Circular **Innovation**
City *Challenge*

DRIVING URBAN RESOURCE SYMBIOSES AND RADICAL CIRCULAR INNOVATION

Case presentation on a public-private innovation project between Copenhagen and Seenons

Circular Innovation
City Challenge

Table of content

Circular Innovation
City Challenge

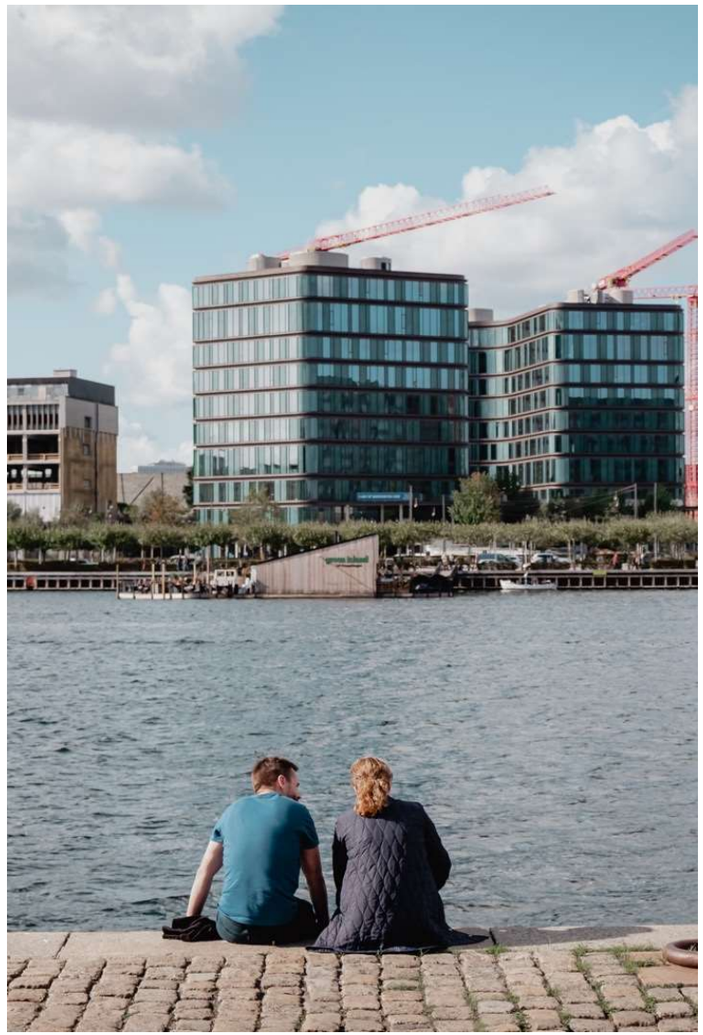
1. POTENTIAL & IMPACT: DESIGNING CIRCULAR RESOURCE FLOWS IN COPENHAGEN

Circular Innovation City Challenge

Copenhagen is working to establish itself as a driving force in the development towards a more circular economy in cities. With the 'Circular Copenhagen' plan from 2019 Copenhagen has set targets to recover 70% of commercial waste for recycling, to increase the direct reuse of goods by three times, and to reduce CO2 emissions with 59.000 tons by 2024.

To fulfill these objectives, all citizens of Copenhagen must learn, adapt, and change their behavior to become more circular. Businesses, the city, Copenhageners must change their attitude in terms of how they treat the city's waste materials and contribute to finding new ways of securing reuse and recycling.

Although many circular economy technologies are already being implemented, such as the digital watermark project 'Holygrail 2.0', Copenhagen is fully aware that new innovations and collaborations are required to meet the ambitious ambitions of 2024 and beyond. As part of the Circular Copenhagen initiative, an innovation platform has already been established. Providing a foundation for collaboration with industry and knowledge institutions around the next generation of solutions.



Copenhagen is also one of the five key partners in the Circular Innovation City Challenge, alongside Glasgow, Amsterdam, New York and Toronto. The search for digital solutions and public-private partnerships will ultimately help Copenhagen become a frontrunner in the circular economy.

A key part of the Circular Copenhagen plan is to *"ensure development of circular material flows of high quality".* This action point aims at facilitating the development of new circular value chains in Copenhagen. Covering both material flows and upcycling of materials, as well as supporting the creation of new sustainable businesses, products and systems solutions.

