

IABR—2014—

URBAN—

**ENGINEERING
[IN] THE
ANTROPOCENE**

**DIRK SIJMONS
KIVI JAARCONGRES
12 NOVEMBER 2014**

NATURE—

BY—

I-

A-

Urban-by-Nature?



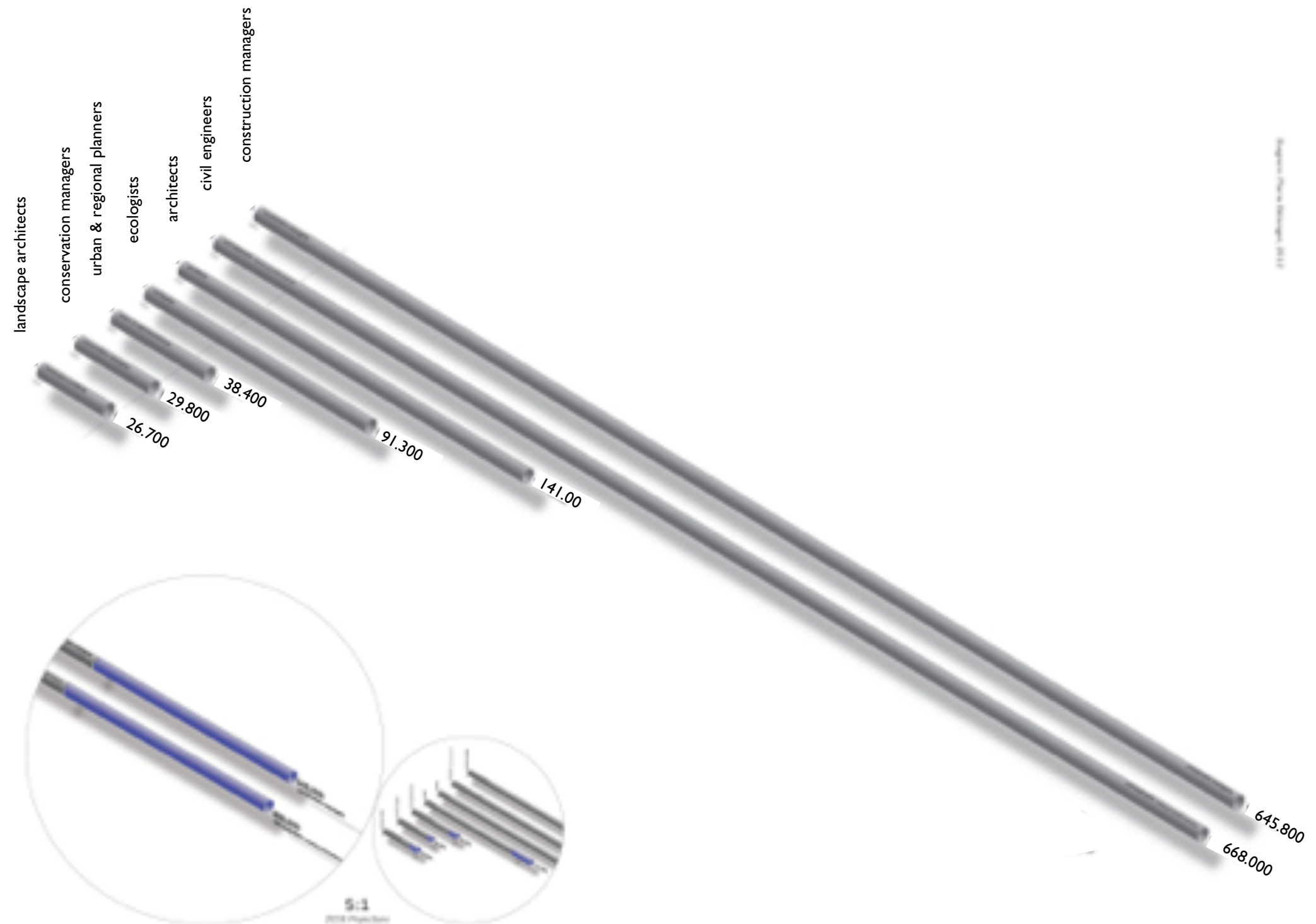
R-

B-

1750



'we' 'made' 'this'



The Silent Majority
 Civil Engineers as the Master Planners of the 20th Century
 Source: The U.S. Bureau of Labor Statistics
 From: Pierre Belanger, Landscape Infrastructure, 2013

anthropocene

- influencing geo chemical cycles;
- influencing sediment flows;
- influencing ocean currents;
- influencing climate;
- influencing biodiversity;
- influencing landuse (agric. + urbanization);





biosphere

technosphere

anthropocene

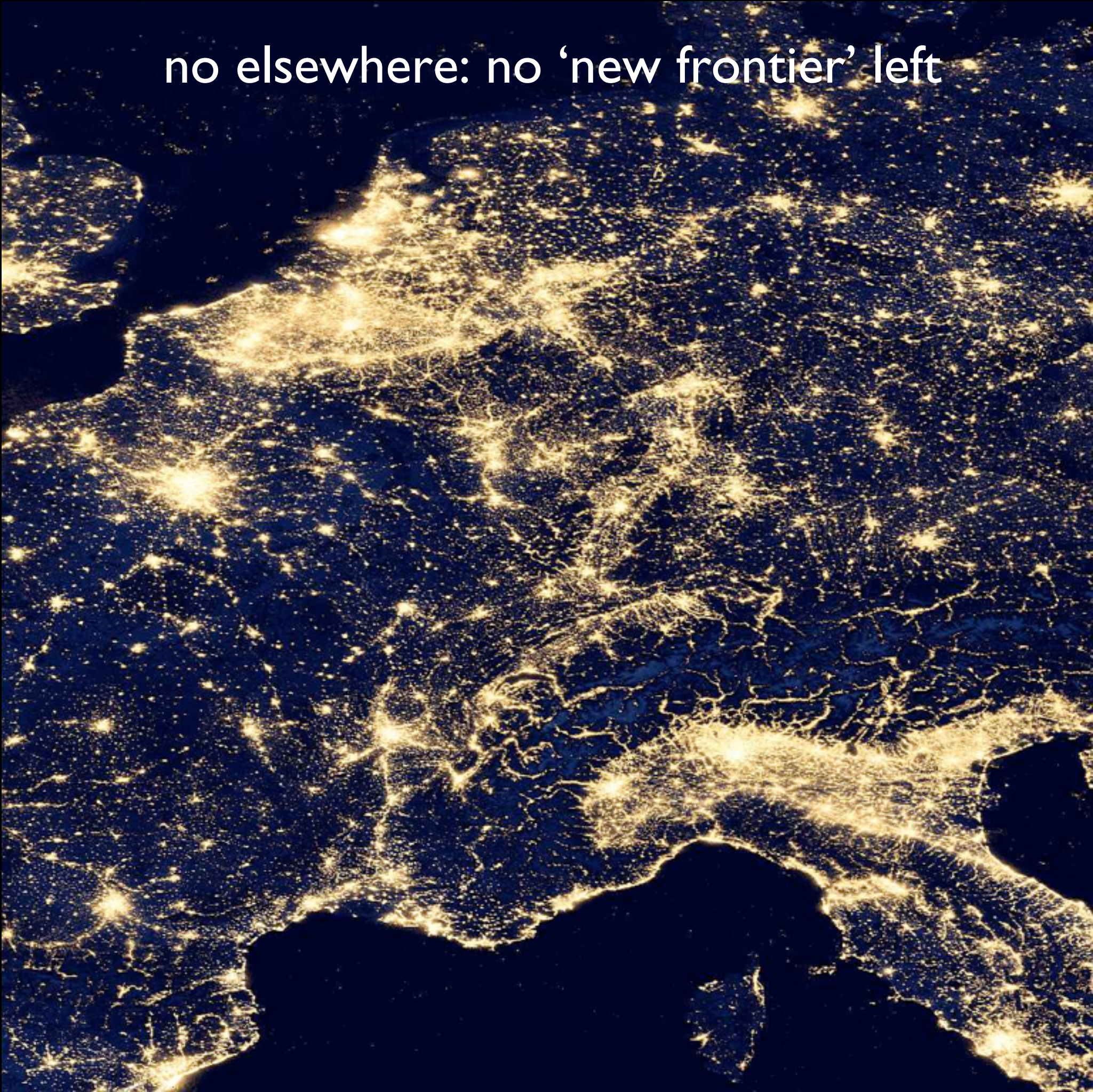
- hybridisation of geo chemical cycles;
- hybridisation of sediment flows;
- hybridisation of ocean currents;
- hybridisation of climate;
- hybridisation of land-use: urban landscapes;



no way back: the arrow of time



I- no elsewhere: no 'new frontier' left



IABR--2014 Urban by Nature

DC I: HET VERKENNEN
VAN DE ONDERGROND
plannen in een
onbekende wereld

Hal III: STRATEGIEËN VOOR
HET STADSLANDSCHAP

Brabantstad

DC 2: STADSLANDSCHAP EN
KLIMAATVERANDERING
New York/New Orleans

Hal I: DE AARDE EEN TUIN
bemiddelde relaties
(groen)milieubeleid

Texel

Hal II: HET METABOLISME
VAN DE STAD
(grijs) milieubeleid

Rotterdam



RHRM: PURE VEERKRACHT
stedelijke ecologie

IABR topics for engineering (in) the Anthropocene

decoupling growth and
footprint?

