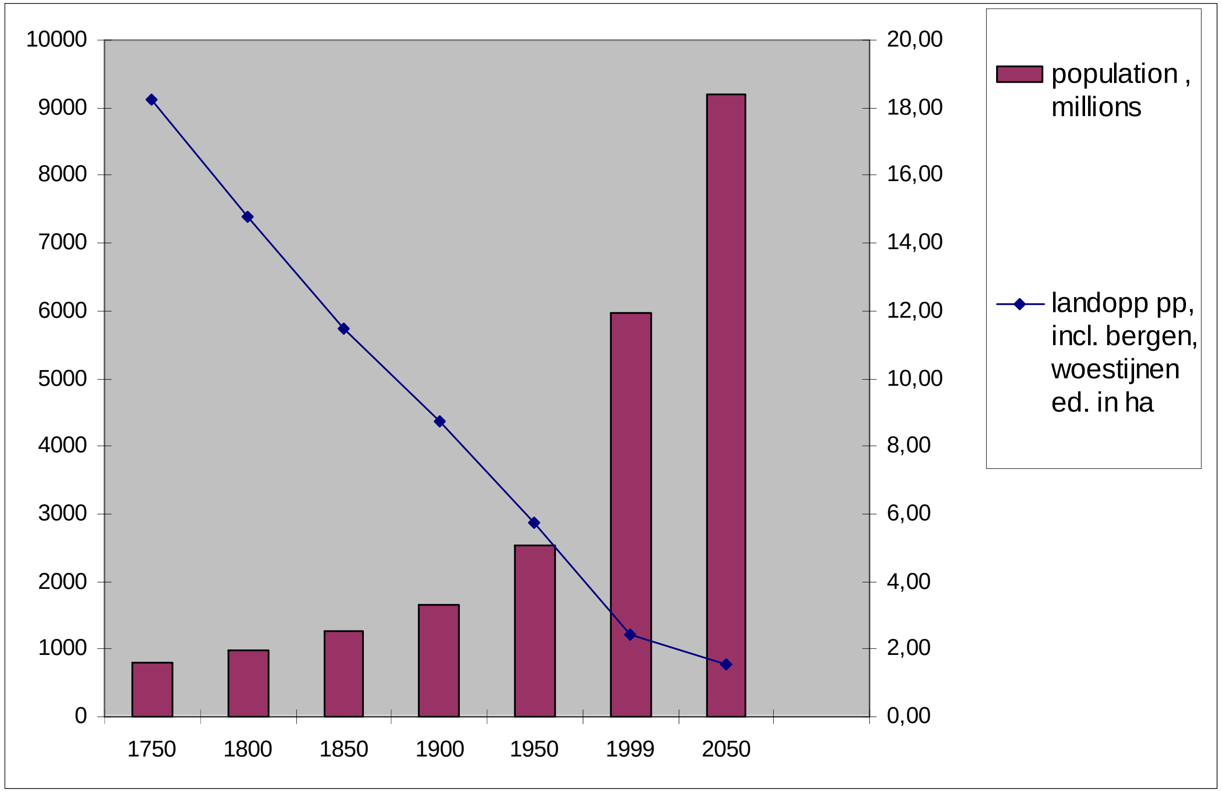
1 ppp is not equal: its resources, that people have to live in balance with. And money to facilitate that. :   So we focus on resoruces

