ASSET on Tour

Excursion Booklet

Interreg
North-West Europe

Co-funded by
the European Union

ASSET

Colophon

Title: *ASSET on Tour Excursion Booklet*

Date: *November 2024*

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Deliverable 1.4.2 of ASSET Interreg NWE Project

Interreg
Co-funded by the European Union
North-West Europe

ASSET

Context

Interreg NWE: ASSET project

A circular built environment (CBE) comes with new demands for space – circular building hubs, storage spaces for reused materials, for sorting, and for developing biobased materials, etc. This transition adds to the already substantially large spatial claims of the energy transition, climate adaptation and regeneration of biodiversity.

In the ASSET project, which stands for *"A Spatial Strategy for the Eurodelta, boosting a circular built environment"*, the ASSET project partners aim to explore these implications of, in particular how the **Eurodelta region** (the Rhine, Scheldt and Meuse delta conurbations including the Randstad, Brussels and Rhine-Ruhr area) can become a blueprint for a European CBE region. Due to its high population density, proximity and accessibility (which are important for closing loops), and many construction activities already crossing the borders of jurisdictions within this region, the Euredelta was selected as the spatial scope of this Interreg NWE project.

Through ASSET, the following key questions are to be addressed:

- How does a circular built environment (CBE) look like?
- How do spatial strategies for a CBE on different spatial levels look like & what is the interconnectivity?
- What is the added value of collaboration on the Eurodelta scale?

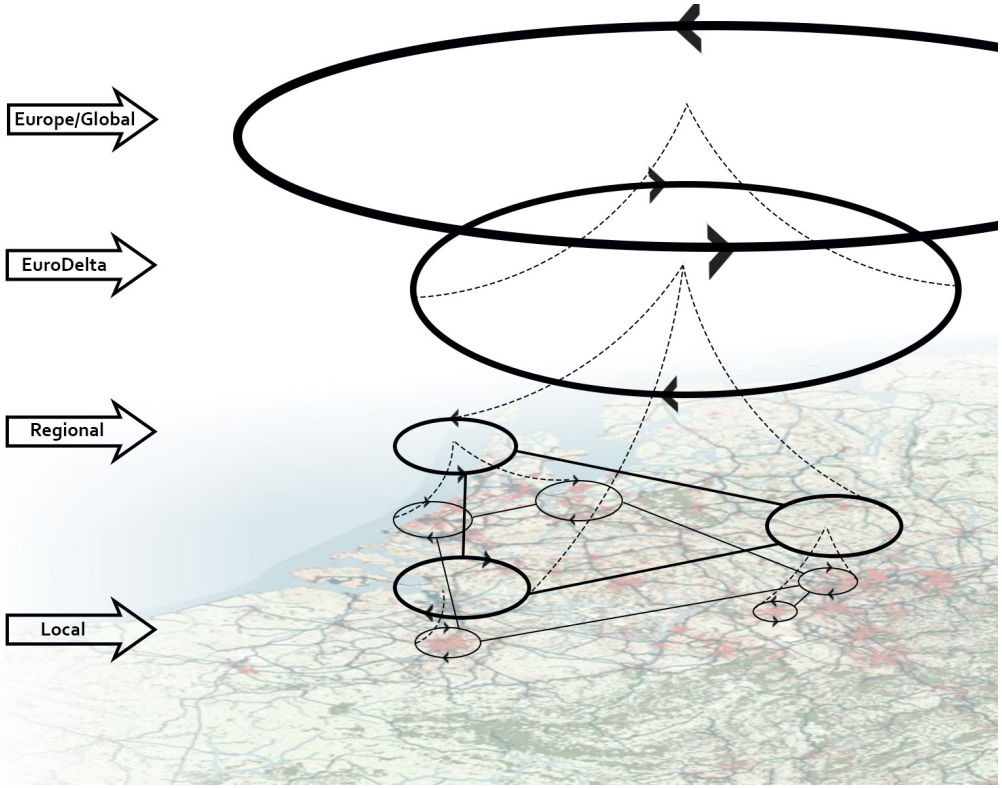


Illustration of the different scales in the context of ASSET

Excursion Details

The ASSET project is comprised of several activities within 1 work package. One of the activities is a **1-week study trip** within the Eurodelta during the first period of the project, which involved the participation of the ASSET project partners.

Belows are the goals of the 1-week study trip:

- To gain general knowledge on different apects of the Eurodelta region regarding their geographical conditions, economies, legal and regulatory frameworks
- To share experiences on circularity in the built environment regarding circular projects on different scales, as well as on urban and regional planning
- To get in touch with individual stakeholders (e.g. decisionmakers in cities, companies or initiatives) to enable knowledge exchange and mutual learning opportunities

Ultimately, the knowledge gained during the excursion is to become the **fundamental basis** of thinking regarding the challenges and drivers of circularity in the built environment and formulating a strategy for the Eurodelta.
This also can lead to a better understanding of instruments and strategies as well as individual situations which may be taken into account when thinking about functional areas in the Eurodelta regarding different economic or functional specialisations.
During the excursion, representatives of each project partner attended and participated accordngly.

The program of each portion (each stop) of the excursion was organized by the relevant City or Region Project Partner(s). They were responsible for arranging site visits, presentations and discussions by relevant stakeholders (as they see fit), as well as accomodations and transport.

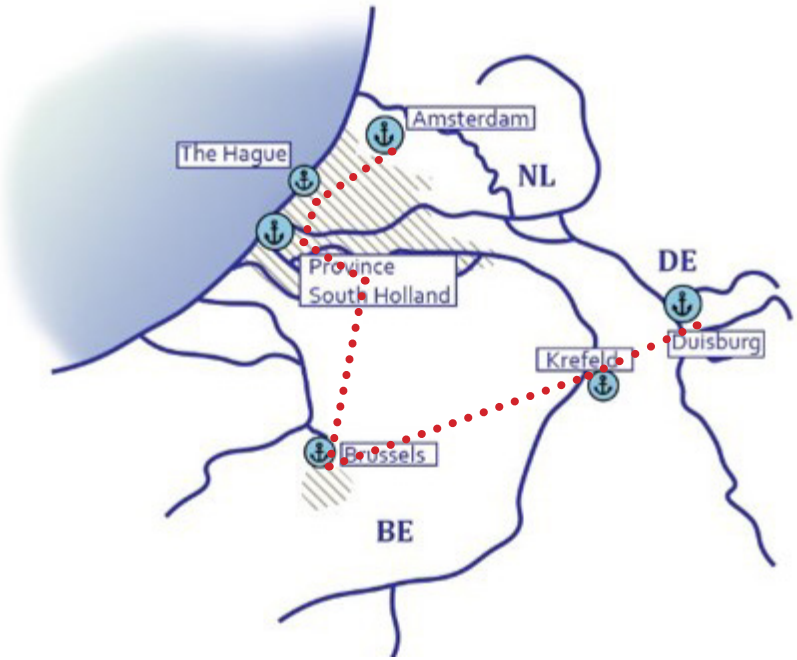


Illustration of ASSET on Tour excursion route

Booklet: Purpose & Reading Guide

One of the deliverables of this activity (the 1-week study trip) is a booklet that documents the main findings of the excursion.
This includes insights of each city/region visited within the Eurodelta in regards to: strategies and policies as it relates to circularity; projects, on-site visits & presentations; best practices; and lessons learned.

This excursion booklet is divided by stop (city or region visited), which are listed below in order of the excursion route:

- Amsterdam
- Province of South Holland
- Brussels
- Krefeld
- Duisburg

Please note that the information in this booklet per stop (city/region) was provided by the relevant Project Partner(s) involved in the organization of their respective portion of the excursion. This was then compiled accordingly by the activity lead (Krefeld Business). In the conclusion, the shared overall insights and lessons learned expressed by the ASSET Project Partners (the ASSET team) from their excursion experience are captured.

AMSTERDAM

To kick off the 1-week study trip of the Eurodelta, the ASSET project partners met in Amsterdam, The Netherlands – the first stop of the excursion. As the lead partner of ASSET. the City of Amsterdam hosted and organized this first portion of the excursion which included presentations, an e-bike tour and a visit of Amsterdam Zuidas.

E-bike tour in Amsterdam led by Bas Horsting (Photo: Fabio Kaiser)

Strategies & Policies

For the city of Amsterdam, circularity is a reoccurring theme in the city's *Omgevingsvisie 2050*; a broad strategic vision of Amsterdam for 2050. This document emphasizes the rising spatial requirements that goes hand-in-hand with circular ambitions.

In 2020, the City of Amsterdam published the first strategy on the circular economy (2020-2025). The strategy aims to significantly reduce the use of new raw materials and resources, contributing to a sustainable city. In the strategy, the Amsterdam City Doughnut model developed by Kate Raworth, the British economist. The model describes how societies and businesses can contribute to economic development while still respecting the limits of the planet and our society.

The City of Amsterdam wishes to implement circularity through 3 specific value chains:

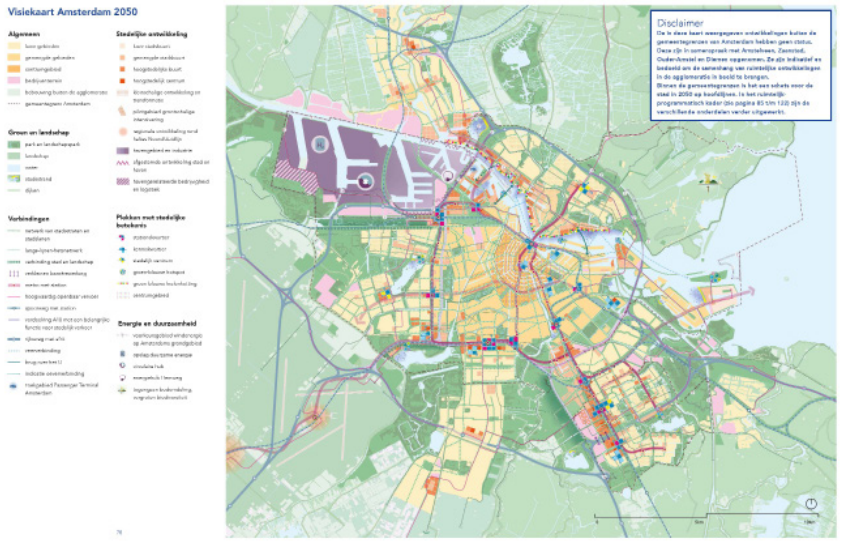
1. Food and organic waste flows;
2. Consumer goods;
3. Built environment.

