Research Institute Built Environment of Tomorrow

Smart Cities

Ronald Rovers,
Professor (sustainable) Built Environment

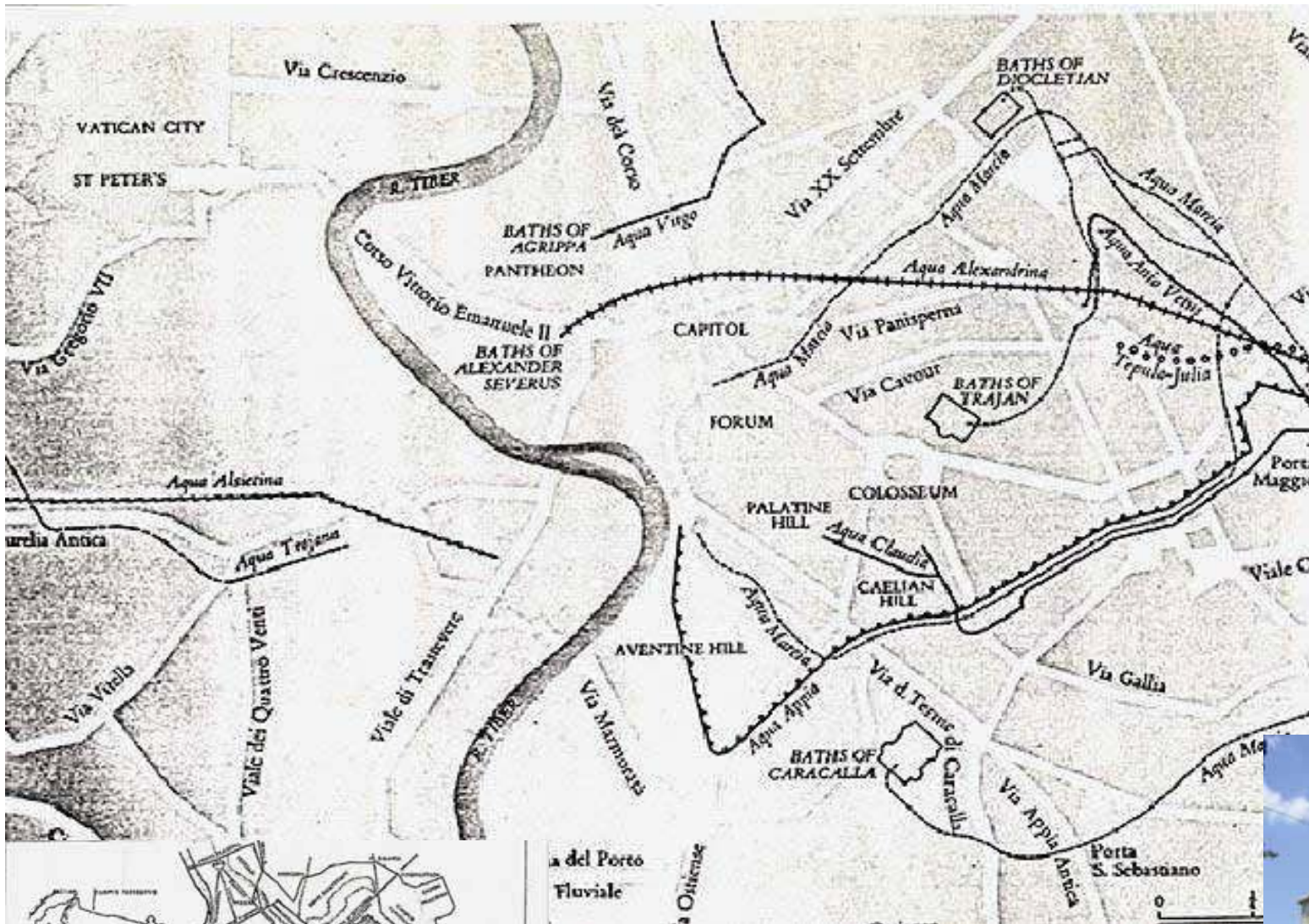RiBuilT is a institute of Zuyd University of applied science, Heerlen The Netherlands
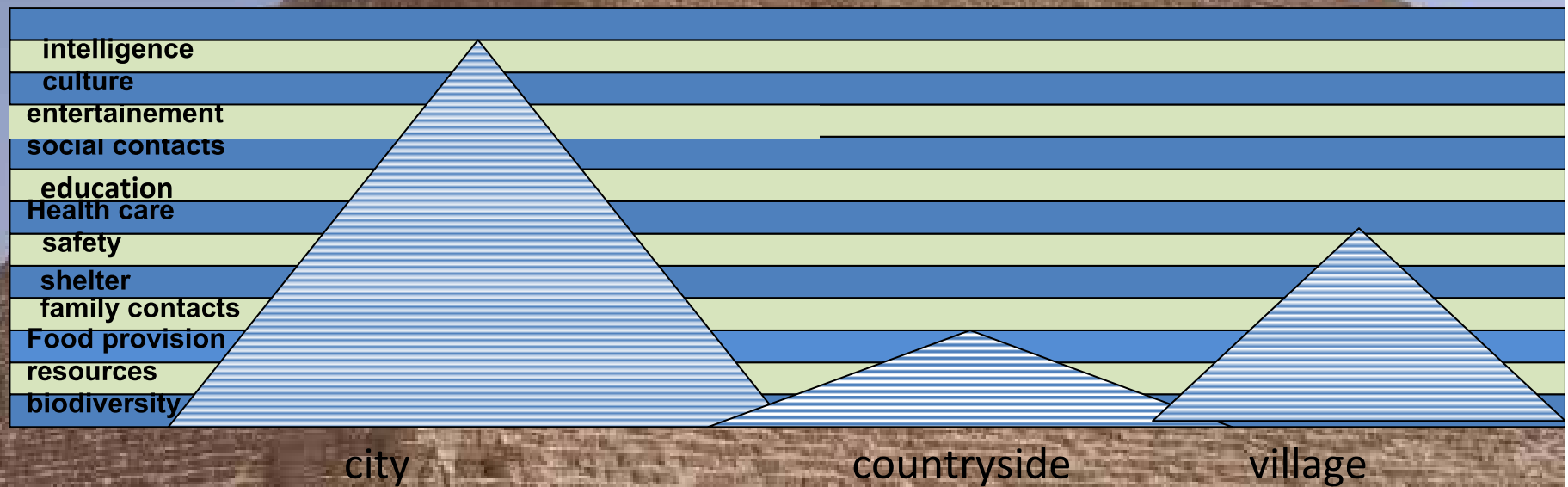
ZU
YD

Madagascar village

Via Crescenzio

VATICAN CITY

ST PETER'S

Via del Corso

BATHS OF
DIOCLETIAN

R. TIBER

Via XX Settembre

Aqua Marcia

Aqua Marcia

BATHS OF
AGRIPPA
PANTHEON

Aqua Virgo

Aqua Anio Vetus

Corso Vittorio Emanuele II

Aqua Alexandrina

Via Gregorio VII

CAPITOL

Aqua Marcia

Via Panisperna

Aqua
Tepula-Julia

BATHS OF
ALEXANDER
SEVERUS

Aqua Marcia

Via Cavour

BATHS OF
TRAJAN

FORUM

Porta
Maggio

Aqua Alsietina

COLOSSEUM

urelia Antica

Aqua Trajana

PALATINE
HILL

Aqua Claudia

Viale C

CAELIAN
HILL

Aqua Marcia

Via Gallia

Via Vitelli

Viale dei Quattro Venti

Viale di Trastevere

Via Marmorata

AVENTINE HILL

Aqua Appia

Via d. Terme di Caracalla

R. TIBER

BATHS OF
CARACALLA

Aqua Ma

a del Porto
Fluviale

Via Ostiense

Via Appia Antica

Porta
S. Sebastiano

Fig 8.
MAP OF
AQVEDVCTS

basics

.building society, the order of organisation

intelligence
culture
entertainement
social contacts
education
Health care
safety
shelter
family contacts
Food provision
resources
biodiversity

city   countryside   village

Cities run on import/export/production of resources and related products. By the abundant and secured supply of these social order and cultural expression can thrive.

1st transition
1800-1900
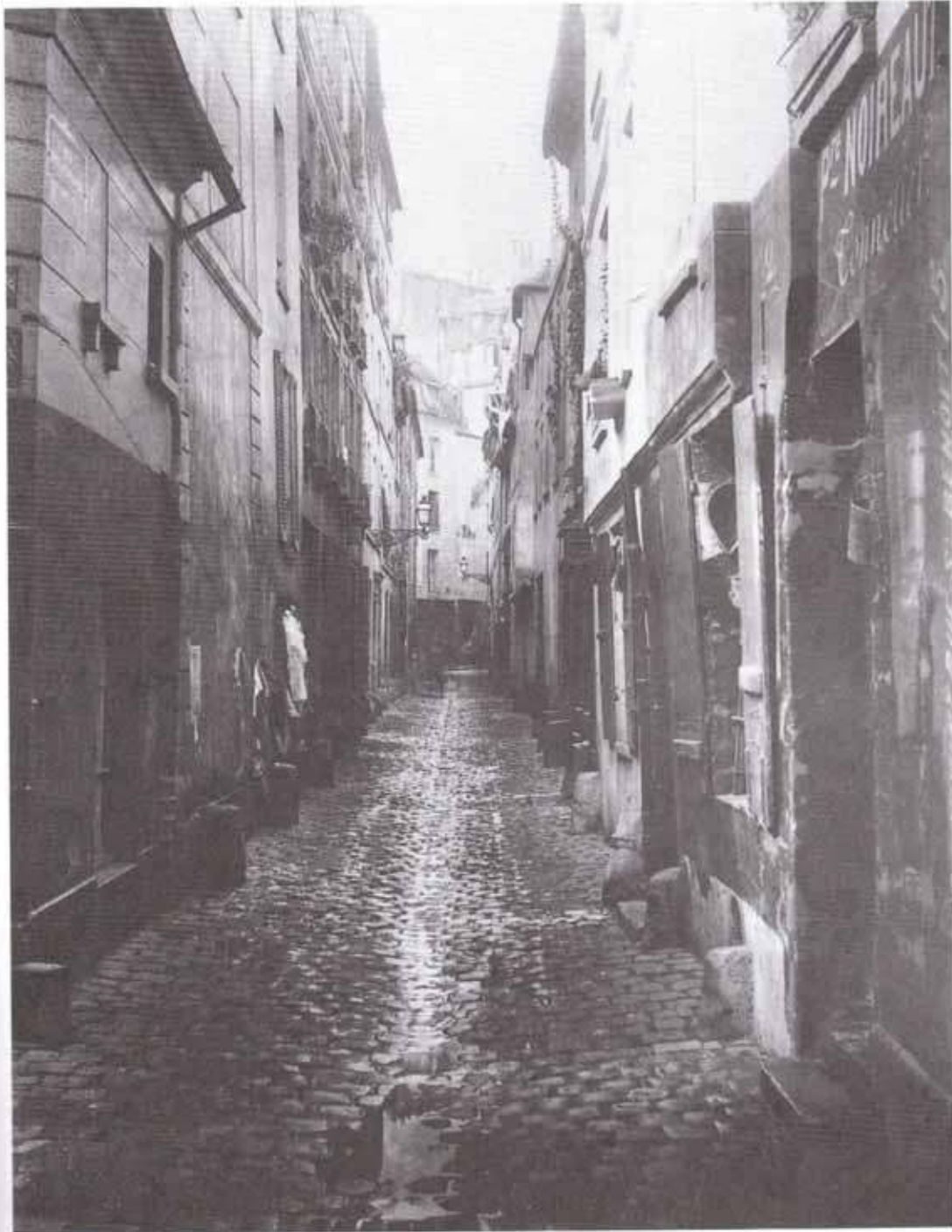
Cities as a death Trap, 19th century, Braadbaart,O.†

Mortality in rural and urban states, USA, late 19th century (deaths per 1,000 persons)

	Rural states	Urban states
All ages	15.3	22.1
Under 1 year	121.2	243.3
Under 5 years	37.1	80.4
5 to 15 years	4	6.2
15 to 45 years	6.9	10.8
45 to 65 years	15.2	26.3
65 + years	67.8	88.6
Unknown	54.9	20.7

Cities as demography balancers …

19th century urban industrialisation

- Cities become centres of production and wealth
- Mass migration into cities
- Overcrowding and poverty create a structural crisis in urban health and hygiene
- Common source epidemics create repeated urban pandemics (cholera, typhoid, typhus)

Health and hygiene innovations

- Technological advances in medicine (microscopy, identification of disease vectors, inoculation)

