



Malmö stad



Municipalities as drivers for circular economy in refurbishment and construction projects

In partnership with the EIT Climate-KIC Circular Cities Project



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Foreword

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The transition from linear to circular systems is a complex journey. It demands the involvement of several different stakeholders and perhaps more importantly – to engage and involve cities. The dense urban areas around the world and continuous population growth gives cities the highest potential for such change. The EIT Climate-KIC Orchestrated Innovation Ecosystem program promotes and encourage cities across the globe to pursue circular economy concepts. To create circular economy networks in and between cities, municipalities play an important role. The proximity to citizens, producers and entrepreneurs make the municipalities work as strategic change agent for a new sustainable and circular future.

This EIT Climate-KIC Circular Cities project, as part of the Ecosystem program, has been working with different directions of developing a better understanding of the circular economy in city context, materialised in a number of publications. This white paper is the result of work conducted in the City of Malmö through the Circular Cities project. The content is collected and developed from a series of workshops with a special focus on the refurbishment area of Sege Park. The white paper focuses on the opportunities arising from construction waste materials and possibilities for reuse that needs to be addressed. The white paper also discusses the barriers that need to be overcome to achieve the much needed value transformation of waste materials.

Other good examples can be found in a case catalogue produced by C40 Cities on Municipality-led Circular Economy Case Studies in the Circular Cities project. It collects forty cases and examples of good-practise circular economy initiatives from around the world that shows a growing number of actions from municipalities to move from linear to circular economies. More and more cities make ambitious visions and strategies to keep materials within “the loop” of its lifecycle to maximize value when in use.

A publication on Transforming Municipality Districts into Learning Centres of Circular Economy is also produced in this project. This publication intends to showcase



Åsa Hellström

examples of specific circular economy hubs at a district and local level. It explains how concrete circular economic concepts have been designed and executed by cities across Europe, including a detailed explanation of potential circular economy business cases and technologies.

Another white paper conducted in the Circular Cities project, produced by the City of Helsinki, shows how The Challenges and Potential of Circular Procurement in Public Construction Projects can be addressed and implemented in municipalities. To obtain impact good examples of development into more circular thinking is needed. Therefore, the white paper also consists of examples from cities across Europe with the aim to put procurement processes into the cities development plans.

A last white paper in the project show A Practical Approach to Develop a City Roadmap Focusing on Utilities. It highlights the importance of circular economy as a tool for cities to transition towards sustainability. It contributes to the discussion around circular economy strategies in cities by looking at examples and concrete solutions offered by technologies regarding utilities; more specifically energy, waste and water management, and thus provides a practical approach to policy makers and other practitioners to develop their own roadmaps.

Following in the footsteps of the above publications in the Circular Cities project the purpose of this white paper is to provide an overview for other municipalities to use in their work with urban refurbishment. It is important to also highlight urban refurbishment operations as a possibility to engage the local community through education, job creation and other opportunities that refurbishment projects can offer a city district.

Åsa Hellström,
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Municipalities as drivers for circular economy

in refurbishment and construction projects

33% of all waste in Europe comes from construction and the situation in Sweden is not an exception. In 2016, approximately 9,8 million tonnes of waste came from the construction sector, whereas 9,4 million were classified non-hazardous and consisted mainly of soil masses, mineral waste, mud masses, wood waste and various metal waste.¹

What is the potential for reusing construction waste material? What are the possibilities that needs to be addressed and which barriers do we need to overcome to achieve the value transformation of waste material?

Municipalities represent one of the largest building developers and building owners in almost every country, making them important drivers for a circular economic change in construction projects. The Circular Economy provides a framework of securing the quality and value of resources within a system and ensure reuse, refurbishment and ultimately recycling of waste streams. Urban refurbishment also has a direct impact on the quality of life of the surrounding society in the district. EIT Climate-KIC and its partners in the Circular Cities project are aware that refurbishment needs to engage the local community both in life quality improvement, but also in education, job creation and communication

on the opportunities that refurbishment operations can offer a district.