Moreover, the city aims to become fully circular by 2050, with the in-between-ambition of using 50% less amount of raw materials by 2030. The new *Implementation Agenda 2023-2026* sets out more than 70 actions that the City of Amsterdam plans to carry out in the coming 4 years with local residents and businesses. Amsterdam is measuring its progress through a monitor, in which the social and ecological impact of the transition is tracked and monitored on a yearly basis.

When it comes to circularity in the city, a large focal point is the port of Amsterdam. The city is especially (but not exclusively) looking at this area for accommodating required space for new circular infrastructures, processes and initiatives. The port has been privatized since 2013, with the City of Amsterdam as a significant shareholder. It is critical that in regard to circularity in the port area, the collaboration between these two entities needs to be accelerated. However, as discussed during the lecture at the AMS Institute during the first day of the ASSET on Tour excursion, the following insights were brought up:

- Creating more space for storage of goods is not necessarily profitable for the port;
- Effective transitions will likely go hand in hand with a multi-layered processing industry, which provides a large quantity of (economic) activities within the R-ladder; this is attractive to the port;
- According to the *Omgevingvsisie Amsterdam 2050*, this key change needs to occur: the creation of material hubs, in which materials can be processed e.g. stored, reworked, and exchanged.

While many of these policy ambitions still require action, the City of Amsterdam has already made efforts into cultivating an innovation landscape with a mix of key stakeholders from the knowledge and innovation industry. The document *Strategie Amsterdam Circulair 2020-2025* expands on the points above, particularly on what circularity means for each economic subsector, what actions are first needed, and how this is to be monitored.



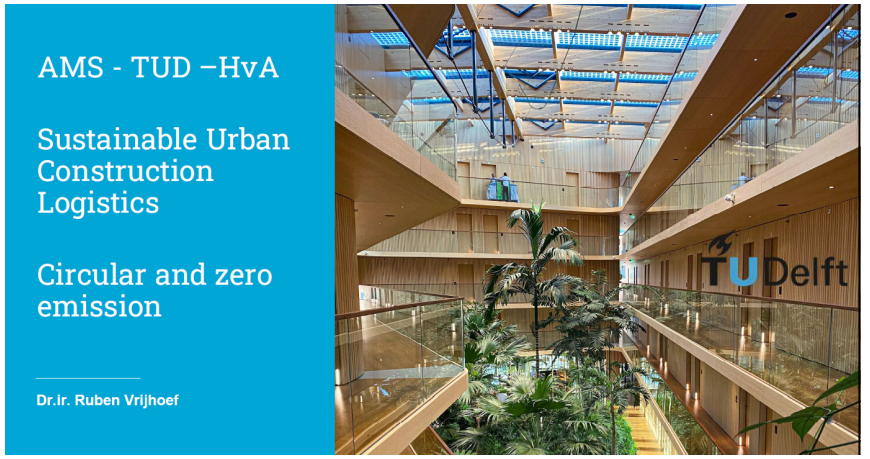
Vision map of Amerdam development for 2050 (Source: Omgevingsvisie Amsterdam 2050)

Projects, On-site visits & Presentations

The visit to Amsterdam started with presentations at the Amsterdam Institute for Advanced Metropolitan Solutions (AMS). Presentations by Dagmar Keim (ASSET project lead), Chandar van der Zande, and Dr. Ir. Ruben Vrijhoef were given to the ASSET team.

Recent projects in Amsterdam linked to circularity (Source: Dagmar Keim — City of Amsterdam)

Presentation on Circular Economy & Sustainabilty (Source: Chandar van der Zande — City of Amsterdam)



Presentation on Sustainable Urban Construction Logistics (Source: Dr. Ir. Ruben Vrijhoef – TU Delft)

Best Practices in Amsterdam

During this visit, the following best practices in Amsterdam were visited as part of an e-bike tour led by Bas Horsting (with the exception of Poppies which is yet to be built):

Houthaven

Houthaven, located between Spaarndammerbuurt and the IJ, was developed as a sustainable and climate-neutral district within Amsterdam. The energy required for public spaces (e.g. public lighting, sewage pumps and parking meters), is to be generated within Houthavensitself as much as possible. Notable elements of the district include the following: solar panels as a sustainable energy source, the use of LED lamps for street lighting, the paving material will largely be baked, recycled clinkers, jetties will be made out of sustainable FSC wood, charging points for electric vehicles. In addition, for the heating of the buildings, Houthaven will be connected to Amsterdam's district heating network.

The development of this new Houthaven started in 2010. The first project, the Brede School, was completed in 2014. The 4th Gymnasium is also already in use, while the Spaarndammertunnel and the Houthavenpark are now built, Between 2018 and 2026, homes, business premises, facilities and public spaces are to be completed. It is expected that the redevelopment of Houthaven will be finished by 2026. Further information is available via: *https://www.amsterdam.nl/projecten/houthaven/.*

Visit of Houthavens (Photos: Fabio Bayro Kaiser)

Zoev City (CityDock)

Zoev City or CityDock is a company based in the Haven-Stad, at Coen and Vlothaven sub-area that offers efficient solutions for construction, waste, and goods transshipment. Its aim is to minimize logistics costs for large and medium-sized construction projects. It addresses key challenges in urban construction by reducing waiting times, speeding up loading and unloading processes, and eliminating the need for transport vehicles to enter congested city centers.

City Dock is strategically located near major highways, therefore ensures quicker turnaround times for transport. This setup, in collaboration with construction logistics experts, streamlines the complex logistics chains typical of large projects, ensuring efficient management of all material flows. Utilizing sustainable transport via waterways, City Dock partners with Zoev City to implement smart logistics solutions, as evidenced by TNO's research. This research on sustainable construction logistics, encompassing the entire supply chain from architects to construction workers, highlights significant cost and inconvenience reductions. Data from nine pilot projects showed savings of up to 65% on journeys, translating to over 260,000 fewer kilometers traveled and substantial CO2 emissions reductions of up to 85%. The positive feedback from the use of BouwHubs, centralized collection points for building materials, further supports the effectiveness of City Dock's approach. This method enhances efficiency and sustainability, demonstrating a clear need for City Dock in promoting circular construction practices.

View of Zoev City/CityDock facility in Haven-Stad, Amsterdam (Photo: Fabio Bayro Kaiser)

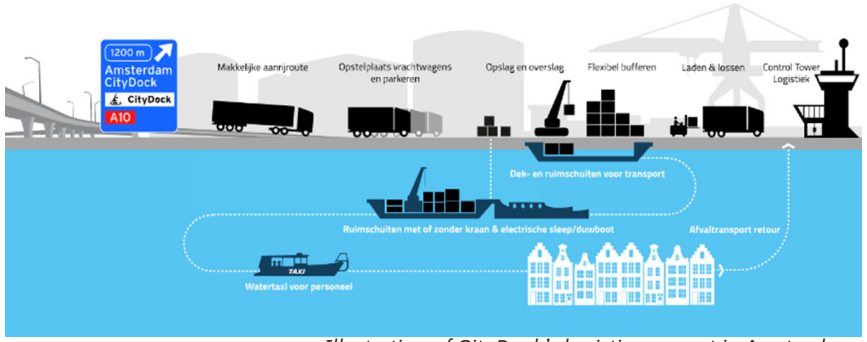


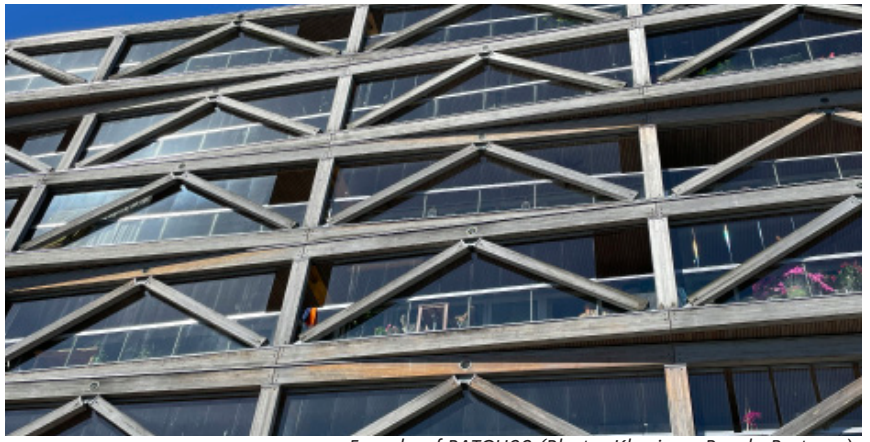
Illustration of CityDock's logistic concept in Amsterdam (source: https://www.zoevcity.nl/zoev-city/)

PATCH22

PATCH22 is a 30-meter tall wooden high-rise located in Buiksloterham (North of Amsterdam) which won the proposal for the 2009 Buiksloterham Sustainability Tender. Architects, Tom Frantzen and Claus Oussoren, who were the initiators, established Lemniskade Projects to realize an ambitious vision that could not be achieved with their previous clients: a highly flexible, striking, and sustainable wooden building.

