

Multimodal infrastructure nodes: chances for the circular economy

VenHoevenGS
architecture+urbanism



Ton Venhoeven
Sure Eurodelta

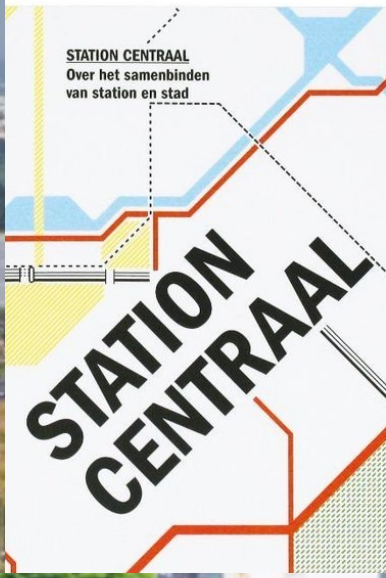
18 November 2022



Olympic Aquatic Centre Paris 2024

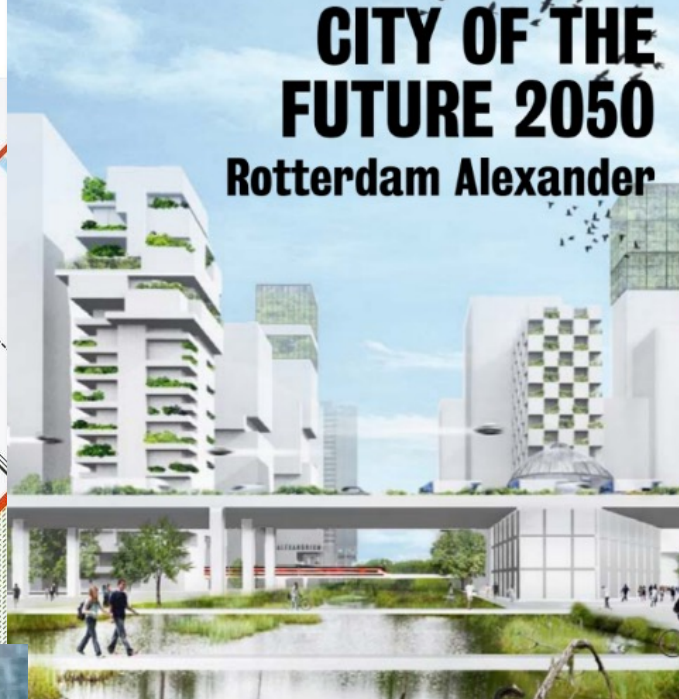


ENERGIETRANSITIE EN LEEFOMGEVING



STATION CENTRAAL

STATION CENTRAAL
Over het samenbinden
van station en stad



CITY OF THE FUTURE 2050

Rotterdam Alexander



De multimodale Hub en Rijkswaterstaat

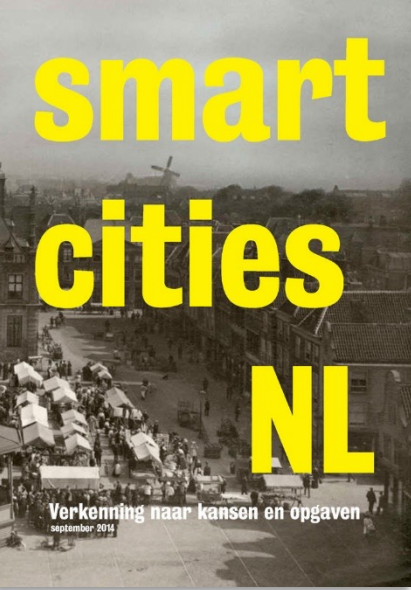
een verkenning naar de link tussen het
Hoofdwegenet en duurzame stedelijke mobiliteit

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SNELWEG X STAD HIGHWAY X CITY

BNA
DE TOEKOMST
VAN DE RINGWEG
ONTWERPVOORSTELLEN
VOOR AMSTERDAM,
ROTTERDAM EN
UTRECHT



smart cities NL

Verkenning naar kansen en opgaven
september 2016



DE BEREIKBARE, SLIMME EN GEZONDE STAD

Juli 2017



DE MOBIELE STAD

Over de wisselwerking
van stad, spoor en snelweg

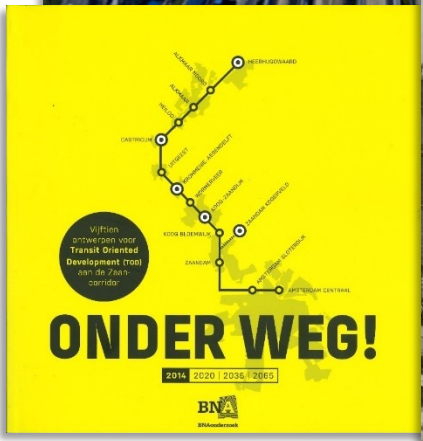
Tips van den Boomen en Ton Venhoeven

CHALLENGE LANDSCHAP 2070

kwaliteit door ontwikkelen



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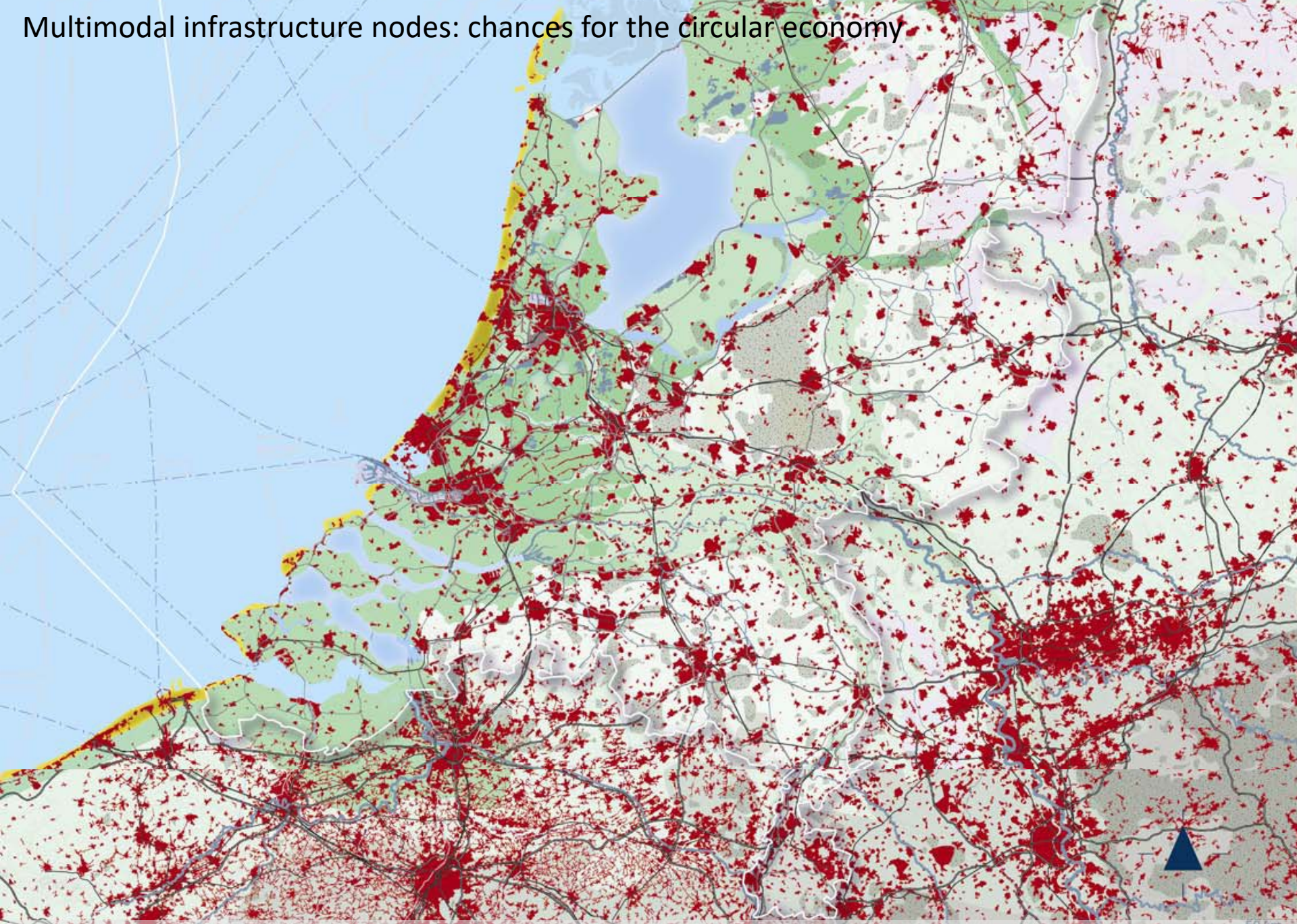
ONDER WEG!