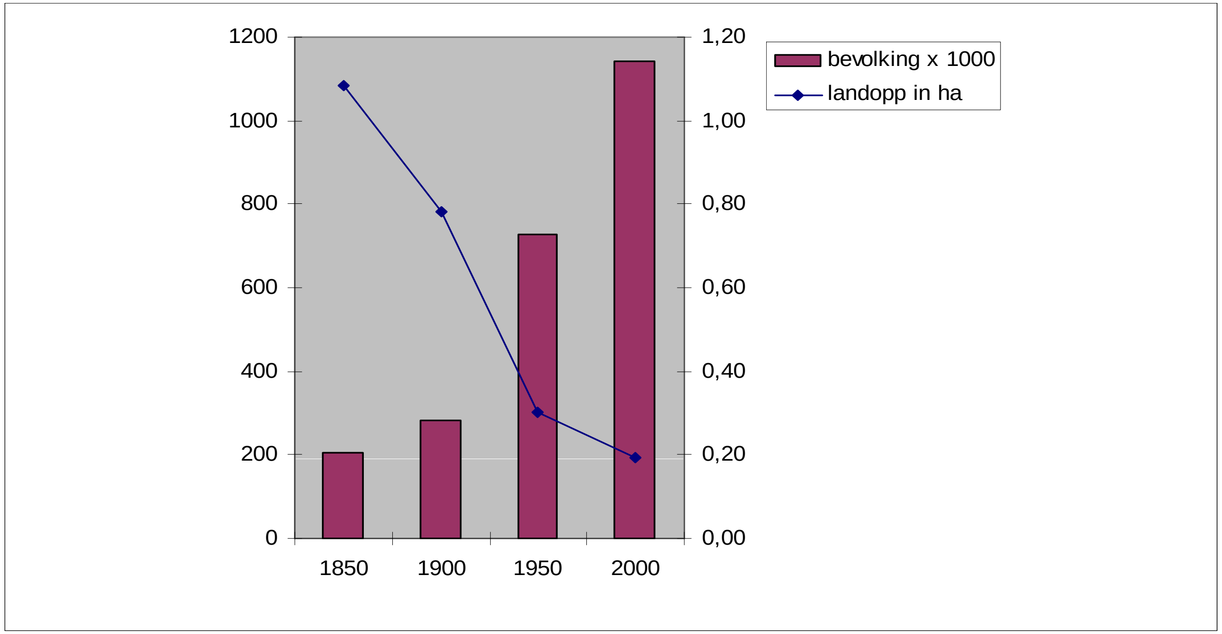
2 its not about a improving a bad scoring benchmark, but about the distance to an ideal future situation.

And that's about working in closed cycles: , or a flow constancy , below carrying capacity, or within potential exergy.

3 No weighing factors….

4 no end of pipe but input and flow.





