Lighthouse Haven-Stad

Leading the Way To A Circular Urban Landscape and Resource Management In Coenhaven and Vlothaven

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CONTENT

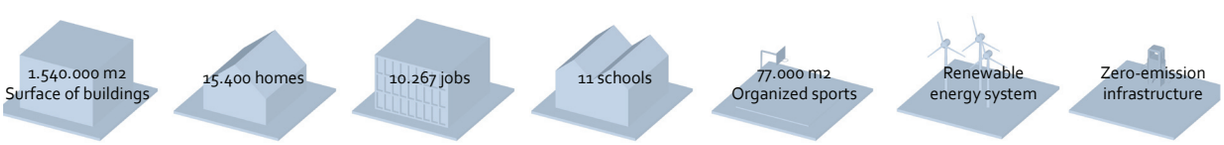
INTRODUCTION

Why circularity?

The traditional linear extract-produce-use-dispose model of modern economic and urban systems is leading to unsustainable consumption and severe environmental consequences (Lucertini & Musco, 2020). In the coming decades, the world will face extreme challenges related to resource distribution and management. In order to create sustainable and livable cities for current and future generations, the traditional wasteful approaches must be replaced by regenerative ones (Williams 2021). Circularity proposes solutions by decoupling economic growth from the constant need for more resources. By reimagining production and consumption patterns, circular cities can reduce their global ecological impact, increase resource security, and enhance urban resilience (Williams, 2021; Lucertini & Musco, 2020; van der Leer et al., 2018).

Amsterdam´s Haven-Stad

Amsterdam has embarked on an ambitious journey to transform Haven-Stad, an industrial area, into a unique metropolitan mixed-use living and working waterside district by 2050 (Gemeente Amsterdam, 2021). Building upon the Integral Framework (IF) for Haven-Stad, this project proposes solutions for integrating circularity into the urban fabric and metabolism of Coenhaven and Vlothaven. As part of the Eurodelta, the district can serve as a model for other urban developments and inspire the implementation of similar solutions for circular resource management across the region.



Scenarios for a circular urban future

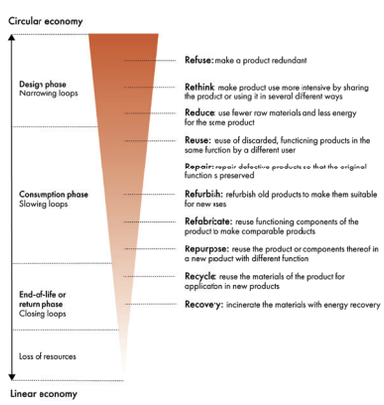
This project follows three what-if scenarios that explore possible circular urban futures for Coen- and Vlothaven. The first scenario, what if the district was bio-based?, prioritize the use of renewable, organic and recycled materials for construction.

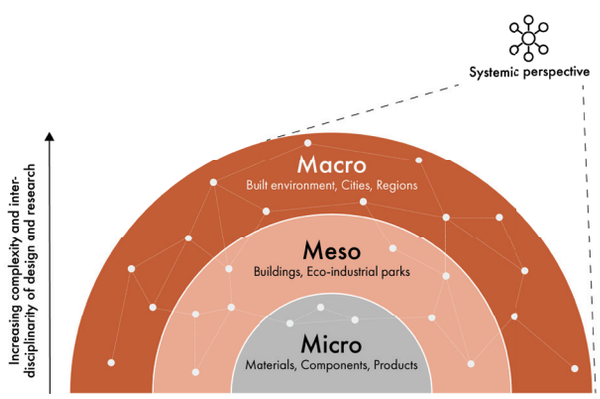
The second scenario, what if the district would produce its own food?, explores the potential of Coenhaven and Vlothaven to produce their own food and transform organic waste to biogas, fostering a resilient local food system.
The third scenario, What if all consumer goods would be looped?, focuses on facilitating the continuous use of consumer goods and recovering valuable materials, reducing the need for new resources and fostering a culture of responsible consumption among residents.

CONCEPTUAL FRAMEWO

From linear to circular economy

A circular economy is an economic system aimed at eliminating waste and promoting the continual use of resources, by managing them in closed loops, so that products, materials, and components are maintained at their highest utility and value. The ultimate goal is to decouple economic growth from natural resource depletion and environmental degradation, creating a more sustainable and environmentally friendly model (Lucertini & Musco 2020; van der Leer et al. 2018). Central to the concept of circular economy is a set of strategies, called R-strategies, which are positioned in a hierarchy based on the extent to which they retain or maximize the value of resources (Dokter 2021).





Circularity In The Built Environment

The circular economy operates at different spatial scales, from the micro (materials, components and products) and meso scale (buildings, eco-industrial parks) to the macro scale (built environment, cities, regions). All scales are interconnected and expand in terms of complexity and interdisciplinarity of the design challenges. Therefore it is crucial for designers to take on a systemic perspective and consider the interaction between multiple scales of implementation (Dokter 2021).

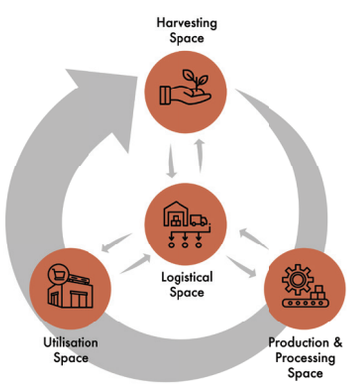
Urban Val

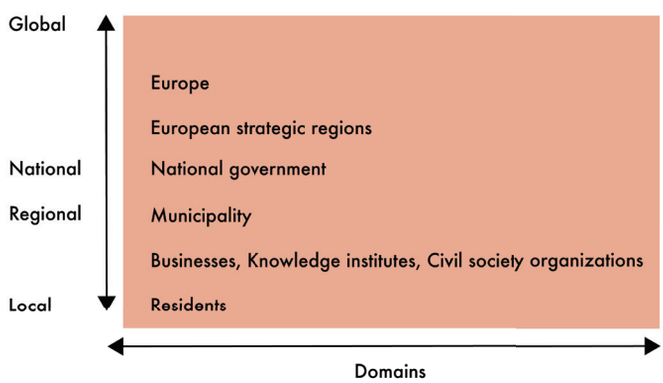
Cities can be described quiring resources to sus generating waste and byproduct of their acti 2020). Because of their and impact on the en three value chains are key Construction and the built ganic waste, and consu terdam 2020). The three selected on the basis of

R K

Arenas for Joint Action

Transitioning towards circularity can only be achieved through collaborative partnerships, collective action and coordination involving all relevant stakeholders across different domains. In order to enable dialogue and make clear agreements on objectives and results, the establishment of value chain specific arenas for joint action is necessary (BVR/Ecorys 2022; van der Leer et al. 2018).



