

Circular Economy in Cities around the World

A Selection of Case Studies



About This Document

This collection of case studies is the partial result of a six month research project. This research explored how circular economy is being implemented in cities around the world, and how these activities contribute to strategic sustainable development. The research was conducted by Patrick Lindner, Cynthia Mooij, and Heather Rogers as their final Master thesis for the MSc. Strategic Leadership towards Sustainability program at the Blekinge Institute of Technology in Karlskrona, Sweden. The full thesis can be found at <http://bth.diva-portal.org/smash/record.jsf?pid=diva2:1108675>.

The complete research included interviews with 21 municipalities from around the world who are actively integrating circular economy in their city. From Kawasaki to Oslo, and from Eskilstuna to New York - the interviews were incredibly insightful, providing a better understanding of the broad scope of the circular economy concept, and showing the varied ways it is being interpreted and applied in different contexts.

This document provides a selection of circular economy actions which have been categorized for readability. We hope to highlight some circular economy case studies that would not receive the same recognition in our academic research paper. The underlying motivation for this overview is to shed light on how municipalities are implementing circular economy in their cities as a source of inspiration for others. The document is intended for municipal departments interested in working with circular economy, or those simply interested in a deeper understanding of what circular economy in cities currently looks like.



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Introduction

Why Do We Need Circular Economy?

Environmental degradation and climate change are major global concerns that impact ecosystems, economies and communities around the world^{1,2}. With global population growth expected to reach 8.5 billion people in the next 15 years³, and 66% of the population expected to live in cities by 2050⁴, municipalities are in a unique position to affect change towards a sustainable society. As the degradation of our socio-ecological system is systematically increasing, the need to find solutions grows more urgent.

What is Circular Economy?

A tool that is being used to address this sustainability challenge is circular economy. The concept mainly originates from environmental economics, general systems theory, and industrial ecology. Although circular economy has traditionally been used in the industrial sector and product design, with cities consuming 75% of the world's natural resources⁵, municipalities are beginning to turn to the concept as an opportunity for resource efficiency - combining both their sustainability and economic ambitions. This circular economy trend within municipalities is further motivated by increased political pressure in various countries and on various levels⁶.

Following the current developments in the field of circular economy, various interpretations and definitions of the concept have also formed in the field. The following description of the concept has been synthesized from 35 different understandings of circular economy⁷:

“

Circular economy is a model that looks at human society from a system's perspective, where both technical cycles (using innovation to close the loop for materials and products), and biological cycles (the cycle of organic material and nutrients) are recognized. Preference is given for cycles that are being closed on a local scale for both.

1

Waste is a resource, and therefore materials are efficiently recycled and upcycled to maintain their highest value for as long as possible.

2

Design is intentional. Systems have a service-based preference and materials are designed for recycling, upcycling, and longevity.

3

Social sustainability is enhanced through sharing and collaboration while simultaneously stimulating economic development and opportunities.

4

Innovative business models are used as an enabling tool.

5

Systems take inspiration from ecology and living systems, where both materials and nutrients are cycled to restore and regenerate the economic and ecological system.

6

Both financial and natural capital are recognized and new value is generated through the cycling and restoration of materials.

7

Energy usage is reduced and comes from renewable sources.

8

The system is designed to be both resilient and adaptive through flexible design, diversification, and risk mitigation.

9

The ecological system is preserved by supporting biodiversity, eliminating toxic materials and managing externalities.

As illustrated, circular economy is a very broad concept with many interpretations. Although this understanding may seem unfocused, it also provides opportunities for cities to integrate the concept in many different ways, either in whole or in part. The case studies in the following chapters represent the key categories that were found in the ways municipalities are implementing circular economy, and will touch on some of the key benefits for municipalities who are considering adopting similar activities.

While not an exhaustive list, the following seven key benefits were identified:



Financial savings / new revenue streams



Stepping stone to other CE projects



Direct benefits to citizens



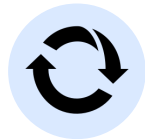
Direct benefits to businesses



Waste diversion



Stimulating innovation



Resource Efficiency



CASE STUDIES

Case Study Overview

	Case Study Name	City
Research	Circle Scan	Amsterdam, The Netherlands
Collaboration	Circular Peterborough Commitment	Peterborough, United Kingdom
Policy	Green Demolition Bylaw Circular Contracting	Vancouver, Canada Apeldoorn, The Netherlands
Platform	Share Peterborough	Peterborough, United Kingdom
Business	Camp Small ReTuna	Baltimore, USA Eskilstuna, Sweden
Incubator	Green & Digital Demonstration Program [Re]Verse Pitch Competition	Vancouver, Canada Austin, USA
Technology	Biogas From Organic Waste Cambie Street Bridge Heat Recovery	Oslo, Norway Vancouver, Canada
Fund	Meermaker Fund	Haarlemmermeer, The Netherlands
Space & Facilities	RDM Campus Baltimore Community Toolbank	Rotterdam, The Netherlands Baltimore, USA
Urban Development	Park 20 20 Circular Buiksloterham	Haarlemmermeer, The Netherlands Amsterdam, The Netherlands



1. Research



1. Research



Circular economy introduced in cities by the municipalities is a relatively new phenomenon. Especially in this early stage, it requires municipalities to gain knowledge about the flows that are embedded in their city; often waste, energy, and water. This knowledge can help municipalities gain awareness about the most impactful ways to affect circular economy in their city. The following Case Study represents such research.