Vijftien
ontwerpen voor
Tram Oriented
Development (TOD)
aan de 7e en
9e lijn

2014 | 2020 | 2036 | 2065

BNA
BRANDERINK

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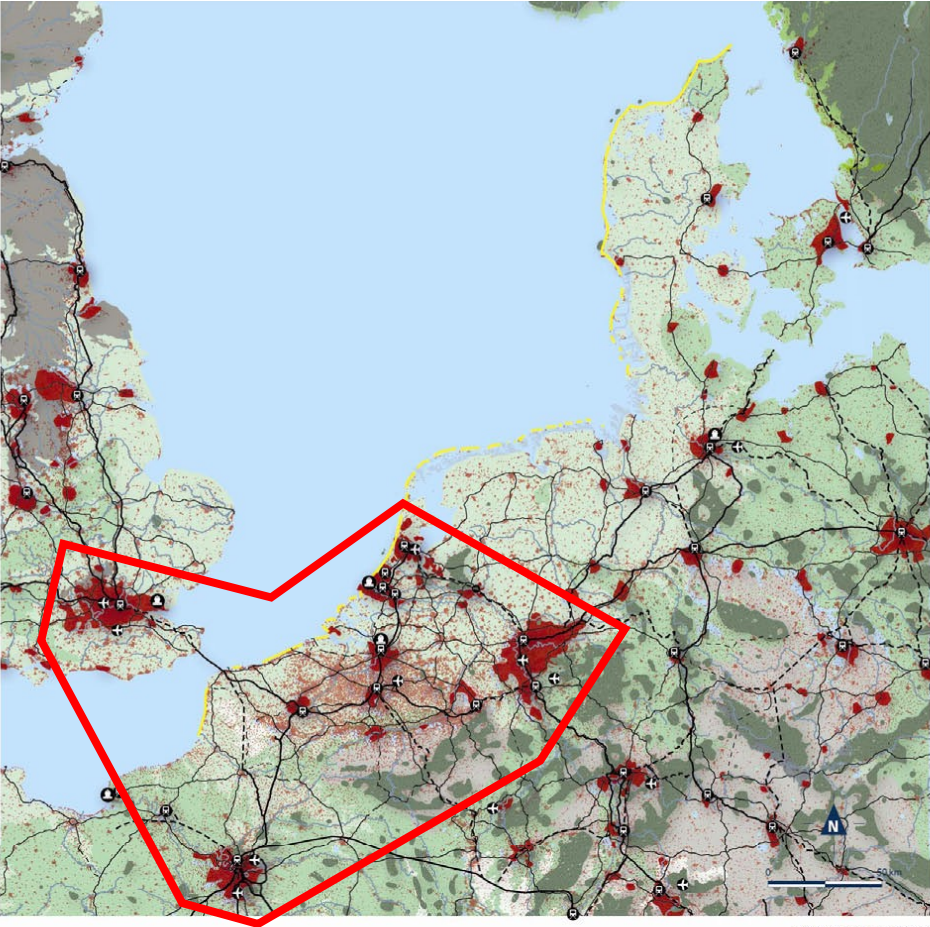
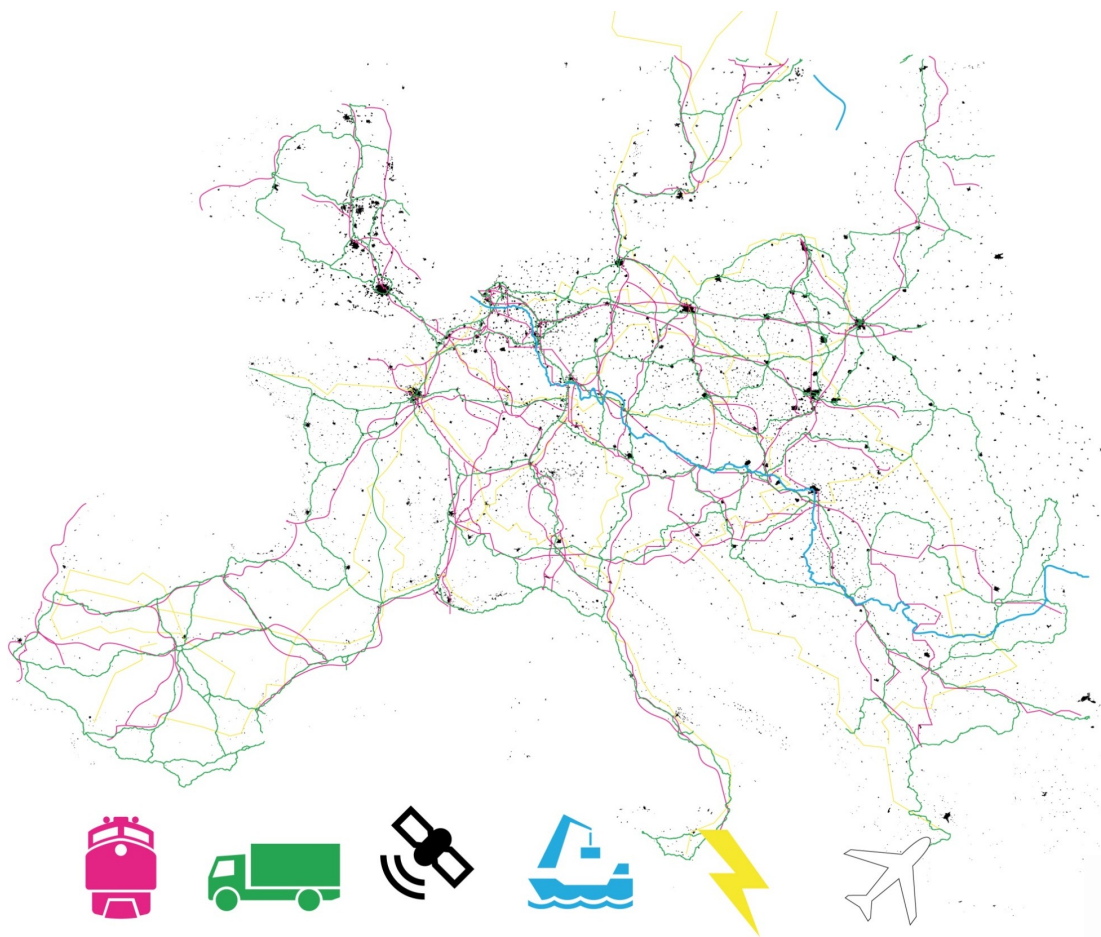


- Legenda***
- bebouwing
 - nationale wegen
 - nationale spoorwegen
 - luchthaven
 - haven
 - water
 - duinenlandschap met duinontg.
 - laagveenontginningslandschap
 - veenkolonial landschap
 - droogmakerij
 - zeekleilandschap (jonge/oude z.
 - rivierlandschap met stroomrug-
 - zandlandschap met essen, kamp
 - heuvelland met loessontginning
 - middelgebergte (buiten Nederla
 - boslandschap
 - grens NL / 12-mijlzone

How to create agglomeration power, develop the circular economy, and solve all sustainability issues at the same time?

*De aanduiding van de landschapsyten is gebaseerd op de ondergrond van de hier getoonde ondergrond later ver...

Multimodal infrastructure nodes: chances for the circular economy



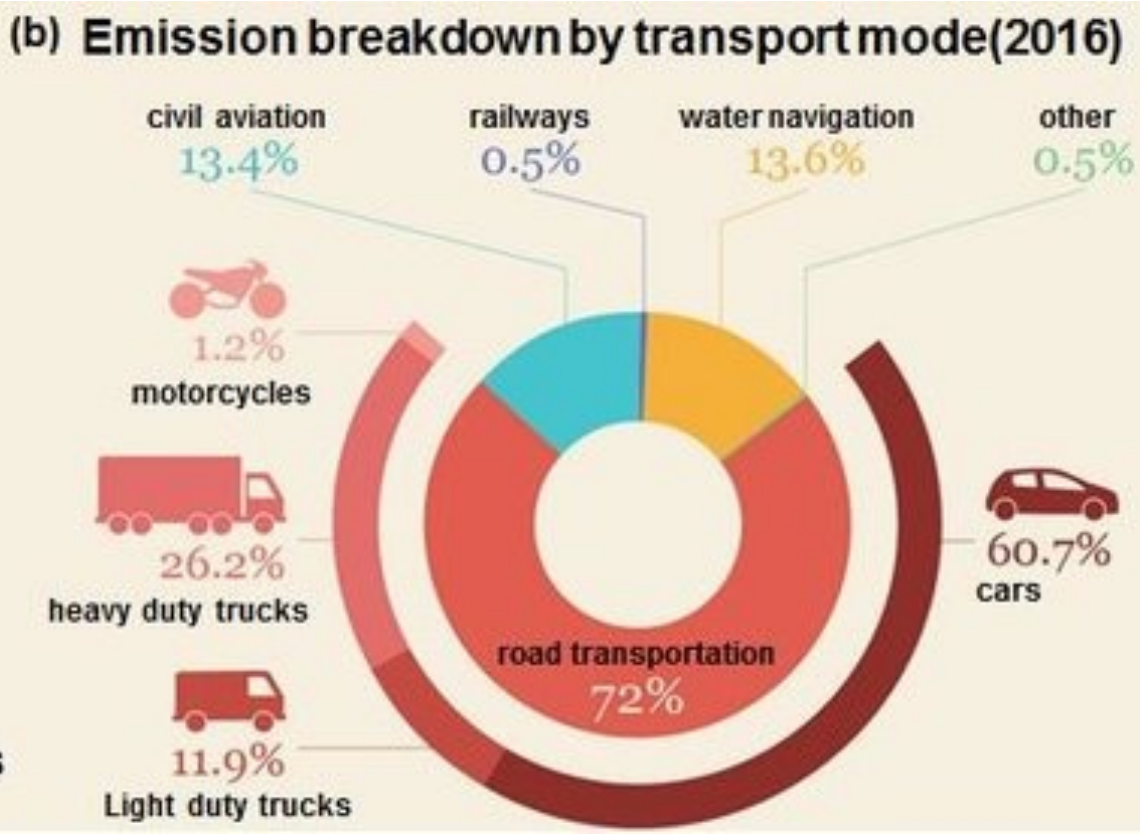
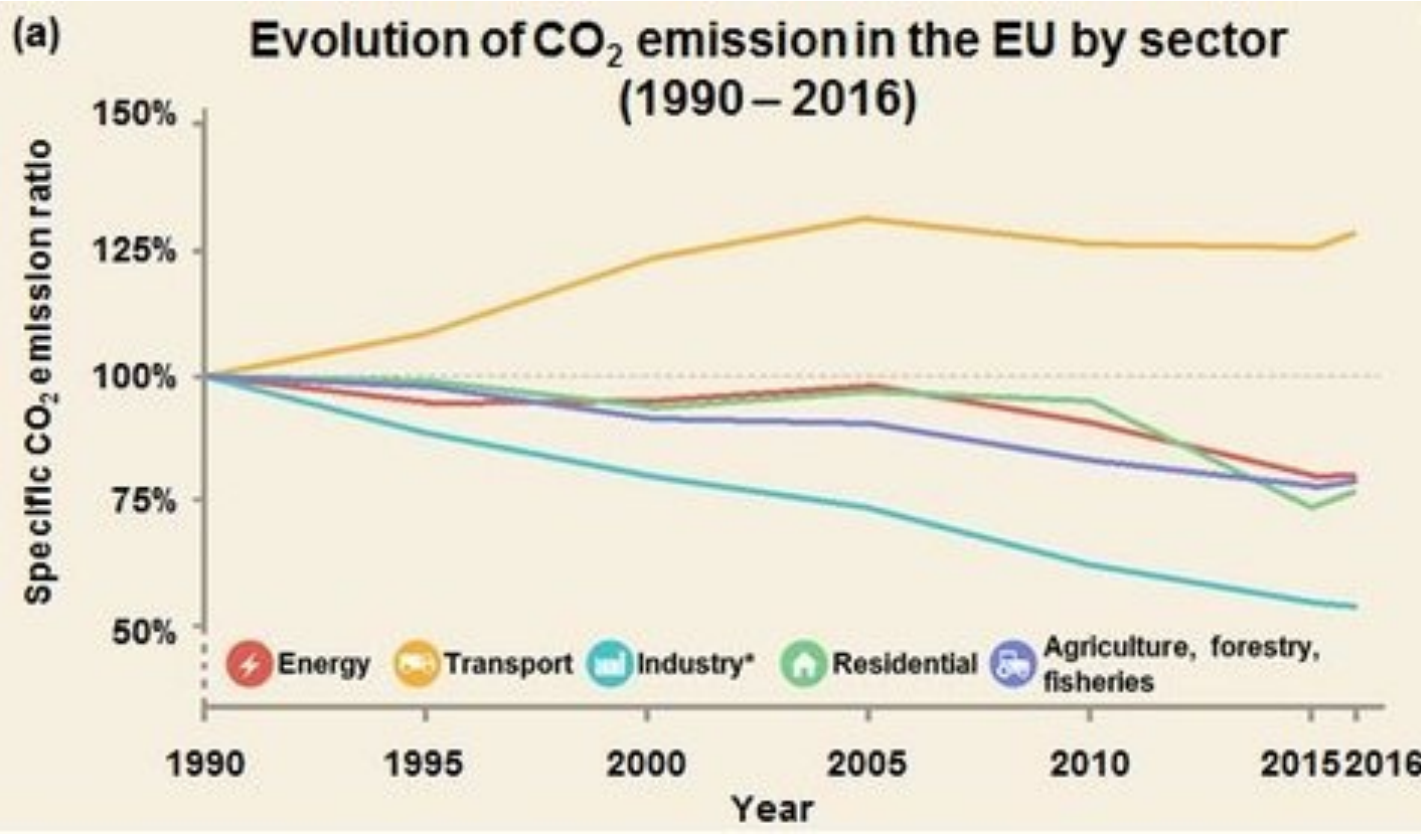
Ministerie van Infrastructuur en Milieu