Developed independently during the economic downturn from 2009 to 2014, the project required innovative financing solutions. It also featured numerous technological and regulatory innovations to maintain flexibility without compromise. Noteworthy elements include hollow floors, a removable top floor, and a design without vertical shafts in the apartments, in which piping and cabling were routed horizontally to central shafts. The building operates on a fixed ground lease while allowing flexible positioning of its functions.
The most distinctive aspect of PATCH22 is its wooden structure, which is largely exposed, enhancing both the interior ambiance and exterior aesthetic.

PATCH22 Building in Buiksloterham, Amsterdam (Photo: Fabio Bayro Kaiser)



Facade of PATCH22 (Photo: Kharisma Pandu Pratama)

Poppies

The **Poppies** project, which is currently under construction, is also located in Buiksloterham in the North of Amsterdam. This project aligns with Amsterdam's goal of constructing 20% of new buildings with wood by 2025. As this target approaches, exemplary projects like Poppies are essential for scaling up sustainable practices, where hybrid use of materials and modular construction processes are utilized.

A key feature of Poppies is its smart energy supply, which includes the installation of a smart grid. This innovation addresses the current issue of electricity grid overload in Amsterdam and other parts of the country. Poppies not only focuses on net energy supply during its operational phase but also on minimizing environmental impact throughout the building's lifecycle. Unlike concrete and steel structures, wooden buildings like Poppies are more suitable for reuse and recycling at the end of their lifespan.

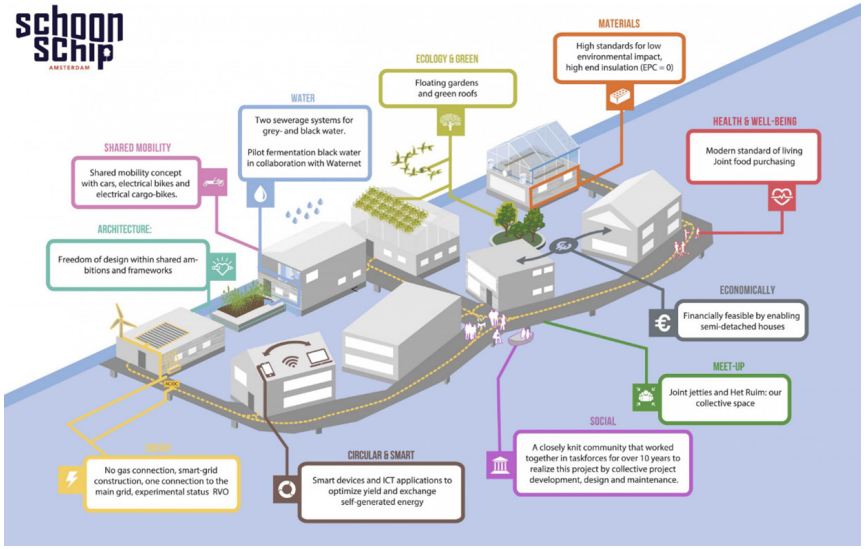
ATELIER's life cycle analysis (LCA) efforts are making the environmental impacts of such projects more transparent. Poppies aims to be a future-oriented building designed to reduce the built environment's impact on nature and the environment, embodying best practices for a circular built environment.

Render of Poppes in Buiksloterham
(source: https://superlofts.co/project.poppies-buiksloterham/)

Schoonschip

The Schoonschip project, which is located on the side canal of the IJ in Buiksloterham, exemplifies circular neighborhood development with its sustainable construction, energy efficiency, and innovative water management. Buildings are made from recycled materials, and homes are energy-neutral with high-efficiency insulation, triple-glazed windows, and solar panels. The community employs a smart grid for optimal energy use and floating homes with greywater recycling and rainwater harvesting systems to manage water efficiently.

Schoonschip's circular waste management includes composting, recycling, and biogas production from organic waste. Cooperative ownership fosters a strong community, with shared resources reducing individual consumption. Green roofing and natural spaces enhance biodiversity in the area. The neighborhood promotes sustainable mobility through electric vehicles, bicycles, and public transportation. Serving as an educational hub, it offers tours and workshops on sustainable living, and its collaboration with research institutions drives continuous innovation. Schoonschip's success showcases a scalable model for future urban developments, proving that circular neighborhoods can reduce ecological footprints while improving quality of life.



Illustation of the Schoonship concept (Source: http://schoonschipamsterdam.org/#mk-footer)

View of the floating houses of Schoonschip (Photos: Fabio Bayro Kaiser)

Lessons Learned from Visit to Amsterdam

During the Amsterdam stop of the excursion, it was recognized that the projects that were showcased are relevant to the larger context of ASSET, as they are important examples of how circular building is happening within a city with a large growth plan (and, by consequence, rising emissions), where even space for linear building is already scarce. The port – where many circular initiatives should start – does not connect sufficiently to the city's circular needs. However, the drastic need for housing is a leverage for connecting the port to new societal functions. This introduces the ASSET proejct partners to an interesting challenge: how does one intertwine a front-runner area for circularity with the rest of the city?
Within the ASSET landscape, Amsterdam is an interesting case, as it is largely a 'consumer city' – while other Eurodelta areas facilitate more production sites. Amsterdam is a pioneer when it comes to circular innovation and the knowledge economy. Adding to this, the large amount of water in the city (and the potential this offers for innovative kinds of transport), the Dutch city provides an interesting testing ground for new ideas.

PROVINCE OF SOUTH HOLLAND

After visiting Amsterdam, the ASSET team travelled to the province of South Holland, where there were several stops including in Leiden, The Hague, Mijnsheerenland and ‘s Gravendeel.
This portion of the excursion was hosted and organized by the Province of South Holland and the City of The Hague Project Partners.

Visit of agriculture plot where bio-based materials are being harvested by VORM (Photo: Fabio Bayro Kaiser)

Strategies & Policies

In terms of strategies and policies, not only will they be touched on at the provincial level, but also at the municipal level. Please note that the City of Leiden is not an ASSET Project Partner, but like the City of The Hague (who is a Project Partner), it is a municipality within the province of South Holland who shared their strategies and policies related to circularity to the ASSET group as part of the excursion.

Strategies & Policies | Province of South Holland

The *Circular South Holland Updated Strategy 2023 - 2027* Holland consists of eight building blocks:

1. **Inclusive transition** (new): the resident perspective is involved in the circular transition, in part by supporting municipalities in this regard. In addition, local (neighborhood) initiatives is valued, which is elaborated on this this new building block, together with municipalities and other local partners.
2. **Circular innovation** (intensify): in addition to technological innovation, hte need for social and system innovation is recognized; many circular techniques already exist. Implementation of these new techniques into the existing economic system is identified as a bottleneck.
3. **Coalitions and Networks** (intensify): networks have proven their value over the past period. For this reason, the Province of South Holland is expanding on this component.

4. **Space** (intensify): sufficient space is a prerequisite for the success of the circular transition.
5. **Circular organization** (intensify): leading by example by saving on raw materials through Province of South Holland's own procurement and contracting.
6. **Funding and subsidies** (adjust): the main issue here is to make existing funding and subsidy opportunities more responsive to the circular transition.
7. **Policy and monitoring** (adjust): as the Province of South Holland moves forward in the transition, this requires circularity to be translated into the various policy domains of the province. Monitoring is essential to know if we are staying the course.
8. **Licensing, monitoring and enforcement** (adjust): the VTH toolbox is constantly evolving to support the circular transition.

The selection of building blocks is based on the following principles:

- **Impact is leading**: The Province of South Holland's efforts are aimed at making a difference, reducing the consumption of raw materials and contributing to a future-proof society.
- **Contribution to solving social issues**: a circular South Holland contributes to the resolution of several social issues faced as a province. This includes housing, agriculture, climate and energy. Activities are partly in line with the usual sectors and policy fields. There are many crossovers.
- **Broadening and strengthening the circular movement**: focus is on front-runners and the broad group that follows them to accelerate the transition.
- **Added value of the province:** focus os on matters where the Province of South Holland can make a difference

The Province of South Holland has developed an additional spatial strategy for the Circular Transition. This strategy focuses on the spatial dimension of circularity:

Circular South Holland Spatial Strategy

The Circular Spatial Strategy for the Province of South Holland puts forward a comprehensive policy narrative, method, and action-oriented approach to bring the circularity transition forward through spatial policies and actions. The core principles of the strategy are: **building up** a circular spatial-economic structure; **transforming** and **breaking down** linear spatial economic structures; thus creating a **spatial framework** to realise circular material chains using **linking spaces**; and by working together in spatial transition **arenas**.

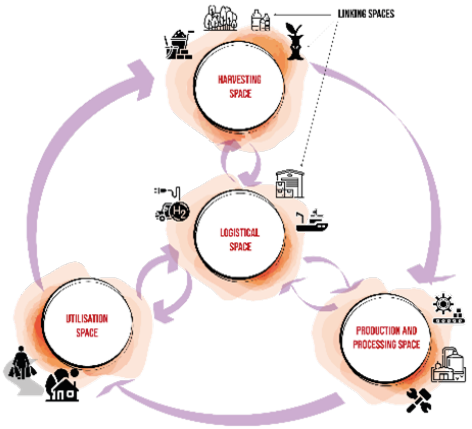
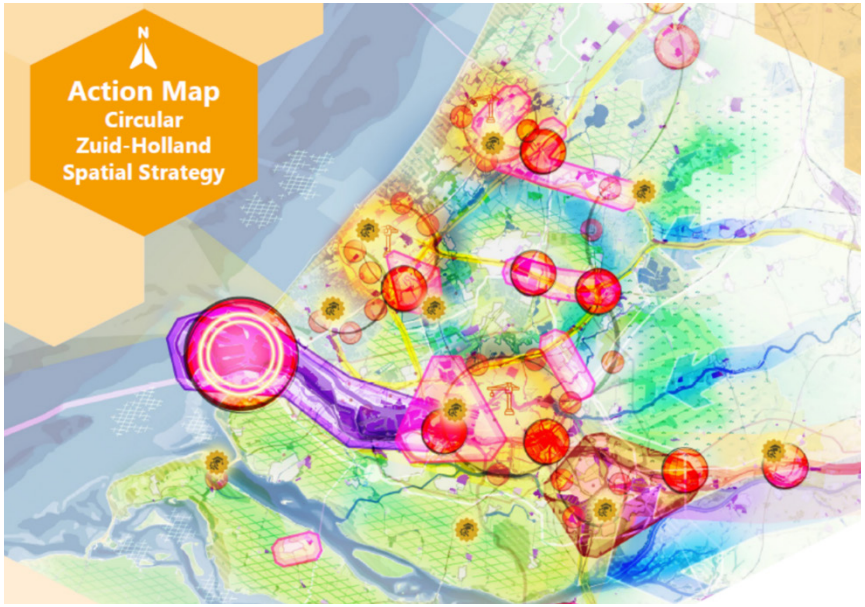


