Beyond REPAiR:
making the transition of the circular economy happen

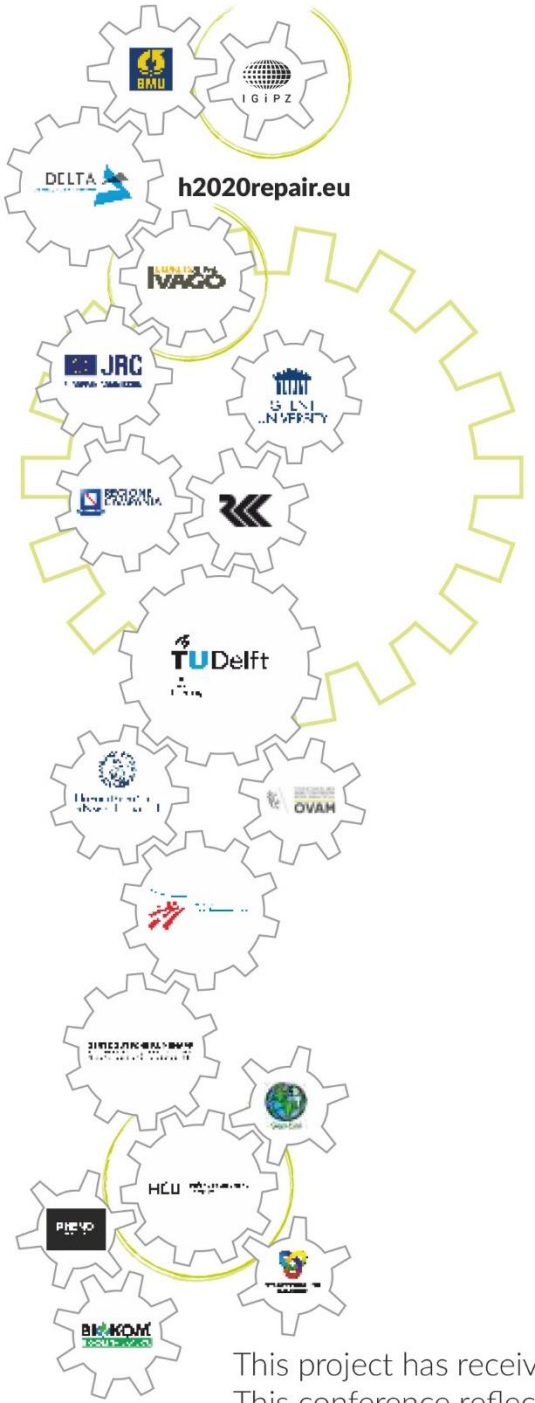
h2020repair.eu

welcome speech

Arjan van Timmeren

TU Delft, Professor Environmental Technology and Design;
REPAiR project leader

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 688920.
This conference reflects only the authors' view. The Commission is not responsible for any use that may be made of the information it contains.



Beyond REPAiR:

making the transition of the circular economy happen

programme

09.00 – 09.15	Registration
09.15 – 09.30	Welcome speech
09.30 – 10.20	Invited Key-note speeches
10.20 – 10.30	Short Break
10.30 – 11.25	Key results of REPAiR
11.25 – 12.35	Key results from other H2020 projects
12.35 – 12.45	Opening of the REPAiR on-line Exhibition and Resume of morning sessions
12.45 – 13.00	REPAiR's Results in detail – Interactive Parallel Sessions: introduction
13.00 – 14.00	Lunch break
14.00 – 15.45	REPAiR's Results in detail – Interactive Parallel Sessions

Session 1	Session 2	Session 3
Peri-Urban Living Labs and Geodesign Decision Support Environment as tools for co-creation	*Assessing Circular Economy Transitions*	*Sustainability Assessment of Eco-innovative Strategies*

15.45 – 16.00	Short Break
16.00 – 17.00	Making the transition of the circular economy happen Final debate among key note speakers, the REPAiR team and the audience
17.00 – 17.15	Closing

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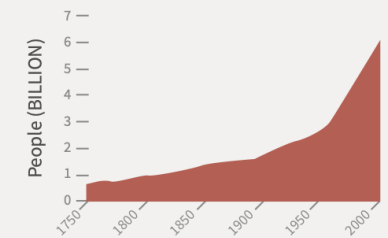
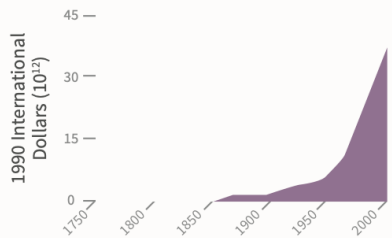
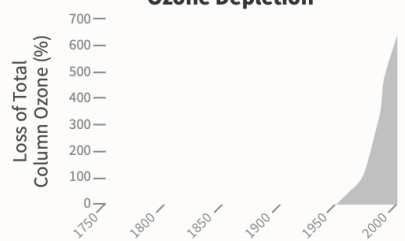
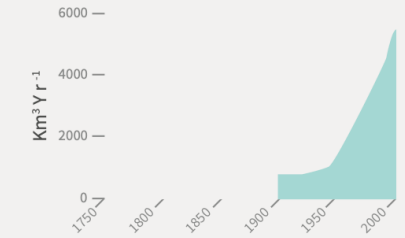
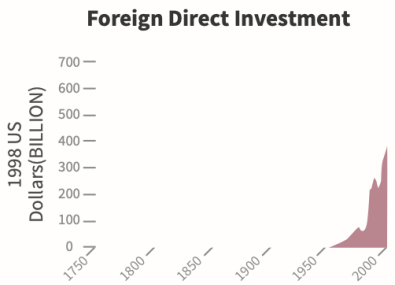
EXPONENTIAL TIMES ...