NEDERLAND IN NOORDWEST-EUROPA

- beouwing
- sterk verstedelijkt gebied
- HSL/HST, pm
- Europees wegennetwerk, pm
- Internationale vaarwegen, pm
- HSL station
- Luchthaven
- Haven
- Zee
- Wadden
- Groot aaneengesloten areaal bos grens (pm)

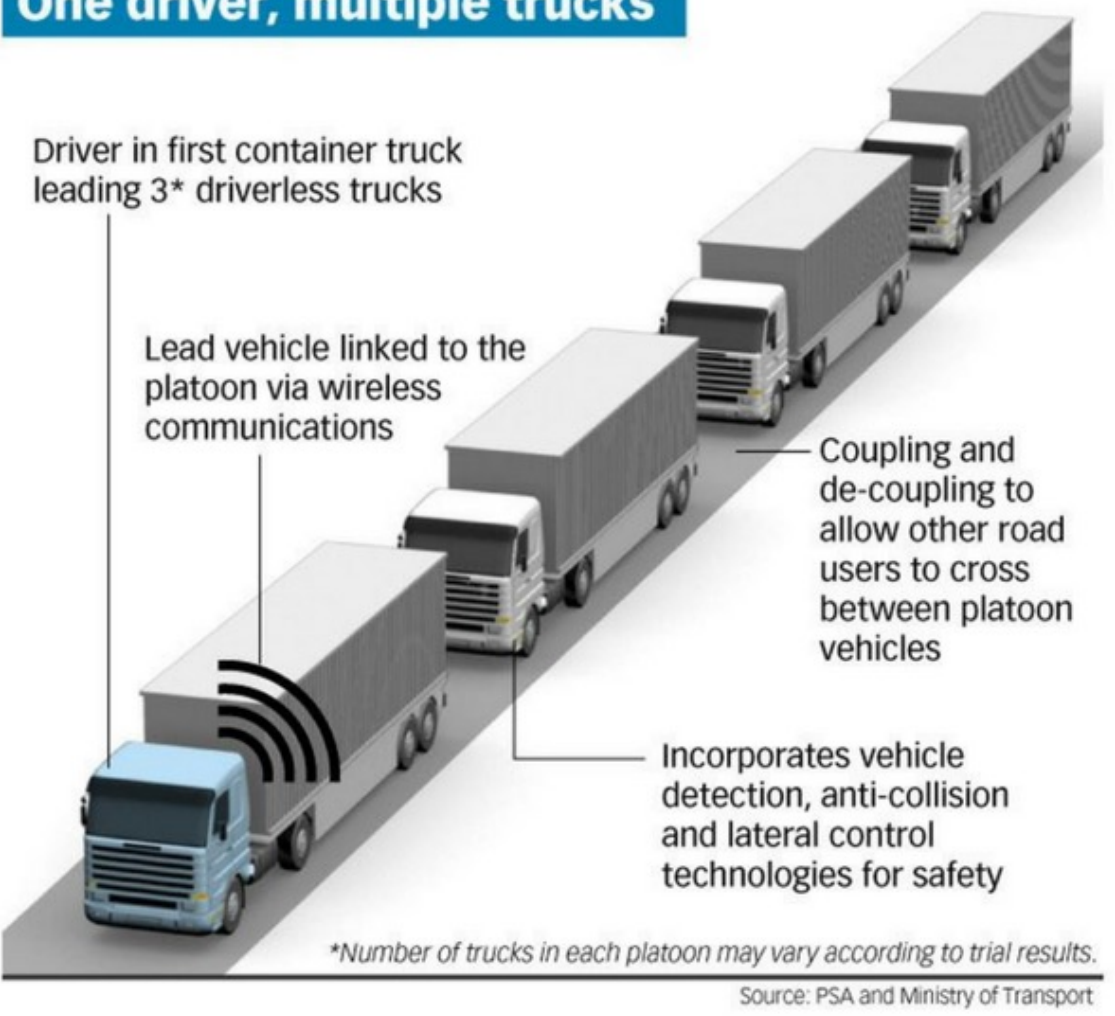
DG Ruimte, NRO, GIRO

Make optimal use of multimodal networks to connect producers and 50.000.000 consumers in the circular economy



On second thought however, there are huge sustainability issues in current transportation and logistics

One driver, multiple trucks



Can we solve this with smart systems like platooning or better trucks, like hydrogen powered trucks?

The Hydrogen-fuelled container feeder vessel



The new container feeder vessel targets traditional trades.

- full open-top 1000 TEU intake with 150 reefer slots, 700 TEU @14t
- service speed of 15 knots

The new container feeder vessel runs on liquid Hydrogen.

- two power generation rooms, forward and aft
- 5 MW fuel cell systems, with 3 MWh battery systems to provide peak power
- multiple type C tanks with 920 m³ to hold liquid Hydrogen for a ten-day roundtrip





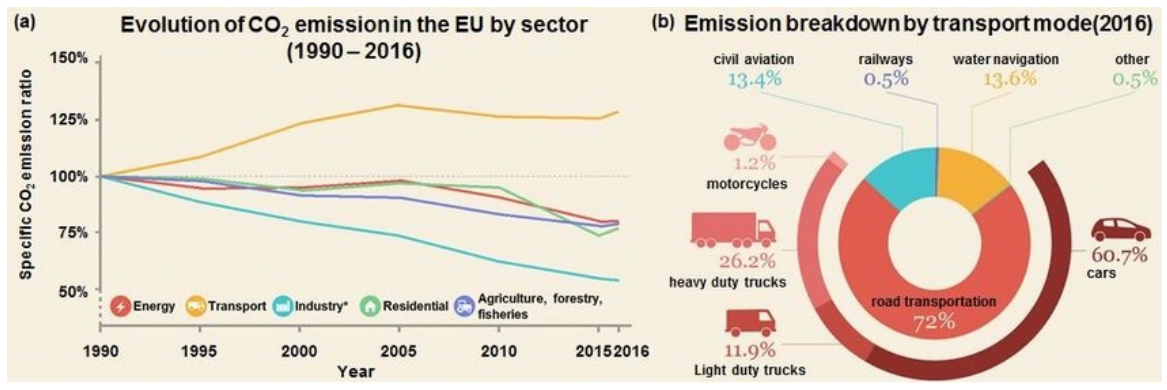
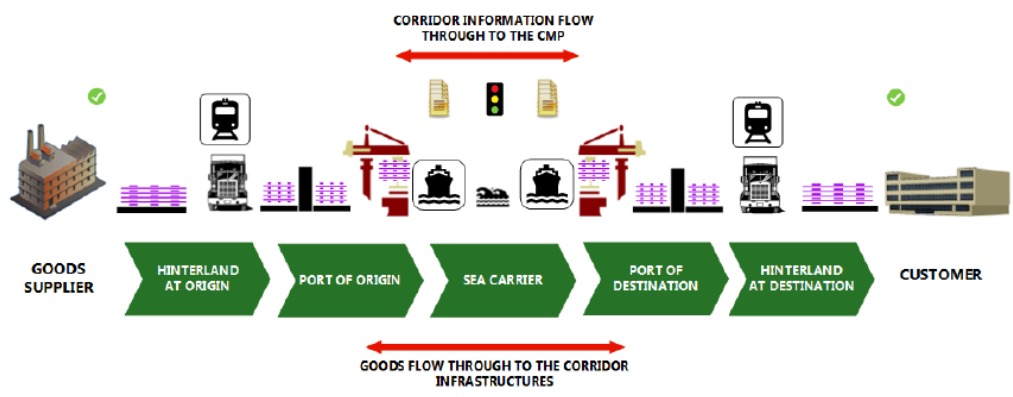
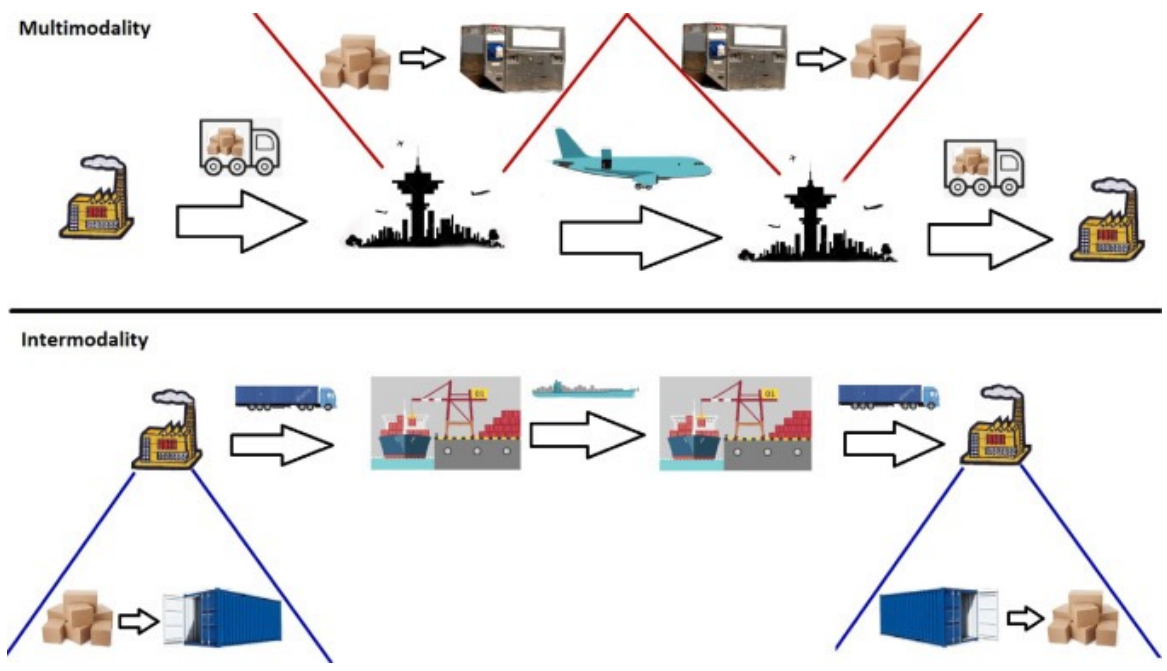
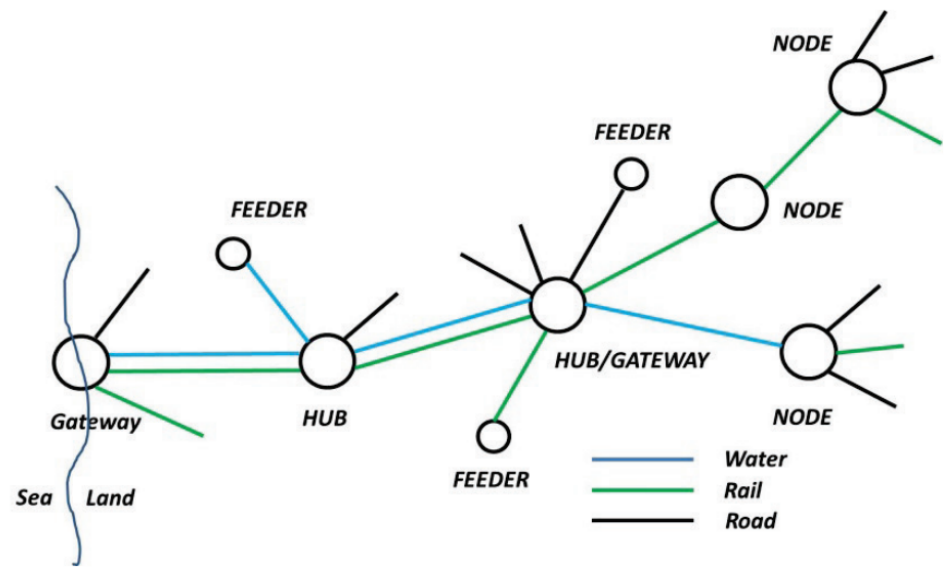
...and hydrogen trains...