Diagram of types of circular spaces and relevant linking spaces
(Source: Circular Spatial Strategy for the Province of South Holland)



Action Map of the Circular South Holland Spatial Strategy
(Source: Circular Spatial Strategy for the Province of South Holland)

Strategies & Policies | City of Leiden

The Strategy 2024-2027 for Leiden aims for 50% less use of finite raw materials in 2030 (compared to 2016) and to have a fully circular economy in 2050. The vision for a circular Leiden consists of three priorities:

1. the homes of Leiden's inhabitants will be built and renovated with reusable materials and at the end of use, they will be demolished in a circular way;

2. Products will be designed with a lifespan that is as long as possible, and businesses will offer products as a service;

3. Inhabitants consume consciously and locally and borrow products instead of buying more products.

The goal for a circular Leiden is conditional for a livable earth.
The transition to a circular economy is a system change and it is a combination of breaking down the existing linear economy and building upp a circular economy (X-curve). Raw material chains are global or European. Leiden endorses the national goals from the National Raw Materials Agreement and the transition agendas. The city of Leiden required that everybody cooperates and creates a foundation to achieve the full transition to a circular economy.

The City of Leiden knows it's impact on different flows of materials; the building and construction sector has the biggest flow of materials and impact on the environment in Leiden. The City of Leiden uses circular design principles in the following categories: prevention, value retention and value creation. The strategy focuses on two themes: construction and revaluation.

Slide of presentation by City on Leiden of the circularity goals for the city (Source: City of Leiden)

Strategies & Policies | The Hague

The City of The Hague focuses on reducing the significant amount of waste that is produced in the city and is brought away from the city. Each day, 4 million kilogram of waste is taken away from the city by logistics (approximately 400 trucks required). The strategy is:

- To prevent no more waste from being generated
  - by less purchasing, for instance with repairing, and other purchasing/production, for instance with new manufacturing entrepeneurs at Social Impact Lab and Start-up in Residence;
- To add value to the waste that is generated locally
  - by strengthening the demand side, for example with existing entrepeneurs, and increasing the supply side, for example with research & monitoring and existing spaces like Raw Materials Counter, Circular building hub, Digital hub.

This will contribute to less CO_2, less resource losses and more money and circular jobs in the economy. Since the 2020s, there is opportunity for a system changing by stimulating the transitions. This system change is best explained by the X-curve, that shows how build-up and breakdown go hand-in-hand in justice and sustainability transitions.

- **4 million kg waste each day** (= 400 trucks each day)
  - Costs 1 million euros each day
  - No value or revenue in the city
- Strategy:

⇨ **Make sure there is no waste**
⇨ **Adding value to the waste that is created in the city**
  - Environmental, economic, social
    - Less CO2, less resource losses, more money in the economy, circular jobs

Slide of presentation by the City of THe Hague regarding policy ambitions for waste (Source: City of The Hague)

Best Practices in Province of South Holland

City of Leiden

In the field of construction, the municipality of Leiden has been working on:

- Realising more circularity in our own construction project - buildings and public spaces
  - for example by realising a material exchange point for municipal reuse of materials
- Building more circularly in Leiden by third parties
  - for example by cooperating with our partners to circular construction on Leiden Bio Science Park
- investing in cooperation with national government in order to increase its own circular results by cooperating and influencing national legislation and regulations
  - for example by cooperating with other leading municipalities to influence national programs (NPCE), legislations and regulations (BBL)

City of The Hague

With the work agenda for 2023 – 2026, the City of The Hague is focusing on the implementation of actions towards a Circular Economy in The Hague, such as circular design, circular procurement, inventory for (high quality) circular reuse of building materials, new policy framework on sustainable building, circular building hub for municipal projects on public space and monitoring of building materials.

Circular buildings in city of The Hague are now stand-alone initiatives for circular construction and demolition by market. There are only national standards with allowance for 100% circular as well as 100% not-circular building and there is not yet a digital & physical marketplace available. Best practices of circular buildings in The Hague are the projects: Binck Blocks, Frank is een Binck, de Titaan and a new office for Police in the area Binckhorst.

Projects, On-site visits & Presentations

Guided tour at circular building of “Biopartner 5” at Bio Science Park in Leiden

The first city that the ASSET team visited during the Province of South Holland portion of the excursion was Leiden. The first item on the agenda was a guided tour of the circular building of “Biopartner 5” at Bio Science Park.

The building is located in the campus Bio-Science Park and is used by start-ups in de biomedical sector. Jan Willem ter Steege, the architect of the circular building, described the circular design process they used for the building. It was revealed that the architect and the permit issuer have to be flexible to make circular buildings possible.
It is important to note that an existing building located nearby the construction site was the donor building of the majority of the steel used in Biopartner 5. Proximity to materials was very important for the success of the circular building. By selecting and choosing to reuse buildings materials, the function of spaces inside the circular building was taken into account. This is considered to be the first Paris Proof building in the Netherlands.

According to the architect, the entire process from design to construction has been no longer than that of an “ordinary” building but a good network is essential to link materials and people who can work with them.

Interior of Biopartner 5 (Photo: Fabio Bayro Kaiser)

Interior finishes like these carpet tiles were sourced from other buildings and reused/ repurposed for the Biopartner 5 building (Photo: Bas Horsting)

Visit and presentation from VORM in Mijnsheerenland

- VORM is a project developer.
- In Mijnsheerenland, VORM has a Farmer and Construction initiative where they are using a field they initially bought for building houses to experiment with growning fibres for biobased construction
- VORM is working on a number of top-up projects in post-war neighbourhoods. Buildings in these neighbourhoods are usually in need of renovation. By adding new homes on the roof, the building and the living environment can be improved.
- Proximity x scale: Timber factory in located in Middelharnis and the prefab producer is in the north of the Netherlands. The factory for sorghum isolation plates is in Venlo
- VORM is also a shareholder ath the Urban Mine in Zaandam where they recycle concrete

What stands out?

Due to its light wood construction, several floors can be added to existing buidings as part of the top-up project; 1ha of land provides roughly biobased sheet material for 1 house every year (e.g. for insulation and division walls). They would like to apply for a permit for multiple projects. Modification of the existing machines for harvesting the cultivated fibers are required.

Render of top-up project of VORM (Source: VORM)

View of field where fibres for biobased construction are being grown by VORM (Photo: Bas Horsting)

Visit to the Urban Miner and presentation from Dura Vermeer in ‘s Gravendeel

Dura Vermeer is a project developer that is active in the Netherlands. Urban Miner is mainly a logistical hub for construction materials, but Dura Vermeer also processes some of these materials to improve their quality and get a better added value.

Urban Miner facility of Dura Vermeer (Photo: Fabio Bayro Kaiser)

The site has a span of control‘ of 35km. The location is accessible by road and water, and focuses on harvesting, processing and high-quality reuse.

Challenges are financial barriers (high initial costs), linear processes (as traditional construction methods and designs often do not consider dismantling and reuse) and lack of policy incentives since governments do not yet provide sufficient financial or policy incentives e.g. subsidies, tax breaks or obligations to promote circular building practices).
They have plannend to open a State of the Art recycling facilitiy in Q2 2025.

Poster of Urban Miner activities on site (Photo: Bas Horsting

What stands out?
Not only is this facility for storage, but also to process materials to create added value. A linear economy still exists alongside circularity, and it is also needed to make it financially feasible.

More info:
- Urban Miner

View of storage facility on Urban Miner site (Photo: Fabio Bayro Kaiser)

ASSET team with Dura Vermeer staff at Urban Miner site (Photo: Fabio Bayro Kaiser)

BRUSSELS

The ASSET Consortium corssed the border into Belgium and travelles to the region of Brussels Capital. This portion of the excursion was hosted and organized by the Belgian project partners — perspective.brussels and Brussels Environment.

ASSET group infront of Brussels Environment office building in Brussels (Photo: Fabio Bayro Kaiser)

Strategies & Policies

Brussels faces a unique challenge: over half of its greenhouse gas emissions stem from energy consumption of buildings. Many of these buildings were constructed before the 1960s and lack proper insulation. In fact, one-third of buildings remain entirely uninsulated. The current pace of renovation falls short of what is needed.
To address this, the Brussels region has equipped itself with tools and resources to accelerate and revolutionize building renovations around ***RENOLUTION:*** *the Renovation Strategy for the Brussels-Capital Region.* RENOLUTION consists of a plan aimed at transforming the city's building stock to an average energy performance level of 100 kWh/m²/year for all Brussels residential buildings by 2050. This target represents a significant reduction — dividing current energy consumption by 3. To support residents embarking on this renovation journey, Brussels-Capital Region has been strengthening its assistance programs. The entire panel of public policies has been deployed: regulations, coaching, incentives, support, innovation, documentation, communication, and so on.
Moreover, in the context of the sectoral policy, RENOLUTION Alliance, which launched in 2021, all stakeholders involved in the energy renovation of the Brussels buildings (public, private players and local associations) are working together to design, evaluate and develop the tools to support the implementation of the RENOLUTION strategy and make it an environmental, economic and social opportunity for Brussels.