Land as limiting factor-

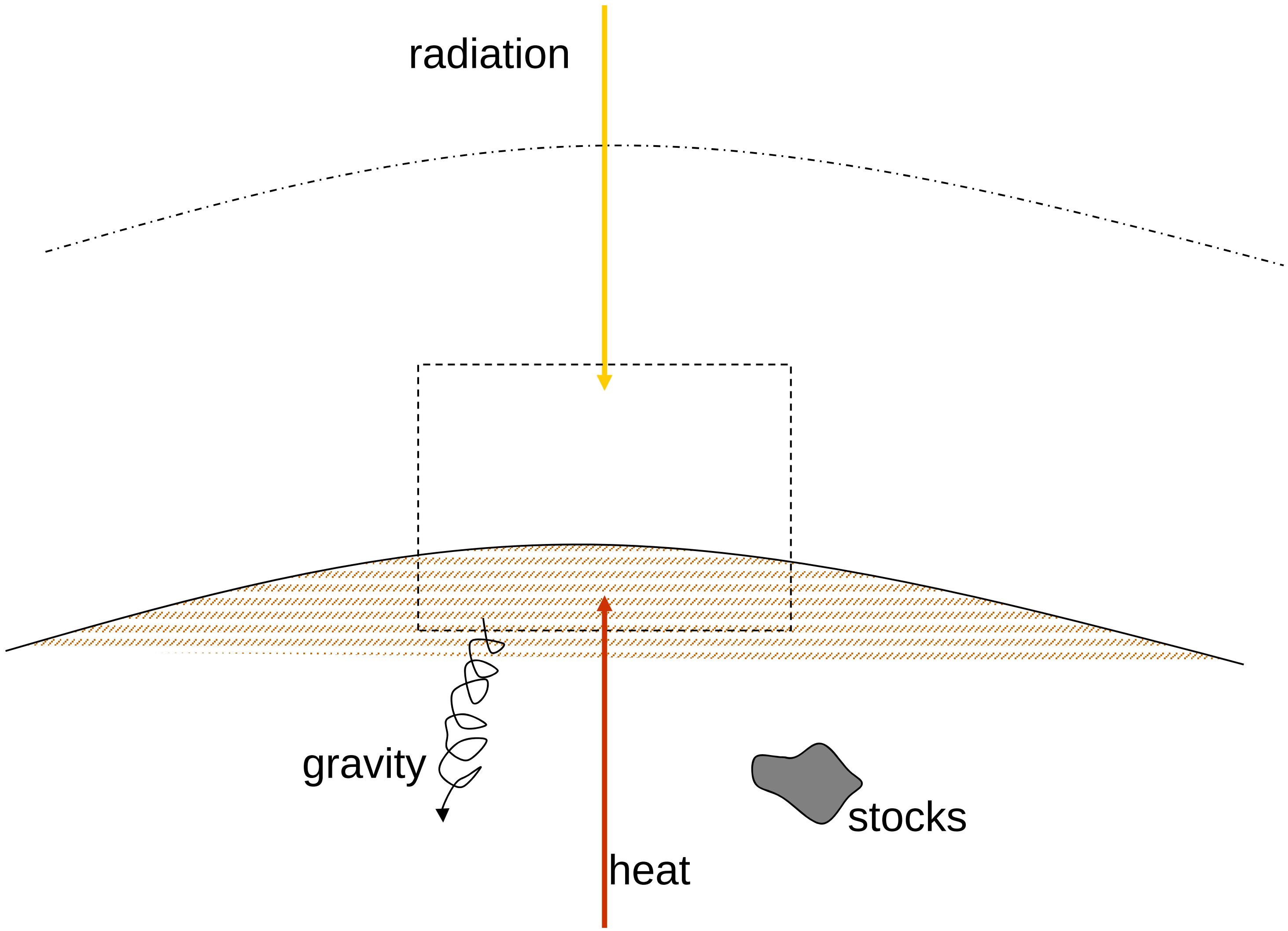
’in time’