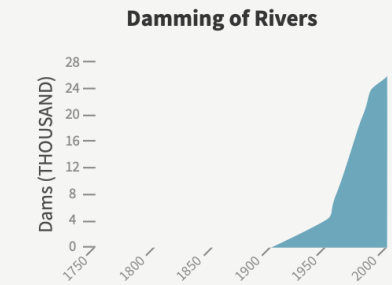


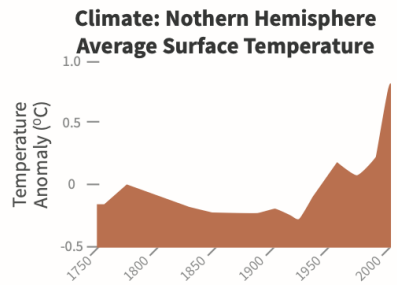


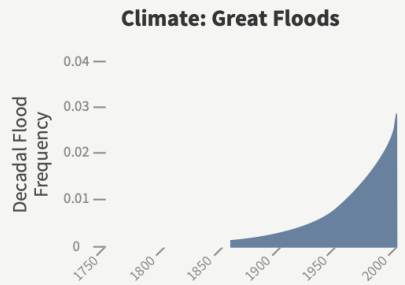


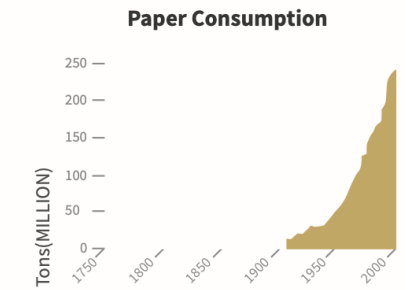


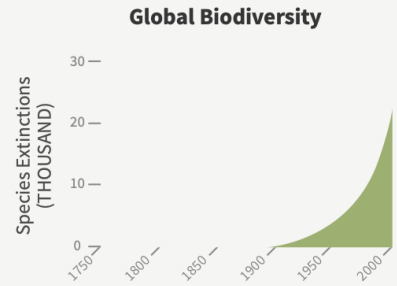


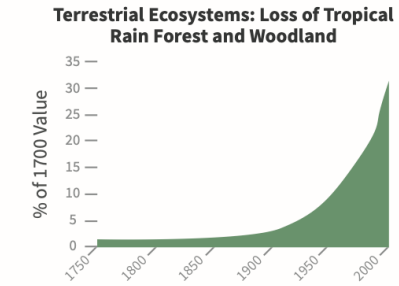


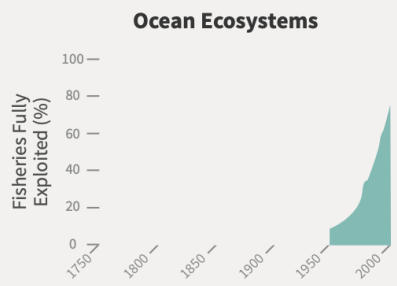


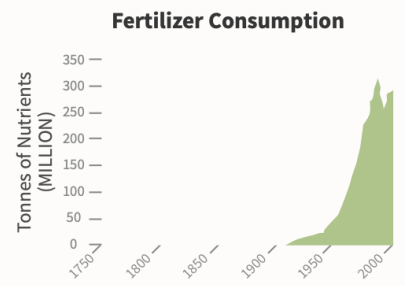


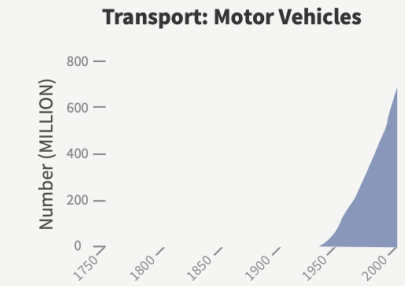












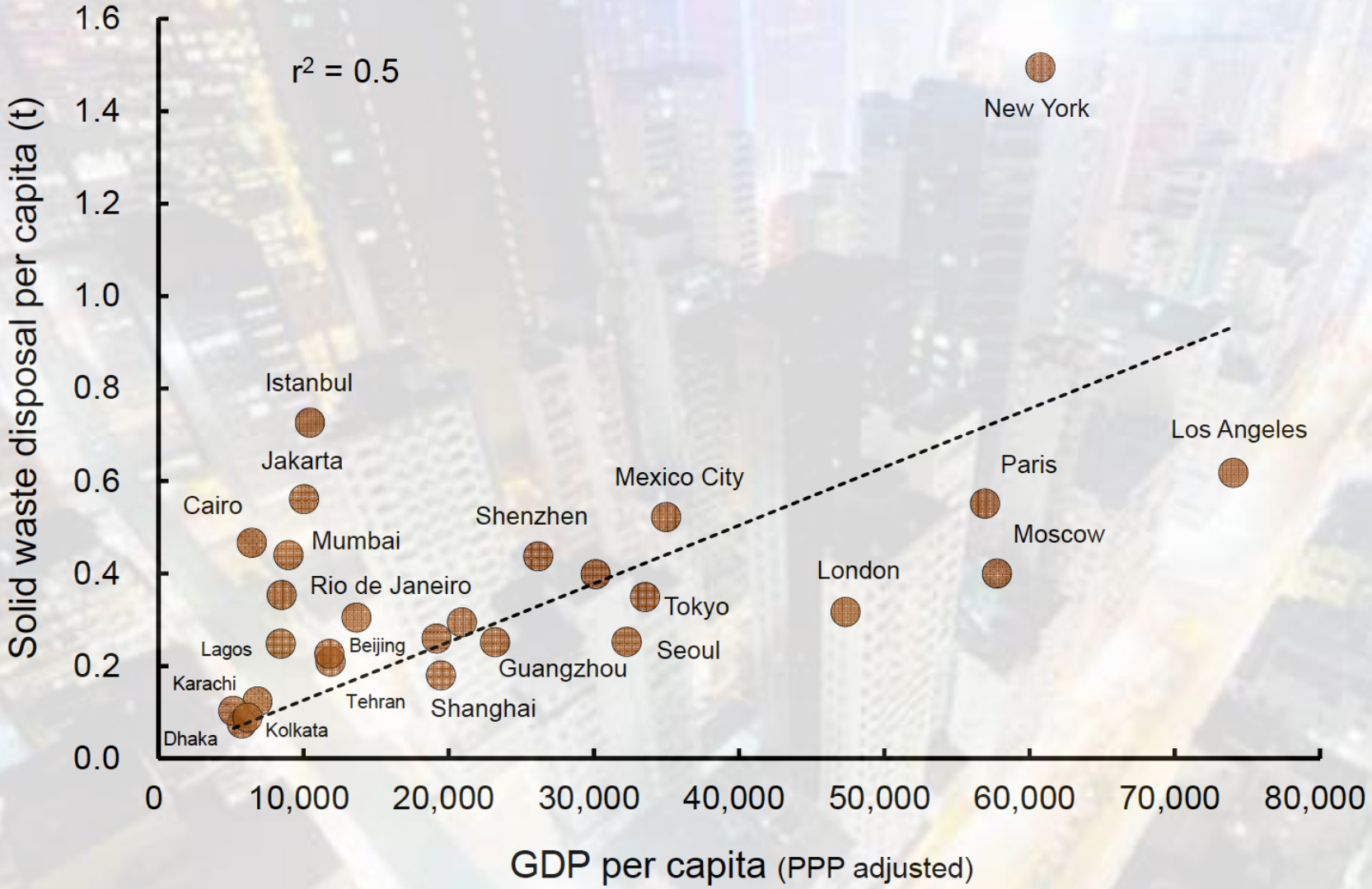
source: Metabolic Amsterdam

Soure: ReciproCities: a dynamic equilibrium, A.van Timmeren, 2013

Source: 3D Printing for the Circular City | PhD candidate Foteini Setaki , The NEW RAW

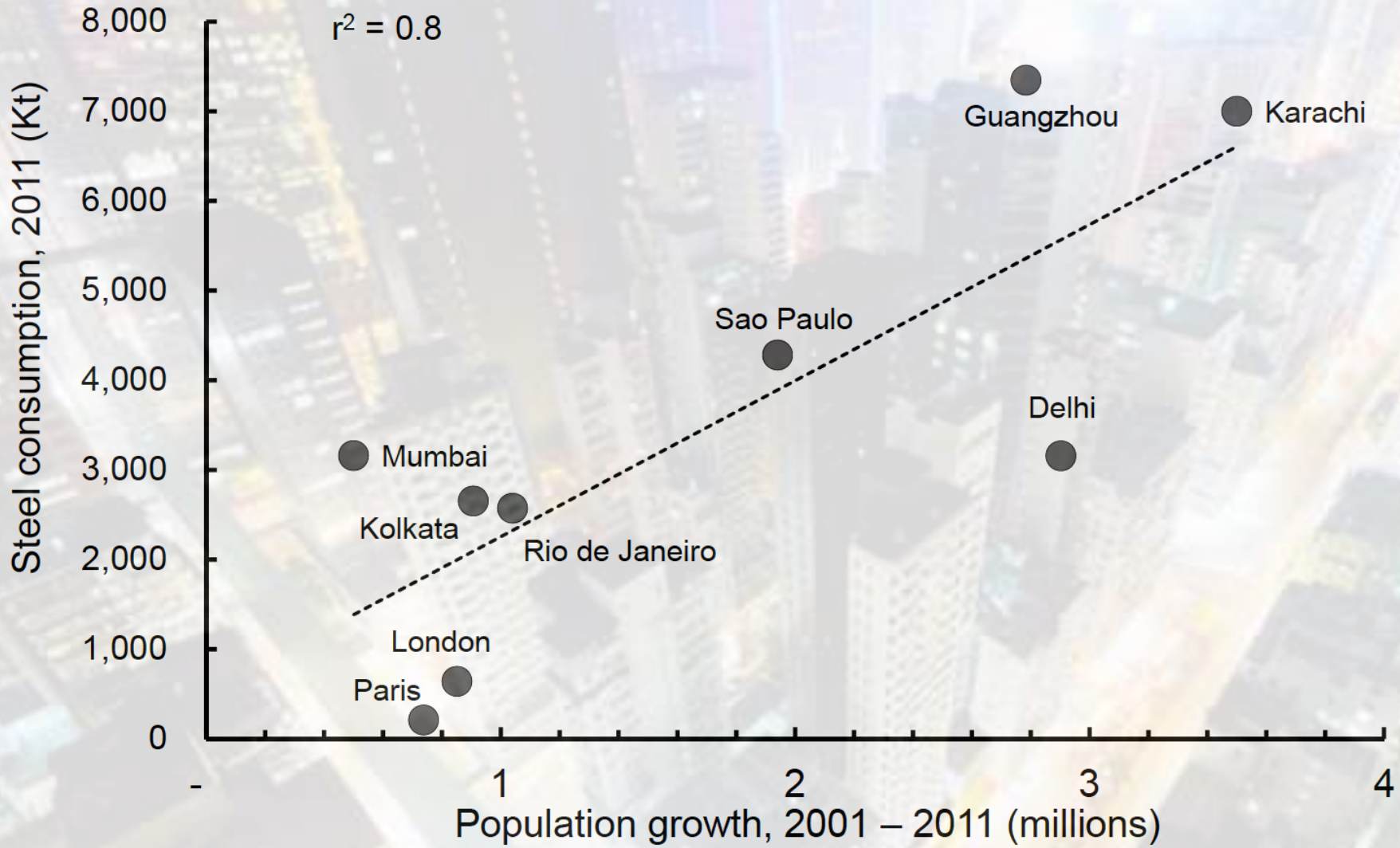

URBAN
GROWTH

URBAN WEALTH INFLUENCES WASTE PRODUCTION



source: Christopher Kennedy, 2015

POPULATION GROWTH … INCREASES MATERIAL STOCK



source: Christopher Kennedy, 2015


A WASTE BASED SOCIETY ...
Source: ANP, 2012

LINEAR CITIES

Dubai ‘The Strip’ (Daniel Cheong, 2014)