ecology as the new
engineering

learning to ride the tiger

synthesizing

engineering the transition to
renewables

enhancing biodiversity as
planned side-effect

adaptation to climate change

mutual opening up between
designers and engineers

savings: assisting to a
prosperous way down

inverse engineering:
retrofitting old mistakes

dealing with uncertainties

sectoral vs integral

fine-tuning the urban
metabolism

nature technique as the civil
engineering for the advanced

steering in dialogue with the
ecosystem

generalist: oversee cascading
effects when one part fails

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integral vs sectoral

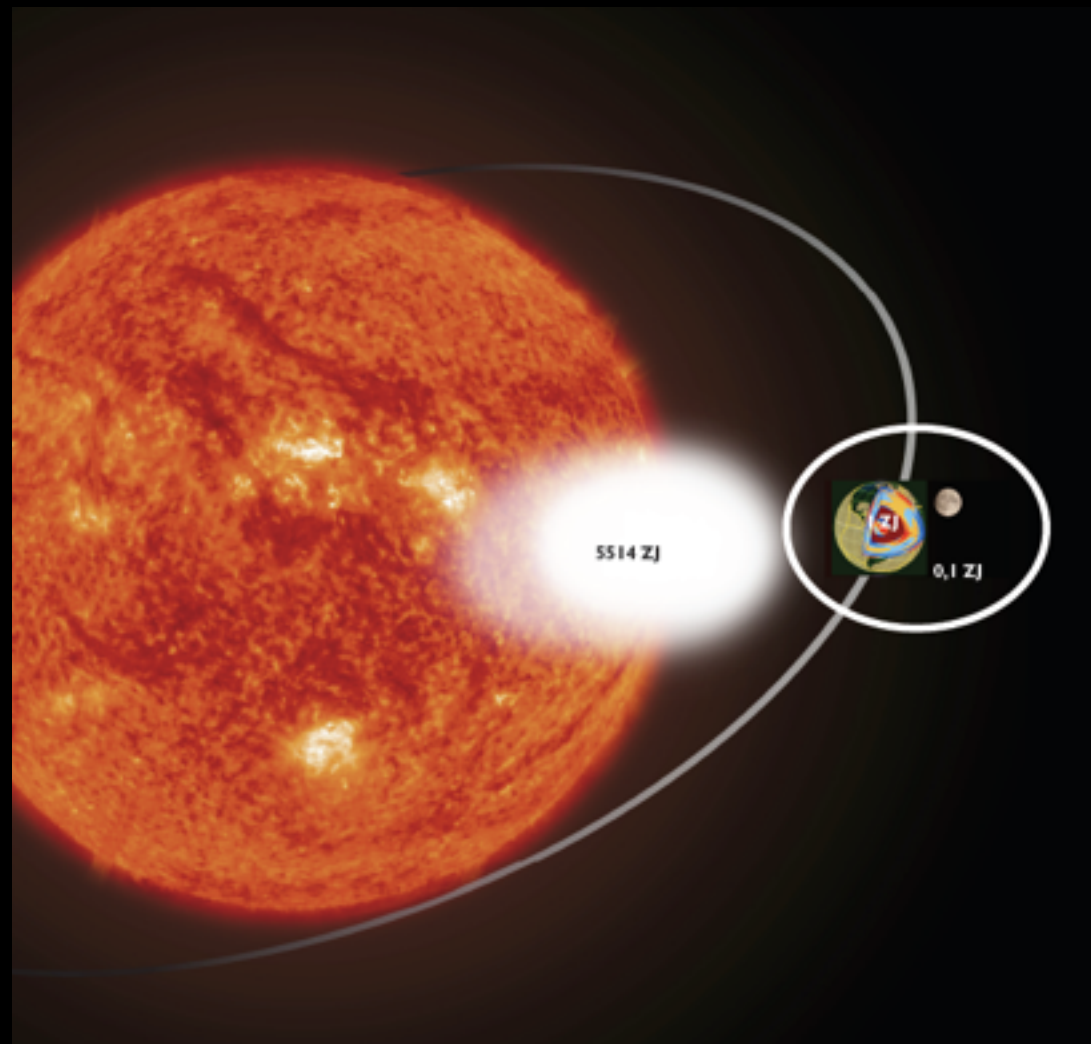
fine-tuning the urban metabolism

nature technique as the civil engineering for the advanced

steering in dialogue with the ecosystem

generalist: oversee cascading effects when one part fails

mitigating climate change:
engineering the transition
to renewables



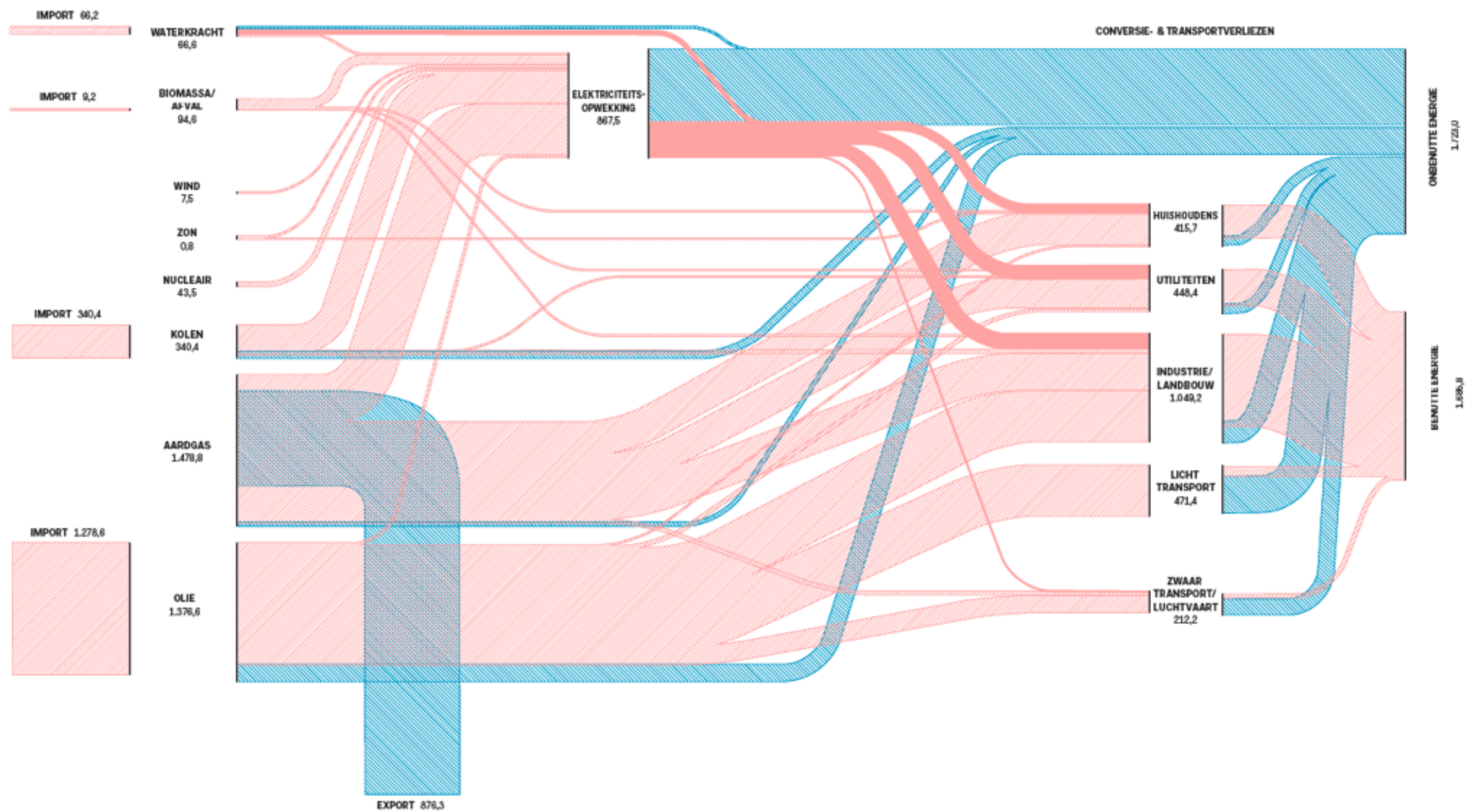
Engineering angle (I)