The objective of this EIT Climate-KIC white paper is to map out the main barriers and possibilities for municipalities to bring about a more circular mindset, where emerging leftover material is considered to be an asset rather than waste in construction operations. Another objective is to investigate how the local community and entrepreneurs can become engaged in the process of turning waste into quality material in refurbishment operations. The white paper will also explore how and in what way SMEs, companies and the local community can create synergies and find win-win solutions in refurbishment projects, and in this way, learn how to create a business from municipality waste. This work has mainly been carried out

These questions have been explored in a number of workshops and interviews, focusing on the situation in the City of Malmö in general and the refurbishment area of Sege Park in particular. Examples of successful initiatives and solutions from other refurbishment- and upcycle operations in the region will act as inspiration to showcase that progress is already taking place in this relatively unexplored field.

¹ <https://www.boverket.se/sv/byggande/hallbart-byggande-och-forvaltning/miljoindikatorer---aktuell-status/avfall/>



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1. THE POTENTIAL OF CIRCULAR MATERIAL SOLUTIONS IN THE BUILT ENVIRONMENT

Examples of circular constructions in and around the City of Malmö

Since the construction sector stands for a significant amount of the total waste volume in many countries, the implementation of circular principles would have the potential to reduce the industry's' impact significantly. Although the transformation is happening stagnantly, there are inspiring examples demonstrating the potential of increased circular implementation.

Anterior circular construction

Examples in and around Malmö

Sysav Headquarter

When the regional waste company Sysav was to build new offices in the proximity of their production plants, Sysav constructed a building consisting of large quantities of reused material. Not only the facade is made of various nuanced reused brick stones, so is the reception counter and flooring, while the windows are refurbished units from 1910 fitted with low emission glass. A great wooden door has been taken from a past hospital building, leading into the board room. Additionally, the wood parquet on the second floor, which is around 90 years old, has been used in an innovative way by panelling the walls in the canteen. A gazebo was additionally built by dint of woodwork from an old hospital area and the pathways connected consist of concrete slabs of various size and colour originating from the main pedestrian street in Malmö.¹

Malmö Live

Malmö Live is a centrally located city block, hosting concert halls, a congress center, a hotel, restaurants and various housing and office buildings. The construction began in 2012 and the building was inaugurated in 2015. In the exploitation and preparation of the area, efforts were made to take care of material assets offered

1 Att bygga hållbart – goda exempel från Lund och Malmö. Holmbergs tryckeri, år framgår inte.

locally – both for future construction projects and in the building of the new area. Buildings from the past with a high cultural value, e.g. an old station building that currently functions as a restaurant, have been saved in their current state. In addition, some of the material has been stored in depots in the city, hosted by different functions of the municipalities for future projects.

Benmöllan

“The Bone Mill” was a mill situated in the current area of Malmö Live, where people back in the day had skeletons grinded to serve as fertilizer on fields. In the transformation of the area, Benmöllan was carefully deconstructed and later used in the construction of an electrical station and a wall. The mill was gently deconstructed before it was sent to Malmö Återbyggdepå (Malmö Rebuild Depot, see figure 1), where the mortar of the bricks was tapped off. After having been processed, the bricks were stored in a depot in the harbour until needed. Some larger stones were cleaved into smaller proportions and were integrated into squares of concrete forming a walkway along the dock. Other stones came to constitute parts of a roundabout just outside the main entrance of Malmö Live.²

2 Ett sökande efter det material som försvann, Tommy Roman, 2014. https://www.sysav.se/globalassets/media/filer-och-dokument/informationsmaterial-broschyrer-arsredovisningar-faktablad-rapporter-etc/rapporter/rapporter-2015/roman_tommy_141024.pdf

Östratornskolan

In the nearby city Lund, an elementary school built in 1970 was expanded in 1996 and 1997 with three new buildings, housing both students and administration. In the planning of the new facilities, the municipalities in Lund decided to set ambitious sustainability targets. The objective was to minimize the outtake of resources when building the school and to the largest extent possible work with circular materials and techniques. Therefore, reused bricks were the main construction material and instead of ordering new windows for the buildings, old refurbished ones were installed.

A long-term way of planning was undertaken so that the materials can either be reused or will be easier to recycle as a future demolition of the buildings was also considered during the construction phase. Using reused bricks makes a substantial difference as the energy saving from a reused brick compared to a new one is 98%. 200,000 bricks coming from an old building in the nearby town Ystad, were used in the construction, resulting in 250,000 kWh energy saved, equivalent of the yearly energy usage of twelve dwelling houses. In addition, the characteristics of the reused brick stones made a positive impact on the aesthetics of the buildings.³

³ Att bygga hållbart – goda exempel från Lund och Malmö. Holmbergs tryckeri, år framgår inte.