By participating in the Circular Innovation City Challenge, the City of Copenhagen has identified an opportunity to engage with the Dutch company Seenons, who was chosen as one of the five winners from 137 submissions. Seenons is a data and tech-driven circular economy company that matches waste with businesses that upcycle the waste into new products, giving it new life.
Seeons connects businesses, transport/logistic partners, waste service providers, and municipalities for more efficient and sustainable waste disposal.

The City of Copenhagen and Seenons have joined forces to explore the potentials in a market and logistics system for circulation, recycling, and upcycling of materials for private businesses in Copenhagen.

The ultimate goal is to ensure less materials go to waste, but it is equally imperative to support innovation in the development of new products and businesses.

To reach a zero-waste society, circular cities will need to lead the movement to stop waste from entering incinerations or ending up in ever-growing landfills.

This presentation provides insights into the Copenhagen-Seenons collaboration, as a case for public-private innovation around digital, circular solutions in cities.

Additionally, it summarizes the benefits Copenhagen has gained from city-to-city collaboration around driving an ambitious, circular transformation to become a circular and thriving city.

”There is something interesting in terms of scale working with Seenons. One thing is to talk about circular economy. But we are looking at it in a narrow geographical context. We are not talking about sending our plastics to the Netherlands. It is the self-sufficient city that we aim to create. We wish to foster closed loops, and to keep materials in the local loops. So, this project collaboration taps into the circular transition and becomes an example of a small micro cosmos of this transition. And it really points out all the flaws in the existing [linear] system. “

- Kathrine Overgaard Warberg, Programme Director of Circular Copenhagen, City of Copenhagen

Circular Innovation City Challenge

2. RESULTS & EMERGING OUTCOME

Circular Innovation
City Challenge

The city of Copenhagen wants to foster a new type of urban symbiosis. Moving away from classic industrial symbiosis, which are often large scale and outside of metropolitan areas, and toward urban contexts, where there are several smaller material streams and where the stakeholders are often local and small businesses.

In practice, this means Copenhagen wants to increase its reuse and recycling rates, as well as to move waste materials up the hierarchy. The project intends to engage other types of waste collectors and operators in the city, challenging the existing linear system operators and actors.

Today, some reuse of materials is taking place in Copenhagen as a symbiotic process. However, they are more niche initiatives. If Copenhagen are to achieve a higher level of recycling and upcycling, they will need to take a different approach. Especially because the practical setup of such a symbiosis must fully align with the operational practices of small and medium-sized businesses and local businesses within the city.

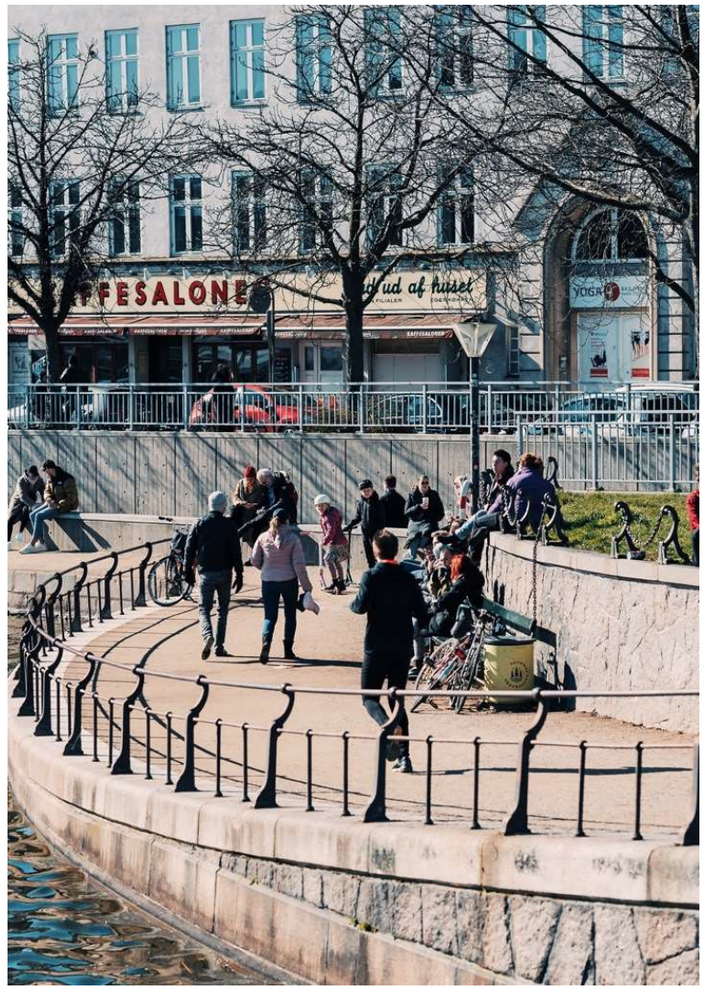
In the long run, Copenhagen hopes that the initiative and setup will not only support existing businesses, but will also stimulate new and innovative startups with a circular mindset and a business model based on the reuse and recycling of remaining resources.