Source: Bob Geldermans / Virpi Heijbroek, AMS Institute

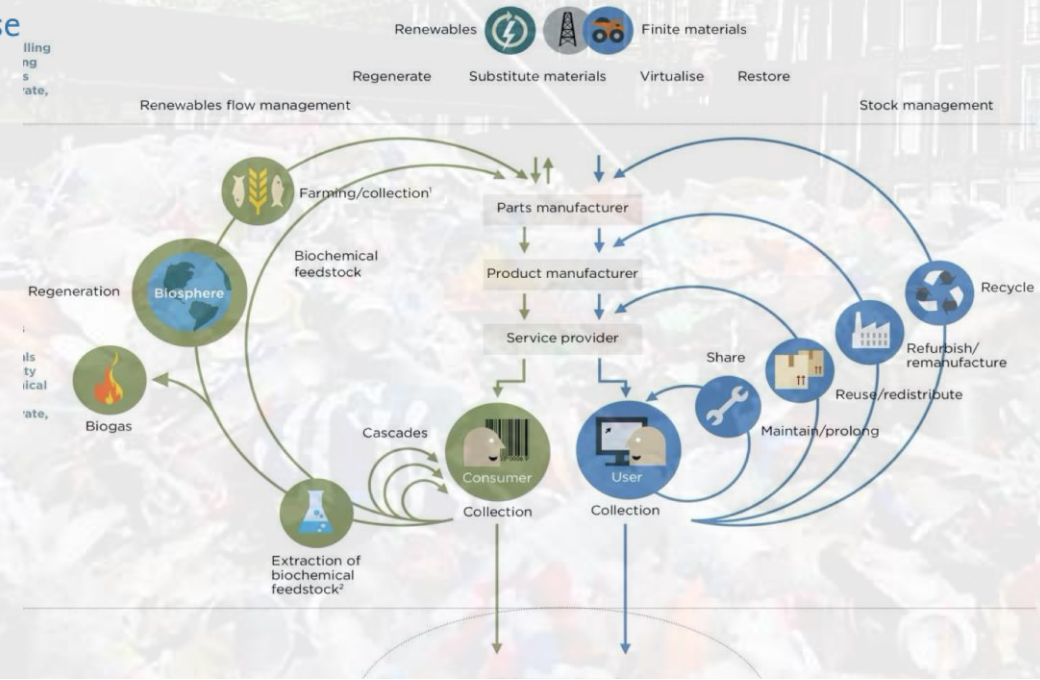
Review

Conceptualizing the circular economy: An analysis of 114 definitions

Julian Kirchherr, Denise Reike, Marko Hekkert

Show more

https://doi.org/10.1016/j.resconrec.2017.09.005



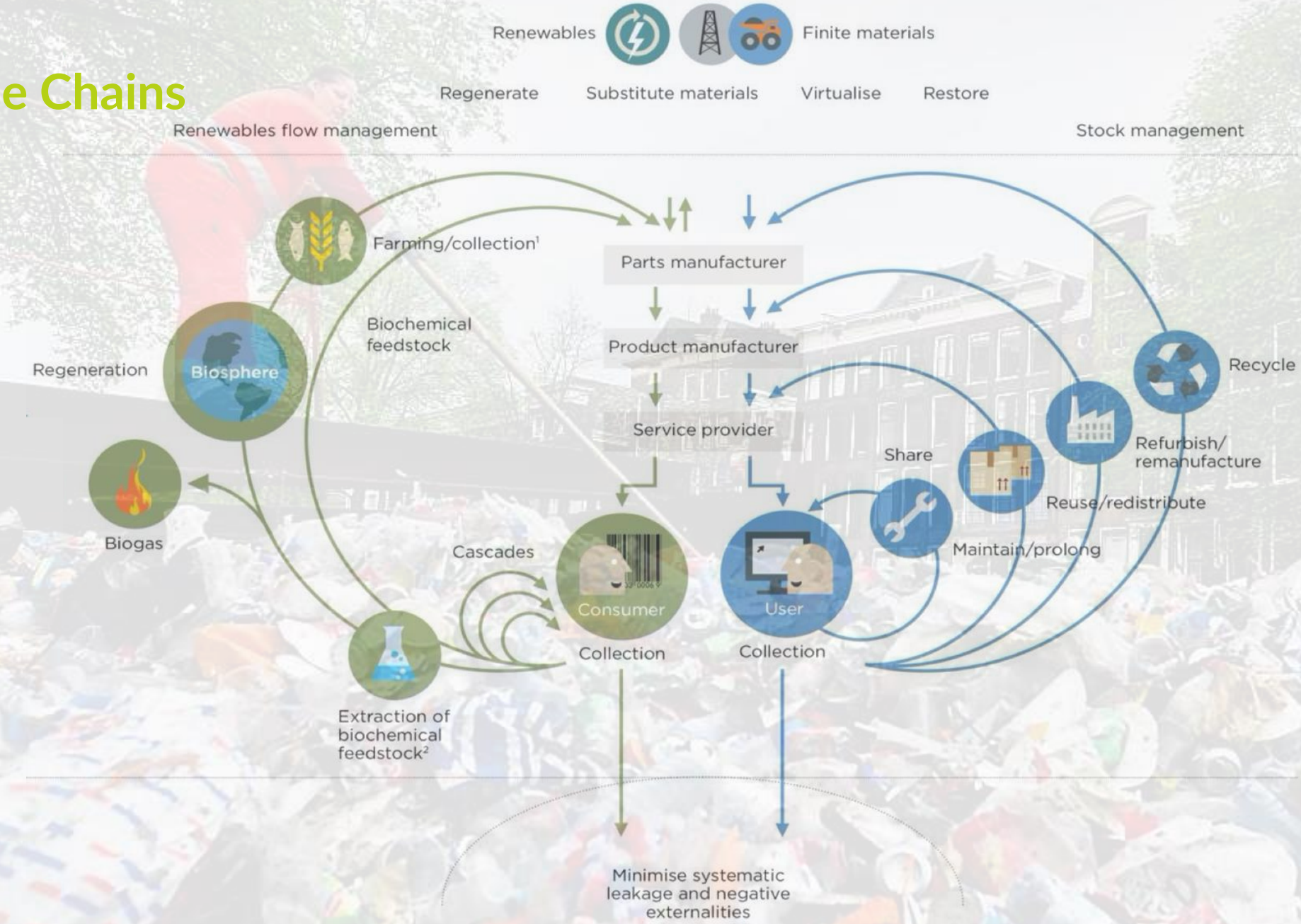
From a Linear to a Circular Economy …

A linear economy converts natural resources into waste via production.
Within this process natural capital is removed from the environment and by pollution of waste the value of the natural resource is reduced.

In a circular economy, there will be no loss of value and the net effect on the environment will be zero.

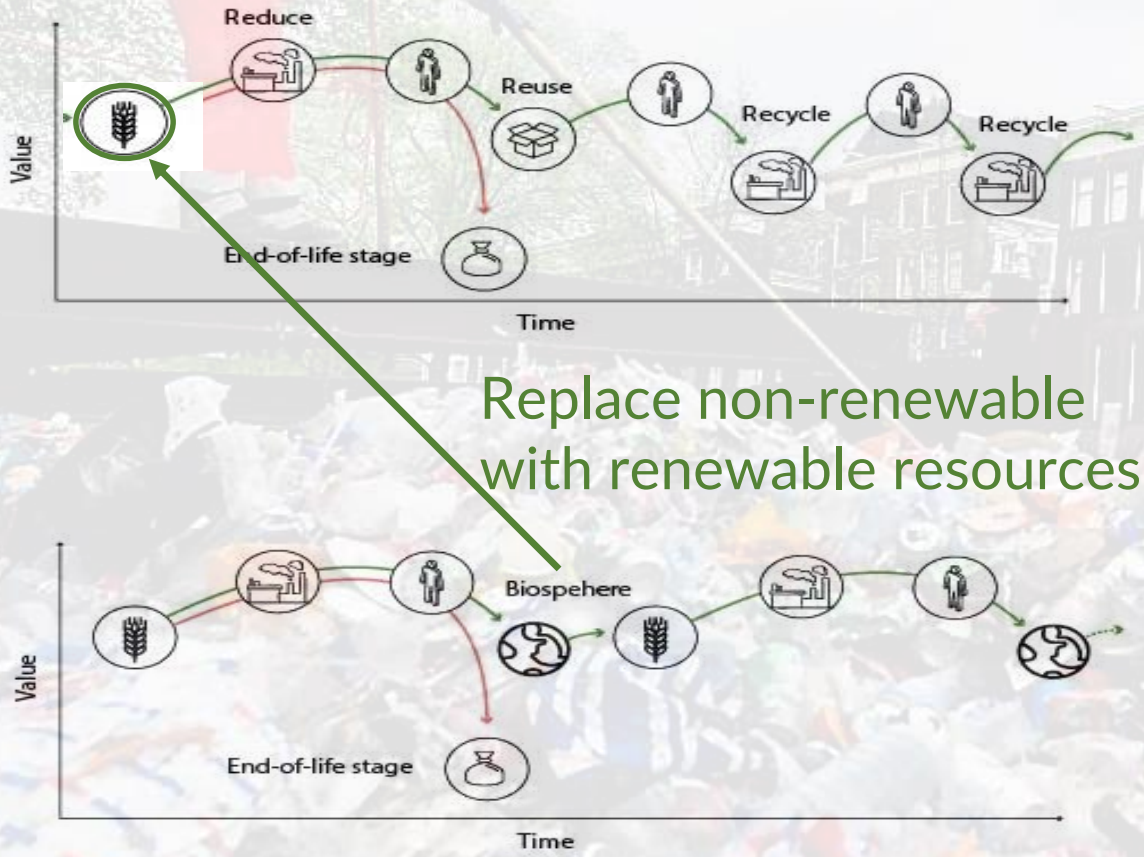
source: https://www.ellenmacarthurfoundation.org