Terms and concepts

Recurrent terms in the text

Recycle – To restore a material while keeping its initial purpose or value

Upcycle – To recover or reuse a waste material by turning it into a new product

Reuse – A material or product gets used anew, serving its original purpose without being changed.

Malmö Återbyggdepå

– a circular construction enabler within the municipality

Malmö Återbyggdepå, “Malmö Rebuild Depot” (MRD), is a municipal function established in 1998 and a grand example of how a municipality can contribute to circularity in the construction sector. MRD has been a key actor in many projects in the Malmö where reused materials have been used in construction projects. They are the number one actor in the Nordic countries when it comes to recycling building material with a turnover of 10,000 tonnes of material every year. At the same time, they are creating social value by engaging people that are standing outside the labour market into their enterprise. Since the beginning, 3,000 people have been engaged via labour market policy measures.



*Figure 1: Unsorted bricks at Malmö Återbyggdepå
Photo credit: Henrik Engblad*

The material circulated at MRD originates from various construction projects within the city, both municipal and private ones, and it mostly consists of “waste” emerging from buildings that are being demolished. A significant proportion is left-over materials, a consequence of miscalculated and incorrect orders from construction sites.

The material is usually picked up by the MRD staff and if necessary, treated and polished at their facilities in the northern harbour area in Malmö, before being put up for sale at the depot. Approximately 30% of their customers are households, while the majority consists of minor private construction companies.

When retrieving goods and materials from construction sites, MRD has interest in everything with the potential of being reused – from door knobs and toilet seats to doors, wood and metal items. All items must, however, have passed through the material inventory. Always in great demand, roof tiles and bricks are two of the more popular items. Bricks regularly come in large quantities and in various condition to get sorted out and cleaned at the depot. Some of the bricks get sawn on the height to be used as flooring.

Thanks to MRD, there are various buildings and constructions in Malmö containing items that previously have been part of other buildings in the city.

As an example, it was decided to use old, refurbished roof tiles when Torup Castle’s roof was renovated. The process became slightly more time consuming, but the old tiles are likely to last many more decades than the new available alternative tiles would have.



*Figure 2: Torup Castle.
Photo credit: Henrik Engblad*



“The materials and items produced a long time ago, usually holds a much higher quality than items made in more recent years”

Mats Lindgren, executive at MRD

Varvsstaden

– an upcycle frontrunner transforming the old shipyard in Malmö

Varvsstaden, situated in the proximities of Malmö Central Station, has played an important role in the city's industrial history as it during the 1950s and -60s was the world's biggest shipyard. During its peak it employed more than 6,000 workers. The area has, however, been left in decadence for decades, since it in 1986 was shut down after a long struggle following the oil-crisis in 1973. Today it is jointly owned by two construction companies, Balder and Peab, who are about to transform the area. The developers have decided to extensively focus on sustainability and climate friendly solutions by trying to limit carbon emissions, which has resulted in some interesting initiatives. The underlying idea is to reuse as many accessible resources within the area as possible, trying to limit the amount of virgin material that is unnecessarily being added to the area. The builders have high ambitions when it comes to taking care of and reusing the large amounts of material that is hosted within the large stock of buildings in the construction site.

Instead of demolishing the buildings, they are being deconstructed and the materials emerging are

considered as assets rather than waste. The ambition has been to reuse as much material as possible to bring in aesthetics and historic value, thus reminding of the area's history. During the construction project, the material is being restored and sanitized (if it turns out they contain harmful substances) in a factory built in the area for this sole purpose. Having passed through this process, the materials are collected and stored in a material bank awaiting future use. All materials are catalogued to make it possible to easily get an overview of material accessibility.