5514 ZJ Solar Energy received

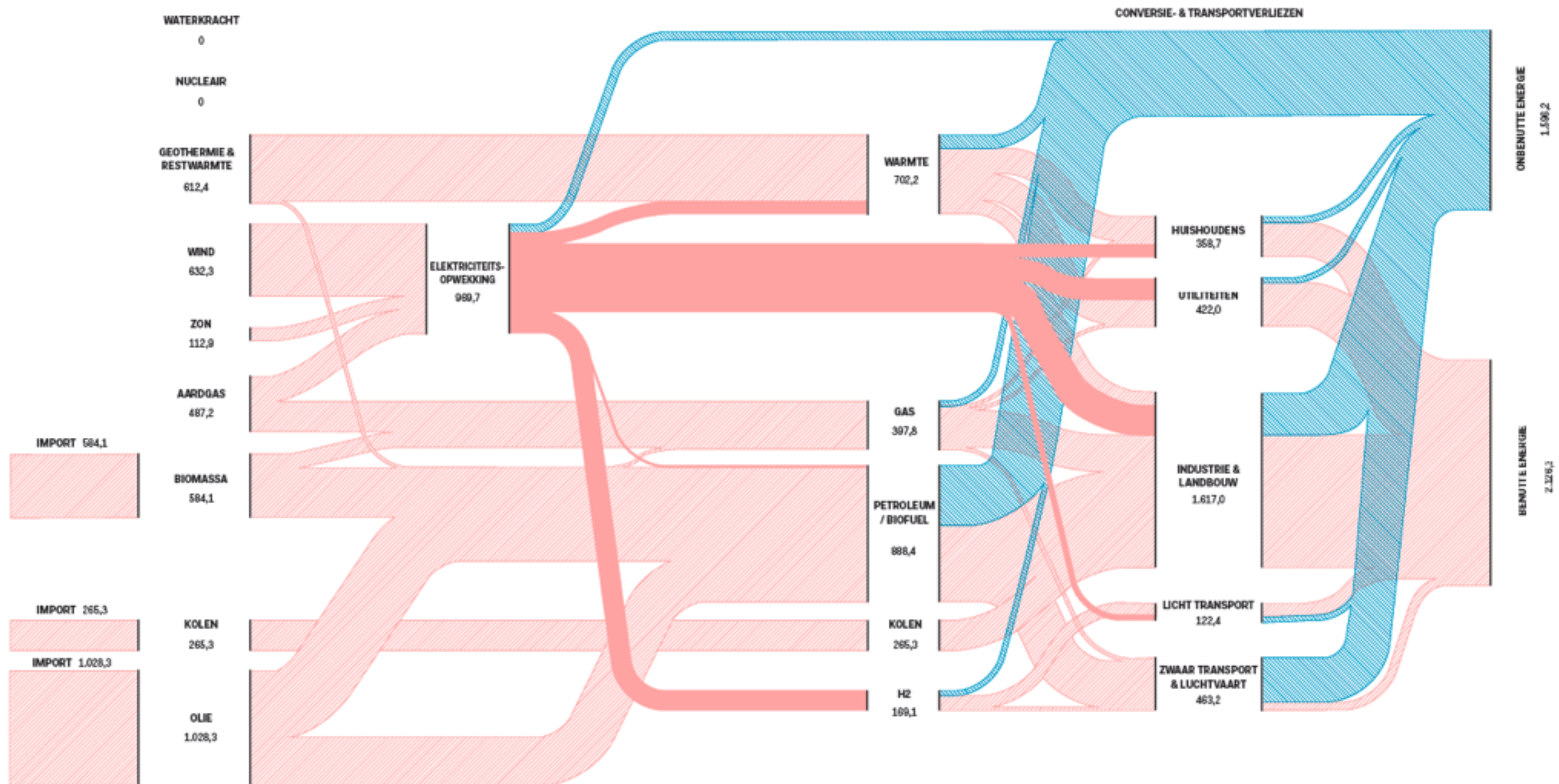
1 ZJ Geothermal Energy

0,1 ZJ Tidal Energy

0,4 ZJ Human Economy



energy management, the Netherlands 2014



energy management in the Netherlands in 2050 with 80% reduction of CO2



Electricity



Heat



Fuels

2020

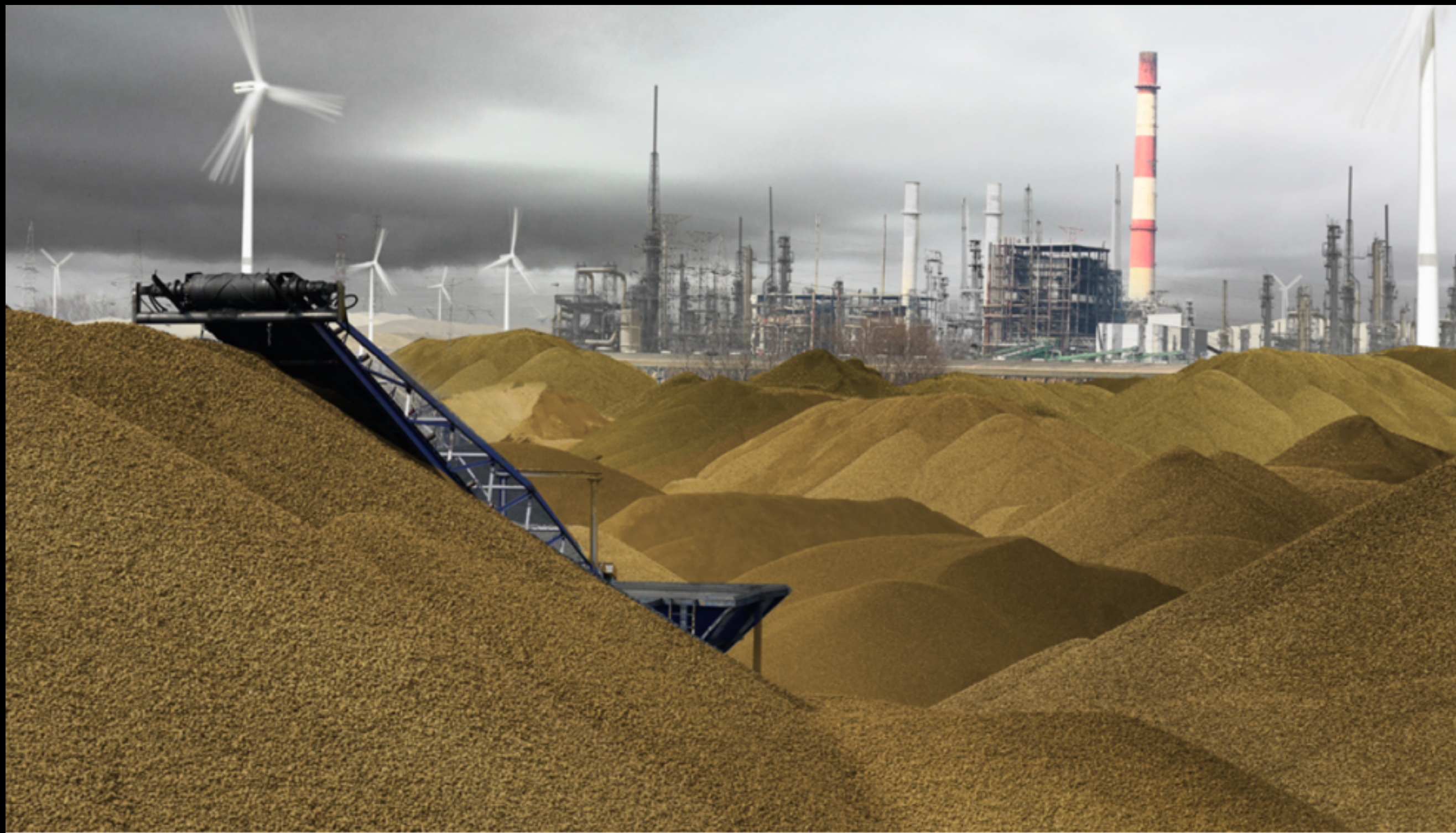
2030



- geothermie
- restwarmte
- windturbines
- CO₂-netwerk
- warmtenet
- biobased industrieën



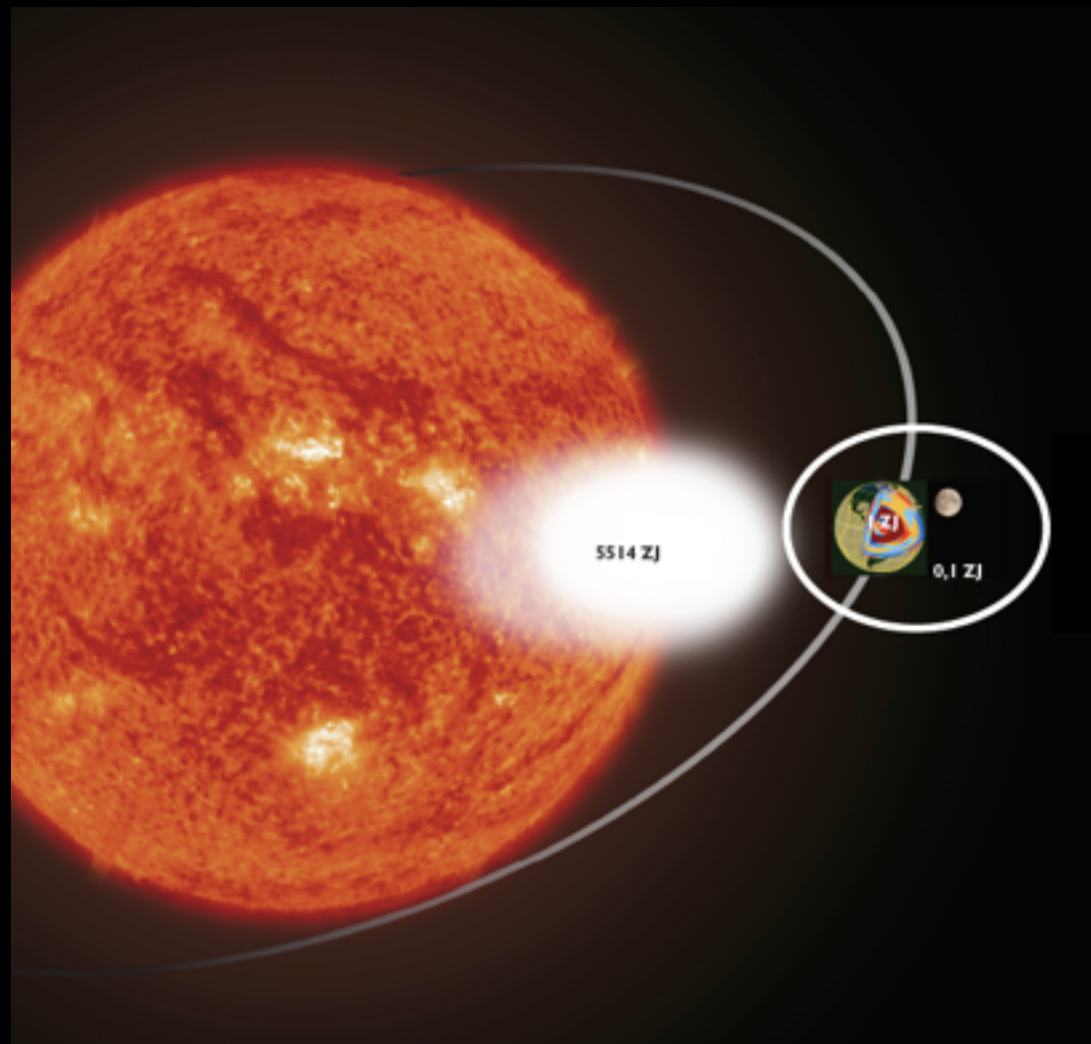








mitigating climate change:
engineering energy savings



Engineering angle (2)