Case Study 1.1 Circle Scan	
City	Amsterdam, The Netherlands
Departments Involved	CTO Office
Description	To identify the leverage points for circular economy within the city the municipality of Amsterdam conducted a circle scan. It outlined several waste flows, strategies to design them circular, and the potential benefits such design would bring. With this knowledge, the municipality is able to develop roadmaps and create concrete action agendas to shift the flows to a circular model. The study was commissioned by the City of Amsterdam, and executed by Circle Economy.
Key Benefits	<div></div>
More Information	<div>https://amsterdamsmartcity.com/projects/circle-scan-amsterdam www.circle-economy.com/case/developing-a-roadmap-for-the-first-circular-city-amsterdam/</div>



2. Collaboration



2. Collaboration

Circular economy requires collaboration between varying stakeholders, as the outputs of one system often serve as key inputs to another. Understanding these different flows is a first step, however having mechanisms in place to collaborate across sectors to take advantage of these synergies is also vital. Collaborative efforts have been taken by many municipalities around the world, and are often first steps which serve as stepping stones to stimulate further action.

Case Study 2.1

Circular Peterborough Commitment

City

Peterborough, United Kingdom

Departments Involved

Opportunity Peterborough (a council-owned non-profit)

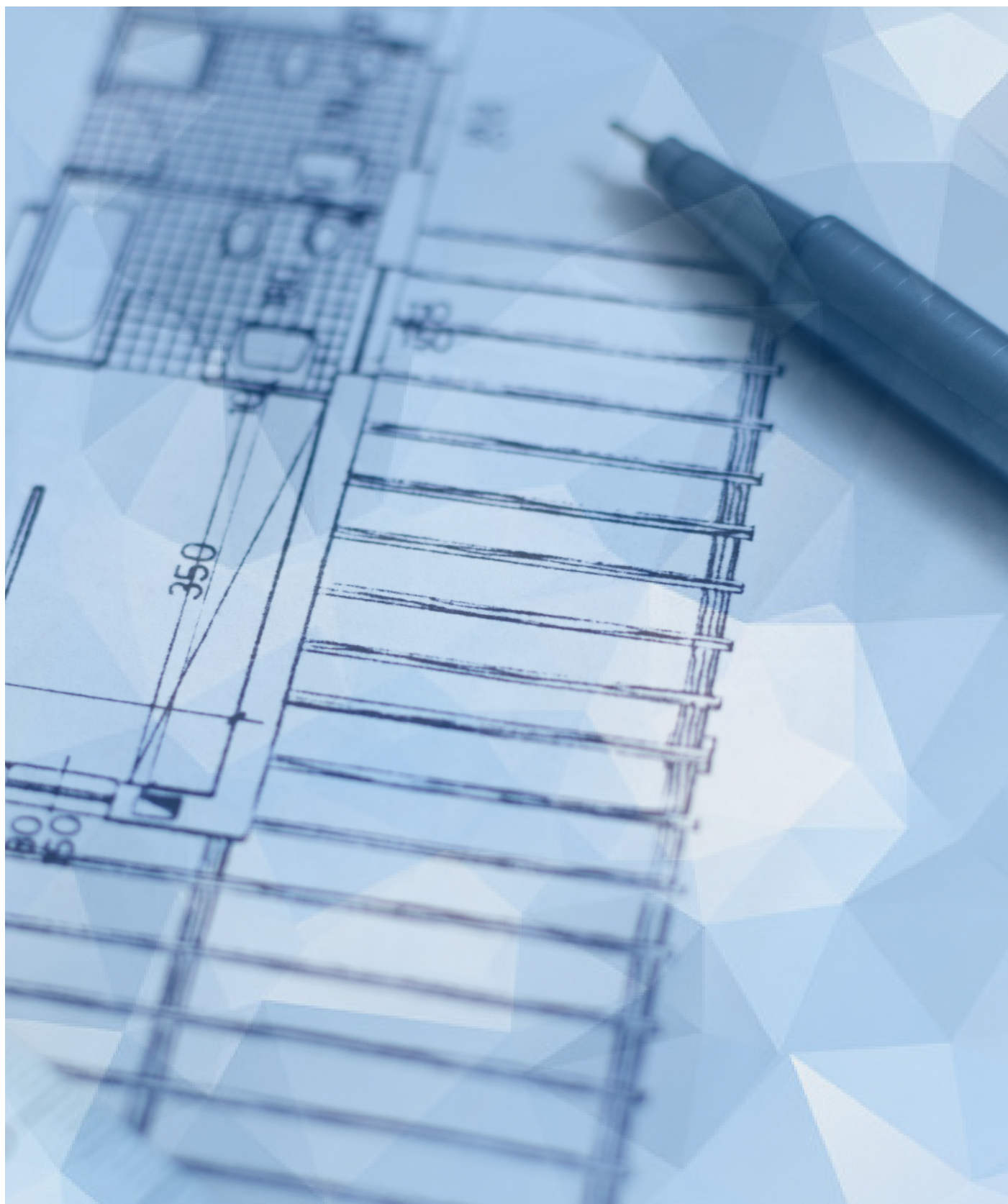
Description

Circular Peterborough is a Future Peterborough initiative, delivered by Opportunity Peterborough and Peterborough City Council. This initiative encourages collaborative working across the city to maximise the lifecycle of products and services, driving greater resource productivity, reducing environmental impact and addressing declining natural resource issues.