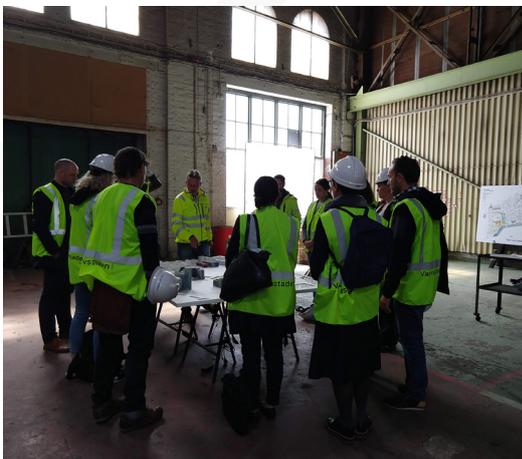


Figure 3: Study visit at Varvsstaden.
Photo credit: Elise Ankersen



Figure 4: Study visit at Varvsstaden.
Photo credit: Elise Ankersen

With help from the Lendager Group, a Material Compass has been developed for instructions and ideas on how the restored material can be used.¹ The compass provides information about the most common material fractions occurring in Varvsstaden, e.g. information about the material's main characteristics and its environmental impact. In addition, examples of how the recovered material can be used in new projects are provided and divided into sections – interior, exterior and public spaces in the city. The most important material fractions that have emerged so far is concrete, steel, bricks, glass and wood.

1 <http://varvsstaden.se/upcycling>



2. THE POTENTIAL AND LOOPHOLES FOR FURTHER CIRCULAR IMPLEMENTATION

The opportunities and loopholes for municipalities to adopt to a circular building sector

As seen in the previous section, there are inspiring examples to be found where circular principles have been undertaken in the construction sector and where waste has been turned into a resource. However, oftentimes cost in time and money have been of less priority and these projects are, unfortunately, relatively few. It is evident that there are barriers when it comes to building with reused and recycled materials as it often is more intricate, time consuming and expensive. At the same time, this means that there is immense potential to make it less complicated. The following section seeks to assess some of the main challenges and barriers.

Leftover materials

in construction and demolition projects

In an extensive report from the Swedish research institute,¹ the building material in circular flows has been investigated and the main potentials and challenges have been described.

The potential of upcycling waste in the construction of new buildings

Large amounts of material purchased for the construction of a new building ends up as waste fractions – usually as a result of material adjustments where the material is adjusted into the building (plasterboards, plastic rugs etc.). Other reasons are miscalculations and over-supplying to avoid the risk of ending up with too small quantities. These materials do, however, have the potential to be used for other purposes as the characteristics are likely to be the same as before the material was discarded. In these cases, the manufacturer has at least the theoretical possibility to use the item or material in the production of new material (secondary raw material in new products). A key challenge, however, is that it is more expensive for the constructor to keep material in stock and manage and transport the leftover material than to purchase new ones. Unfortunately, there are few incentives for the constructor or developer to store the material instead of simply discarding it.

¹ Kvalitet hos byggnadsmaterial i cirkulära flöden, Rise, 2017
https://www.researchgate.net/publication/331043648_Kvalitet_hos_byggnadsmaterial_i_cirkulara_floden

Waste from demolition

Waste from demolition projects is more challenging to include in a circular loop. Buildings and constructions that are to be demolished are in general old, making it hard to know what they consist of, and if and to what degree they might be contaminated. Various hazardous or nowadays illegal substances, such as blue concrete or asbestos, are likely to be found in older buildings. External factors also impact the material of the building, making the characteristics change over time e.g. when it comes to durability, strength and permanence. Another key challenge is that some products and items are consisting of several different materials, making it hard to make use of it in other contexts and to recirculate the material.

Material inventories – a key bottleneck for circulating building materials

Diverse materials, components and the year of their production means different kinds of challenges to take on. Therefore, inventories and analyses of the materials are crucial to conduct before the demolition of a building in order to know what it consists of – both for legal reasons and for the reuse potential. Detailed inventories are often more expensive than the estimated worth of

the material with the potential to be reused. An important aspect in refurbish- and renovation projects, is to make thorough material analyses of the emerging material in order to map potential hazardous substances. This is regulated by law and provides the basis for making a correct demolition process and sorting of materials. According to interviews conducted in conjunction with the Rise report, people in the construction and demolition industry often have the opinion that these inventory processes rarely are given enough time or a reasonable budget. The consequences might be too conceptual inventories, where potentially useful material is condemned and turned into waste. Several interviewees were suggesting that more parameters should be taken into account when making the material inventory to make upcycling and recycling initiatives more feasible. Examples mentioned were remaining technical lifetime, aesthetics and the capacity to be stored, transported etc.

