UPCYCLING CENTRE
ZUIDOOST
FROM WASTE TO RESOURCE
‘How will the growth of inhabitants and tourists, the extra demand for new housing, infrastructure, data and energy networks and climate change management influence the public domain, on a time horizon up to 2025 and to 2050?’
STUDIO INTEREST

Energy

Economy

Future
A CIRCULAR ECONOMY IN 2050

Leader
The Netherlands will be the international leader in the area of the circular economy

50%
Reduction in the use of primary raw materials (minerals, fossil and metals).

100%
The Dutch economy will fully run on reusable raw materials

Source: A Circular Economy in the Netherlands by 2050, P.12
BIJLMER / HOLENDRECHT
DEMOGRAPHICS

86,000
Inhabitants in Zuidoost

146
Different nationalities in Zuidoost
DEMOGRAPHICS

- Surinamese: 32%
- Turks: 27%
- Moroccans: 24%
- Other non-western immigrants: 9%
- Western immigrants: 6%
- Natives: 6%
- Antillians: 3%

12% unemployment rate in Zuidoost

22.8% within the group of low income

AMSTEL III
36% Office building vacancy in Amstel III

38,300 Workers in Amstel III area

NO
Meeting spaces and a poorly designed public space
WASTE IN AMSTERDAM

304,000 Metric ton of waste in Amsterdam each year

261,000 Metric ton of waste from companies in Amsterdam

Households 86%
Waste separation 14%

Companies
Waste deposit
Waste incineration
Composting
Reuse

Sources: Afvalketen in Beeld Grondstoffen uit Amsterdam (2015)
RESOURCES IN AMSTEL III

Cardboard from IKEA warehouse

Energy from ArenA

Materials from waste point Gaasperplas

Food waste from local shops and restaurants

Food waste
Coffee ground
Wood
Plastic
Glass
Metal
Cardboard
Electronics
Textile
Rubber
Thermal energy
Electrical energy
**FUTURE AMSTEL III**

Mixed-use development to create an innovation district

‘Innovation districts constitute the ultimate mash up of entrepreneurs and education institutions, start-ups and schools, mixed-use development and medical innovation, bike sharing and bankable investment - all connected by transit, powered by clean energy, wired for digital technology, and fueled by caffeine.’

- Katz & Wagner (2014)

THE BORDER
Border
creates strong disconnection
between mono-functional areas
The Zuidoost district welcomes the development of Amstel III to a lively, connected city district. There will be more homes, facilities and recreational opportunities, and more opportunities to strengthen the local economy. Amstel III is therefore for several reasons important for the residents of Zuidoost ‘on the other side of the traintrack’.

- Muriël Dalgliesh, district manager (2017) (translated)

‘The Zuidoost district welcomes the development of Amstel III to a lively, connected city district. There will be more homes, facilities and recreational opportunities, and more opportunities to strengthen the local economy. Amstel III is therefore for several reasons important for the residents of Zuidoost ‘on the other side of the traintrack’.’

- Muriël Dalgliesh, district manager (2017) (translated)
ZUIDOOST CHALLENGES

**Unemployment**
High unemployment rate and a big low income group

**Disconnection**
Strong disconnection between Holendrecht in Amstel III, train track forms a border

**Waste**
Lots of waste available from the companies of the Amstel III area
The Netherlands will be the international leader in the area of the circular economy.

- **Leader**: The Netherlands will be the international leader in the area of the circular economy.
- **50%**: Reduction in the use of primary raw materials (minerals, fossil and metals).
- **100%**: The Dutch economy will fully run on reusable raw materials.

- **2020**
- **2030**
- **2040**
- **2050**

Source: A Circular Economy in the Netherlands by 2050, P.12
WHAT IS A CIRCULAR ECONOMY?

‘A product is just a temporary use of a material or component.’

- Ruben van Doorn, CEO of Turn Too

Source: A Circular Economy in the Netherlands by 2050, P.12
WORLDWIDE RESOURCE EXTRACTION

Source: Krausmann et al., 2009.
Production concentration of critical mineral materials in Europe is dependent on other continents.