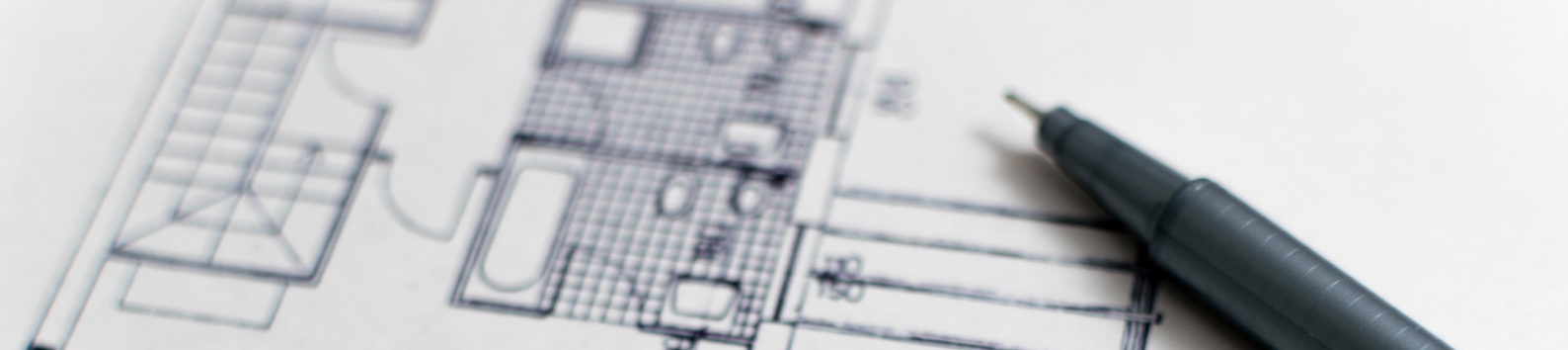
The Circular Peterborough Commitment sets out an approach; rethinking, redesigning, repairing, reusing, remanufacturing, recycling and recovering products and services – the 7 R's which enables the city to make the most of local resources, support economic resilience, develop strong communities and increase environmental sustainability. Organisations who have signed the commitment are actively involved in developing pilot projects and initiatives which encourage a more sustainable approach to business in the city⁷.

Key Benefits**More Information**

<https://www.opportunitypeterborough.co.uk/app/uploads/2017/02/Circular-cities-commitment-Final.pdf>



3. Policy



3. Policy

Policy can be a powerful tool for municipalities to integrate circular economy in their cities, both through internal municipal policy, and also public policy to influence the private business sector or citizen behaviour. Around the world, policy is being used in varied and creative ways and can be seen through procurement, materials bans, tendering policies, and incentive programs. The following case studies give a few examples of the ways policy can be used to transition systems toward circularity.

Case Study 3.1 Green Demolition Bylaw

City Vancouver, Canada

Departments Involved Sustainability Department, Department of Engineering: solid waste group

Description Pre 1940's homes are now required to be deconstructed as opposed to demolished, with a minimum of 75% of materials reused or recycled. This requirement increases to 90% for character homes of the same age. Incentives are also provided to prioritize reuse over recycling.

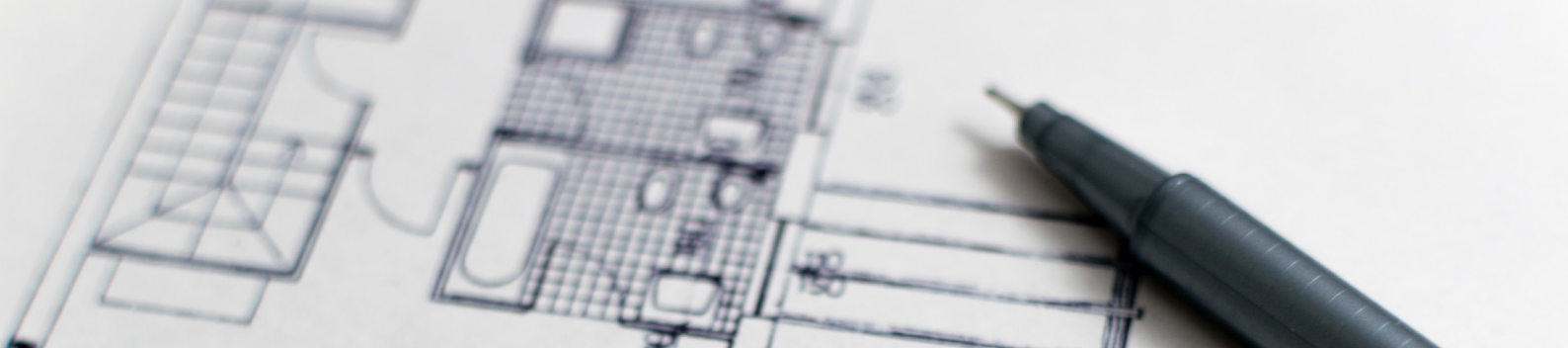
Key Benefits



More Information

<http://vancouver.ca/files/cov/demolition-permits-for-pre-1940-houses-recycling-requirements.pdf>

Case Study 3.2 is a method for the municipality to stimulate innovation within the private sector. By partnering with contractors they can provide opportunities for new circular economy solutions that might not have been developed without the prospect of large contracts. It can provide a push for contractors to get more creative and provide a stepping stone for them to apply this kind of thinking in their other work as well.



Case Study 3.2

Circular Contracting

City

Apeldoorn, The Netherlands

Departments Involved

Civil Project Department

Description

Apeldoorn is changing the way they establish contracts. Instead of tendering projects, they are tendering the contractor. For their new urban development project “De Parken”, the municipality is looking to renew infrastructure and public spaces for a total of €8 million⁹. They are specifically looking for the most inventive contractors that have the skills and knowledge to apply their creativity to the project, stimulating innovation for circular economy. They will select their partner based on their creativity, instead of their ability to perform at the lowest cost¹⁰.

Key Benefits



More Information

<http://tenderen.nl/circulair-tenderen-apeldoorn-trapt-af/>

<https://www.deparken.nl/>

<http://www.kplusv.nl/duurzame-economie-en-leefomgeving/circulaire-economie/als-gemeente-circulair-inkopen-met-rapid-circular-contracting/>



Case Study 3.1: Deconstruction is favored over demolition



Case Study 3.2: ‘De Parken’ neighborhood in Apeldoorn



4. Platform



4. Platform

Municipalities have a superior role within a city. With this unique role, they have the possibilities to facilitate platforms that enable citizens and businesses to act and interact with each other. Such platforms can serve to enable knowledge exchange or collaboration, or share and trade materials that would be thrown away otherwise. The Case Study below is one of these platforms that enables businesses to trade different resources with each other. A similar type of marketplace, concentrating on left-over materials, is set up in Austin, USA. Platforms like these can also be set up and used on a municipality-internal basis; Gothenburg and Eskilstuna in Sweden have platforms in place where old furniture and materials can be passed between uses and facilities within the municipal organization.