Value Chains



source: https://www.ellenmacarthurfoundation.org

Biological and Technical Value Chains …



Retaining value in the technical material chain-

Starting from non-renewable resources

Retaining value in the biological material chain-

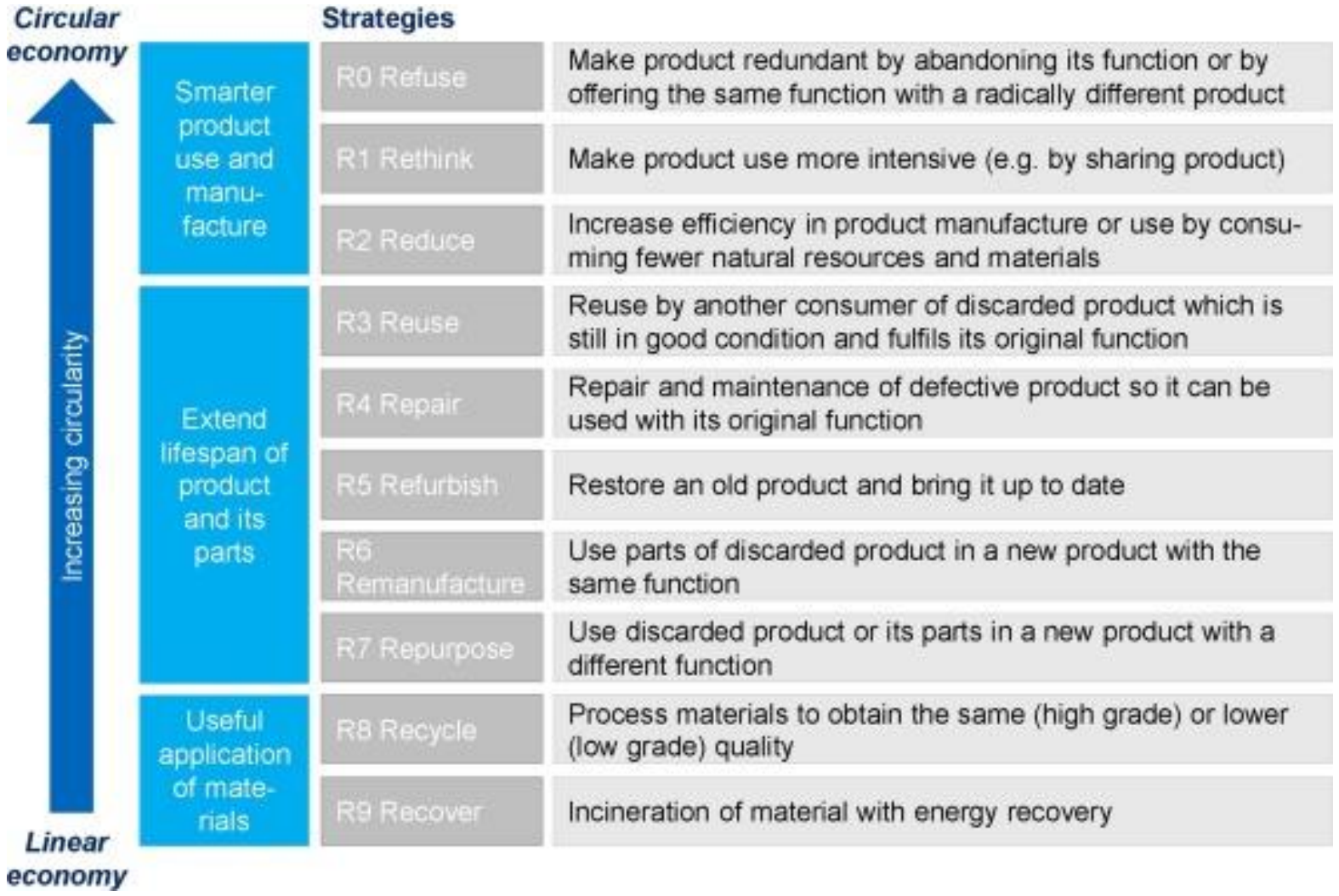
Starting from renewable resources

Graphic: Twan Cortenraede based on Murray et al, 2017

RECYCLE

Image: A. van Timmeren, source: H2020 REPAIR consortium

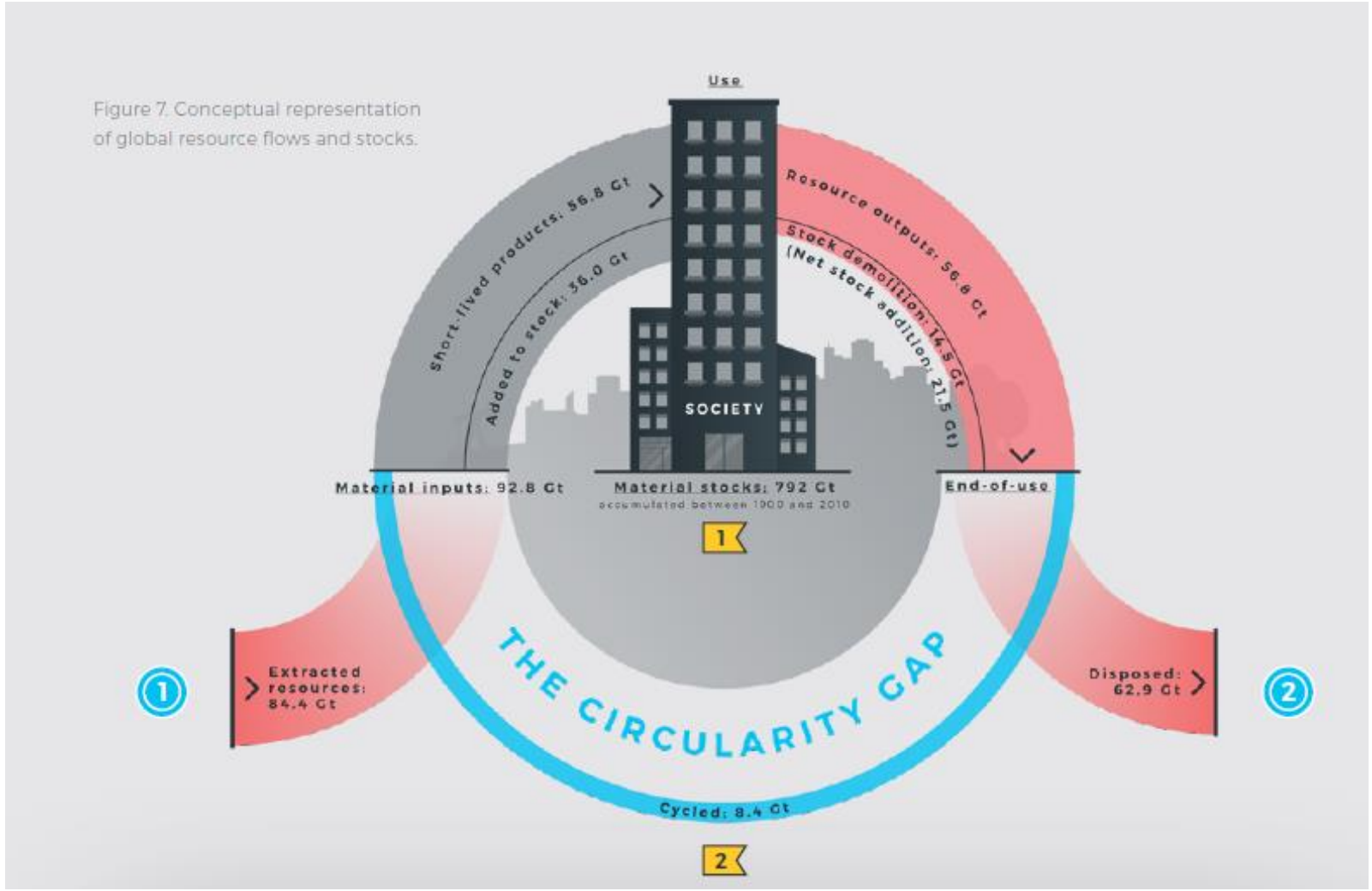
The ‘R-ladder’ with 10-strategies from Linear to Circular …

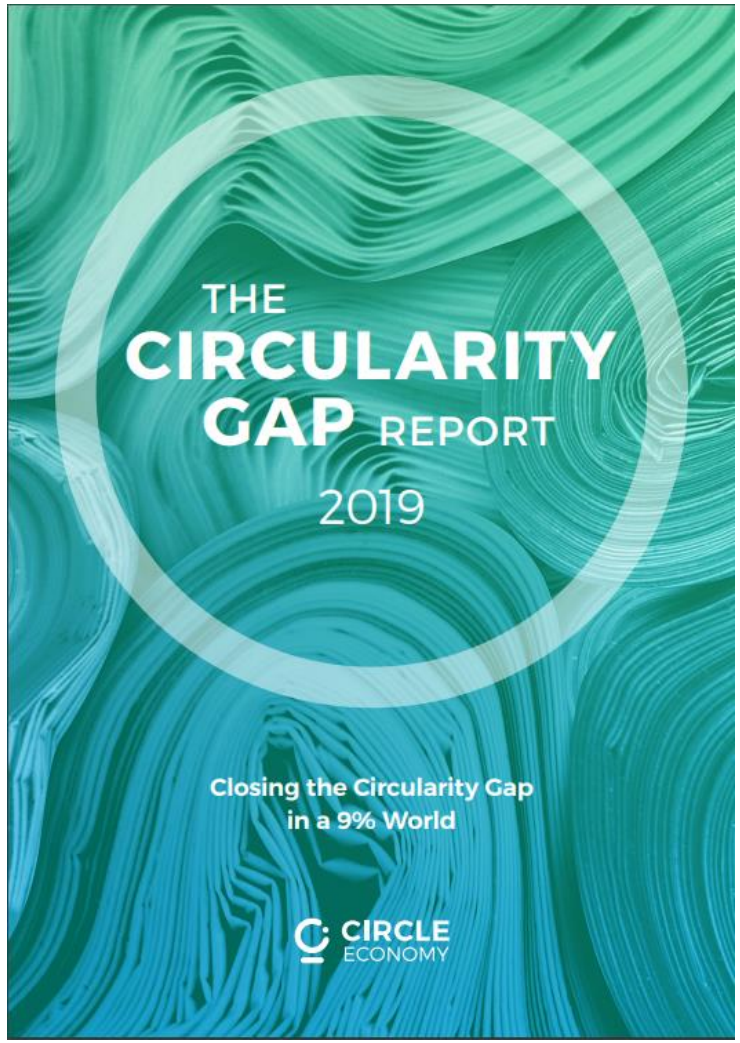


REPAiR uses a more ample definition of Waste …

- **REPAiR innovates by extending the definition of waste by 'wasted landscapes'** (WL), which apply to open spaces as well as built entities, like buildings and infrastructure.

Closing the Loop… Reinventing the wheel…?





At a global scale only **9%** of all materials used annually are being recycled in the global economy…

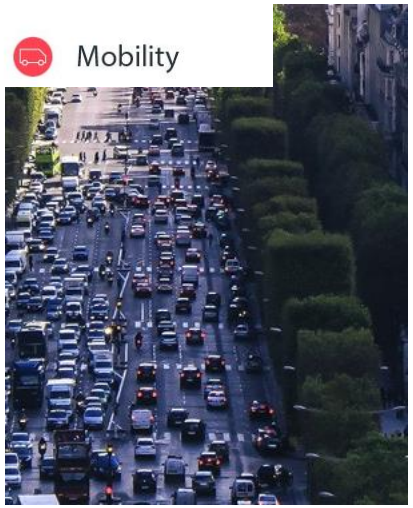
source: http://shiftingparadigms.nl/wp-content/uploads/2017/11/the-circularity-gap-report-2018.pdf

SHARES...