- Medicalisation of urban society

- Piped water supply and sand filtration

- Urban waterborne waste removal (sewerage)
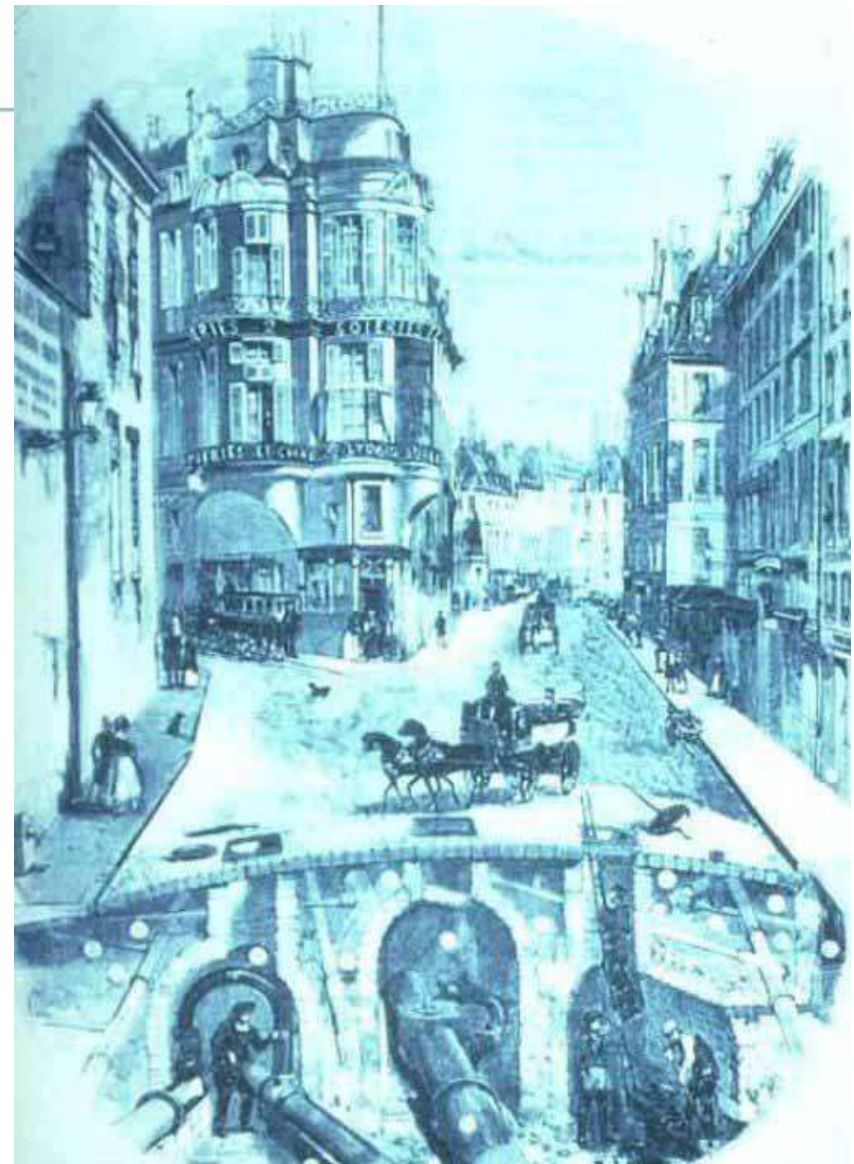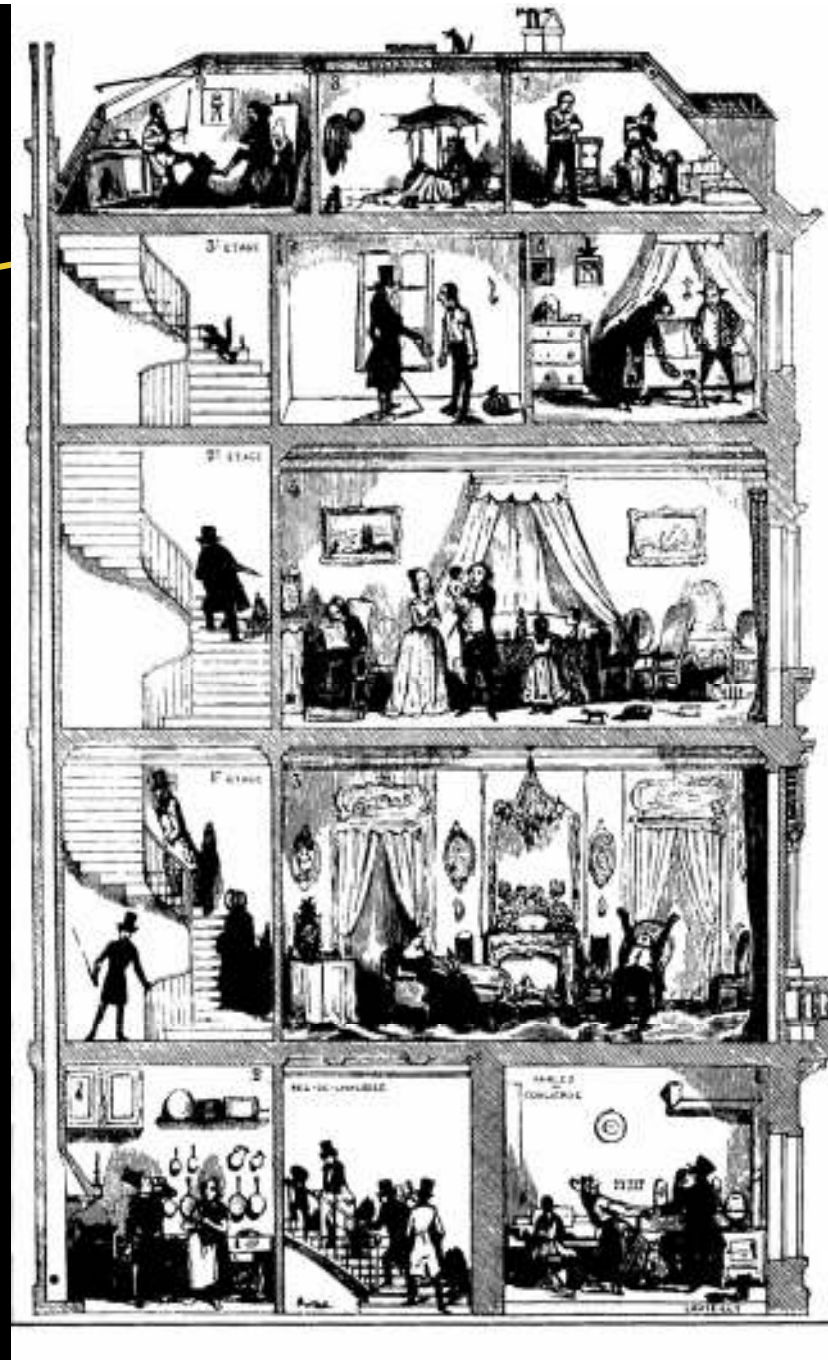
Paris, 1853
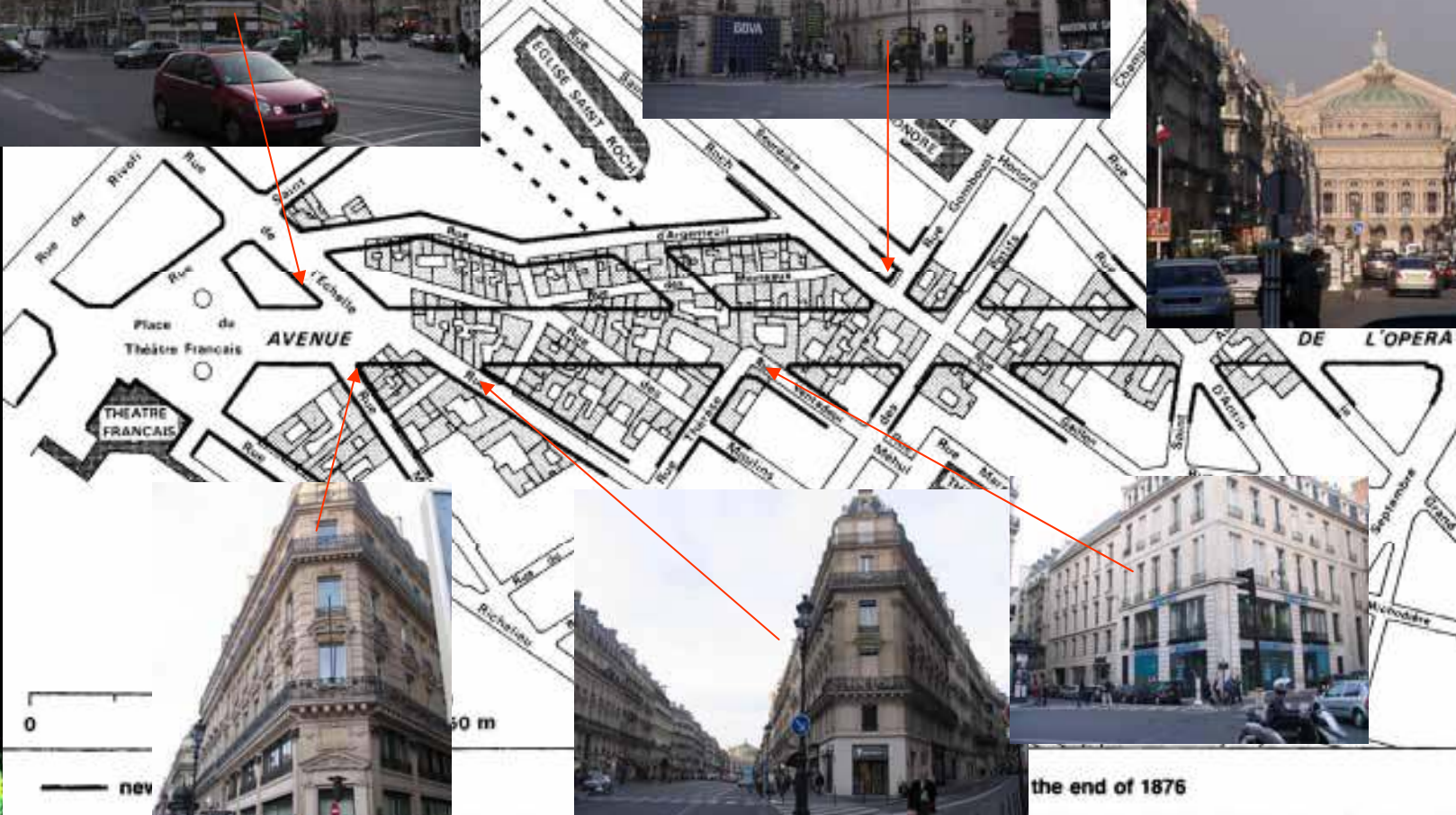
Including 600 km sewer system

19th century

Parisian mansion block, 1853,
home for all social classes

SBScentre

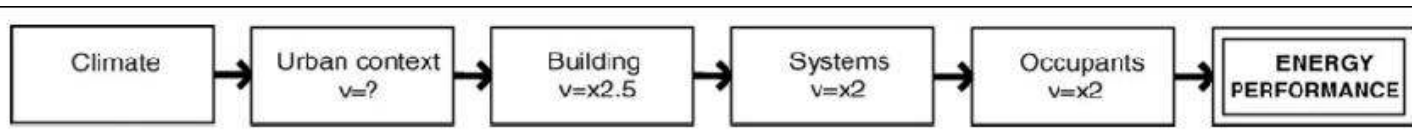Energy in Urban context:

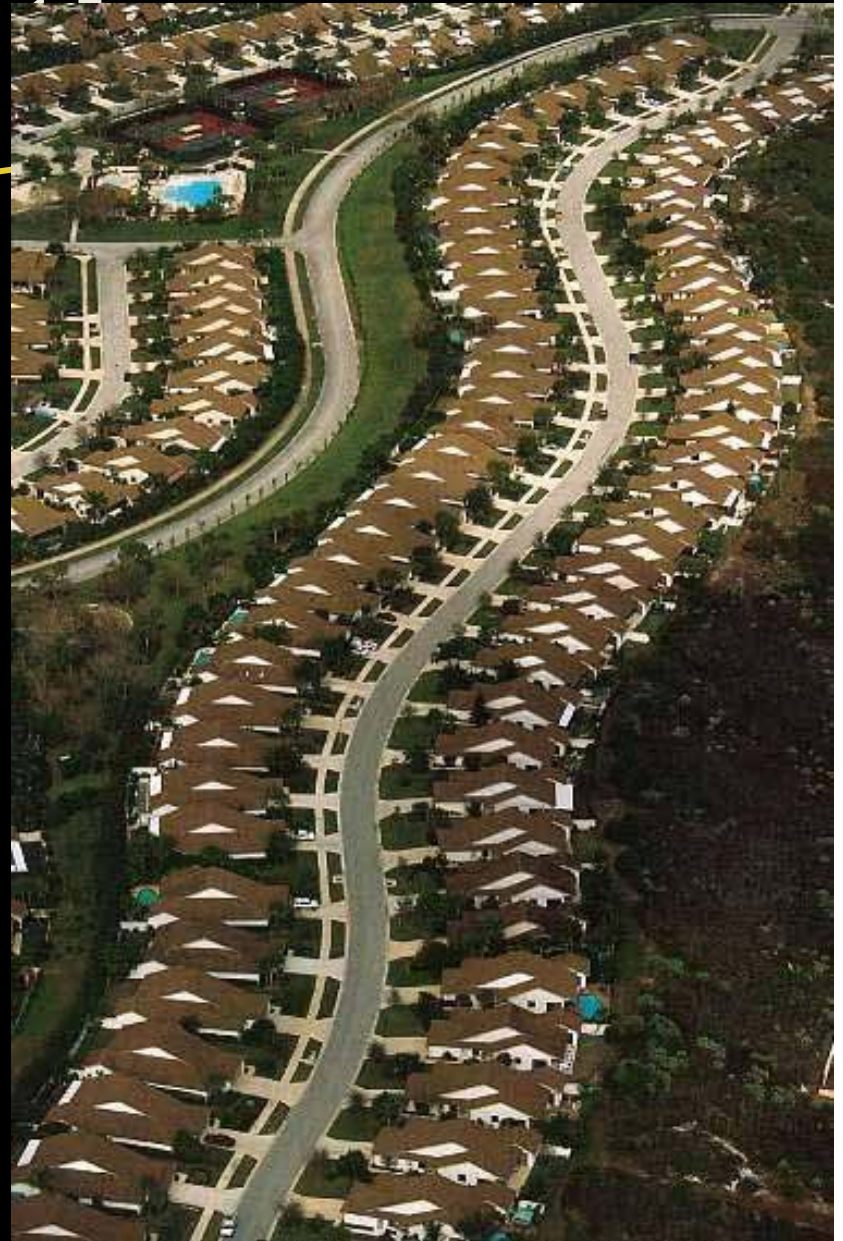| Climate | → | Urban context $v=?$ | → | Building $v=x2.5$ | → | Systems $v=x2$ | → | Occupants $v=x2$ | → | ENERGY PERFORMANCE |

Beijing   Shanghai   Paris   Berlin

Serge Salat, CSTB Paris,& iiSBE working group Urban Indicators

M

1850-1880

BC 0 AD

BC   0   ▲ AD

Modern times

Reasons for wide and high

Elevators

Motorised vehicles

Steel (frame building)

telephones

Typewriters

Money

1900-2000 Causing:

- Connecting distant goods physically,

- disconnecting people physically

SBScentre

CITIES 1900-2000

today,

elevators move the equivalent
of the world's population

every 72 hours.