RENOLUTION is mainly focused on construction and renovation. It addresses the system, supply chain, and flows related to the design process, renovation work investments, and construction practices.

RENOLUTION is fully integrated into the circular economy paradigm. It takes into account all of the environmental impacts of the building: energy consumption, but also the production and transport of materials needed for the renovation. The renovation is therefore designed to maintain the existing building as much as possible, to enhance the existing materials by reusing them in the renovation itself or in other projects. The objective is to promote more circular practices on private or public renovation projects. The strategy supports both private and public clients, ensuring a diverse range of projects insisting on innovative solutions.

Best Practices in Brussels

RENOLUTION is fully part of the circular logic. It promotes a set of circular best practices that are applied in building renovation of various scales. One of these best practices is the **principles of Dismantling and Reuse**.

Dismantling consists of “de-constructing” i.e. removing elements for reuse in other construction work. Examples of deconstruction include tiles, paving stones, washbasins, bricks and windows.

Deconstruction consists of several stages:

- Identifying what can be dismantled for re-use (in situ and ex situ);
- Giving priority to selective dismantling: carefully dismantle the elements (prior testing recommended) and store them for later recovery;
- Drawing up a demolition waste management plan to identify the appropriate recovery channels (recycling)

The first step is to identify the potential for **re-use**. This involves preliminary tests to determine the quality of the materials to be recovered and building an inventory. Next, careful deconstruction and/or disassembly is carried out, followed by meticulous sorting, storage and packaging of the materials. These steps ensure that the materials can be restored to their original condition and reused in the future.

For the renovation project USQUARE (large renovation project of three main buildings dating back to the early 1900s), the materials

that were reused in their original form on the Usquare site are brick, natural stone, sanitary appliances, glass sheets, window tiles, cast iron radiators, doors, tiles, parquet, cobblestones, fire ladders and fire reels. In addition, the shortage of materials on site was also supplemented by materials from the reuse market, such as reclaimed bricks from “Franck” and tiles from “RotorDC”, which are local stakeholders. Also note the reuse of excavated earth from other building sites with which an acoustic earth plaster was developed for the office spaces. This practice is being widespread among other large renovation project where client set ambitious and stringent goals in regards to reuse, with as many components as possible from the original building being retained in the renewal. The ambition of large-scale reuse is innovative and often serves as an example for other projects of a similar nature. One key success factor in such projects is the involvement of partners active in the circular economy from the very start of the preliminary design stages.

Projects, On-site visits & Presentations

During the Brussels stop of the excursion, site-visits to two companies as well as presentations from different actors were arranged. They will be described in this section in the order of occurrence.

Ship it

Ship it was the first company that was visited in Brussels.
Ship it was developed with the goal of establishing a logistics hub for the construction environment in Brussels. It started as The Brussels Construction Consolidation Centre (BCCC), a urban logistics hub located in the Port of Brussels that aims to enhance the efficiency of supplying construction sites by consolidating supplies of building materials at the construction hubs in the city. This hub focuses on inland shipping and multimodal transport, offering innovative solutions that extend beyond traditional transportation operations. Ship it aims to equip construction sites in Brussels with a collaborative IT tool to streamline the urban logistics process of construction materials. In this sense, the circular idea behind the Ship it logistics project consists of improving logistics operations efficiency for the construction and recycling sectors and contributing to a more sustainable and environmentally friendly supply chain. The main concern was to “put as much as possible stuff off the road!”.

The circularity of the Ship it project aims to improve the construction supply chain in a more effective manner by implementing closed-

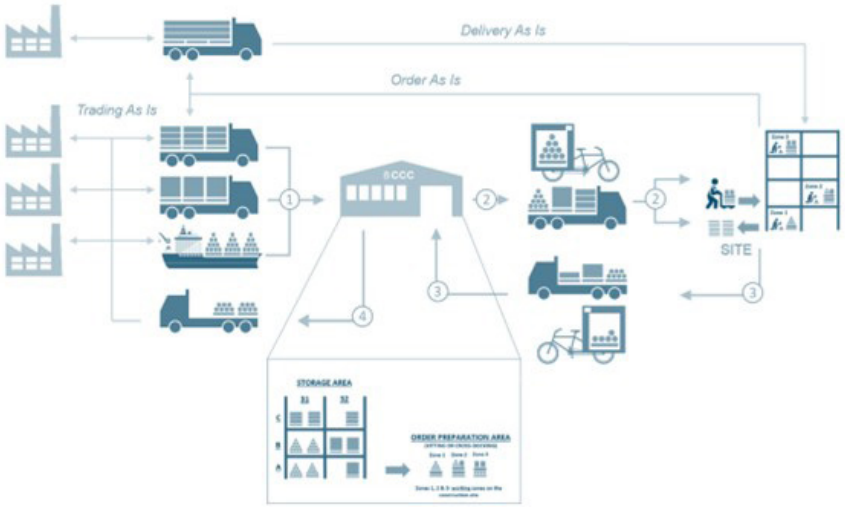
loop of material flows, applying circular design principles, developing circular procurement and sourcing practices, and incorporating reverse logistics. These approaches aim to reduce the amounts of raw materials used in construction materials and projects, increase the potential for extended life cycle use of materials, and promote the reuse of waste within the construction industry.

As shown above, Ship it focuses mainly on the off-site construction logistics part, e.g. the logistics to and from the construction site. This is defined by the following flows:

1. From the supplier to Ship it (BCCC) (inbound);
2. Between Ship it (BCCC) and the construction site (outbound);
3. From the construction site to the BCCC;
4. From the BCCC to the supplier, incineration point etc. (reverse logistics).

It thus does not take into consideration the on-site logistics activities. These 4 transport flows can be divided into inbound and outbound flows. Most of the inbound trips arrive by inland waterway transport (IWT). Outbound trips refer to the consolidated last mile deliveries (most often by HGV-Heavy Goods vehicle) from Ship it to the construction site.

The logistics services made available to construction sites by Ship it include: storage, quality check, work pack creation, pre-assembly, just-in-time, grouped or last-minute delivery, just-in-place unloading, reverse logistics and massification. These elements have the aim to:



Illustation of the logistic flows of Ship IT (Source: Ship it)

- Reduce the negative externalities of urban transport of construction materials;
- Improve the use of existing transport infrastructures (especially waterways);
- Reduce construction costs while increasing the productivity of construction sites;
- Increase coordination and cooperation between the players

The Ship it hub is an excellent example of logistics innovation within the construction sector applied to a very dense urban area where available surface dedicated to logistics is rare and expensive. It is also important to note that although Ship it is a private owned company, the initial BCCC project is a public-private initiative which aimed to improve the supply chain process and make it more sustainable.

The Ship it´s hub can be linked to other cities in the Delta Region via waterways, and its innovative logistics model can be replicated elsewhere, providing environmental benefits across the region. The hub's location, being very close to the city center, makes this case particularly unique. It necessitates a high rate of material turnover and a robust IT system to streamline the supply chain process.
This project demonstrates the potential of logistics innovation and public-private collaboration to enhance the sustainability of the construction supply chain. A key challenge will be identifying private partners to establish distribution hubs, considering the substantial investments required for IT systems and logistics operations

References:

- BCCC project presentation video (in Dutch and French)
- Environmental benefit assessment of the BCC project (research paper)

View of Ship it facility in Brussels (Photos: Fabio Bayro Kaiser)

BC Materials

The construction sector has a gigantic impact on the environment. In Europe, it is responsible for more than 40% of $C0_2$ emissions, air pollution, resource depletion and waste.

The ambition of BC Materials is to replace standard building materials with earth building materials. Their aim is to push the construction sector to tap into available urban mineral waste streams (such as excavated earth), transform them into decarbonised and democratised building materials (like earth plasters, compressed earth blocks and rammed earth), and generate healthier & circular buildings to live in. In this way, the limits of our planet actually generate amazing added value for all of its inhabitants.

Main benefits of this approach:
Carbon neutral: Earth is a local resource that does not need fossil fuels nor energy intensive processes to be transformed into building materials.

Circular: BC Materials source their non polluted, non-disturbed earths from urban construction sites, and upcycle this “waste” as earth building materials. Since in their transformation process earth building materials do not change chemically, these can be reused infinitely after their end-of-life, without quality loss nor the addition of energy. Earth is never lost, and is never waste.

Innovative: The latest scientific results and standards are used to characterise their earth building materials. Their expertise in mixing, blending, and transforming various earth materials, coupled with their ability to scale production, positions BC Materials as European pioneers in this field.

Comfortable and healthy: Earth-based building materials provide exceptional indoor comfort and air quality. They excel at noise reduction, temperature regulation (retaining heat in winter and offering cooling in summer), and humidity control. As natural, non-toxic materials free from VOCs, they contribute significantly to a healthy indoor environment.

On-site tour of BC Materials facility in Brussels (Photo: Fabio Bayro Kaiser)

BC Materials is partnering with Brussels-based circular economy pioneers, Sonian WoodCoop, Democo Group, and Natura Mater, to create a new circular production, storage, and administrative hub: Stadsatelierdeville. This ambitious project aims to transform urban waste into high-quality building materials. With a proposed budget of €5-6 million, Stadsatelierdeville seeks funding from the European Regional Development Fund (ERDF).

The hub will serve as a catalyst for scaling up circular economy activities, fostering collaboration among businesses of all sizes, and accelerating the development of innovative building materials. By combining expertise and resources, the partners will create a robust circular ecosystem. This includes increasing the capacity to process urban waste, reducing costs through shared infrastructure, and developing new products and markets. Stadsatelierdeville will also play a pivotal role in knowledge sharing and network building, both nationally and internationally. Ultimately, this project will contribute to a more sustainable built environment by promoting the use of recycled materials and reducing reliance on virgin resources.

BC Materials has pioneered a circular production process for transforming excavated earth into high-performance building materialsThis process has the potential to be replicated in other regions, paving the way for circular building materials to become more widespread.