Housing and infrastructure

Nutrition

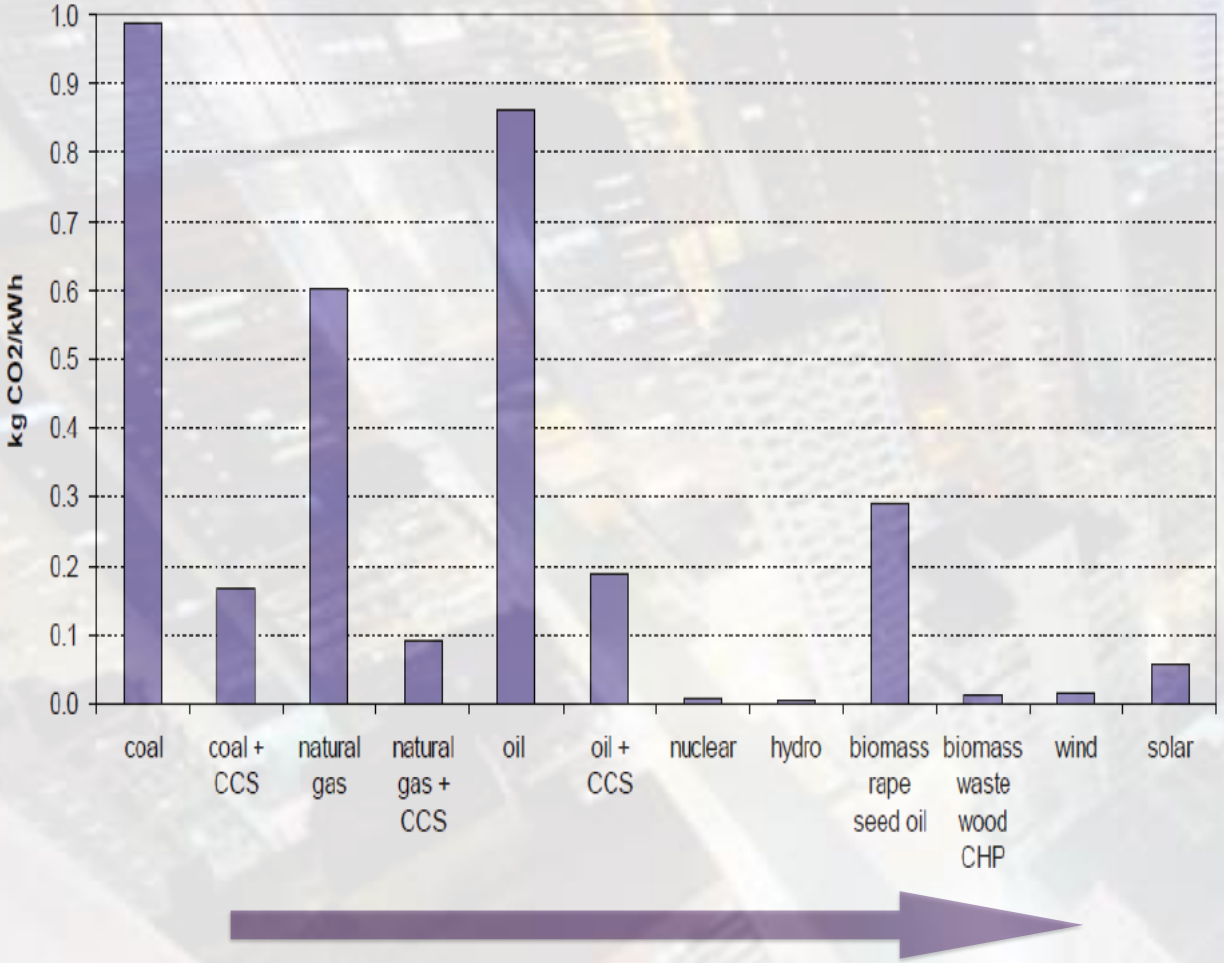
Mobility

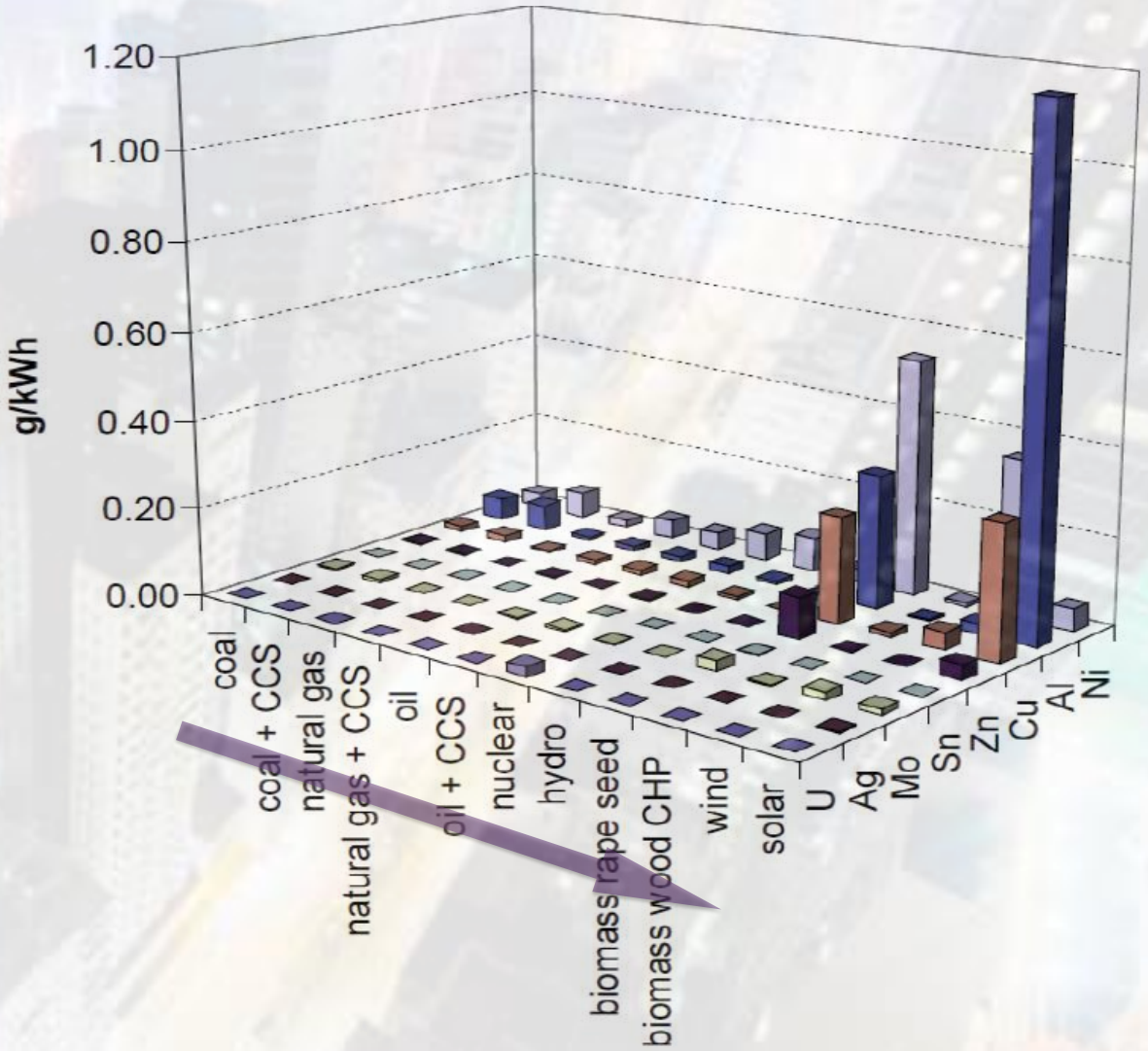


- Consumables
- Services
- Healthcare
- Communication

ource: http://shiftingparadigms.nl/wp-content/uploads/2017/11/the-circularity-gap-report-2018.pdf

SYSTEMS THINKING …



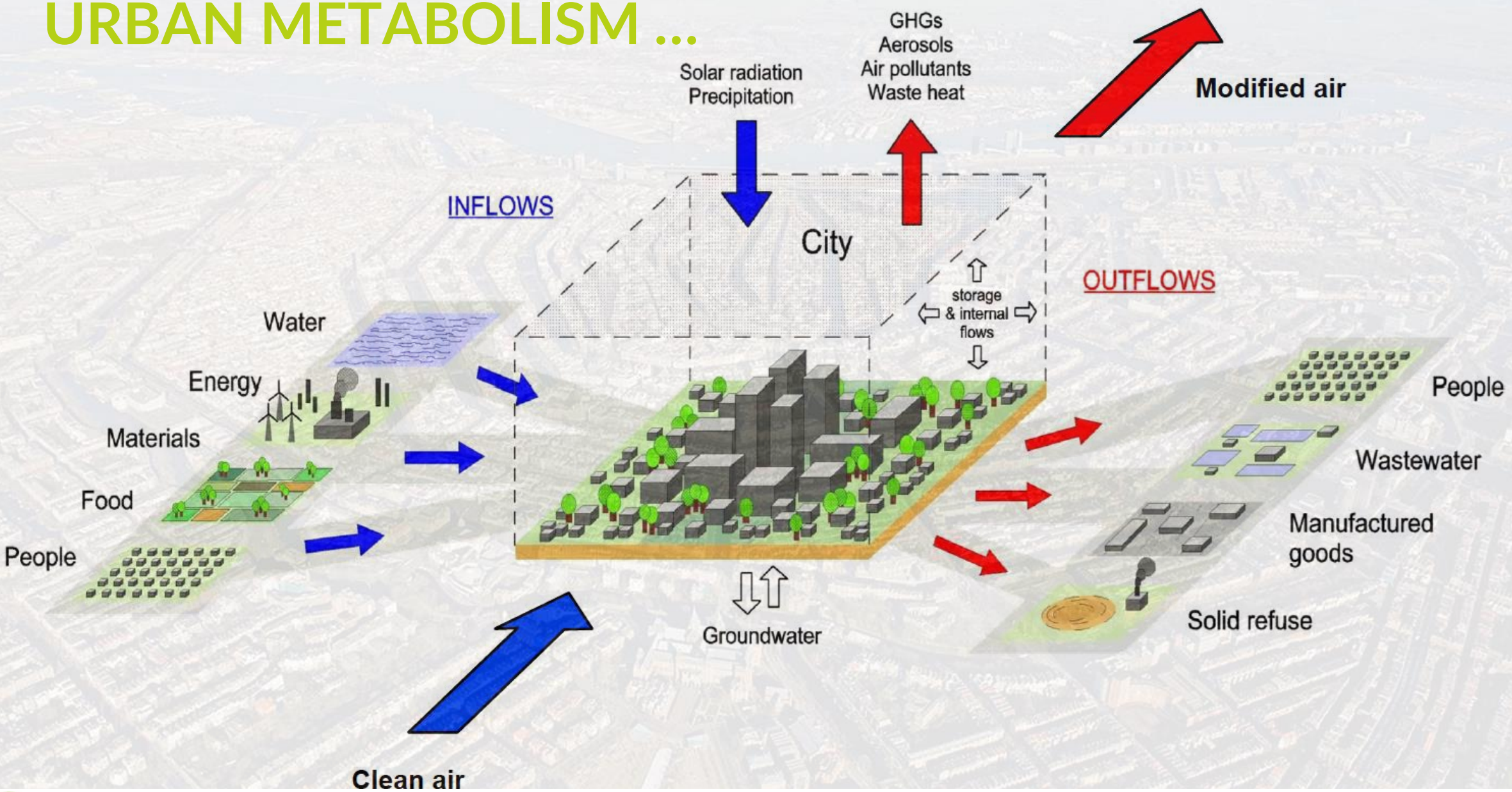


source: Rene Kleijn, Leiden Universiteit

URBAN METABOLISM …

footage / courtesy: Metro Madrid

URBAN METABOLISM …



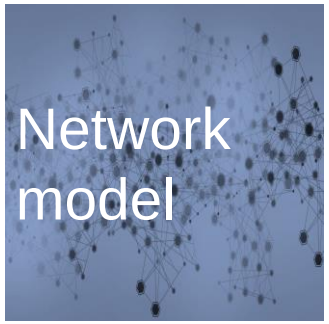
Christopher Kennedy (2015)

Complexity / Understanding Urban Metabolism

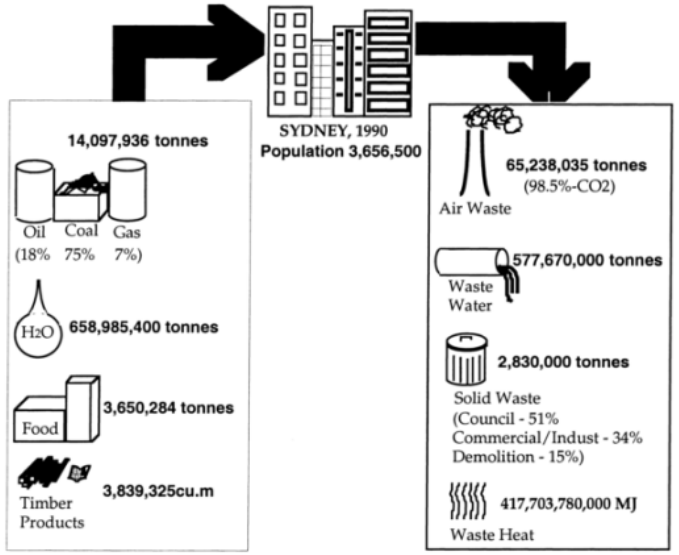
Three stages in modelling / understanding the Urban Metabolism

1 **Black-box model**

Grey-box model



Source: Newman, P. W. G. (1999). Sustainability and cities: Extending the metabolism model. Landscape and Urban Planning, 44, 219–226.