Island Earth

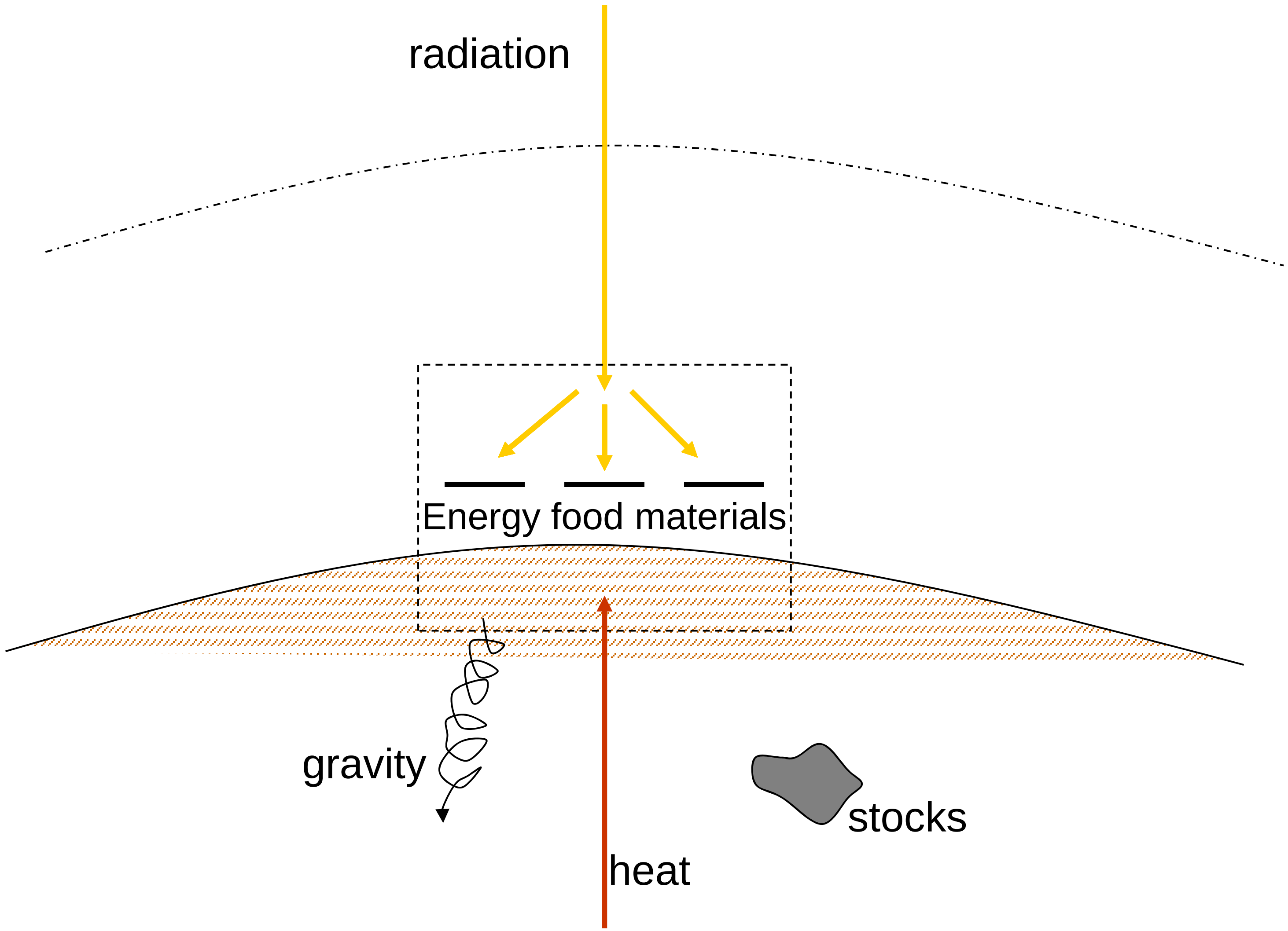
“Island” Limburg

Limburg krimpt al honderden jaren!

Alleen hoefden we daar tot nu toe niets mee te doen…



(to be verified:) If a system, whether defined as a building, city or the earth as a whole, consumes more thermodynamic “quality” as being converted and stored from radiation, somewhere depletion takes place and quality in the system as a whole decreases.
(Within limits of balancing the original situation)