Anton Maartens, business developer for BS Materials) shows building material products made of excavated earth — drying stage (Photo: Bart Bomas)

BC Material products: Earth brick masorny and rammed earth commercialised unfrr the "Leem" trademark — examples (Photo: Bas Horsting)

According to Anton Maertens, business developer at BC Materials, the key challenge is reducing production costs to make these circular products more competitive with those from the linear economy. To tackle this, BC Materials has joined forces with an established brick manufacturer, increasing production capacity while driving down costs. The Stadsatelierdeville project represents a substantial advancement in the circular economy. This multi-functional hub will integrate storage, production, and training facilities, fostering the adoption of earth-based building materials among architects, designers, and contractors. By establishing a comprehensive ecosystem, Stadsatelierdeville positions itself as a leading example of sustainable and innovative construction practices. The project demonstrates how future hubs can be structured to encompass various operations and create collaborative environments for stakeholders.

References:

- BC Materials
- Stadsatelierdeville two pagers

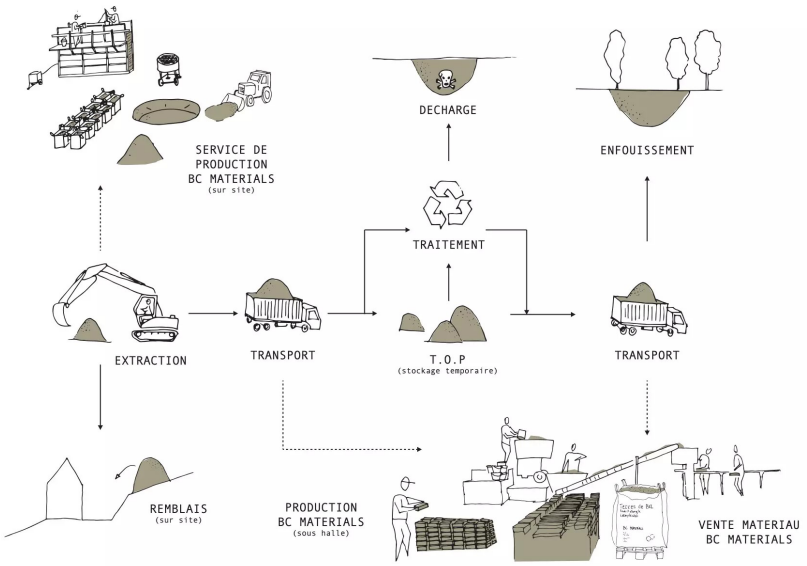
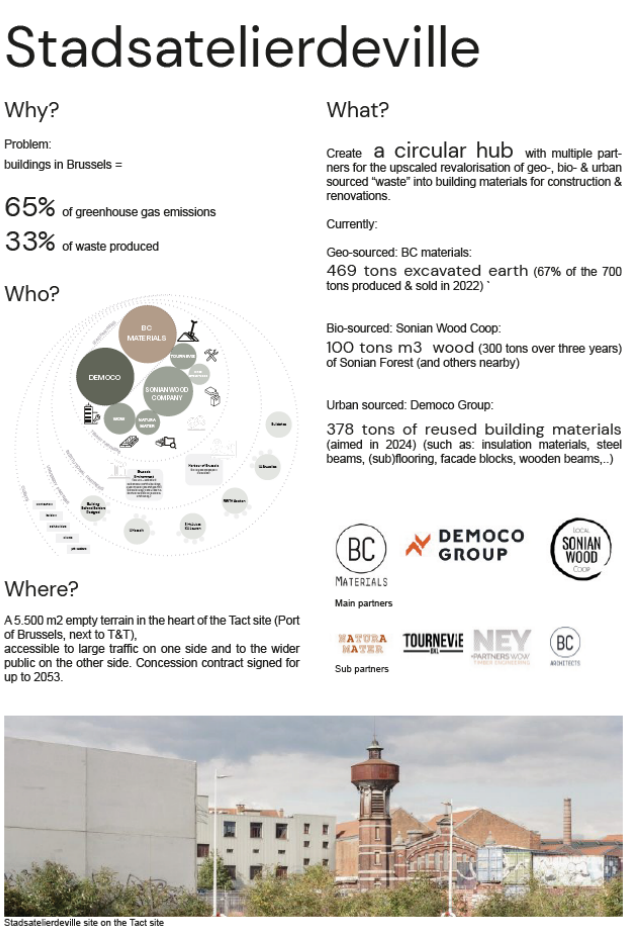


Illustration of how BC Materials produces and sells circular building materials based on excavated earth (Source: BC Materials)



Poster of BC Materials' Stadsatelierdeville site in Brussels (source: BC Materials)

PREUSE Interreg NWE

PREUSE is an international research project that aims to help local and regional public authorities improve the management of their material resources and implement solutions within their territory to reclaim and reuse building materials.
Despite an existing and growing commitment to adopting circular practices in public construction work, organising the reclamation and reuse of materials remains a challenge for many actors. For 5 years, the project partners will be working, studying and field-testing strategies to create:

- A strategy for developing reuse centres (material banks) for construction materials salvaged from public works sites;
- A series of local action plans for the future development of reuse centres;
- 3 pilot projects to test innovative formats of reuse centres;
- Training programmes in the reclamation and reuse of construction materials for public and private organisations.

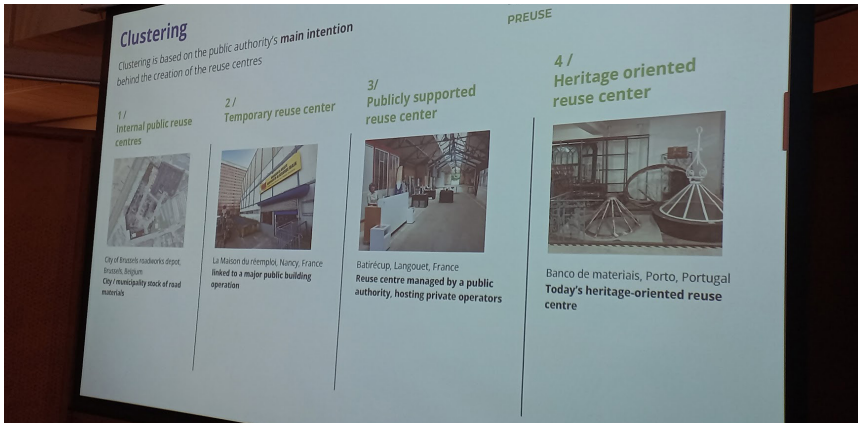
The ultimate aim is to provide public authorities, construction industry players and local communities with tangible, reproducible solutions to encourage the reuse of construction materials in their areas. To achieve this, the project's approach is based on collaboration between public authorities and reuse experts to implement the proposed solutions directly and operationally. The partnership draws on existing solutions, developed in particular by the project partners, and on the diversity of initiatives in the NWE region to ensure that these innovative solutions are more easily disseminated and adopted.

The Preuse project shares many similarities with Asset, particularly in terms of urban planning and public-private collaboration approach for establishing material reuse centers. Both initiatives aim to develop comprehensive circular models that minimize reliance on virgin resources within a large territory.

The process involves identifying and adapting best practices from various regions to create innovative approaches. To optimise the use of space for circular activities, the project will analyse different hub typologies, their functions, the way they are operated and how they can be interconnected within a broader network. The variety of typologies of material reuse centres might be of interest for Asset in the process of defining the types of hubs for applying circular practices. The presentation also shows the importance of empowering the stakeholders to use and operate these new facilities in an efficient manner.

References:

- Preuse NEW interreg website
- FCRBE (Facilitating the circulation of reclaimed building elements in Northwestern Europe): previous interreg project managed by Rotor
- Preuse presentation on the 20.06 (Asset on Tour Brussels Brussels)



Presentation slide about PREUSE Intwerreg NWE project presented by Gaspard Geerts (source: Rotor DC)

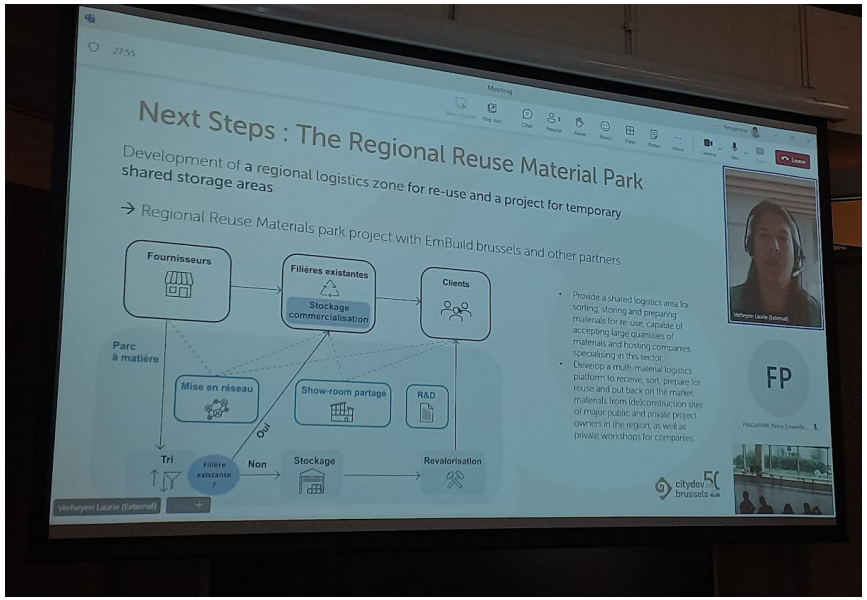
Citydev.brussels

Founded in 1974, Citydev.brussels was for a long time known as the Société de Développement pour la Région de Bruxelles-Capitale (SDRB). It was renamed as we know it today in 2013, on the eve of its 40th anniversary.
Citydev's primary goal is to attract and retain industrial, semi-industrial, and craft businesses, along with high value-added services, within the region by providing real estate infrastructure (land or buildings) at competitive conditions and prices. Additionally, they offer new homes to private individuals, subsidized by the Brussels region.