An example of Black-box model: Resource inputs consumed and waste outputs discharged from Sydney, 1990 (Newman, 1999)

Source: Yan Song, PhD ETD chair, dept.Urbanism TUD

Complexity / Understanding Urban Metabolism

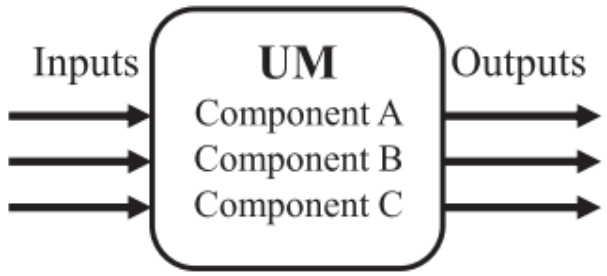
Three stages in modelling / understanding the Urban Metabolism

Black-box model

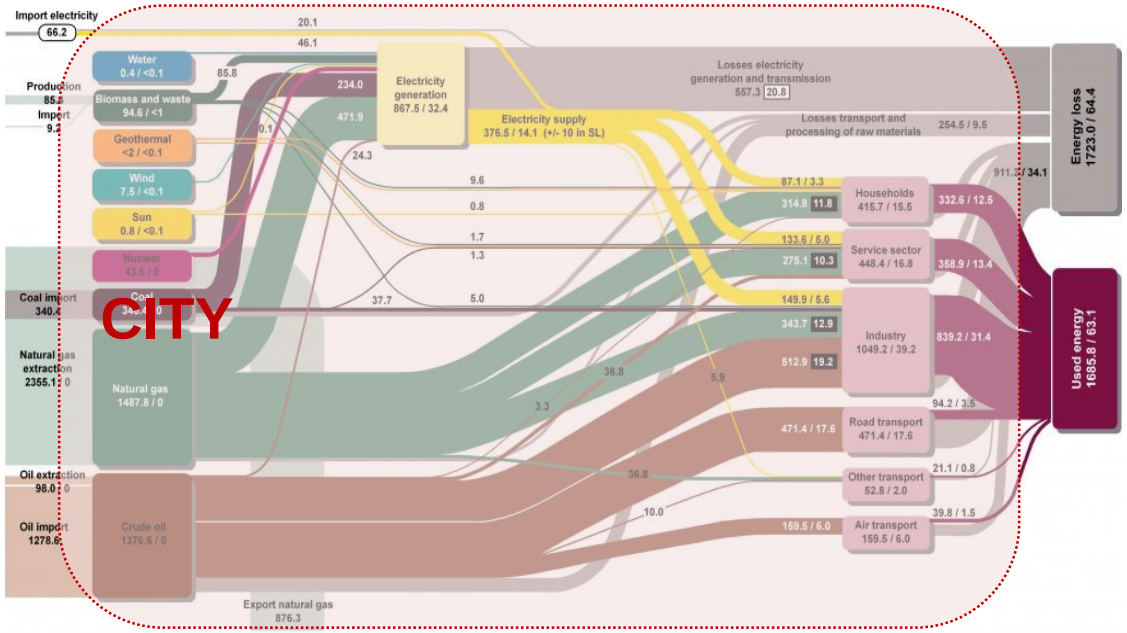
2

Grey-box model

Network model



Source: Stremke, S., & Koh, J. (2011). Integration of Ecological and Thermodynamic Concepts in the Design of Sustainable Energy Landscapes. Landscape Journal, 30, 2–11.



An example of Grey-box model: Sankey diagram of the energy flows in the Netherlands and South Limburg (Stremke & Koh, 2011)

Source: Yan Song, PhD ETD chair, dept.Urbanism TUD

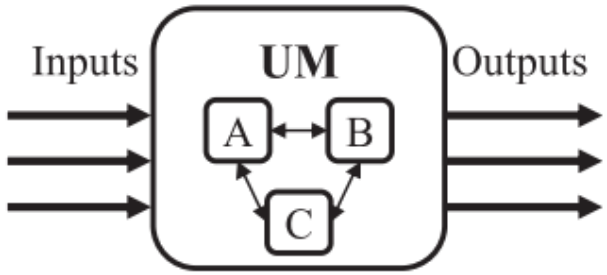
Complexity / Understanding Urban Metabolism

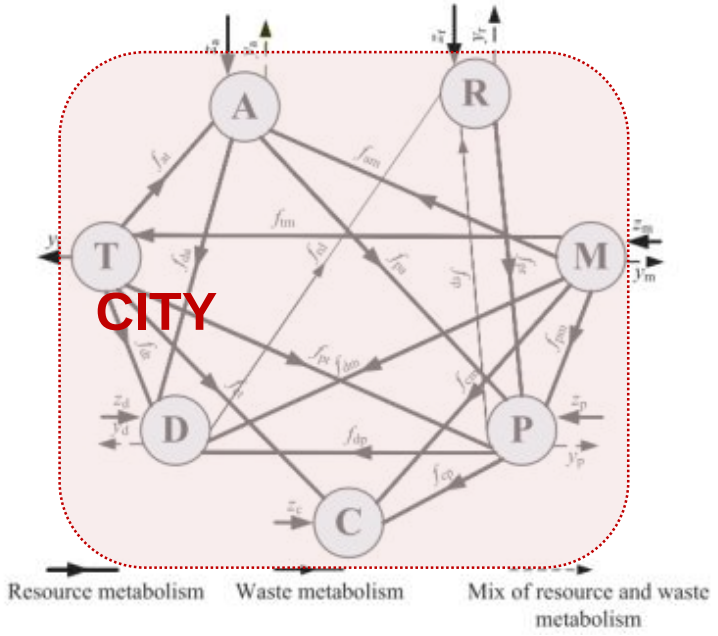
Three stages in modelling / understanding the Urban Metabolism

Black-box model

Grey-box model

3 Network model





An example of Network model: Model of Beijing's urban metabolism with two metabolic mainlines (Zhang et al., 2013)

Source: Zhang, Y., Liu, H., & Chen, B. (2013). Comprehensive evaluation of the structural characteristics of an urban metabolic system: Model development and a case study of Beijing. Ecological Modelling, 252, 106–113.

Source: Yan Song, PhD ETD chair, dept.Urbanism TUD

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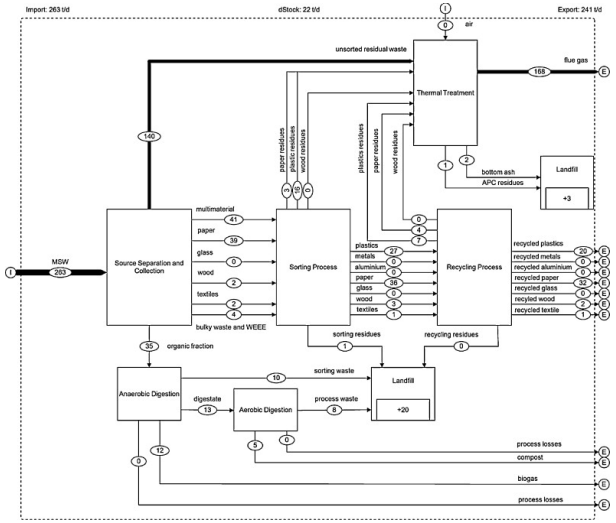
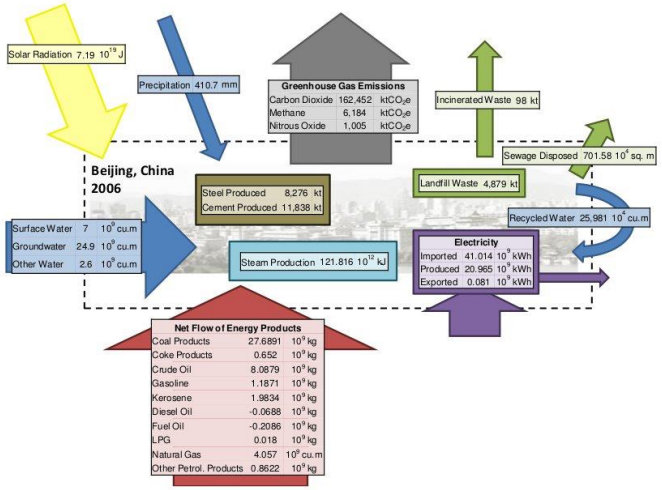
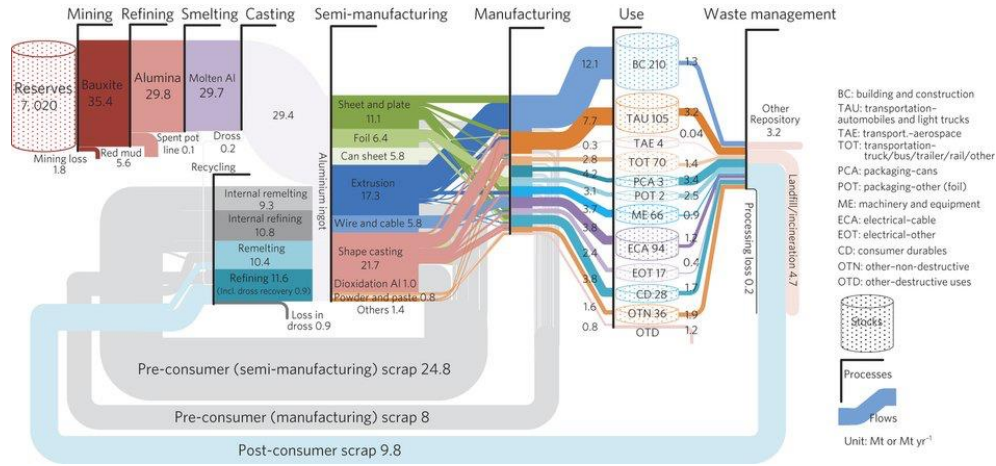




