmet oyster mushrooms at the harbour of Aarhus, the second largest city in Denmark.

Time period

2017- ongoing.

Information source

From Grounds to Gourmet's Facebook page.

The Blue Economy by Gunter Pauli.

Maribor, Slovenia

Urban soil 4 food

Who was the team?

The municipality of Maribor is the lead partner of the case study project and is in charge of implementation. The seven other project partners involved are local or national companies, institutes or associations, combining different areas of expertise needed for project preparation and implementation.

What was the vision/goals?

The overall goal for the Municipality of Maribor with this project is to find a systemic circular solution to close the material and food circle with development and production of safe and standardized urban soil to be used in urban farming.

This project is inspired by the fact that Slovenia is only 31 % self-sufficient in its demand for fruits and vegetables. Moreover, the soil is degrading and the young population of the country lack knowledge on and motivation for healthy eating.

What is the local waste recycling context?

52 % of all food produced is lost or wasted along the food value chain, which means there are great efficiency and resource potential.

How did you do it? (your approach)

The project was prepared over a long period, as the process from idea to approval lasted almost 2 years. Several stakeholders took part during the process: The Municipality of Maribor (Development Projects and Investments Services – Project Office), municipal companies for waste treatment and public services, faculties, NGOs and farmers.

What was done? (activities)

The project partnership is composed of the Municipality of Maribor and seven other delivery partners with specific project roles. The municipality is managing the Urban soil 4 food project and its communication activities. The project is currently in an early stage and will as it develops engage different relevant local stakeholders.

52 % of all food produced is lost or wasted along the food value chain, which means there are great efficiency and resource potential.

What was achieved? (impact)

The Urban Soil 4 Food project will trigger changes in material flows from currently landfilled to recycled and reused within the city. It will also impact the food flows and shift some of the imported food to locally produced food. These changes will enable a transformational change of the local society towards a more circular economy.

What were the challenges?

Bureaucratic processes have delayed the preparation of activities for the project. Nevertheless, with some innovative thinking and proactive preparation for a plan B, all obstacles were successfully surpassed.

Next steps

With the expected positive outcomes of the project achieved, the city will scale up the system and expand it to other areas of the city.



City Contact Details

Brina Lazar
Municipality of Maribor, Development Projects and
Investments Service – Project Office,
Ulica heroja Staneta 1, 2000 Maribor
brina.lazar@maribor.si

Summary

This project analyses material waste flows in Maribor's urban area and determines which streams are usable for production of urban soil. It investigates return on investment in the soil production system and finally turns unused municipality owned land into urban community gardens, fertilized by municipal compost.

Time period

December 2017 - November 2021

Information source

Read details about the project on Urban
Innovation Action

Watch a video with project manager at Wcycle.

Finding and key learning

First and foremost, city-led physical location where to learn and work with circular economy concept under the manta "Reduce-Reuse-Recycle-Rethink" is an effective and low cost way to accelerating the transition to the circular economy and to scale out good ideas and test new innovative initiatives.

The 13 cases in this publication are individual all assist cities in meeting their ambitious sustainability goals and targets in very hands-on way.

Moreover, through engaging the general public in circular learning centres, city administrations can expect to become more up-to-date with regards to the newest circular knowledge and ideas available. Most of the cases presented have created a social media outreach and created an ecosystem which thrives and accelerate to new ideas and create knowledge sharing. Cities often find themselves falling behind when it comes to participating in the latest ways of tangible circular thinking, Circular Economy Learning Centres represents a tool through which they can rectify this.

In the longer term, City-led circular economy learning centre can help facilitate a number of co-benefits including social engagement, profit, learning, inspiration and just make the circular transition an every-persons business. We see that some of the cases like in Trondheim, Aarhus, Copenhagen and other places enhancement of cities' innovation ecosystems and entrepreneurial sectors by engaging start-ups and other actors which want to contribute to act more circular.

Through the provision of resources, material, data and professional feedback, cities can encourage and support individuals and start-ups whilst reaping the benefits of improved circular solutions tailor made for use in their situation. Furthermore, by reaching out to the community groups and entrepreneurs, the city administration

can find itself more closely engaged with its public, promoting participation in city issues and increasing awareness of the climate and sustainability in general. Finally, through adopting the Open Innovation concept and taking the lead in sustainable innovation processes, cities will be able to brand themselves as front-runners in the race to achieve their climate goals on the international stage.