Multimodal infrastructure nodes: chances for the circular economy



...as well as in hydrogen transportation and fuel stations

Multimodal infrastructure nodes: chances for the circular economy



The real problem: logistic chains are designed for the linear economy, not for reverse logistics

- (1) Refuse: prevent the use of raw materials
- (2) Reduce: reduce the use of raw materials
- (3) Reuse: product reuse (second-hand, sharing of products)
- (4) Repair: maintenance and repair
- (5) Refurbish: refurbishing a product
- (6) Remanufacture: creating new products from (parts of) old products
- (7) Repurpose: product reuse for a different purpose
- (8) Recycle: processing and reuse of materials
- (9) Recover energy: incineration of residual flows.

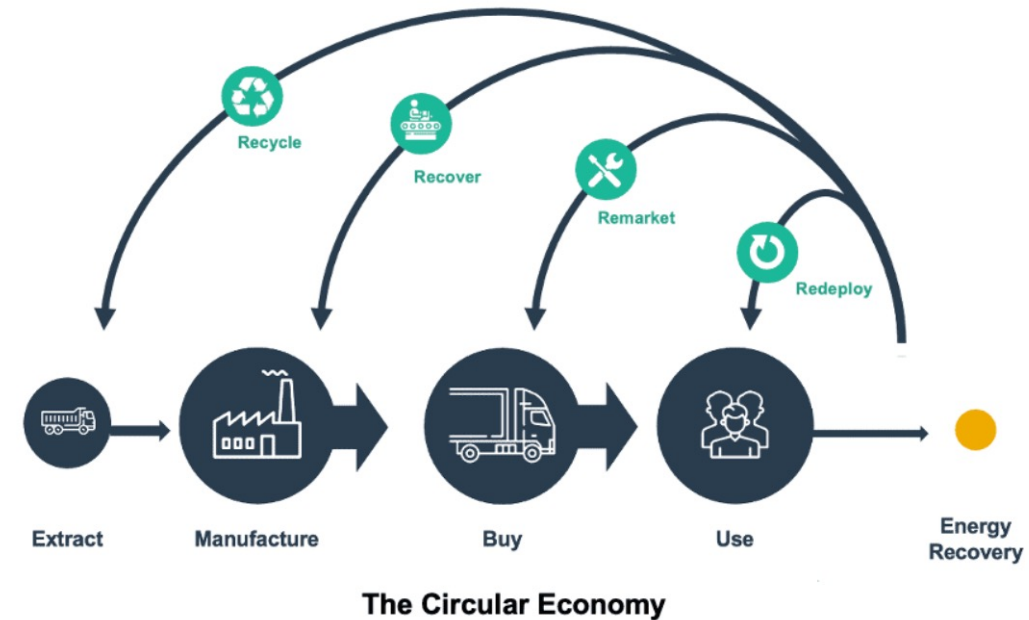
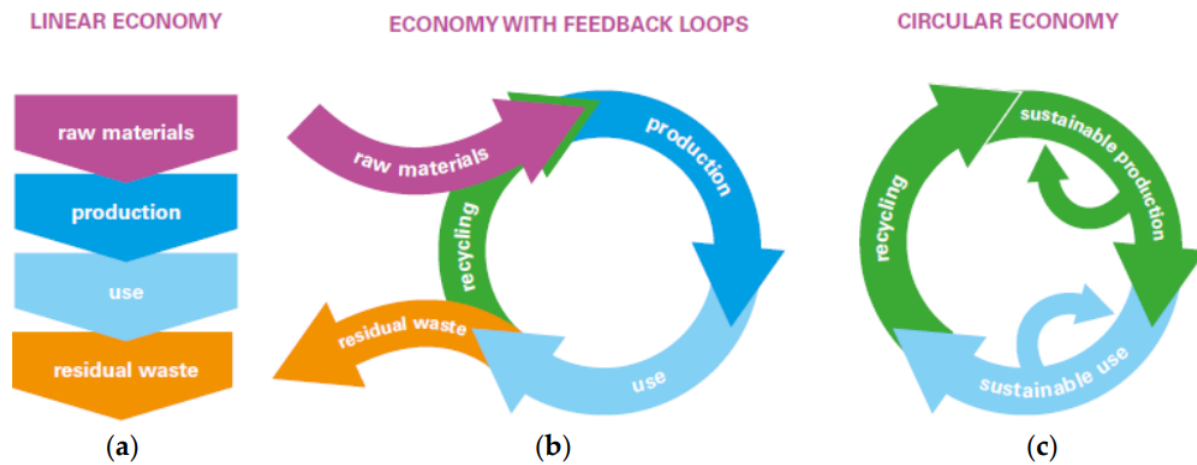


Figure 1. Differences between linear economy, economy with feedback loops, and circular economy [5].
(a) linear economy; (b) economy with feedback loops; (c) circular economy.

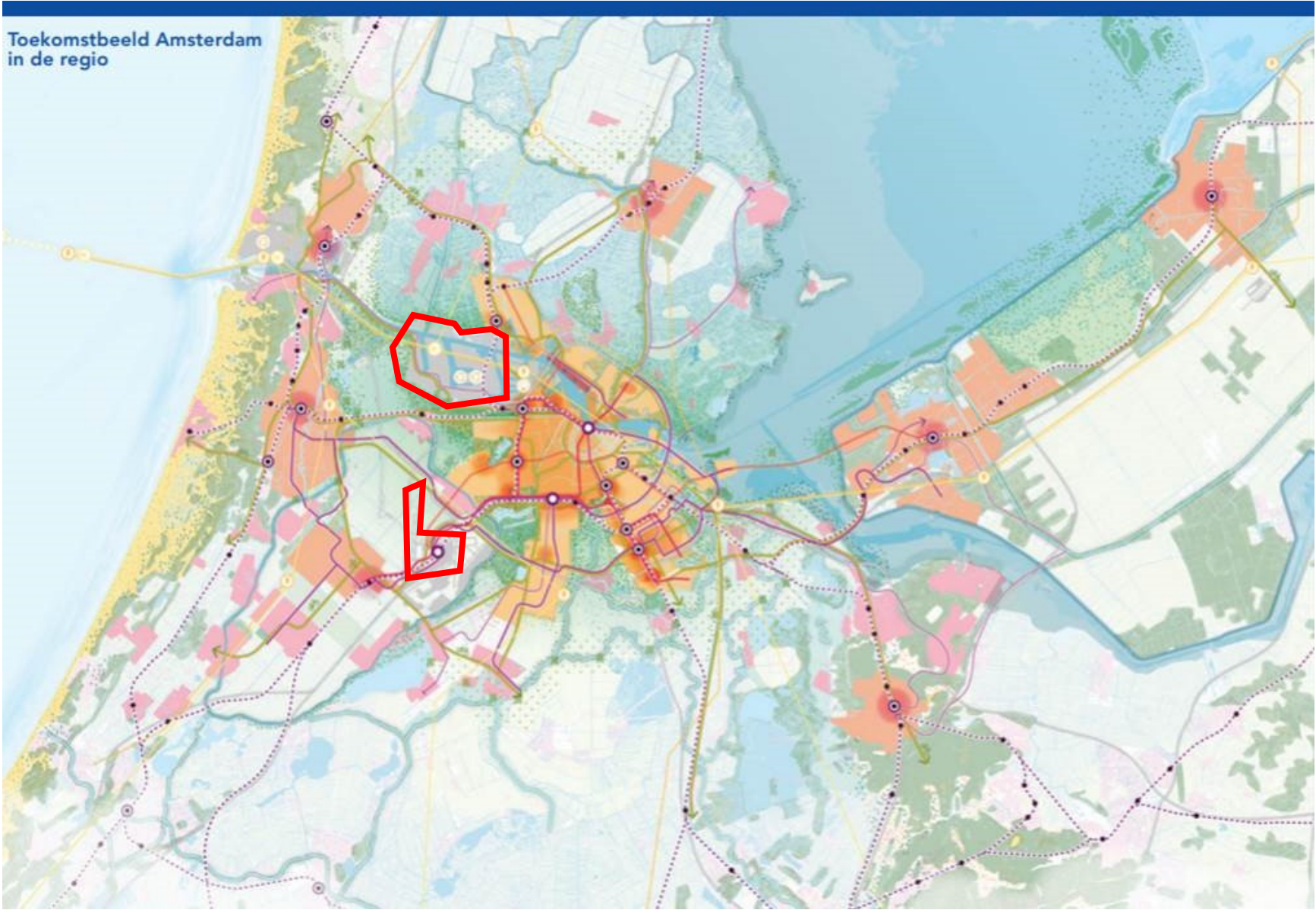
How should we organize logistics for the circular economy to avoid loss of value by cost of transportation and storage?