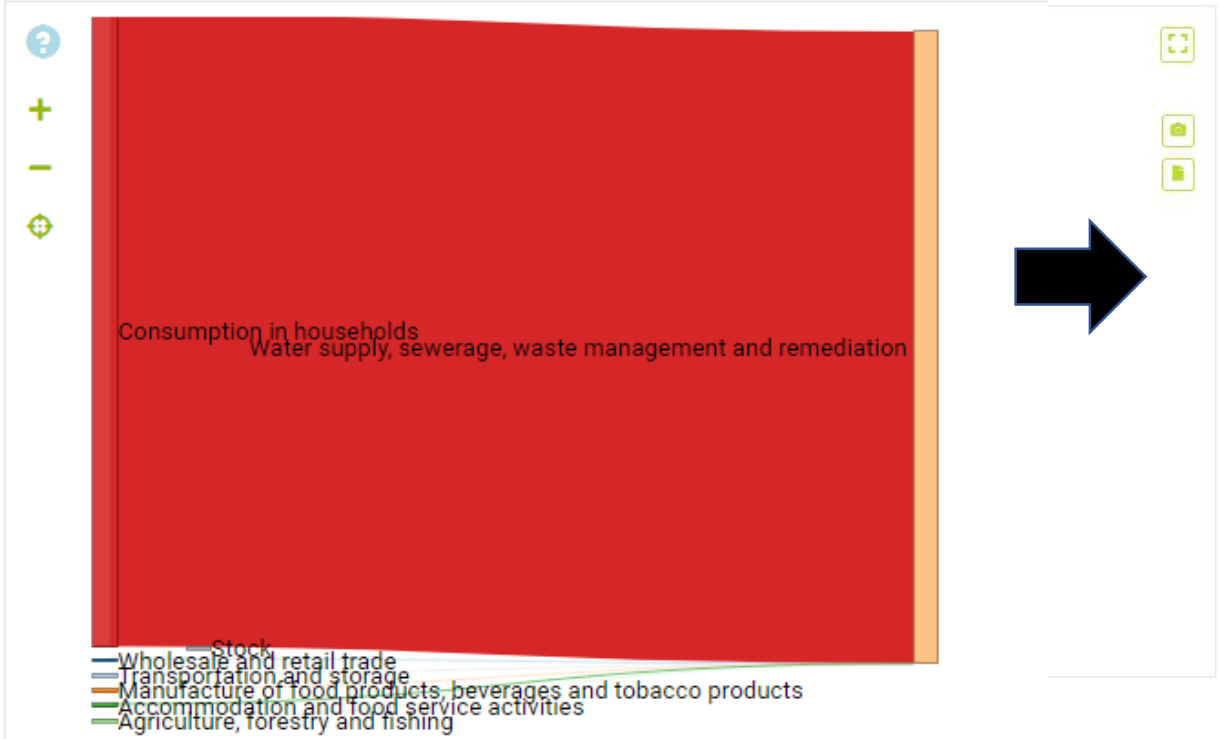


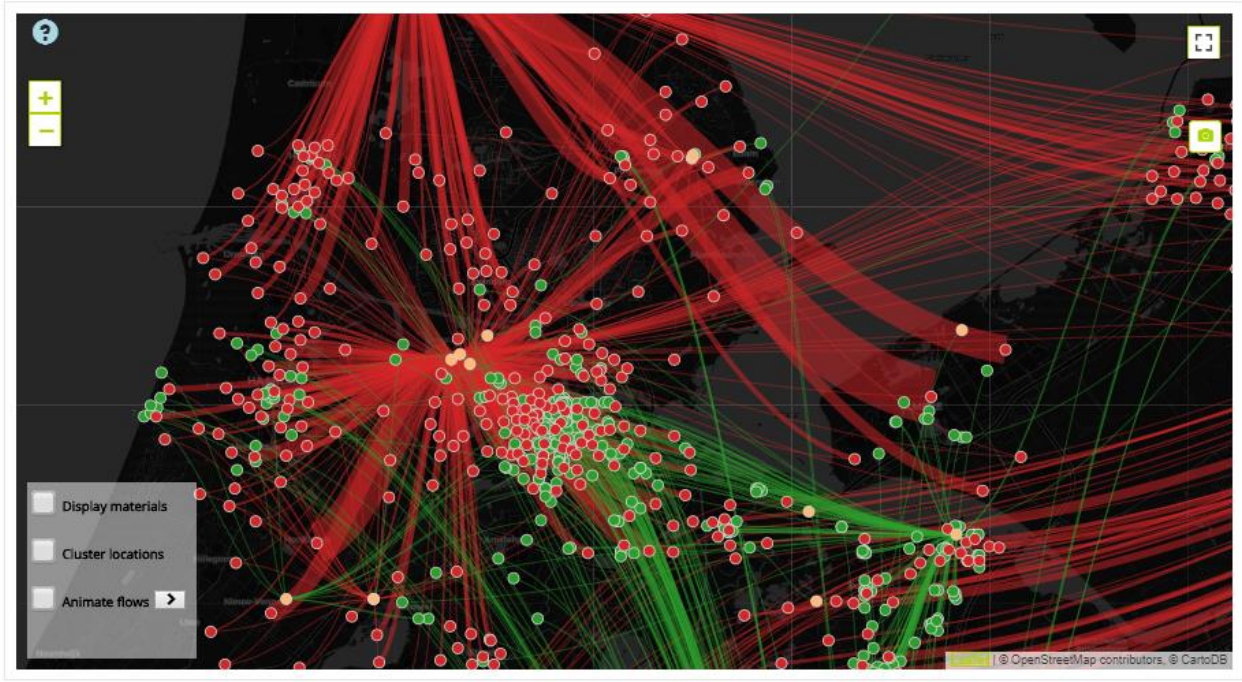
Non spatial

Not Use(r) specific

Insufficient accurate

To:

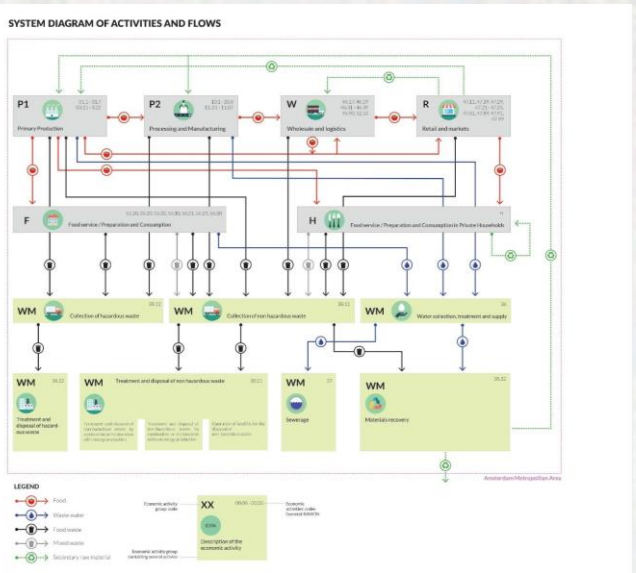

Consumption in households
Water supply, sewerage, waste management and remediation
Stock
Wholesale and retail trade
Transportation and storage
Manufacture of food products, beverages and tobacco products
Accommodation and food service activities
Agriculture, forestry and fishing

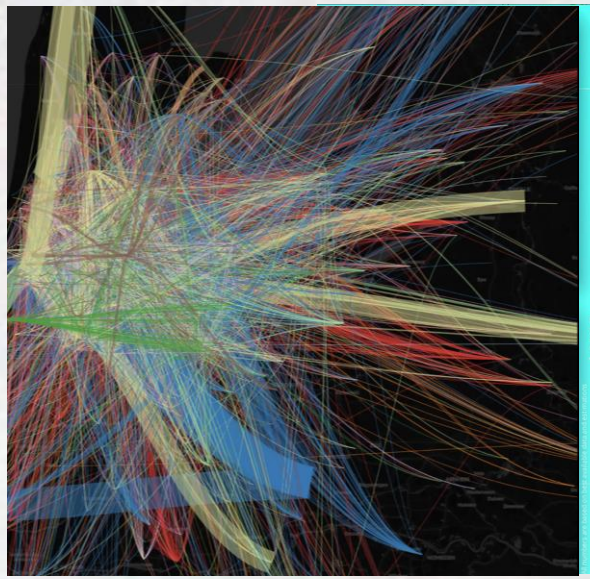

Display materials
Cluster locations
Animate flows
© OpenStreetMap contributors, © CartoDB

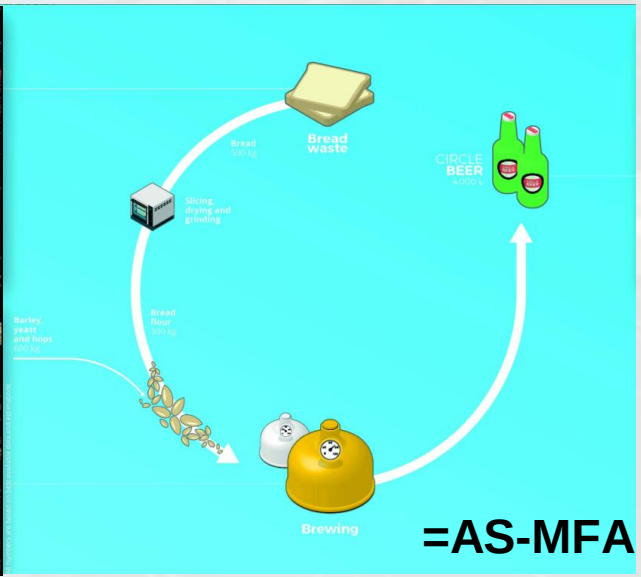
Activity based Spatial Material Flow Analysis

From a traditional **M**aterial **F**low **A**nalysis (**MFA**)
… towards an innovative <u>**A**ctivity-based</u> **S**patial **M**aterial **F**low **A**nalysis (**AS-MFA**)

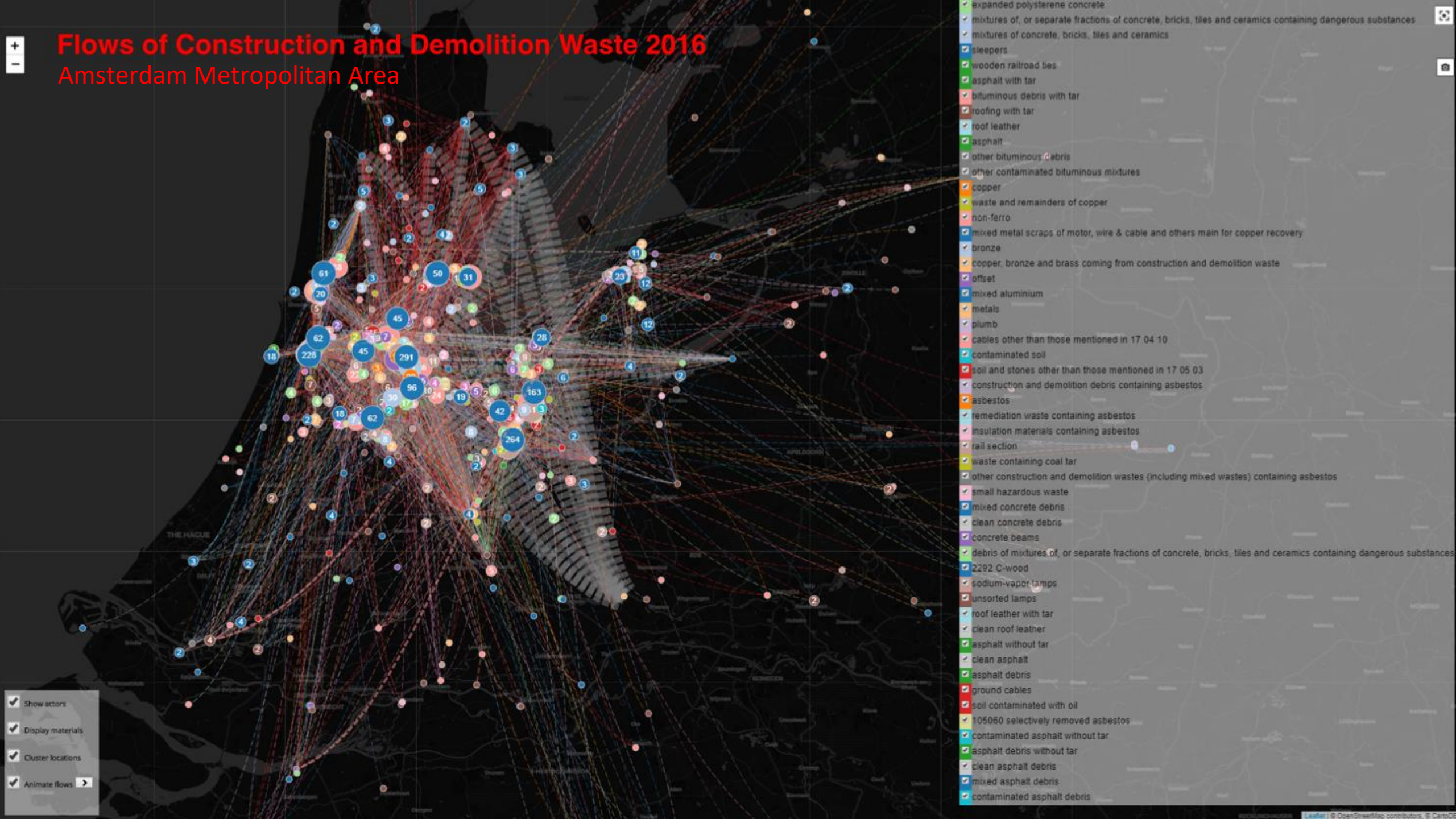
- Hands-on, insightful and interactive
- Actor-specific
- Spatial