Barriers to successful implement circular learning centre

Implementing circular learning centres into the operations of a city isn't necessarily straightforward. In past cases – i.e. Copenhagen and Malmö – it has been observed that public administrations, can struggle with direct community learning, how to deal with the new actors brought forward by creating new learning spaces around a waste and recycling centre. Furthermore, in specific circular economy learning centres which seek to source new product ideas originating from available waste fraction, then it has been noted that the often substantial differences between the policies, regulations and ways of working between cities can either deter or delay non-local solution providers from getting involved. This regulatory barriers should not hinder that community, entrepreneurs and the general public get actively involved in the circular transition and use available city districts as testbeds to fast track a circular city transition

Barriers such as the fragmented administrative landscape within the city municipal boundary can also be difficult to overcome. This is especially the case in Berlin when the differences between districts are so great that engaged entrepreneurs and circular economy solution providers would be required to completely reassess their business model in order to be competitive and/ or relevant in the new environment in the same city but in different district. Moreover, certain solution providers



find that the time frames that administrative municipalities commonly work to can be problematic with their own. Small businesses often have a tight cash flow. This can put them in conflict with cities and municipality administrations who often take significant amounts of time to approve and act on agreements.

It is apparent that a large proportion of the barriers to create more circular economy learning centres arise due a city's lack of resource capacity and or mismatch in skill set. Even larger administrations who possess a wealth of resources can conceivably lack the necessary knowhow and expertise to coordinate co-development

activities to make the circular transition to a more open business model for its citizen and ecosystem of start-up, without initially falling into the usual traps and pitfalls.

In many cases, it is useful for progressive and ambitious administrations to enlist the help of experienced facilitators who can assist with the planning and organisation of the learning centres. In doing so, cities can acquire knowledge and experience of the already existing centres like this publication present and avoid making rookie mistakes that can lead to initially unsatisfactory results and a general loss of momentum.

Despite the variety, ambition and experimental nature of the 13 circular learning centres and the solutions they provide all show cases which other cities can pick up and replicate

Key learnings

In order for a facilitator to both overcome the barriers to successful implement circular economic learning centres, engage different type of community groups and practices and maximise the value of the available resource, like electronic equipment, textile, food based products ect., it is important that one cities is completely in control of proceedings resource into new products and create new learnings. In particular, it is important to bear in mind that:

Stakeholders need to be kept motivated.

Circular Economy learning centres, by definition, involves large numbers of actors, stakeholders and collaborators. Circular district, like Copenhagen South Harbour can be difficult to manage, particularly when motivation to engage with the process is driven by the desire to create differing forms of value. In processes with an environmental theme, it is often the case that consortia members view value differently. Some – generally SMEs and more cooperated entities – will desire value to be largely economic, whilst others – community groups and certain start-ups for example – may also value the idea of creating a societal or sustainable impact. The differences in outcome desired by each stakeholder needs to be appreciated by those overseeing the circular innovation process, as without a tangible end result that is satisfactory to all parties, members of a consortium may be reluctant to continue.

A varied stakeholder group often produces the best results.

Circular economy learning centres is often more effective when it includes actors from different backgrounds in the innovation process. Having access and

exposure to the different knowledge, experiences and thoughts typically held by different types of individuals and organisations – i.e. start-ups, SMEs, corporates, universities, the public sector etc. – ensures that certain new, more alternative or up-to-date thinking, applicable to the desired solution(s) aren't missed. As such, the learning centres and implementation processes should be designed to act as an "multi-actor" platform which is as inclusive as possible.

Match-makers help, a lot.

Successful implementation processes in the circular economy learning centres benefit from supporting actors who connect and match stakeholders together, build bridges between them and act as brokers between the different sub-divisions of the collaboration. These match-making nodes are essentially acting as civic accelerators, building bridges between players. They can become key in keeping the overall process in motion. Bespoke match-making events represent one bridge building activity can enable an acceleration of new ideas and new partnerships. Matchmakers are crucial in not only bringing different cultures together but also in developing and establishing the models through which collaboration will take place. The role of match-makers can vary between the different approaches which want to be established in the learning centres. In short, in events such as hackathons, like tested in Helsinki and Malmö, the municipality are very "hands on" where as in longer and less intense settings they can operate more subtly. Typically, match-makers are typically found to be cities officials but external business developers and intermediate organizations can take the role. However, they have also been known to be progressive municipality offices, forward thinking officials and business mentors. Regardless of who the match-maker is, it is important that they perform the role of facilitator within the design process of the specific learning centres and the available resources collected.



Circular Cities Project Lead Contact

Peter Vangsbo
Business Development Lead
EIT Climate-KIC
Copenhagen
peter.vangsbo@climate-kic.org

Graphic design

Morten Meldgaard
morten_meldgaard@me.com

Editorial, proof-reading and City relations support

Elisabeth Bergendorff, Isabel Ordóñez, Line S. Lauritzen, Alessandro Gretter,
Klemen Risto Bizjak, Chin-Yu, Jonatan Marcussen, Øystein Leonardsen,
Roel Massink and Emmi Kallio



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