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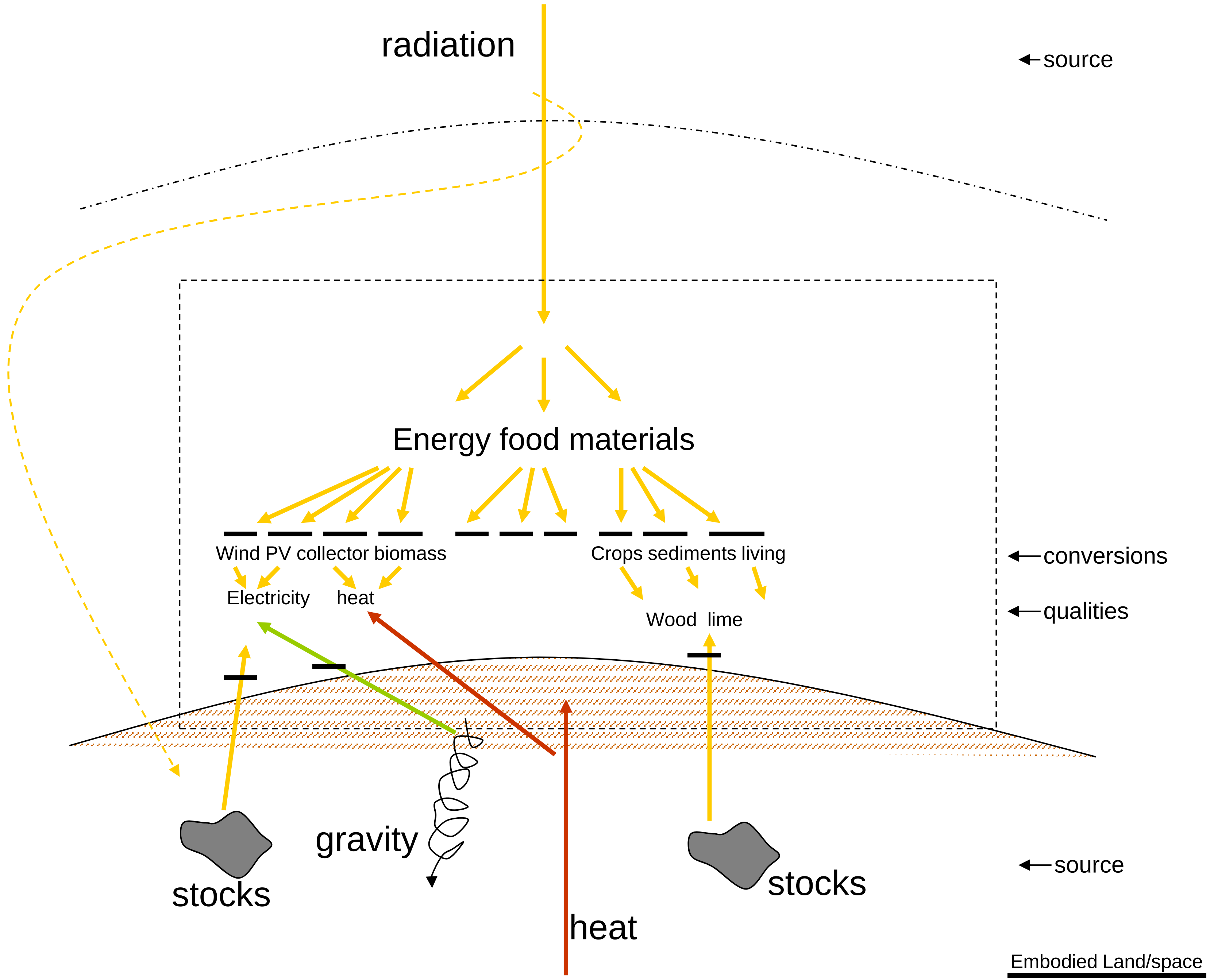
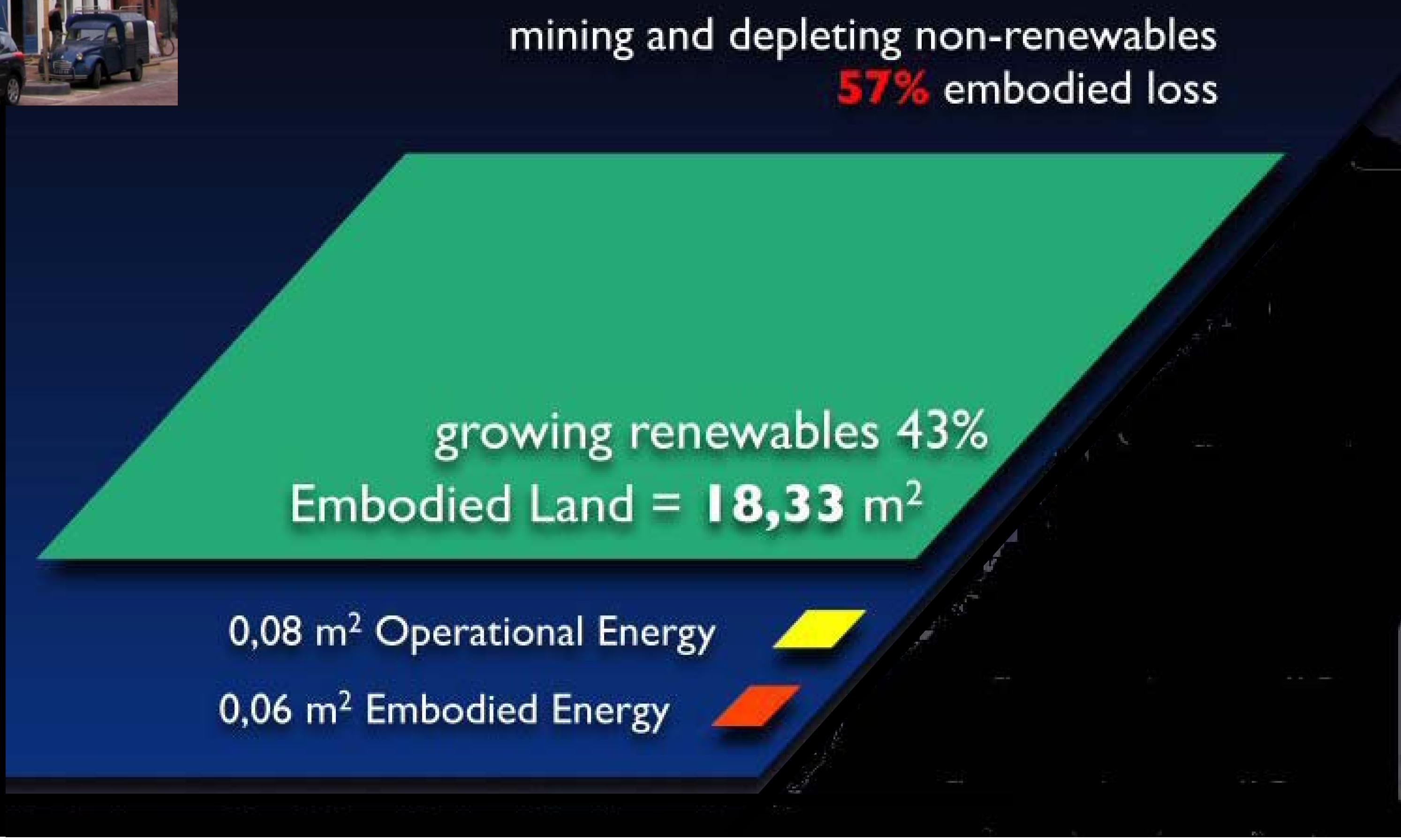