One of the key aspects of the collaboration between Copenhagen and Seenons is that it will not be the municipality itself that will be the end-user, but the individual businesses that operate within the city.

Thus, the collaboration between Copenhagen and Seenons is not focused on implementing a specific product or service. It is rather aimed at identifying the potentials, opportunities, and limitations of establishing a viable business model around an urban resource symbiosis.

During the initial stage of the innovation collaboration, an analysis will provide the basis for future decisions on the direction of the collaboration. As part of this analysis, a particular focus area is identifying potential uses of resource flows in Copenhagen, influenced by Seenon's activities in Amsterdam. In addition, it is crucial to understand the logistics and infrastructure required for the symbiosis system and model to be scalable.

Copenhagen and Seenons agree that collaboration is not just about producing a report or analysis that resides on a shelf. But that it becomes a practical guide that can be used to



guide the implementation of the best possible setup, as well as inspire local businesses in Copenhagen about how such an initiative can be beneficial for them,

In three years, Seenons hopes to have a finely-tuned network in Copenhagen with a vibrant ecosystem of businesses and processors, and a logistics network that will connect them.

To lay the foundations for such an innovative model of resource symbioses, Copenhagen must work with a partner who is willing to accompany them on this exploratory journey.

"Seenons has the startup drive, agility and power to think and act differently. There is a great deal of idealism in them. They have shown that they can make it work in Amsterdam. At the same time, they understand that we are in a transition phase in Copenhagen. They respect this and are ready to act according to where we are," says Kathrine Overgaard Warberg, Program Director of 'Circular Copenhagen', City of Copenhagen.

Thus, Seenons was the right partner for Copenhagen to start this journey and take the important first step is learning about potentials and market opportunities for urban resource symbiosis in Copenhagen.

3. THE CHALLENGES - ON SOCIETAL, CITY AND PROJECT LEVEL

Circular Innovation City Challenge

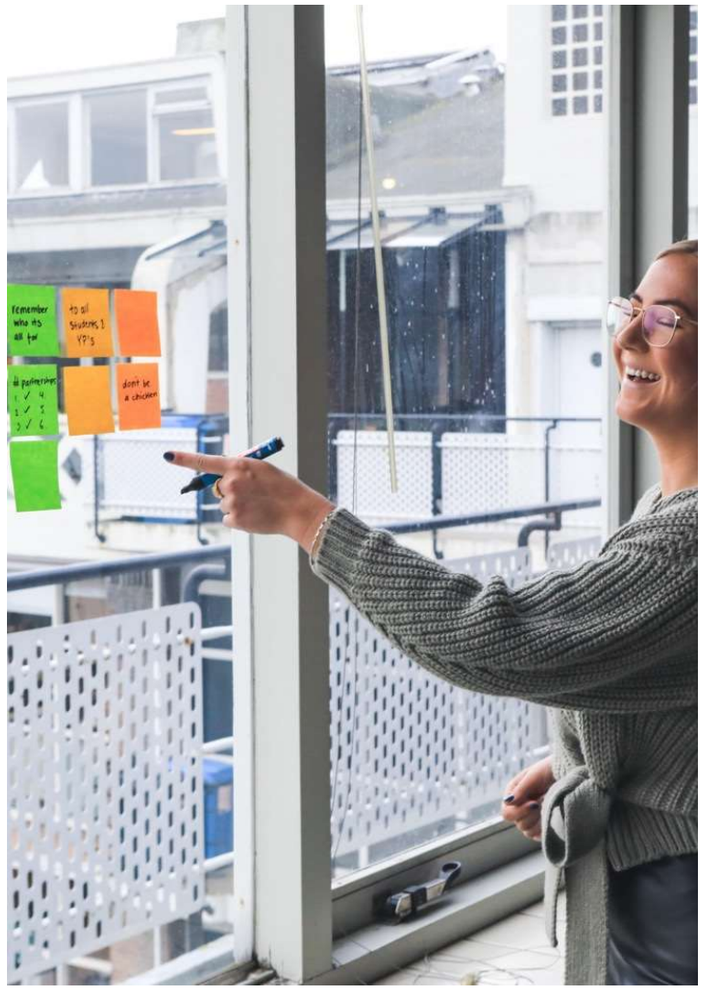
Copenhagen has identified a gap and a challenge in their overall circular economy initiatives, but they lack the right approach and setup to tackle this challenge.