Case Study 4.1

Share Peterborough

City

Peterborough, United Kingdom

Departments Involved

Peterborough City Council, Opportunity Peterborough (the economic development company for the city)

Description

Share Peterborough is an online trading platform for businesses. Members that have signed up are able to offer and search for skills that might be needed for a specific project, spare meeting rooms, or leftover material that can be used by someone else. Additionally special promotions for platform members and opportunities for others can be posted by the members. As the platform is open to a diverse range of 'goods' that can be traded, the benefits of it are widespread as well.

The circulation and sharing of resources lowers the environmental impact each business has. Additionally, the collaborative approach of the platform encourages the creation of a stronger business community within the city.

Key Benefits**More Information**

<https://www.sharepeterborough.com/>
<https://www.opportunitypeterborough.co.uk/share-peterborough/>



5. Business



5. Business

Municipalities around the world are showing how circular economy can be applied to business models to create economic growth for the city, often while also surfacing the positive benefits in waste diversion and cost savings. The following case studies show examples of how business models can be adopted or initiated by the municipality. In Case Study 5.1, Camp Small is run by the municipality, however in Case Study 5.2, ReTuna is meant to be initiated by the municipality, with the private sector eventually taking over operations. In both cases there is a financial incentive for the program to continue, which helps bring stakeholders on board with new programs, and can generate revenue that may be reinvested into further projects.

Case Study 5.1 Camp Small

City Baltimore, USA

Departments Involved Recreation and Parks Forestry Division, Office of Sustainability

Description Camp Small is the wood waste collection yard run by the Baltimore City Department of Recreation and Parks. The 12 acre site is located in the Jones Falls Valley just north of Cold Spring Lane. Every day, City crews and contractors bring logs, chips, and brush to the site for processing. In early 2016, the Rec & Parks Forestry Division, in collaboration with the Baltimore Office of Sustainability, began the Camp Small Zero Waste initiative in an effort to sort and distribute the variety of wood products at the site.

Now, Baltimore City residents and businesses can purchase the resulting wood products directly from Camp Small¹².

Key Benefits



More Information <http://treebaltimore.org/programs/camp-small/>



The municipality plays a crucial role in being able to identify waste streams and market opportunities, to then be able to bring in the right partners into the project. Apeldoorn, a municipality in The Netherlands, demonstrated this by challenging their local paper producer to design cardboard from their roadside grass, which would have otherwise been burned or composted at the expense of the city¹¹.

Case Study 5.2

ReTuna

City

Eskilstuna, Sweden

Departments Involved Eskilstuna Energi and Milijo skilstuna

Description

Initiated by the municipality, ReTuna is a shopping mall for reused and repaired products. Residents can drop off various used items, which are then sorted and upcycled through repair or refurbishment, and ultimately resold.

There are different shops for different items (furniture, kitchen equipment, toys, sports equipment, textiles, etc.), and each shop is owned and run by an independent entrepreneur, with business support from the municipality. The mall employed 47 people in 2016, and particularly provides opportunities for those with employment barriers¹³.

Key Benefits



More Information

<http://www.retuna.se/>



Case Study 5.1: Sorting wood at Camp Small in Baltimore



Case Study 5.2: Shoppers enjoying a coffee at ReTuna



6. Incubator



6. Incubator

Business incubator programs provide resources to entrepreneurs to develop their business. This can be through things like office space, funding, mentorship or technical advice. These programs often provide a key opportunity for startups to launch in order to ultimately contribute to regional economic development. There is an increasing trend in business incubators programs focusing on social entrepreneurship, in which business ideas revolve around solving a specific social or environmental problem.

Circular economy requires a variety of partnerships, and the involvement of the private sector is crucial in order to stimulate new circular business models. Incubators are one way municipalities can involve and empower local businesses, combining their interest in stimulating the economy, bringing innovation to the city, and developing circular economy within their city.

Case Study 6.1 Green and Digital Demonstration Program

City Vancouver, Canada

Departments Involved Vancouver Economic Commission (VEC) and varying City Departments

Description This program was set up by the City of Vancouver to provide opportunities for cleantech startups to demonstrate and scale up their innovative solutions. Applicants pitch to different heads of city departments to see if there's a match between what the business can offer and an existing asset of the city. The municipality will then lend its resources (e.g. facilities, transportation, utilities) for product testing and demonstrations in order to help commercialize innovative technologies.

Key Benefits



More Information

<http://www.vancouvereconomic.com/gddp/>



Case Study 6.1 highlights how municipalities have the ability to use their own resources to provide a testing ground for innovation. It also shows the potential of bringing innovation to the municipality's current operations and assets and to test if there are longer term applications for the solution to be integrated (e.g. through procurement policies). New business ideas can also be launched, looking at the direct needs of a municipality, as can be showcased by Case Study 6.2, in which waste products are the foundation of a pitch competition. This provides direct long term solutions for big waste streams in a community.

Case Study 6.2 [Re]Verse Pitch Competition

City Austin, USA

Departments Involved Austin Resource Recovery, Economic Development Department

Description This social Innovation Program annually challenges participants to come up with innovative solutions for local waste products. Local businesses in Austin participate by offering their waste materials or byproducts that would otherwise go to landfill, and participants compete to pitch a new business or service idea using those discarded materials. Ideas are judged on viability, sustainability, economic and social impact. The competition is designed to inspire profitable new ventures while keeping valuable discards out of landfills.

