

TERRITORIALISING CIRCULARITY

ASSET Meet and Learn
August 30, 2024

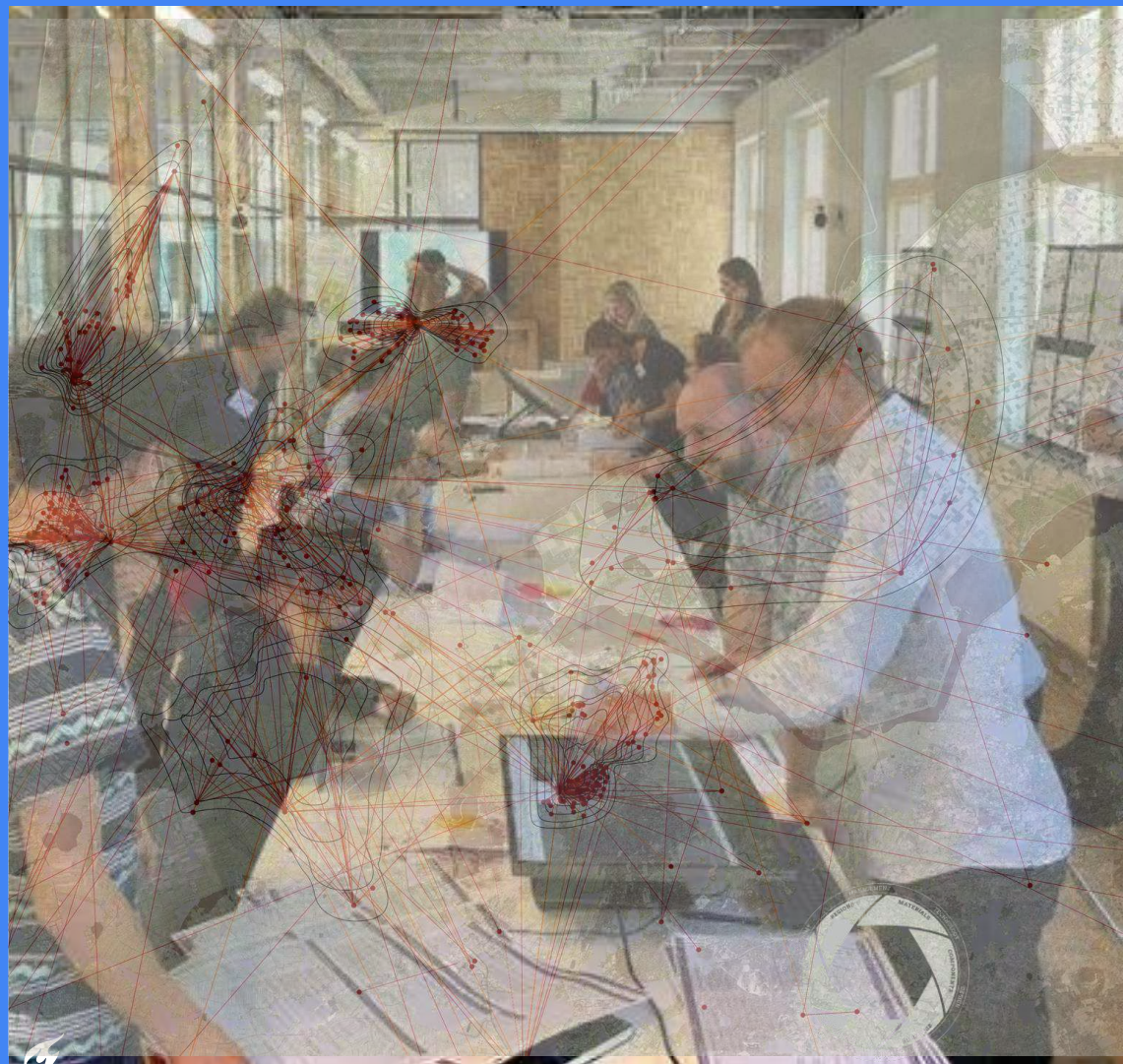
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&

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ASSET Meet and Learn

Circular Built Environment Hub

www.tudelft.nl/CircularBE

Who we are



Research projects portfolio



Biobased, Inclusive & Circular



CARED

Catalyse Remanufacturing through Design Bootcamp



CHARM

Circular Housing Asset Renovation & Management - No More Downcycling



CIK: The Circular Kitchen



CINDERELA

New Circular Economy Business Model for More Sustainable Urban Construction



CIRCLETECH

Twinning partnership to develop a European Sustainable Circular Economy Research Hub

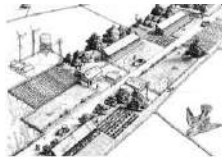


Circu-MAT

Circular city and Industry park Materials metabolism Learning package and assessment tool



**Circular Area Development
Binckhorst - The Hague**



Circular City

Exploring the roles of contemporary Dutch architects regarding the circular economy in the built environment.



Circular Components in the Built Environment



Circular and Prefabricated High Rise



Doughnut Architecture

The Doughnut Economic approach in Architecture



FacadeReLog

Reverse logistics for the recovery of metals in the facade industry



Façade Leasing

A circular business model based on the use of multifunctional façades.

Research projects portfolio



IRTC

International Round Table on Materials Criticality



Intrinsically Circular

A service for integrated disassembly and design of buildings.



Pop-Machina

Understanding the spatial and social consequences of circular collaborative production in urban areas.



Product Development Test Lab

Testing innovations in an innovative building



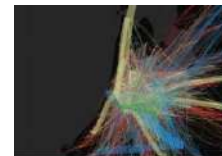
REHAB

Developing circular components for housing renovation



REMANPATH

Building Lifelong Education Through Finding Company Path to Remanufacturing



REPAIR

REsource Management in Peri-urban Areas: Going Beyond Urban Metabolism



SeRaMCo

Secondary Raw Materials for Concrete Precast Products



SusCritMat

Sustainable Management of Critical Raw Materials



Trancibo

Changing inter-organizational collaborative behaviour in circular construction projects



Urban Waste

Urban strategies for Waste Management in Tourist Cities



Showcase 'P-Lab': urban raw materials in a small-scale circular economy

Arjan van Timmeren & Monica Conthe | TU Delft



My façade is your façade!?

Juan Azcarate & Tillmann Klein | TU Delft





Circular building covenant in the making

Ellen van Bueren & Hans Wamelink | TU Delft



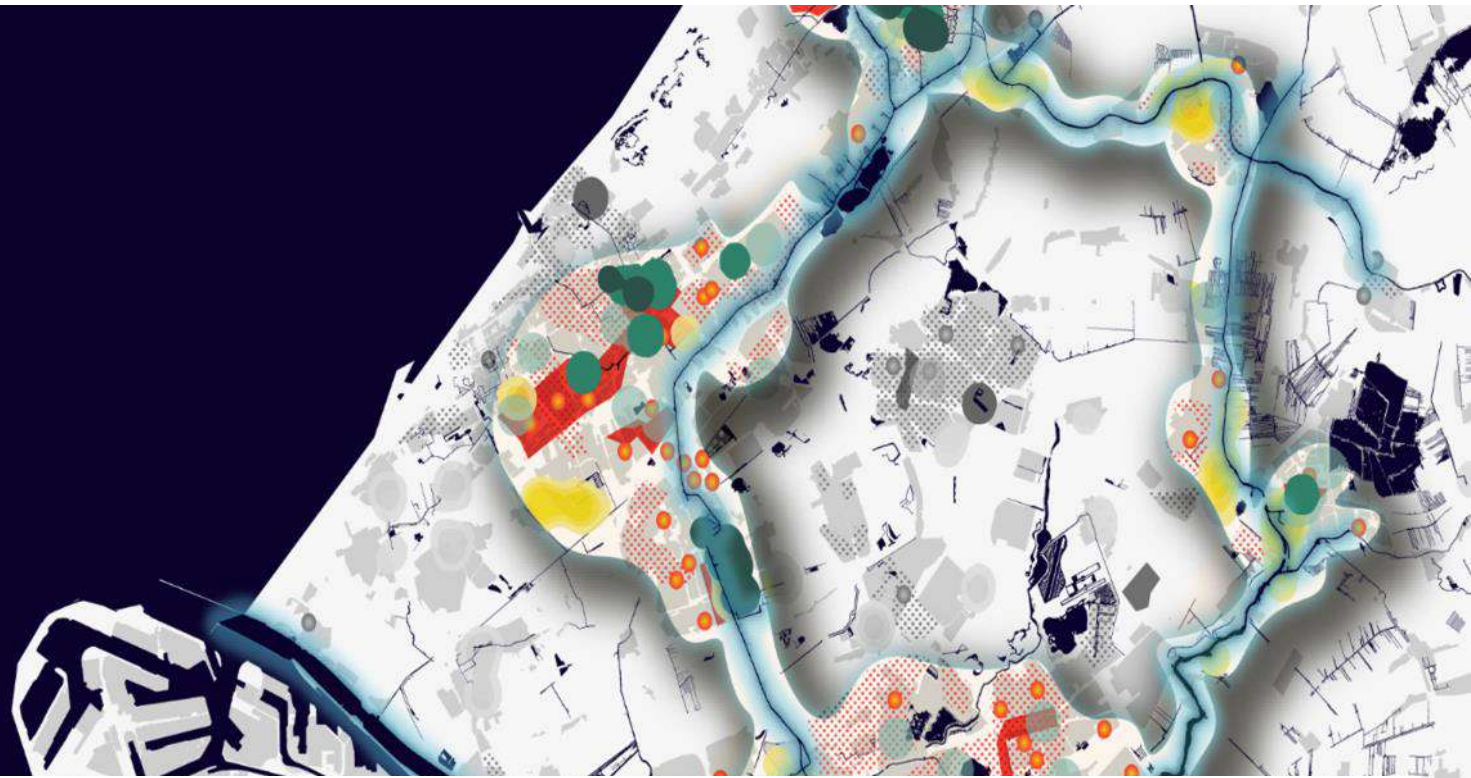
The added value of closing resource flows by communities at the neighbourhood scale

Els Leclercq & Mo Smit | TU Delft



Circular area development: pioneering on a large scale

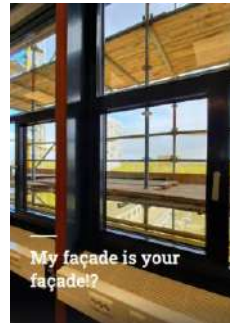
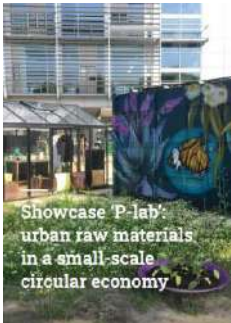
Ellen van Bueren & Karel Van den Berghe | TU Delft



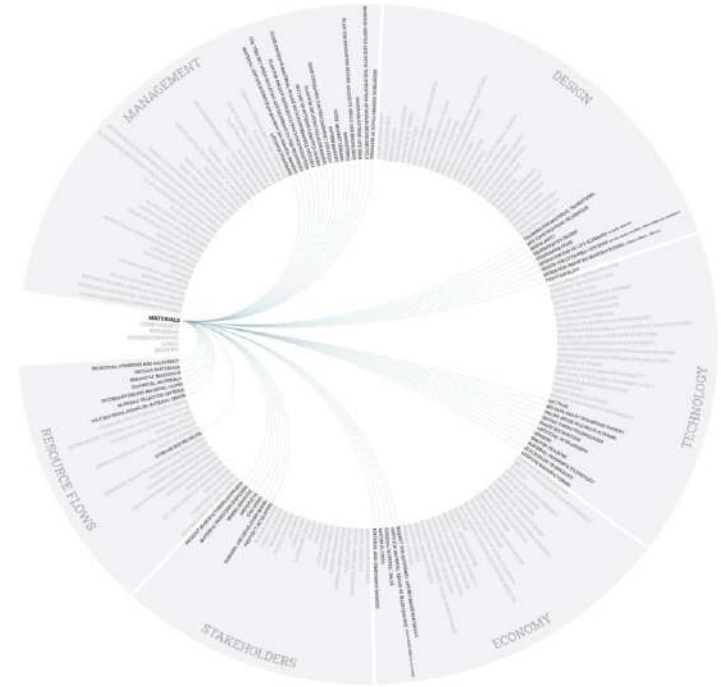
Zooming in on and out of a circular region

Alexander Wandl, Lei Qu & Verena Balz | TU Delft

Stories



Systemizing input to communicable knowledge



Circular Built Environment – A working definition

"The Circular Built Environment (CBE) is a system designed for **narrowing, slowing and closing** resource loops at **different spatial-temporal levels** by **transitioning** cultural, environmental, economic & social **values** towards a sustainable way of living (thus enabling society to live within the planetary boundaries)".



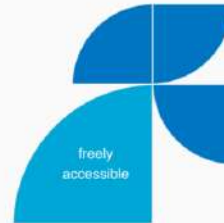
Circularity for Educators – (open for everybody)



Feed Blocks Authors About

Circularity for Educators.

Browse through our resources and explore the topics. Use everything freely in your courses.



Featured Items

Ready to dive in to our resources? Take a look at these three first to get a better idea about how this content has been structured.

PEDAGOGY

The Circular Learning Objectives (CLO) List

VIDEO

CIRCULARITY

The Circular Built Environment (CBE) Hub

VIDEO

CIRCULARITY

The Circular Impulse Initiative

VIDEO

Blocks

All the blocks are informed with content that matches the blocks of the circular learning objectives. For first what resources you think are the most interesting for you or the ones you or your students can already benefit from. All content is grouped thematically in blocks, but is neither sequential nor linear.

02/04/2024



Circularity for Educators

Check this section to find out how we built this content.

03/04/2024



Contextualizing Circularity in the Architectural Discourse

Check this section on the relation of circularity to systemic theory and complexity theory but also to sustainability and the water-food-energy nexus. Trace the origins of green architecture and the historical boundaries of circularity.

03/04/2024



Circular Definitions

Check this section on circular definitions to get better acquainted with terms that have a proven value of representing circularity in the built environment. Learn about the different materials and the design choices at hand.

03/04/2024



Circularity in Architecture and the Built Sciences

Check this section features to connect to the Circular Design Asks and practitioners' interviews. Learn about the implications of applying circular principles to design.

03/04/2024



An Interdisciplinary Approach to Circularity

Check this section to learn about cross-disciplinary findings of circularity. All resources in this unit around the complex encounters between science and aspects.

03/04/2024



New Horizons

Check this section to get familiar with the A+DE Faculty ongoing doctoral research on circularity.

Educators for Circularity

TU Delft Sign in

Educators for Circularity.

Share insights. Ask questions. Create impact.

Connect with colleagues and experts, share knowledge, insights and best practice, learn from experiences and inspire innovation and new ways of working. Visit [Circularity for Educators](#).

ALL PEOPLE DISCUSSIONS PEDIAGOGY EVENTS RESOURCES

Summer School on Circularity in the Built Environment

5-7 July 2022

The Circular Built Environment Hub of the Faculty of Architecture and the Built Environment will host the second Summer School on Circularity in the Built Environment from 5 to 7 July 2022. This year, the topic will be: From "circuits of capital" to "circuits of value": addressing the barriers of circularity implementation.

Architectural Education in Times of Uncertainty Symposium

2-4 November 2022

The symposium aims to engage a number of colleagues in a discussion about our current pedagogical approaches for circularity, but also about ways we can go ahead for teaching in times of uncertainty.

Launch Event: Circular Impulse Initiative

16 September 2022

Celebration for the official launch of the Circular Impulse Initiative Actions. The event will take place Friday, September 16 at the Faculty of Architecture and the Built Environment of TU Delft.

Teaching in Times of Uncertainty

How do you think uncertainty and complexity affect pedagogy? What is your learning approach?

Olga Ioannou

Do you have an idea for a discussion?

CONTACT US

Closed and Open Systems

To understand the importance of non-linearity when approaching issues of circularity, one needs to consider the crucial differences between closed and open systems.

Stavros Kousoulas

Andrej Radman

Non-Linear Thinking

The distinction between linear and non-linear systems is fundamental. It constitutes what is arguably the single most important conceptual development in contemporary sciences with a significant impact on the concept of circularity.

Blended Learning

Blended learning is as much about improving teaching experience as it is about enhancing learning experience. Do you use blended-learning for educating your students?

Atefeh Aghaee

Karel Van den Berghe

Creating a repository of circular examples across scales

Circular Design Atlas




Bouwkunde > Circular Design Atlas

Circular Design

The Circular Design Atlas is an online open source repository of circular design examples across the material, component, building, neighbourhood, city and regional scales.

- Scales**
 - Materials
 - Components
 - Buildings
 - Neighbourhoods
 - Cities
 - Regions
- Resources**
 - Biological
 - Technical
 - Reclaimed
 - Critical
 - Land use
 - Water
 - Energy
 - Nutrient
- Aspects**
 - Resource Flows
 - Management/Government
 - Economy
 - Stakeholders
- Design Approaches**
 - Regenerative Design
- R Strategies**
 - Refuse
 - Remanufacture

Prato Circular City



Design & Development: City of Prato
Year: 2018
Location: Prato, Italy
More info: pratocircularcity.it

[Download PDF](#)


The city of Prato (around 200.000 inhabitants) is famous worldwide for its textile district, representing about 3% of European textile production. Prato Circular City is an ongoing project, started in 2018 and promoted by the Municipality of Prato, to enhance the city's transition towards a circular economy. Historically, the town was strongly characterized by a homogeneous production district, a fertile ground for this transition. Textile recycling techniques led to Prato being considered one of Italy's most progressive and innovative industrial cities. Therefore, today, the city aims to be at the forefront of the circular transition of the built and industrial environment. However, rather than shaping this as a top-down and linear initiative, Prato has developed an integrated and holistic approach, considering the circular economy a horizontal priority within its long-term urban agenda. With this project, the city aims to achieve three main objectives:

- Strengthen the image of Prato as a "circular city" and promote shared, integrated and participatory actions towards the understanding of the circular economy,
- Establish a permanent table with the stakeholders of the territory to promote shared circular economy actions and build a governance model of the circular city.
- Create circular city governance.


Credits | Image "Prato, palazzo pretorio, terrazza superiore, vedute 04 san domenico 1" by Saiko is licensed under [CC BY 4.0](https://creativecommons.org/licenses/by/4.0/).



Buiksloterham
Amsterdam, The Netherlands



De Ceuvél
Amsterdam, The Netherlands



Frac Dunkerque
Dunkerque, France

Lifelong learning

Massive Open Online Courses (MOOC's)



Circular Economy for a Sustainable Built Environment

Massive Open Online Course



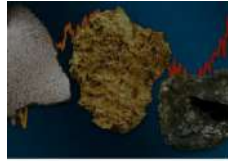
Engineering Design for a Circular Economy

Massive Open Online Course



Circular Economy: An Introduction

Massive Open Online Course



Critical Raw Materials: Managing Resources for a Sustainable Future

Massive Open Online Course

Online courses for professionals



Circular Building Products for a Sustainable Built Environment

Professional Education Course



Spatial Circularity Strategies for Sustainable Regional Development

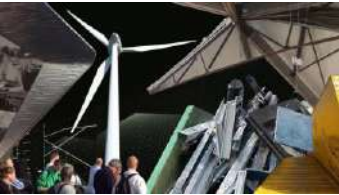
Professional Education Course



Spatial Circularity Strategies

Short online courses on spatial circularity strategies

Summer School 2023



Summer School 2022



Special training programmes



Expert Workshop on Reverse Logistics for Circular Building Products



REMANPATH

Building Lifelong Education Through Finding Company Path to Remanufacturing



FacadeReLog

Reverse logistics for the recovery of metals in the facade industry



Circularity in the Built Environment Graduation Award Ceremony

Circular Built Environment Hub

13 October 2022

TU Delft





Making the Circular Built Environment a Reality: A Call for Collaboration

Facilitating an inclusive and open dialogue for envisioning shared circular futures and co-creating values



Making the Circular Built Environment a Reality

Dissolving borders in the transition towards a circular built environment – Antwerp, December 2023



Making the Circular Built Environment a Reality

The often-overlooked role of space in the circular economy transition



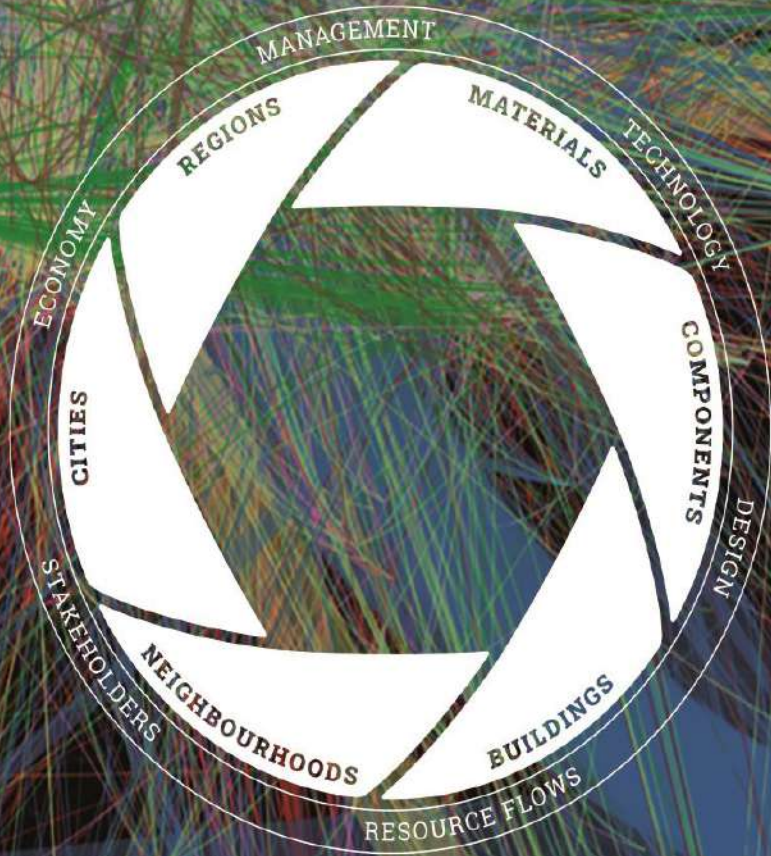
Making the Circular Built Environment a Reality