Multimodal infrastructure nodes: chances for the circular economy



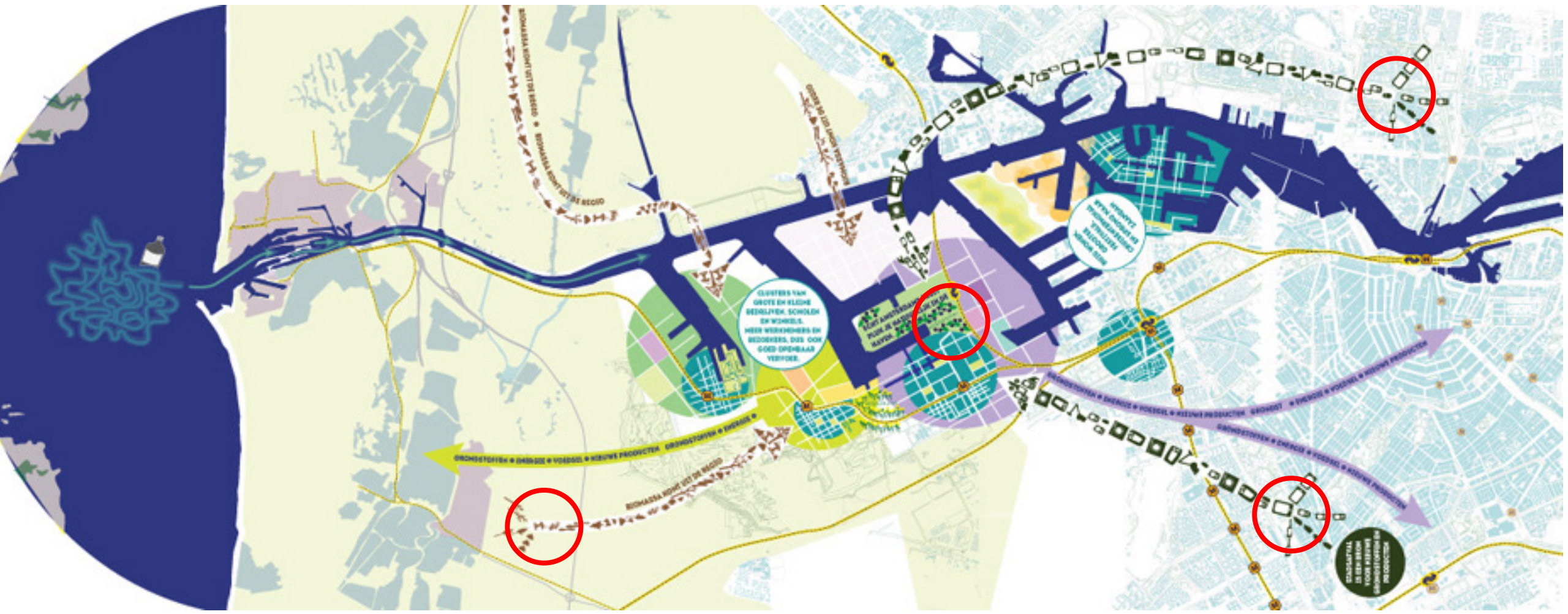
1st circular construction materials hubs Amsterdam, Utrecht: many scales in the value chain of the circular economy

Multimodal infrastructure nodes: chances for the circular economy



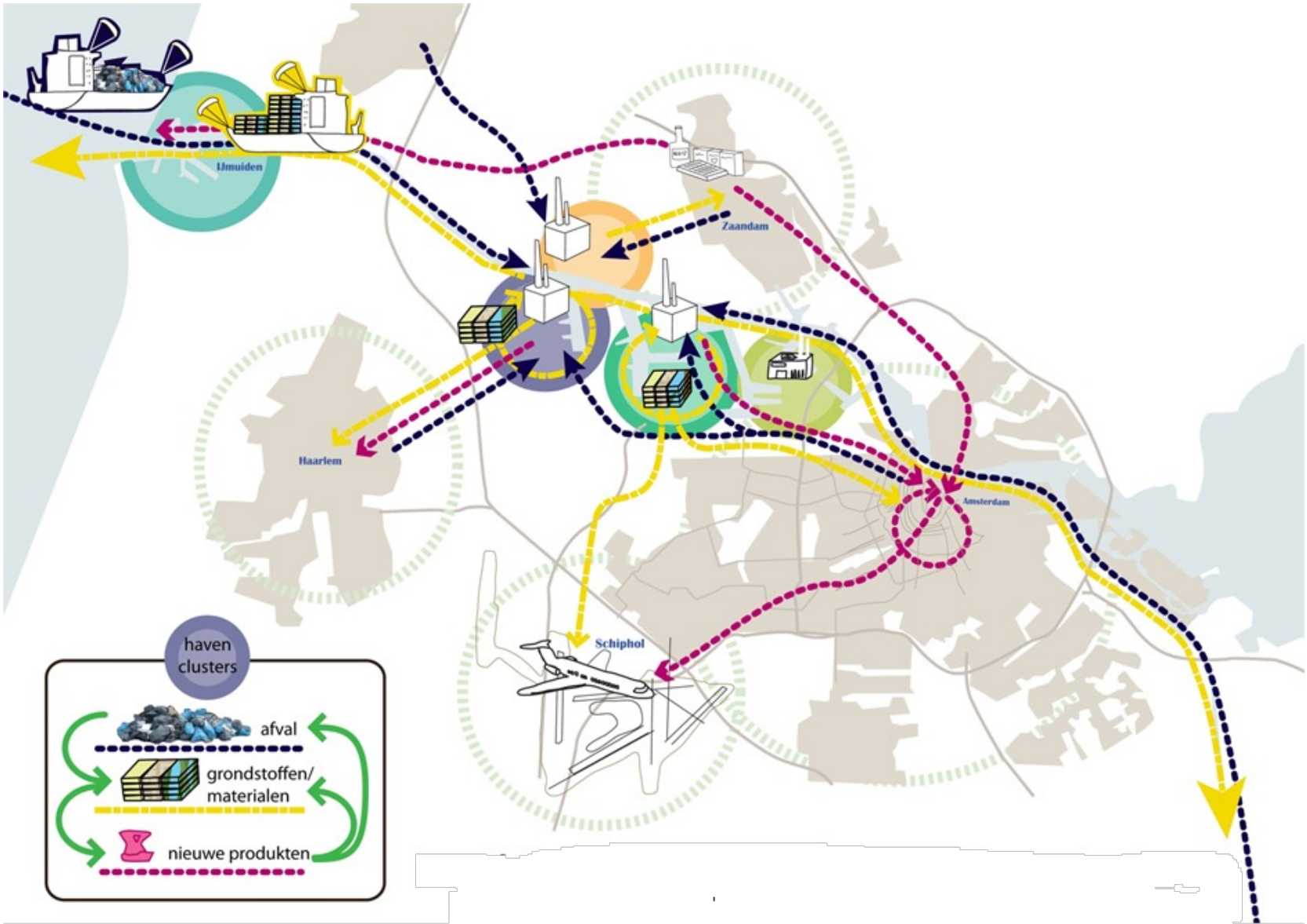
Amsterdam develops the circular harbour and airport, but does it provide a clear concept for scales and circular logistics?

Multimodal infrastructure nodes: chances for the circular economy



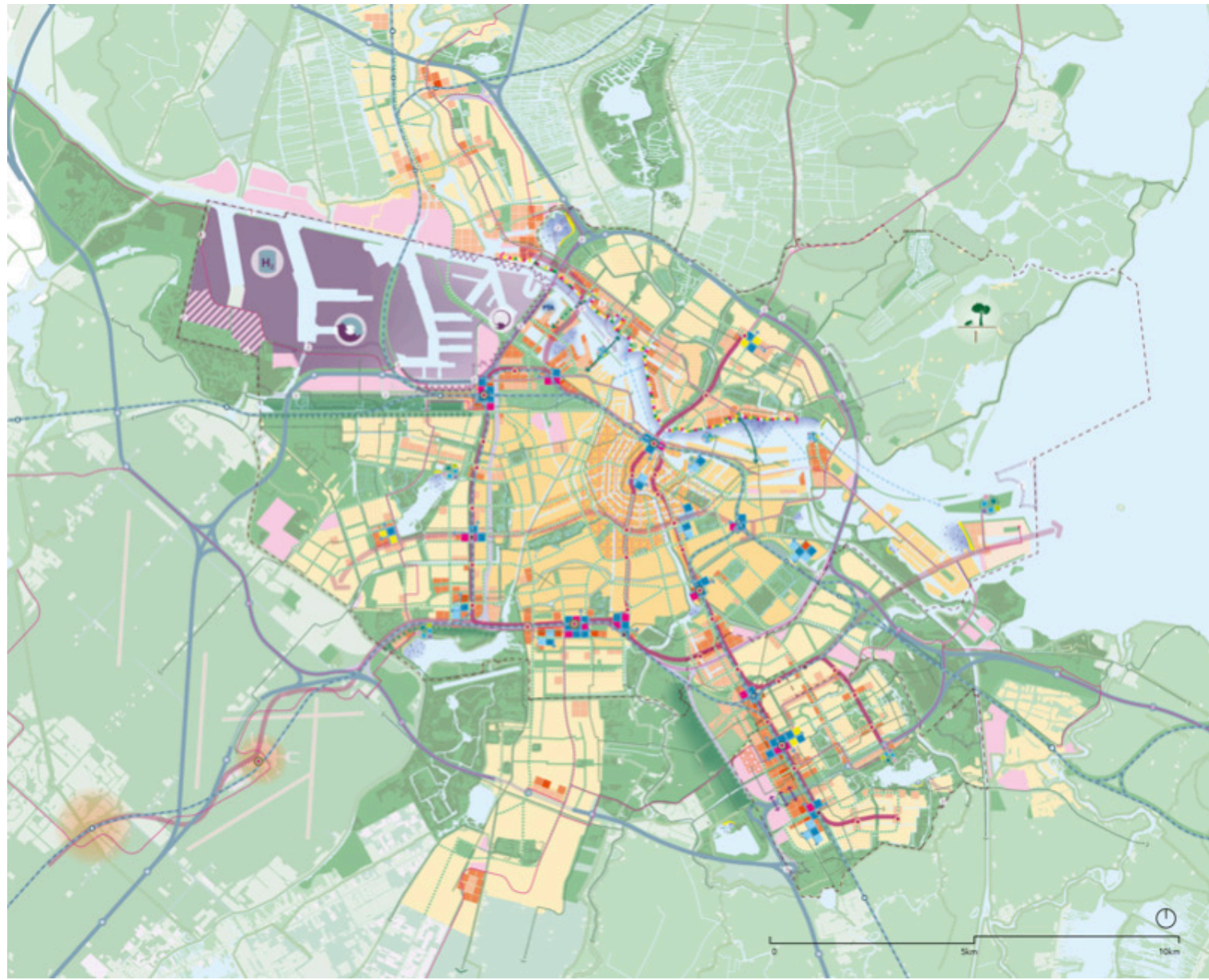
This drawing indicates some network relations, but what happens at these points, and how does stuff get there efficiently?