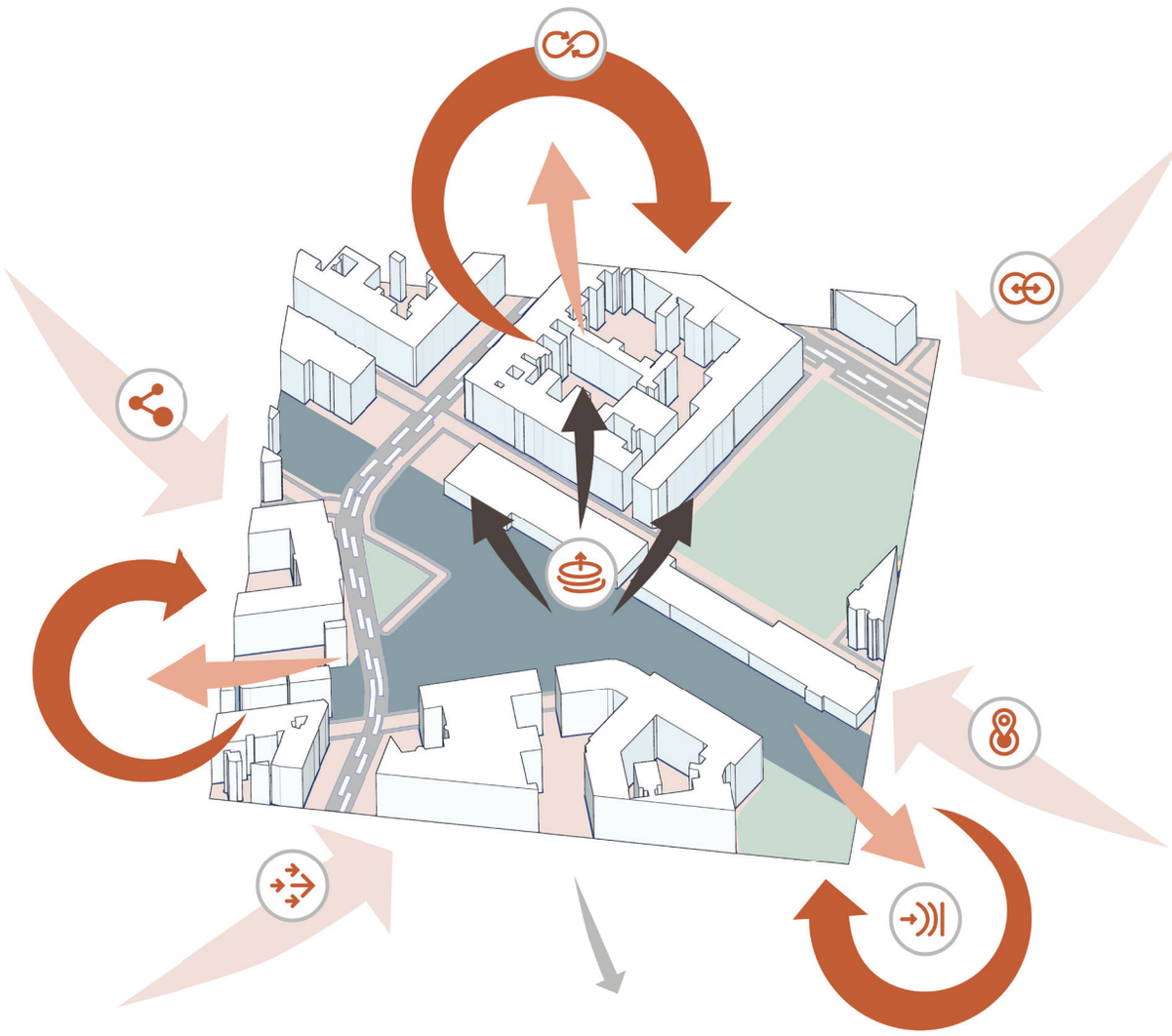


ue Chains

as metabolic systems, tain their functions and residual streams as a vities (Lucertini & Musco economic significance, vironment and climate, to achieving circularity: environment, food and or mer goods (City of Amswhat-if scenarios were these urban value chains.

Linking Spaces

A circular economy requires four different types of linking spaces: harvesting spaces, production and processing spaces, utilization spaces, and logistical spaces to organize circular material flows and link them together. Creating a diverse spatial network of linking spaces of different scopes (from whole landscapes to individual plots or streets) is fundamental for transforming linear production chains into circular material flows (BVR/Ecorys 2022).



Looping
Adapting
Regenerating
Localizing
Optimizing
Substituting
Sharing
Resources produces by ecosystem services (clean soil, air, water)
Resources produced by urban activities (products, energy, food)
Resources consumed by urban activities (land, materials, energy, water, infrastructure)
Looped resources
Resources wasted

Circular design principles

Based on the widely used framework for a circular economy (ReSOLVE) by the Ellen MacArthur Foundation, a circular approach to resource management in cities focuses on seven design principles, that not only enable the renewal of the urban ecosystem and infrastructure with minimal resource consumption and wastage, but also moderate the quantity and type of resources consumed by the urban ecosystem (McKinsey 2015; Williams 2019).

Looping: Closing, slowing and narrowing loops in material flows to increase the recirculation of resources, extending their utilization period, minimizing the generation of waste and maximizing their value (Dokter 2021; Venkata et al., 2020; Williams 2019).

Adapting: Fostering the capacity of urban ecosystems for adaptation to changes in context, disturbances and stress, ultimately renewing itself (Williams 2019).

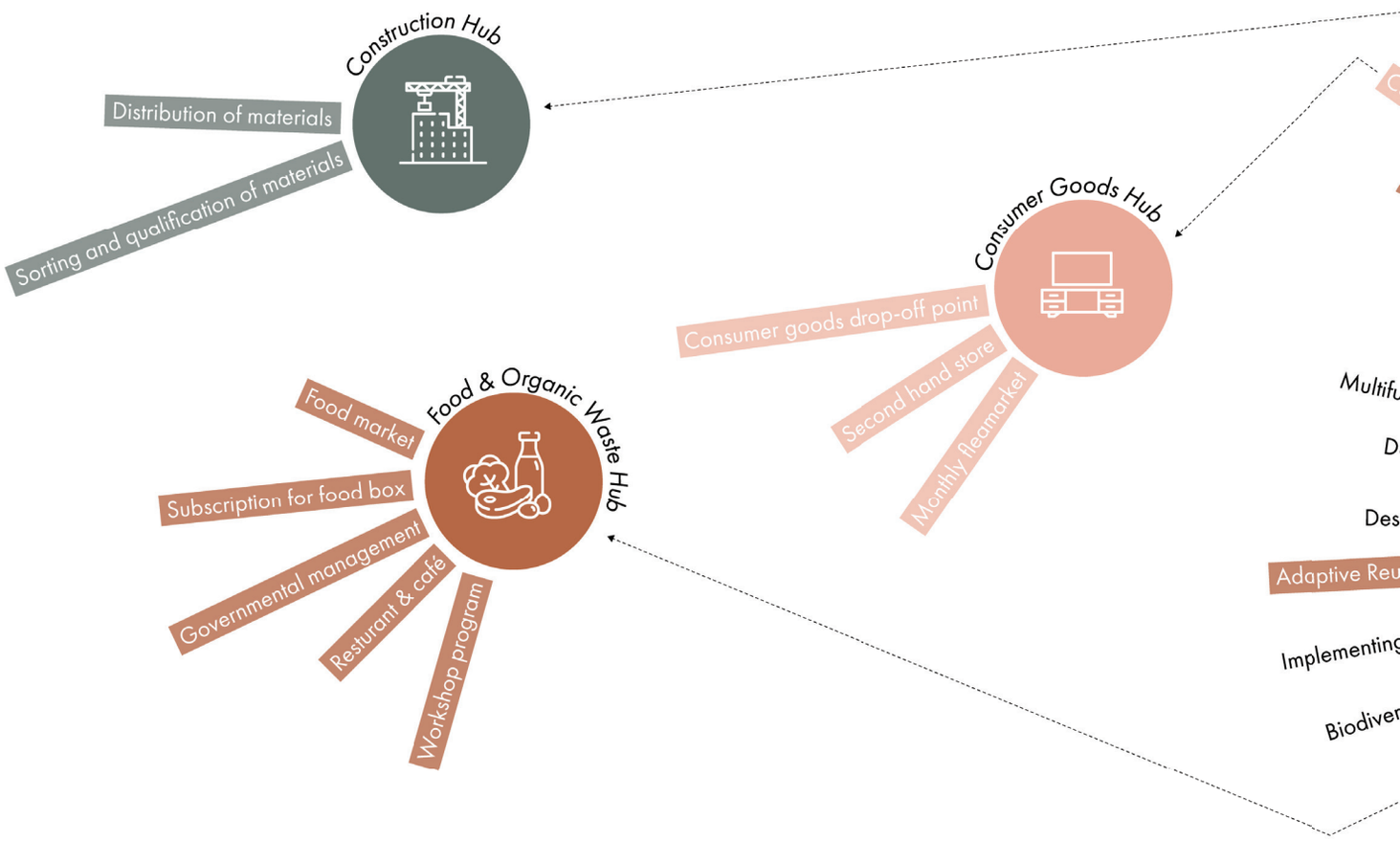
Regenerating: Reclaiming, retaining, and regenerating the health of urban ecosystems, preserving natural capital and fundamental ecosystem services (Pedersen Zari, 2015).

Localizing: Localizing of resource flows reduces resource consumed by transportation, and encourages change in social practices, lifestyles and systems of provision as both positive and negative impacts of resource consumption are being localized (Williams 2019).

Optimizing: Increasing the performance and efficiency of resource consumption, as well as removing waste in production and supply chains (McKinsey 2015; Williams 2019).

Substituting: Replacing e.g. non-renewable with renewable resources, resource-based with service-based activities, and products and services with lower resource consuming alternatives (McKinsey 2015; Williams 2019).

Sharing: Establishing a policy and infrastructure of access over ownership to share resources across a range of activities, including living, working, and travel (City of Amsterdam 2020; Williams 2019).