As of today, most recyclable waste fractions in the city are handled by the public, municipal system. However, when it comes to creating value from smaller and more specialized fractions, especially those from small and medium-sized companies in the city, the situation becomes more complex.

"There is also a reason for this gap to exist. It is very complex and there are many constraints and regulations for what we as a city can drive and take on as a public organisation," says Kathrine Overgaard Warberg.

It is difficult to capture the value inherent in the smaller and more niche material fractions through the traditional waste management system. A more agile, decentralized approach is needed.

Through their data-driven and ecosystem-based platform, matchmaking and logistics setup, Seenons have shown ways to overcome these challenges in the Netherlands.



"In my opinion waste companies should say: 'We don't recycle everything'. There are hundreds and thousands of waste streams and it is not realistic that you are the best solution for everything. [...] The chain has to be reinvented. The players have to go back to the drawing board and consider, 'What is my role'. "Am I a transporter, a processor, and what streams can I process economically, sustainably?", asks Joost Kamermans, Co-Founder & CEO, Seenons.

Another part of the complexity is the requirement for a lot of data to secure the value from these fractions. This is data about what the materials are, where they are, and when they are available.

"Data plays a big role. Because at the end of the day it is about understanding what kind of waste, in what quality and what quantity becomes available - and when. Because if you no longer look at waste as waste, but as a resource, it is no longer enough to say: "I have cardboard - but are we talking pizza boxes with a lot of grease, are we talking paper with print, or is it the average cardboard in the city, which is very contaminated?", says Joost Kamermans.

The data that provides the foundation for the urban resource symbiosis also contributes to transforming the system as a whole. Giving insights to the disposal company, the logistics company, the processor, as well as the procurement manager, because ultimately, they will be the ones to purchase waste.

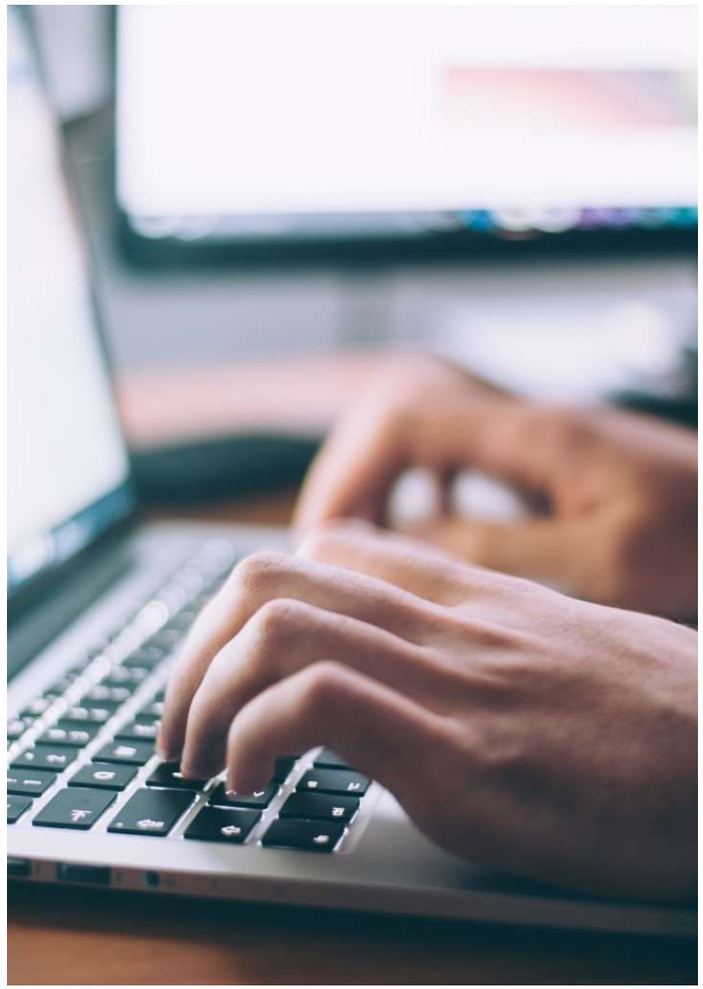
Seenons works on an on-demand basis, where companies use the service and marketplace when - and only when - they have residual materials. The digital and data-driven foundation on which this solution is built is vital, since it allows for an agile, decentralized setting for urban resource symbioses as well as inherent scalability.