- **Canada**: Cobalt
- **United States**: Beryllium
- **Mexico**: Fluorspar
- **Brazil**: Niobium, Tantalum
- **South Africa**: Platinum group metals
- **Democratic Republic of Congo**: Cobalt, Tantalum
- **Rwanda**: Tantalum
- **India**: Graphite
- **Russia**: Platinum group metals
- **Japan**: Indium
- **China**: Antimony, Beryllium, Gallium, Germanium, Indium, Magnesium, Rare earth minerals, Tungsten

The necessity to strive for a circular economy comes from a concurrence of three developments:

1. Explosive demand for raw materials
2. Dependency on other countries
3. Interconnectivity with the climate (CO₂ emissions)

A Circular Economy in the Netherlands by 2050

Source: European Commission, 2010
ENVIROMENTAL IMPACT

CENTRALIZED RECYCLING PROCESS

CENTRALIZED
Decentralization in Amsterdam

Stimulation of decentralized waste and water management systems. This makes it possible to recover heat, energy and raw materials locally.

Source: Amsterdam circulair, Een visie en routekaart voor de stad en regio (2015), p. 65
‘In 2020, ABP, the biggest pension fund in the Netherlands, invests 23 billion Euros more in sustainable projects compared to 2015.’

- De Nederlandsche Bank N.V.

‘We need to build a new system – one that delivers sustainable investment flows, based on both resilient market-based, and robust bank-based, finance. We need finance for the long term.’


OPPORTUNITIES IN THE NETHERLANDS

7 billion Euro can be generated in a circular economy

54,000 new jobs will be created in the Netherlands

9% CO2 reduction with a circular economy

Source: A Circular Economy in the Netherlands by 2050, P.11
CIRCULAR ECONOMY

ZUIDOOST

RESEARCH CONCLUSIONS

High unemployment and low income

Disconnection mono-functional zones

Lots of waste available at the Amstel III companies

ZUIDOOST CIRCULAR ECONOMY

Long term investments in large sustainable projects

Decentralized recycling to reduce use of raw materials

Value potential in large amount of waste

€

Recycle

Trash
In Amsterdam there are some problems with energy transition but also a lot of opportunities. At first, there are around 23% of social housing tenants that have trouble paying the energy bills. Then, there is the opportunity of around 300,000 metric tonnes of produced waste in Amsterdam, what is currently mostly burned causing CO2 emissions, but can be processed differently. And there is a 1.8 billion energy business in Amsterdam, so there is a good chance of earning money during the transition.

**PROJECT AMBITIONS**

- **Waste as a resource** in the circular economy to create local economic value
- **Opportunities in work and investment** by inserting a circular economic model
- **Connecting the areas** Amstel III and Holendrecht physically, socially and economically
- **Social inclusion and interaction** by a mix-used program for all people
- **Climate goals contribution** by creating a new sustainable typology
How can a circular sustainable economic model be implemented to connect Amstel III and Holendrecht socially, economically and physically in the future?
RESEARCH QUESTION

THE PRINCIPLE
Typology
Upcycling centre

THE PROGRAM
Functions
Users

DESIGN QUESTION

THE LOCATION
Future development

THE CONCEPT
Design
Spaces

DETAILING
Construction
Climate

CONCLUSION
Wasteboards
Making skateboards from plastic

Rotterzwam
Making mushrooms from coffee ground

Refil
Making 3D print inkt from used plastics

Instock
Restaurant that uses waste of supermarkets

Black bear
Reuse of carbon black into ink, tires or other products.

Interface
Recycling fishnets into new carpets

Fruitleather
Transforming leftovers of fruit into leather like material

Spireaux
Making of spirulina, a proteins and vitamins rich food.

Community plastics
Transforming plastic from the community into new products

Reblend
New clothing from used textile parts.
BLUE CITY ROTTERDAM
“Companies can earn six times more money on coffee grounds than on the coffee itself, making the ‘waste’ more valuable than the product.”

- Gunter Pauli

The RotterZwam company is not seeing the coffee ground as waste but as a resource to produce valuable mushrooms. The company can produce 1 kg of mushrooms with 5 kg of coffee ground and sell it for 20 Euro. This would be only in the Netherlands a business of 480 million Euro with as a positive side effect less CO2 pollution.

Source: Rotterzwam. https://www.rotterzwam.nl/page/rotterzwam-growkit
SEOUL RECYCLING PLAZA

‘The facility allows visitors to experience the entire process of recycling in a functional and exciting atmosphere that encourages participation.’
RETUNA | ESKILTUNA, SWEDEN
I want to make a local resource hub which houses all different programs that can help creating local value. It will collect all the resources in the future and make them accessible for the blue economy startups in the building. There will also be a local market, vertical gardening, and offices that manage local energy projects. The building will provide jobs, connect with the two sites, and form new investment opportunities.

Source: http://www.effekt.dk/work#/regenvillages
DECENTRALIZING RECYCLING

‘To avoid depletion of material resources, violation of ecological values and loss of cultural diversity the trend towards globalization must be broken and replaced by new economic approaches (e.g. circular economy) tailored to local conditions.’