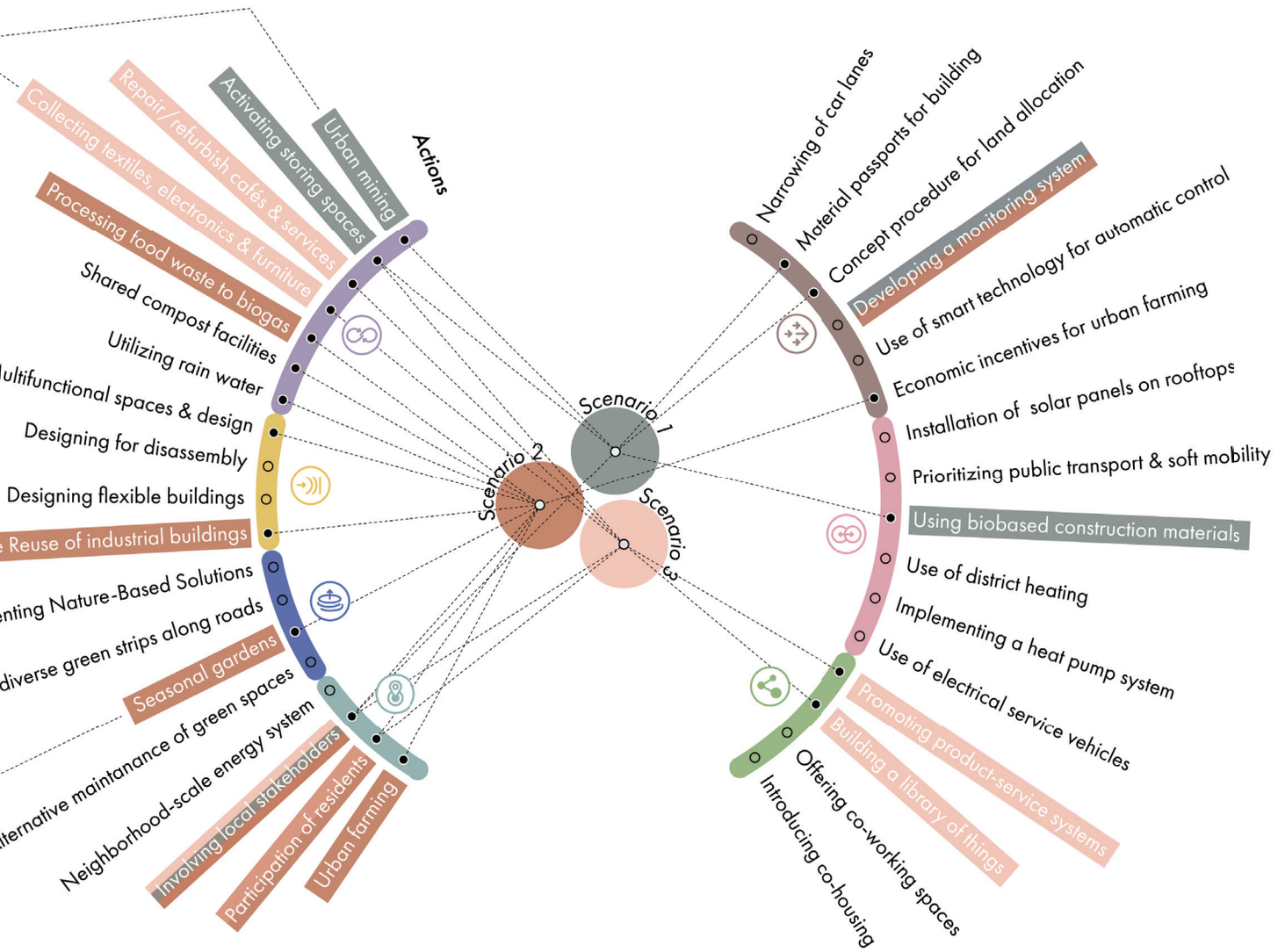


Design Principles

- *Looping*
- *Adapting*
- *Regenerating*
- *Localizing*
- *Optimising*
- *Substituting*
- *Sharing*

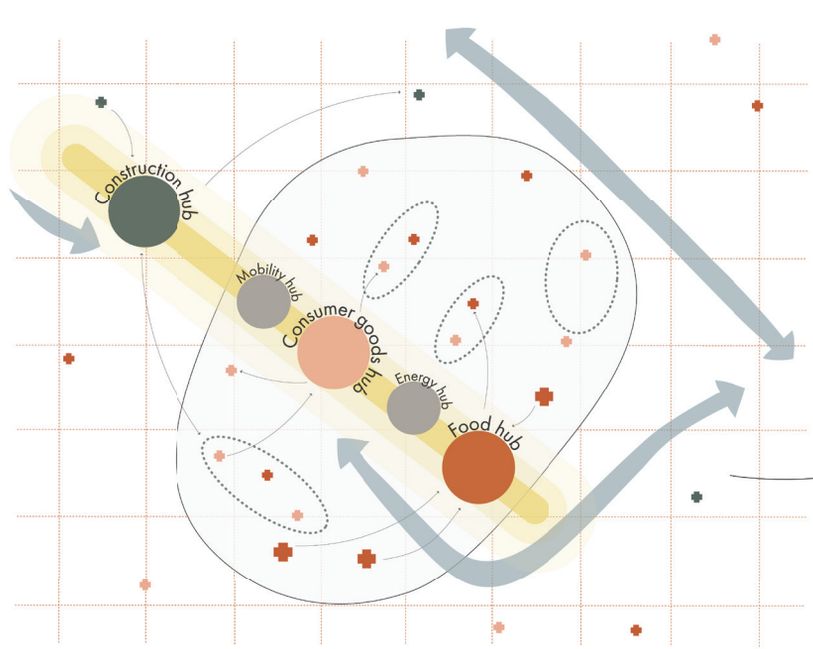
Scenarios

- ***1**: What if the district was biobased?*
- ***2**: What if the district would produce its own food?*
- ***3**: What if all consumer goods in the district would we looped?*

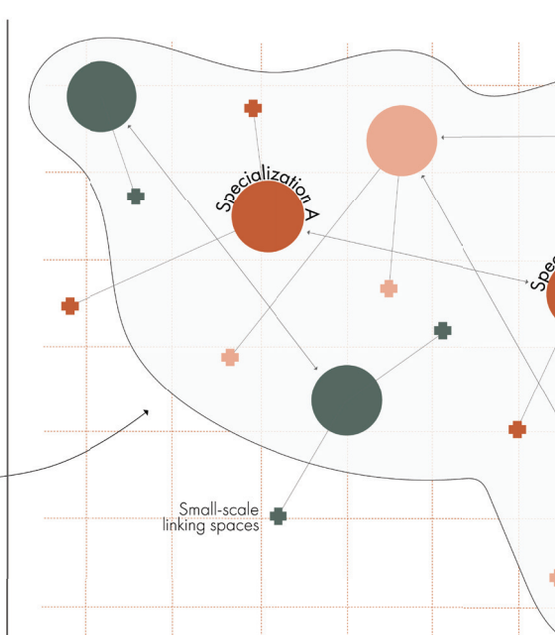

Actions
Urban mining
Activating storing spaces
Repair / refurbish cafés & services
Collecting textiles, electronics & furniture
Processing food waste to biogas
Shared compost facilities
Utilizing rain water
ultifunctional spaces & design
Designing for disassembly
Designing flexible buildings
e Reuse of industrial buildings
enting Nature-Based Solutions
diverse green strips along roads
Seasonal gardens
ternative maintanance of green spaces
Neighborhood-scale energy system
Involving local stakeholders
Participation of residents
Urban farming
Scenario 1
Scenario 2
Scenario 3
Narrowing of car lanes
Material passports for building
Concept procedure for land allocation
Developing a monitoring system
Use of smart technology for automatic control
Economic incentives for urban farming
Installation of solar panels on rooftops
Prioritizing public transport & soft mobility
Using biobased construction materials
Use of district heating
Implementing a heat pump system
Use of electrical service vehicles
Promoting product-service systems
Building a library of things
Offering co-working spaces
Introducing co-housing

SITE ANALYSIS

STRENGHTS	WEAKNESSES	OPPORTUNITIES	THREATS
• Mixed use of land and buildings • Mobility hub for transportation • Good accessibility via pedestrian & bicycle network • High connectivity via main distributor road and public transport • Cross-water connections (passenger ferry) • Availibility of wind turbine & electricity grid substations • Availibility of neccessary elements for sustainable water management system • Industrial and historical value	• Segmentation of district quater by the motorway • Reliance on petrol based transport • Lack of bicycle hub • Scarcity of land • Anti-adaptability of many existing buildings (containers, concrete, poor quality, etc.)	• Proximity to both harbor and inner city • Port function & logistics across water and cruise shipping • Functional green spaces allow for regeneration and seasonal gardens • Integration of water landscape for greenery • Adaptive reuse of old industrial buildings and silos for urban farming etc. • Incentive, place-making and signature projects for circularity • potential symbiosis with industrial harbor	• Industry is not fully moved by 2040 • Change in policy or housing regulations • Industrially contaminated and polluted soils • Effects of the climate crisis (water damage, heat stress, rising sea level) • Fincancial compexity and high investment costs • Acceptance and willingness of residents to embrace lifestyle changes regarding circularity