In addition, logistics plays an extremely significant role in the setup and is also a complex problem to solve. Again, Seenons' approach relies on decentralized, ecosystem-based processes where materials are circulated through environmentally friendly vehicles and mobility solutions already available in the city (electric cargo bikes, etc.).

“We are a platform that has no vested interest. We share the interest of the customer, the waste disposer. We don’t have our own facilities, we don’t have our own processing plants, nor do we have our own diesel trucks. So we don’t care who transports it and processes it. We look objectively at who is best suited to handle this, and who is best situated to process this into something new. Because we are a tech platform, we can automate a lot, we can keep costs low, and we can give you advice on how to prevent waste. […] We have a business model that allows for waste reduction“, says Joost Kamermans, and explains that it differs significantly from the business model of many of the traditional waste operators which is about increasing volumes to increase profit.

As part of the project, The city of Copenhagen and Seenons are assessing the suitability of existing low-carbon logistics services in Copenhagen for providing the required transportation infrastructure to distribute materials on an on-demand basis among the participating companies.

Collaborating with a Dutch company and using best practices from Amsterdam also places some pressure on the local administration when they are able to say: "If they can solve this in Amsterdam, we should be able to do the same in Copenhagen."



As a public-private innovation project, this project addresses a global challenge of reducing the amount of waste generated in cities and developing new urban systems which can ensure zero waste, increase the recirculation of material and decrease the carbon footprint of cities.

If the urban resource symbiosis model is to succeed in Copenhagen, it is based on the willingness of local businesses to participate in it. For local operators and businesses to become involved in the process, they must understand their responsibility for the products they sell, provide, and ship out into the world. Additionally, they must understand the value-add and innovation potential inherent in engaging in urban resource symbiosis.

In the long run, this is about taking small niche projects and establishing viable value chains within these urban resource symbioses, where many operators and businesses can get involved in providing and utilizing materials at a larger scale.

4. THE HOW & THE PILOT PROJECT UNFOLDED

Circular Innovation
City Challenge

As a first step in the collaboration between Copenhagen and Seenons, a research study will examine how Copenhagen can benefit from and participate in urban resource symbioses. This includes mapping out potential collaborations between businesses with resource that can be used and valued by other companies rather than going into the waste management stream.

Seenons contributes to the research study with best practices from a Dutch perspective. Copenhagen adds insights into the Copenhagen perspective and where the greatest opportunities exist within the city.

The analysis will present an overview of the potential of urban resource symbiosis in Copenhagen. Additionally, it will allow Seenons to determine if it makes sense from a business perspective to focus on the Danish market and establish their services in Copenhagen.

For this type of project, an insight-analysis-roll-out model is necessary, since the municipality will neither own nor operate the urban resource symbiosis. As such, the innovation collaboration cannot be viewed as a traditional procurement project.

To support the decision-making of Seenon's side regarding whether to engage and seek market opportunities in Copenhagen, the Municipality can provide expertise, know-how, and human resources.

For Seenons, it is crucial to understand how Copenhagen differs from e.g., Amsterdam in the resource streams available, the maturity and readiness among businesses, and the regulatory framework. Seenons has already established some lucrative business opportunities in the Netherlands, where the company currently operates.

"There are businesses who go the extra mile for moral reasons. There can also be legal reasons for why you need to do it. The companies we work with that want to become zero waste are not economically viable right now. Then you do it for your reputation because your customers like it or due to your motivation. But there is a big gap between becoming completely zero waste - which is very difficult to do - and reducing your waste by significant amounts. Which can typically lead to cost savings. And we of course do R&D to make sure it becomes more and more economically viable to go to complete zero waste", says Joost Kamermans.

The market potential analysis by Copenhagen and Seenons provides insight and highlights market opportunities in Copenhagen.

However, it will take action on the ground to truly convert Copenhagen's businesses to more circular business practices, and potentially dedicated circular innovation business support programs for new companies to arise from urban resource symbiosis.