People matter: exploring the social relevance of circularity



Public debate: The Transition to a Circular Society in the Eurodelta

9 July 2024 19.00 - 21.30 | TU Delft Faculty of Architecture and the Built Environment - Berlage Rooms



www.tudelft.nl/CircularBE

Circular Built Environment Hub

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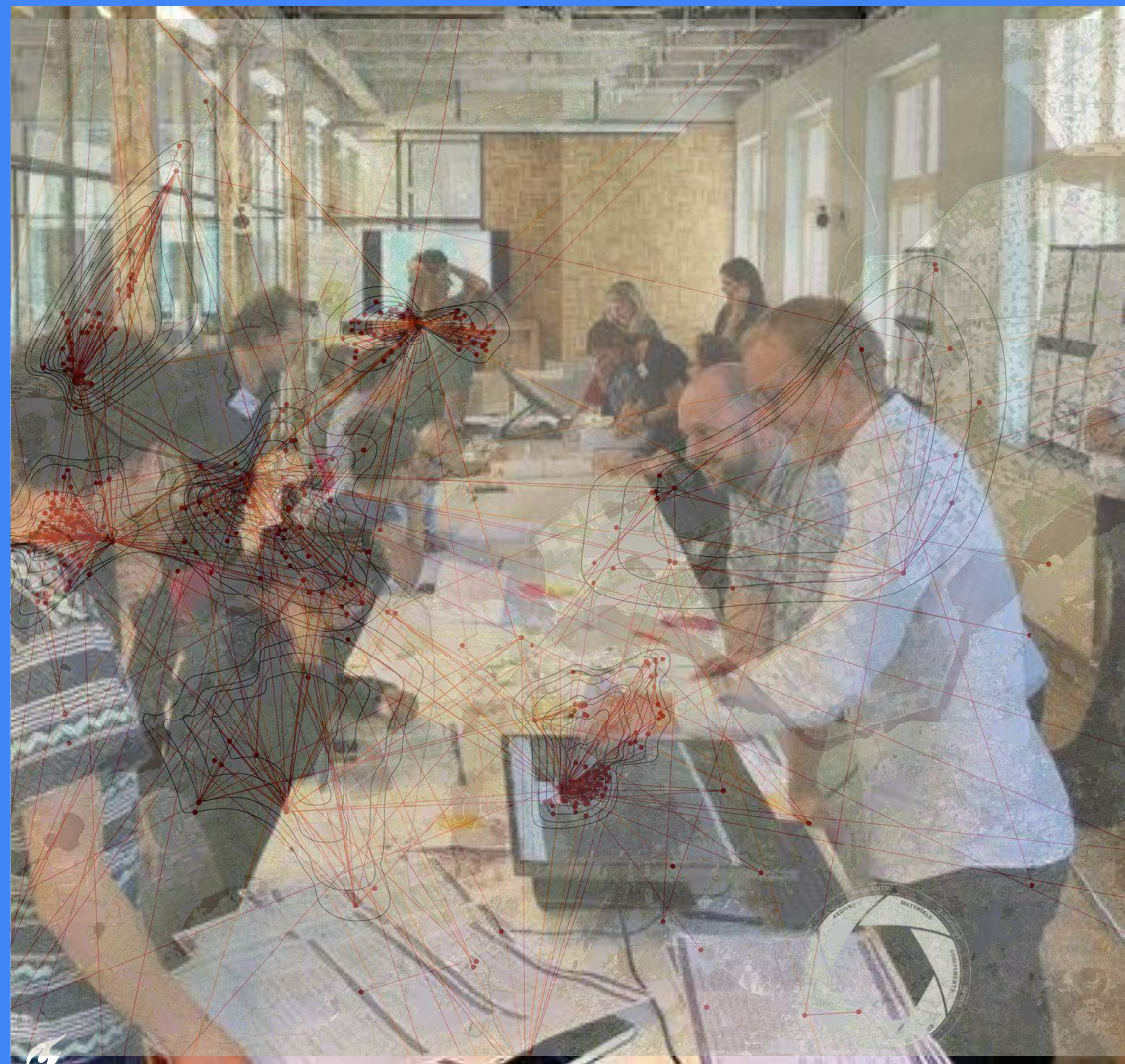
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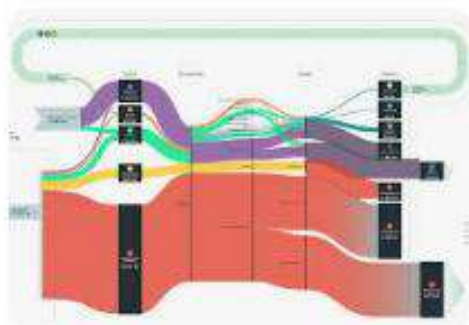




Metabolic circular cities



ResearchGate Comprehensive material flow...



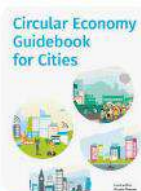
LinkedIn Measuring the Circularity of Cities



Metabolic Applying Material Flow Analysis...



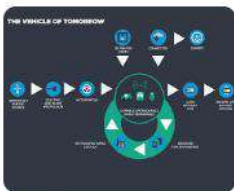
ICLEI Circulars Actions Framework - C...



European Circular ... Circular Economy ...



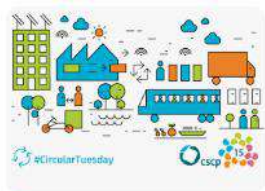
App Recycling Circular cities: Explore How Urban ...



Ellen MacArthur Foundation Cities and the circular economy



MDPI Circular Cities ...



Collaborating Centre on Sustainable C... Circular Economy at a City Level - ...



OECD (Library) The Circular Economy in Cities and ...



OECD iLibrary The Circular Economy i...



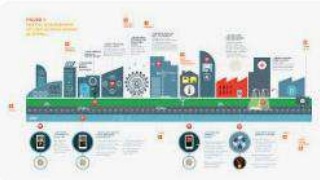
Circular City Funding Guide Circular cities » Circular City Funding ...



Circular Cities and Regions Initiative - European U... Circular Cities and Regions Initiative



Frontiers Smart Cities, Circular Econo...



Tall Architects Cities in the circular economy. — Tall ...



URBACT Cities paving the way for a circular ...



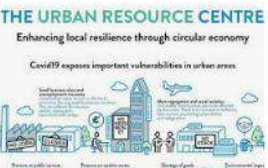
European Commission - European Union Circular Economy Partnership ...



European Investment Bank



ResearchGate



The Smart City Journal



LinkedIn



Circle Economy



URBACT



Europe of Cities

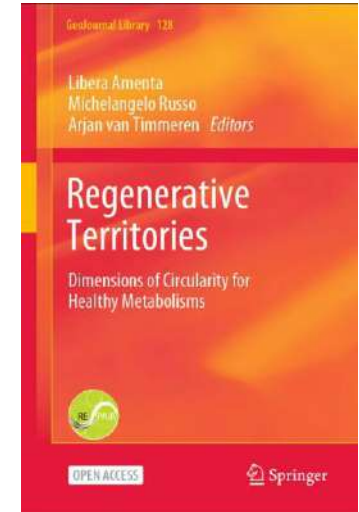
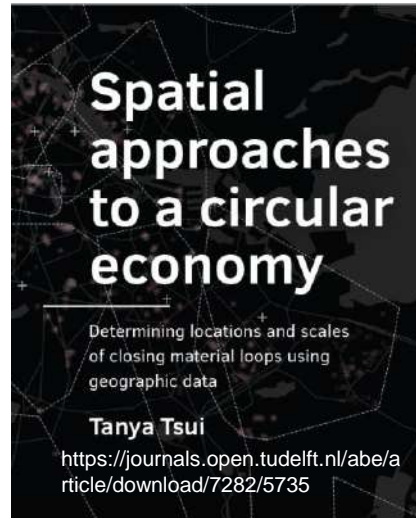
TERRITORIALISING CIRCULARITY with contribution by...

Chapter 2 Territorialising Circularity

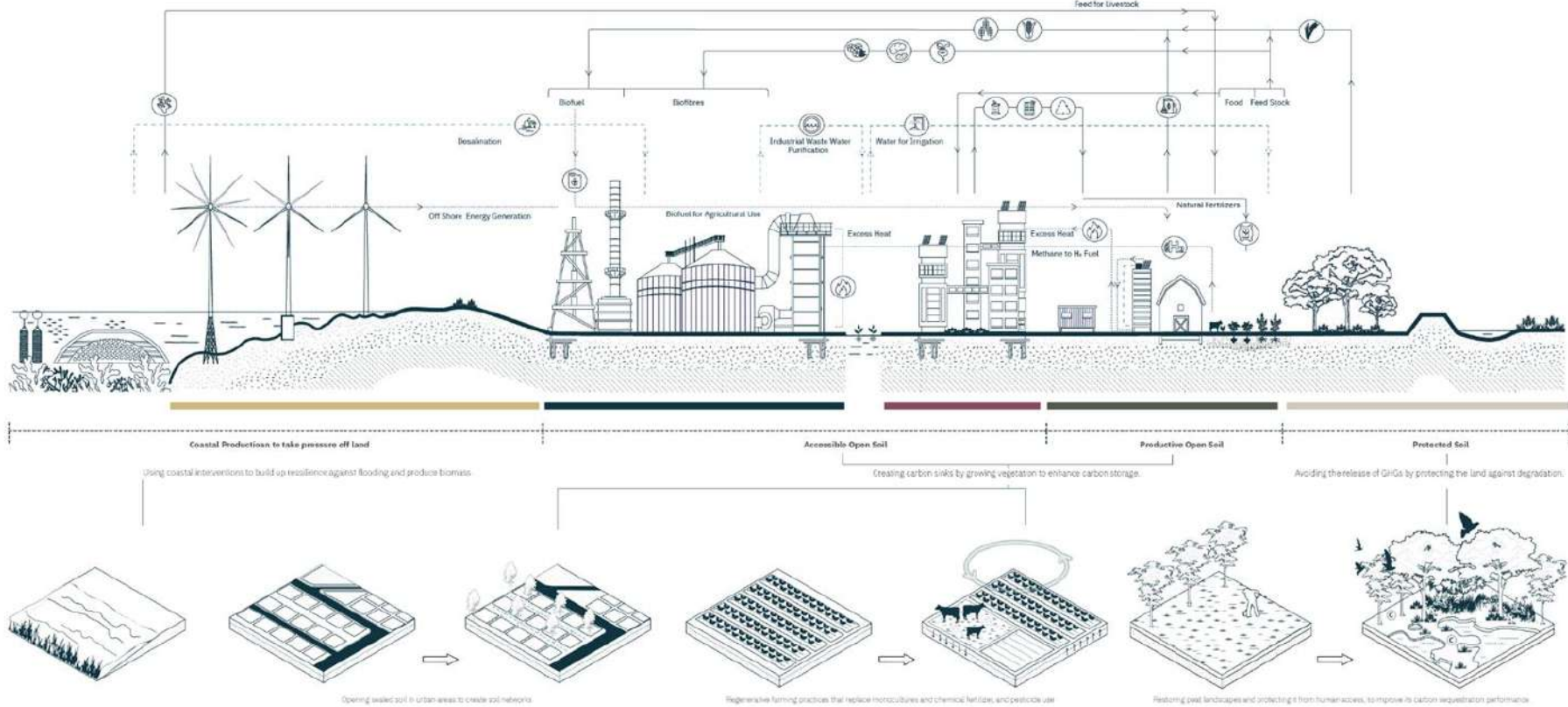


Cecilia Furlan , Alexander Wandl , Chiara Cavalleri ,
and Pablo Muñoz Unceta 

Nowadays, the circularity concept dominates the debate on resource management in cities and territories. The idea is often used as a vehicle towards a more sustainable socio-ecological transition, based on the circular economy (CE) framework. Unlike other sustainability frameworks, CE originates in ecological and environmental economics and industrial ecology. It focuses on developing an alternative economic and technological model for production and consumption, avoiding natural resource depletion and redesigning processes and cycles of materials (closed-loops). However, when CE is translated to cities and territories, its environmental, economic and design agency is often neglected. On the one hand, it demands to acknowledge the need for a relational understanding of space, place and actors involved and, on the other, to explore the spatial specificity of CE. Therefore, there is a need for a broader theoretical discourse on the CE's territoriality as the predominant. Research on circular urban and territorial development demands more than merely upscaling industrial ecosystems diagrams and generating circular businesses. Consequently, what is the role of territory in the CE conceptualisation in the urbanism literature?



... and the many brilliant students who joined our regional and geo-design courses on circularity.



How to consider the territory subject and not only as support.

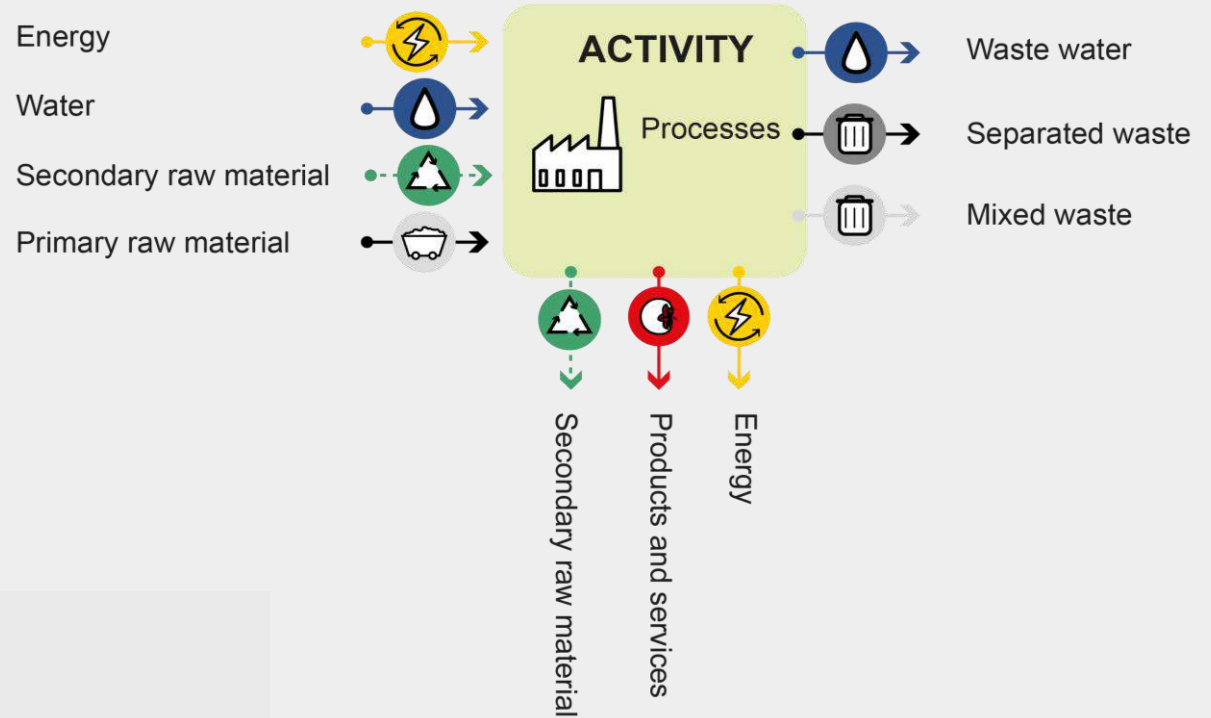
How can contemporary urban planning and design consider the built environment's metabolism and promote a transition to a more circular way of living?

Which flow?

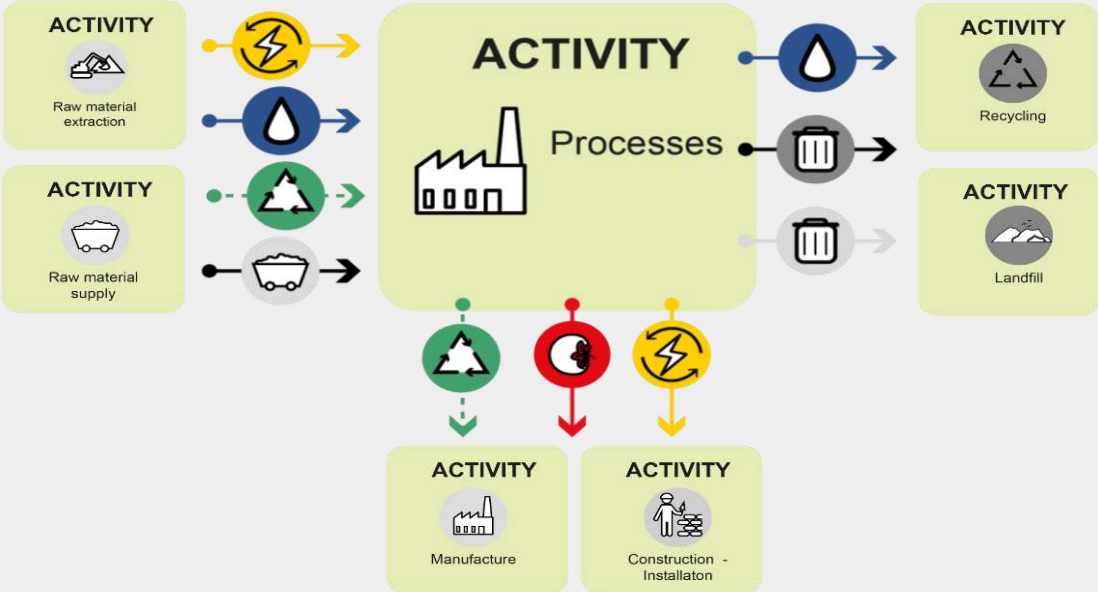
What are the activities involved?

What are the relationships?

1) Identify Activities-Inputs-Outputs-Stocks

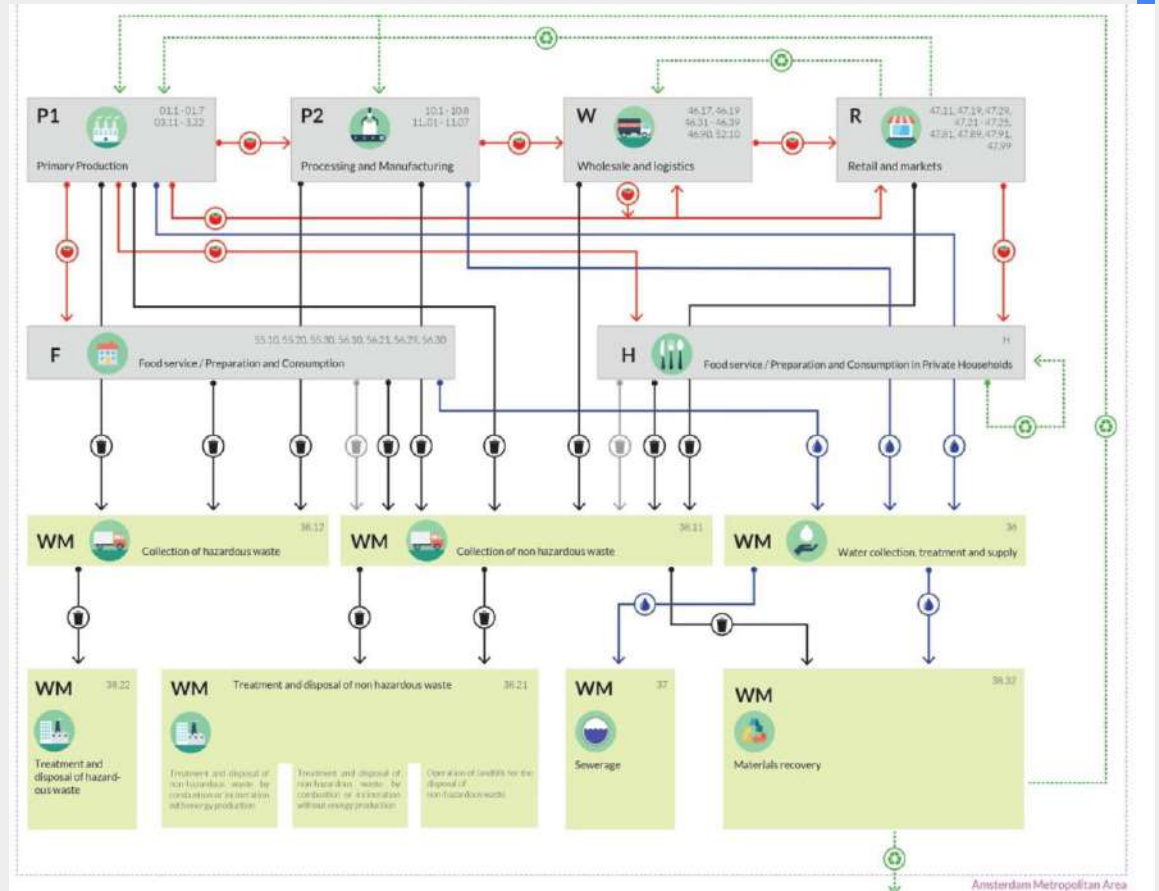


Flow Relations



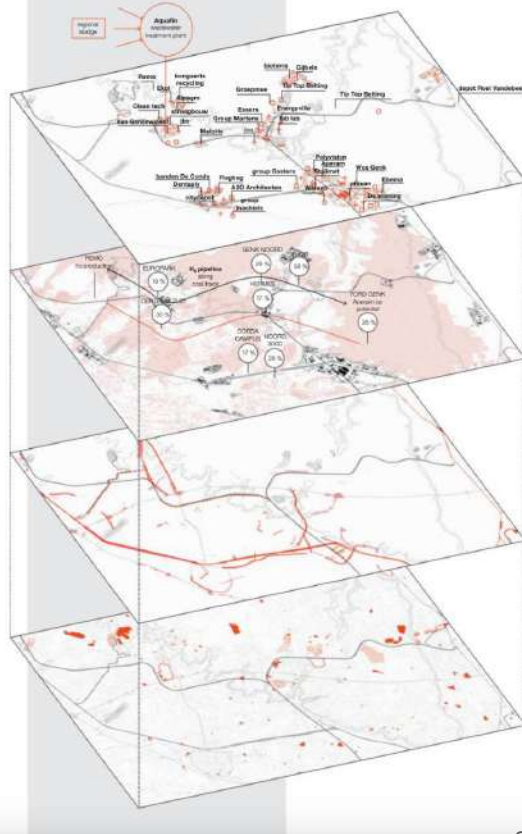
Source: Adapted from Geldermans, B., et al. (2017).

3) Systemic Diagram of Activities



Systemic Diagram of Activities in relation to space

WASTE AS RESOURCE



What is the potential of recycling Central Limburg's landscapes and integrating its infrastructures as part of the transition to the circular economy?

Current waste practices

- Recycling
- Reusing
- Composting

Closing circles

- High density of business
- Low density of business

Residual Infrastructural spaces

- Abandoned infrastructure
- Under used infrastructures
- Unused infrastructures

Microtopographies

- Tanks
- Polders
- Lacks
- Residual

The closing of Ford Cars in 2014 suddenly impacted the region's economic dynamics, causing the loss of thousands of jobs. Supported by the government's SALIR program, Central Limburg aims to develop into a pioneering region for a circular economy: waste as a resource. Central Limburg focuses numerous companies for recycling, reusing and composting. But how can this transition be rooted in its spaces, its local landscape and culture?



Existing potential
This area has the potential existing companies that could be supported by a regional or local authority that in which could focus on other companies.



Next economy
Central Limburg has the potential to become a circular economy. The region's economy will be based on recycling, reusing and composting.



At the start of the transition to a circular economy, several initiatives are already taking place in the space. Here, one of the three remaining active facilities in France is processing in France's Central Limburg. Several research and development institutes and incubators support innovation and unexpected local 'wastes' such as biomass from landscape waste are being identified as important resource streams in Central Limburg's transition to the circular economy.