Multimodal infrastructure nodes: chances for the circular economy



At the large scale there seems to be a clear strategy how to turn waste into new materials and new products

Multimodal infrastructure nodes: chances for the circular economy



But while we transition to the circular harbour, what should happen in the city, and how does it connect to the larger region?

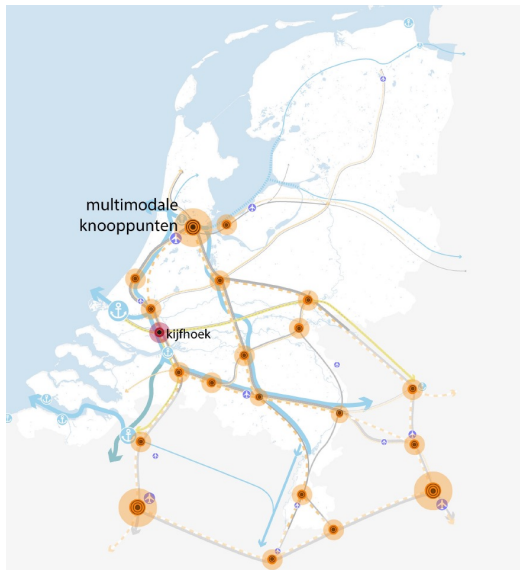
Multimodal infrastructure nodes: chances for the circular economy



stedebouw
must

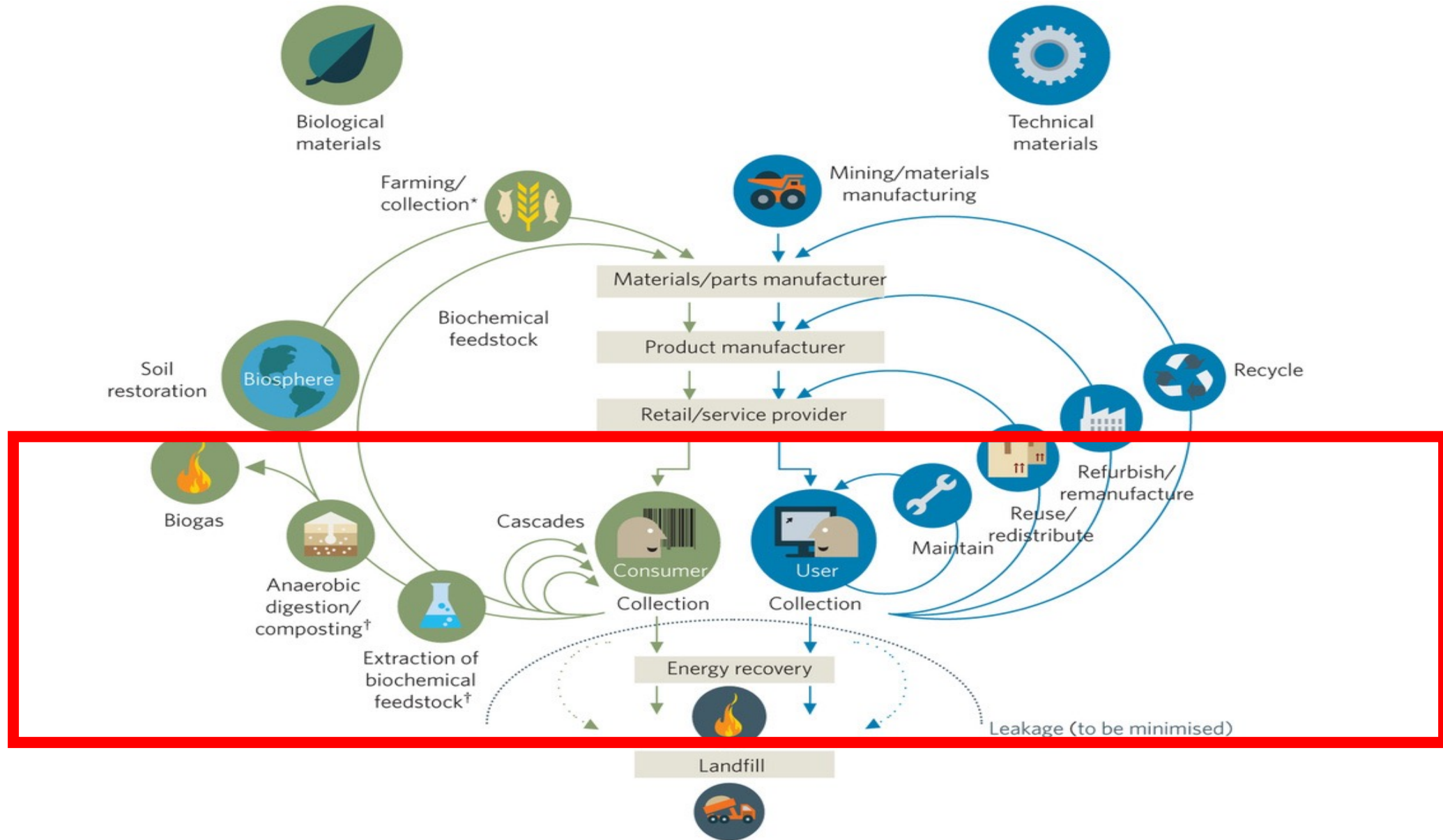
Can we improve the circular metabolism at European scale, and reduce the impact of transportation at the same time?

Multimodal infrastructure nodes: chances for the circular economy



How can we optimize use of the available networks, connect them and transition to zero emission transportation?

Multimodal infrastructure nodes: chances for the circular economy



Circular challenges at neighbourhood, city and metropolitan level: how can we optimize small scale metabolism in the last mile?



Organize the circular economy from the smallest scale upward and from the largest scale downward

The Breathing City, City of the Future 2050, Rotterdam (NL) 2018

The proximity principle is a precondition for a successful transition to the circular economy

Mobility hub, car-free neighbourhood, circularity hubs, wetland regeneration

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The Breathing City, City of the Future 2050, Rotterdam (NL) 2018

BNA
Min I&W
Min Int Aff
Ams, Rott, Utr, TH, Eind
TU Delft
AMS
PBL
Deltametropolis

How does the city of the future solve these issues?

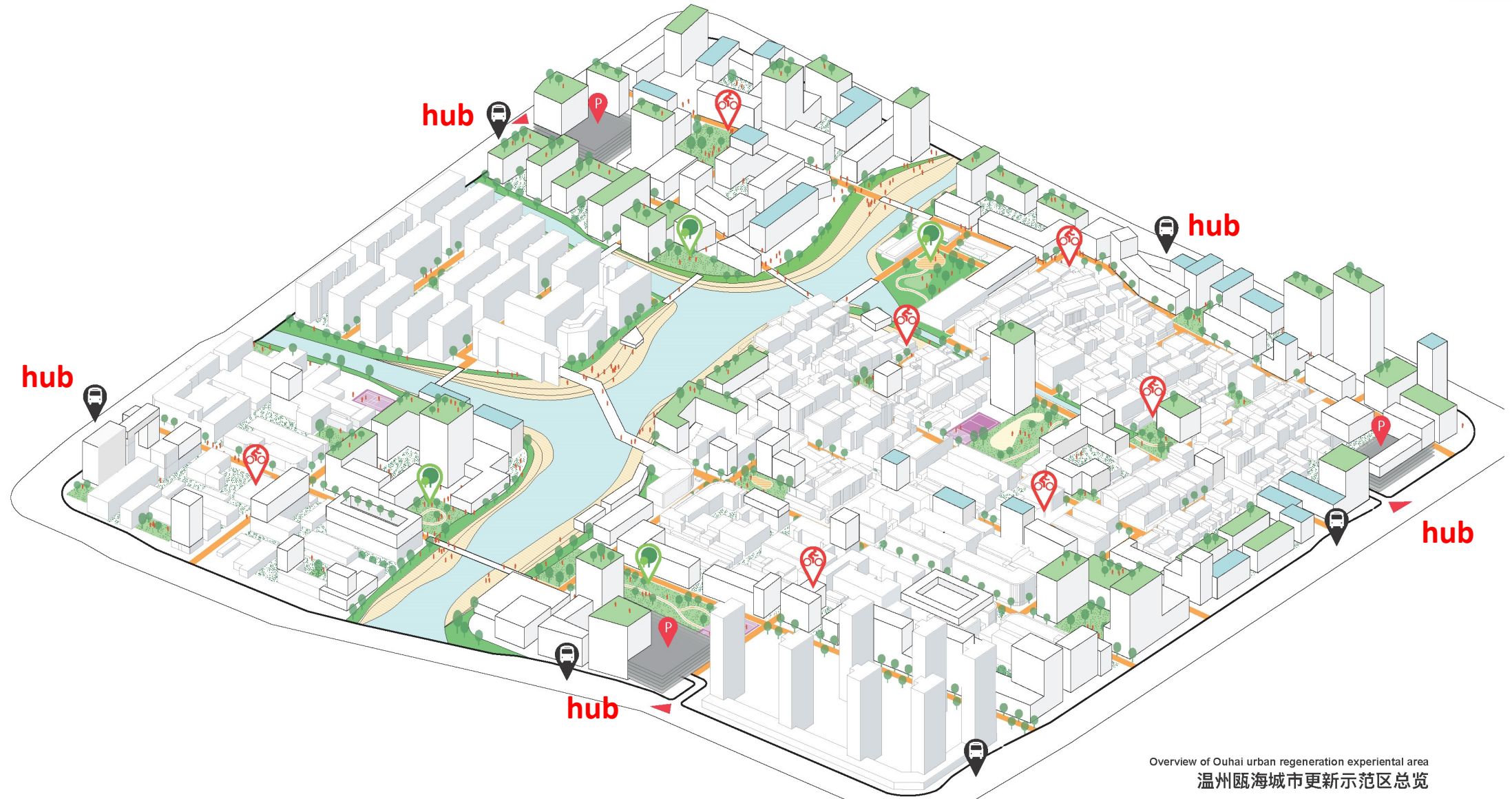


Microcity hub organizes neighbourhood level

Multimodal hub connects to the region

Wenzhou Ouhai, nature-inclusive walkable city masterplan, Wenzhou (CN) 2020

Hubs at different scale levels are crucial for an effective circular economy without loss of value by transportation and storage