0,4 ZJ Human Economy

400 % Tidal Energy

50% Geothermal Energy

0,007 % Solar Energy Received

**fine-tuning the urban
metabolism**



biota

sewers

urban metabolism

drinking water

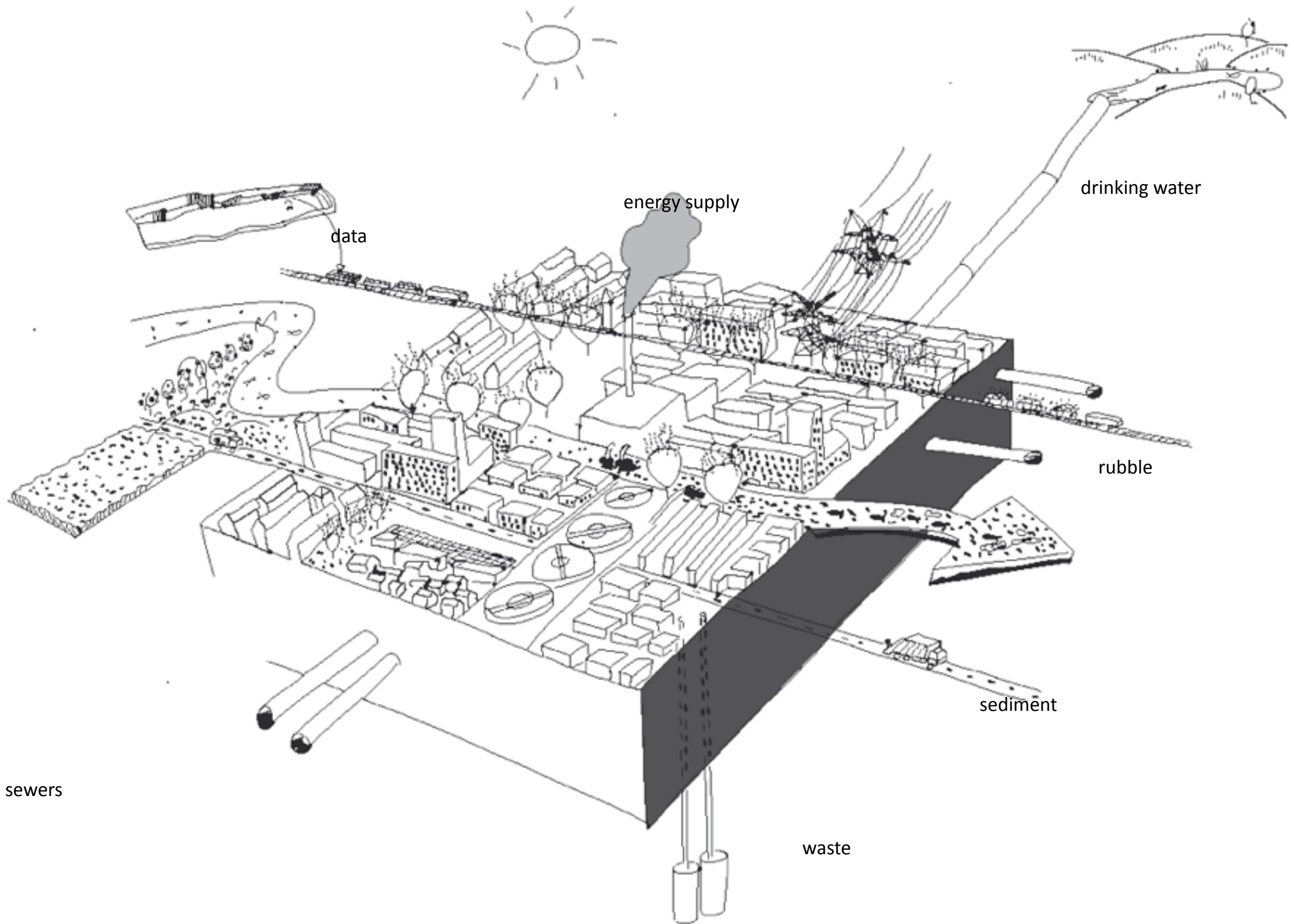
energy supply

drinking water

rubble

sediment

waste



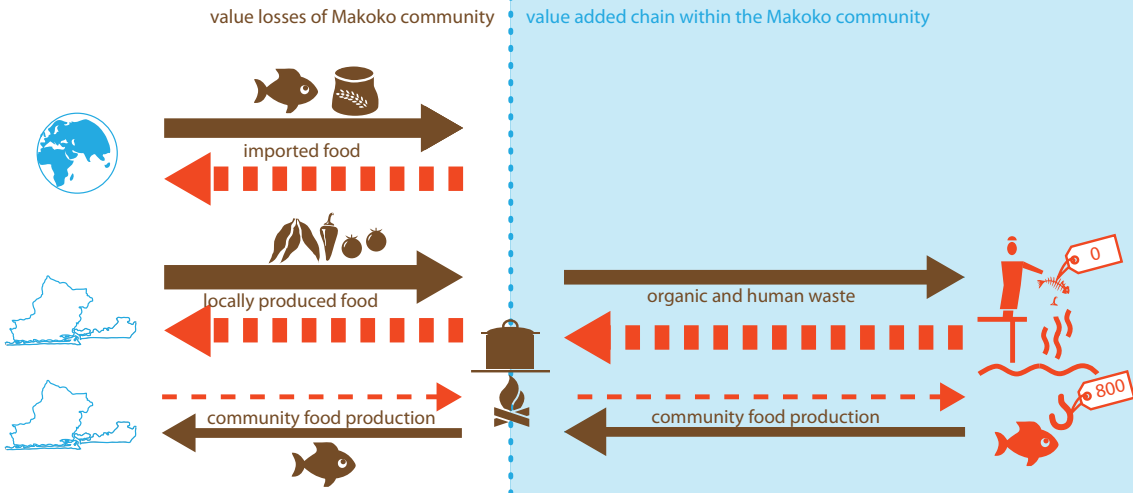


Existing and suggested organic/ human waste cycle

1 Existing principle of organic and human waste

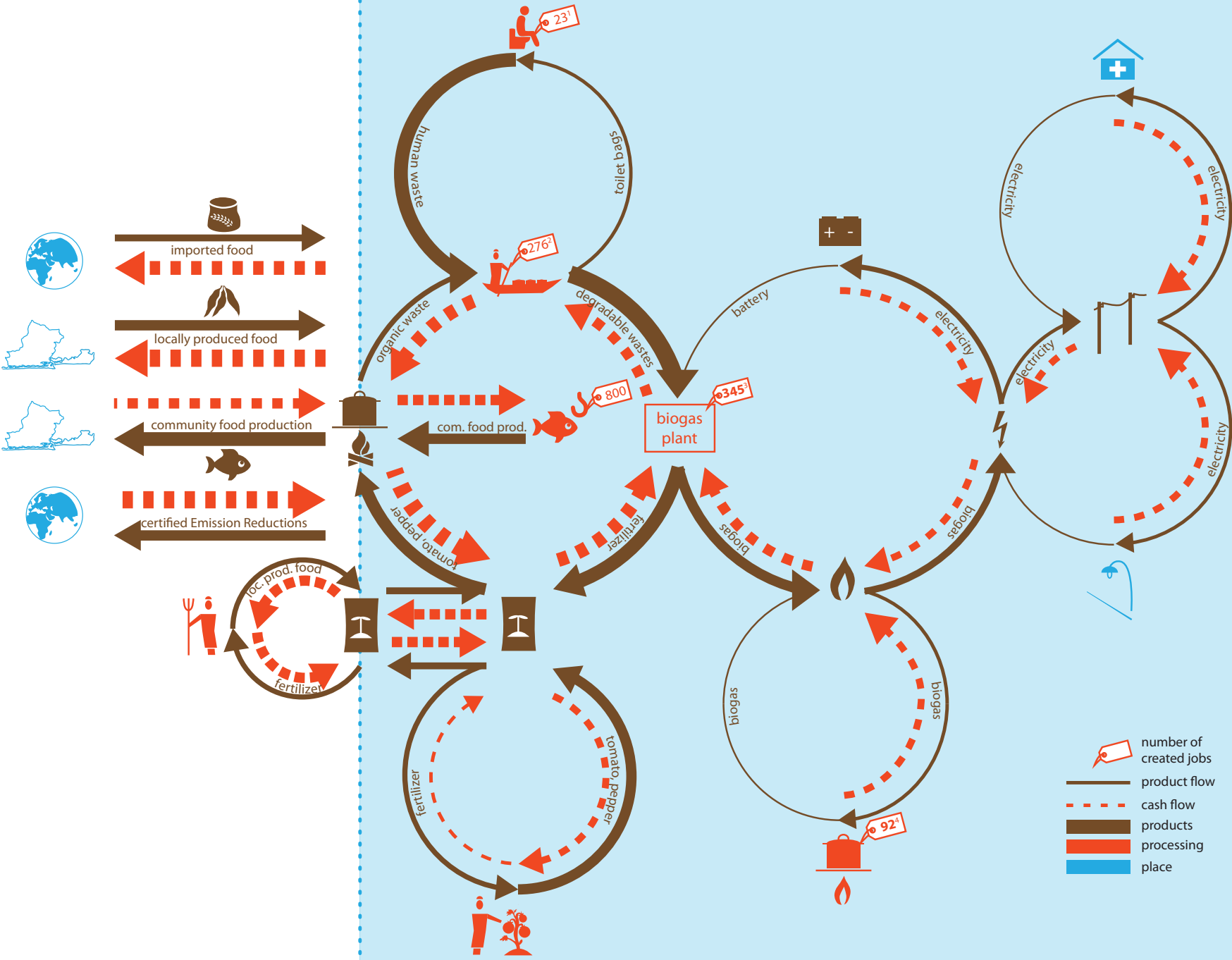