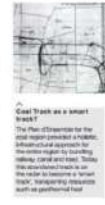
Enhanced benefit mining
Closing the circle is a process. In Central Limburg, waste will be re-used and converted into valuable products. This means that the waste is not just a waste, but a resource.



Classmate campus
Openness is an essential part of the transition. The region's economy will be based on recycling, reusing and composting.



During the past centuries, large infrastructures such as roads, rail and canals, were constructed to connect the land and its resources. As the coal mining activities and later industry declined in the region, these infrastructures are today left abandoned, overgrown or even abandoned. What is their potential to be re-utilized and recycled in Central Limburg's next economy?



Reusing infrastructure
Infrastructure is not just a structure, it is a resource. The region's economy will be based on recycling, reusing and composting.



Fast track as a smart track
The fast track is the most important infrastructure in the region. It is a resource that can be re-used and converted into valuable products.



Fast (and) present being infrastructures have created a landscape of micro topographies. In the past, microtopographies would fill these pits with water. Today, Central Limburg has a series of landfills under greenfields, or tanks. How can these micro topographies be recycled in the next economy?



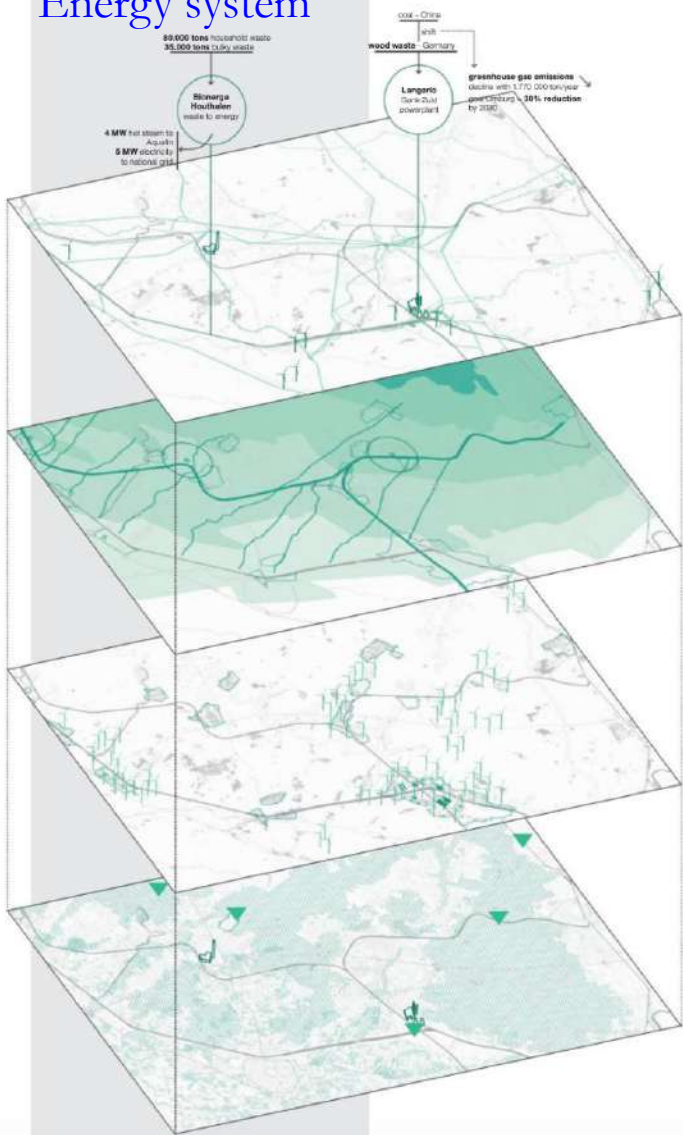
Artificial microtopographies
In the past, microtopographies were created to fill the pits with water. Today, Central Limburg has a series of landfills under greenfields, or tanks. How can these micro topographies be recycled in the next economy?



The Water benefit
The water benefit is a resource that can be re-used and converted into valuable products.



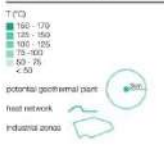
Energy system



Current situation: Energy dependency



Potential heat exchange



Renewable energy sources



Biomass potential



Around 52% of Belgium's energy production is covered by nuclear power. Belgium imports a huge quantity of raw materials for energy production, making its economy dependent from the world market. Mainly nuclear power and coal provide Belgium's energy supply. Energy pipelines carry electricity through the country; they connect different power centres (nuclear, thermal, hydraulic, solar) to the centralized electricity grid.

Deep geothermia is a technique where warmth is extracted from more than 500 m below earth surface. This renewable energy source can play a major role in the full-Flemish region's energy transition. Because of its strategic location the coal track could become a future heat - highway and function as the main spine for a regional heat network where multiple heat sources can be plugged in.

Local renewable energy production such as wind and solar energy can be further developed in Central Limburg. On a large scale, as Group Machiels is doing with windfarms, but also on the scale of a single building. Expanding the wide range of more local and small-scale energy initiatives that are mostly based on wind and sun, will contribute to the shift towards a more decentralized electricity network.

Several studies have pointed out that Limburg with its abundant forests, agricultural land and national parks is a strategic region for local biomass harvesting of landscape management waste. By maintaining and managing the landscape it's not only possible to improve the cultural landscape and enhance the biodiversity but also to 'harvest energy' and materials from biomass, that is local and sustainable.

Energy consumption

The consumption of energy per sector is 47% transport, 20% industry, 20% residential, 9% power generation, 4% services.

Nuclear dependency

The pie chart shows the different origins of energy in Belgium. Belgium is highly dependent on nuclear energy.

Discoopteren

Technical shortcomings in Flemish 'aged energy infrastructure' and political barriers on the areas of flow of energy production, contribute to energy shortage plans since winter 2014. There is an urgent need for decarbonisation.

Prospective study of energy economy

The study looks at concrete business cases and formulates long-term vision and policy recommendations at various scales and in different policy sectors, such as energy, climate, agriculture, etc.

Energy production in Belgium

Source: M&L, Landings, University of Leuven (2012)

Energy electricity storage plan

Atelier diepe geothermie

WTO (The Flemish Institute for Technological Research) together with architects and urban design office CH2M, look for energy and development scenarios for the coal track to become a regional center of geothermal heat, in 2015.

Coal track as smart track

In 2015, TOP Limburg defined three 'aged' scenarios for the coal track. The coal track as smart track puts forward the potential of the former railway line to become a carrier of resources (energy, water, heat, ...).

Atelier Track Design

Atelier Track Design: Potential heat exchanges between existing companies in Genk-2015 Study Bureau, DTP have to find potential heat exchanges between existing companies in Genk-2015 for VOM Limburg energy infrastructure network (see 2.0.2.10).

Bioserra Aquafin, Heat exchange

Bioserra, a waste incinerator that might close (Genk-2015) Study Bureau, DTP have to find potential heat exchanges between existing companies in Genk-2015 for VOM Limburg energy infrastructure network (see 2.0.2.10).

Private Solar central Machiels

In cooperation with L&M Limburg Investment and several solar energy parks in the region were created to support their own needs.

Optimalisation

A model to optimise strategic and tactical decisions in biomass harvesting and energy production. Source: M&L, Landings, University of Leuven (2012).

Potential wind energy 2030

This map shows the potential areas for wind turbines based on GIS analysis. The analysis takes different aspects in consideration such as: urban areas and habitat guidelines.

Potential solar power 2020

This map shows the potential for solar energy based on biomass and the efficiency of the solar panels.

Wind turbines

Wind turbines are the organization that is responsible for finding new potential locations for wind turbines. The organization is a cooperation between Aspirol and LIM (Limburg Investment company).

The biomass potential

The future potential of woody biomass (material + energy) for the province of Limburg, Belgium and investment strategy for biomass use energy in Limburg, 2014, 2015.

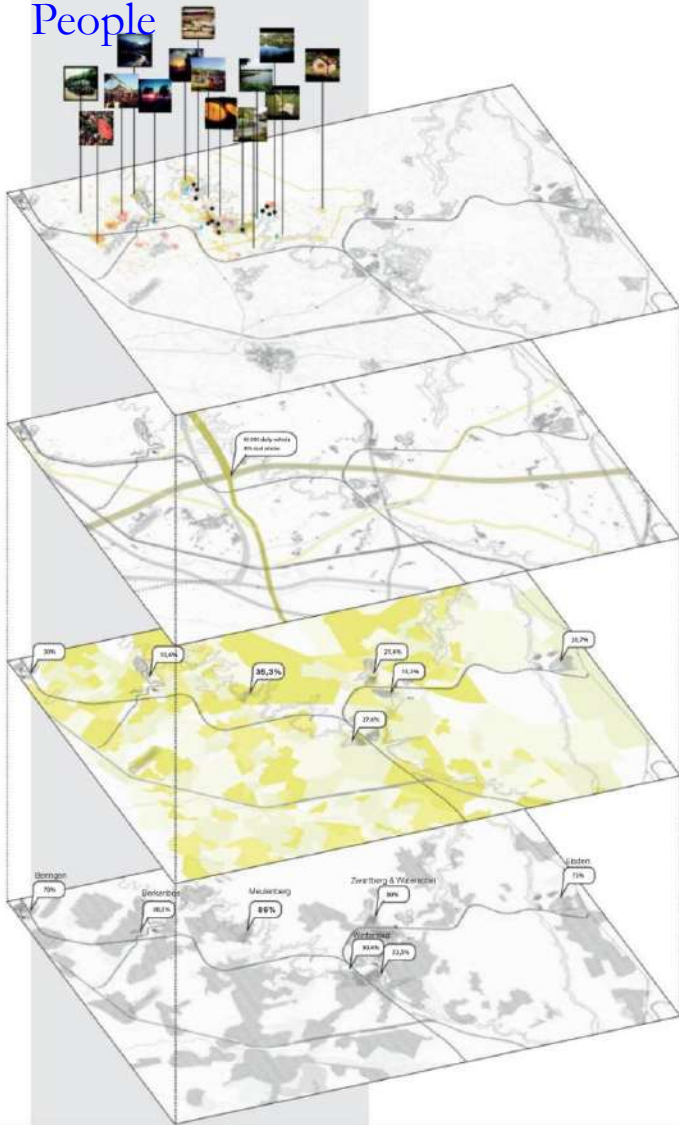
Sustainable use

For a sustainable use of biomass, it should be used in a way that does not affect the production and only at the bottom of the ladder of Lantini & annual for conversion (digestion or fermentation) to energy.

Diplo Tool

Regional Landship Logo Kampen developed an interactive tool, DPLA, for mapping the available biomass from landscape management waste for local energy production in the region, in order to be able to set up local and regional logistic chains for biomass.

People



Social media

Instagram photos
Twitter

Contours of Houthalen-Helchteren

The map gives an indication of the concentration of social media activity. The highest concentration can be seen along the Grote Baan and the social housing neighbourhood of Meulenberg.

An analysis of social media data (Instagram postings and tweets), reveals the area of the coal track in Houthalen as a blind spot on the map. This makes us think that there is little or no incentive to stop along the coal track in Houthalen-Helchteren. Concentrations of activity on social network sites are visible in Meulenberg and along the Grote Baan.



Coal Track
In Houthalen-Helchteren the coal track is still used for transporting wood and gravel. Even though there is a bicycle path between the railway track and a 150m road on the social media map, people do not work along it.

Tweets

What becomes immediately visible when reading the tweets in the vicinity of Houthalen: languages Dutch, French, Greek and mainly Turkish. The high points on the Grote Baan are often the topic of the tweets. Source: wikipedia.nl, 2015



Mobility issues

Today we see that the Grote Baan, that once was the main corridor for the urban development of Houthalen-Helchteren, acts like a barrier between east and west HH. Daily, the Grote Baan collects 40,000 vehicles, both local and regional traffic, travelling in the north-south direction. Due to this large flux of traffic there is a lot of vacancy which isn't stimulating for urban and social dynamics.



Disconnected
From the soon missing municipal Council building, the former railway line Meulenberg in Houthalen is the only one that was physically disconnected and from the existing vehicles. The only connector is the footbridge. Source: Frank Baert, Houthalen-Helchteren



North-south connection
The federal Agency of Traffic and Roads (MIA) has planned a North-South highway to the west of Houthalen-Helchteren. In order to disconnect the Grote Baan in Houthalen-Helchteren from local traffic, but the work has already been on the table for decades without concrete results.

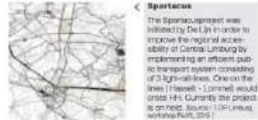
Unemployment



The unemployment is specifically high in Meulenberg, a social housing area, located where the former mining site used to be. The historical identity of the neighbourhood is closely linked with the mining activities. When the mines closed, Meulenberg houses people from many different nationalities and backgrounds. How to inscribe the social potential of Meulenberg in the circular economy?

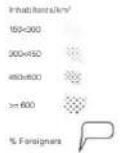


Old trade route
Since the Middle Ages, the Grote Baan has been an important trade connector between Houthalen and the north. Source: H.H. Lammens (July 2014)



Sparterank
The Sparterank project will improve the regional accessibility of Central Limburg by implementing an efficient public transport system consisting of 3 light-rail lines. One on the lines (Houthalen - Lommel) would cross the Grote Baan. The project is on hold. Source: UPR-Limburg, wikipedia.nl, 2015

Density



Meulenberg emerges as a strategic area to include in the transition to the circular economy, by creating local employment and activities related to clean tech.



Village Meulenberg
This research by design, initiated by the Flemish Environment, aims to enhance the existing village setting of Meulenberg as a way to find solutions to local social problems that have been occurring. Source: Streek Meulenberg (April 2014) and website: Over de rivier Meulenberg, 2014



Garden city
Picture of the original garden city (left) and an single house in Meulenberg. Source: wikipedia, 2015



Mining site HH
Source: wikipedia.nl



Dynamic metal workshop
Dynamics is a community, called Metal-workshop, located in a social neighbourhood in Zurich, where young people can learn practical skills and get guidance when they want to start their own business. Source: www.metallwerk.at



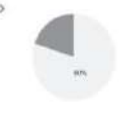
Garden space in Meulenberg
Meulenberg: 7 gardens appear. Source: wikipedia.nl



Conflict
Meulenberg often appears in the media due to fights or conflicts between immigrants and police. Source: www.democratie.nl, De Persgroep Media Meulenberg (March 2014) and www.112.be



RIMO Community Development
This organization works to improve the social cohesion within the community of Meulenberg by organizing neighborhood meetings and providing a platform for legal, social and educational advice. Source: www.rimo.be



Mining site HH
Source: wikipedia.nl

Ok but how do we start?

Where in the region are the flows?

What is the quality and quantity of the materials?

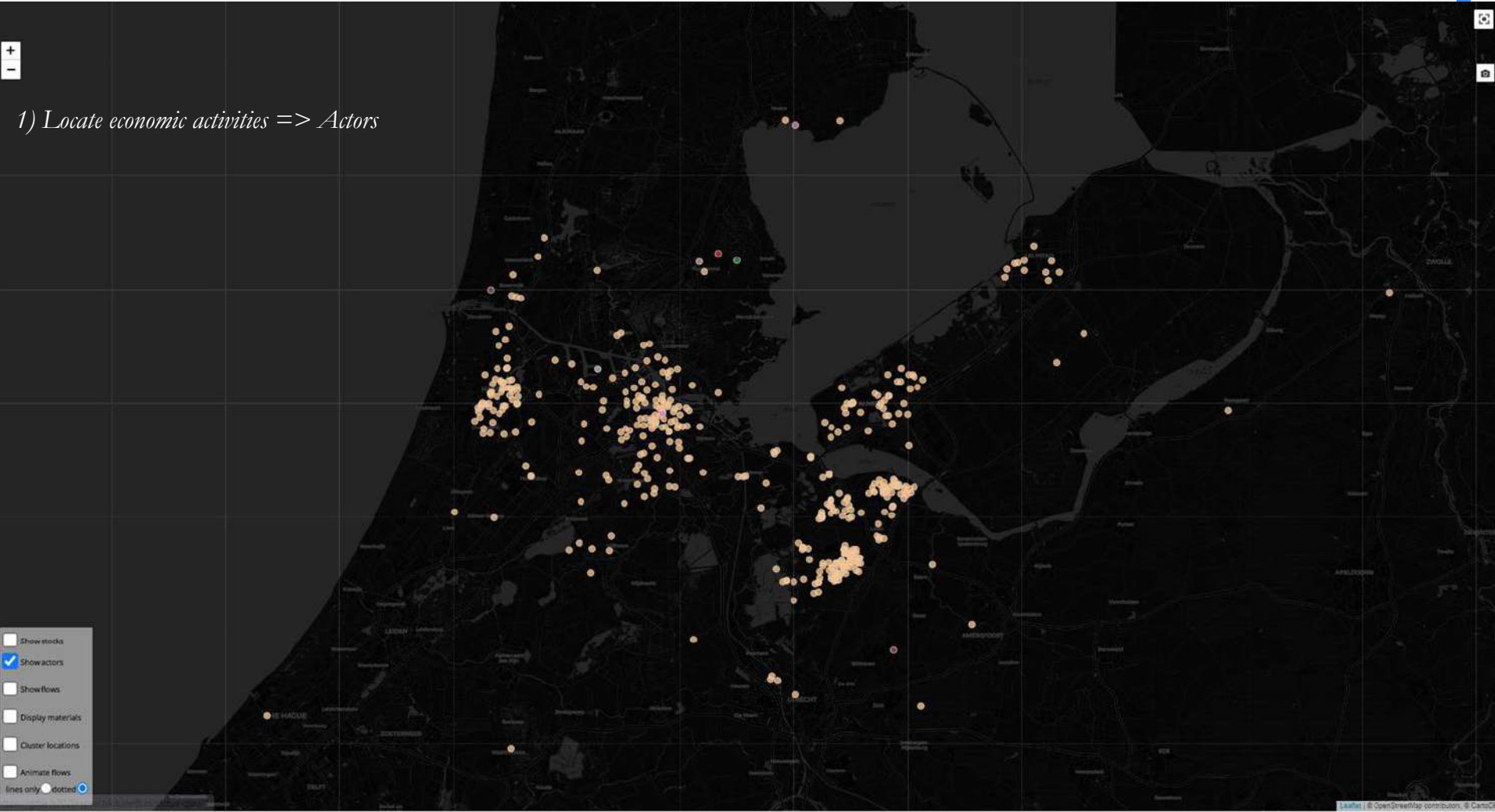
Who are the actors and activities involved, and where are they located?

What are the potentials for synergies?

*The developed method, which links actors and activities on a specific geographical territory. Through this method, coined the “**Activity-based Spatial Material Flow Analysis**” (AS-MFA), specific activities relating to material flows and stocks in specific areas, the involved actors and their interrelations can be identified*

Activity based Spatial Material Flow Analysis Method

1) *Locate economic activities => Actors*



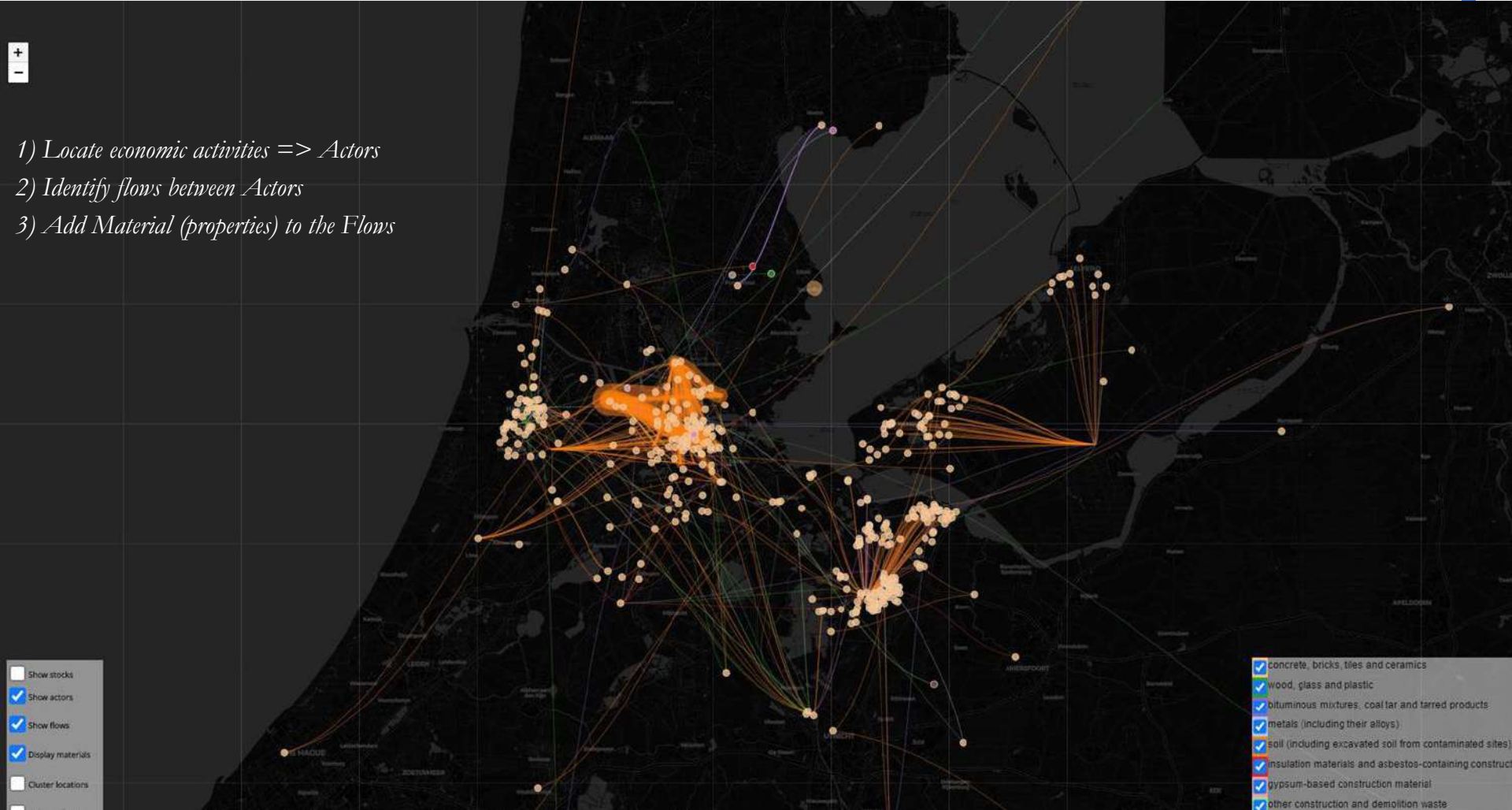
Activity based Spatial Material Flow Analysis Method