Urban Organism = Orbanism

Table 6 Shortage of resources supply and demand in China in 2005–2050 under the restrictions of both modernization and urbanization

Unit	2005	2010	2020	2030	2040	2050
Urbanization rate (%)	33.19	34.68	37.15	39.14	40.82	42.26
Coal (100 million tons)	+6.34	+8.21	+11.77	+24.64	+18.24	+21.17
Oil (100 million tons)	+0.04	+0.05	+0.04	+0.03	+0.02	+0.02
Natural gas (100 million cubic meters)	−2.74	−7.02	−15.06	−22.35	−28.95	−34.97
Iron ore (100 million tons)	−3.81	−5.43	−9.25	−13.83	−19.08	−25.01
Raw iron (100 million tons)	−0.30	−0.53	−1.15	−1.99	−3.02	−4.25
Steel (100 million tons)	−0.33	−0.63	−1.48	−2.65	−4.13	−5.91
Copper (10,000 tons)	−34.59	−36.30	−38.96	−41.00	−42.62	−43.97
Aluminum (10,000 tons)	−147.18	−187.11	−272.10	−361.69	−454.21	−548.61

Urbanization, sustainability and the utilization of energy and mineral resources in China: L Shen et al.
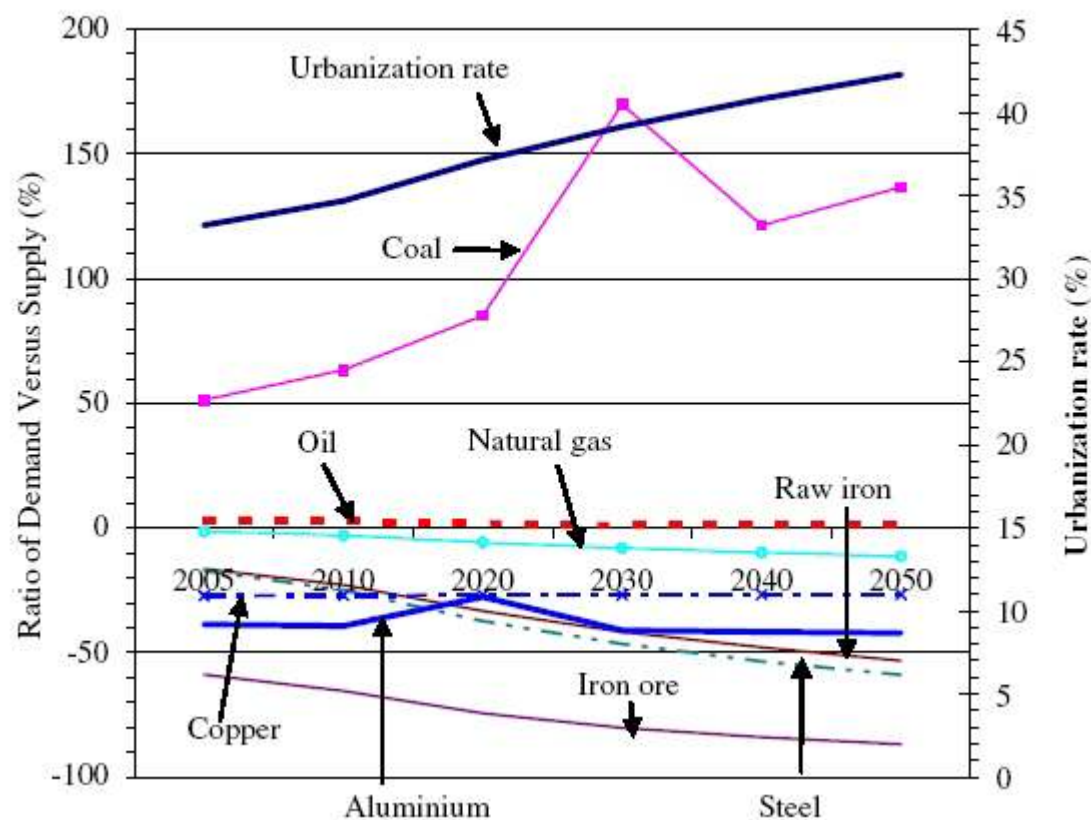
Jaap Peters & Judith Pouw
Intensieve Menshouderij
Hoe Kwaliteit
oplost in rationaliteit

SCRIPTUM

How to run a city, densily packed people, and maintain their welfare in terms of resources, social contacts and cultural expression?

A Mega stable with toys for the pigs? Or even intensive man-farming …?

We try to automate everything, efficiently running our city, creating a rigid structure, vulnerable to many disruptions

Europe

With Work Scarce in Athens, Greeks Go Back to the Land

Eirini Vourloumis for The New York Times

Vassilis Ballas and his wife, Roula Boura, extracted the gum from a mastic tree on their 400-tree farm in Chios, Greece.

By RACHEL DONADIO
Published: January 8, 2012 | 💬 82 Comments
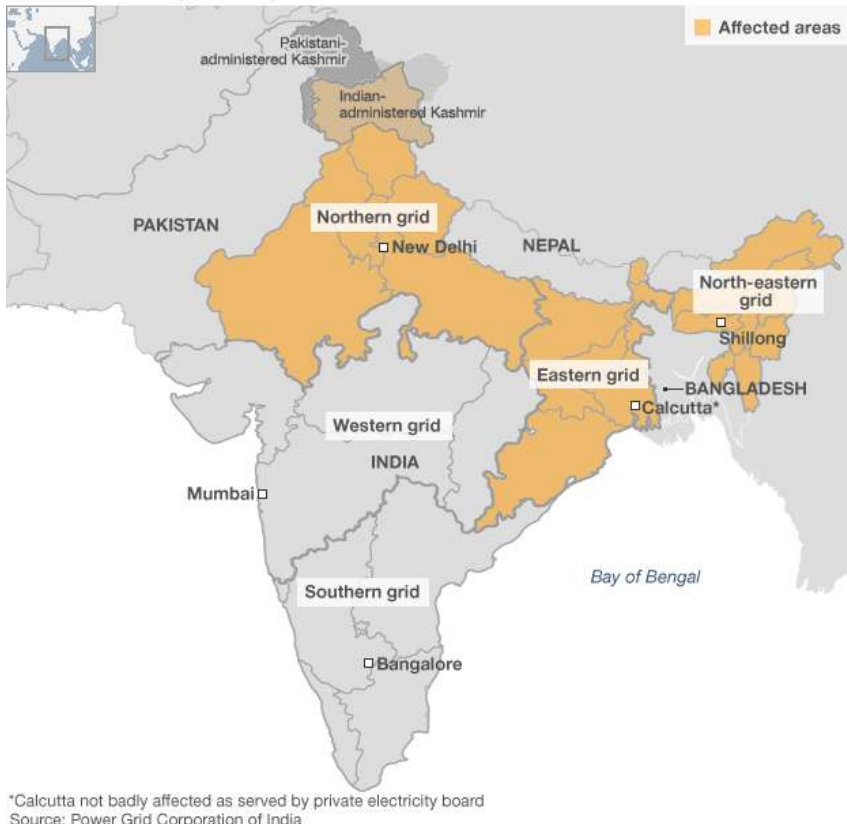
Series: Greece in crisis

Greece in crisis

Greeks fall back on family ties amid debt crisis

Greece has a strong tradition of family responsibility, but the Greek family is now coming under unbearable strain

Angelique Chrisafis in Veria
guardian.co.uk, Tuesday 2 August 2011 19.43 BST

Affected areas

Pakistani-administered Kashmir

Indian-administered Kashmir

PAKISTAN

Northern grid

New Delhi

NEPAL

North-eastern grid

Shillong

Eastern grid

BANGLADESH

Calcutta*

Western grid

INDIA

Mumbai

Southern grid

Bay of Bengal

Bangalore

*Calcutta not badly affected as served by private electricity board
Source: Power Grid Corporation of India

nrc.nl>

Nieuws | Blogs | Columns | In beeld | Verkiezingen

NU IN HET NIEUWS: ALEID WOLFSEN FACEBOOKMOORD SYRIË WONINGCORPORATIES

● 31 juli 2012, 12:34

Nieuwe stroomstoring India treft 670 miljoen mensen

Transitions:

1608 1st stockexchange amsterdam

Golden ages: 16/17 century: **economical transition**

- barter-trade, to moneytrade

Industrial age,   19 th century: **technological transition-**
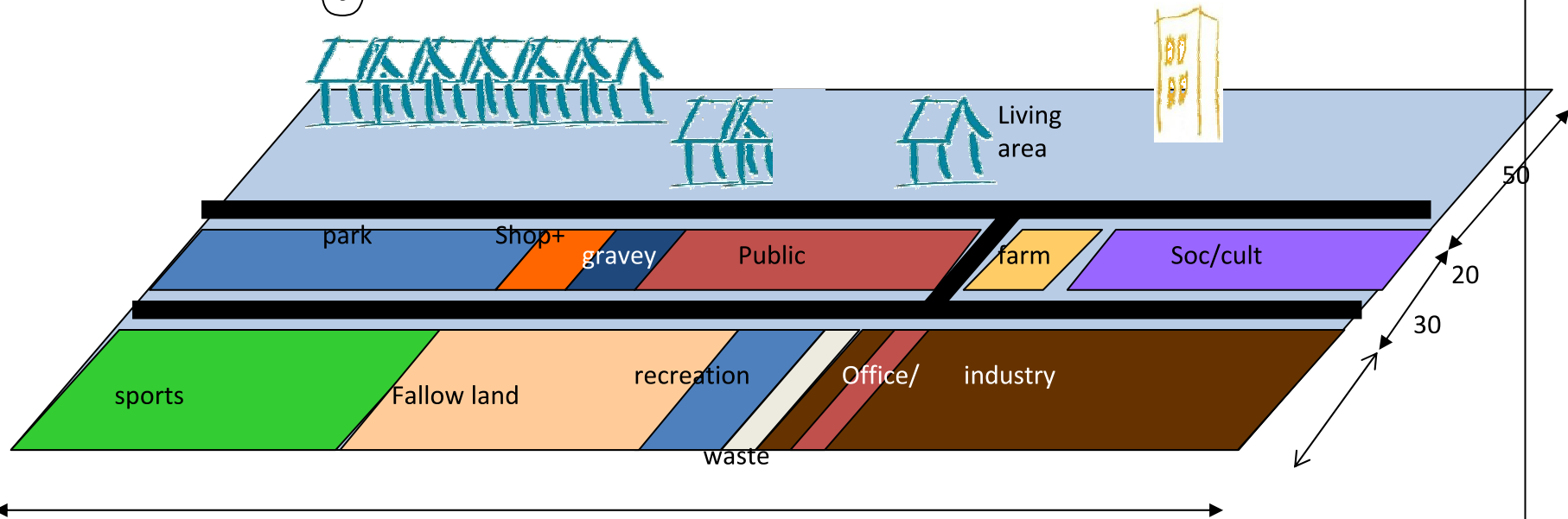
energy-transport-etc

Globalisation age 20 th century: **socio cultural transitions**

- not finished yet-migration,urbanisation, clashes of cultures /religions

…….…….age :   21 st century: **ecological transition ?**

City as (eco) system

"average NL Urban hectare"

Living area

park Shop+ gravey Public farm Soc/cult

sports Fallow land recreation Office/ industry

waste

50
20
30

4360 m2 living area

> 9,5 houses (4in a row,two cornerhouses, 1,5 semidetached, 1 villa),
> 4 appartments,
> inclparking, local shop/bank
> primary schools(20m2), etc

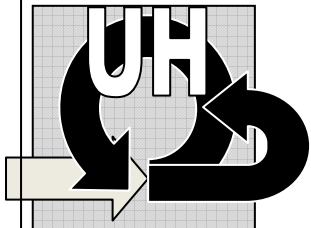**~300 m2 socio-cult service**

> Incl hospital (~1m2/ha),
> elderly care centres, (~4m2/ha)
> church , museums,(1m2/ha) libraries etc
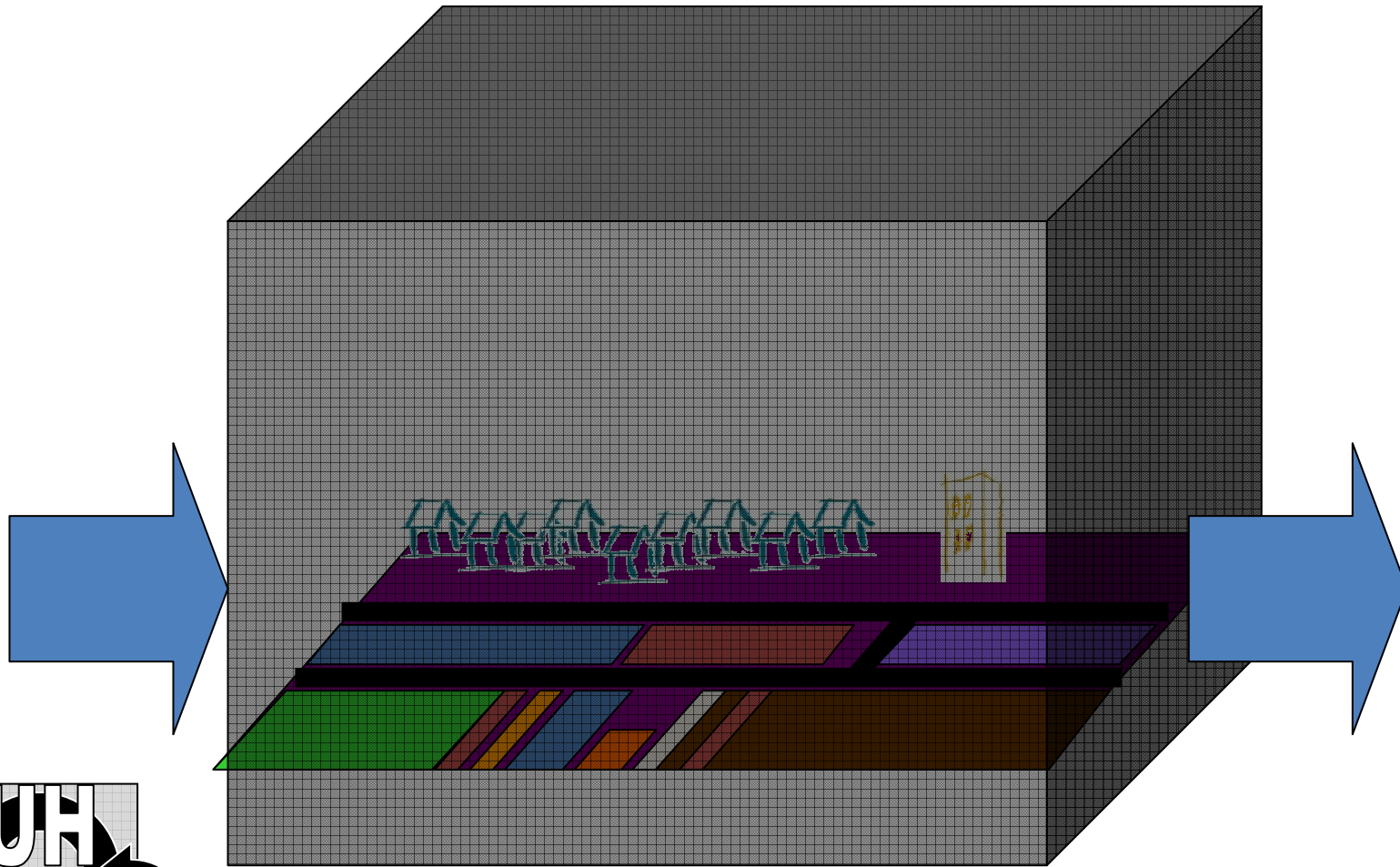> monuments (~10m2)
> Cinema, theatre,conf.

~230 m2 public fac. (adm. Police , energy,. etc)

~1300 m2 industry area

> incl 83 m2 officelevel,
> ~1-industry-office/ha,

~90 m2 shopping + horeca

> ~81 m2 shop (gamma-1m2)
> ~4m2 hotel, (rest:5m2 pub/rest.?)