WHY DECENTRALIZING?

**Awareness**
creation about recycling and waste, making it visible for the people

**Transport**
can be reduced, creating less CO2 emission

**Local**
circular economy is stimulated by creating local jobs and local products
I want to make a local resource hub which houses all different programs that can help creating local value. It will collect all the resources in the future and make it accessible for the blue economy startups in the building. There will also be a local market, vertical gardening and offices that manage local energy projects. The building will provide jobs, connect with the two sites and form new investment opportunities.
THE PRINCIPLES

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RESOURCES EXCHANGE

‘With the spread of the Internet of Things (IoT), there is incredible opportunity to enable circular innovation’.

- Chris Dedicoat

[Diagram with various nodes and arrows indicating resource and energy trade]
I want to make a local resource hub which houses all different programs that can help creating local value. It will collect all the resources in the future and make them accessible for the blue economy startups in the building. There will also be a local market, vertical gardening, and offices that manage local energy projects. The building will provide jobs, connect with the two sites, and form new investment opportunities.

Source: SuperUse Studios, http://superuse-studios.com
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UPCYCLING CENTRE PROGRAM
PROGRAM REQUIREMENTS

**Recycling**
Program necessary for recycling and transport of waste and product making

**Inclusion**
Mixed program for inclusion of social entrepreneurs, learners and low educated workers

**Interaction**
Approachable meeting space for users and visitors to get to know the building and each other
PROGRAM MACHINE

THE MACHINE
5,500 m²

TOTAL = 21,000 m²
THE MACHINE
5,500 m²

TOTAL = 21,000 m²
# Program Operator

## The Operator
5,500 m²

- **Education**: 500 m²
  - Conference: 500 m²
  - Lobby: 1,000 m²
  - Offices: 3,500 m²
  - Classroom: 600 m²
  - Shared working space: 300 m²
  - Auditorium: 300 m²
  - Exhibition space: 300 m²

## The Maker
10,000 m²

- **Hospitality**: 1,000 m²
  - URBAN Farming: 1,000 m²
  - Recycling Market: 2,000 m²
  - Recycling Start-ups: 6,000 m²
  - Food production: 300 m²
  - Laboratory: 300 m²
  - Outside garden: 300 m²
  - Market space: 300 m²
  - Recycling shops: 300 m²
  - Storage: 300 m²

## The Machine
5,500 m²

- **Recycling Centre**: 5,500 m²
- Technical Room: 300 m²
- Cargo Hub: 300 m²
- Train transport hub: 300 m²
- Product storage: 300 m²
- Material storage: 300 m²
- Material recovery facility: 300 m²

**Total**: 21,000 m²
UPCYCLING PEOPLE

THE MARKET MAN

THE SOCIAL ENTREPRENEUR

THE PRODUCT CREATOR

THE INVESTOR

THE CREATIVE STUDENT

THE VISITOR
SITE REQUIREMENTS

Network
Embedded in local and regional infrastructure to transport resources

Connect
The areas of Amstel III with Holendrecht in a physical way
PROBLEMS
In 2040 already a lot of buildings in the Amstel III area as well as in Holendrecht are changed. The social housing structures make places for new dwelling and more nature flows inside these areas. The transport hubs become bigger and there is densification around the station.
In 2050 all the social housing has changed and the areas are mixed use.
UPCYCLING CENTRE
CONCEPT
DESIGN REQUIREMENTS

**Users**
Create vibrant spaces that welcome all users for social inclusion.

**Flexible**
Create solid grid structure that can easily be reused.

**Transparent**
Create an easy approachable and welcoming building that shows all activity.

**Green**
Design meeting spaces with lots of green to blend in with Zuidoost.
DESIGN OPTIONS
SITUATION
CONNECTING
THE MAKER

The lobby connects
THE OPERATOR
The lobby connects
The lobby connects
ENTRANCES
ROUTING
The lobby connects to the PUBLIC ROOF.
FLOWS
As well as the other meeting spaces of the restaurant and the local market under the train track.
As well as the other meeting spaces of the restaurant and the local market under the train track.
ALIBABA WAREHOUSE

As well as the other meeting spaces of the restaurant and the local market under the train track.
As well as the other meeting spaces of the restaurant and the local market under the train track.
UPCYCLING TOYS TO FURNITURE

The RotterZwam company is not seeing the coffee ground as waste but as a resource to produce valuable mushrooms. The company can produce 1 kg of mushrooms with 5 kg of coffee ground and sell it for 20 Euro. This would be only in the Netherlands a business of 480 million Euro with as a positive side effect less CO₂ pollution.