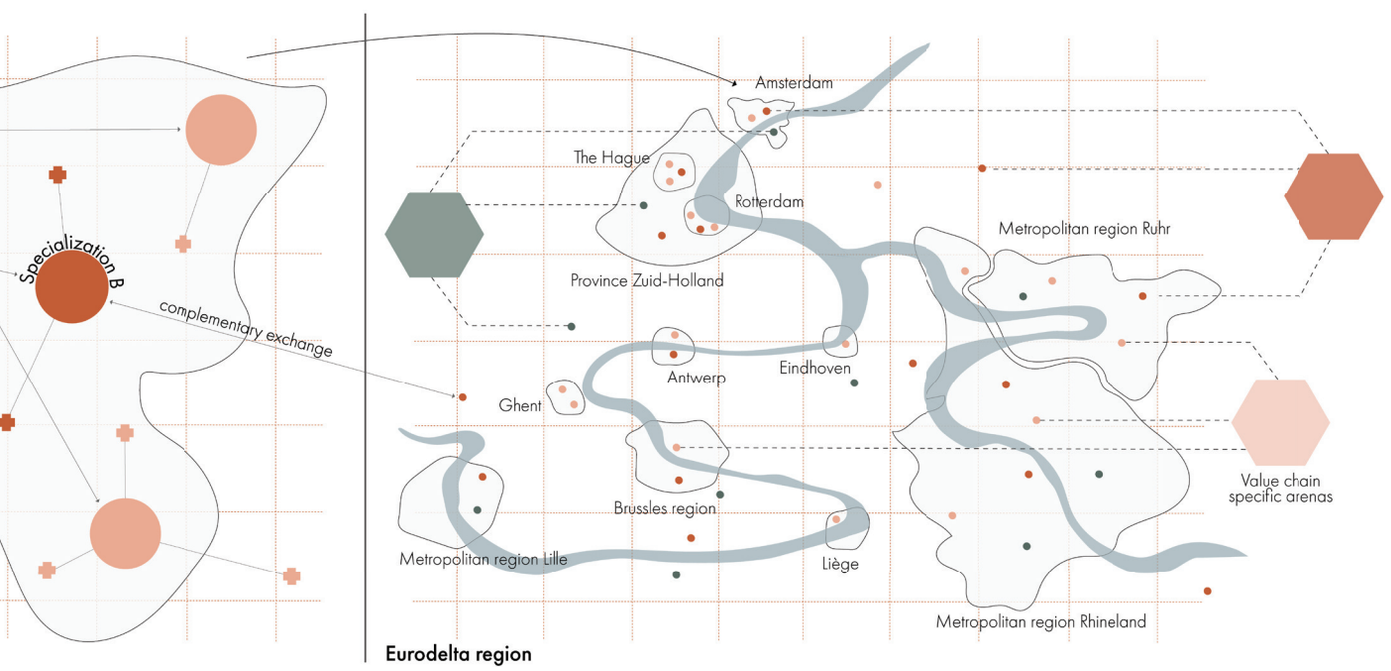
Coen- & Vlothaven



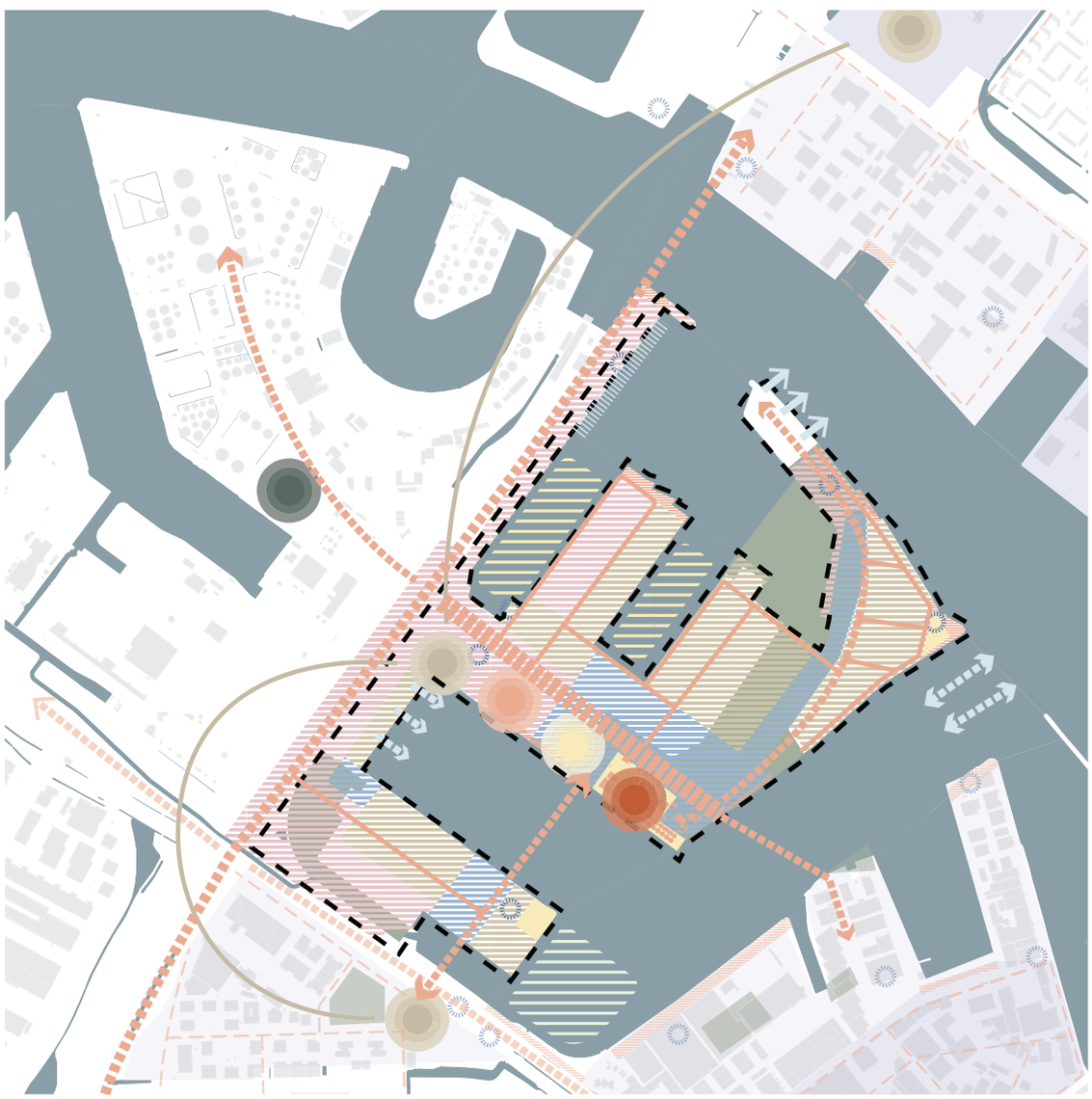
Amsterdam

SPATIAL FRAMEWORK

At the heart of the project's spatial vision is the establishment of a system of distributed circular hubs, directly related to the three scenarios and designed to deal with the harvesting, production and processing, logistics, as well as the nearby utilization of construction materials, food & organic waste, and consumer goods. Acting as linking spaces, these hubs are not only imagined in Coen- and Vlothaven, but potentially in different scopes all over Amsterdam and across the Eurodelta region. On the neighborhood scale the hubs are connected to a network of smaller linking spaces that enable the circular flow of resources. On the city and regional scale the hubs of the same value chain are connected, complementing each other with their specialized functions. This not only allows for the exchange of goods and resources, but also of knowledge, innovation and coordination, as the value chain specific arenas will provide the platform for joint action.