Overview of Ouhai urban regeneration experiential area
温州瓯海城市更新示范区总览

Wenzhou Ouhai, nature-inclusive walkable city masterplan, Wenzhou (CN) 2020

Multimodal infrastructure nodes: chances for the circular economy

With the **UN Sustainable Development Goals** and the **Paris Climate Agreements** we have shared ambitions for the future

The **MicroCity model** on the next pages translates these ambitions into feasible urban strategies with simple measures at the neighbourhood level

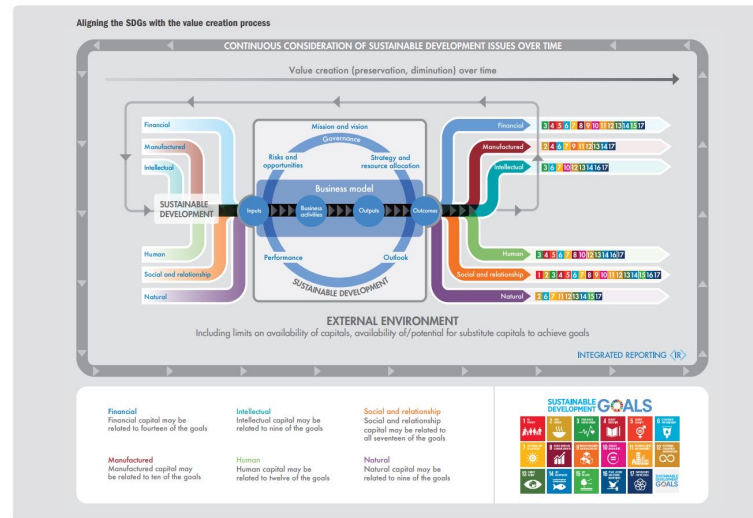
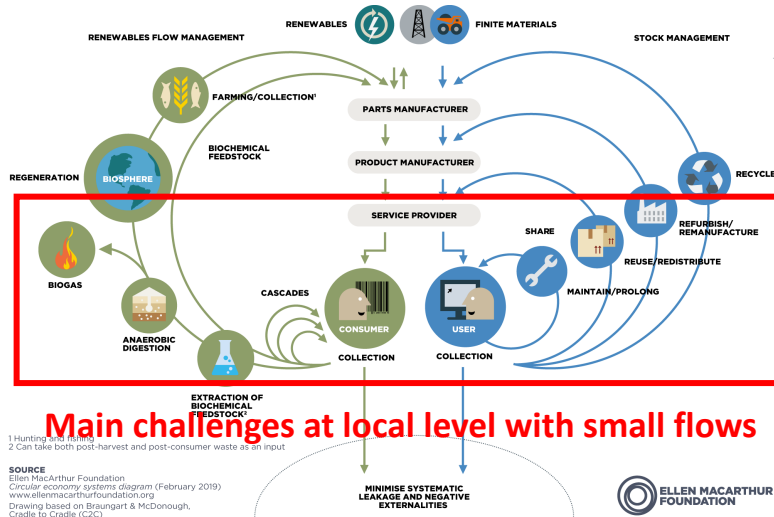
We **eliminate most of car traffic and parking** in neighbourhoods to create room for people, ecology and the **circular economy**

This way, neighbourhoods are transformed into **resilient natural and urban ecosystems** that are part of a strong and resilient circular economy

With these strategies we can create **largely self-sufficient neighbourhoods** and circular economies that seriously reduce man's footprint on the planet

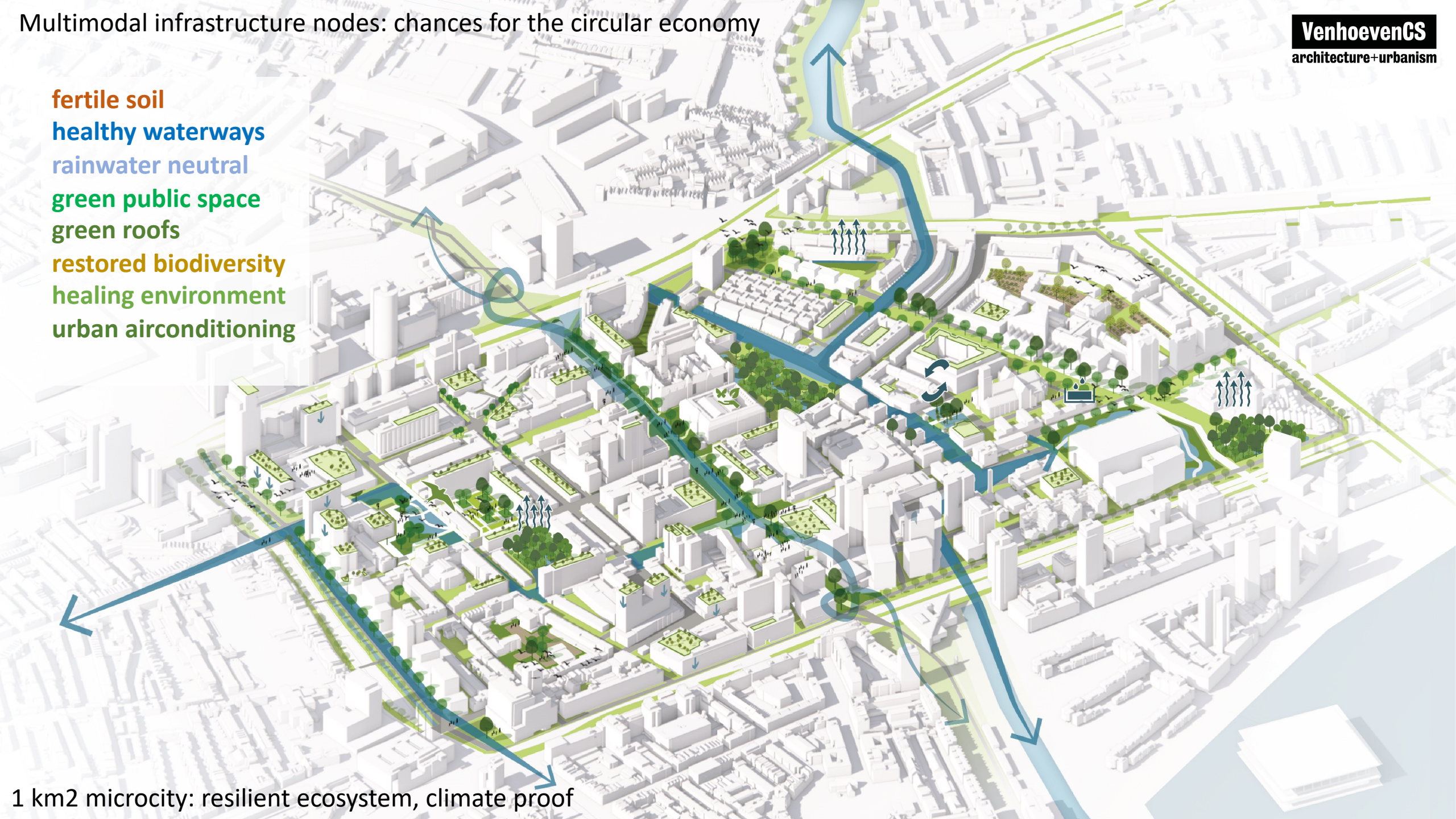
With a combination of **high-tech and low-tech measures** we contribute to multiple ambitions at the same time, including healthy, strong and inclusive local economies

The **six capitals approach** is used to assess impact on natural, social, human, intellectual, manufactured and financial capital, and **progress on the SDG's**



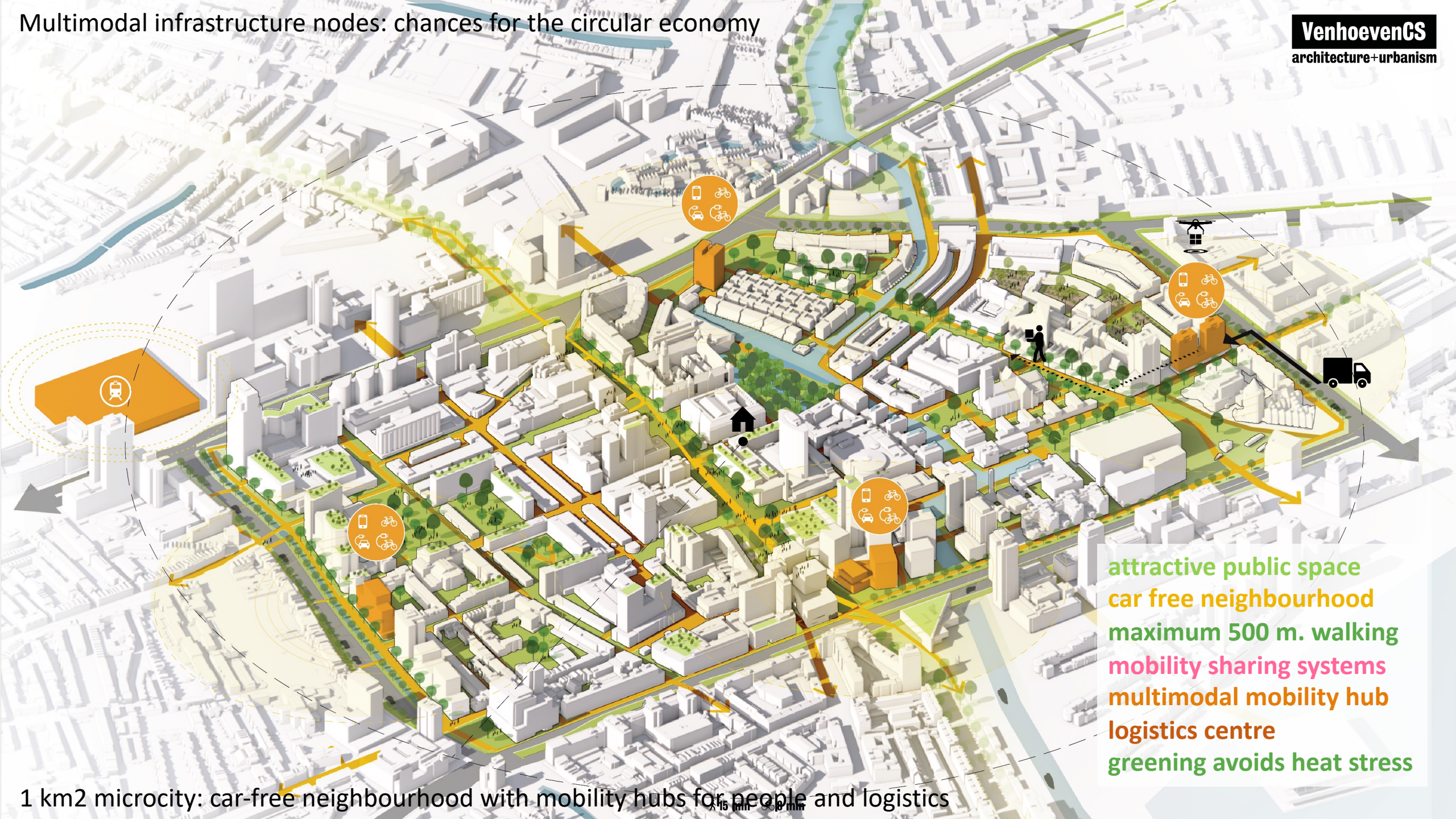
Multimodal infrastructure nodes: chances for the circular economy