The [Re]Verse Pitch Competition is a collaboration between the City of Austin, U.S. Business Council for Sustainable Development, Impact Hub Austin and the UT Herb Kelleher Center for Entrepreneurship, Growth and Renewal with additional support from local businesses.

Key Benefits



More Information

<http://reversepitch.org/>



7. Technology



7. Technology

The rate of technology advancement is rapid, and can be used to help implement solutions that build circular economy within a city. The case studies below are concerned with technological solutions on two different flows within a city: household waste and heat. In both cases, the initiatives taken by the municipality try to alter the treatment of the waste products of these flows and shift from a linear flow model to a circular one.

Case Study 7.1 Biogas From Organic Waste

City Oslo, Norway

Departments Involved Waste to Energy Agency

Description Based on a system of waste separation in households, the city of Oslo turns organic waste into biogas and bio-fertilizer. For that, the municipality invested in a biogas plant to enable this process. The biogas produced is used in the municipal waste trucks as well as in the buses for public transport. The byproduct of the bio-production can be passed on to farmers as bio-fertilizers.

Key Benefits



More Information

<https://www.oslo.kommune.no/english/politics-and-administration/green-oslo/best-practices/circular-economy-in-practice/>
<http://www.cambi.com/MediaSection/Files/Fact-Sheets/ROMERIKE-BIOGAS-PLANT-Oslo-Norway>
<https://www.wartsila.com/resources/customer-references/view/ege-biogass-oslo-norway>



Case Study 7.1 addressed food waste coming from households in the city and created value from an unused resource. Case Study 7.2 on the other hand, tries to tighten the loop of the flow of heat by recovering and redirecting waste heat that would have been otherwise lost.

Case Study 7.2 Cambie Street Bridge Heat Recovery

City Vancouver, Canada

Departments Involved -

Description In the area of False Creek in Vancouver the municipality installed a heat recovery system under the Cambie Street Bridge. The recovery system takes up the heat of the sewage that comes from the surrounding neighbourhoods. The heat collected is supplemented by heat from natural gas boilers. Both together are sent back to the houses where the heat is re-circulated.

Key Benefits



More Information

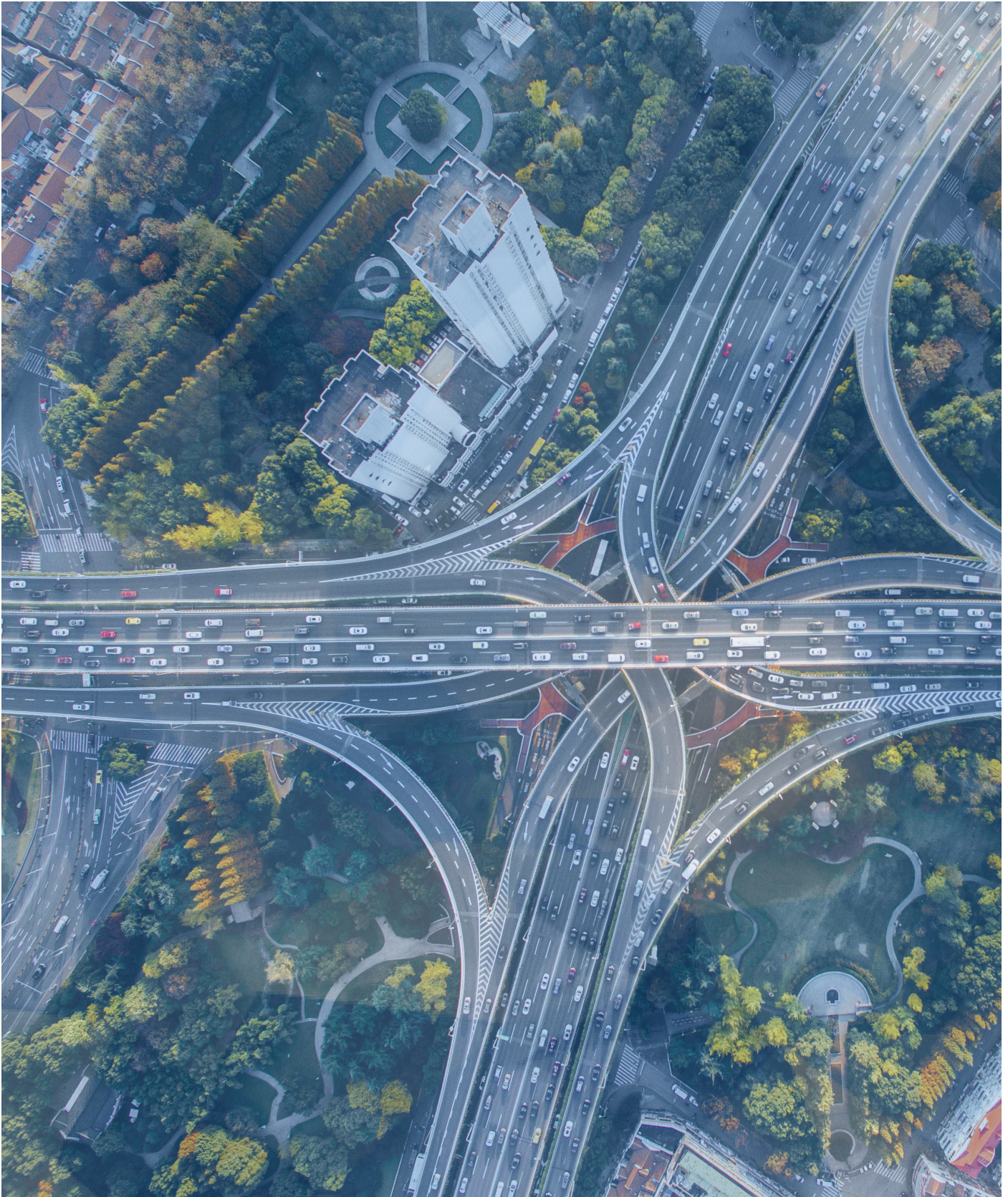
<http://vancouver.ca/home-property-development/how-the-utility-works.aspx>
<http://vancouver.ca/home-property-development/southeast-false-creek-neighbourhood-energy-utility.aspx>



Case Study 8.1: The biogas facility in Oslo, Norway



Case Study 8.2: The heat recovery system



8. Funds



8. Funds

Funds or grants that municipalities dedicate to sustainable development or circular economy initiatives are becoming more common. They can provide an opportunity for projects to gain access to the necessary financial resources to get them off the ground. This can be especially important for smaller initiatives that may otherwise be unable to secure funding. Funds can take different approaches - offering a one-time lump sum, or providing a low-interest loan for example.