- 1) Locate economic activities => Actors
- 2) Identify flows between Actors



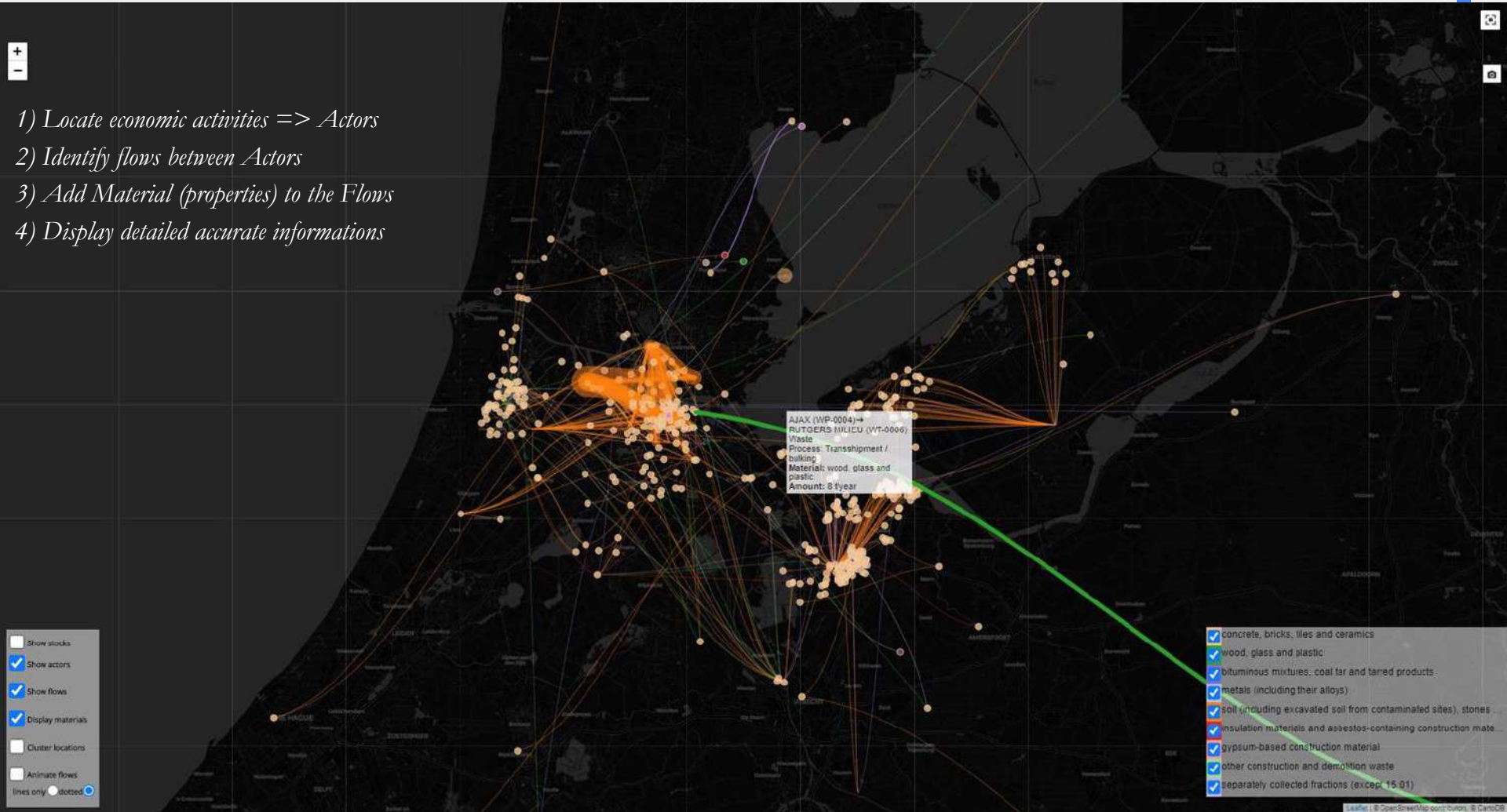
Activity based Spatial Material Flow Analysis Method

- 1) Locate economic activities => Actors
- 2) Identify flows between Actors
- 3) Add Material (properties) to the Flows



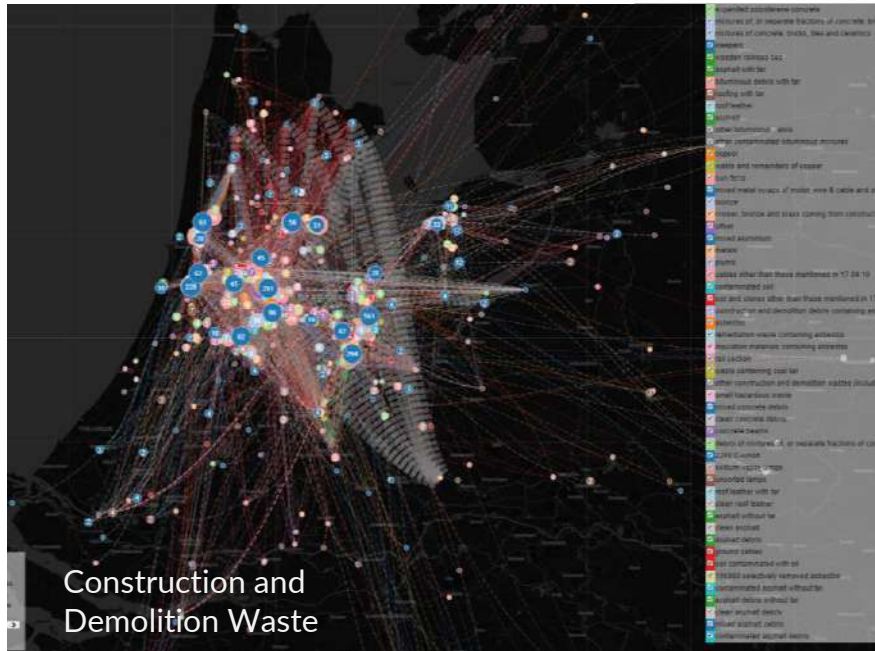
Activity based Spatial Material Flow Analysis Method

- 1) Locate economic activities => Actors
- 2) Identify flows between Actors
- 3) Add Material (properties) to the Flows
- 4) Display detailed accurate informations



Activity-Based-Spatial Material Flow Analysis

The Amsterdam Metropolitan Area (NL)

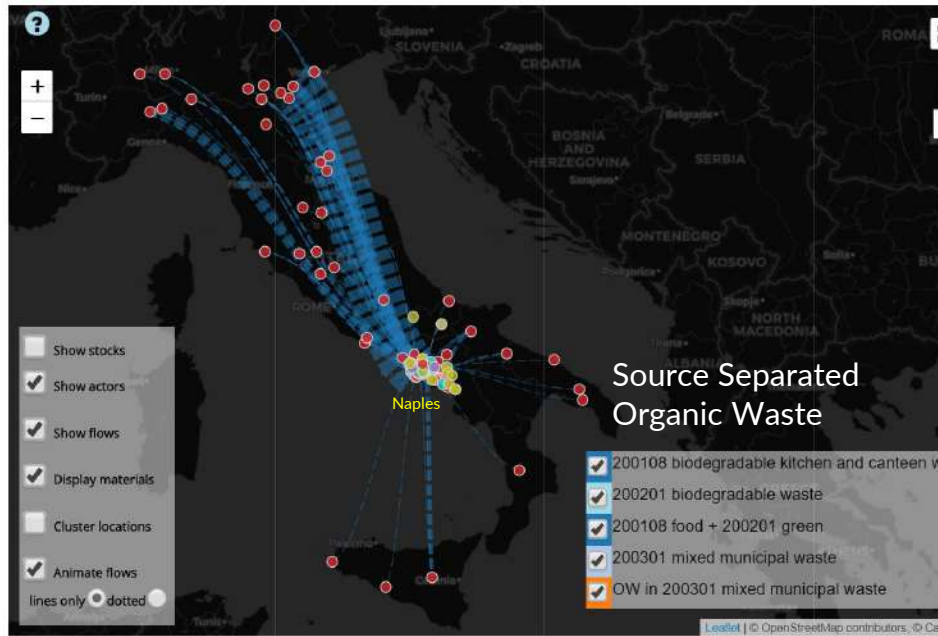


Hamburg: Altona District (Germany)

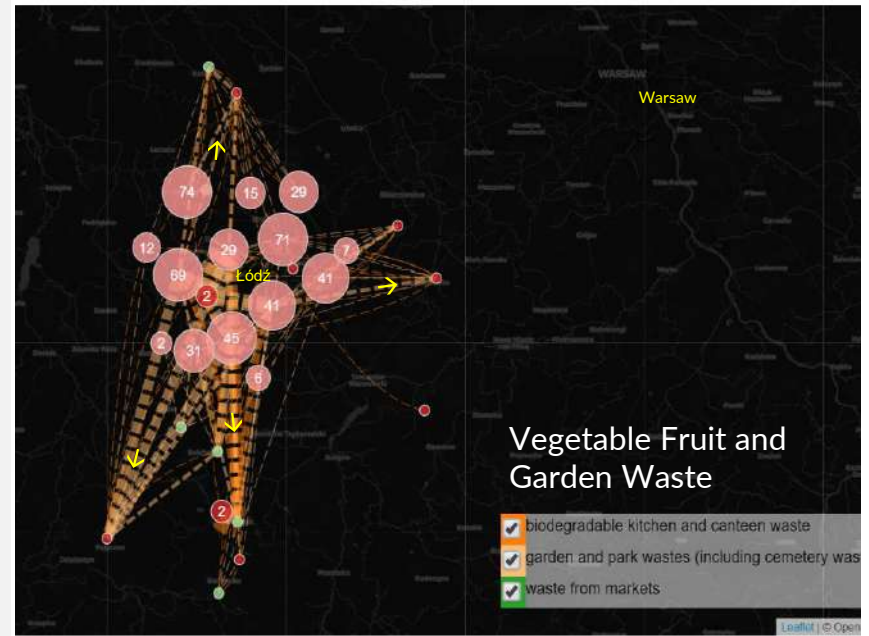


Activity-Based-Spatial Material Flow Analysis

The Metropolitan Area of Naples (Italy)



Łódź Metropolitan Area (Poland)



Activity-Based-Spatial Material Flow Analysis

Ghent and Destelbergen (Belgium)



The Pécs Agglomeration (Hungary)



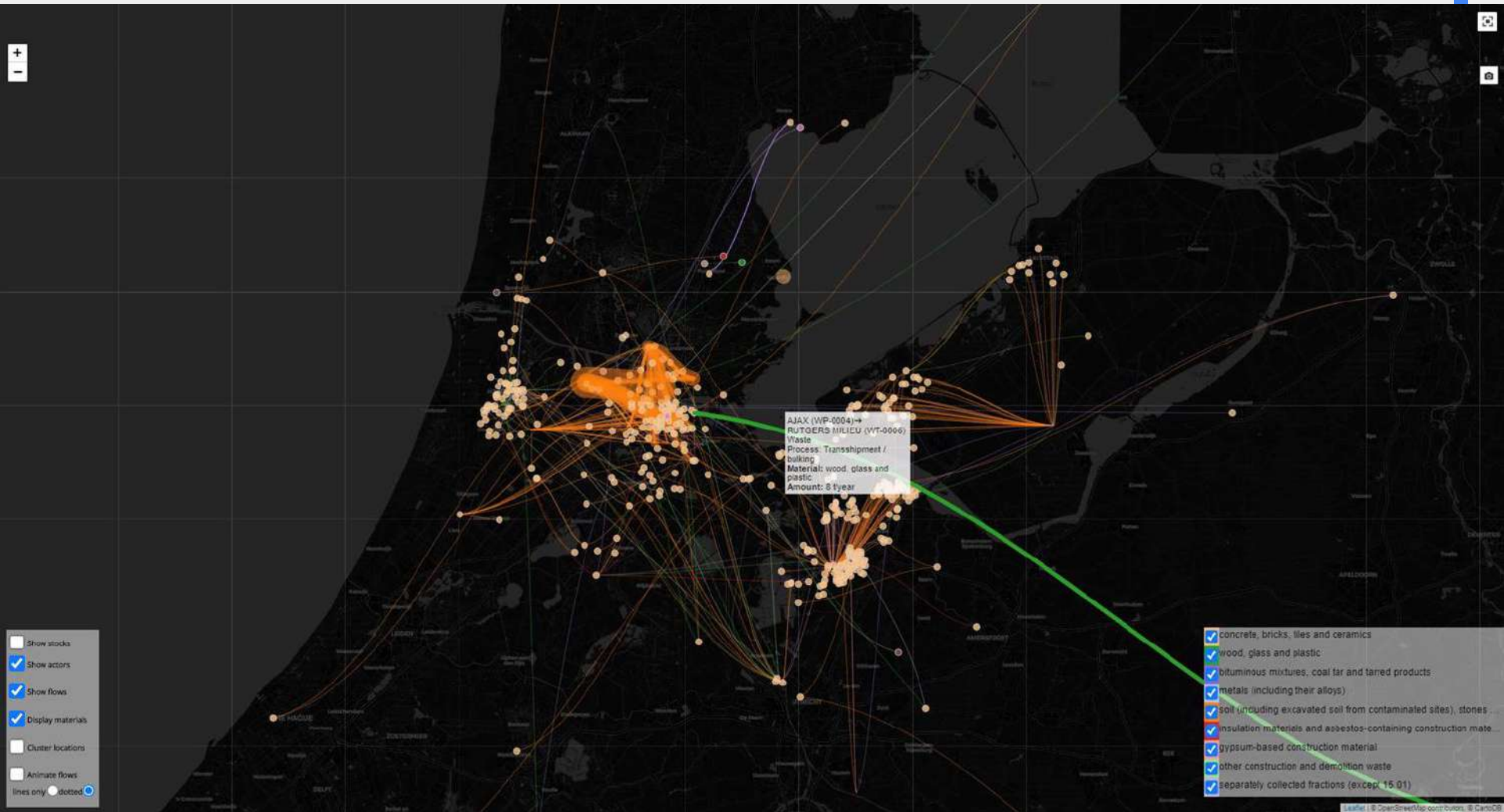
The scale of the Circularity is a matter of values, policies, infrastructure and spatial organisation!

AS-MFA method discloses how to integrate a metabolic approach based on data-driven information in urban territories

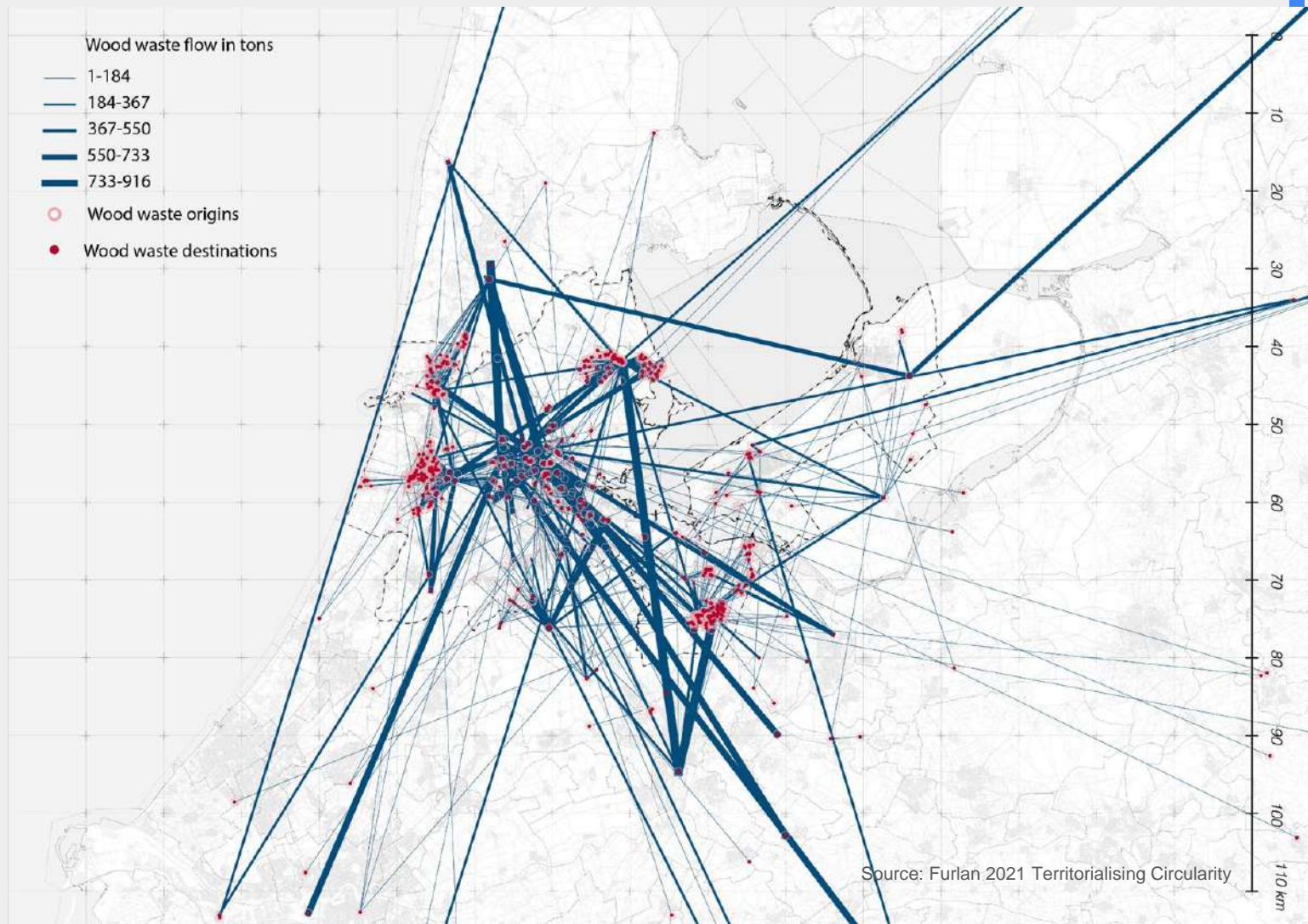
However, a territorial lens calls for a close reading of the urban context, going beyond the more traditional limits imposed by a data-driven analysis.

The territorial lens requires an interpretation, a selection, or a combination of different spatial features.

Mapping the construction and demolition waste movement: the Amsterdam Metropolitan Area