- fertile soil**
- healthy waterways**
- rainwater neutral**
- green public space**
- green roofs**
- restored biodiversity**
- healing environment**
- urban airconditioning**



1 km² microcity: resilient ecosystem, climate proof

Multimodal infrastructure nodes: chances for the circular economy

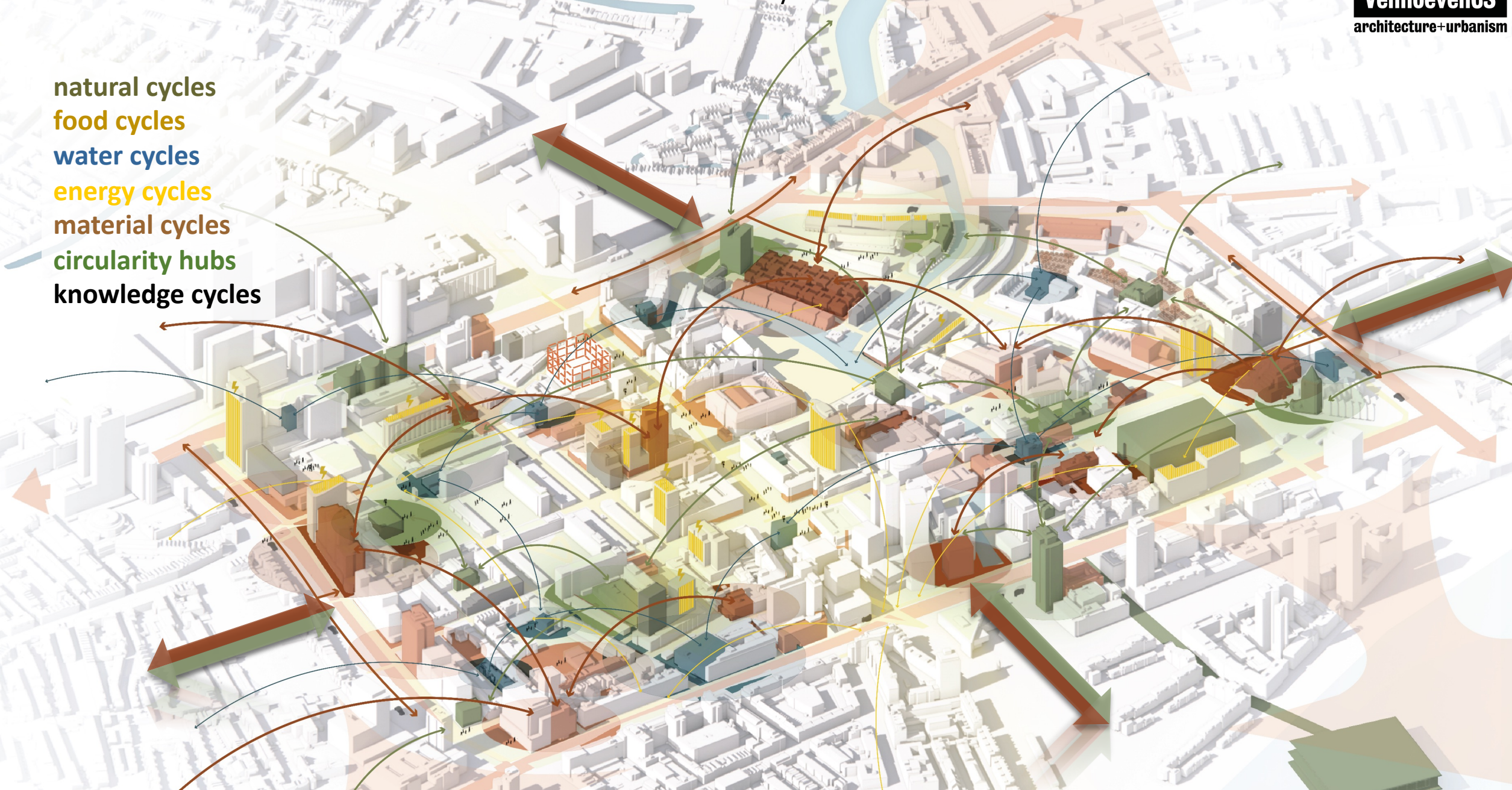


- attractive public space
- car free neighbourhood
- maximum 500 m. walking
- mobility sharing systems
- multimodal mobility hub
- logistics centre
- greening avoids heat stress

1 km2 microcity: car-free neighbourhood with mobility hubs for people and logistics

Multimodal infrastructure nodes: chances for the circular economy

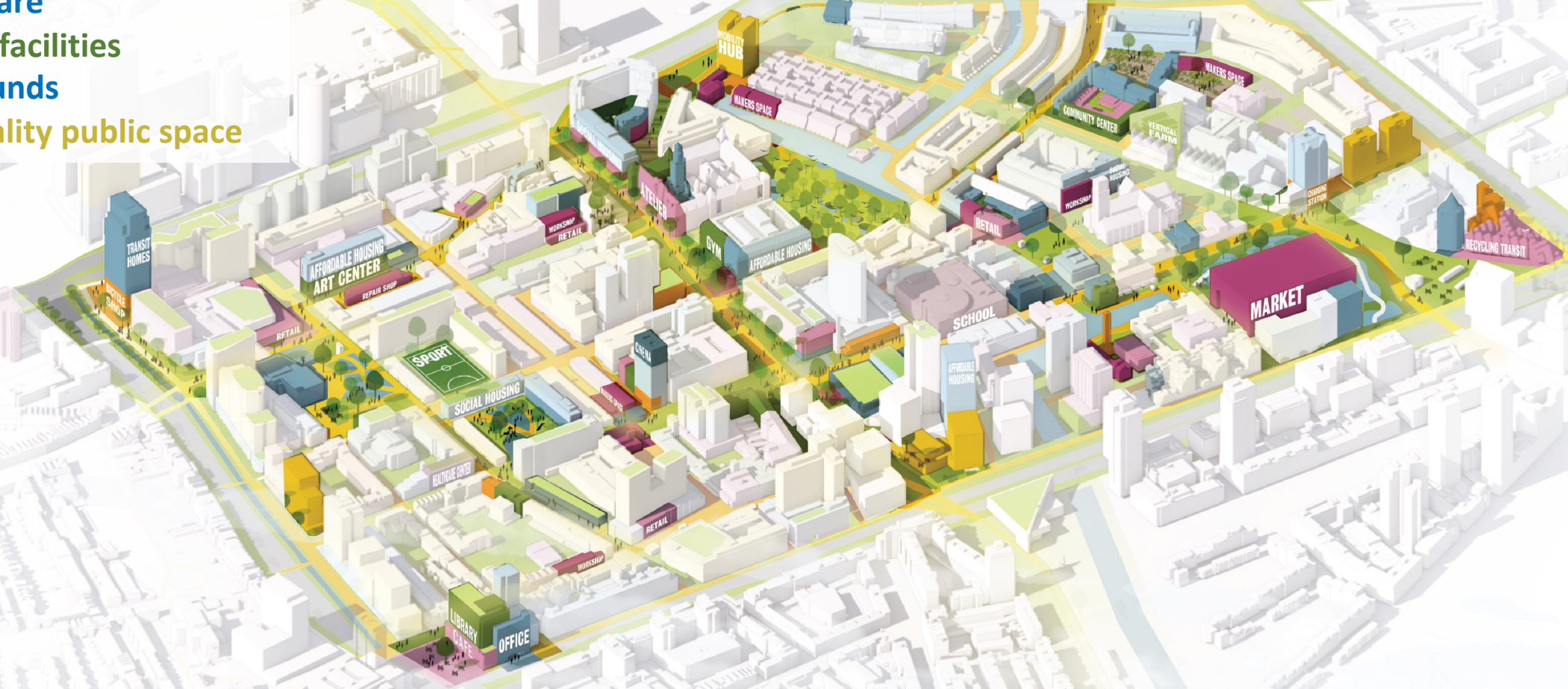
- natural cycles
- food cycles
- water cycles
- energy cycles
- material cycles
- circularity hubs
- knowledge cycles



1 km2 microcity: circular economy at the neighbourhood level

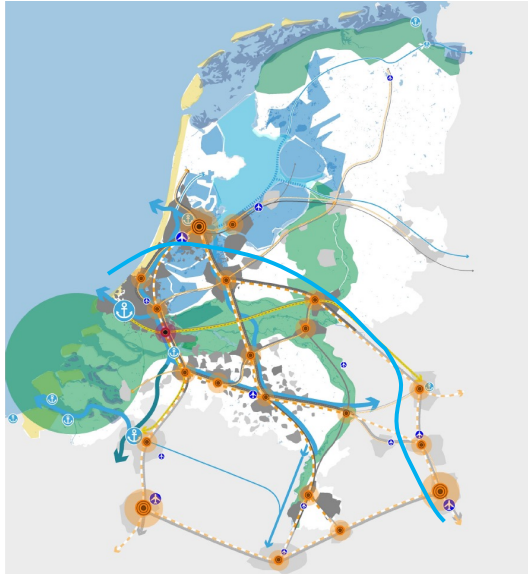
Multimodal infrastructure nodes: chances for the circular economy

- 5.000 – 25.000 inhabitants
- >30% affordable homes
- schools
- sports facilities
- health care
- cultural facilities
- playgrounds
- high quality public space



1 km2 microcity: attractive mixed-use neighbourhood at walking distance

Multimodal infrastructure nodes: chances for the circular economy



The Hydrogen-fuelled container feeder vessel



- The new container feeder vessel targets traditional trades.
- full open-top 1000 TEU intake with 150 reefer slots, 700 TEU @141
- service speed of 15 knots
- The new container feeder vessel runs on liquid Hydrogen.
- two power generation rooms, forward and aft
- 5 MW fuel cell systems, with 3 MWh battery systems to provide peak power
- multiple type C tanks with 920 m³ to hold liquid Hydrogen for a ten-day roundtrip



Hydrogen powered modes

active modes

Multimodal metropolitan networks and nodes, zero emission transportation with hydrogen powered and active modes

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