Designing a fund with specific criteria for circular economy can be a big boost for development in the private sector. Setting up a revolving fund for low-interest loans can benefit the municipality with revenues from collected interest while also sustaining the fund. This is showcased in Case Study 8.1 by the revolving fund in Haarlemmermeer. This type of fund stimulates other investors to co-finance, and directly stimulates regional sustainable development.

Case Study 8.1

Meermaker

City

Haarlemmermeer, The Netherlands

Departments Involved

Spatial Planning Department

Description

The municipality of Haarlemmermeer initiated Meermaker, a revolving fund that co-finance innovative sustainability projects in the region. The fund provides a maximum of 40% funding, and in turn also This initiative provides an opportunity for a continuous realisation of new businesses supporting the sustainable development of Haarlemmermeer, as the fund is sustained by the collected interest. Examples of projects that have been realised: small-scale waste to energy systems, local renewable energy organisation, algae nursery, and sustainable transport services for the region.

Key Benefits**More Information**

<http://meermaker.nl>



9. Space & Facilities



9. Space & Facilities

As resource efficiency is key within a circular economy, the sharing of space and facilities is becoming increasingly popular within communities as a method of efficient infrastructure use. Sharing spaces and facilities provides a lot of opportunities, which may be in the form of financial savings, but also in innovations through new collaborations. Case Study 9.1 presents some of the benefits of sharing spaces and facilities. RDM Campus brings together private sector, education, and research institutes under one roof, boosting innovation in the maritime and offshore sector. Not only that, but it also presents an opportunity to repurpose a former ship wharf that would otherwise need large amounts of investment to be broken down and redeveloped.

Case Study 9.1 RDM Campus

City Rotterdam, The Netherlands

Departments Involved The Port of Rotterdam Authority

Description RDM Rotterdam is part of the Rotterdam Innovation District, in which private-sector, education and research institutions meet to work on a 'smarter' port. The former shipyard of the Rotterdamsche Droogdok Maatschappij (RDM) is now home to cutting edge facilities and hosts a number of business and cultural events.. Over 40 innovative companies have their offices and workshops at the RDM campus, from SMEs to global players in the maritime and offshore sectors. The dynamic space is also shared with vocational- and higher professional students, who are able to make use of the labs, equipment, and facilities.

Key Benefits



More Information

<https://www.rdmrotterdam.nl/en/about-rdm-rotterdam/>



A concept, partly popularized by the successful peer-to-peer sharing platform Peerby, is a 'library of stuff'. Rather than investing in your own tools or equipment, there are now also increasing opportunities for citizens to borrow from someone in their neighborhood. More and more organisations are setting up local tool/resource libraries, stimulating resource efficiency on a local level. The Baltimore Community Toolbank (Case Study 9.2) showcases how a tool library can benefit community development projects, by providing the service specifically to non-profits.

Case Study 9.2 Baltimore Community Toolbank

City Baltimore, USA

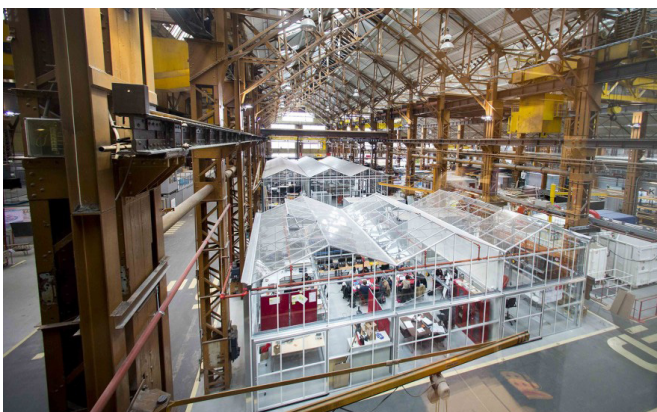
Departments Involved Sustainability Office

Description The Baltimore Community Toolbank provides the tools for non profit organisations they need for their community projects, in exchange for a small membership fee. The toolbank serves to increase access to tools, negating the necessity to own your own and thereby also helping non profit organisations save money. It is a service for non profits, as well as a strategy to limit materials entering the consumer waste stream. The Baltimore Community Toolbank is affiliated with ToolBank USA, and are supported with donations from e.g. Home Depot Foundation, UPS Foundation, and Stanley Black & Decker.