~60 m2 wastedump (incl car wrecks, 10m2)

~80 m2 graveyard (incl cremation centre)

~470 m2 greenpark

~620 m2 sportsfac. (incl indoor) (Golf:123 m2)

~200 m2 recreational area (comm.)

~80 m2 urban foodgardens

~1520 m2 road (250 meter road , 6mtr wide)
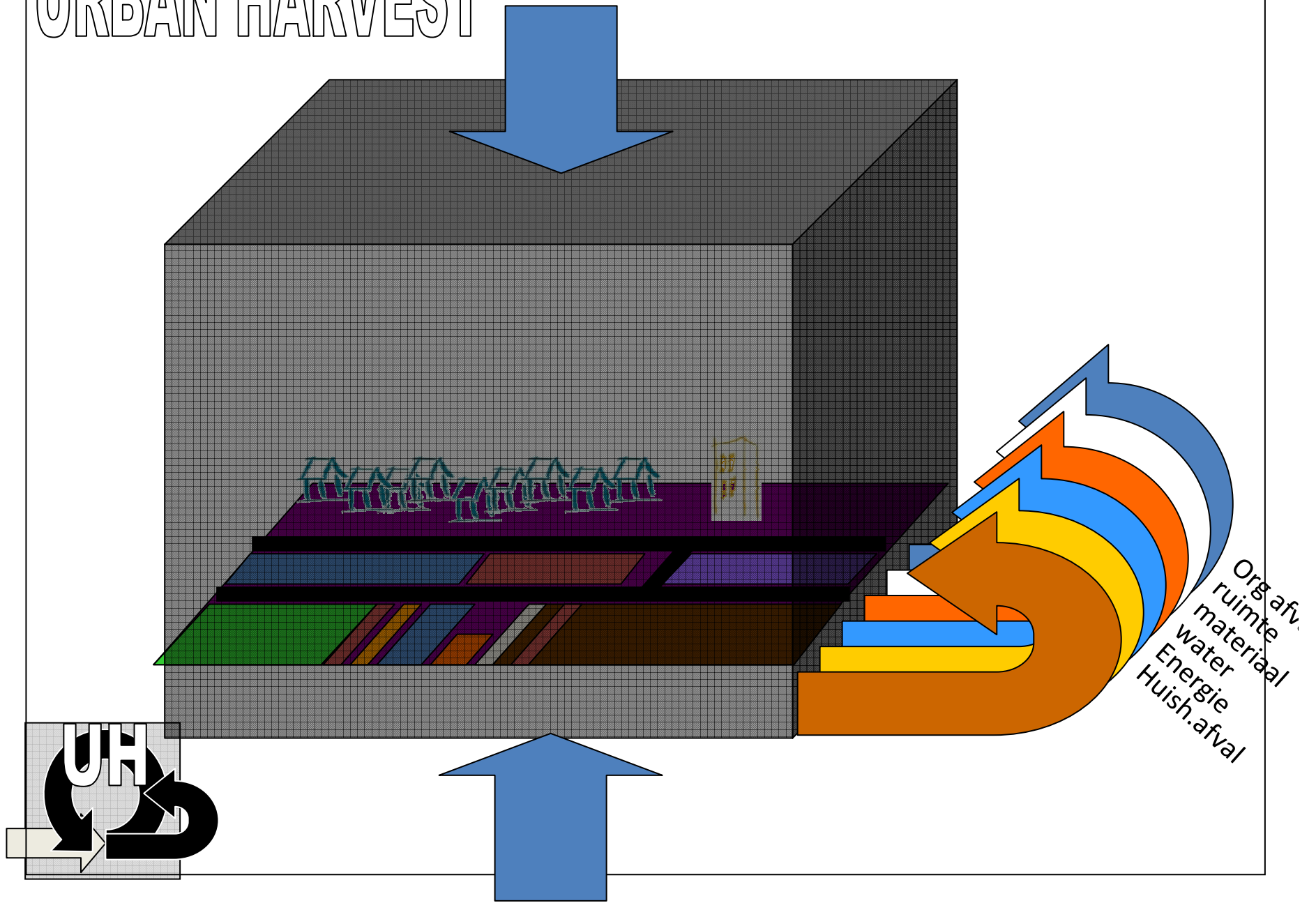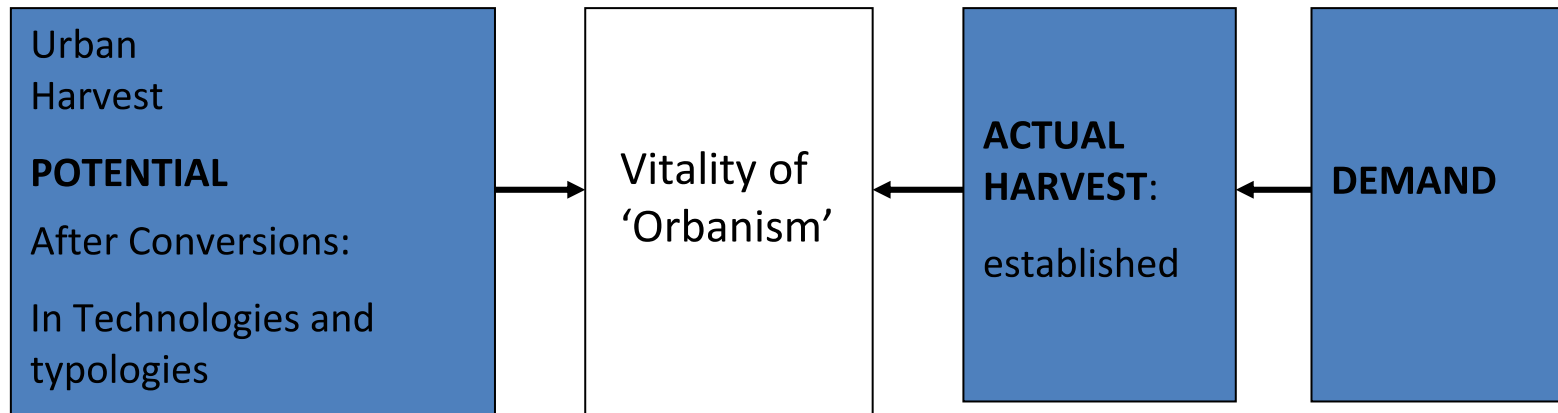
~ 630 empty constr area (build/industry)
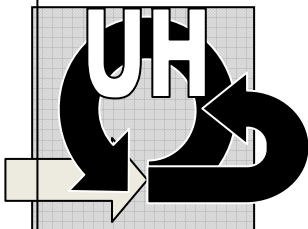
URBAN BOX
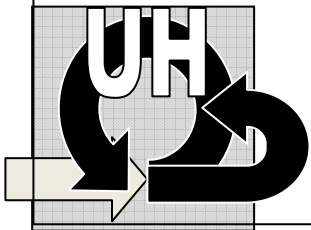
" average NL Urban hectare"

URBAN HARVEST

Org.afv.
ruimte
materiaal
water
Energie
Huish.afval

Orbanisms Vitality

Urban Harvest program

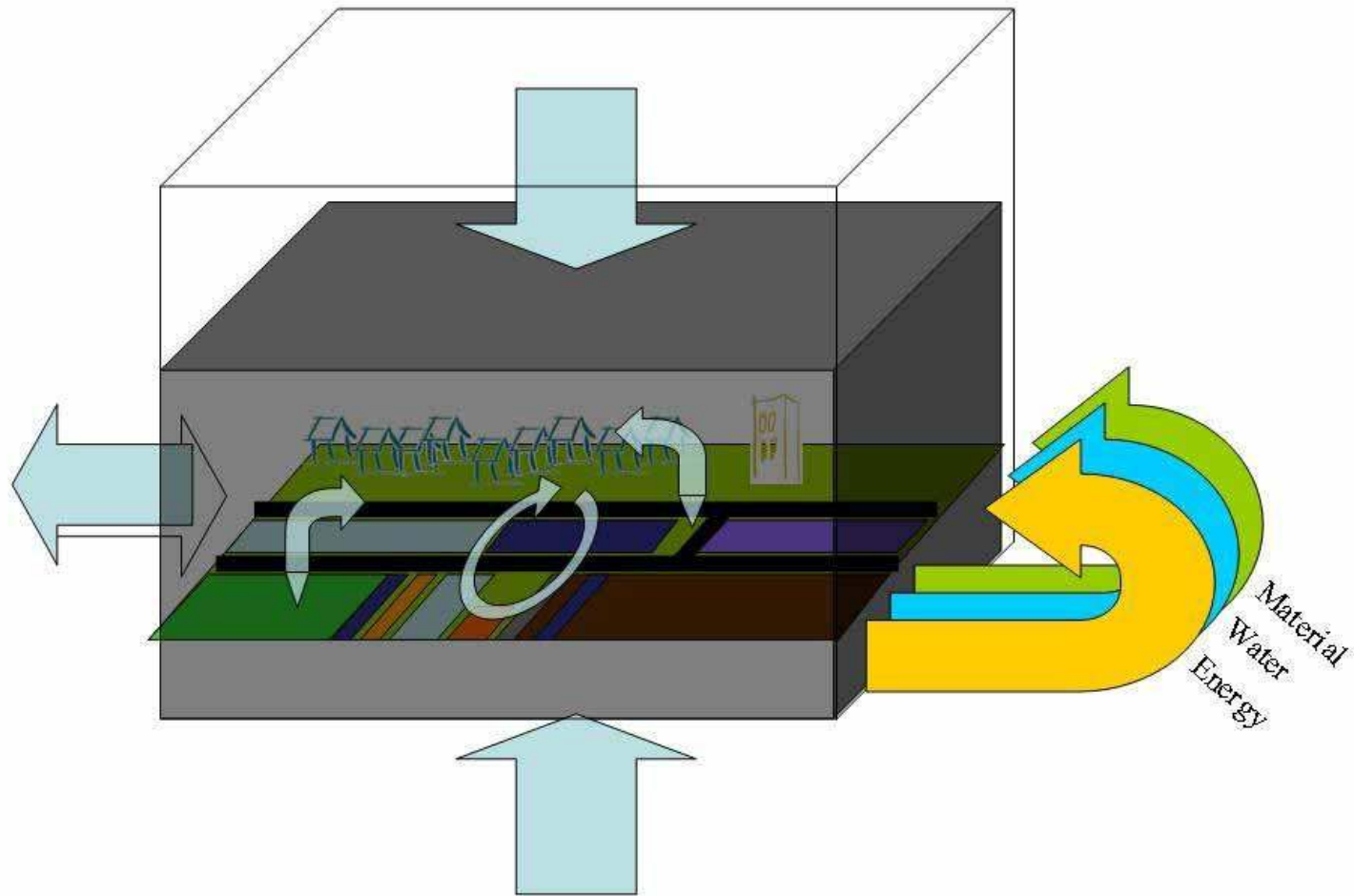| Urban Harvest **POTENTIAL** After Conversions: In Technologies and typologies | → | Vitality of 'Orbanism' | ← | **ACTUAL HARVEST**: established | ← | **DEMAND** |

Vitality of cities:
Measure to which level they can survive in times of stress.
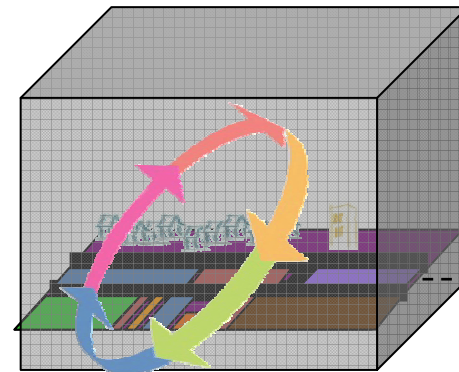
Urban Harvest + method

Material
Water
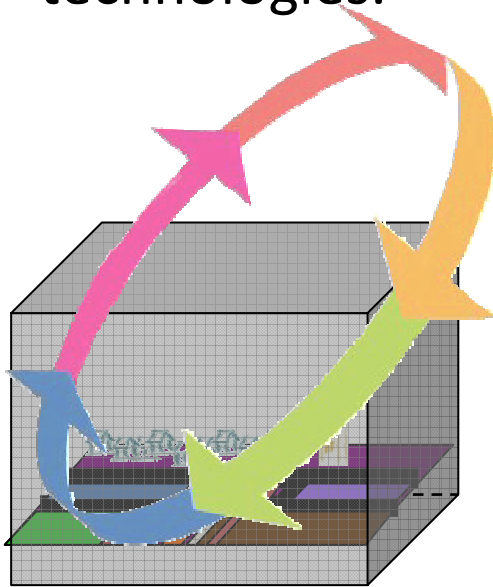Energy

Its about Exergetic space of a any system

To define as :

The max potential of human valued quality over time and by human knowledge of conversion technologies.

squeeze into the system

Case study

 Kerkrade West

Maximisation for energy
water materials and land use
as descisive factor

Case study

Kerkrade West

Maximisation for energy, water, materials , and land use as descisive factor

Fight for m2's for energy, materials water and food

1km2

Globaal profiel met hoogte NAP

Example of Claims:

	Material claim	Material contribution
From / **to**		
Energy	• Steel construction for wind turbines	• Secondary waste materials out of office demolition
	• Renovating dwellings to passive houses	• Reed production from the water basin
	• Silicium for solar panels	
	• Metal ducts for asphalt collectors	
Water	• Substrate for the constructed wetlands	• Reed production from the constructed wetlands
	• Materials to replace shower heads, toilets and ducts	

Principles derived from UH studies

PRINCIPLES

Nature

To secure biodiversity and ecosystem development : part of the earth should be untouched.

Mankind

To survive there is order in resource needs

Closed cycles

Only what can go round in a cyclic way, otherwise degradation and depletion is the result, sooner or later

Exergy

In the end its physical potential that sets borders for effective use of space to create welfare or well-being.