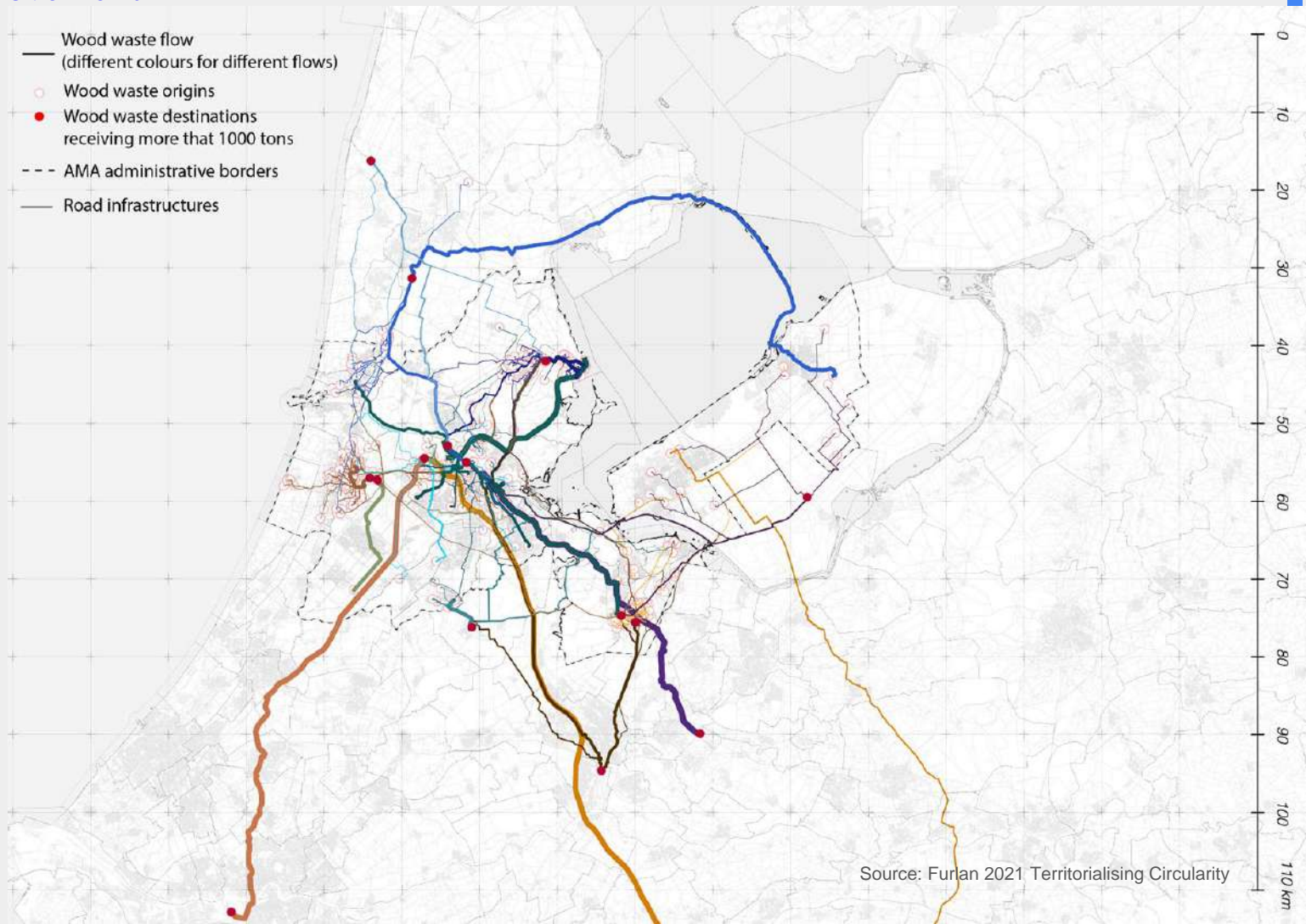


Waste flows movement

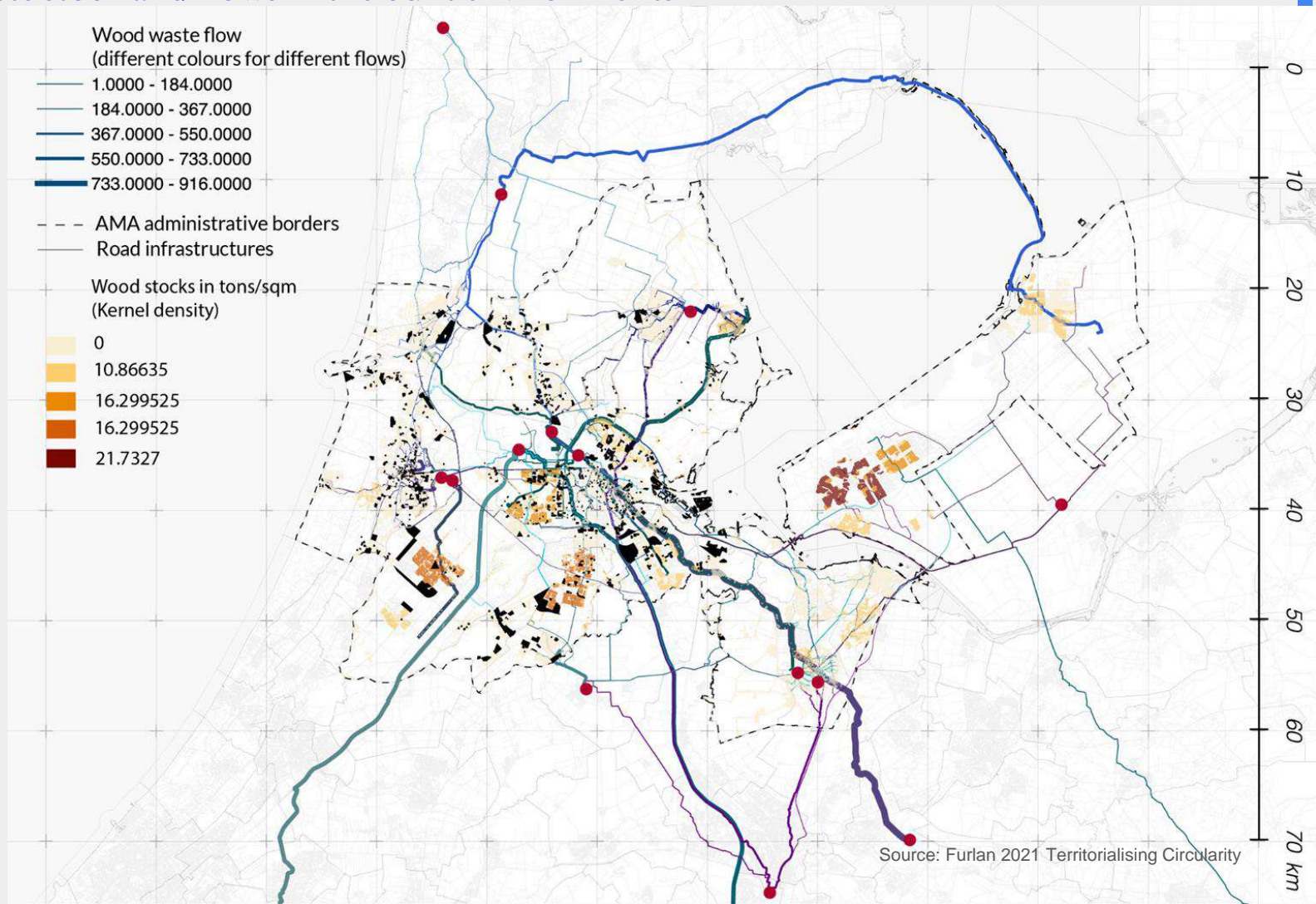


Source: Furlan 2021 Territorialising Circularity

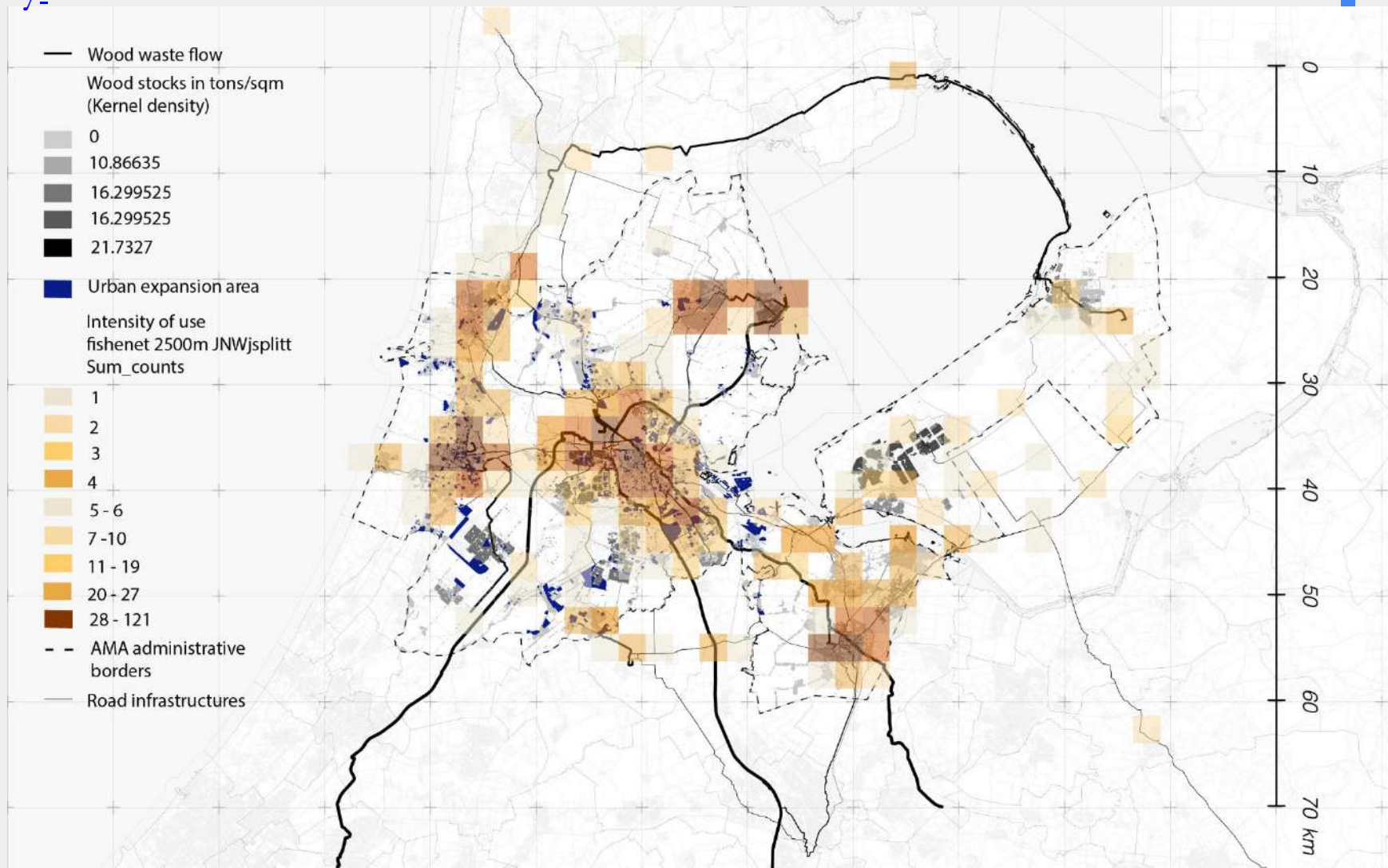
Waste flows movement



Identify_waste stock and flows in the built environments



Identify_resource scheds



Flow movements exceed the city's administrative boundaries.

The visual analysis of flows origin, destination and material stock displays alternative synergies at a different spatial level.

The definition of resource sheds helps to identify the operational scales in which to develop circular strategies.

Location Choices of Material Hubs, based on Material Density and CO2 Emissions

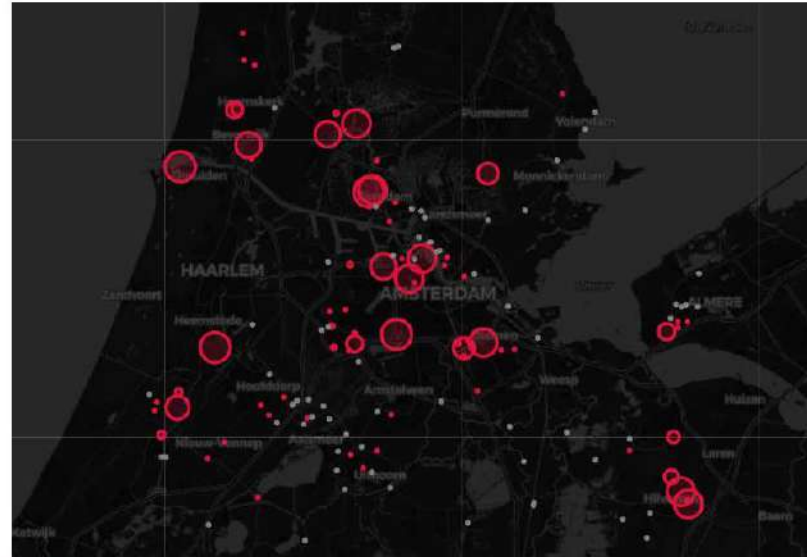
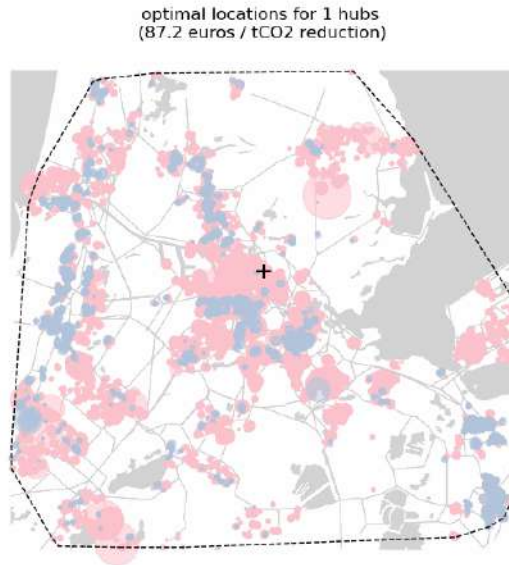


FIG. 7.3 Popularity of candidate hub locations. Circle size represents the number of times the location has been chosen as an optimal location. Red dots are locations that were chosen at least once, gray dots are locations that were never chosen.

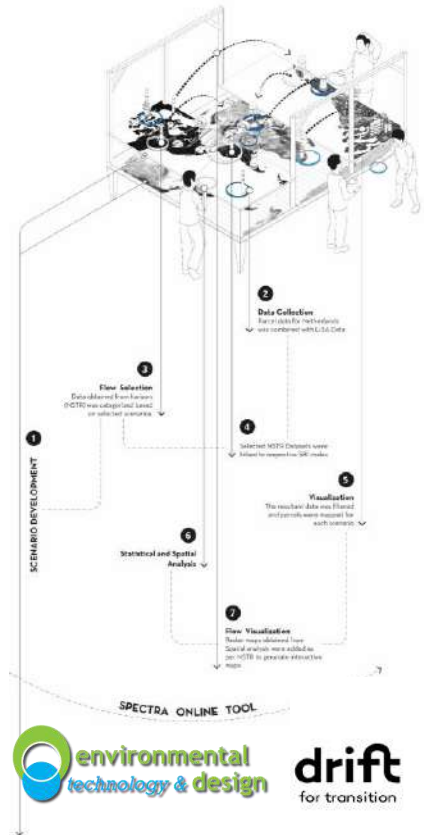
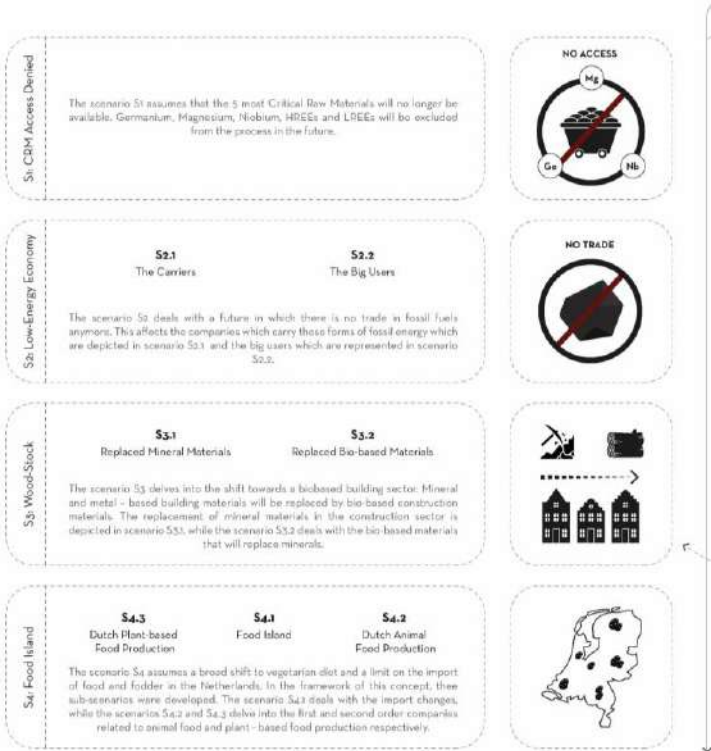
Spatial parameters for circular hubs: criteria for future facility locations for a circular built environment in the Netherlands

Tanya Tsui, Cecilia Furlan, Alexander Wandl, Arjan van Timmeren; Published in Circular Economy and Sustainability (2023). <https://doi.org/10.1007/s43615-023-00285-v>

Spatial optimization of circular timber hubs, Tanya Tsui, Fabio Duarte, Titus Venverloo, Tom Benson Preprint available at https://assets.researchsquare.com/files/rs-3013682/v1_covered_8c6bcd55-52ea-4be3-b28c-4c243fcb818.pdf?c=1686725490

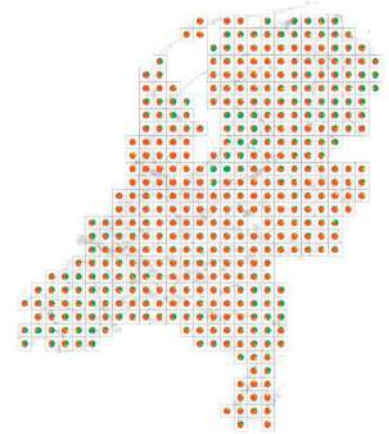
Dealing with Geopolitical Changes International Flows –Ports - (hinter)Land

Spatial Economic TRAansition

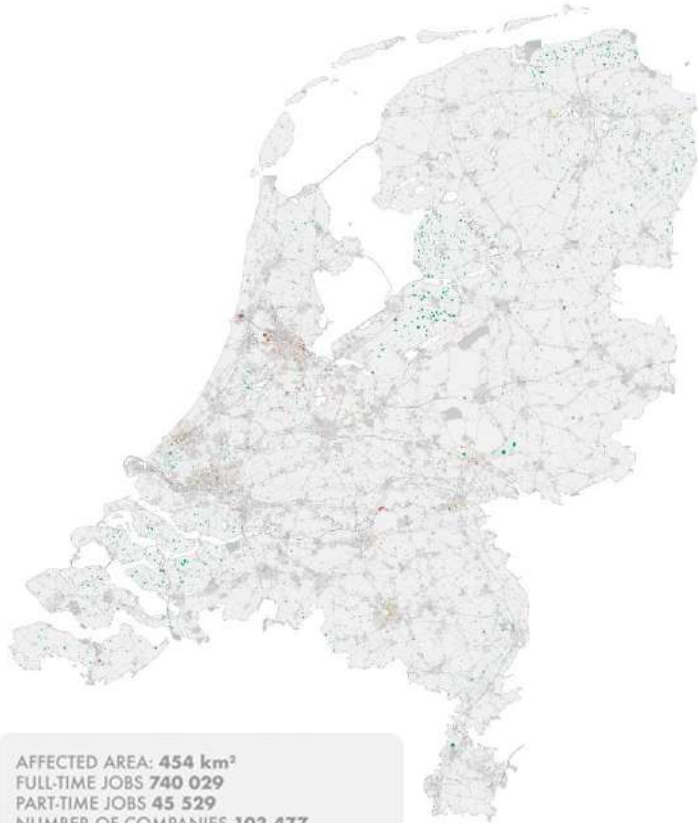


Interactive Online Tool

Relating global trade flows with the port hinterlands



Access denied to CRMs



AFFECTED AREA: 454 km²
FULL-TIME JOBS 740 029
PART-TIME JOBS 45 529
NUMBER OF COMPANIES 103 477
AVERAGE COMPANY SIZE 7 EMPLOYEES



Legend

- Railway
- Road
- Industrial area
- Residential area
- COROP region
- A: Agriculture, forestry and fishing
- C: Manufacturing
- E: Water supply, sewerage, waste management and remediation activities
- F: Construction
- H: Transportation and storage
- I: Accommodation and food service activities
- J: Information and communication
- M: Consultancy, research and other specialised business services
- N: Renting and leasing of tangible goods and other business support services
- Q: Human health and social work activities
- R: Culture, sports and recreation



Sometimes material flows are too complex; they move too far or too little, or even underground to be represented on a map. Representing in sections might help to identify material movement and synergies

Systemic Section from Analysis

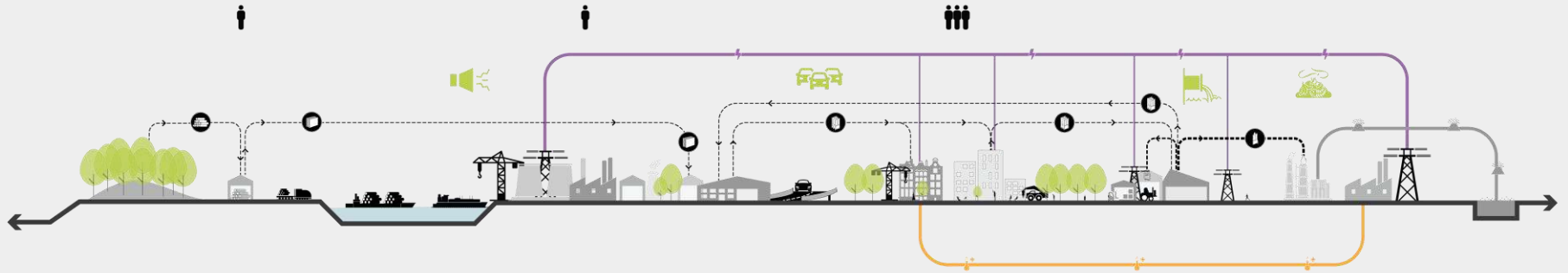
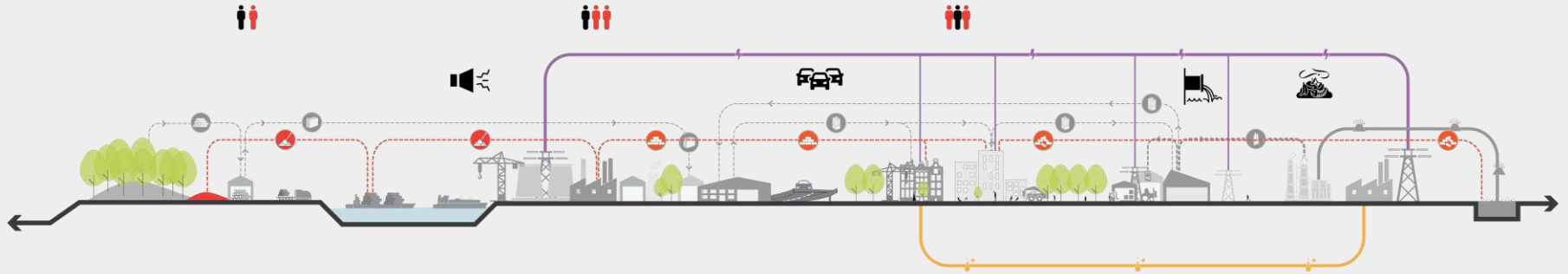
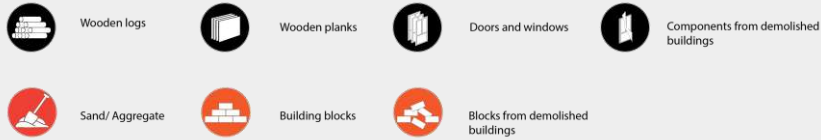


Image by Oviya Elango. Icons from Lorenzo, Orin Zuu, Delwar Hossain, Adrien Coquet, Patrick Trouve, Maurizio Fusillo, Patrick Morrison, Asham Ishaq, Fasobrun Jamil, Ismael Ruiz, Isaac Claramunt, Graphic Engineer, Nick Abrams, HideMaru, Lluisa Iborra, Federico Panzano, Wahyu Untile, Akash, Prashanth Rapolu from Noun project.

Adding the Concrete Chain



Finding Space to Grow Trees

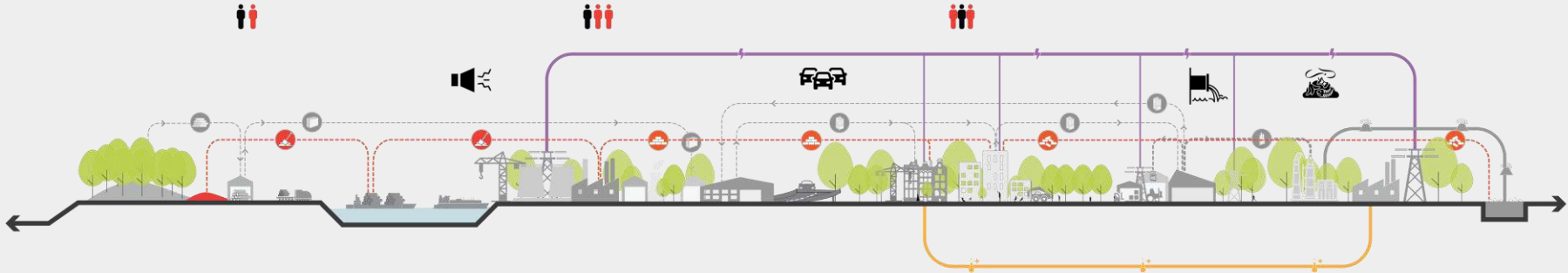
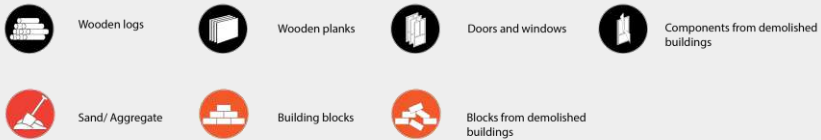


Image by Oviya Elango. Icons from Lorenzo, Orin Zuu, Delwar Hossain, Adrien Coquet, Patrick Trouve, Maurizio Fusillo, Patrick Morrison, Asham Ishaq, Fasobrun Jamil, Ismael Ruiz, Isaac Claramunt, Graphic Engineer, Nick Abrams, HideMaru, Lluisa Iborra, Federico Panzano, Wahyuntile, Akash, Prashanth Rapolu, Designs by MB, Nareerat Jaikaw, Gilbertages from Noun project.