radiation
source
Energy food materials
Wind PV collector biomass
Crops sediments living
conversions
Electricity
heat
qualities
Wood lime
gravity
stocks
stocks
source
heat
Embodied Land/space

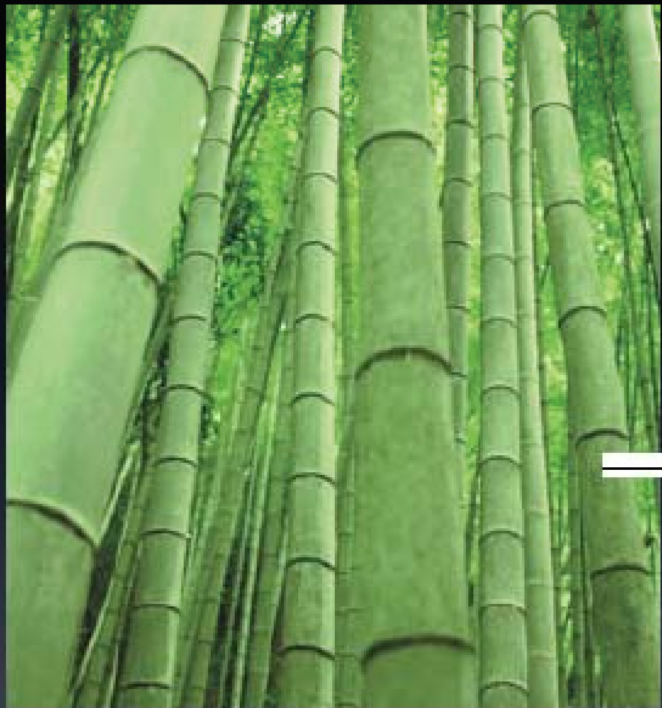
Ijburg house



Embodied Land:

The land in time needed to convert solar radiation into usefull resources,
In principle via the best known technology ,
ie energy is recalculated to m2 PV panels,
and materials:

Production renewable fraction: yields in **kg/ha-year**

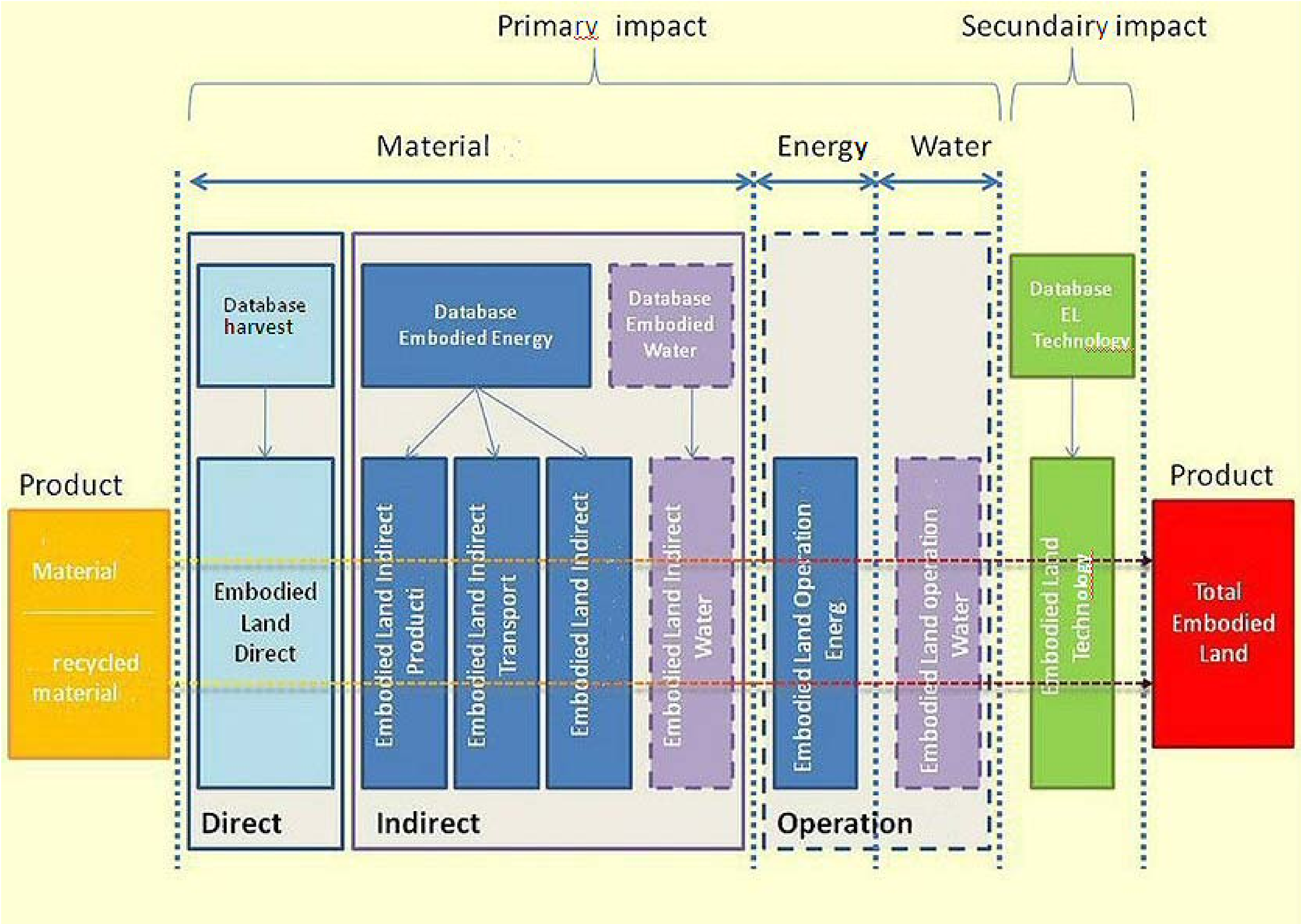


flax fibres (vlas) for insulation material	2.000	kg/ha-year
flax shives for partile board / flax board	3.000	
flax linseed for linoleum	1.500	
straw	4.000	
roof reed (dry)	6.500	
sheep wool	29	
hemp	3.500	
wood	10.800	
bamboo	36.000	
cork	125	
shells	245	
loam	1.000	
sand	1.000	

Yields vary greatly depending on various factors e.g. location, climate, what part of the biomass is counted as yield, dry/fresh material, quality selection, harvest method, use of fertilisers/chemicals, etc.

Refine database in further research

Maxergy indicator: **Embodied Land**