Rules from Principles

- Only resources that can or will be renewed

- Primairy use of local resoruces

- Survival order as a choice:
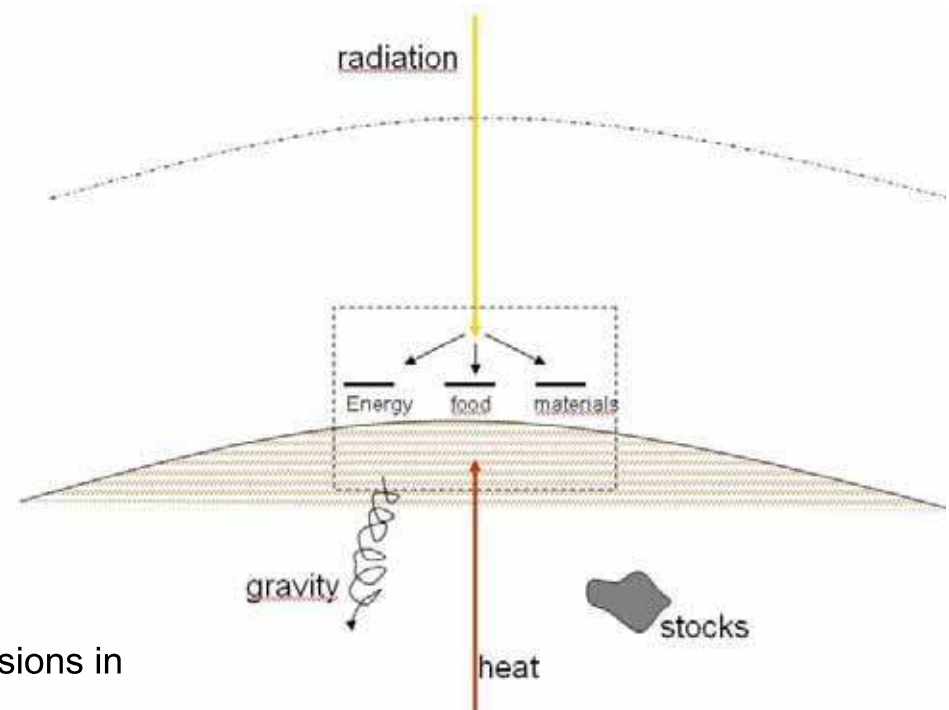There is order in resource needs to survive:
 air – water – food - material - heat - fuels

- Mass remains mass
Burning mass is destroying exergy

- M2 landuse
The ability to add exergy from solar radiation conversions in
        terms of m2 land needed, is the comparing
        indicator

Kerkrade West – Maximisation

Energy plan: passive standard renovation

exploring research, indicative
data, do not spread

17 ha

Not including materials, storage

135 ha

Not including remaining heating, processing materials, transport

3 separate sewer systems: black water - grey water - rainwater ,for easy treatment (Culemborg)

Efficient, but smart?

3 times infrastructure! A smart resource solution –and resilient- would be a compost-toilet system

UH+ transition

Actual transition: Hestia 0-energy renovation In Kerkrade West

MAXergy: 5 step exergy maximisation **urban areas**

Including Energy mass, water sources (food to be added)

1 Production
Determine the maximum production capacity for each
resource (exergetic space)

2 Reorganisation
provide functions alternatively per resource (
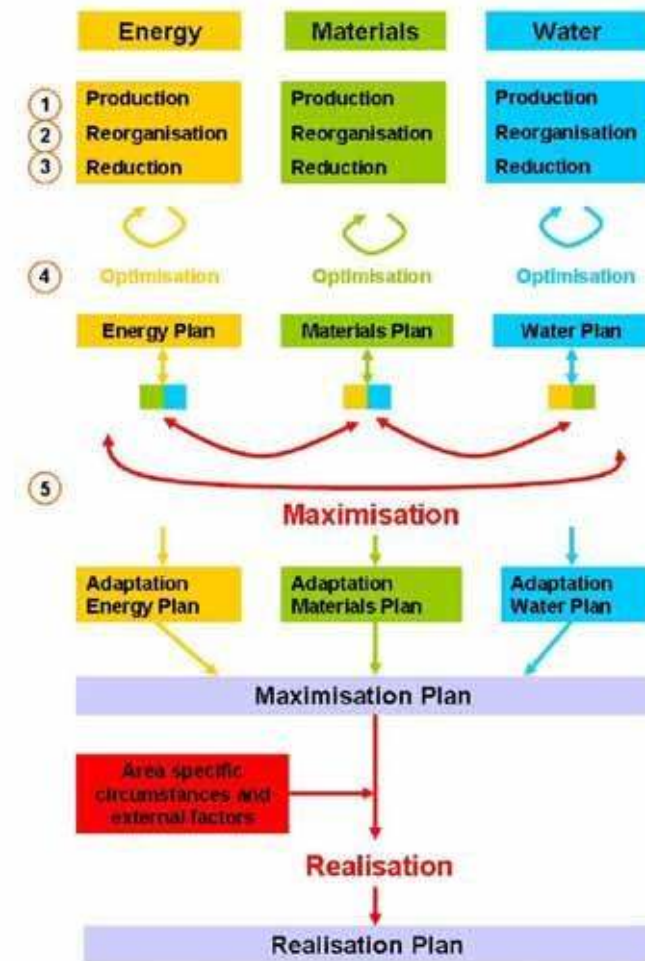information, organisation of system)

3 Reduction
Reduce the unavoidable demand directly of a resource
(effectivity of functions)

4 Optimisation
Cascade and combine demand and supply for each
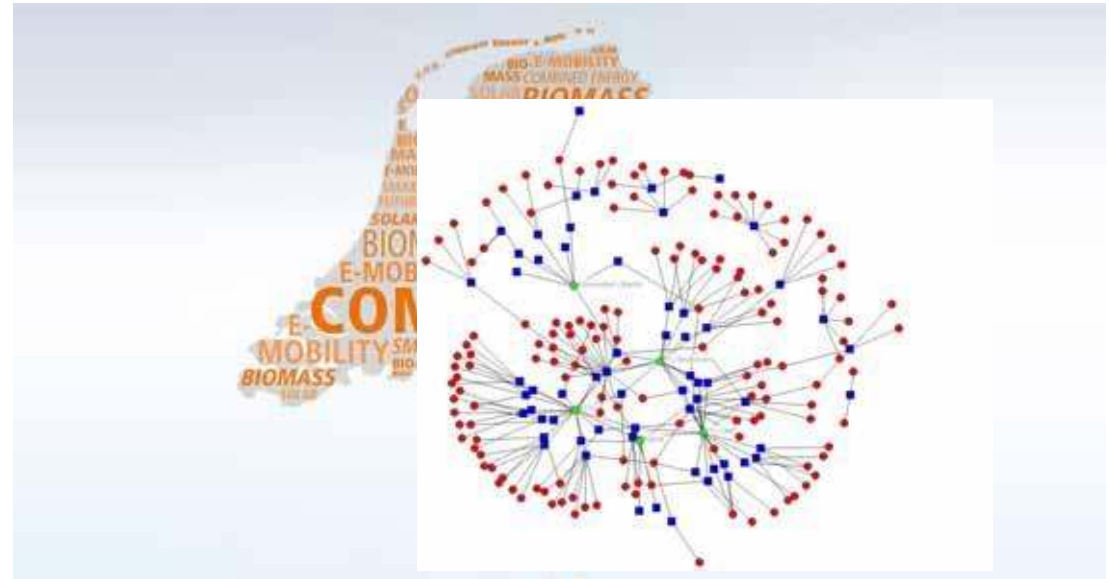resource (combination of conversions and functions)

5 Maximisation
Maximise provision of the needs by combining the
resources (exergy based choices for functions.

Fossil energy chain

PROJECTED ROUTES OF NORD STREAM, NABUCCO AND SOUTH STREAM PIPELINES

— South Stream — Nabucco — Nord Stream

Local energy value chain

■ Projects

● Companies/organisations (=people, labour, local economy)

● Key-players

Land , or productive surface, is the most valuable resource of a city...

Buy land, they're not making it anymore.
Mark Twain

SMART CITY 2000-2100

Avoiding a new deathtrap

Adaptation   Mitigation   Transition

2nd Transition

Super Sustainable City, Gotenburg

La Rochelle -Transport

Sydney - monorail
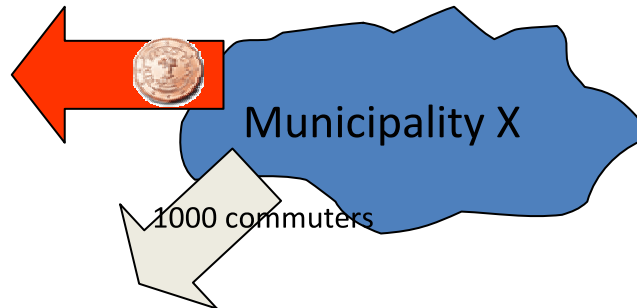
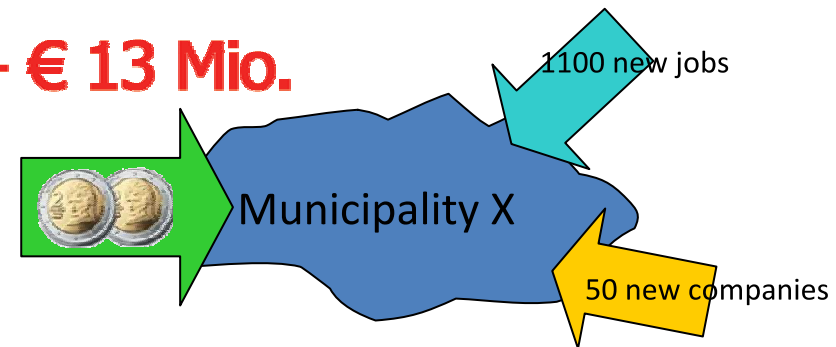Freiburg :housing transition

Gussing, 0-energy town

Gussing: ~ 4000 inhabitants

- More than **50** new companies
- More than 1.100 new jobs netting € 9 Mio. a year
- Total sales volume of energy € 13 Mio. a year
- Total wood consumption 44.000 tons a year
- No agriculture land used

1992 □ 2007

€ 6,2 Mio.

Municipality X

1000 commuters

+ € 13 Mio.

1100 new jobs

Municipality X

50 new companies

"You don't need all the answers, and should be prepared to make mistakes "

" Incredible , how far you can go when you just start things"

Jaime Lerner (former Major Curitiba, Governor Parana state)

strategic planning, in the '90s.
The need for creating jobs and generating income led, in the early nineties, to the creation of the "Linhas e Liceus do Ofício" (Job Lines and Schools).
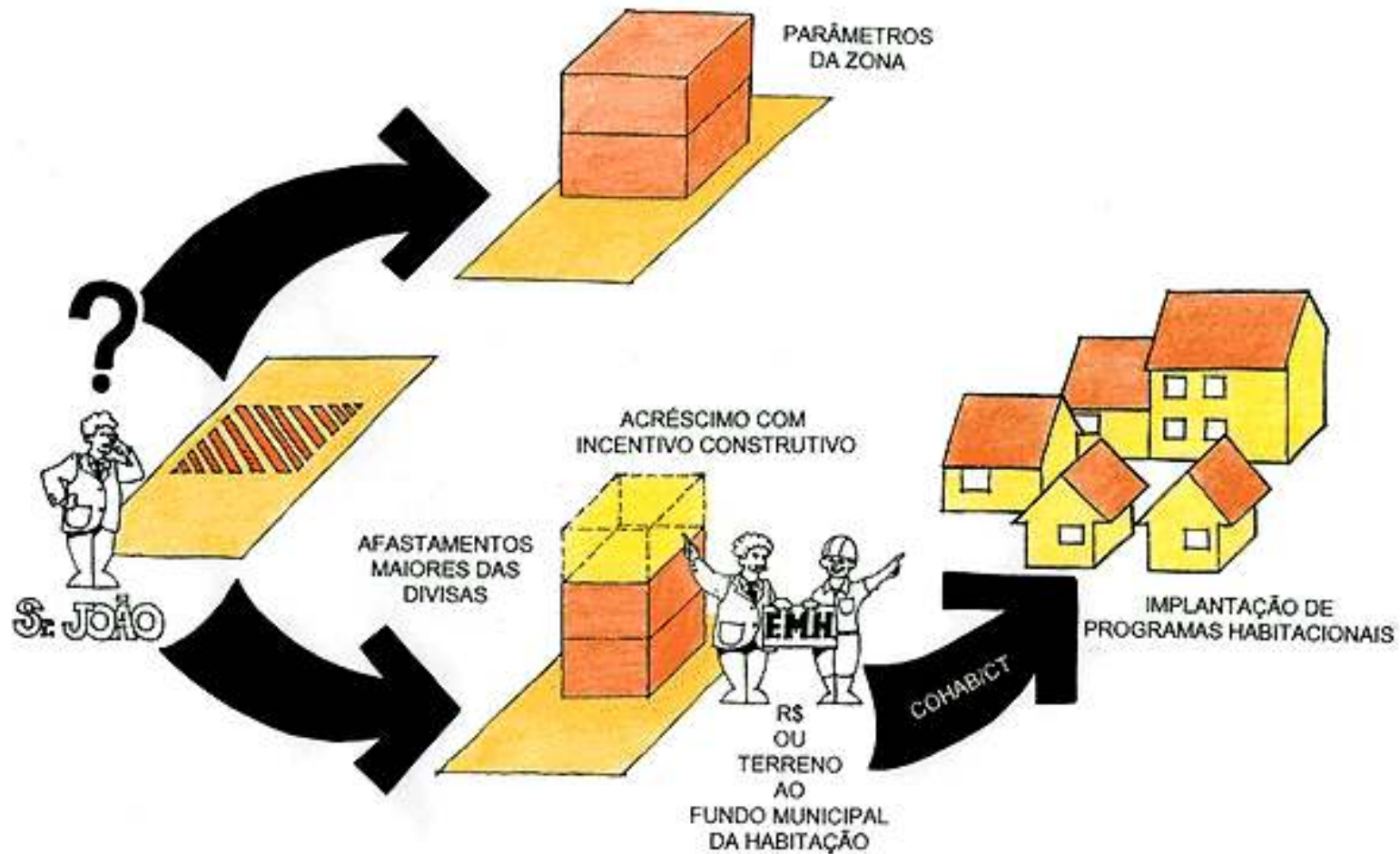

lighthouses of knowledge

additional education near schools

improve neighbourhood safety

environmental education programmes in slums

programme '**linha do oficio**': training program operated in old buses

Building Rights Transfer Act, an an incentive for implementing Social Interest Housing Programs

Building Rights Transfer Act, an an incentive for implementing Social Interest Housing Programs

(einspeizegesetz for social housing....)

Limburg in 2050
10 essays over duurzame ontwikkelingen in Limburg

editie 2012

RiBuilT

ZU
YD

"Social Exergy"

10 Professors exploring 2050 regarding:

Education
Youth care
Aging people
Care
Legal development
Health
Business
Product quality
Demography
recreation

The common factors: co-operation, social networks, personalization of care, family ties, life long learning communities.