Barriers to overcome to adapt to a more circular construction industry

Quality assessment

Storage and timing

Lack of time and budget for selective demolishing

Man hours

Economic incentives

Access to adequate quantities

Legal aspects

Infrastructure to know what is available

Municipal barriers

When speaking to representatives from the municipal real estate company Stadsfastigheter (“City Properties”), the complexity of taking care of demolition waste is confirmed. It is challenging to find incentives for making it rewarding to take care of the demolition waste. A project leader at Stadsfastigheter confirms the difficulties saying:

“It is hard to motivate, from a time- and financial perspective, to put a lot of efforts on trying to reusing demolition masses”

Thomas Håkansson,
Project Leader at Stadsfastigheter

pointing out that it is cheaper to buy new products than to store and sort out the waste fractions. Neither is there a budget for managing the waste fractions to a greater extent.

A key challenge is to give the demolition phase adequate time so that as much material as possible is likely to be “saved”. When speaking to the managers at Malmö Återbyggdepå (MRD), they are frustrated, since they see that there is so much potential in the City of Malmö when it comes to circulating construction waste. Often, MRD are not even contacted when a building is about to be demolished – the process of demolishing a building does not let those who have an interest in the material take part of it. This could be an incentive and driver, encouraging and perhaps even supporting a function like Malmö Återbyggdepå.

“We should consider investigating whether it could be part of our policy that, for example, a certain percentage of a new building should consist of reused materials”

Malin Åberg,
Unit Manager at Stadsfastigheter



Figure 5: EIT Climate-KIC Workshop in Sege Park.
Photo credit: Elise Ankersen

Röda Oasen

– a building community turning municipal waste into value in construction and demolition projects

Stadsfastigheter made a great effort trying to circulate the fractions emerging when demolishing some of their buildings in the refurbishment area Sege Park (more about Sege Park in the following chapter). One of the more ambitious projects aimed to distribute the materials from a couple of municipal buildings that were to be demolished, to other private developers building on the site. Developers were invited for a tour inside the buildings and could then select materials and interior items that they thought they could make use of. One of the developers who took part of the tour, Röda Oasen, turned out to have great interest in the offer.

Röda Oasen is a building community consisting of a couple of individuals in a social cooperative, who came together to become their own construction developer. The building community has taken over one of the

presented a long list of items they had interest in and the municipality provided it to them for a very low cost. Most of the material was appliances and stainless-steel interior. One of the building community members pointed out that, goods that are expected to have few years left of usage are of great value to those who haven't got the financial muscles to buy everything new, while it at the same time can make an environmental difference: Additionally, it was indispensable that they had the

“The City of Malmö really contributed to a sustainable cause by offering us this opportunity”
Sofie Persson,
Member of the building community

possibility to keep the materials in the basement of their future building to have somewhere to store the material up until the point it will be used.



Figure 6: Demolition items.
Photo credit: Sofie Persson

buildings in Sege Park and will renovate it themselves, as their ambition is to live in and construct their house in a sustainable and personal way. Therefore they gladly accepted the offer from the municipality, as it would mean their renovation would be more climate friendly and as they would make a financial saving. Röda Oasen



Figure 7: Demolition items.
Photo credit: Sofie Persson

Lendager group

- a circular construction frontrunner

The Danish architect agency Lendager Group is pushing the boundaries when it comes to circular economy in the built environment. Due to Lendagers' circular focus, they are regarding the demolition workers as key actors in the circular transformation due to their knowledge about the value in "waste" material. The Upcycle Studio houses in Ørestad, Copenhagen, are exemplifying how the Lendager Group is finding innovative ways of using discarded materials. As the name suggests, the buildings are to a large extent built from upcycled materials. A couple of the solutions are especially interesting as they demonstrate the potential for constructions containing upcycled materials: (see right hand column)

- Concrete: Great effort was made on upcycling concrete. As part of the foundation of the block, 1,400 tons of waste concrete (constituting 50% of the concrete usage in the project), came from the Copenhagen metro expansion. The achievement made a 12-15% CO₂ saving per ton.
- Old window glass: Double glazed windows appropriated from abandoned buildings in the north of Denmark were used – 75% of the windows in the buildings are upcycled items. Compared to using new glass, 96% CO₂ is saved.
- Floors, wall coverings and facades: Floorings, wall coverings and facades were all made of wood waste coming from a Danish wood manufacturer. Since it was a clean, hazardous free material, no paints, wallpaper, lime or silicone was needed in the process with the result that chemical distended products could be opted out¹.