URBAN DEVELOPMENT P



Phase 1a
Phase 1b
Phase 2
Phase 3
Phase 4

Green
Special Quays
Harbor Functions
Public Space
Main Connections

Blocks: calm
Blocks: bustle
Blocks: buzz
IF Mobility Hub
Construction Hub

Consumer Goods Hub
Energy Hub
Food Hub

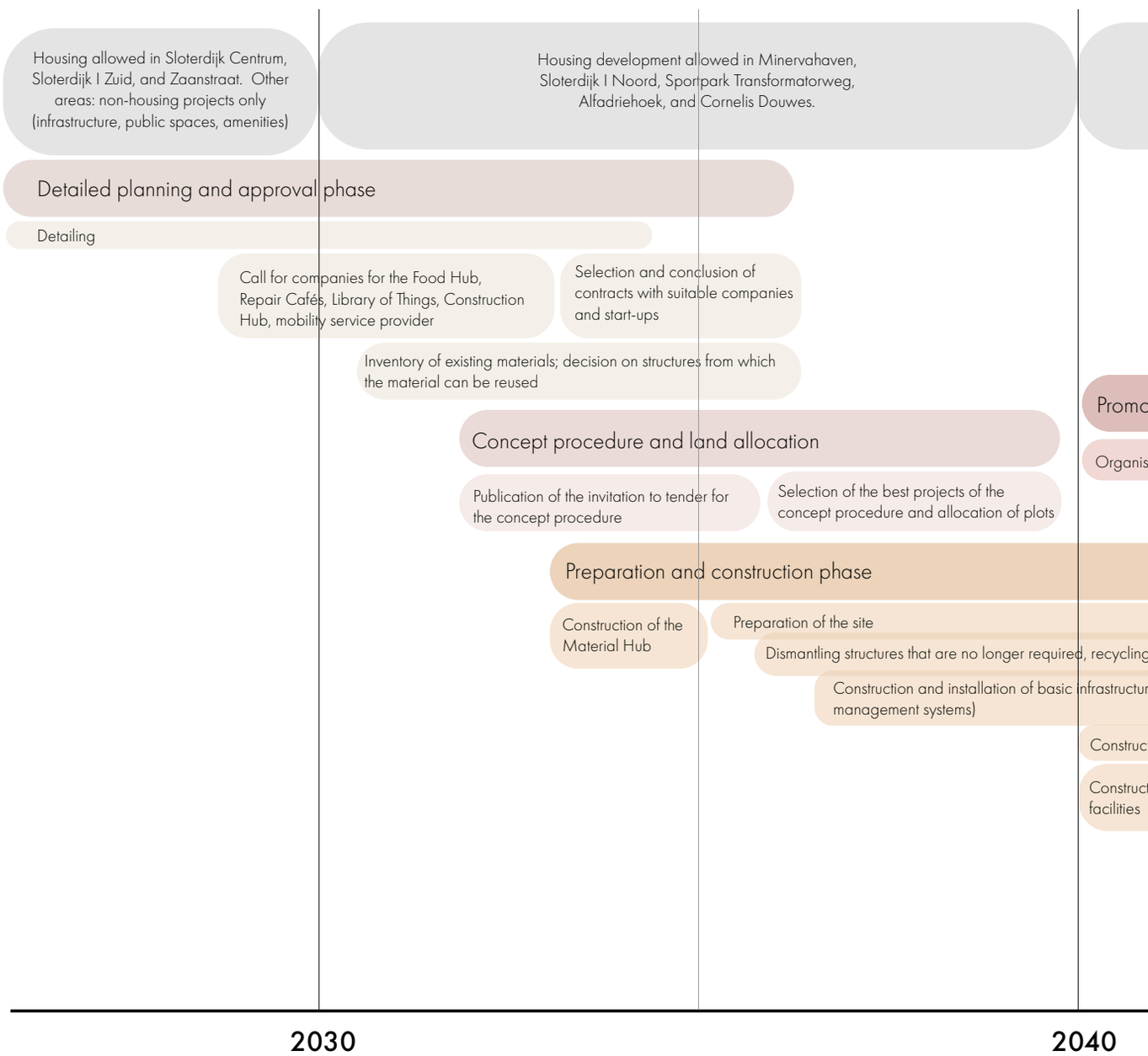
LAN

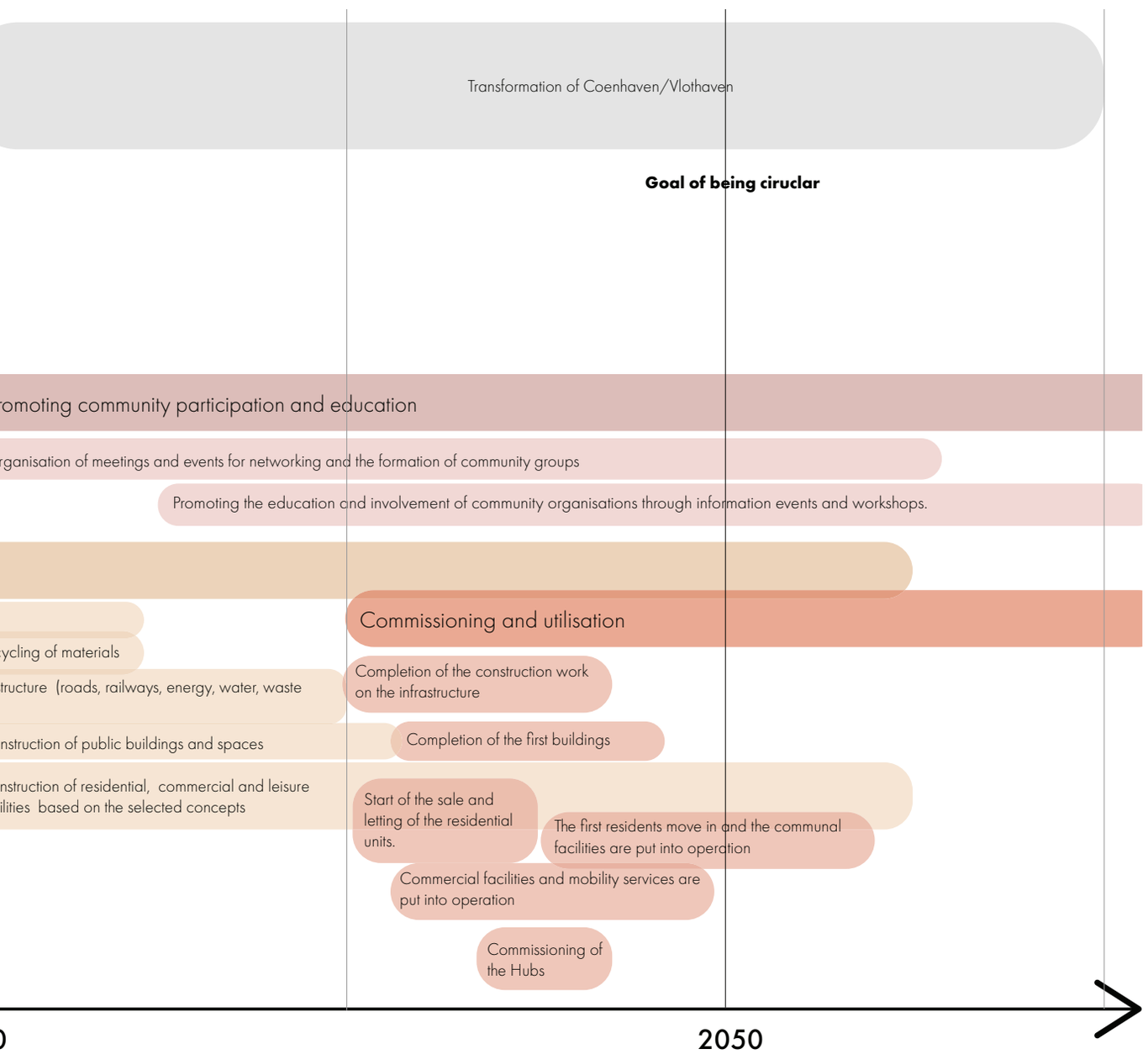
Structural plan

Building upon the Integral Framework's zonification of bustle, buzz, and calm areas, the location of different density zones and building heights was determined. Key spaces within the area have been further identified based on the circular design principles. These include the potential for developing regenerative green areas, public space with distinct characteristics, as well as crucial locations for harbor activities and connections. The neighborhood features five different hubs: a construction hub, a food and organic waste hub, a consumer goods hub, a mobility hub and an energy hub, the last two being proposed by the Integral Framework. The circular hubs are strategically positioned along Coen- and Vlothaven's main street, the Lighthouse Axis, serving as a vital link between the two districts, as well as the port and the inner city. Their close proximity to the waterfront enables efficient movement of goods by reducing reliance on road transport, reducing emissions and traffic congestion.

Timeline

The timetable for the development of Coen- and Vlothaven aims at completing the phase of detailed planning and approval by 2035. Around the same time, the concept procedure will begin in order to finalize the allocation of land by 2040. The preparation of the site, including the establishment of the construction material hub can already begin before 2040, allowing for the recovery of resources from demolition, as soon as the industry is moved. By 2040 the construction of buildings, as well as public spaces and facilities, including the other hubs, can begin alongside the promotion of community participation and education. Around 2050 construction will be progressively completed, and the utilization of the neighborhood can begin.