It happens to be the same targets as created by sustainability: local responsibility, local fysical networks, change for services in stead of products, shaping social cohesion, green jobs, local robust economy,

The art is to built in local complexity , to create resilience ,
like an ecosystem

 Gulpen beer brewers, binding and connecting people and
(local) resources. And now starts producing with renewable
energy

solutions

Summary of transition :

From: to:

Fossil energy $\longrightarrow$ renewable energy
New construction $\longrightarrow$ (re-)development existing construction
Global growth $\longrightarrow$ local welfare
Depletion $\longrightarrow$ renewal
Goods $\longrightarrow$ Services
Care $\longrightarrow$ Pre-Care
Monofunctional $\longrightarrow$ integration
CO2 strategy $\longrightarrow$ landuse strategy
Traditional materials $\longrightarrow$ biobased materials
individual $\longrightarrow$ collective
Entropy increase $\longrightarrow$ exergy increase
… $\longrightarrow$ …

In 20 steps to energy efficient cities

A. Ambition
- Personal ambitions and effort
- Describe ambition in policy documents

B. Design of the roadmap/ transition management
- Make a physical view in terms of space and area. Visualise the energy neutral district in future.
- Backcasting and forecasting based on best practises.
- Organise a strong team to coordinate the roadmap.

C. Bundeling economic results / business model/ spin offs
- Develop business plans
- Ask for contracts based on price and quality for the whole period of exploitation
- Get strong comittment by showing spin-offs

D. Scenarios/ decision model
- Think in terms of out of the box solutions. Scan the financial consequences of the different scenarios.

E. Suitable energy concept
- Determine the energy demand and reduction
- Analyse the energy potentials of the district
- Choose the right energy system

F. Planning/ monitoring/ smart metering/ itteration
- Determine the best steering mechanism
- Construct strong partnerships with new roles based on clear financial arrangements
- Put strong effort on monitoring

G. Strong implementation/ execution
- Develop an ambitious programme based on specifications in terms of solutions for barriers
- Make a contract for reaching the energy ambitons
- Ensure the implementation

H. Involve users
- Involve users in the exploitation / achieve quick wins
- Stimulate low energy consumption

IEA - Annex 51

Energy efficient communities
Case study findings,

RiBuilT participated in research

Case study	Contributor
Austria, St. Johann	Helmut Strasser
Canada, Pr. George	Jessica Webster
Denmark, Aarhus	Allesandro Dalla Rosa
France, Nantes	Benoit Boutaud, Pascal Girault, Andreas Koch
Germany, Ludwigsburg	Ursula Eicker
Netherlands, Tilburg	Pieter Biemans, Wendy Broers, Chris Roorda
Sweden, Stockholm	Heimo Zinko

City of Leeuwarden

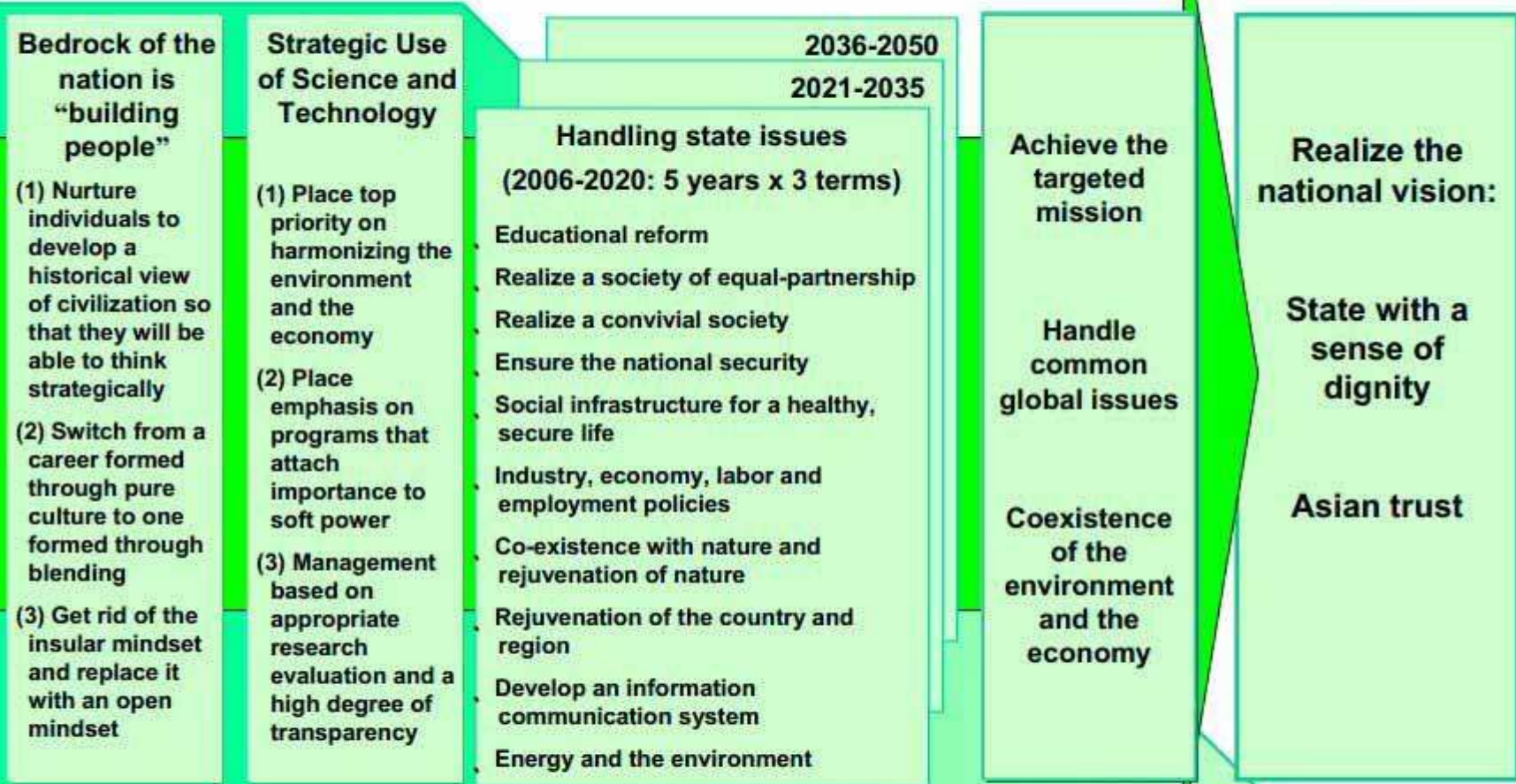Very interesting projects, based on their <u>adopted conditions </u>for political choices:

• There will be no shifting of impacts towards other scale levels (global , national, regional)

• There will be no shifting of burdens to future generations

• There will be no shifting of impats between domains/ sectors

Japan Vision 2050 – Principles of Strategic Science and Technology Policy toward 2020

<Beginning of the 21st Century>   <2006⇒2020⇒2050>   <2050>

Bedrock of the nation is "building people"

(1) Nurture individuals to develop a historical view of civilization so that they will be able to think strategically

(2) Switch from a career formed through pure culture to one formed through blending

(3) Get rid of the insular mindset and replace it with an open mindset

Strategic Use of Science and Technology

(1) Place top priority on harmonizing the environment and the economy

(2) Place emphasis on programs that attach importance to soft power

(3) Management based on appropriate research evaluation and a high degree of transparency

2036-2050
2021-2035

Handling state issues
(2006-2020: 5 years x 3 terms)

- Educational reform
- Realize a society of equal-partnership
- Realize a convivial society
- Ensure the national security
- Social infrastructure for a healthy, secure life
- Industry, economy, labor and employment policies
- Co-existence with nature and rejuvenation of nature
- Rejuvenation of the country and region
- Develop an information communication system
- Energy and the environment

Achieve the targeted mission

Handle common global issues

Coexistence of the environment and the economy

Realize the national vision:

State with a sense of dignity

Asian trust

Global issues:

Sustainability of human society

-Degradation of Earth's environment

-Population growth

-Expanding North-South Disparity

Germany

Nationale Forschungsstrategie BioÖkonomie 2030, Unser Weg zu einer bio-basierten Wirtschaft, Bundesministerin für Bildung und Forschung

Unsere Vision
Eine am natürlichen Stoffkreislauf orientierte, nachhaltige bio-basierte Wirtschaft, deren vielfältiges Angebot die Welt ausreichend und gesund ernährt sowie uns mit hochwertigen Produkten aus nachwachsenden Rohstoffen versorgt.

Leitlinien :
- menschen nachhaltig versorgen
- nutzungswege gemeinsam betrachten
- Gesamte Wertschöpfungsketten in den Blick nehmen

AGENDA

A Smart City actionplan 2012-2020: (starting tomorrow, In our region)

1 make and execute ambitious energy plan, large and small scale: facilitate local energy companies (district wise organized etc), find and develop storage opportunities.

2 secure food distribution , plan for future local production . "every inhabitant owns a urban garden"

3 start organizing local materials cycle: biobased production, re-use everything locally and make new biobased materials available.

4 develop extensive and flexible public transport, renewable energy based: for instance mini (electric) vans driven by people, part of an employement- plan

5 secure regional connections to exchange qualities, to balance differences in all resources

6 Help people to manage their own resources, to prepare for times of stress

7 develop a "serviced" city: laundryshops, repair-shops, shared car services, etc

8 Appoint Space managers: Indoor for empty buildings, outdoor for productivity

Development of jobs in the Renewable Energy sector

Steady increase in number of employees.

1998: 66.600
2000: 100.000
2002: 135.000
2004: 160.500
2006: 235.000
2008: 278.000
2009: 300.500
Industry forecast 2020: 500.000

Sources: BMU/AGEE-Stat, DLR/ZSW/DIW/GWS, UBA
Status: 4/2010
www.unendlich-viel-energie.de/en
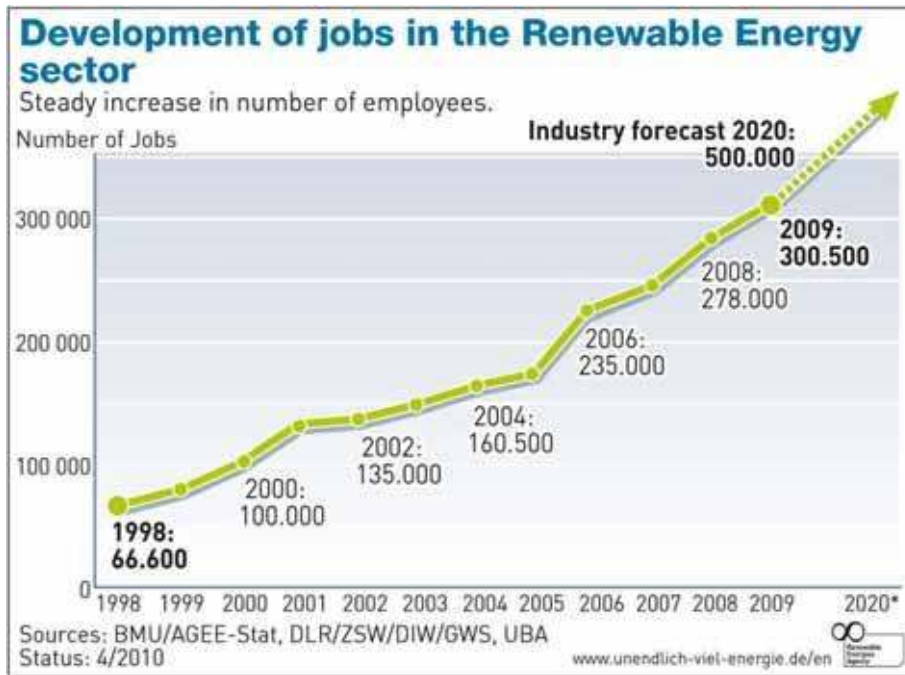
Herman Scheer at SB10 Maastricht, 2010:

Investments in the field of renewable energy are considered an economic burden that no one is willing to shoulder. Those arguments are short-sighted, superficial and highly misleading.

The use of solar energy provides greater social, economic, regional-urban, and individual autonomy

The best instruments are:

Tax-differentiation between renewable and conventional energies. That means a lowering of taxes for renewables, possibly down to complete tax-exemption policies. It would be optimal to this end to generally replace taxation on energy by taxation on pollution. Like this, only polluting energies will be taxed.

Low or zero interest rates for renewable energy investment credits. The result of this investment will be that the state only covers the difference between normal interest rates and the interest rate reduction. As a result, the investment creates benefits for the whole society and its economy.

Feed-in tariff regulations in grid-connected areas with a priority access for power produced from renewable sources and a guaranteed fee. This results in an ever-increasing contribution of renewable energy, substituting conventional energies

20% energy reduction in 2020

For existing housing in Limburg this implies:

Total 600.000 houses, 120.000 renovated for 0-energy,
like in the Kerkrade West case. (150 houses)

Therefore:
we need to start 100 Kerkrade West projects each year!

Smart Shrinking

Shrinking city:

- shrinking reduces environmental burden!

- The Gross Regional Product shrinks, but individual welfare can still grow..

- A shrinking region can in principle live on its stocks and outputs..

-Plan shrinking, like planning growth.