¹ A Changemaker's Guide To the Future, Anders Lendager och Ditte Lysgaard Vind, Narayana Press, 2018

Buildings as material banks

– building for circularity

How are other municipalities in Sweden taking on the circular construction challenge?

As noted, several barriers are making it challenging to upcycle waste materials, although it is far from impossible. Without certain efforts, it seems as if other priorities regarding time and finances oftentimes overtrump the efforts needed in e.g. demolitions processes. However, the buildings being teared down nowadays have rarely been built with a circular mindset. Back in the day, they were not constructed with the ambition that they should be easy to take apart in separate fractions, material by material. This reveals that to stimulate circular constructions, it must be rewarding to act proactively, making the demolition process easier and less time consuming.

There is a lot of research and projects going on related to circular construction. In our EIT Climate-KIC project, we invited project leaders from the Cities of Malmö, Gothenburg and Ronneby to discuss circular constructions with the purpose to share information and learn more about the topic. Both Ronneby and Gothenburg have several interesting circular economy projects, which is why we were keen to meet them. During the workshop, each municipality presented their focus points related to circular constructions. The City of Malmö is about to start a project that will involve several departments in the city. The goal is especially via public procurement to substantially lower the CO₂ emissions when building, to lower the use of raw materials with 20% and the amount of waste with 25% compared to 'business as usual'.

The City of Ronneby strives to become a municipal circular frontrunner in Sweden and they realise that it is crucial to implement a circular mindset into the construction sector in order to succeed. They have been part of a larger project called BAMB (Buildings as Material Banks), focusing on the transformation to a circular building industry by for example exploring how to construct more flexible buildings so that they, when the time comes, can be deconstructed in a circular way. "When the purpose

of a building is being outdated, the building should be able to alter for the new purpose", Camilla Sjögren project leader the City of Ronneby points out during the workshop.



Figure 8: EIT Climate-KIC workshop.
Photo Credit: Elise Ankersen

Nina Wolf, project leader from the City of Gothenburg presented "Circular Gothenburg", a project aiming to push and support the circular transformation in the city. The main objective is to accelerate the circular transition in the construction and demolition process by using public procurement as a tool. It is important to increase the knowledge about how procurement requirements can be formulated to guide towards circular resource flows. The ambition is then to share the results and findings with stakeholders in all parts of the construction supply/value chain, with the hope of making as much impact as possible. The focus areas of the project are offices, housing and industry.

Nina Wolf believes that there are many positive effects to hope for using public procurement as a tool, e.g. reduced material consumption, high quality material recycling, increased reuse of material and long technical and aesthetic lifetime. Ultimately, resulting in buildings that are possible to disassemble and put into circular loops.

The main conclusion during the workshop with the municipalities involved was that all the cities present agreed on the importance to keep sharing updates and knowledge and to help each other progress within the circular construction transition.



3. SOCIAL ASPECTS IN REFURBISHMENT OPERATIONS - ADDRESSING SOCIAL ENTREPRENEURSHIP

-Involvement of civil society for increased circularity.

Larger neighbourhood refurbishment operations can offer an opportunity to stimulate entrepreneurship and to make a social difference in the local community. In the Sege Park area in Malmö, where a major transformation process is about to take place, the Circular Cities project has been exploring different ways of how the material streams emerging from the forthcoming refurbishment could stimulate local entrepreneurship and community engagement.

Sege Park

- from hospital area to a sustainable spearhead neighbourhood

How could the refurbishment of Sege Park stimulate entrepreneurship?