Establishing a CLT Production Chain

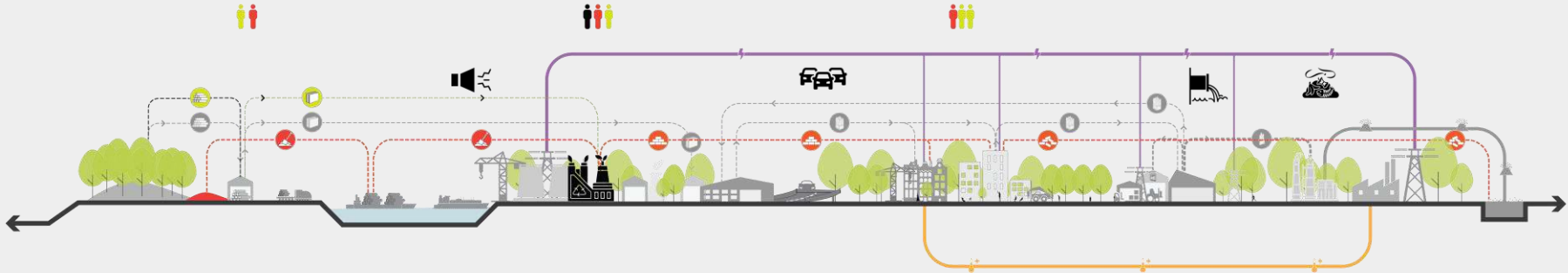
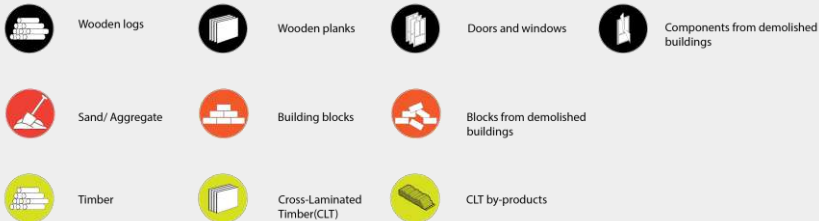
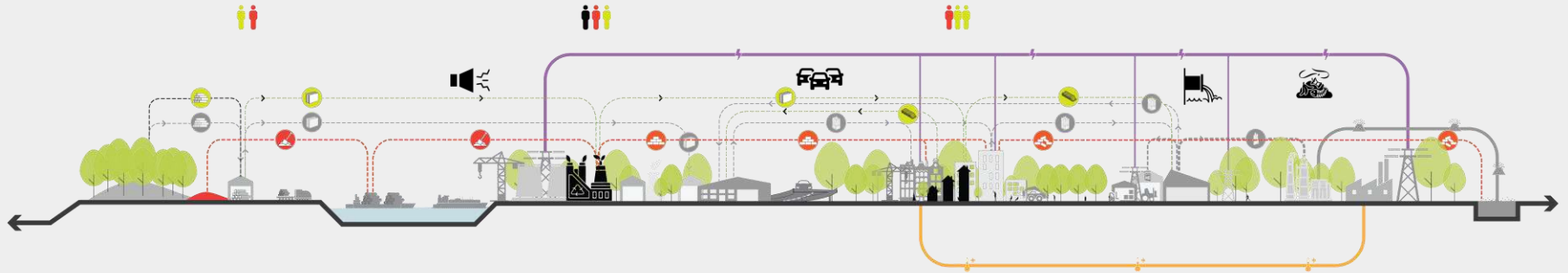
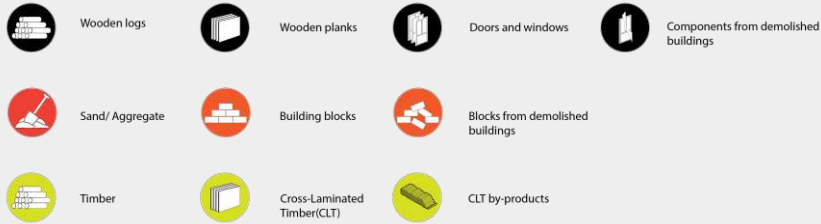
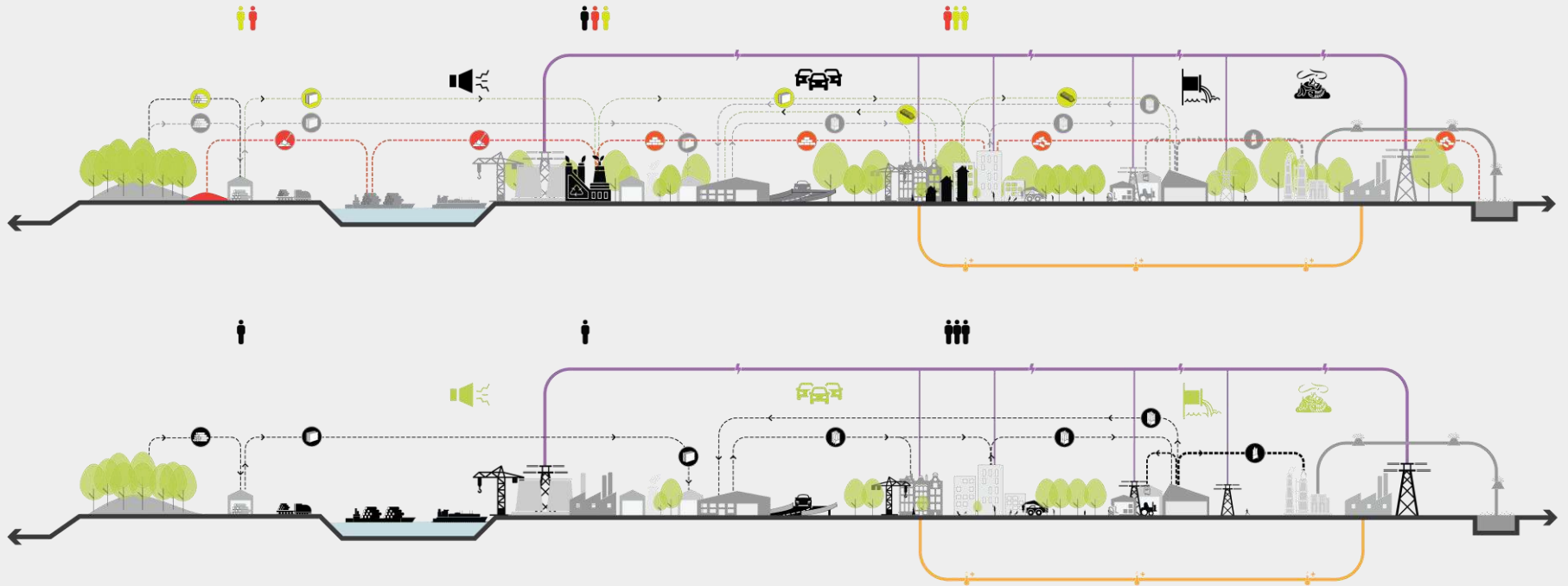


Image by Oviya Elango. Icons from Lorenzo, Orin Zuu, Delwar Hossain, Adrien Coquet, Patrick Trouve, Maurizio Fusillo, Patrick Morrison, Asham Ishaq, Fasobrun Jamil, Ismael Ruiz, Isaac Claramunt, Graphic Engineer, Nick Abrams, HideMaru, Lluisa Iborra, Federico Panzano, Wahyuntile, Akash, Prashanth Rapolu, Designs by MB, Nareerat Jaikaw, Gilbert Jages from Noun project.

Cascading Flows

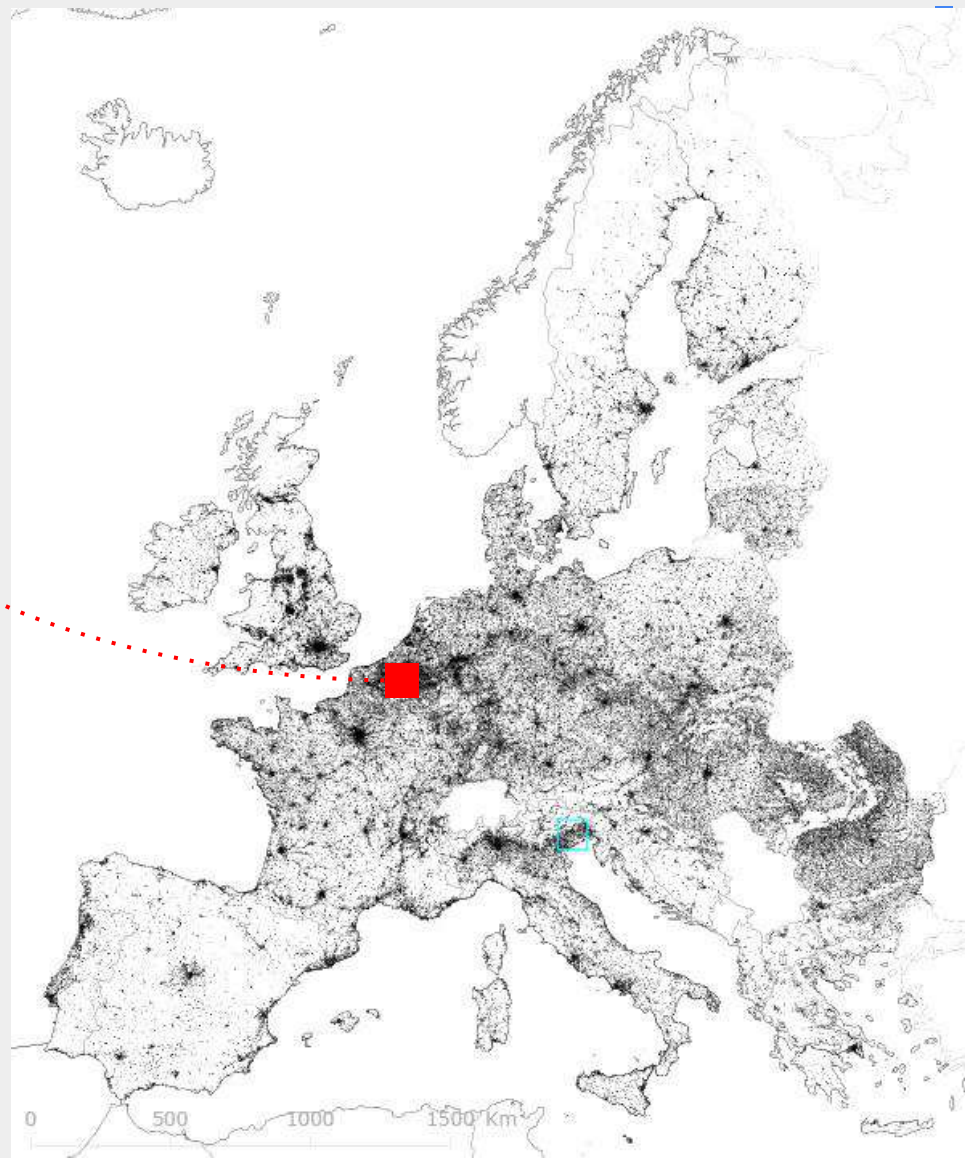


Comparing Status Quo with one Potential Future



How can territorial flow understanding support a circular design project?

Charleroi
(BE)





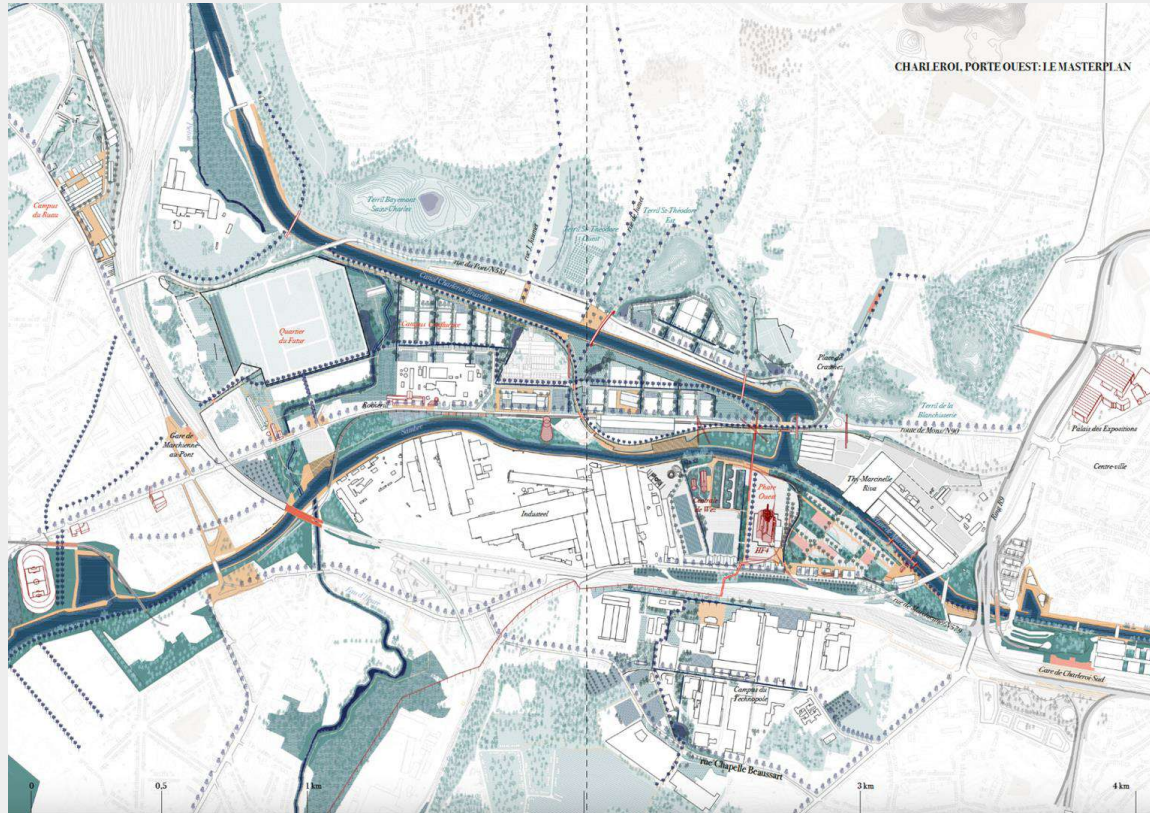


5 *Required Elements from the competition*



- 1/ il Campus ;
- 2/ the residential area;
- 3/ the urban Port;
- 4/ the industrial ruin:
- 5/the park.

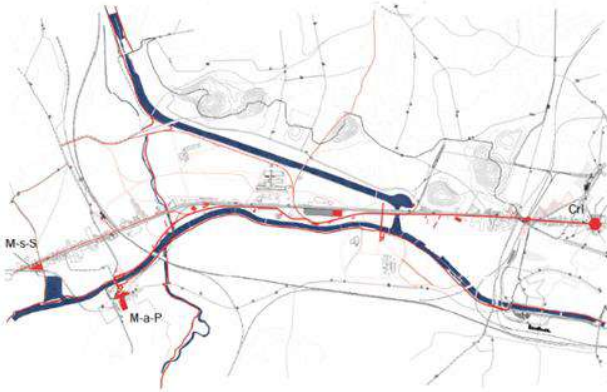
Landscape as a structural element





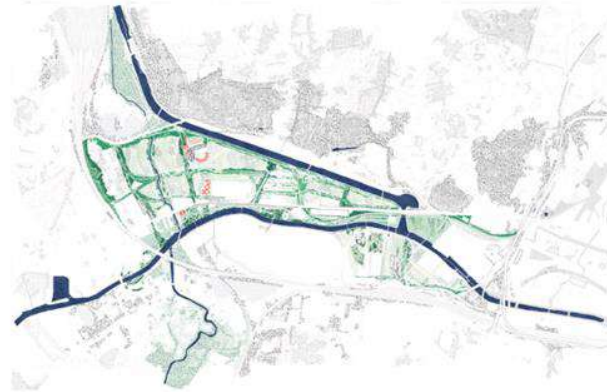
Three strategies

re-CONNECTING the site



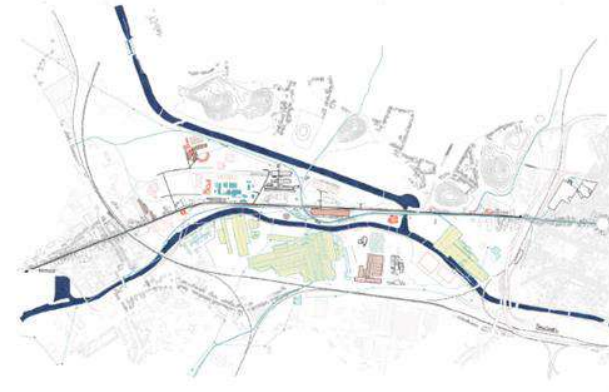
- E-S strip between civic centres
- RAVE (mainly along the main waterways)
- bike and pedestrian path on former railway line
- secondary bike and pedestrian paths
- secondary bike and pedestrian paths out of project site
- reactivating the Ch. de Mons into an urban boulevard, in its urban surroundings
- navigable waterway
- railway
- tram / metro
- bus connections and stops
- Rapid Transit Bus connection

re-GENERATING the land



- tree nursery (eg. trees for new urban projects)
- walled garden, with phytoremediating plants and flowers
- concrete break-off experimentation fields
- phytoremediating trees
- re-opening the Piletion river
- N-S green infrastructure
- E-W green infrastructure
- biogas, providing biogas to the STEG
- new composting and soil reconstruction facility
- carpentry training centre and workshops
- nature-based biotech research institute

re-CIRCULATING the productivity



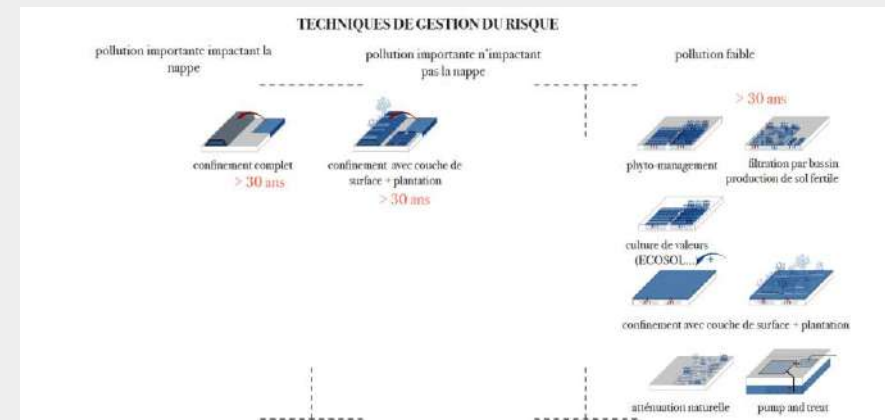
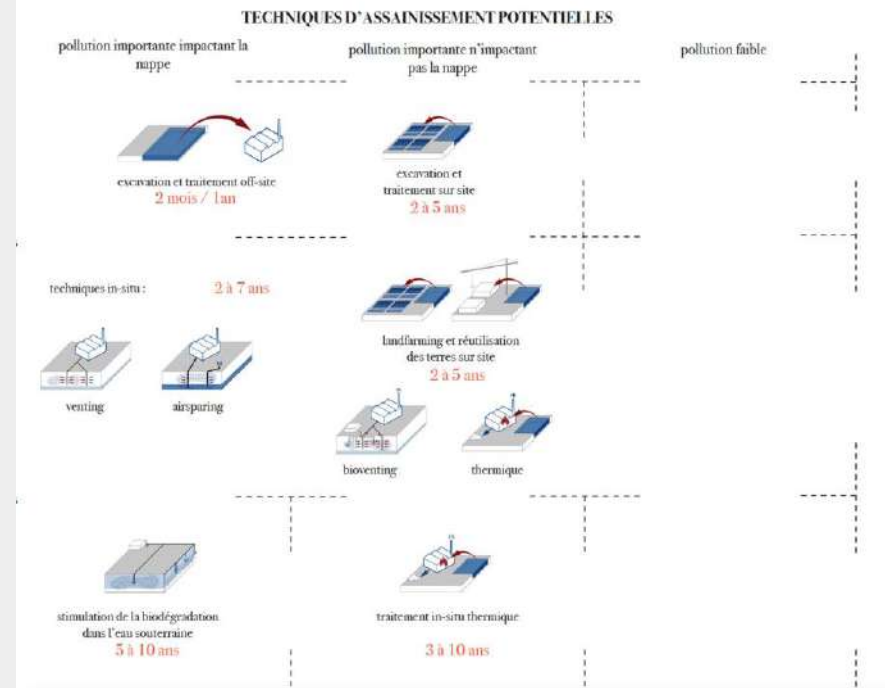
- power transformer
- energy production infrastructure
- building with a lot of rest energy or heat to be valorised
- existing material recycling infrastructure (here steel)
- heat network, under paths of former railway
- hydro-power generation at locks
- reactivation of industrial infrastructure for production spaces
- new productive building, i.r.t. site cycles
- possible new productive building (mixed or stacked)
- new composting and soil reconstruction facility, and carpentry training centre and workshops
- nature-based biotech research institute