Today, all organic waste is released directly into the lagoon without any treatment whatsoever.

The suggested network of Neighborhood Hotspots is able to provide the badly needed waste management, linked to new job opportunities and income for the Makoko community.



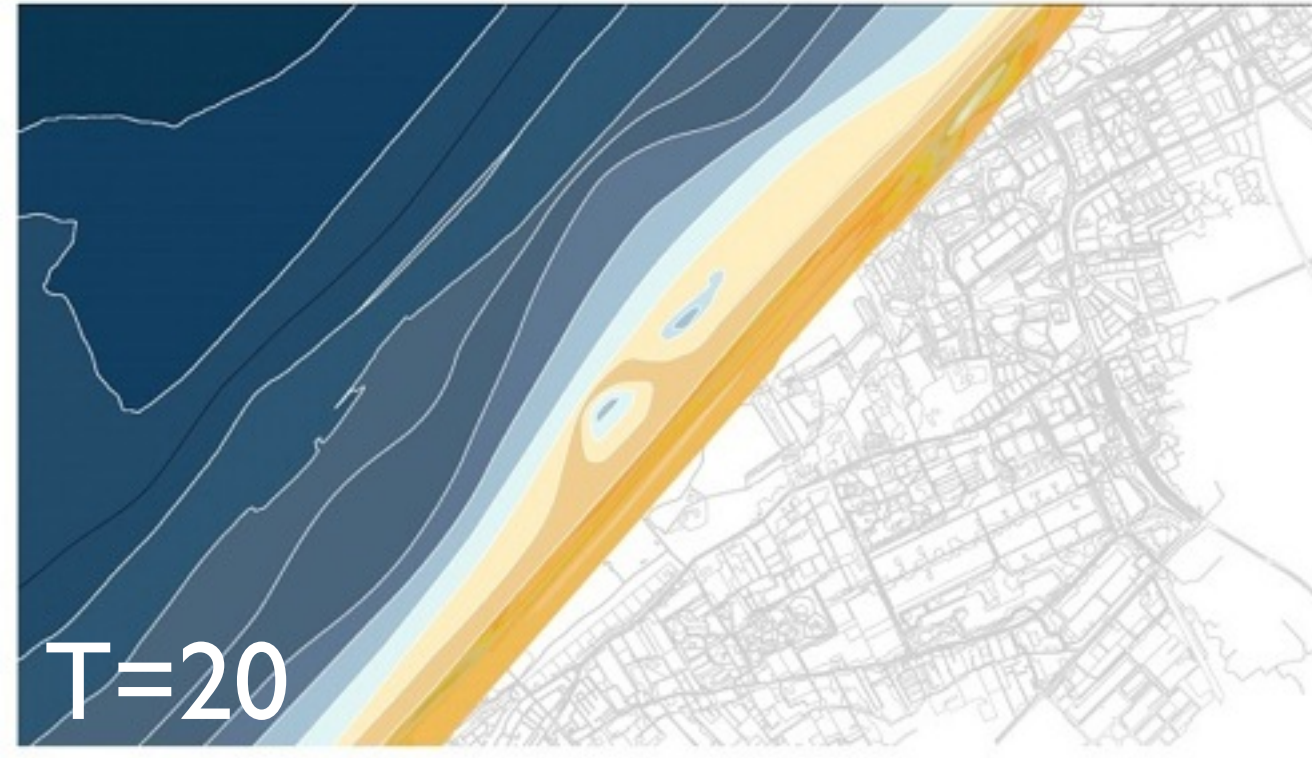
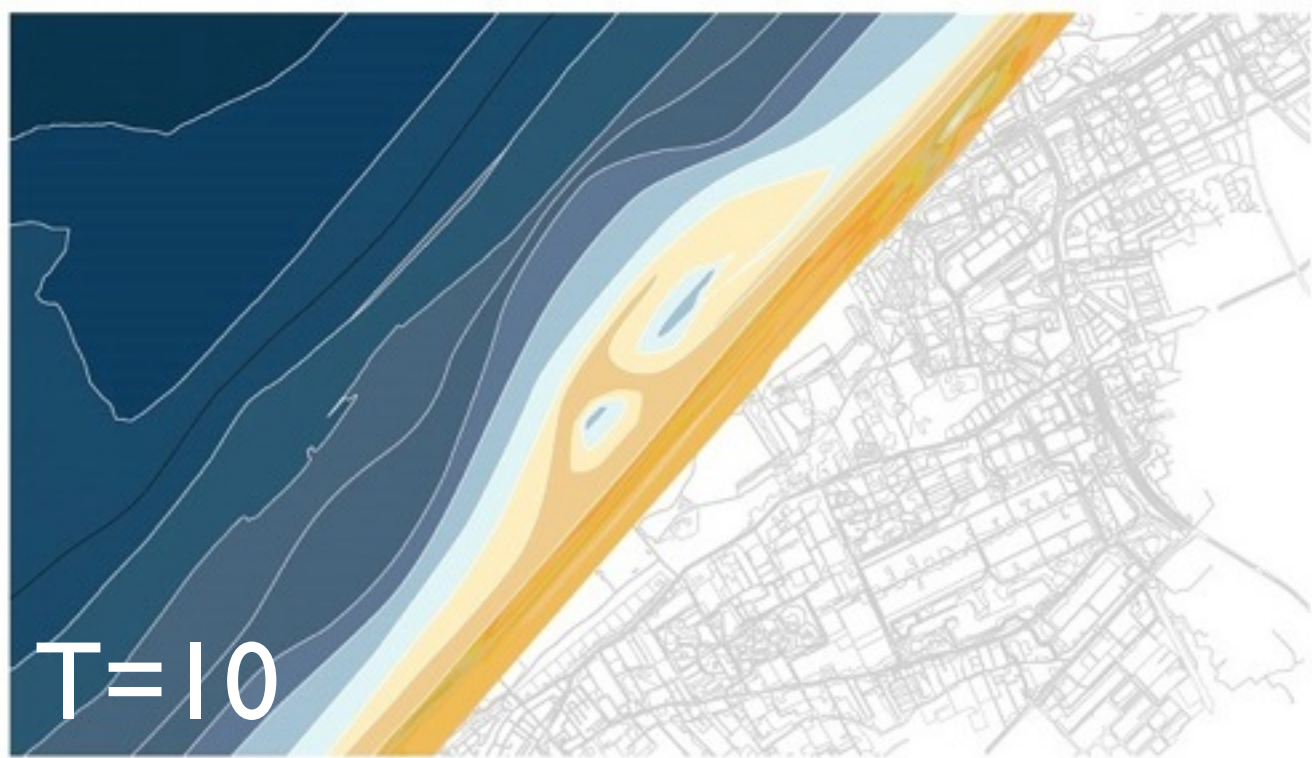
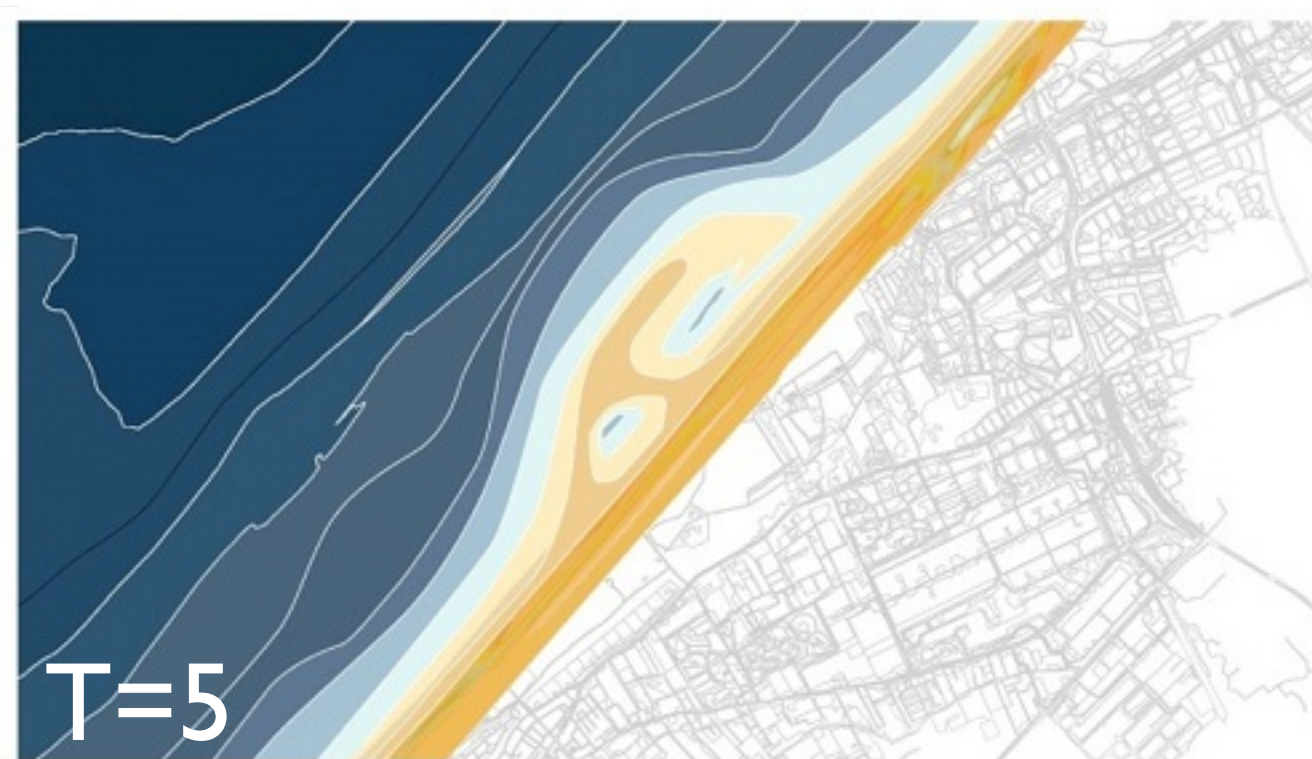
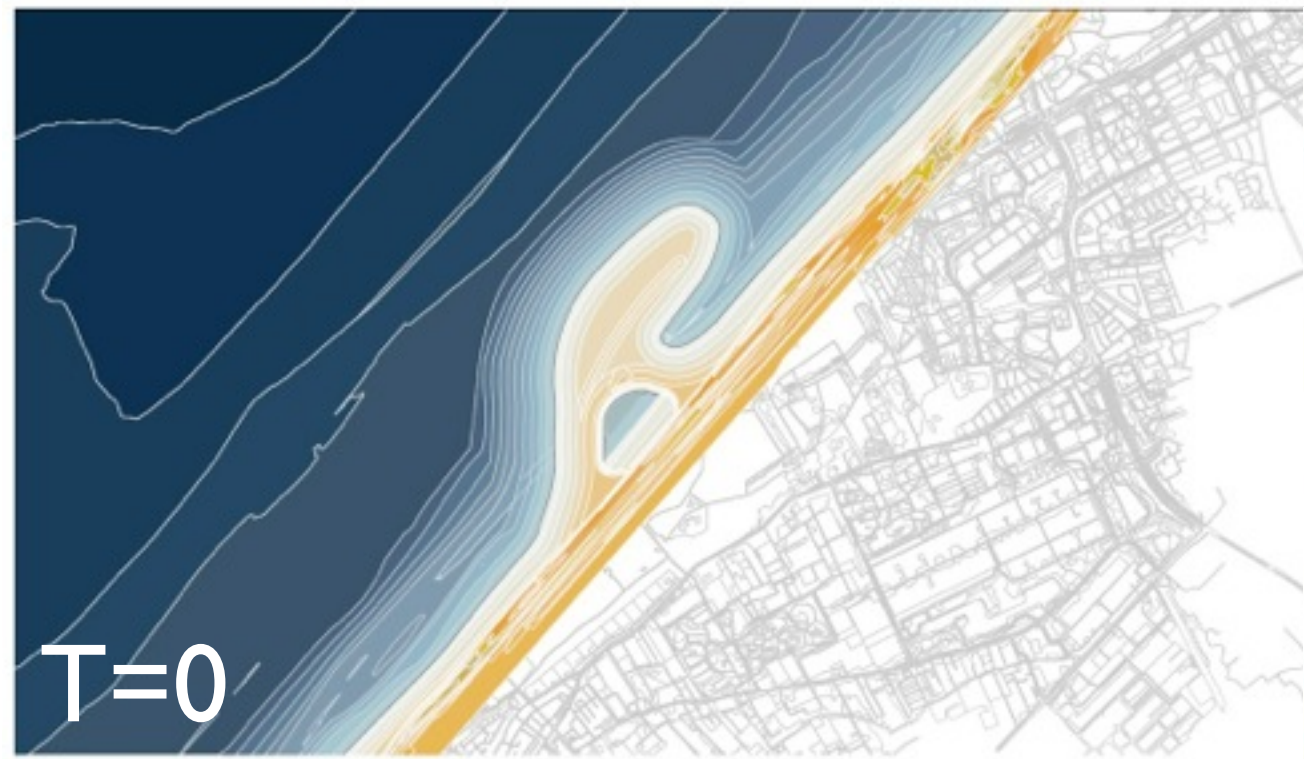
2 Suggested closed-loop cycles of organic/ human waste