- A smart shrinking city has incentives for preferred living areas, and bonuses for leaving *de-planned* areas

SMART - regions

Different solutions require different scale levels

Two know more then one : combine technological and conceptual
knowledge in the NL/NRW region

Combine growth and shrinkage, especially in the Euregion

Combine Solar decathlon ambitions and IBA Parkstad

Combine scientific labs RWTH and real life lab "das Viertel von Morgen"

Cross border research and planning for "resilient cities institute"
Including Food emergency plans/ energy emergency plans
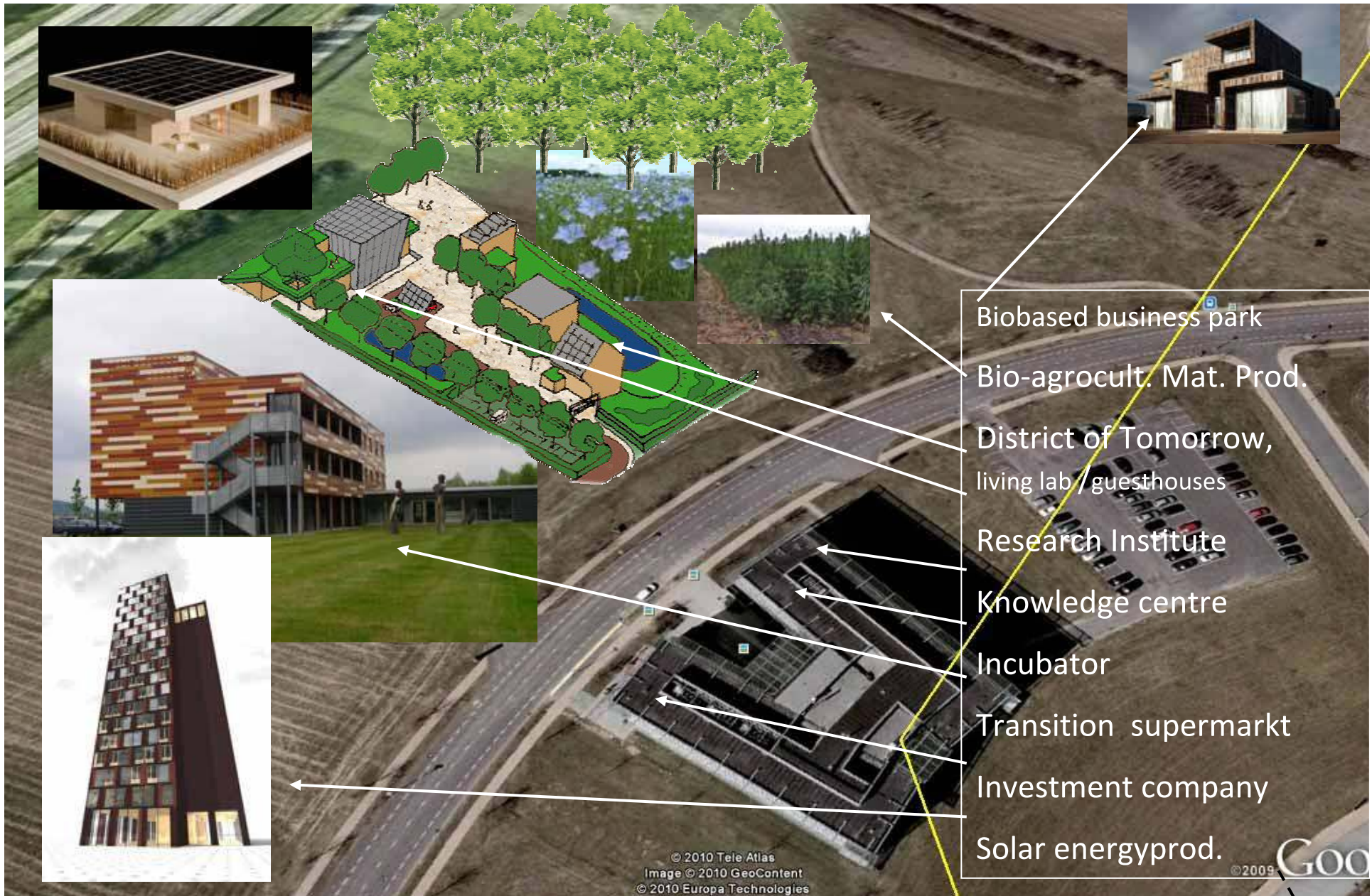
Biobased business park

Bio-agrocult. Mat. Prod.

District of Tomorrow,
living lab / guesthouses

Research Institute

Knowledge centre

Incubator

Transition supermarkt

Investment company

Solar energyprod.

Real Life Lab for "the Euregion of Tomorrow"

In the German-Dutch Avantis area.

Counter entropy -project, RWTH: actual construction in Madrid 060912

To summarize, **Smart cities are:**

- Servicing cities

- Productive cities

- Closed cycle cities

- Co-operating cities

And therfore establish labour, social cohesion and welfare

As a Result:

From sustainable re-development, managing your
resources, (Nachhaltig / volhoudbaar),

you will get a city with

social cohesion, labour increase, economy
growth
(per individual, not necessary total) ,

That is vital and resilient

Research Institute Built Environment of Tomorrow

Thanks for listening!

RiBuilT is a institute of Zuyd University of applied science, Heerlen The Netherlands

END

London

Table 2: A summary of material flows through London					(Figures in '000s of tonnes)	
Material category	Production	Imports	Exports	Apparent consumption	Waste	Stock
Construction	24,067	8,143	4,430	27,779	14,756	13,024
Crude materials	884	462	183	1,163	595	568
Wood	102	2,565	255	2,412	574	1,838
Metals	830	451	307	974	642	332
Chemicals	312	820	287	845	462	383
Misc. manufactures	3,404	3,960	2,395	4,969	3,269	1,700
Misc. articles	6,424	3,043	5,458	4,010	2,051	1,958
Unidentified waste					3,361	-3,361
Sub-total (excl. food)	36,024	19,444	13,315	42,152	25,710	16,442
Food	2,076	5,585	761	6,900	562	**
Total (incl. food)	38,100	25,029	14,076	49,052	26,273	16,442

** Data was either not available or was confidential and suppressed Note: Due to the rounding off of figures, totals may not add up

relatief overschot/tekort
horeca vestigingen naar soort

relatief overschot

relatief tekort

café
coffeeshop
ontmoetingscentrum
(café)restaurant
cafetaria
bistro

Gr.

F

D

N-H (geheel)

F

O

Z-H (geheel)

U (geheel)

Gld

N-B

Z

L
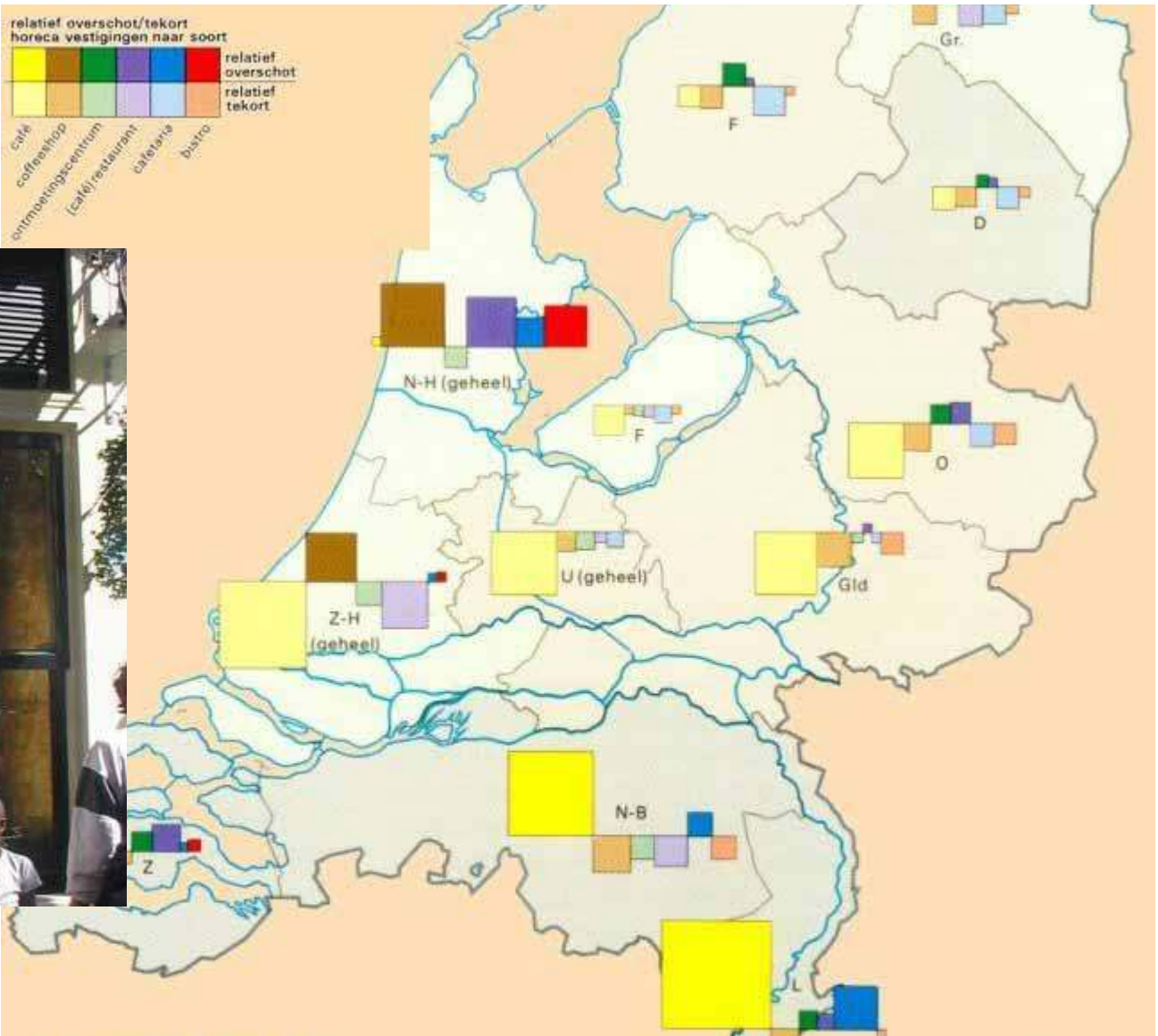
de 4 grote steden afzonderlijk

Amsterdam

Utrecht

Rotterdam

's-Gravenhage
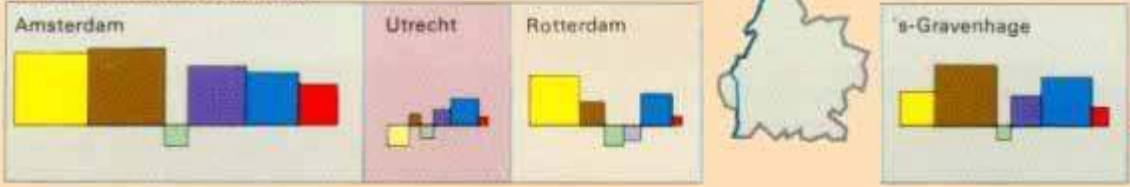
Table 5: Space requirements for various transport modes, under various operating conditions.[#]

McNulty, 2002

Mode	Capacity scenario (users/ hour/lane*)	Speed (km/h)	Space demand (m² per user)
Pedestrian	23,500	4.7	0.7
Pedal cycle +	5,400	12	8
Motorcycle ++	2,400	12	17.5
Car (urban street)	1,050	12	40
Car (expressway)	3,000	40	47
Bus (55 seats)	7,700	10	4.5
Bus or Tram (150 seats)	18,000	10	2
Tram (250 seats)	24,000	10	1.5
Metro rail	40,000	25	2.5

[#]   These figures are not maximum values or typical speeds for all situations, but rather present the space required, under various conditions

*   The width of a lane is assumed as 3.4 m

+   One user per pedal cycle

++ 1.1 users per motorcycle

All public transport modes are assumed to be 80 % full.

Te gebruiken bij uitbreiding maxergie

ILO

Figure 4.1. Employment change by major economic sector between 1995 and 2008 in selected countries (%)

Countries (x-axis): Australia, Brazil, Costa Rica, Egypt, Indonesia, Korea, Rep. of, Philippines, South Africa, Thailand, United States, Denmark, Estonia, France, Germany, Spain, United Kingdom, EU average

EU

Legend: Agriculture · Industry · Service
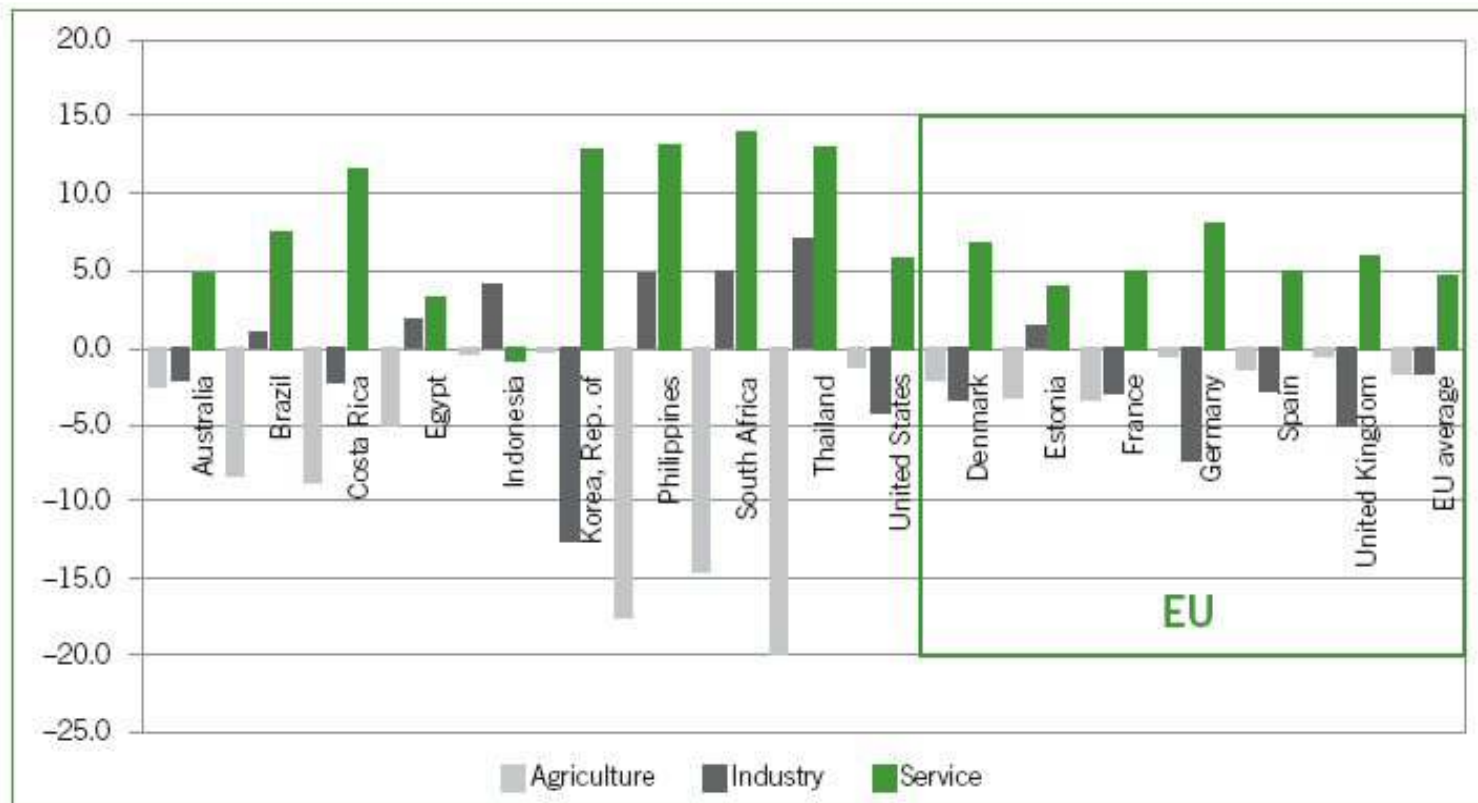
Note: No data are available for Bangladesh, China, India, Mali and Uganda.

Source: Authors' own calculations based on ILO LABORSTA database, Table 1C, "Economically active population, by industry and status in employment (thousands)".