Key Benefits



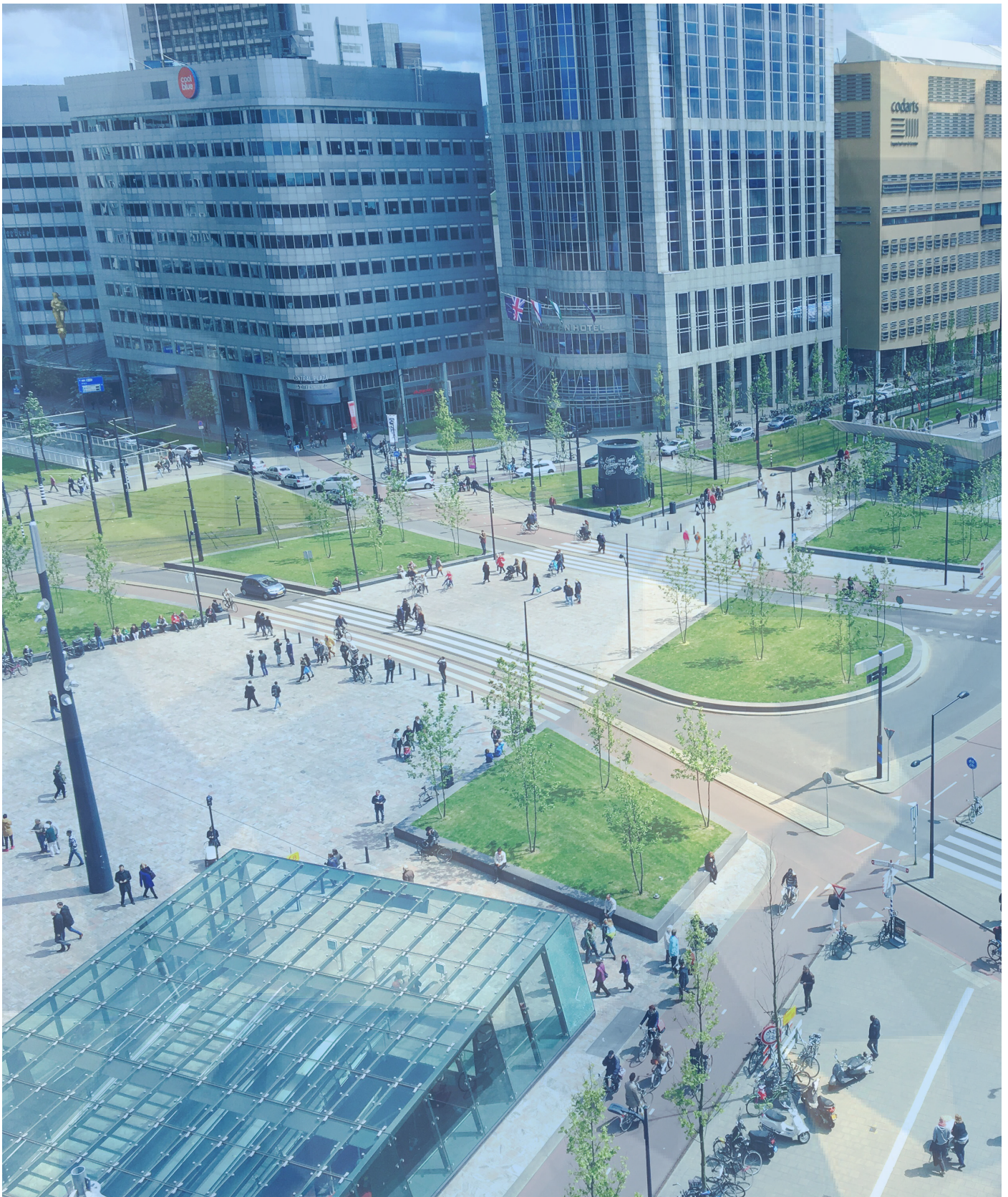
More Information <http://www.baltimore.toolbank.org>



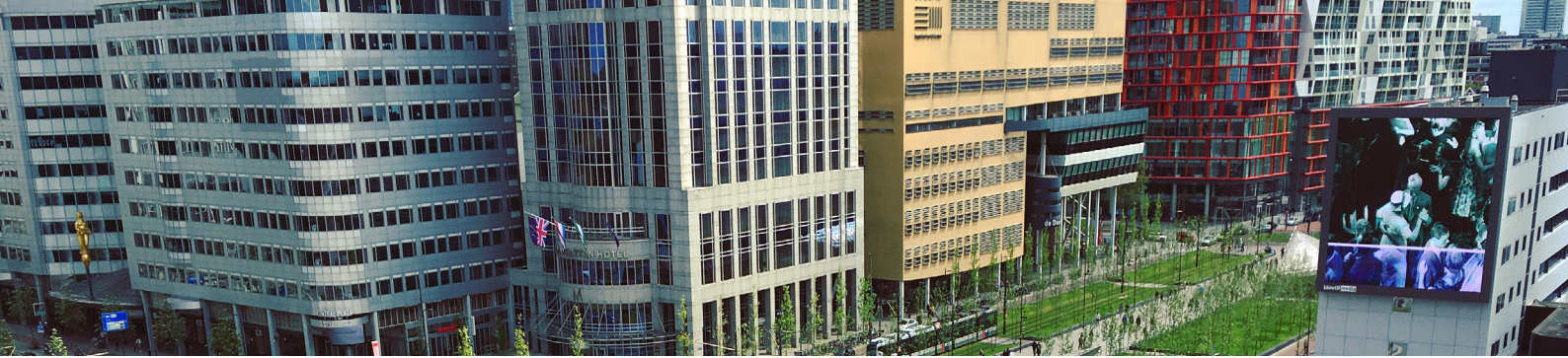
Case Study 9.1: A peek into the RDM Campus facilities



Case Study 9.2: A community project using borrowed tools



10. Urban Development



10. Urban Development

Smart urban development can play a major role in the advancement of circular economy in the city, as new infrastructure can be designed specifically with circularity in mind. Neighbourhood-level development in particular is gaining traction, as circular solutions for waste, energy, and water recovery and reuse are often more easily realized on this scale. The cost of transportation between differing material or resources uses is low or non-existent. The smaller scale also allows new technologies to be tested before large investments are made for city-scale projects. Urban development is often in partnership with the private sector, however there are ways that municipalities can encourage circular development through enabling policy, partnerships, tax incentives, funding, or marketing.

The following cases are two very different examples of how municipalities are helping to stimulate circular economy within new urban development.