The question is what concrete resource streams in Copenhagen might be candidates for symbiosis with urban resources.

Orange peels are one example of this since they are a current biowaste problem in Copenhagen. Here, Seenons also has experience from Amsterdam with a corresponding use-case, in which orange peels provided by one city business are used to make orange liquor by another city startup. Other examples are coffee grounds that become soap, and used textiles use for new products. An area where Copenhagen hopes to identify viable use cases is the various plastics going through the waste system.

If the ambitions to build urban resource symbioses are realized on Copenhagen territory, a potential follow-up for Copenhagen could be to explore partnerships with other public organizations. Potentially, the symbiosis of urban resources can benefit both new and existing businesses, lowering entry barriers and increasing success chances for private operators.

5. KEY LEARNINGS FROM CICC & PUBLIC-PRIVATE INNOVATION PROJECTS

Circular Innovation
City Challenge

When the burning platform is missing, it's difficult for city governments to act and seize new opportunities. The same applies to the City of Copenhagen.

"What we do most of the time is incremental innovation. Adjusting and changing the existing is what we have the mandate to do. While radical innovation and potential are rarely explored. And when opportunities present themselves, we find that it can be difficult to seize them.", says Kathrine Overgaard Warberg.

This paradox between incremental innovation on the one hand, and radical innovation on the other, is caused by internal processes and governance within the city administration. In order to work with innovative and radical solutions, maturity is required internally. The organization has to be ready and mature to catch these both for colleagues to get on board and support the process and to get top-down approval to spend time on this when it is not an urgent internal need right now.

One of the benefits of a challenge like the Circular Innovation City Challenge is that it fosters radical innovation and introduces cities to new digital and circular solutions.

"It opened our eyes to all the new things out there. Globally, there are much more things already existing than we thought. That's something that we experience over and over again.", says Kathrine Overgaard Warberg.

On the other hand, the format of the challenge and the open innovation environment does present several challenges for city governments in terms of scoping, planning for, and preparing teams and decision-makers. Due to this, it may be difficult to gain buy-in at a later stage in the exploration of a potential collaboration.

Copenhagen has experienced substantial value in the close dialogue and knowledge exchange between the five partner cities of the Circular Innovation City Challenge. The importance of getting to know one another and aligning practices within the circular economy has been a significant strength for the challenge.
Despite Copenhagen's participation in many circular networks, such as The Circular Cities Declaration, the smaller number of partner cities combined with the trust and honesty built into the conversations creates value, and implications for future city-to-city collaborations that are even bigger in scope.

6. NOW WHAT? FUTURE AMBITIONS & NEXT STEPS

Circular Innovation City Challenge

Within three years, Copenhagen hopes to see self-sustained symbioses of urban resources flourishing in the city, working on an extensive and profitable scale with city operators and local businesses.

As of that time, the City of Copenhagen may see its role in urban resource symbioses as outsized.

"The municipality will no longer be part of this. We will be redundant. At that time, the symbioses are just running on their own, and more and more companies will be involved and new ones pop up.", says Kathrine Overgaard Warberg.

As for the City of Copenhagen, the interesting part lies in what kinds of circular businesses will arise based on these urban resource symbioses and create an extra value-add for the city. The Danish capital hopes to see new companies as well as a shift in business mindset among existing businesses that will act and think more circularly in the future.

Awareness and a circular mindset are what Copenhagen hopes to spearhead and spread to all the cities' local businesses. This project aims to create rings in the water for the many operators and actors in the city and to make them accountable for the goods and services they produce.

If possible, the ideal future scenario would be for them to understand their extended responsibility when it comes to by-products and surplus to consider how to incorporate these into other businesses instead of sending them to the municipal waste system as a default practice.

Ultimately, the public-private innovation collaboration project between Copenhagen and Seenons aims to kick-start a transition for local Copenhagen businesses to become truly circular.