Transformation of Coenhaven/Vlothaven
Goal of being ciruclar
romoting community participation and education
rganisation of meetings and events for networking and the formation of community groups
Promoting the education and involvement of community organisations through information events and workshops.
Commissioning and utilisation
cycling of materials
tructure (roads, railways, energy, water, waste
Completion of the construction work on the infrastructure
nstruction of public buildings and spaces
Completion of the first buildings
nstruction of residential, commercial and leisure ilities based on the selected concepts
Start of the sale and letting of the residential units.
The first residents move in and the communal facilities are put into operation
Commercial facilities and mobility services are put into operation
Commissioning of the Hubs
0
2050


PTA
C
Pc
N
P
S
Y
Ps
E

Circularity Principles

Looping
- Construction Hub
- Functional connections related to Construction Hub
- Food & Organic Waste Hub
- Functional connections related to Food & Organic Waste Hub
- Shared compost facilities
- Consumer Goods Hub
- Functional connections related to Consumer Goods Hub

Adapting
- Reuse of industrial buildings
- Multifunctional spaces & design

Regenerating
- Seasonal gardens
- Preserved trees
- New trees
- Nature based solutions
- Biodiverse green strips along roads

Localizing
- Floating farms

Substituting
- Energy Hub

Sharing
- Mobility Hub
- Linking Spaces on block level (related to the Food and Remakery Hub)

Social amenities

- Ps Primary School
- Pc Primary Care
- E Secondary Education
- Y Youth Facilities
- S Social Center
- N Nursing Home
- C Cultural Function

Mobility

- Public transport
- Bike paths
- Street
- Boat connection
- P Car park
- PTA Passenger Terminal

Masterplan

The masterplan centers around the five hubs along the waterfront and main traffic axis of the district. The Construction Material Hub is situated outside the neighborhood due to scarcity of space, noise and emissions concerns. The Mobility Hub is a key node for public transport and shared vehicles, accommodating all modes of mobility, whereas the Consumer Goods Hub manifests the vision of looping all consumer goods, offering diverse facilities and services for reusing, repairing and repurposing them. The Energy Hub emphasizes renewable energies, essential for a circular future. The Food Hub explores the potential for Coen- and Vlothaven to produce its own food. It utilizes the preserved silos for vertical gardens and technologies like aquaponics, alongside two additional areas dedicated to food production: the floating farms and seasonal gardens in the south of the neighborhood.

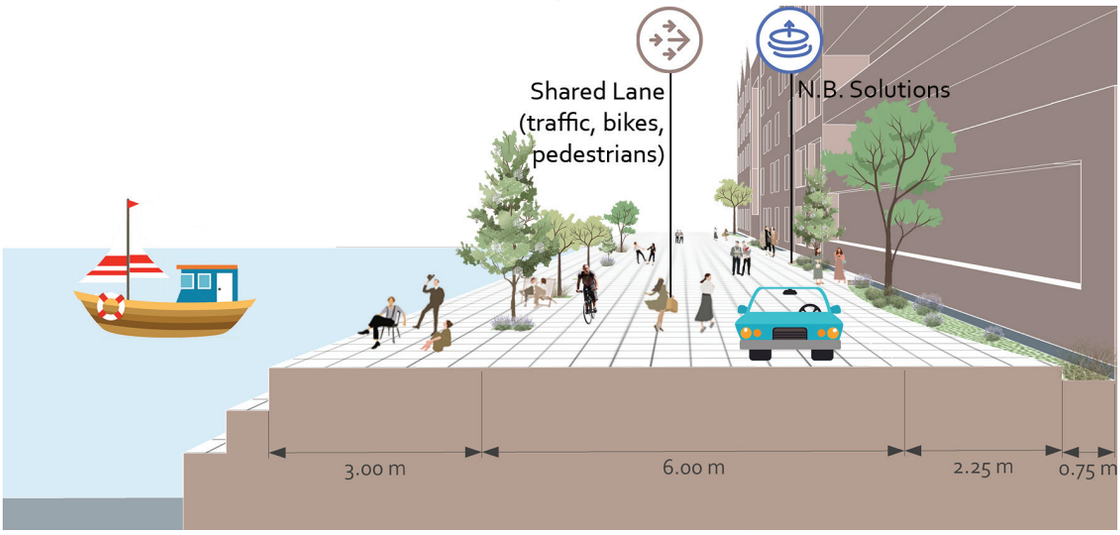
All hubs in the district are designed to be publicly accessible attractive landscapes, fostering community engagement. Moreover, small-scale linking spaces are integrated on the block level throughout the district. These small, prefabricated cabins serve as storage for shared consumer goods, such as tools and equipment, package stations, the delivery point for vegetable boxes from the Food Hub, and shared compost facilities. These spaces aim to foster a sense of community and sharing, as well as involvement in circular practices, making circularity tangible.

In addition, the district features numerous public spaces - from squares to courtyards - with varied qualities, adaptable designs, as well as high quality urban spaces with optimal views, including a beach next to a lively promenade and large green areas for recreation, regeneration and biodiversity. The block typologies and neighborhood characteristics are diverse, taking into account views, sunlight exposure, and the desired levels of privacy and activity. This thoughtful and comprehensive planning ensures the achievement of the target of 1,540,000 m² of building space, creating vibrant, circular, and interconnected communities.

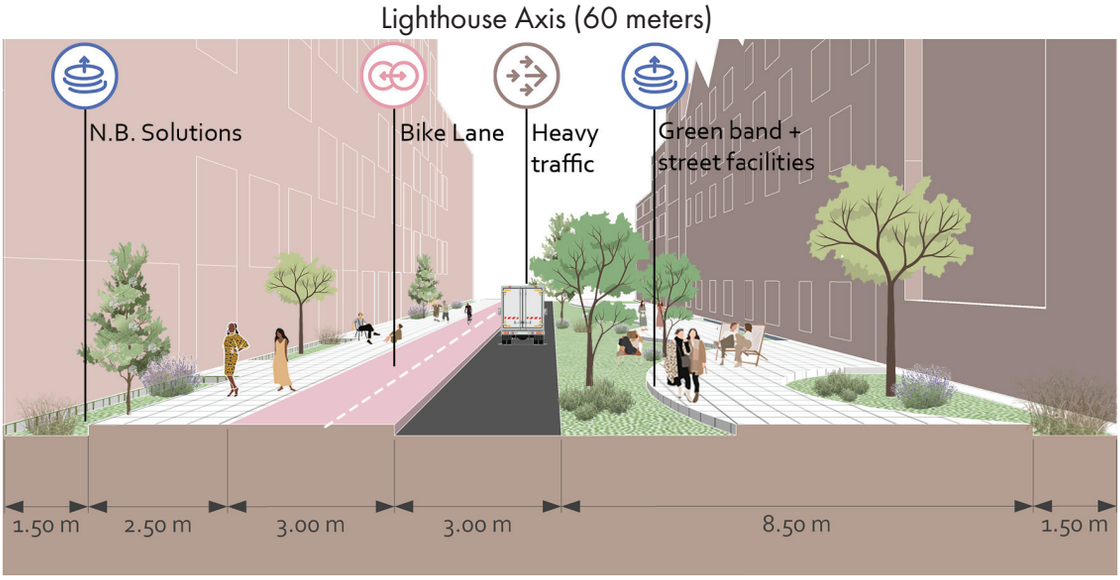
Street sections

Prioritizing active modes of transport, all main streets provide dedicated bike lanes and wide sidewalks, allowing ample space for pedestrians to walk comfortably and engage in social activities. The sidewalks are lined with biodiverse green strips featuring nature based solutions like rain gardens and bioswales, that help manage stormwater runoff, reduce urban heat, and provide habitat for local wildlife. Public seating areas, integrated within the green strips and pedestrian zones, offer rest spots surrounded by greenery, further encouraging people to spend time outdoors. In order to slow traffic, all main streets feature narrower vehicle lanes than usual, yet sufficient for delivery vehicles and emergency services, ensuring essential services are maintained. Making efficient use of space and resources, local streets offer a shared lane for cars, pedestrians and bicycles.