Challenge 1: Soil pollution



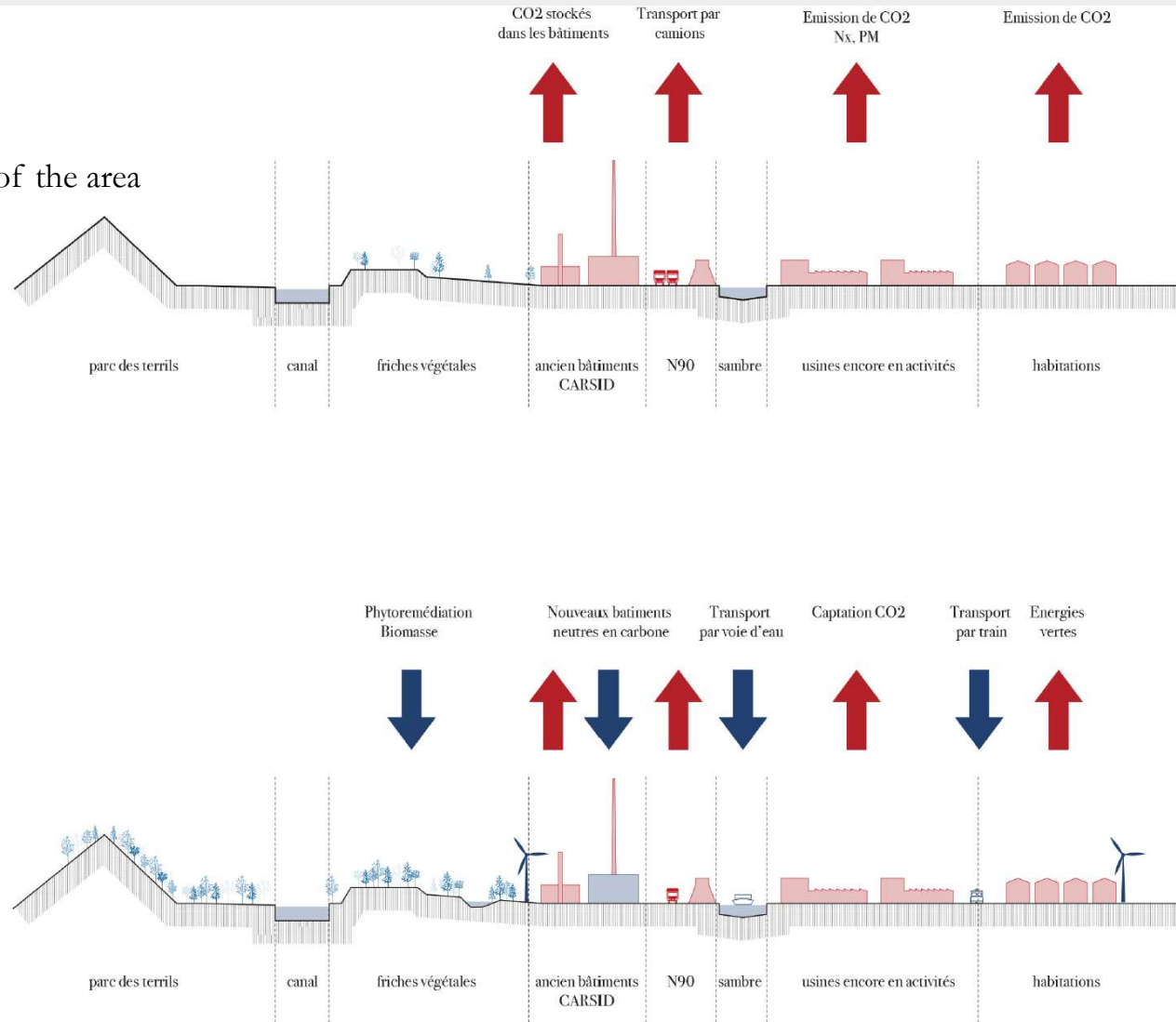
Challenge 1: Soil pollution

Urban Strategies to Integrate Reclamation Processes in the design of the area



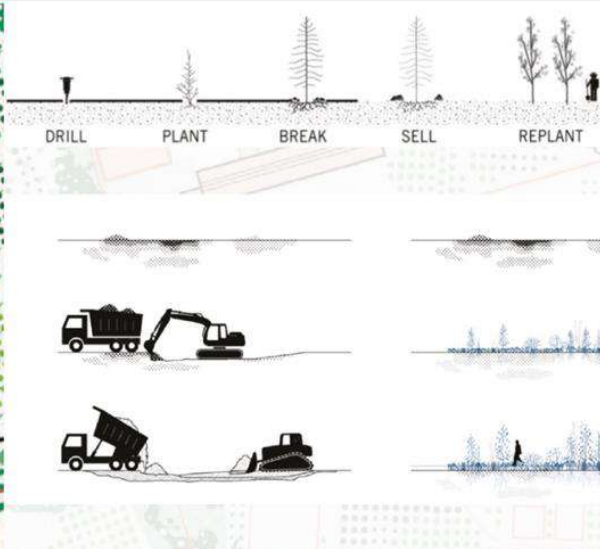
Challenge 1: Soil pollution

Urban Strategies to Integrate Reclamation Processes in the design of the area
The site as cleaning machine

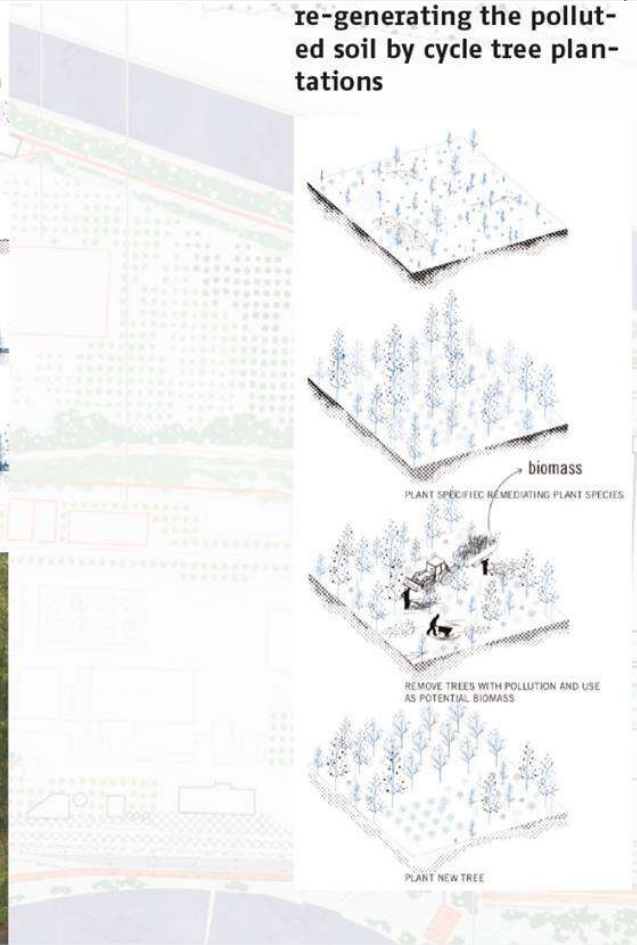


Challenge 1: Soil pollution

Urban Strategies to Integrate Reclamation Processes in the design of the area



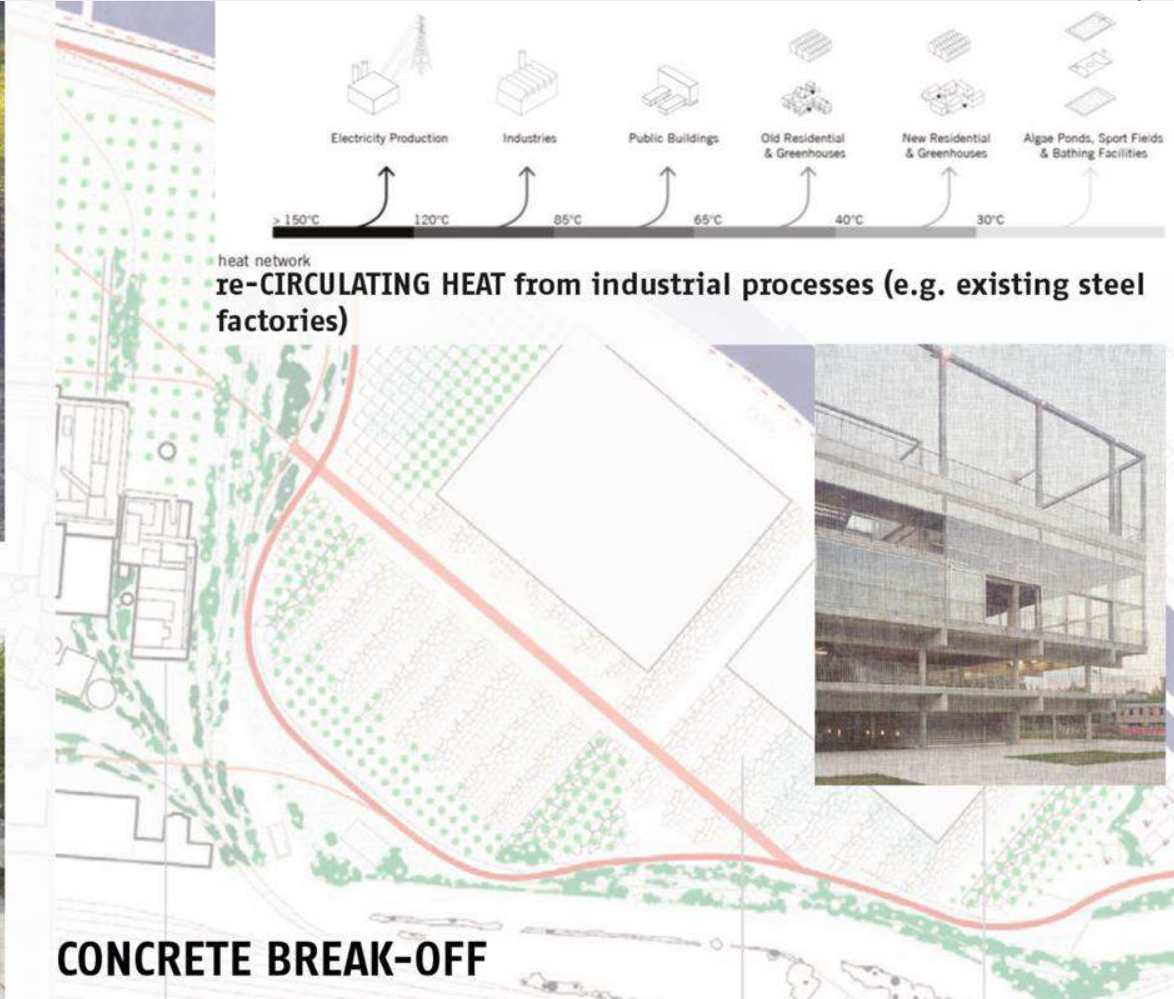
re-generating the polluted soil by cycle tree plantations



Challenge 2: Energy efficiency

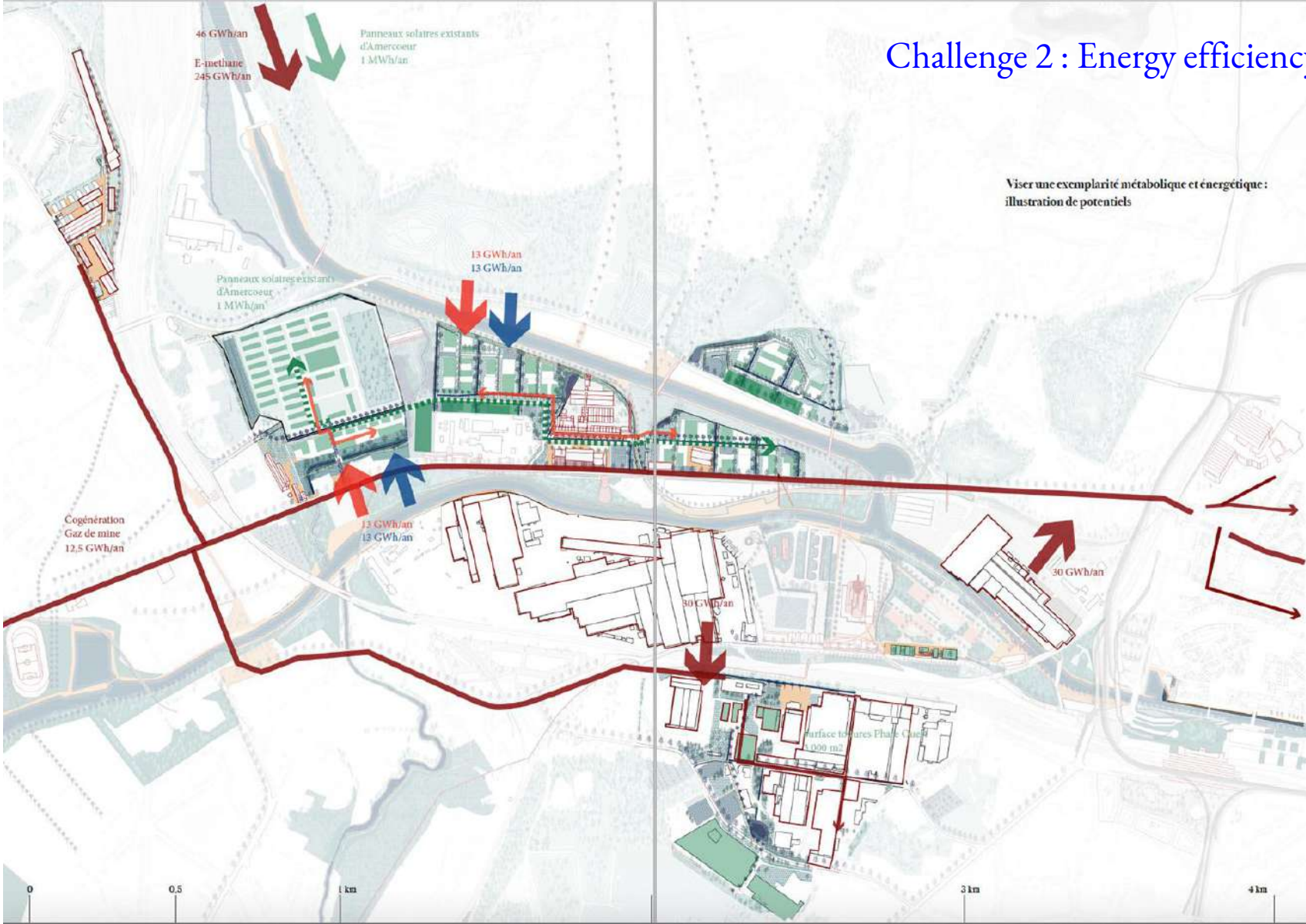


Concrete break-off experiments, creating green cracks in the surface

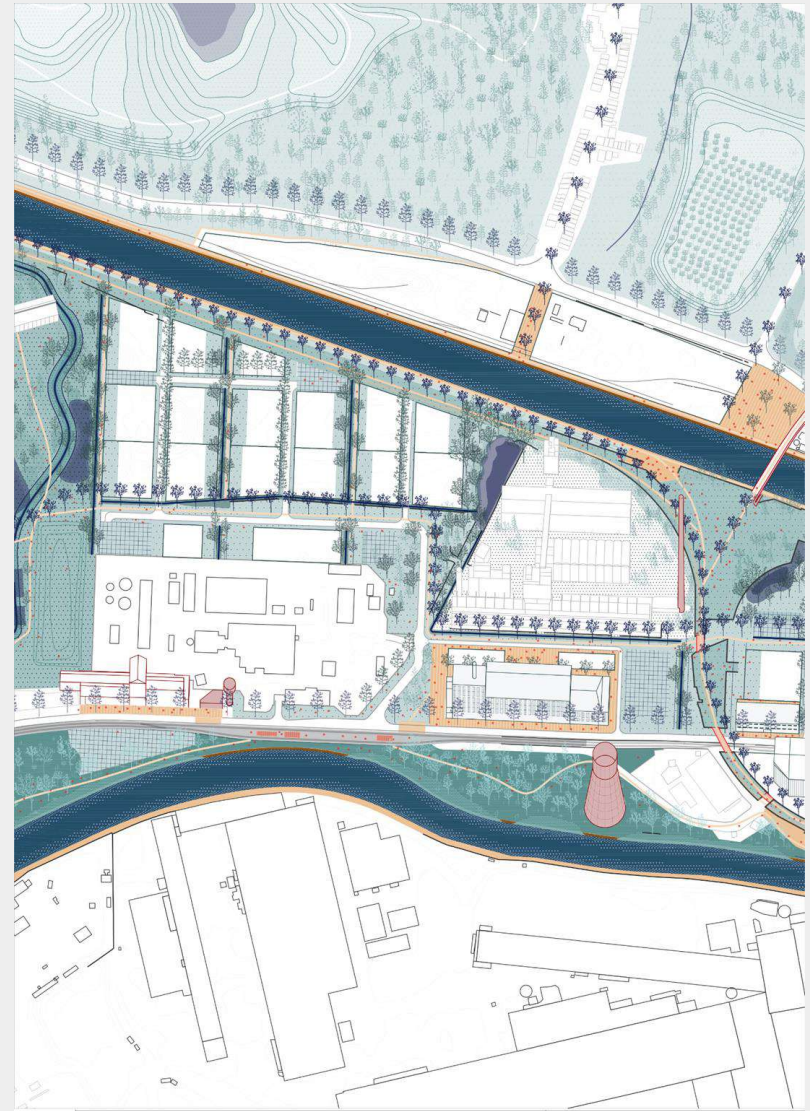


Challenge 2 : Energy efficiency

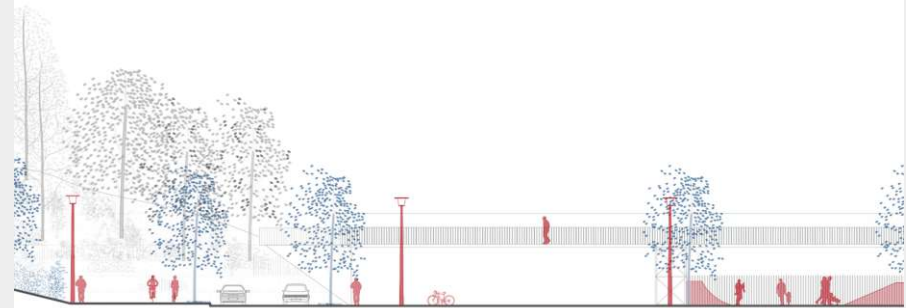
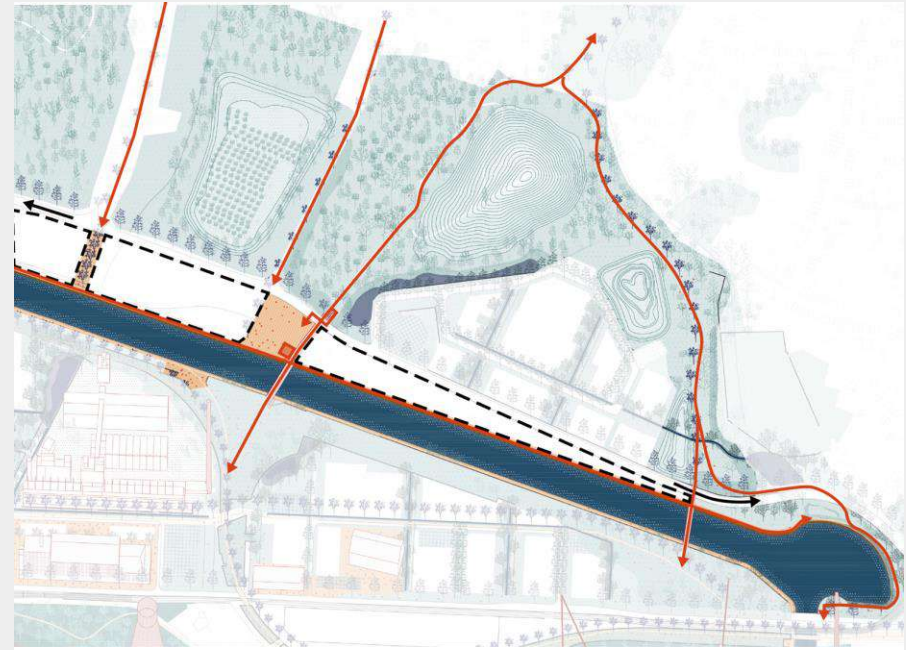
Viser une exemplarité métabolique et énergétique : illustration de potentiels



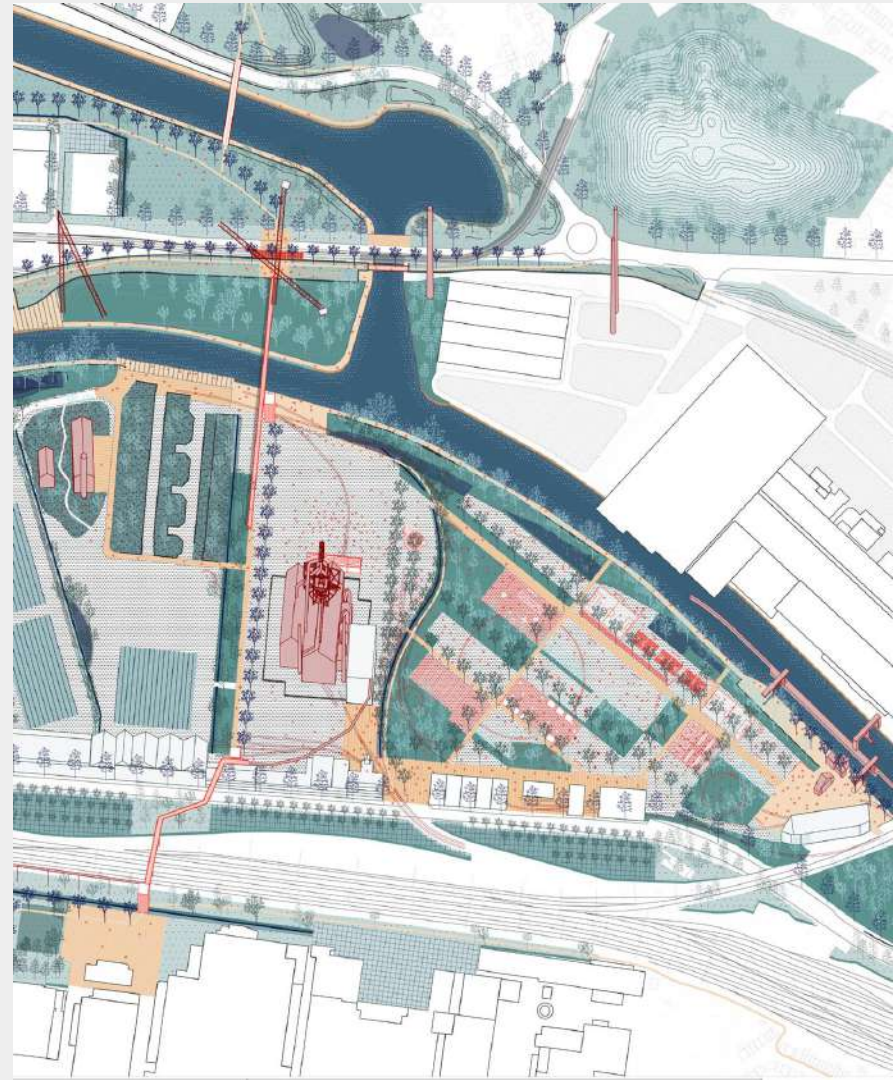
View from the masterplan: the campus



View from the masterplan: the port



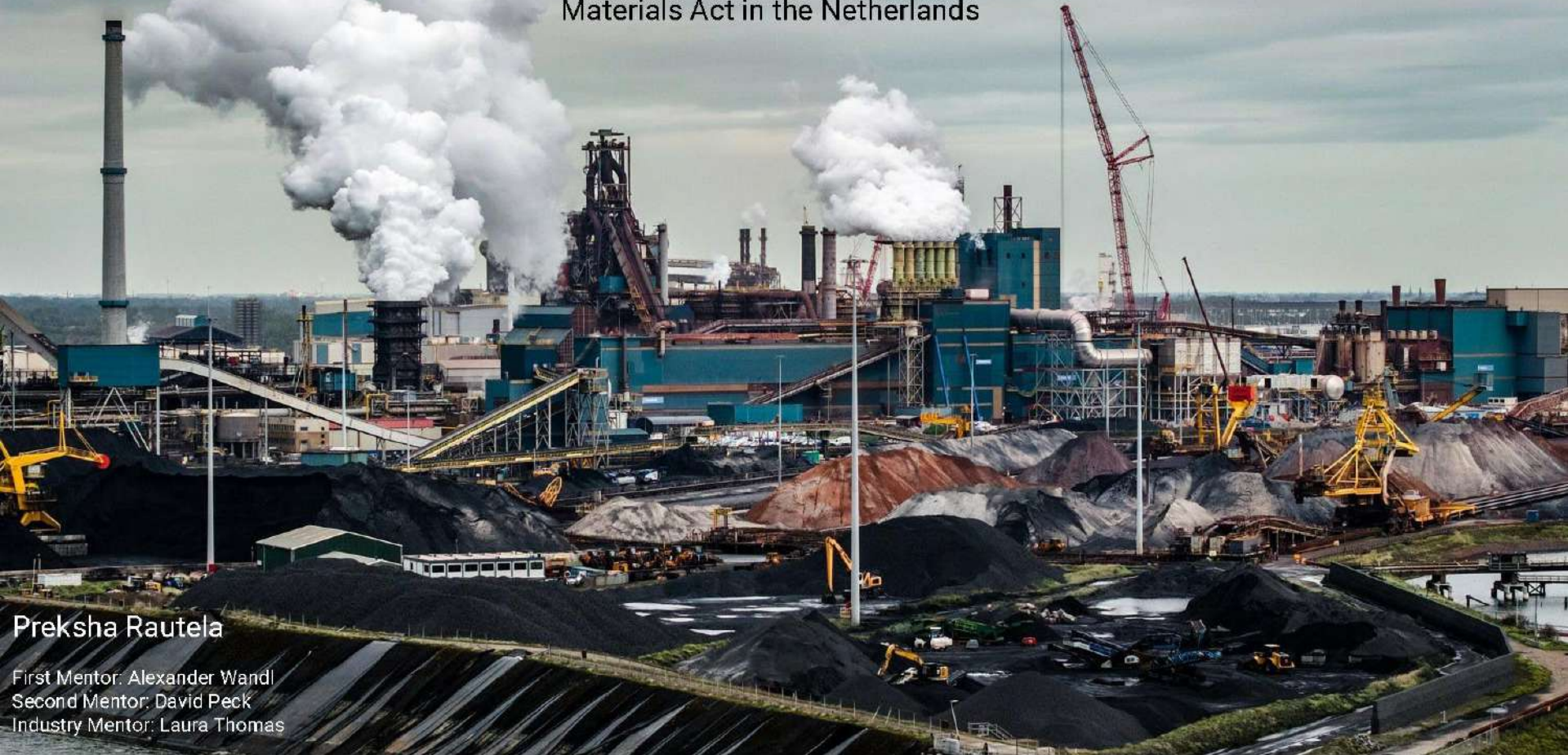
View from the masterplan: the integration of the industrial ruins





Extractivism to Circularism

An exploration of the spatial implications of the Critical Raw Materials Act in the Netherlands



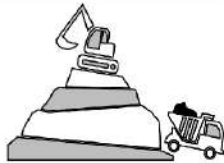
Preksha Rautela

First Mentor: Alexander Wandl
Second Mentor: David Peck
Industry Mentor: Laura Thomas

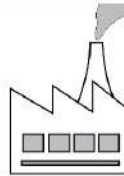


Critical Raw Materials Act (CRMA)

The Critical Raw Materials Act will ensure EU access to a secure and sustainable supply of critical raw materials, enabling Europe to meet its 2030 climate and digital objectives.