The Neighbourhood Hotspots with attached biogas plants function as business incubators, knowledge centers, and "brain" of the new waste economy. They are owned and organized by the biogas cooperatives. The Hotspot network will provide income, increase the standart of living of the Makoko community and create a more healthy environment. Each of the Hotspots serves as a micro-community-center, providing a doctor's room, shared sanitary facilities, rainwater harvesting, biogas cooking, and a multi-puropose workshop room, proving education opportunities for girls, amongst other features.





adaptation to climate change
&
steering in dialogue with the system





inverse engineering:
retrofitting mistakes







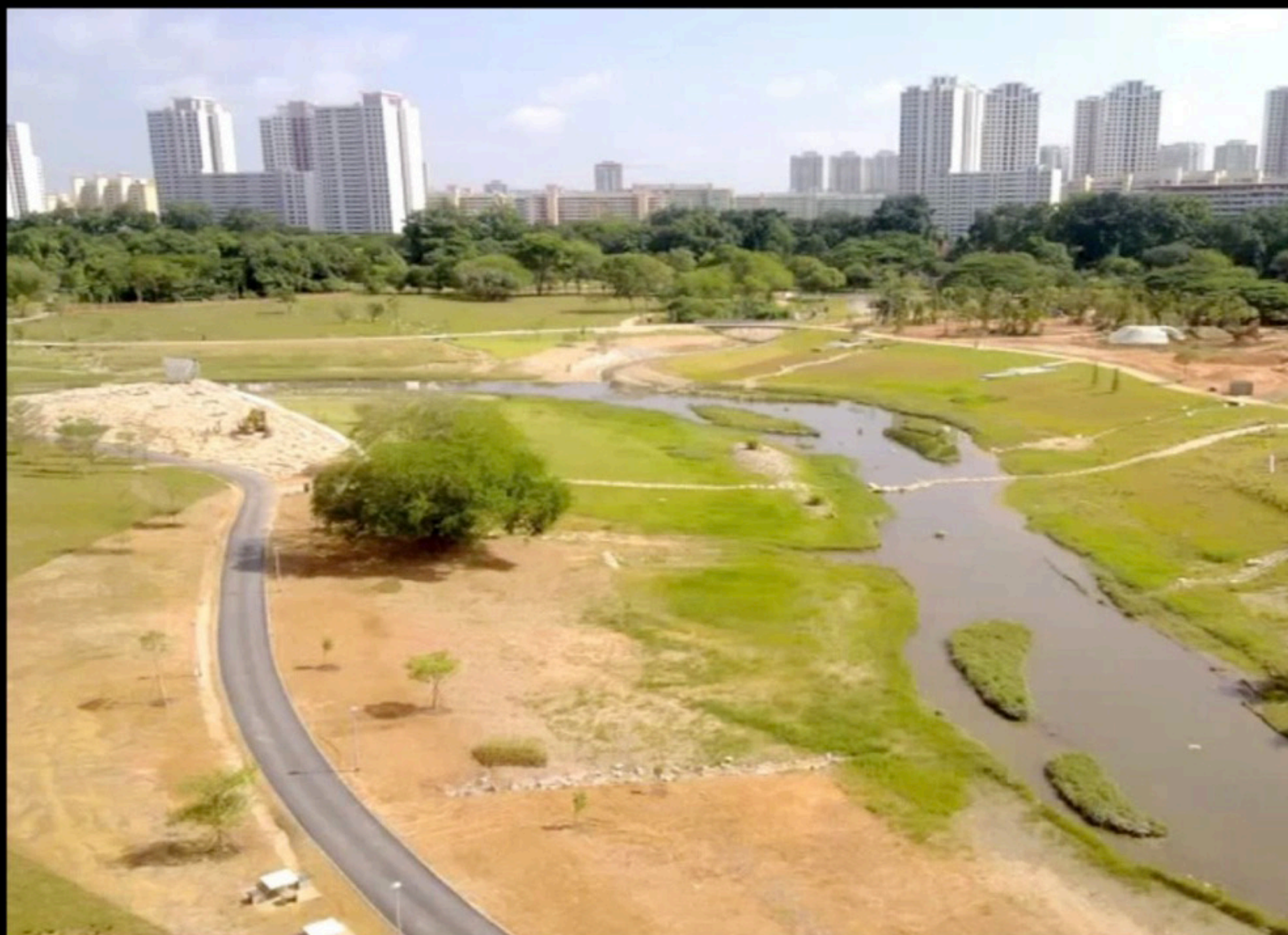








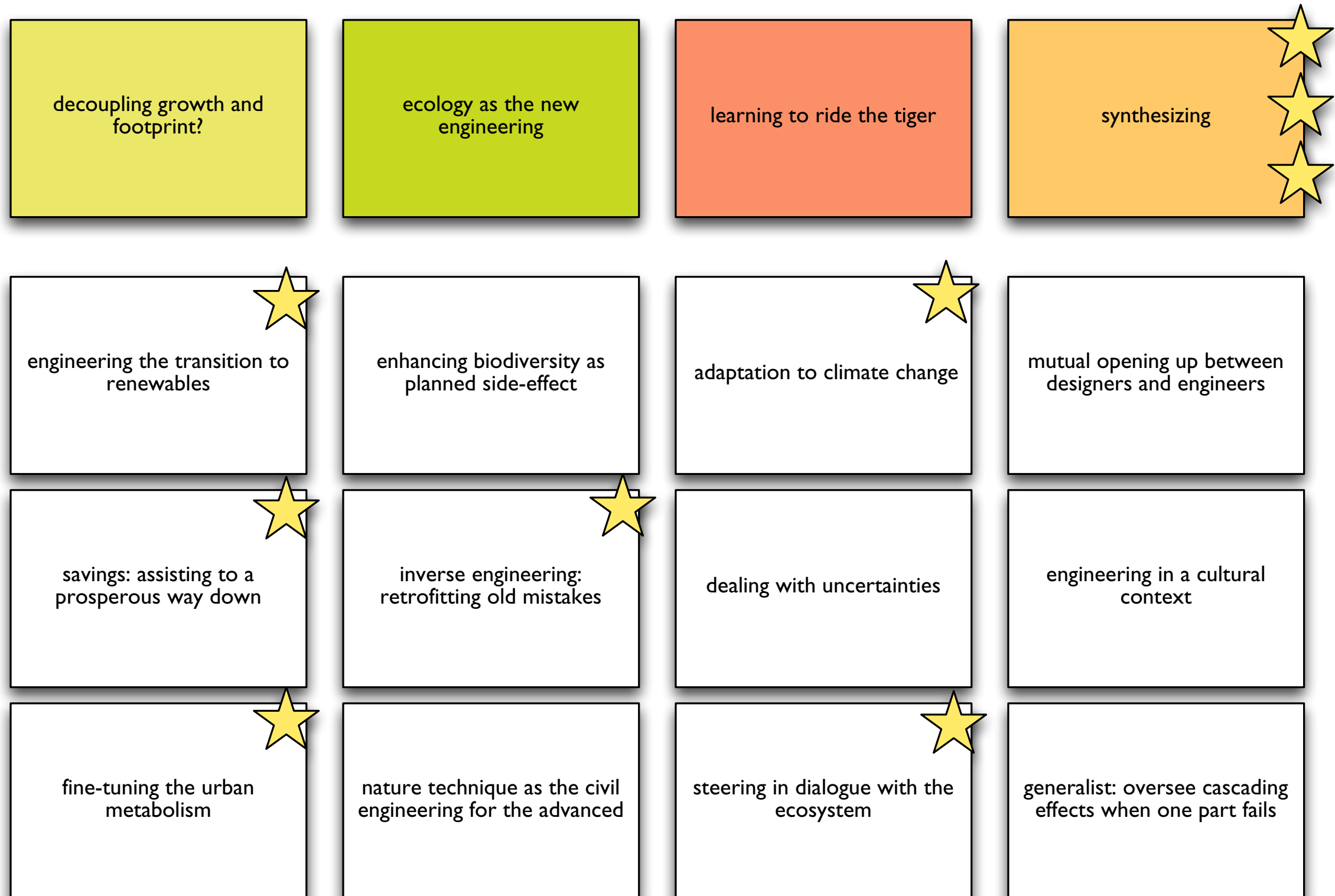






Kallang Riverside park 2.0 Singapore

IABR topics for engineering (in) the Anthropocene





Do engineers operate
in a world without theory,
while architects overdose on it?