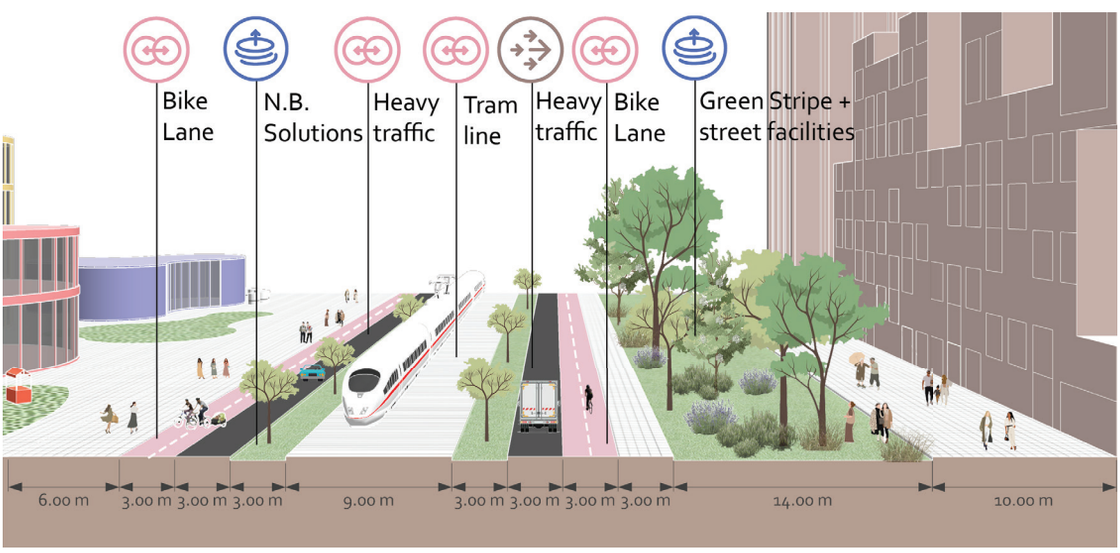
Local Street (12 meters)



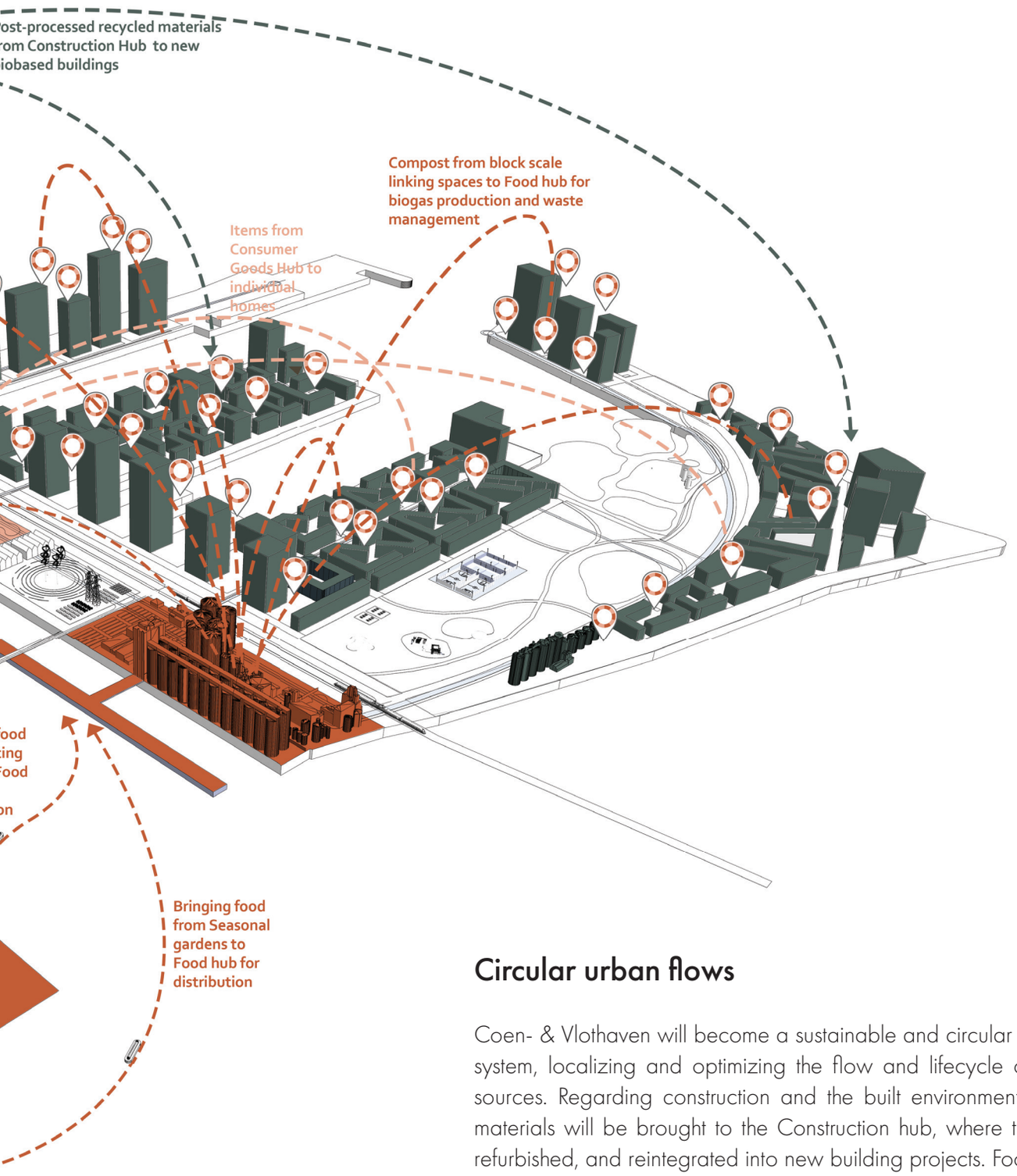
Lighthouse Axis (60 meters)



Main Street (20 meters)

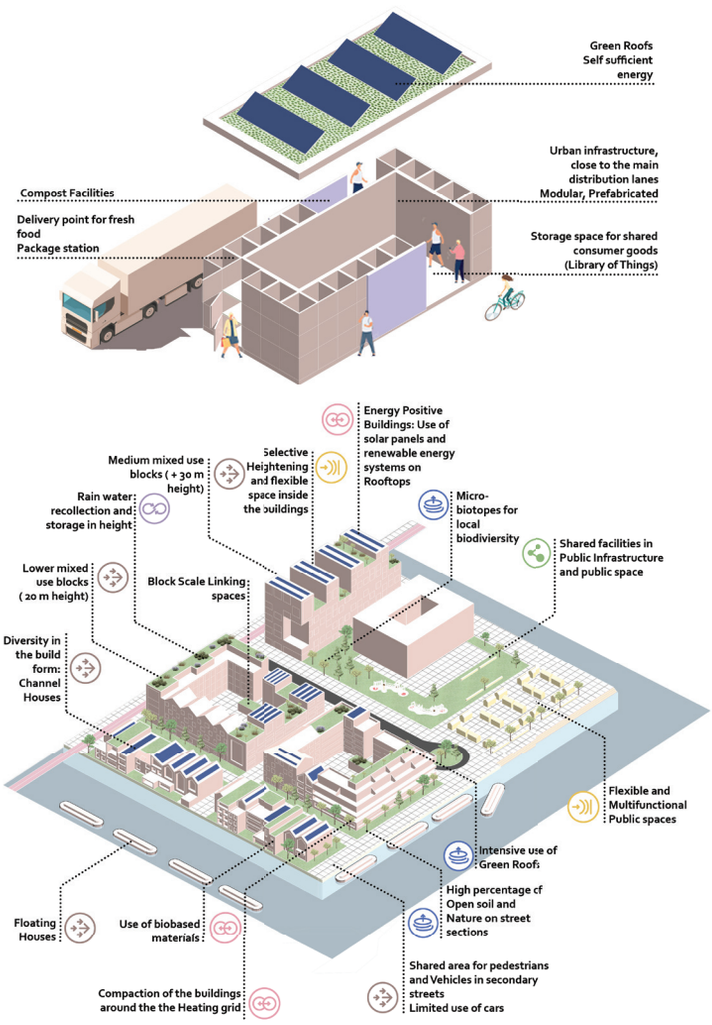


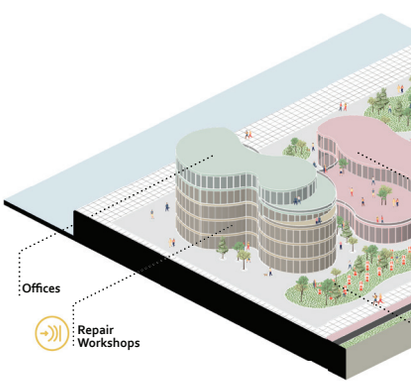
URBAN VALUE CHAINS



Circular urban flows

Coen- & Vlothaven will become a sustainable and circular metabolic ecosystem, localizing and optimizing the flow and lifecycle of its urban resources. Regarding construction and the built environment, urban mining materials will be brought to the Construction hub, where they are sorted, refurbished, and reintegrated into new building projects. Food and organic waste will be cycled, starting with urban farms producing fresh produce, leading to local markets and households, and ending with the composting and biogas facilities that transform organic waste into valuable resources. Finally, consumer goods such as electronics, furniture, and clothing, will be looped and shared - traveling between households and the Consumer goods hub.