Citydev's 3 main missions are the following:

Mixed-Use Projects: Integrating Housing and Businesses within the Same District
They undertake complex initiatives that blend subsidized housing with economic zones, community facilities, retail spaces, workshops, schools, hotels, restaurants, cultural centers, medical facilities, etc. all within a single multifunctional block. These projects are designed to reshape or revitalize towns and districts, fostering vibrant, interconnected communities.

Economic Expansion: Creating Space for Businesses
To support economic growth and employment in the Brussels-Capital Region, they conduct studies and analyses to understand the specific needs of various economic actors, from craftsmen to industrial players, including SMEs. Leveraging this expertise, they provide tailored accommodation solutions and services, such as industrial parks, science parks, SME and VSE parks, business buildings, incubators, FabLabs, etc.



Laurie Verheyen, circular economy coordinator at Citydev.brussels, presenting on the Regional Reuse Material Park project (photo: Brussels Environment)

Urban Regeneration: Making Housing Accessible to All
Citydev.brussel develops new housing to enable middle-income households to own homes in areas where residential construction is lacking. The goal is to attract and retain residents in the Brussels-Capital Region. These housing projects are executed through partnerships between the public and private sectors.
To foster a resilient Brussels, Citydev has committed to integrating sustainability, circular economy, biodiversity, innovation, and high-quality built environments into all their projects. In addition to their core responsibilities, Citydev will take on new roles in managing polluted land, coordinating public fab labs, overseeing temporary occupation permits, and facilitating property acquisition for migrant housing.

As part of their commitment for a circular economy Citydev has developed 2 key circular economy logistics hubs: Irisphere Woodpark and the Regional Material Reuse Center.
Laurie Veheyen, Citydev's circular economy coordinator, presented the process of establishing these hubs and the challenges encountered (determine the most effective model and choose the best location, partnership, etc) to the ASSET team. She highlighted the effectiveness of public-private partnerships in driving such initiatives, emphasizing the complementary roles of both sectors.

The challenges encountered in establishing these hubs, along with the strategies implemented to overcome them, could provide valuable insights for ASSET – inparticular in determining optimal locations for similar facilities. Additionally, the comparative analysis of different hub models may inform decision-making processes in other regions.

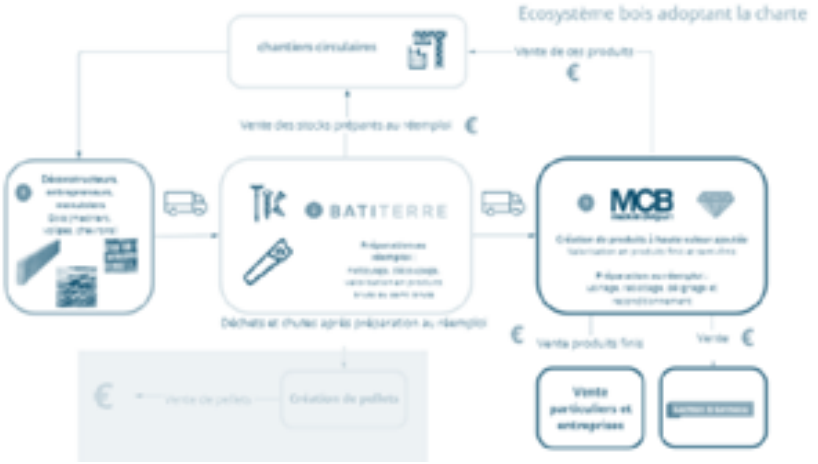


Illustration of The Wood Park Hub concept: A public-private partnership promoting the circular economy of wood in the built environment (source: Citydev.brussels)

KREFELD

After the visit to Brussels, the ASSET consortium travelled to Germany. The first stop in Germany was the city of Krefeld. This part of the excursion was hosted and organized by Krefeld Business, one of ASSET's German project partners.

ASSET team is introduced to the city of Krefeld (Photo: Bas Horsting)

Strategies & Policies

The City of Krefeld (comprised of 236.000 inhabitants) is located in the state of North-Rhine Westphalia within a 30 km distance from the Netherlands and on the edge of the Rhine-Ruhr region. It is recognized as a transformative city as the main industry was historically textiles (silk and velvet), and has since transformed to other industries such as chemicals, machinery and equipment, as well as metal processing. The value added of the manufacturing sector accounts for 35% of the total value added, exceeeding the share of the sector in comparison to North-Rhine Westphalia (27%) and Germany (30%). As a result, Krefeld is a city with still a very strong manufacturing industry.

The building industry in the admisitrative district of Düsseldorf, in which Krefeld is part of, accounts for nearly 9 billion euro, which makes it the third largest building economy on administrative district scale. In regards to sustainable buildings, the region has excellent conditions to scale-up the market since materials, material efficiency and ressource efficiency are the biggest market regarding value added and employment in the sustainabilty economy (Source Umweltwirtschaftsbericht NRW).

For many years, energy efficiency and renewable energies have played a major role in the German building sector. The City of Krefeld is engaged in "energy contracting", which means investments in energy efficiency measures to profit from lower energy costs and using renewable energies and supporting the decarbonisation strategy of the City of Krefeld that wants to achieve carbon neutrality by 2035. The

city is a so called “model municipality“ in the “Co2ntrachting: build the future!” of the German energy agency (Source: dena).

Influenced by Dutch-German cooperation and the sustainable construction of the City Hall of Krefeld’s sister city Venlo (in terms of energy, cradle-to-cradle, and health of users), the theme of health (see further the Healthy Building Movement) has also been introduced as a policy. Therefore, the City of Krefeld has decided to apply a holistic sustainable building approach to energy, circularity, and health to be implemented in future buildings and renovations (Source: Stadt Krefeld).

So far, projects (mostly children daycare buildings) have been constructed based these standards with a focus on energy and health with more projects already planned for realization. Moreover, cradle-to-cradle is stronger emphasised as well as an additional focus of sustainable buildings and first projects are planned. Corrently, the City of Krefeld is also working on a circularity strategy in cooperation with the municipal enterprises notably the public building company, the energy company, and the economic development agency.

Projects, In-site visits & Presentations

The program in Krefeld started with a presentation of the Building Management Department of the City of Krefeld by Rachid Jaghou (Head of Building Management Department of the City of Krefeld).

Krefeld focuses on healthy and wellbeing for users, mainly in real estate used for social uses (e.g. kindergarden, schools) and energy. More recently, circularity has been recognized as a further issue.

Visit of Interface

Interface is a producer of carpet tiles. The enterprise envisions to be carbon negative by 2040. Globally, they are the first producer in this market segment in which their products are climate neutral during the whole lifecycle. Some of the materials are CO_2-negative in themselves and thus significantly reduce the CO_2 footprint of the overall product. The result is a carpet tile that stores more CO_2 than it emits from raw material extraction to sale (CO_2 footprint of these three products (cradle-to-gate): -0.26 kg CO_2e/m^2). Overall, the CO_2 footprint (or grey emissions) of construction projects can thus be reduced (DGNB, 2024). Regarding their engament in the circular economy, Interface takes back used carpet tiles and puts them to good use to support community projects, local businesses and charities. Moreover, their textile products are fully recyclable to make new carpet tiles in the future and no products lands on a landfill.

More information on Interface: https://www.interface.com/EU/de-DE.html

The office building itself was the first building with a “Platin certification for renovated buildings“ by the German renewable building council (DGNB) (DGNB, s.a.). One characteristic of the building is ist biophilic design which intregates natural design principles and materials into the indoor design to foster wellbeing among its users.
Interface’s office is located at Mies van der Rohe Campus. The developments in this industrial area designed by Aachen Bauhaus architect Ludwig Mies van der Rohe Mies van der Rohe Campus symbolise the dynamic transformation of Krefeld’s economy. In recent years, the historically significant textile industry site has developed into a location for internationally operating companies from the construction and textile sectors, as well as innovative start-ups and companies from

Office building of Interface and sustainable building materials (Photo: KREFELD BUSINESS)

the IT and digital economy. In particular, companies with links to the Netherlands are contributing to the transformation of the building sector at the location, also in cooperation with Interreg projects such as the Healthy Building Movement.

More information:

https://www.interface.com/GB/en-GB.html
Interface ed. Why Biophilic Design matters .Understanding the human-nature connection and the built environment

https://www.interface.com/content/dam/interfaceinc/interface/publications/brochures-collateral/ams/a-e/biophilic-design-insert/interface_august_2019_Insert_final.pdf

Heath, O., Jackson, V., Goode, E. (2018): Creating positive spaces using biophilic design.

https://www.interface.com/content/dam/interfaceinc/interface/publications/brochures-collateral/emea/design-guides/biophilic-design-guide/biophilicdesignguide-en.pdf

Interface (ed.) (2015) The Global Impact of Biophilic Design in the Workplace

https://www.interface.com/content/dam/interfaceinc/interface/global-campaigns/human-spaces/report/global-human-spaces-report/Human%20Spaces%20report%202015%20EN.pdf

View of the modernist (Bauhaus) style industrial estate Mies van der Rohe Campus (Photo: KREFELD BUSINESS)

Visit of The Healthy Building Movement: Dutch-German cooperation to build a cross border ecosystem for sustainable construction

After being welcomed by Eckart Preen – Head of the department of Economy, Digitalisation and International affairs and Managing Director of the economic development agency of Krefeld, Michel Weijers (Project lead of the Venlo City Hall and the Healthy Building Movement) gave a keynote presentation on the regional approach and vision on sustainable buildings which encompasses high energy efficiency, renewable sources, circular and health for users.