Tomorrow:
Re-organisation

Transport service
Material uitleen
Laundry shops
Local energy, etc

Countries	Region	Life Sat	Life Exp	HLY	EF		HPI	HPI c	HPI rank
Costa Rica	1a	8,5	78,5	66,7	2,3	=	76,1	4	1
Dominican Republic	1a	7,6	71,5	54,2	1,5	=	71,8	4	2
Jamaica	1a	6,7	72,2	48,5	1,1	=	70,1	3	3
Guatemala	1a	7,4	69,7	51,8	1,5	=	68,4	4	4
Vietnam	6c	6,5	73,7	47,8	1,3	=	66,5	3	5
Colombia	1b	7,3	72,3	53,0	1,8	=	66,1	4	6
Cuba	1a	6,7	77,7	52,4	1,8	=	65,7	4	7
El Salvador	1a	6,7	71,3	47,6	1,6	=	61,5	3	8
Brazil	1b	7,6	71,7	54,3	2,4	=	61,0	3	9
Honduras	1a	7,0	69,4	48,7	1,8	=	61,0	4	10
Nicaragua	1a	7,1	71,9	51,0	2,0	=	60,5	4	11
Egypt	3a	6,7	70,7	47,2	1,7	=	60,3	3	12
Saudi Arabia	3b	7,7	72,2	55,6	2,6	=	59,7	3	13
Philippines	6c	5,5	71,0	38,9	0,9	=	59,0	1	14
Argentina	1b	7,1	74,8	53,4	2,5	=	59,0	3	15
Indonesia	6c	5,7	69,7	39,5	0,9	=	58,9	3	16
39. Burma	5a		60.8	5.9	1.1		51.2	3	17
40. Algeria	3a		71.7	5.6	1.7		51.2	3	18
41. Thailand	6c		69.6	6.3	2.1		50.9	4	19
42. Haiti	1a		59.5	5.2	0.5		50.8	3	20
43. Netherlands	2c		79.2	7.7	4.4		50.6	2	21
44. Malta	2e		79.1	7.1	3.8		50.4	3	22
45. Uzbekistan	7a		66.8	6.0	1.8		50.1	1	23
46. Chile	1b		78.3	6.3	3.0		49.7	4	24
47. Bolivia	1b		64.7	6.5	2.1		49.3	3	25
48. Armenia	7a		71.7	5.0	1.4		48.3	2	
49. Singapore	6b		79.4	7.1	4.2		48.2		
50. Yemen	3b		61.5	5.2	0.9		48.1		
51. Germany	2c		79.1	7.2	4.2		48.1		
52. Switzerland	2c		81.3	7.7	5.0		48.1		
53. Sweden	2d		80.5	7.9	5.1		48.0		
54. Albania	7b		76.2	5.5	2.2		47.9		
55. Paraguay	1b		71.3	6.9	3.2		47.8		
56. Palestine	3b		72.9	5.0	1.5		47.7		
57. Austria	2c		79.4	7.8	5.0		47.7		
58. Serbia	7b		73.6	6.0	2.6		47.6		
59. Finland	2d		78.9	8.0	5.2		47.2		
60. Croatia	7b		75.3	6.4	3.2		47.2		
61. Kyrgyzstan	7a		65.6	5.0	1.1		47.1		
62. Cyprus	2e		79.0	7.2	4.5		46.2		
63. Guyana	1a		65.2	6.5	2.6		45.6		
64. Belgium	2c		78.8	7.6	5.1		45.4		
65. Bosnia and Herzegovina	7b		74.5	5.9	2.9		45.0		
66. Slovenia	7b		77.4	7.0	4.5		44.5		

Helmond

Groei wonigbouw, waarom?

Groei automotive campus: waarom stimuleer je dat?

Hoge kwalitatieve werkgelegenheid .

Zijn dat ook jullie werklozen? Nee….

Dus je creert werkgelegenheid voor vreemden en moet daardoor veel bouwen?

Ja….

Lokale duurzaamheid creert ook werkgelegenheid

Met name voor de lagere opleiding werklozen….

Green *local* jobs

Verona-
Garda

Grapes

Marble

Aquaduct

Fishery

Future, Das Brothers

TIRION

SBScentre

Dogon village, Mali

Want wat niet volhoudbaar is, is gedoemd te vergaan

Wass nicht nachhaltig ist, halt nicht nach

If its not sustainable, its impossible to sustain

Blanc system

No demand, no production

High potential/quality increase <u>over time</u>
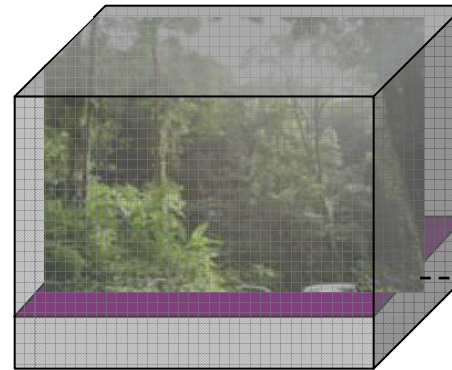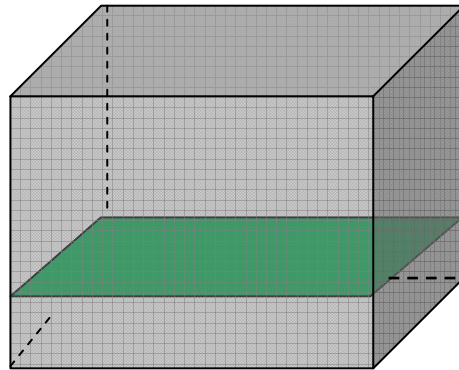
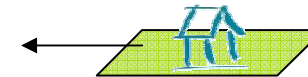growing quality/Exergy: <u>ecosystem</u>
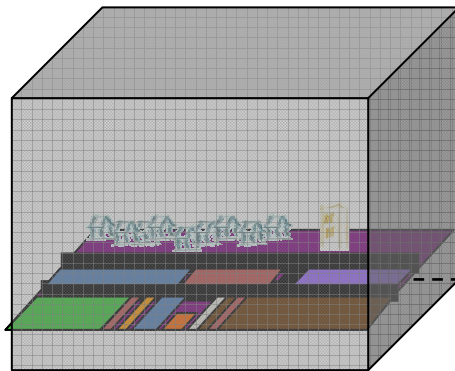
Existing system situation

High demand No production: strong decrease of quality

process: maximize production, reduce functions and demand to become neutral: Urban Harvest Plus (pilot KW)
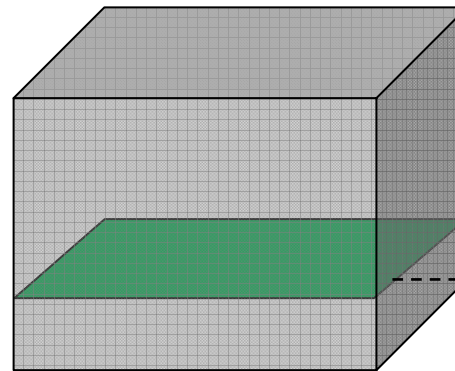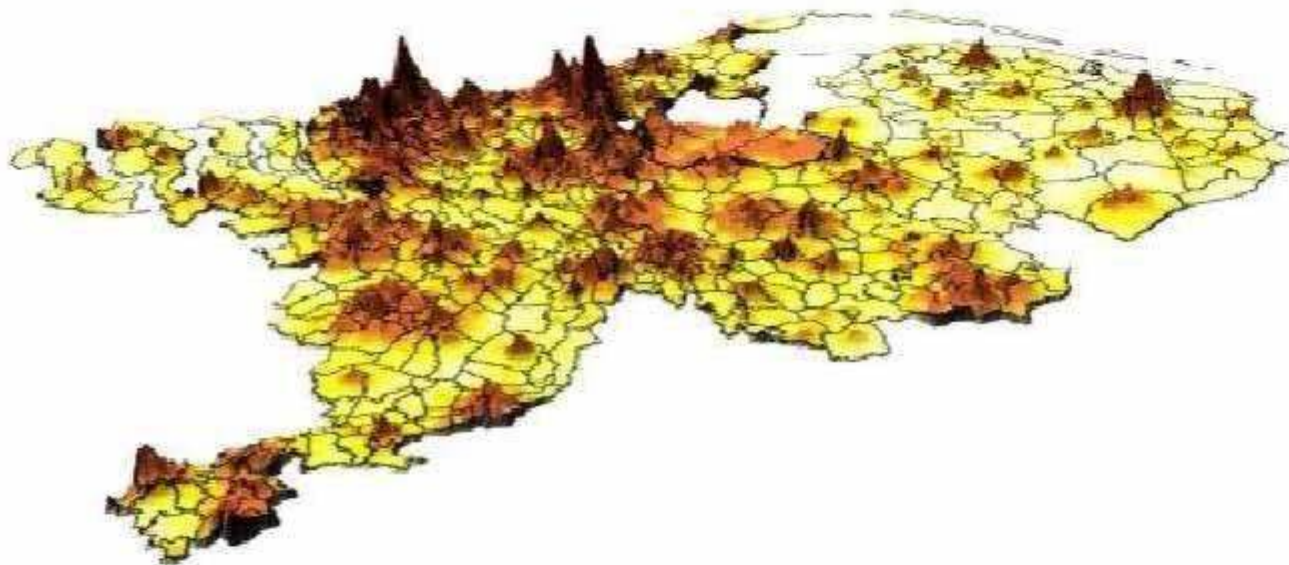
System to be used:

Process: max production of quality guiding for functions to be allowed in system

Function/demand :

Optimise space time need, for functions, to balance quality potential growth and decrease by functions.

Micro-level spatial variation in population density:
the Netherlands: only 40,000 km² but much variation
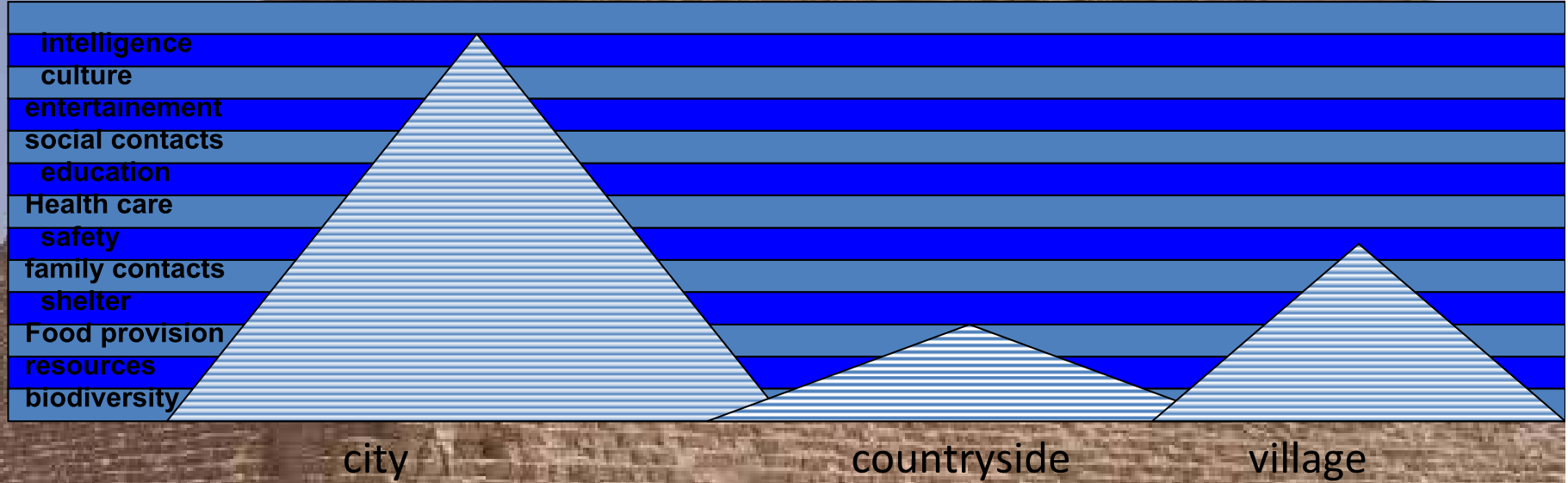
UK: To sustain = volhouden

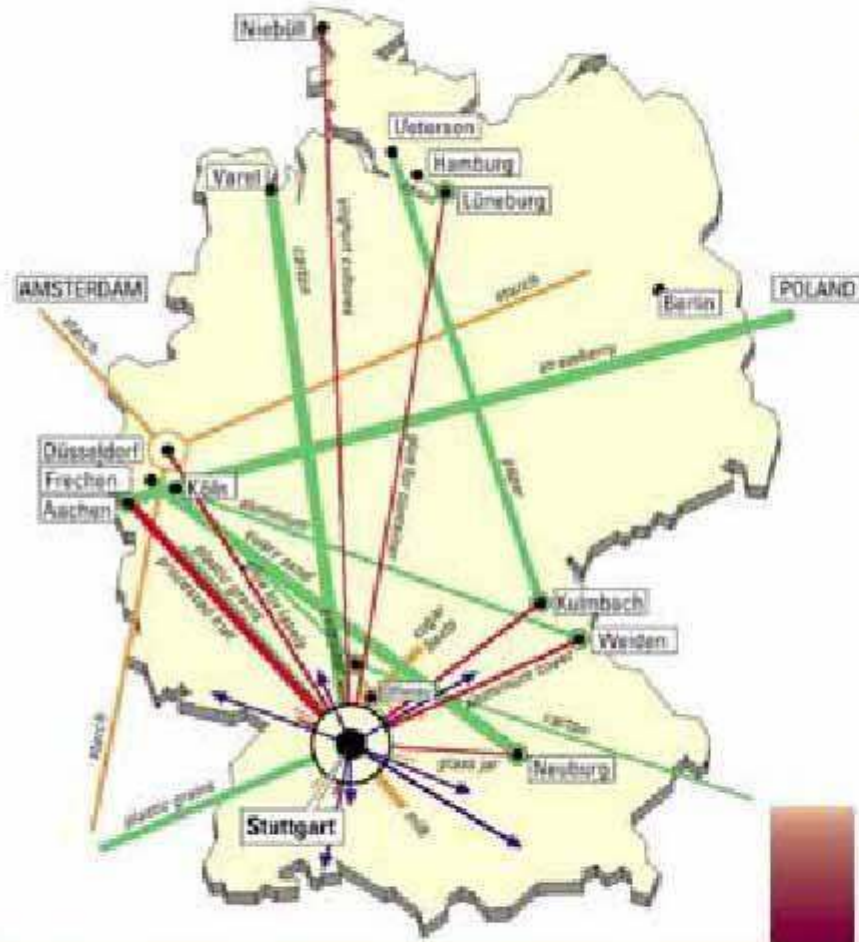GE: Nachhaltig = volgehouden

Vandaar:

NL: volhoudbare samenleving!

Building basics

.

.building society, the order of organisation

intelligence
culture
entertainement
social contacts
education
Health care
safety
family contacts
shelter
Food provision
resources
biodiversity

city   countryside   village

Strawberry yoghurt

Kerkrade 0-energy renovation