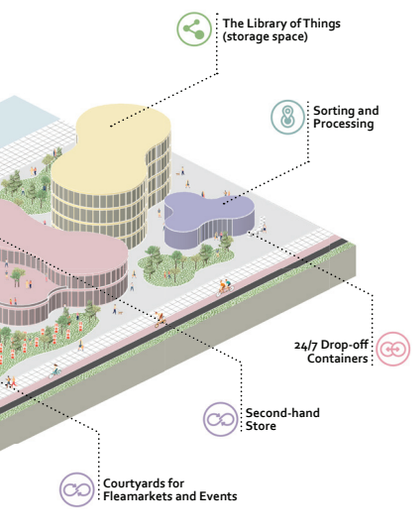


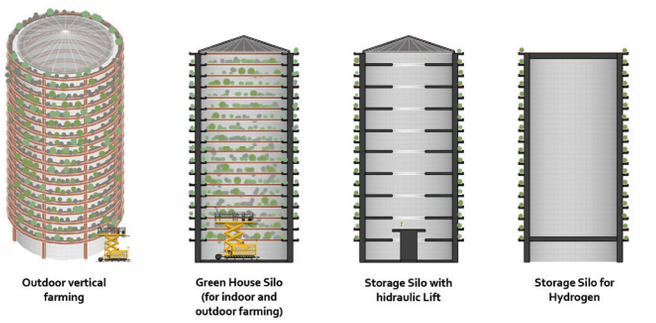
Building block and construction

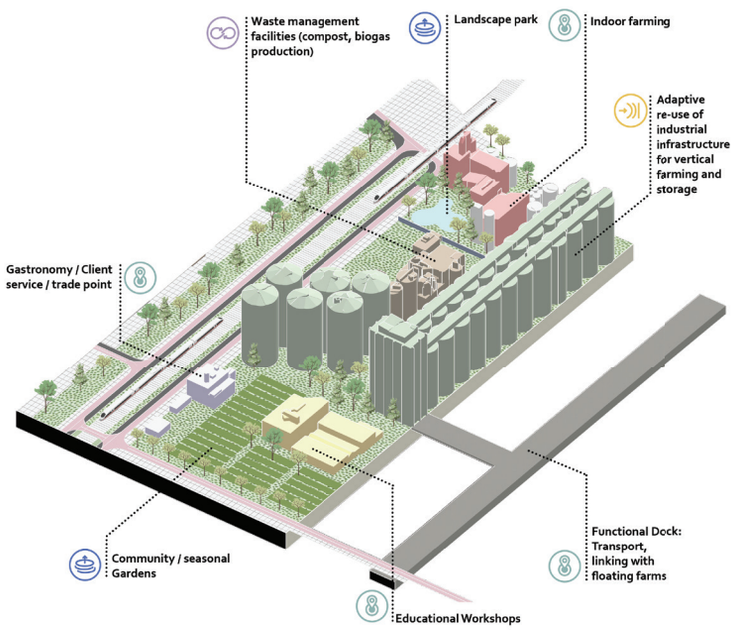
The building blocks integrate circular design with multifunctional and bio-based construction, featuring solar panels for renewable energy. They include green roofs and water management systems for recycling and harvesting rainwater, promoting efficient resource use. The block encourages green and active mobility, while also incorporating smart logistics in the form of small scale linking spaces for efficient supply chain management and sharing of resources in the neighborhood. The Construction Hub is a key component in Coen- and Vlothaven's circular urban infrastructure, dedicated to the responsible handling of building materials, focused on collecting, sorting, and processing materials such as wood, metal, and concrete. It plays a crucial role during the transformation phase by storing and processing materials from the demolition of existing structures. By reintroducing these materials into the construction supply chain, the hub successfully reduces waste, conserves valuable natural resources, and lowers carbon emissions.

Consumer

The Food & Organic Waste Hub em agriculture, integrating innovative nics, composting, and biogas pro of fresh, local produce, ensuring that tious and sustainable food options. self-sufficient farms on water, em Beyond food production, the hub pe park and educational center. It residents in community gardens and ning and cooking, fostering a dee sidents and their food sources. By sed biogas production, the hub also making it a comprehensive model of







goods hub

bodies a circular approach to urban practices like vertical farming, aqua- duction. This hub serves as a vital source urban residents have access to nutri- The floating farms are developed as phasizing modularity and scalability. acts as an eco-industrial landsca- promotes the engagement of local offers workshops areas for garde- per connection between urban re incorporating organic waste ba showcases circular energy practices, modern, eco-friendly urban living.

Food and organic waste hub

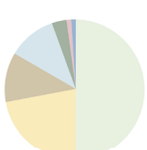
The Consumer Goods Hub is a center for innovation in circular consumption, dedicated to the continuous use of consumer goods. This hub provides workshop facilities and services for repairing and refurbishing items such as electronics, furniture, clothing, and tools, extending their lifecycle and reducing the overall consumption of new products. Establishing a culture and infrastructure of access over ownership, the hub offers a library of things, where consumer goods and tools can be borrowed. In addition the hub includes drop-off containers and a large second-hand store. The hub's courtyards are envisioned as vibrant public spaces for events promoting circularity, such as monthly flea markets. This hub is envisioned to be realized through an architectural competition, in order to design a landmark building, aiming to create a standout structure that embodies the principles of circularity, and contributes to the unique identity of Haven-Stad.

ACHIEVEMENTS' ASSESS

Building heights

- 12m
- 15m
- 18m
- 30m
- 42m
- 45m
- 60m
- 72m
- 81m
- 90m
- 102m
- 120m

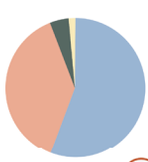
Food and organic waste hub



- Workshops 1394.23 m²
- Gastronomy 437.56 m²
- Indoor storage 9.174.06 m²
- Waste management 4.614m²
- Landscape park 4643.11 m²
- Green open space 20653.2 m²

Average production: 4.375 kg/m² in mixed vegetables cultivation

Average consumption of mixed vegetables per person annually: 75kg



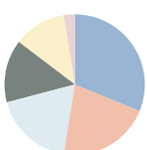
Harvesting area 65.192,64m²

- Community gardens 2890.69 m²
- Vertical farming 36.309,6m²
- Indoor farming 887.99m²
- Floating farms 25.104.36m²

Annual food production in ideal conditions:1.156.716kg

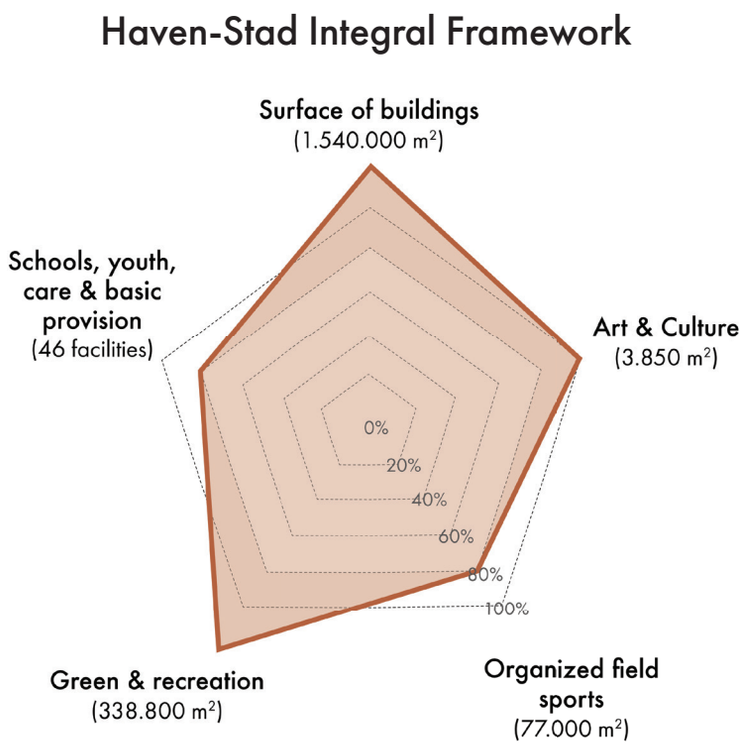
Total of people that can be fed annually by the food hub in ideal conditions: 15,423

Consumer goods hub



- The Library of things (storage) 5154m²
- Repair Workshops 3500 m²
- Second-hand store 3935 m²
- Courtyards for fleamarkets and events 2353 m²
- Offices 2000 m²
- Sorting and Processing 413 m²
- 24/7 Drop-off containers 10 m²

MENT



With the given building heights and density the development proposal is not only achieving, but exceeding the by the Integral Framework desired amount of building surfaces, as well as green and recreational areas. Regarding the capacity of the Food Hub, annual production of fresh food reaches up to 1.156.716 kg, serving more than 15.000 future residents of Coen- & Vlothaven.

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