Sege Park, situated in a lush park area in Malmö, was until 1995 a hospital providing psychiatric care. Since then, a couple of primary schools, student housings and other facilities have been established in the buildings originating from the 1930s. The area is about to undergo a major transformation as it is about to become Malmö's new state of the art sustainability area, focusing on energy efficiency, sharing-economy solutions and local food production, alongside other sustainable solutions reducing the environmental impact. By renovating existing buildings and by constructing new ones, the project will provide Malmö with around 1,000 new households.



Figure 9: Sege Park
Photo taken 18 juli 2019

The City of Malmö has for many years been conducting "building developer dialogues" in the development of new neighbourhoods, 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 leading the way for more sustainable urban constructions and city planning. The property of the Sege Park location is owned by the municipality and 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 development phase, representatives from the municipality met with those who have received land referral once a month to discuss different themes – design, sharing economy and energy solutions, with the aim to stimulate sustainable incentives.

The City of Malmö has a vision for Sege Park to establish large-scale systems such as open storm water management, local energy sources, smart electricity grids and self-sufficient street lighting. This coincides with small-scale investments in for example bicycle pooling, car-pooling, recycling centres and greenhouses. Car traffic is to be minimized and a fine-meshed network of infrastructure for pedestrian and bicycle traffic is being built, which connects the district closer to the city centre.

In 2015, a sustainability strategy for Sege Park was adopted with ambitious goals for sustainability in the area. The City of Malmö alongside the local energy company E.On and waste & water company VA Syd have developed ambitions and common objectives for achieving the goals of the strategy and have established three focus areas: energy, waste, water and sewage. Together they are striving to achieve the goals in close cooperation with developers and other actors. Although the area has a substantial focus on circularity, it is mostly sharing solutions oriented. Upcycling and reuse of material has not been a subject that has been addressed to a large extent, apart from the initiatives described in the previous section. The Circular Cities project took the opportunity to highlight these questions in a workshop, to discuss and inspire circular efforts for the spill over-material emerging in the upcoming refurbishment operations (see last paragraph).

Social perspectives in refurbishment operations

It seems as the involvement of the local community can have many positive effects in an area that is undergoing considerable transformation. In May 2018, the Rockwool group gathered a group of experts on large-scale urban regeneration projects to share knowledge on the topic. It was pointed out that successful urban regeneration programs need to know the needs of the residents. It was stated that

“A bottom-up approach where residents are involved can uncover new innovative solutions while making the residents feel ownership of the process and increase their willingness to participate”

The socially challenged area Lindängen in Malmö was pointed out as a good example, where local authorities have been successful in stimulating transformation through public-private partnerships, in which social aspects have been the main focus. A key actor was the private real estate company Trianon that owns several buildings in the area. They were, in collaboration with the City, using the concept “social contracts”, which led to initiatives like employment of unemployed residents in the area, summer jobs for young people and small projects in which old windows were reused for building greenhouses for the residents. The initiatives seem to have been successful and they are probably the reason why vandalism has been reduced in the area. Furthermore, the general well-being has improved and it is thought to explain why the relocation from the area has decreased.¹

¹ “Upscaling urban regeneration” from <https://www.rockwoolgroup.com/our-thinking/indoor-comfort-health-and-safety/urban-regeneration/>

The Goldmine at Southern Harbour Resource Centre

– how to stimulate circular business initiatives by engaging young entrepreneurs

On the other side of the sound dividing Sweden and Denmark, in the South Harbour of Copenhagen, inspiration can be found on innovative ways to upcycle waste streams. At the “Goldmine” situated at the Southern Harbour Resource Centre, the Copenhagen municipalities together with EIT Climate-KIC are trying to find circular business models for their waste streams. A project has been set up to find people who could take on the challenge to be frontrunners in the Goldmine Lab. Copenhagen municipality together with EIT Climate-KIC established a test lab, providing space and resources needed for entrepreneurs to test and find new business models to upcycle waste fractions into new products. The overall objective was to seek knowledge on how to reuse waste and to create an atmosphere in the lab where entrepreneurs share their experience and knowledge amongst themselves and other interested actors. The project is trying to identify methods to locate, single out and attract suitable entrepreneurs for the lab and how to support a knowledge sharing environment. And, more interestingly, it seeks to find answers to how a lab like this could create synergies, contributing to an area’s or city’s circular material system development. The main findings of the project so far are listed in the textbox on the right-hand side of this page.