As well as the other meeting spaces of the restaurant and the local market under the train track.
FACADE PRINCIPLE

As well as the other meeting spaces of the restaurant and the local market under the train track
UPCYCLING CENTRE
DETAILING
WOODEN CONSTRUCTION

**Storage**
Instead of emitting CO2 by production, like concrete and steel

**Renewable**
Wood can regrow, creating new carbon storage, oxygen generation and forest habitat

**Reuse**
Possibilities when constructed in the right way

**Well being**
Lowering blood pressure and heart rates, reducing stress and increasing positive social interactions

THE CONSTRUCTION
WOOD TYPES

Source: Courtesy of Achterbosch Architectuur and Onix

WOOD TYPES
CROSS-BRACED CONSTRUCTION TO WITHSTAND LATERAL FORCES

BUILDING CORES TO WITHSTAND LATERAL FORCES

STABILITY
STEEL CONNECTORS
possibility of disassembly

GLULAM COLUMN
600x600 mm

CLT FLOORS
270 / 130 mm

LVL BEAMS
150x600 mm
REUSE OF WOOD

2,300 m
Glulam Column
Pinus Radiata
600x600 mm

2,000 m
Glulam Column
Beech
600x600 mm

19,000 m2
CLT Floor
130 mm

8,500 m2
CLT Floor
270 mm

2,000 m
LVL Beam
Pinus Radiata
150x600 mm

1,400 m
LVL Beam
Beech
150x600 mm

9 pcs
LVL Beam
36 m
BUILDING = RAW MATERIALS DEPOT

http://www.rau.eu/portfolio/gemeentehuis-brummen/
Comparison of net emissions of CO2 for various materials (KG)

-4,492,754

+28,079,706

+151,630,414

WOOD

CONCRETE

STEEL

CO2 REDUCTION

Source: NBvT https://co2opslag.nbvt.nl/
CO2 REDUCTION

4,500 KG tons of stored CO2 in the wood of the Upcycling centre

5.5 min Time it takes for the European forests to produce this amount of wood

5,000 households produce the same amount of CO2 with energy consumption each year

2,900 cars produce the same amount of CO2 emission each year in the Netherlands

Source: NBvT, https://co2opslag.nbvt.nl/
LEVEL 2
8000
WINDOWS SECOND FLOOR
Triple layered glass in minimal steel window frames

LAMINATED BEAM
Acetylated and laminated wooden beam from local Pinus Radiata

FLOOR CONSTRUCTION
- 10 mm wooden floor finish
- 10 mm acoustic gypsum floor board
- 30 mm Recycled wood fiber with integrated aluminum plate for heat distribution of the floor heating
- 130 mm cross laminated timber
- 270 mm cross laminated timber
- Polyethylene membrane
- 130 mm Insulation layer
- 25 mm wooden ceiling finish

GUTTER
Aluminium gutter with drain system for rain water collection
CLIMATE SUMMER

- AIR INTAKE
- MVHR
- SOLAR PANELS
- AIR OUTAKE
- FIXED SUN SHADING
- RAIN WATER FOR GREEN ROOF
- SEMI TRANSPARENT ROOF, MACHINE HEATED BY SUN
- FILTER
- GROUND HEAT EXCHANGER
- MVHR
- COLD SOURCE
- AQUIFER
- HEAT SOURCE
MVHR GROUND HEAT EXCHANGER
COLD SOURCE
FILTER
AIR INTAKE
HEAT SOURCE AQUIFER
MVHR SOLAR PANELS
FIXED SUN SHADING
AIR OUTAKE
RAIN WATER FOR GREEN ROOF
SEM TRANSPARENT ROOF, MACHINE HEATED BY SUN
CLIMATE WINTER
GROUND HEAT EXCHANGER
COLD SOURCE
AQUIFER
HEAT SOURCE
UPCYCLING CENTRE
ZUIDOOST
FROM WASTE TO RESOURCE
CONCLUSION

- Climate goals
- Waste as a resource
- Opportunities in work and investment
- Social inclusion and interaction
- Connecting the areas
CONCLUSION

- Climate goals
  - CO2
  - €

- Waste as a resource
  - Trash can
  - Euro symbol

- Opportunities in work and investment
  - Two people presenting

- Social inclusion and interaction
  - People network

- Connecting the areas
  - Building connection

- New decentralized upcycling centre typology
  - Recycle symbol

- Providing space to create and sell new products
  - Box

- Social entrepreneurial work environment
  - Tie

- Low profile meeting space
  - People meeting

- Synergy of the two sides
  - Gear and building