Do engineers work without theory,
while architects overdose on it?
From: Pierre Belanger, Landscape Infrastructure, 2013

1964

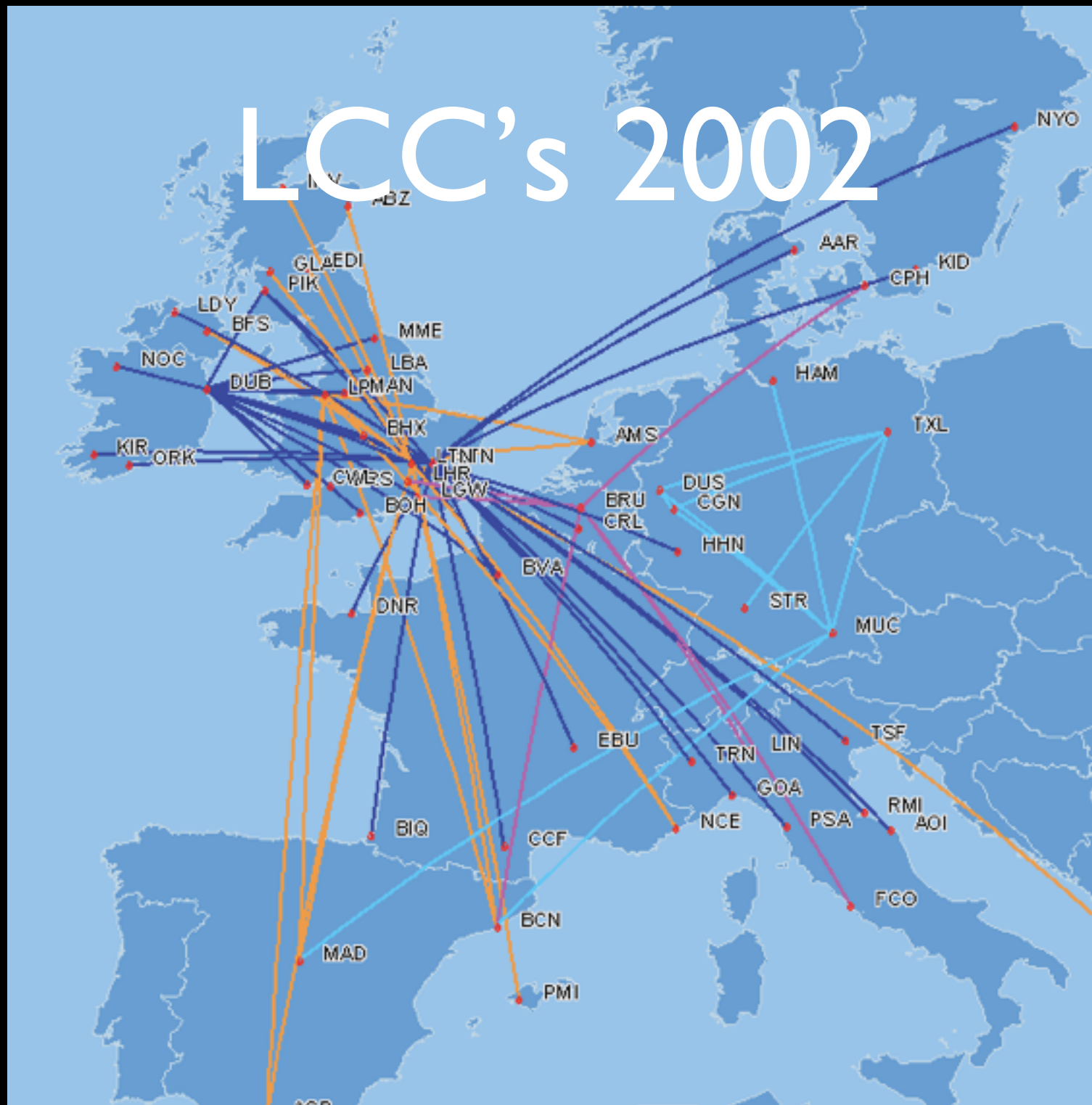
4x400 Watt



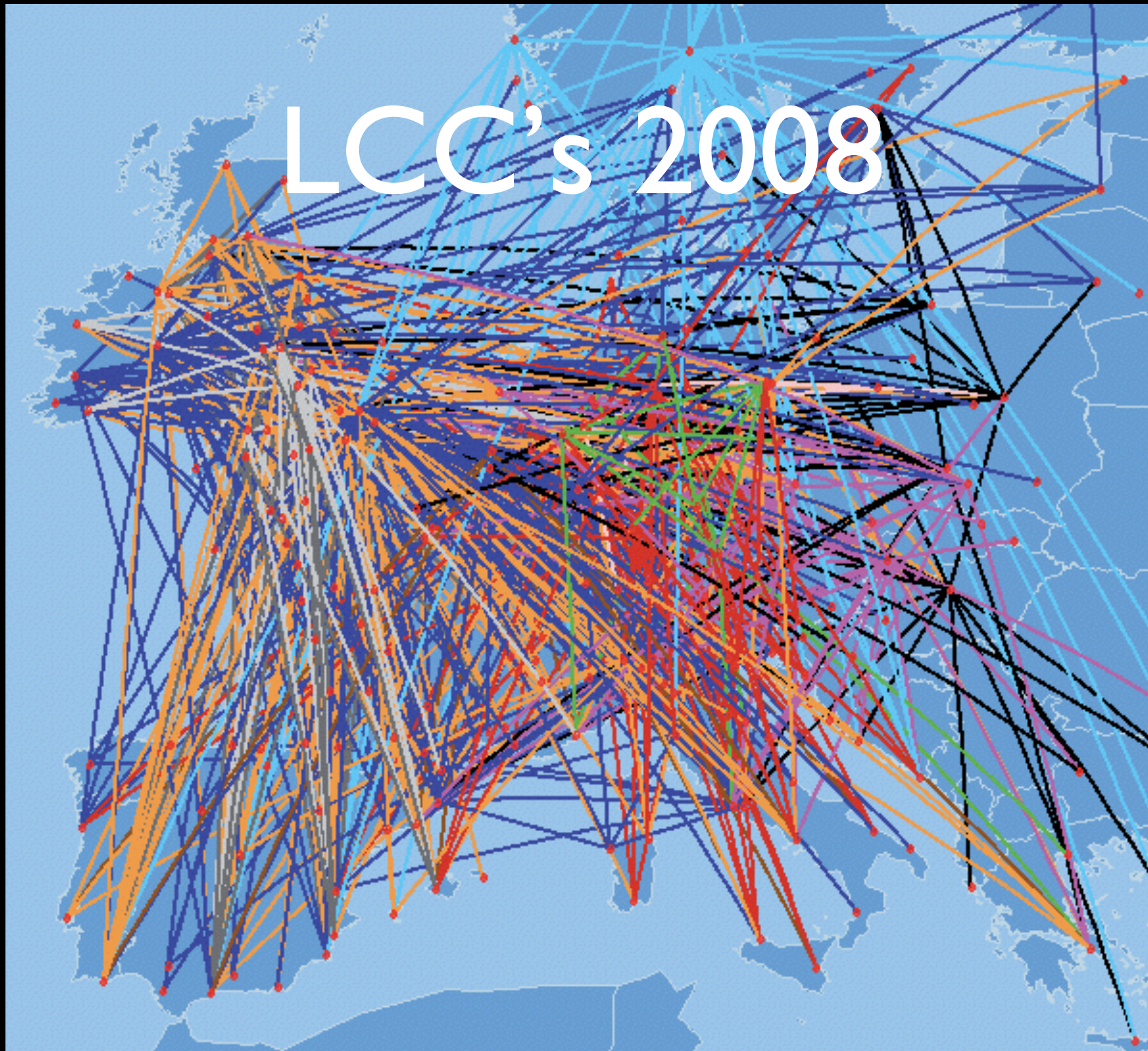
2002:
too big for Reykjavik

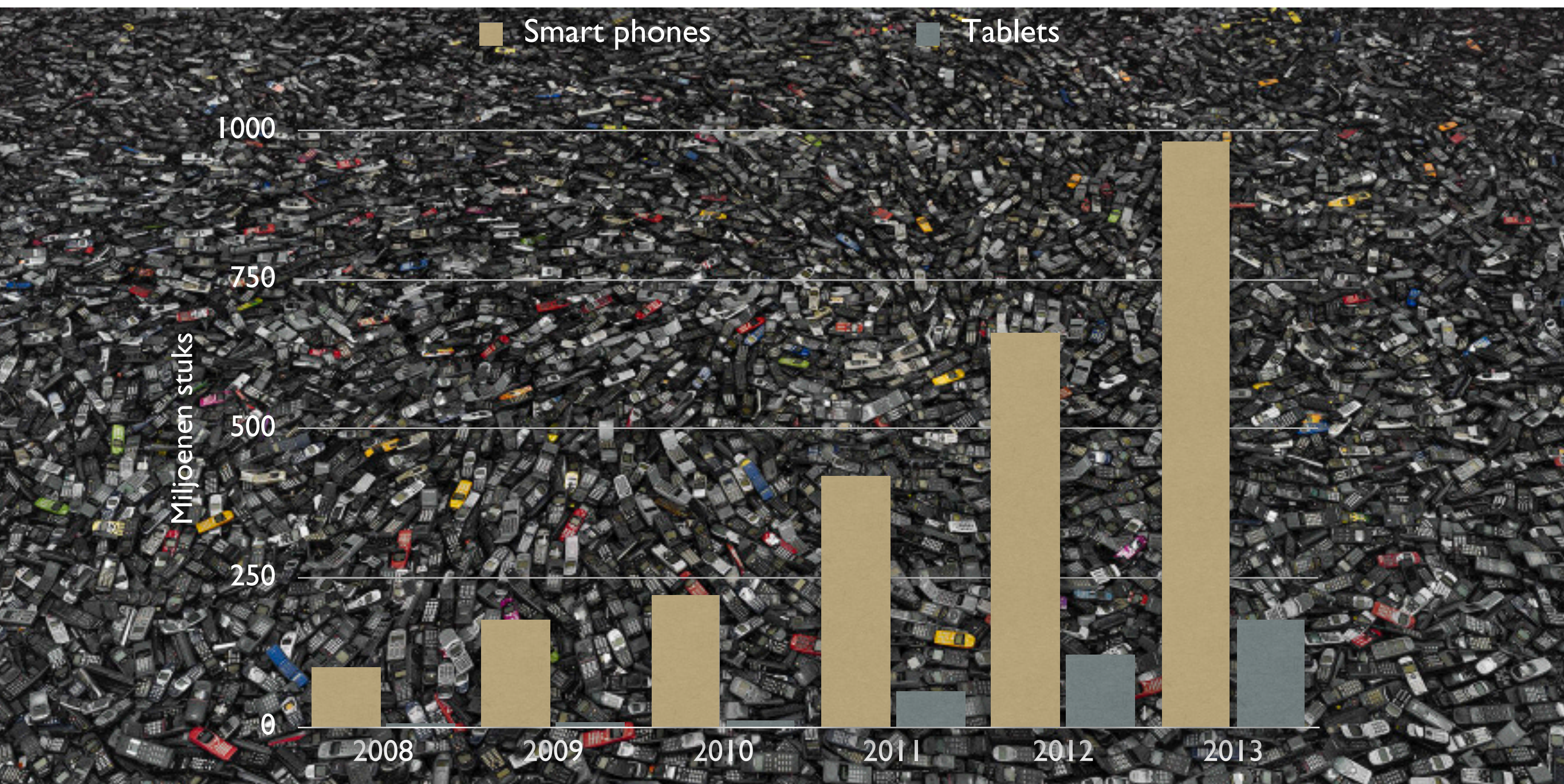


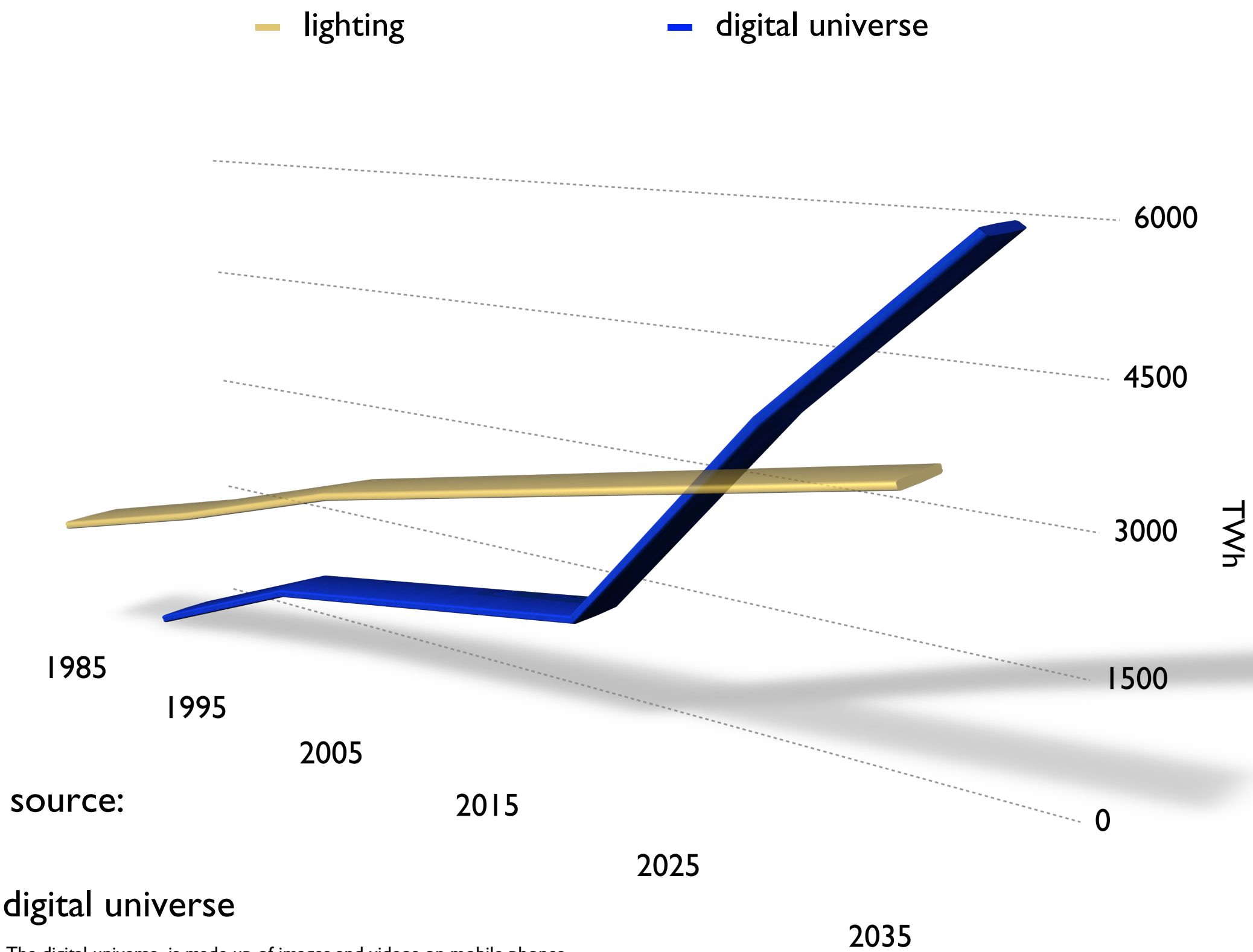
LCC's 2002



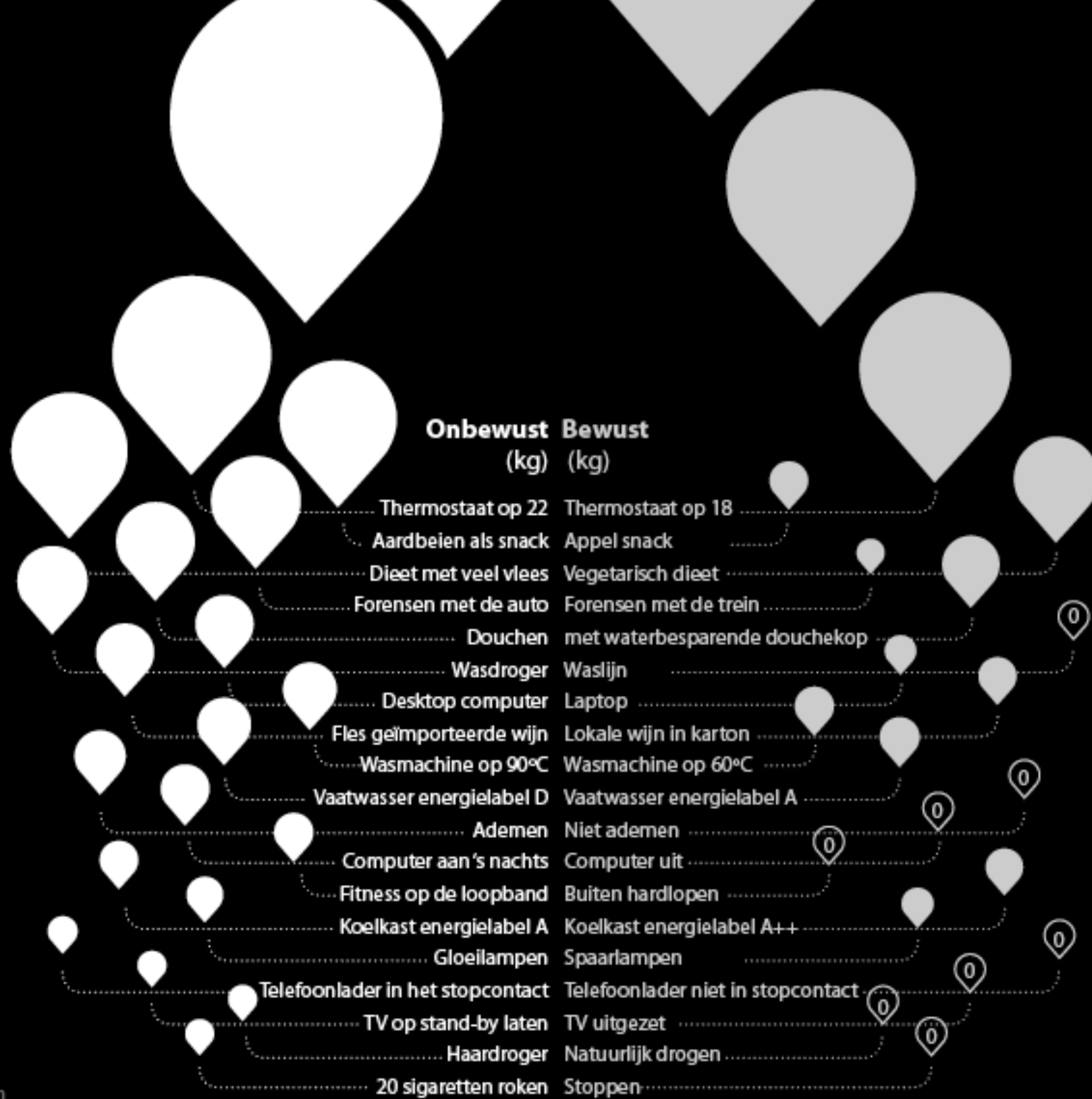
LCC's 2008







The digital universe is made up of images and videos on mobile phones uploaded to You Tube, digital movies populating the pixels of our high-definition TVs, banking data swiped in an ATM, security footage at airports and major events like the Olympic Games, subatomic collisions by the Large Hadron Collider at CERN, transponders on highway tolls et cetera.....



Koolstofbewust leven

Carbon conscious, 'Tweak your day'

source: UNESCO, Environmental Protection Agency, Energy Information Administration, in: Information is beautiful, David McCandless, 2009

T-Mobile 12:08

clearstandards Carbon Tracker personal edition

mei 2009

Max Goal 60 kg CO₂

Actual 77 kg CO₂



Home



Activities



Goals



About

T-Mobile 12:13

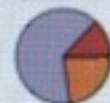
About

Total: 18,6

How your footprint is divided up:

CO₂ Total

18,6 Tons



House: 4,29 Tons



Car: 11,94 Tons



Flight: 2,38 Tons

Reduce



Offsets: 0 Tons

Compare your footprint:

Your Footprint: 18,6 Tons

Your Offsets: 0 Tons

USA Average Footprint: 23,4 Tons

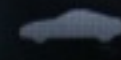
EU Average Footprint: 11 Tons

World Average Footprint: 4,3 Tons

10 20 30 40 50



House: 4,29



Car: 11,94



Flight: 2,38



Total: 18,6



Offsets

- engineers that know when to use a tech fix when an eco fix;
- engineers that dare challenge the decoupling ideology between economical growth and ecological footprints, but dare to work in small steps anyways.
- engineers that can position their work in a societal and cultural context;
- engineers that dare to start working also when not all the knowledge is available (Hoekelinge dam? Garuda?) Building in dialogue with the system. (learning from monitoring);
- engineers that know how to deal with uncertainties in a complex world (riding the tiger);
- Integral vs sectoral specialization
- engineers and designers (don't stay locked in in your autonomous Buildings) need to open up to each other
- engineers that help us on a 'prosperous way down'. "you got us into this mess now you get us out of it."