At least **10%** of the EU annual consumption for extraction.



At least **40%** of EU annual consumption for processing.



At least **25%** of the EU annual consumption for recycling

Benchmarks for 2030



Challenges



Need space and have environmental implications



Increasing consumption

What could be the potential spatial and environmental impacts of the European CRMA on the Netherlands based on different socio-economic systems?

Scenario building

Processing capacity



What if the Netherlands does no processing ?



What if the Netherlands does processing for the whole of Europe?



What if the Netherlands does its own processing independent of the EU?



What if every country does its own 40%?

Agenda

Knowledge Economy

Industry Leaders

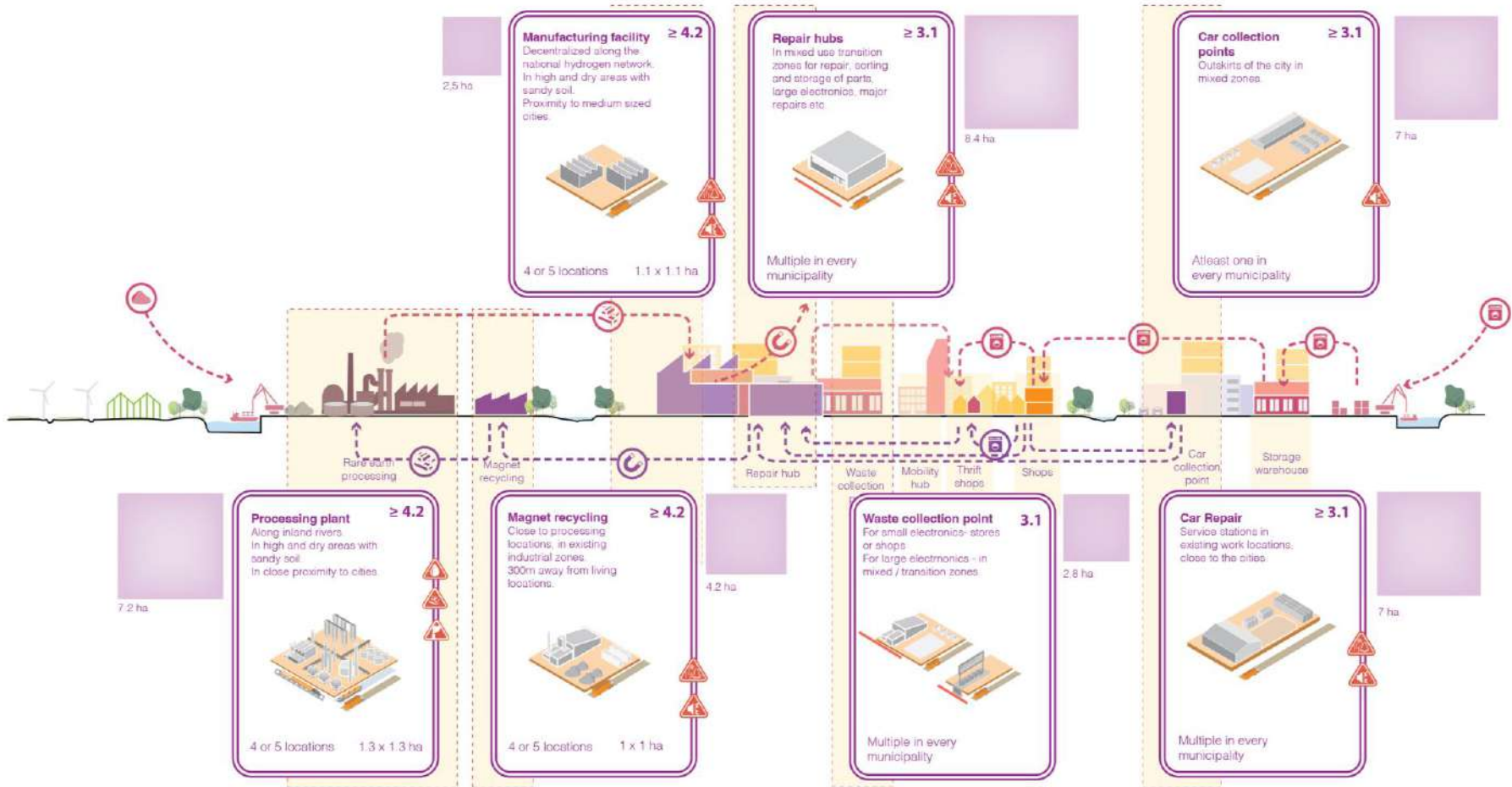
Self-Sufficient

Regenerative

How to create scenarios ?

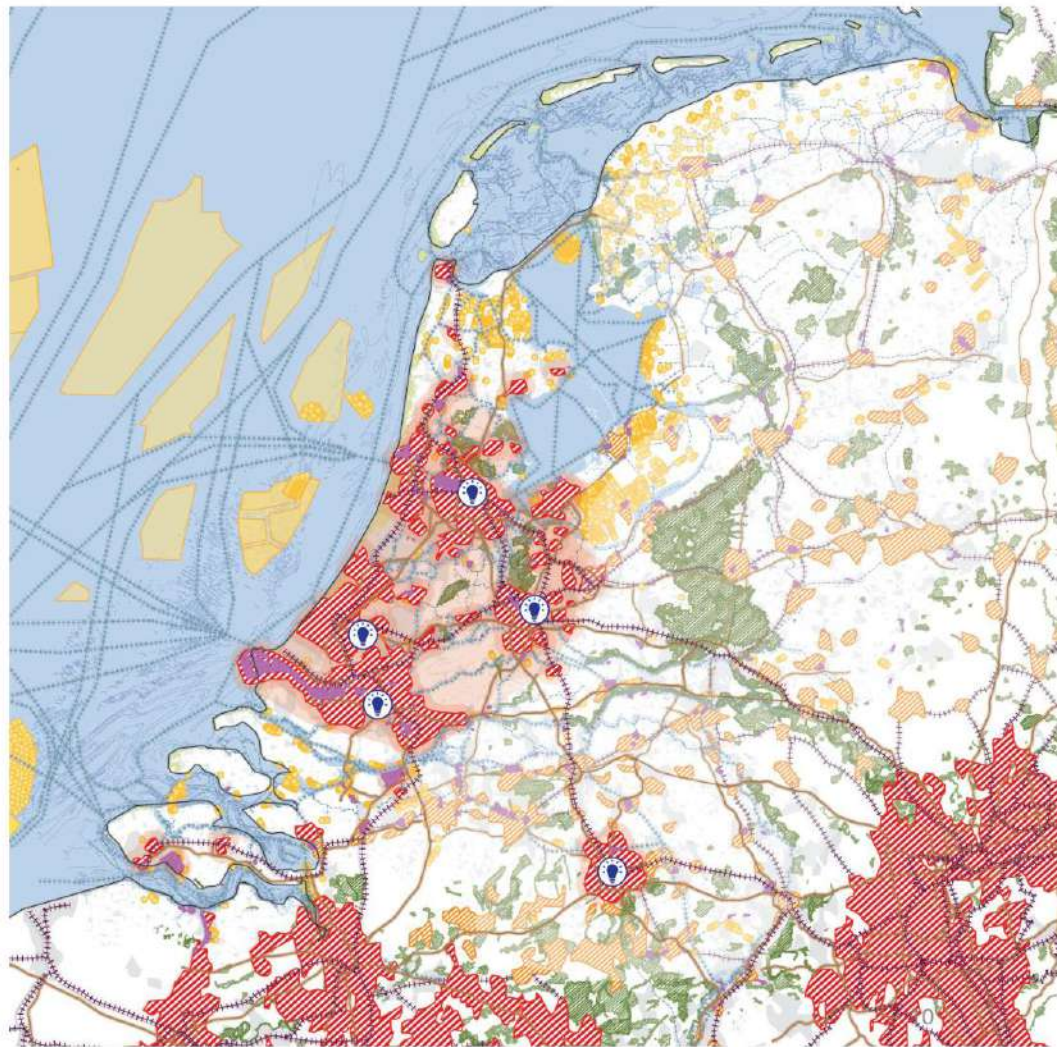
Scenario building

Processing capacity	<p>0% 40% EU</p>	<p>0% 40% EU</p>	<p>0% 100% 40% EU % NL</p>	<p>0% 40% 40% EU % NL</p>
Agenda	Knowledge Economy	Industry Leaders	Self-Sufficient	Regenerative
Societal Value	Economic growth (Profit)	Economic growth (Profit)	Social well being, equity (People)	Environmental sustainability (Planet)
Material consumption	Increases	Increases	Decreases	Decreases
Supply chain	Global	European	National	Regional (Euro delta)
Spatial organisation	Increase in container ports and storage areas.	Large processing facility. Processing away from living locations.	Processing happens in proximity to cities.	Processing in high and dry locations



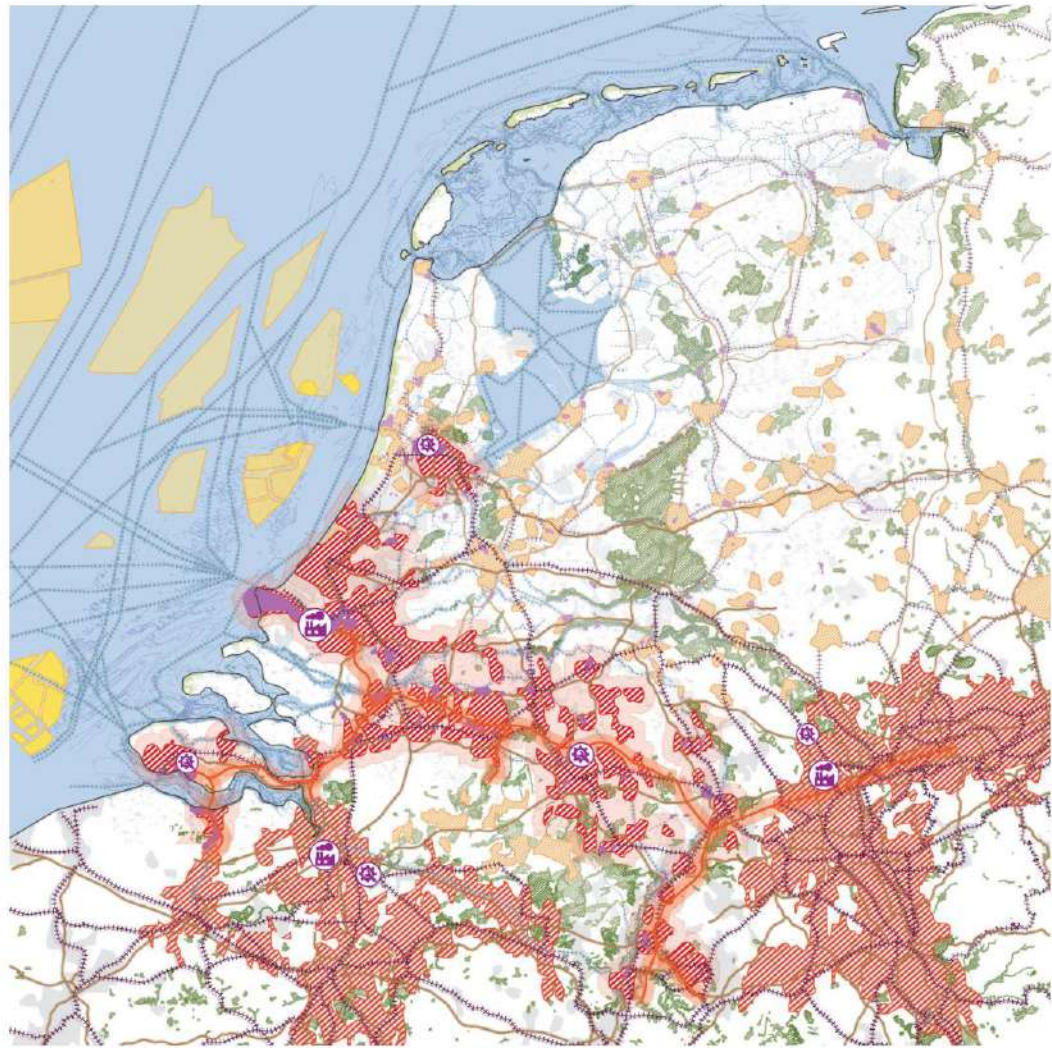
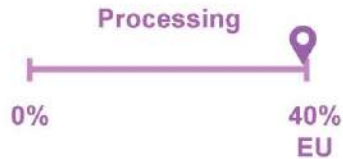
1. Knowledge Economy

- Growth is concentrated in the Randstad.



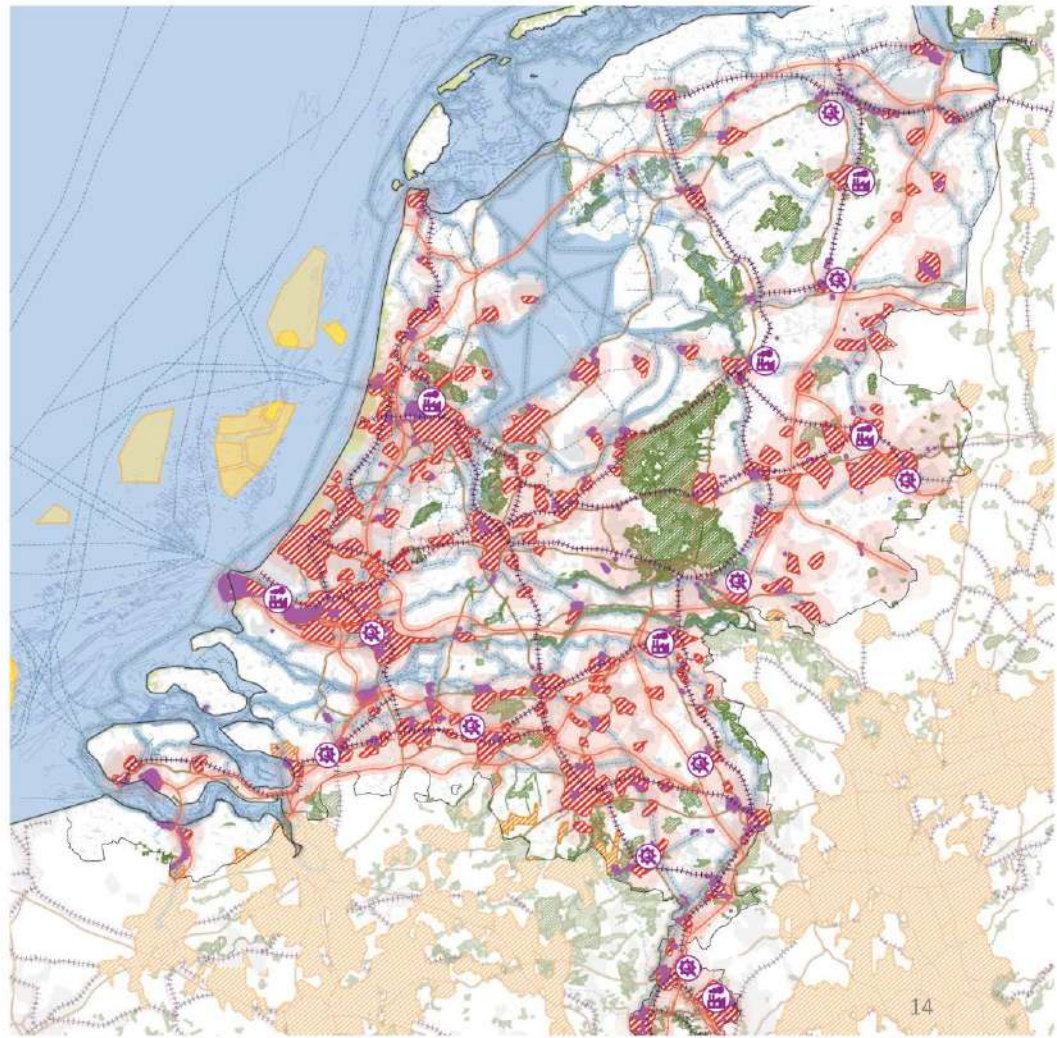
2. Industry Leaders

- Growth concentrated around the Delta corridor.
- Processing in Rotterdam.
- Manufacturing in Eindhoven.



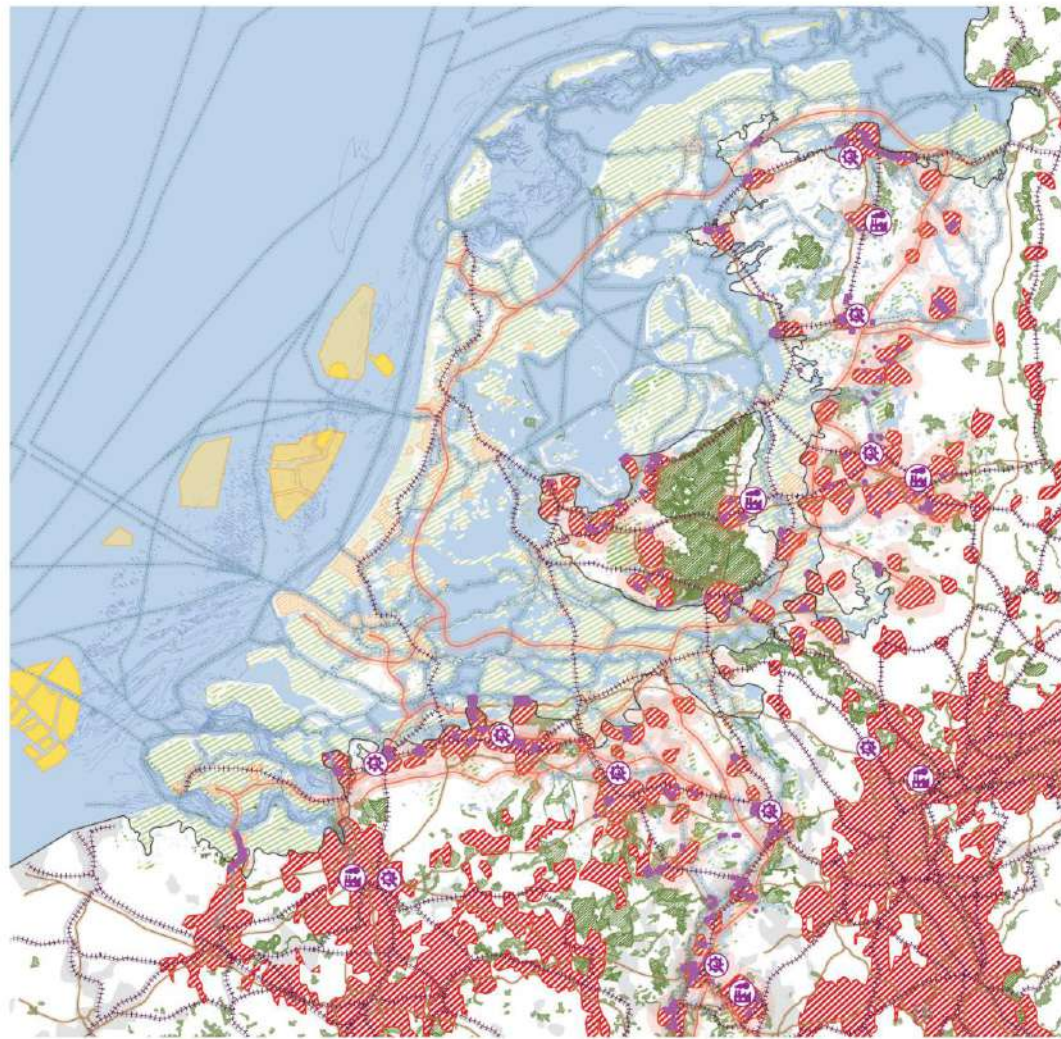
3. Self Sufficient

- No region dominates.
- Processing happens along the inland rivers.



4. Regenerative

- Growth is concentrated at safe - higher and dryer locations.
- Seasonal agriculture is practiced in vulnerable locations.



Including a circular approach in the design is still an open question.

The examples show how different dimensions and possibilities to design (with) circularity could be integrated into the urban space through scales

The project becomes an instrument for negotiating and doing research.



<https://online-learning.tudelft.nl/courses/spatial-circularity-strategies-for-sustainable-regional-development/>



[edu.nl/b83r8](https://www.tudelft.nl/edu.nl/b83r8)



<https://online-learning.tudelft.nl/courses/circular-building-products-for-a-sustainable-built-environment/>

TERRITORIALISING CIRCULARITY

ASSET Meet and Learn
August 30, 2024

Thank you

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