The Venlo city hall was initially planned as a sustainable (energy-wise) and circular project, before the theme of health was recognized as an additional positive factor. However, a circular approach does not necessarily cover user well-being and energy efficiency. In addition, a very insulated and therefore efficient building needs a ventilation system which may influence the energy demand and the wellbeing of users. This is why a hollistic and comprehensive approach for sustainable buildings is being applied in the region, in order to not develop new unsatisfacory outcomes by optimising a single factor.

Since 2017, the region has been working on healthy buildings by stimulating demand and supporting the supply (i.e. regional SMEs) with mainly information and networking offers. The healthy building network was the initial project to create awareness in the region and to support SMEs to produce healthy materials and services for the healthy building market. Since then, nearly 500 actors from administration, knowledge institutions, administration and potential future clients in Germany and the Netherlands have joined the initiative.

The Healthy Building Movement (HBM) is an EU-funded Interreg project in which 10 organisations from the Netherlands and Germany work together with the aim of encouraging healthy building in practice. To achieve this goal, the project conducts research, links supply and demand and shows how accessible adjustments to existing buildings can significantly contribute to the health of a building and its users.

Michel Weijers presenting on the Healthy Building Movement (Photo: Simon Erath)

Definition: Healthy Building
In healthy buildings, interiors are designed to have a positive impact on our mental and physical well-being. In the planning, construction and operation phase of Healthy Buildings, factors that affect human health, such as lighting, acoustics, thermal comfort, indoor air quality, look and feel and active design, are therefore taken into account. In addition to using healthy and non-toxic materials, the buildings are ideally built in a resource-saving manner and in accordance with circular economy standards. This means that the materials used can be reused or recycled, buildings are supplied with renewable energy, and energy is used efficiently.

Goals
Research and evaluation:
- Applied research into the impact of healthy buildings on people's well-being and performance.
- Focus: office buildings, (home) offices and schools.
- Innovation and development
- Developing supporting materials for the market, such as a "Nutriscore" to assess the health of buildings.
- Promoting the development of healthy (building) materials.
- Stimulating innovation through living labs, expert tools and brainstorming sessions.

Market development & legal framework:
- Bringing supply and demand together.
- Increasing market demand for healthy building products.
- Removing existing barriers and improving the (legal) framework for healthy buildings.

Healthy (re)construction projects
- Supporting and supervising healthy (re)construction projects
- Becoming a model region for healthy and sustainable construction

More information at: https://healthybuildingmovement.com/

Lessons Learned from Visit to Krefeld

Starting with a focus on energy, the sustainable building initiatives of the city has shifted to an additional focus on health and ~~currently~~ also cradle-to-cradle. Initiatives and projects are driven by a strong cooperative and network approach. Cross-border cooperation mainly with Dutch partners plays a strong role like in The Healthy Building Movement or the Initiative Euregional Sustainabiliy Center (ESC) for example, which focuses on sustainable manufaturing and sustainable buildings. Moreover, approaches tend to focus on a comprehensive shift towards sustainability by integating the economy (mainly SMEs) which may innovate towards sustainable products, services and business models, thus providing the potentials for green growth. With its industrial base in manufacturing, the city of Krefeld may further scale up a green economy and postion itself as an excellent location for sustainable materila production. With a high accessibility by ship, rail and road, and an international airport (Düsseldorf) nearby, logisitic

conditions are also excellent. By being situated directly between the Netherlands and at the edge of the Rhine-Ruhr area, this makes Krefeld an excellent connection between both countries in terms of resource flows but also knowledge transfer.

DUISBURG

The last stop of the ASSET on Tour Excursion was the city of Duisburg. This was hosted and organized by Duisburg Business & Innovation, one of ASSET's German project partners.

ASSET team in Duisburg (Photo: KREFELD BUSINESS)

Strategies & Policies

Duisburg is a city in the Ruhr area that is known for its long industrial tradition and significance as an important industrial hub in Germany. The industrial character of Duisburg is primarily shaped by the steel industry and port operations.

- **Steel Industry:** Duisburg was and still is a center of German steel production (for example with Thyssenkrupp). The city is home to large steel mills and steel processing companies. The iron and steel industry has significantly influenced the economy and the city's landscape for decades.

- **Port:** The Port of Duisburg (duisport) is the largest inland port in the world and plays a crucial role in Europe's freight transport. It is an important link between water and land transportation and serves as a major hub for goods of all kinds.

- **Logistics and Trade:** Due to its location on the Rhine and its proximity to other industrial centers in the Ruhr area, Duisburg holds significant importance as a logistics hub. Numerous logistics companies and freight forwarders have established themselves here to efficiently utilize the transport routes.

Duisburg's industrial character has evolved over time. While heavy industry still plays an important role, the economy has increasingly diversified. The city is now focusing more on promoting new technologies and sustainable economic concepts, such as in the field

of hydrogen, to be future-proof and continue developing its industrial tradition.

In Duisburg, there are currently no comprehensive strategies for the circular economy that specifically target the built environment. However, there are concrete plans to implement the topic of Circular City more strongly within the city from 2025. The Ruhrort district will serve as a real-life laboratory.

Projects, In-site visits & Presentations

During the Duisburg portion of the excursion, the ASSET team visited TSR Recycling GmbH & Co. KG, or TSR for short. It is a company in the recycling sector, particularly metal recycling. The company has their headquarter in Duisburg and is a subsidiary of the REMONDIS Group. TSR specializes in the collection, processing, and recycling of scrap metal and metal waste. The company recycles both ferrous scrap and non-ferrous metals like copper, aluminum, and zinc. TSR's recycling process aims to produce high-quality secondary raw materials that are reintroduced into production cycles.

By processing up to 450,000 tonnes of input material annually, including end-of-life vehicles, mixed scrap, and large household appliances, TSR produces a certified high-quality recycled steel product. This approach significantly reduces CO_2 emissions and the reliance on virgin raw materials. Utilizing advanced measuring,

Presentation and discussions at TSR Recycling office regarding TSR's business operations and relevancy of Eurodelta scale (Photos: Duisburg Business & Innovation)

detection, and separation technologies, TSR ensures the efficient production of high-quality steel from recycled materials. This company is essential for Duisburg, as the city is known as the largest steel hub in Europe and represents a significant step towards a sustainable / circular industry. Key stakeholders such as thyssenkrupp Steel and Hüttenwerke Krupp-Mannesmann collaborate to increase the use of recycled materials in steel production, thus saving approximately 1.4 million tons of CO_2 annually. TSR exemplifies the potential of circular economy practices to transform traditional industries, promoting sustainability and resource efficiency on a large scale.

Logistics is crucial for the transportation of recycled materials from the collection and processing sites to the production facilities. Within the Eurodelta region, optimized routes and transport methods (e.g. via the Rhine) must be found to maximize efficiency and minimize costs.

View of TSR Recycling's metal recycling facility in Duisburg (Photos: Fabio Bayro Kaiser)

Lessoned learned from the Excursion

When reflecting back on the 1-week long excursion, it became evident that most cities in the Eurodelta that were visited, have (at least started) to integrate circularity in the built environment within their current strategies. These activities range from: public awareness raising and public tendering to support circularity in public projects (e.g. Poppies in Amsterdam), to the support of local and regional economies concerning circular business opportunities (e.g. Brussels, Krefeld).

There is also a spatial specialisation in these cities while embracing a circular economy. While cities like Leiden and Amsterdam focus on the realization of public projects and mostly residential or office projects, the Province of South Holland, on the other hand, is establishing itself as a hub with access to the seaports with its logistics sector. While in Brussels and the cities in the Rhine-Ruhr area, there is a strong manufacturing industry and production of circular materials, products and creating circular business models may be regarded as a regional specialisation.

In addition, the following insights were found:

- **The Eurodelta scale:** At most of the visited places, this scale was not mentioned, but TSR (metal recycling) in Duisburg already operates at the Eurodelta scale with a network of specialized factories to recycle metal.

- **The need for space:** The excursion provided furthermore insights in the need of space e.g. for logistic hubs in urban areas with good transport possibilities (ideally by water or train). As told by BC Materials, co-siting is seen as an opportunity (also with linear activities). They use machines from a minear bigger company to increase own production.

- **Pressure of Space:** Industrial areas that can play an important role in the transition to a circular economy are under pressure. This is evident in the transformation of indutrial areas into housing in Amsterdam and Brussels.

- **Top Up:** In the Eurodelta, many post-war neighbourhoods are due for renovation. Adding wooden structure floors on top of existing buildings offers opportunities for an integrate approach to the housing challenge and the sustainability of these neigbourhoods, alongside possibility for upgrading the living environment

- **Collaboration at a bigger scale:** This could provide the necessary space for crops cultivation to be implemented in the construction industry.

- **Space for growing crops to be processed into biobased building materials:** To meet future demand of biobased materials, rural areas in the quite densely populated Eurodelta or in neigbouring regions may be exploited as well, as agriculutural land is already in use, perhaps for the food industry.

- **Private sector side:** The ASSET team recognizes ambitious companies with existing products and services. However, it is evident that the provision and production of technologies, products, and materials should be scaled up by industrial processes to lower costs and to satisfy the demand.

- **Regulations:** Entrepreneurs are asking for more space for experimentation and flexibility and have pointed out discrepencies between regions (what is waste for one is a resource for another).

- **The local economy:** It should be supported to produce or use circular materials and services (i.e by subsidies and bringing supply and demand together).

- **Supply and demand of materials:** This needs to be transparent/ insightful (example: Home - Sloopcheck or Opalis mapping network).

- **Improved digital information:** This can help minimize the demand for storage space.

- **Linking health to circular construction:** This can help increase the urgency of the topic (e.g. Interface, Healthy Building Movement)

- **Collaboration opportunities:** With Interreg projects like PREUSE and Healthy Building Movement.

To conclude, collaborating on the Eurodelta scale and linking stakeholders to share knowledge and expieriences could help to solve some of the identified challenges and accelerate the transition to a circular built environment.