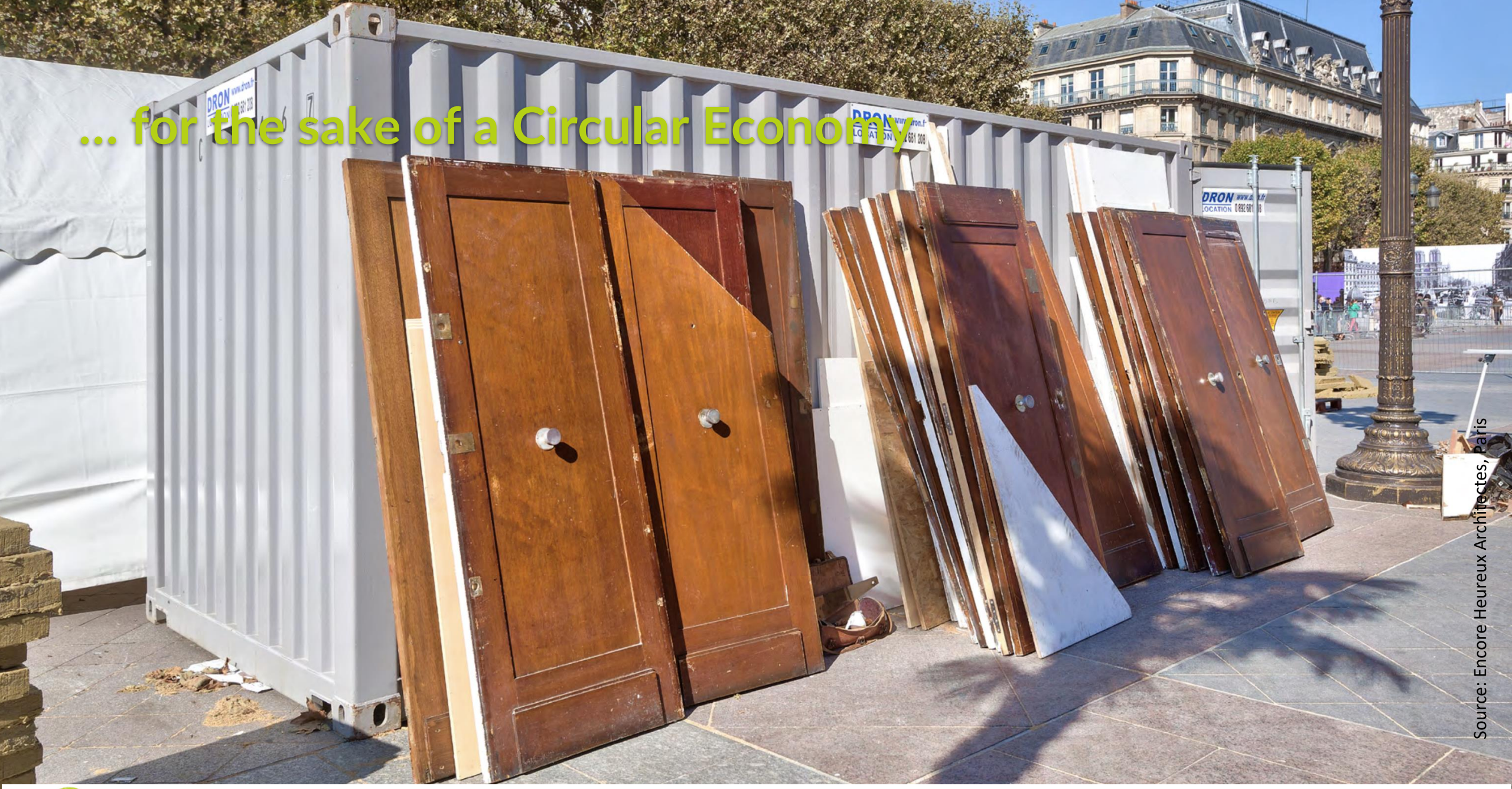




REPAiR - REsource Management in Peri-urban Areas
Grant Agreement No.: 688920


Flows of Construction and Demolition Waste 2016
Amsterdam Metropolitan Area
expanded polysterene concrete
mixtures of, or separate fractions of concrete, bricks, tiles and ceramics containing dangerous substances
mixtures of concrete, bricks, tiles and ceramics
sleepers
wooden railroad ties
asphalt with tar
bituminous debris with tar
roofing with tar
roof leather
asphalt
other bituminous debris
other contaminated bituminous mixtures
copper
waste and remainders of copper
non-ferro
mixed metal scraps of motor, wire & cable and others main for copper recovery
bronze
copper, bronze and brass coming from construction and demolition waste
offset
mixed aluminium
metals
plumb
cables other than those mentioned in 17 04 10
contaminated soil
soil and stones other than those mentioned in 17 05 03
construction and demolition debris containing asbestos
asbestos
remediation waste containing asbestos
insulation materials containing asbestos
rail section
waste containing coal tar
other construction and demolition wastes (including mixed wastes) containing asbestos
small hazardous waste
mixed concrete debris
clean concrete debris
concrete beams
debris of mixtures of, or separate fractions of concrete, bricks, tiles and ceramics containing dangerous substances
2292 C-wood
sodium-vapor lamps
unsorted lamps
roof leather with tar
clean roof leather
asphalt without tar
clean asphalt
asphalt debris
ground cables
soil contaminated with oil
105060 selectively removed asbestos
contaminated asphalt without tar
asphalt debris without tar
clean asphalt debris
mixed asphalt debris
contaminated asphalt debris
Show actors
Display materials
Cluster locations
Animate flows

… for the sake of a Circular Economy

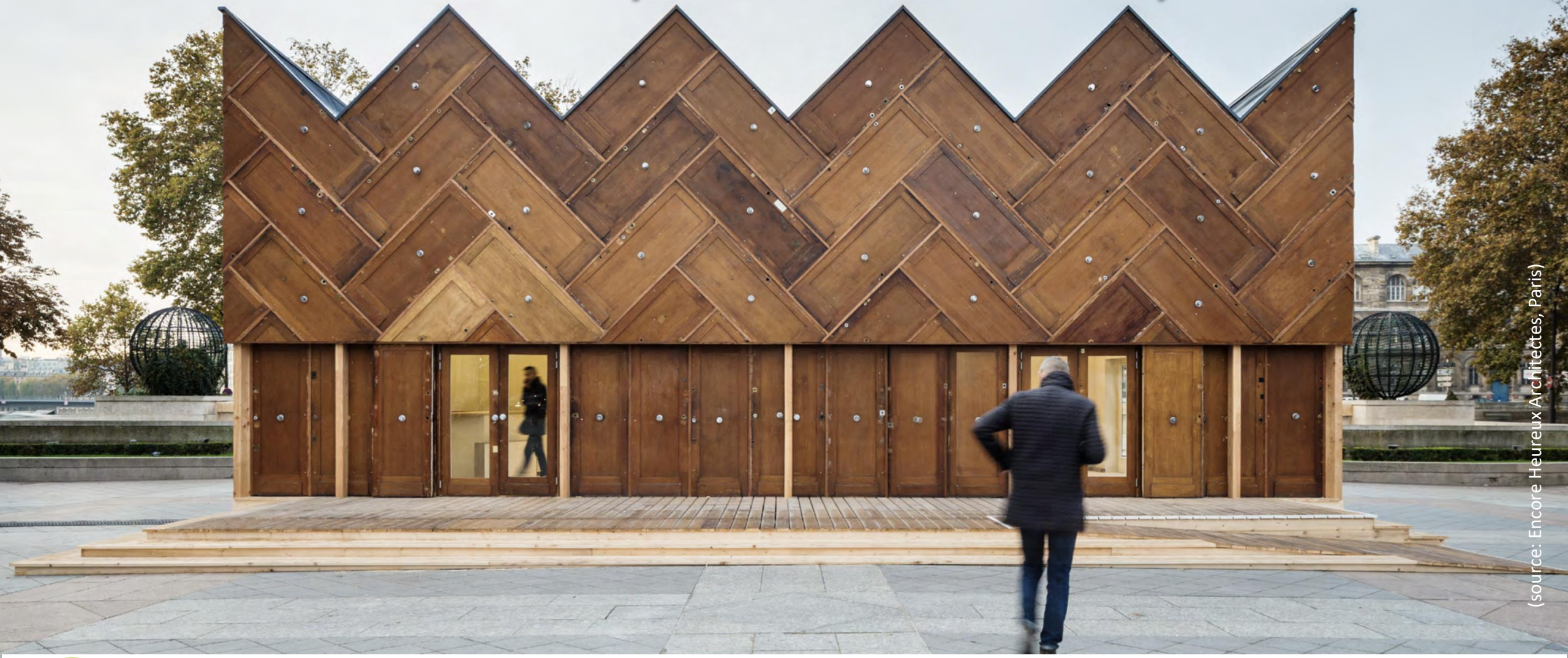


Source: Encore Heureux Architectes, Paris

… for the sake of new opportunities in a CE

(source: Encore Heureux Architectes, Paris)

… for the sake of beauty in a Circular Economy



(source: Encore Heureux Architectes, Paris)

Development of Tools and Methods …

courtesy AMS Institute | Ellen van Bueren & Kris Steen


Show stocks
Show actors
Show flows
Display materials
Cluster locations
Animate flows
lines only
dotted
concrete, bricks, tiles and ceramics
wood, glass and plastic
bituminous mixtures, coal tar and tarred prod...
metals (including their alloys)
soil (including excavated soil from contaminat...
insulation materials and asbestos-containing ...
gypsum-based construction material
other construction and demolition waste
wastes from the mechanical treatment of was...
separately collected fractions (except 15 01)
garden and park wastes (including cemetery ...
courtesy geoFluxus, Arnout Sabbé & Rusnė Šileryté
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Inventing a more prosperous city:
smart, sustainable, resilient and just…

REPAiR