Case Study 10.1 Park 20 | 20

City Haarlemmermeer, The Netherlands

Departments Involved Urban and Spatial planning

Description Park 20|20 is a business park entirely built according to Cradle to Cradle standards. It includes 92.000 m2 office space and services like a supermarket, daycare, gym, and various restaurants. The sustainable business park is designed to reduce and re-use waste streams, reduce CO2 emissions and material use. In addition to that, its landscape and buildings are also specifically designed to add to job satisfaction, increase employee productivity, and inspire creativity amongst the park's professionals. There is also an emphasis on engaging the workers through various community programs.

Key Benefits



More Information

<http://www.park2020.com/en/our-story/>
<https://amsterdamsmartcity.com/visit/park-2020>
<http://www.mcdonoughpartners.com/projects/park-2020-master-plan/>



Case Study 10.2 Circular Buiksloterham

City Amsterdam, The Netherlands

Departments Involved Spatial/Urban Planning, Sustainability

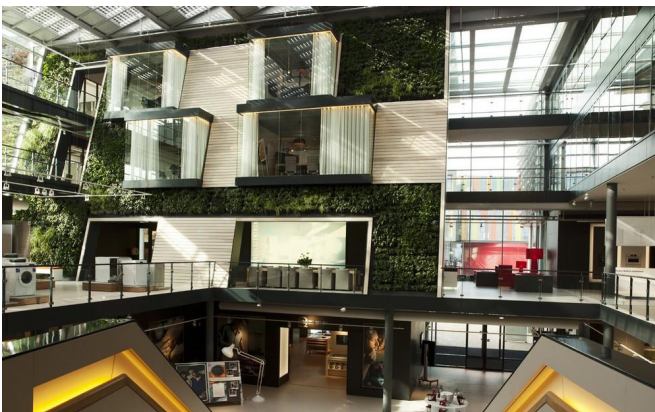
Description The City of Amsterdam is facilitating and supporting the development of Buiksloterham, a previously industrial region in Amsterdam North, into a sustainable and circular district. The City of Amsterdam is one of the signatories of a manifest which has been drawn up in order to emphasise the circular ambitions of the project. Over the next 10 years, Buiksloterham will be transformed into a circular neighbourhood where products and raw materials are reused as much as possible. The city is already supporting individual self-builders in realising a sustainable home with circular elements.

Key Benefits



More Information

<https://www.amsterdam.nl/projecten/buiksloterham/circulair-duurzaam/>
<https://amsterdamsmartcity.com/projects/circulair-buiksloterham>
<https://www.metabolic.nl/publications/circular-buiksloterham-designing-post-industrial-amsterdam-eng/>



Case Study 10.1: Specific C2C design within buildings



Case Study 10.2: An architect completed building a passive house from mainly glass and wood in Buiksloterham



RECOMMENDATIONS

Recommendations

In addition to the case studies provided, there are also a number of general recommendations for municipalities who wish to pursue a circular economy in their city. Recognizing and leveraging influence, adapting to culture, implementing system-level solutions, and focusing on internal education are all elaborated on in the following section.



Recognizing and Leveraging Influence

Municipalities are in a unique position to design, plan, manage, and monitor the city. In order to leverage that position however, they must first recognize their areas of highest influence, which are highly context dependent (e.g. Circle Scan in Amsterdam). For instance, some municipal agencies may own and operate their own public utilities, while others may be in partnership with private companies, or may contract out to the private sector. Based on the complexity of the system circular economy operates in, we recommend that municipalities invest in some initial research to understand which areas they may have the greatest influence to stimulate circular economy in their city. This provides direction and can ensure that resources are used effectively for greatest impact.

Some possible areas of high influence may include: the already mentioned public utilities (e.g. water, energy, waste), policy, procurement, built environment, communication, fund distribution, and knowledge of industry/business activities in the city.

Adapting to Culture

The message of circular economy may need to be adapted according to the particular culture and context of individual cities.

Municipalities may want to ask what is important to their citizenry. For instance, are they open to recycling policies? Do they need to be financially incentivized? Is there a culture of environmentalism? Similar questions should be asked for the local businesses and industry. Is there a culture of experimentation and innovation? Is employment a priority?

Depending on the context of the city, circular economy can be communicated and applied accordingly. One advantage of circular economy, as reflected in its broad definition, is that it can be looked at from different perspectives - especially as it combines both environmental and economic components.

System Level Solutions

The major challenges to our environment and our society call for a systemic approach that addresses upstream solutions. While municipalities may first focus on circular economy projects that reap low hanging fruit, these downstream and stand alone projects often do not realize the potential of circular economy on a system level.

To develop circular economy as a strategy, it is important to understand what system-level barriers are present, such as prohibitive policy or physical infrastructure. For example, it may be tempting to focus on waste diversion from the end of the line, where materials can be creatively recycled or reused, however an upstream, system-level solution may take the form of collaboration for the redesign of products before manufacturing, or the re-evaluation of manufacturing at all in favour of service-based approaches. Enabling policy for this transition is therefore vital.

Internal Education

The establishment of departments or working groups for circular economy is common, however, internal education of departments and effective processes for interdepartmental communication must be given significant attention as well.

As seen in the broad scope of the definition, circular economy is not limited to one department, but can be applied on many levels. While one department may focus on supporting the implementation of circular economy as a whole, the other departments must also be aware of their role and how circular economy can benefit their operations.



Conclusion

The concept of circular economy, and the ways it can be implemented in cities is in a period of significant evolution. Research has shown that currently, circular economy in cities is positively contributing to a sustainable society, and there are many passionate practitioners who are devoting themselves to its advancement. We hope that the collection and sharing of these case studies can serve to connect municipalities who are facing similar challenges and opportunities, and provide inspiration going forward. We also look forward to seeing the forms that circular economy will take in the coming years, and how the current implementation of the concept will be adapted, improved and enhanced to realize the potential of radical systems change.

References

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