IABR topics for engineering (in) the antropocene

ecology as the new
engineering

charting the course in a
complex world

eco-fix vs tech-fix

dealing with uncertainties

mutual opening between
designers and engineers

inverse engineering:
retrofitting old mistakes

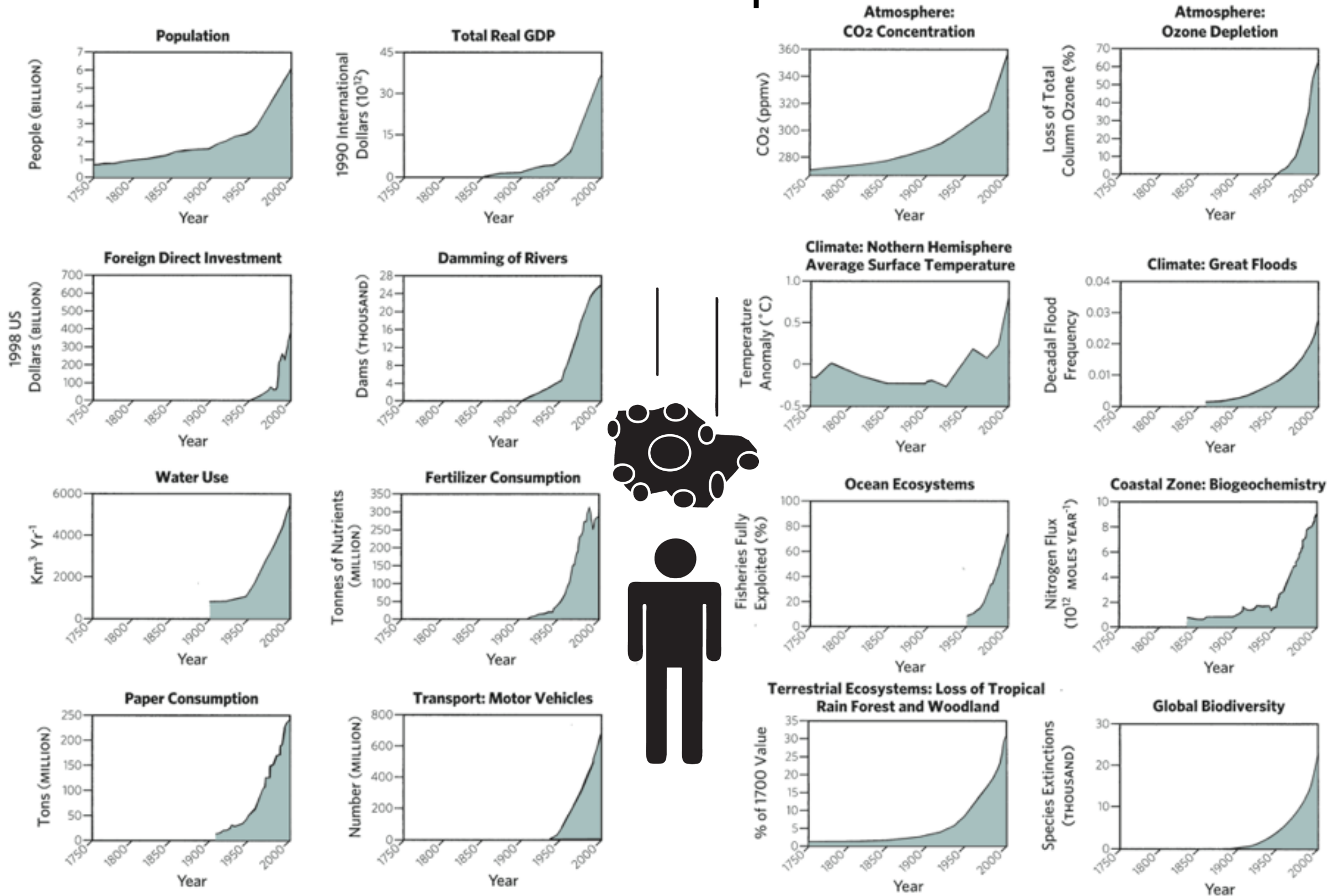
learning riding the tiger

nature technique as the civil
engineering for the advanced

steering in dialogue with the
system

bottom up engineering

attached & responsible

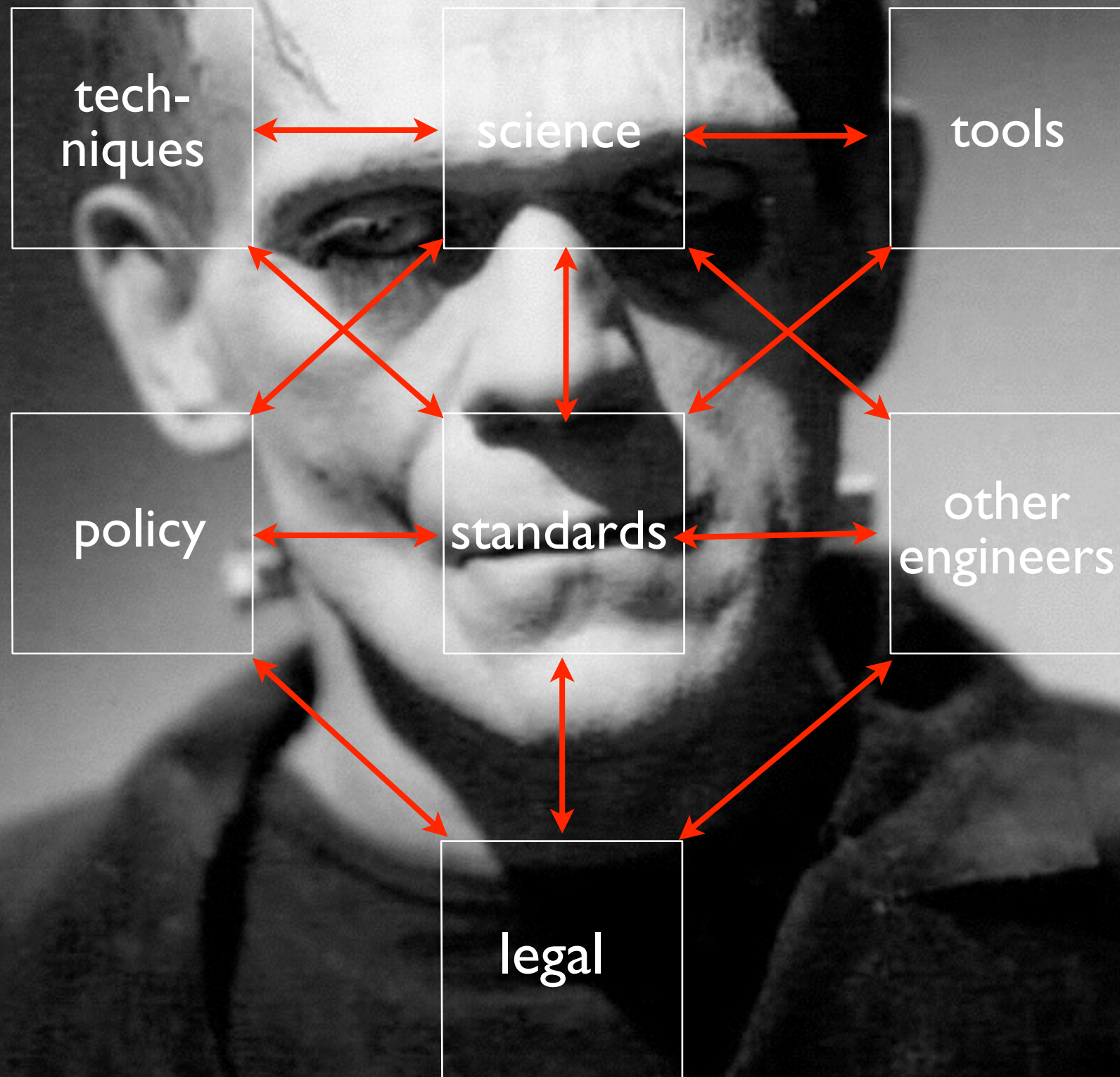


offender and victim

era	nature/ resources	vector	key notion
modernization	given, source and sink	emancipation	freedom/ detachment
explicitation	nothing for granted	concern	responsible/ attached
antropocenic	?	?	riding the tiger

Engineering 2014

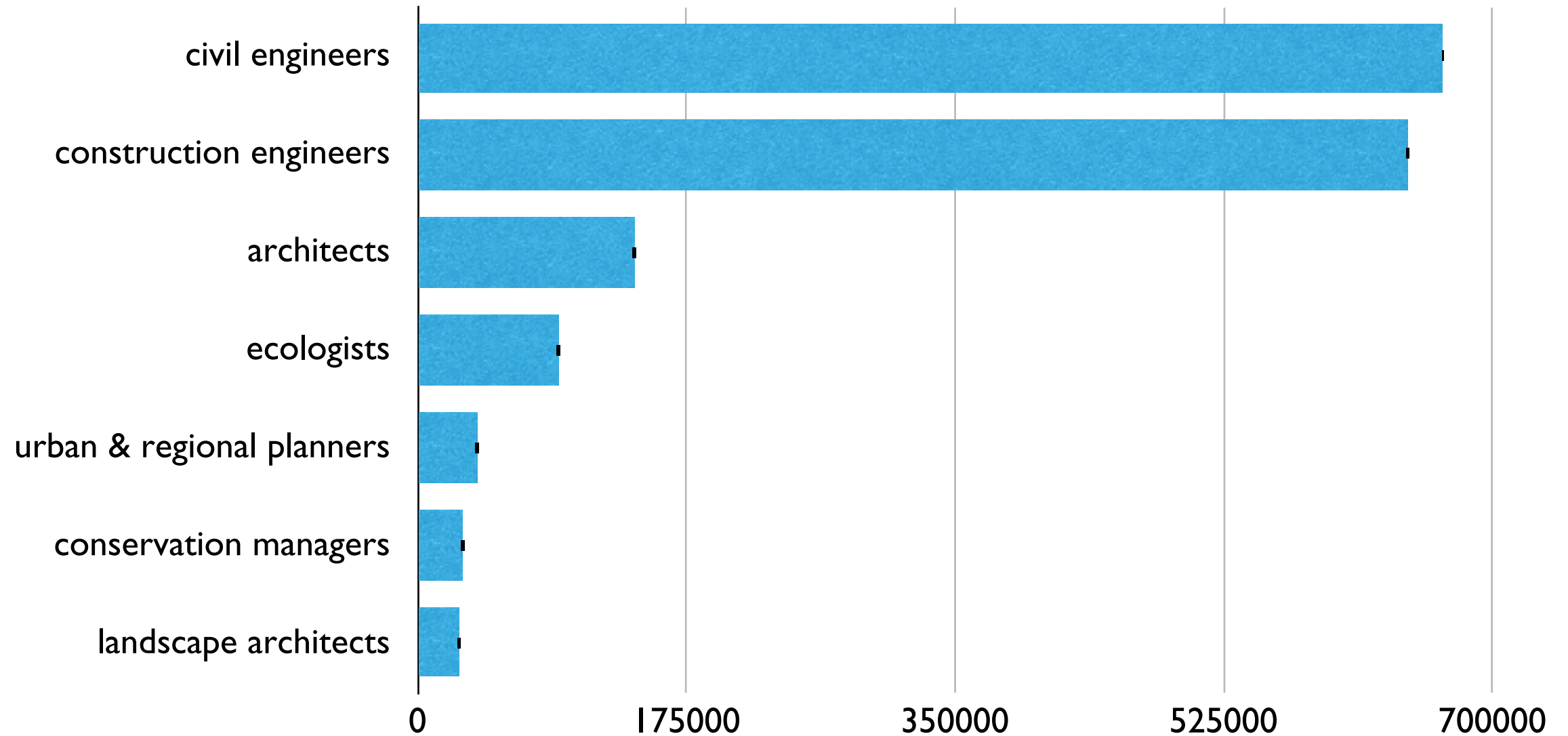
```
graph TD; tech[tech-niques] <--> science[science]; science <--> tools[tools]; tools <--> standards[standards]; standards <--> other[other engineers]; other <--> legal[legal]; tech <--> standards; science <--> legal; tools <--> legal; policy[policy] <--> standards; policy <--> legal; standards <--> legal;
```





Nature | Society

‘we’ shaped this



The Silent Majority
Civil Engineers as the Master Planners of the 20th Century
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engineering challenges

- mitigation of & adaptation to Climate Change
- enhancing Biodiversity
- retrofitting Urban Metabolism