A lab similar to the Goldmine would be an inspiring example, which could be used in areas like Sege Park to support entrepreneurs in, for example, upcycling waste materials. The lab could be located in one of the sharing hubs that are being planned in Sege Park. The hubs will host various sharing functions for the people residing in the neighbourhood and a lab where entrepreneurs could work on finding ways to upcycle waste fractions would make good sense to be situated in one of the hubs.

Circular Learning Hubs – how to stimulate entrepreneurship

Existing companies can provide sparring based on their own experiences of developing and getting their products to the market – this will potentially create collaborations and thereby future opportunities for the front-runners after their stay in the Test Laboratory.

Educational institutions can collaborate with the Test Laboratory regarding student projects, which can lead to interest and further involvement as a front-runner after graduation.

Trade organisations can provide knowledge on waste/resources/materials as well as methods for working with and treating them.

Maker spaces and educational institution can buy waste materials from the resource centre and Test Laboratory and thereby help inventing new solutions to the recycling of specific waste fractions as well as creating a new market for these. Furthermore, the maker spaces will encourage makers with circular solutions to apply for a workspace at the Test Laboratory.

EIT Climate-KIC

Workshop

- how to stimulate circular solutions and employment in Sege Park

In one of three workshops conducted in this EIT Climate-KIC project, we invited stakeholders – from both the private and public sector, along with material researchers and people working with upcycling of material waste – involved in the upcoming refurbishment of Sege Park. An idea that came up was that local artists and entrepreneurs would be allowed access to leftover material from the refurbishment process that could benefit and promote the park. Developers about to build in the park



Figure 10: Workshop about refurbishment waste in Sege Park.
Photo credit: Elise Ankersen.

thought it could be a good idea, to demonstrate the high sustainability ambitions in Sege Park. A specific example came from a local upcycle entrepreneur who suggested that a sculpture park made from waste material and transformed by local artists could be established. Such an initiative is likely to raise awareness, promoting both Sege Park and circular possibilities.

A way to gain labour force and at the same time engage local residents to realise the ideas that came up during the workshop, could be to make use of social contracts mentioned above. When the private developers in the park are to sign their final contract of sale, social contracts describing how the developer will act to make sure they make a social contribution to the local community can be included. If this could be implemented, the ideas and synergies described in the Goldmine-report could potentially be realized. This would hopefully be the start of a learning centre that could act as inspiration and a physical hub for a number of stakeholders and institutes interested in reuse and upcycling of material waste.

How do we move forward?

This EIT Climate-KIC white paper has looked into the field of reusing and upcycling material in municipal construction projects in the region surrounding the City of Malmö. The climate is rapidly changing due to human activities, which calls for a systemic change in how natural resources are utilized. A circular approach is more likely to provide the means to tackle these challenges than a linear, traditional approach is. As the construction sector is responsible for around 30% of the total waste amount in the western world, it would mean a substantial difference if the sector were to be transformed. The municipalities play an important role in this transformation.

As demonstrated in the white paper, there are many inspiring initiatives, where circular material approaches have influenced the construction of a building. In some cases, just a few reused or upcycled elements have been integrated – in others, the majority of a building comes from circulated materials. In many cases, however, the reused elements of a building are merely there for aesthetic purposes, to create a nostalgic atmosphere. It is clear that municipalities have the power and influence to enhance these initiatives and making reused materials a standard in their construction projects. To get there, it is necessary to resolve existing bottlenecks.

By using public procurement as a means to include reused and upcycled material into the municipal construction operations, it would encourage and put pressure on the sector to adopt circular principles. A policy document could be developed demanding that a certain percentage of every new construction project should consist of reused, recycled or upcycled materials. It would most likely increase the demand for reused material and in turn, hopefully affect the entire construction chain, making all the barriers listed in this paper more feasible to overcome. Without demand, change is unlikely to happen and as this report demonstrates, there are currently few incentives encouraging the construction sector to implement a circular mindset.

Positively enough, immense amounts of expertise on the technical barriers that need to be addressed exists – both inside and outside of the municipal sphere. If the financial perspective would be allowed to take a step back, the circular alternatives would have the chance to flourish. In the future it will hopefully be less challenging and more economically viable to build in a circular way.

Participants and references

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