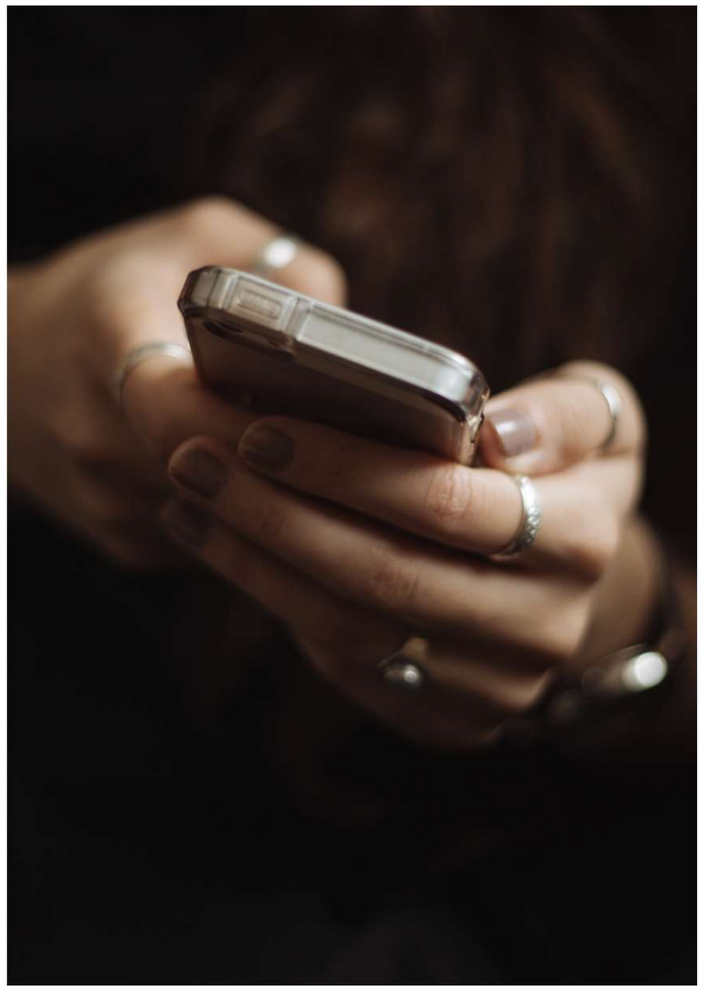
7. BACKGROUND & METHODOLOGY

Circular Innovation City Challenge

About Circular Innovation City Challenge
In a joint effort, the cities of New York, Toronto, Amsterdam, Glasgow, and Copenhagen sought innovative digital and data-driven solutions from around the world to create more circular and thriving cities. Digital solutions to create a truly circular city where businesses and people work together to make the most of our scarce resources. A thriving city where designing for circularity means generating new jobs and opportunities for all citizens and communities.

The Circular Innovation City Challenge has been a global call to action for innovators and entrepreneurs with digital and data-driven solutions to accelerate circularity. Together with the five partner cities, the DDC, Leaderlab, the Danish Business Authority, and the Ellen MacArthur Foundation invited and encouraged all types of innovators globally to apply and help cities find innovative solutions to create more circular and thriving cities. Fortunately, we found that there are already several innovative solutions on the global scene within the digital and circular economy fields.

Find more information about CICC here:
www.circularinnovation.city



The challenge has resulted in following:

- More than 137 digital and data-driven circular solutions were submitted from more than 26 countries across the five continents
- 15 finalists pitched their digital and data-driven solutions for cities and international jury members
- 5 winners were selected by our international jury. Get to know the winners here
- The five winning innovators are now exploring public-private innovation collaboration opportunities with the cities

The methodology behind the cases
The three cases from the Circular Innovation City Challenge are based on interviews with partner cities and winning innovators participating in the selected public-private innovation collaboration projects.

In the two case studies focusing on the specific collaborations, both cities and innovators are interviewed, but the focus is on the perspective of the interviewed part.

We have posed the same questions for both the selected city and the innovator engaged in the project. The third case is taking a broader look at the field of digital and data-driven solutions in circular economy and the learnings gained from working with public-private innovation within this field.

The empirical data for the three cases are drawn from 5-6 interviews and other secondary qualitative sources such as background information and meetings held with the partner cities throughout this process, as well as insights and perspectives presented by the cities during panel debates at public events in 2021. The format of the interviews was a semi-structured interview held as an informal conversation lasting one hour. Each interview was recorded for internal purposes.

This particular case is generated based on interviews with:

- Kathrine Overgaard Warberg, Programme Director of Circular Copenhagen, City of Copenhagen
- Ditte Maria Vestergaard Hansen, Project Manager of Circular Copenhagen, City of Copenhagen
- Joost Kamermans, Co-Founder & CEO, Seenons

Partner Cities in the Circular Innovation City Challenge

Facilitated by

In collaboration with

Thank you!

www.circularinnovation.city

Circular Innovation
City Challenge