Show xls tool

Winning design for Building 4 District of Tomorrow

WEIGHT	floor-net	renewable	normalised weight	design
ton	m2	%	kg/m2	
121	266	82	454	group 12

Embodied Land:

-EL for 82% **renewable materials**: ~ 800 m2-year/m2-useful area)

-EL for **Embodied energy** all materials: ~ 10 m2-year /m2 ua

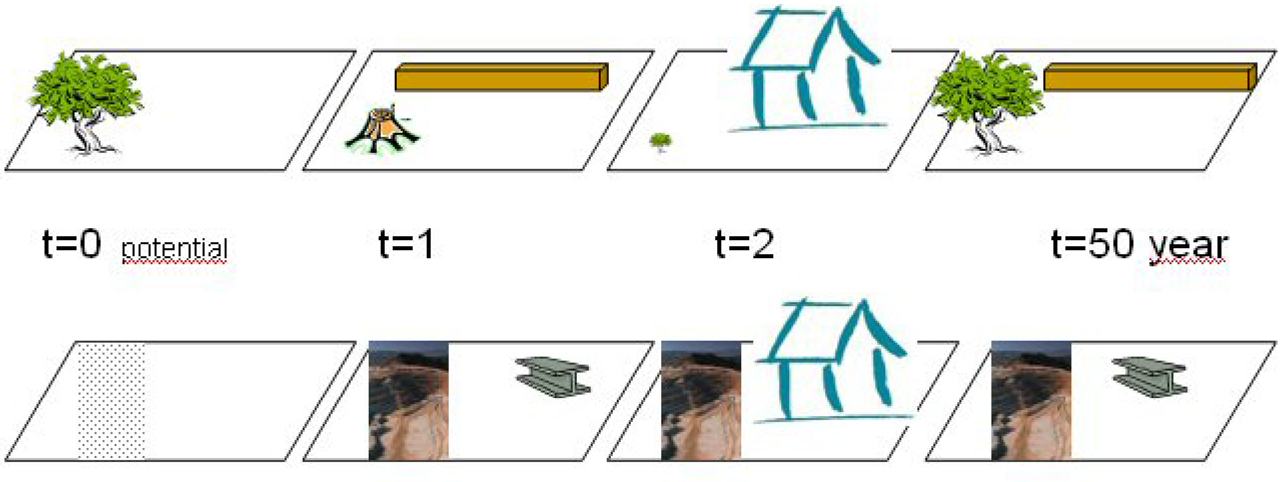
-EL for **Operational energy**(0-energy house):~ 0,5 m2-year/ m2 ua

- After ~ 20 year OE equals EE. After ~ 1600 years EL materials.
- (related to PV potential/ incl storage)

roughly planting area renewables

(without return E and Recycling)

					Building as normalised		building - normalised -T - breakdown						
WEIGHT	floor-net	renewable	normalised weight	design	EL total	per m2 floor	tot	per m2 fl	Emb Energy	EE/m2 floor	Operational 0-Energy		
ton	m2	%	kg/m2		ha	ha/m2 fl	hayear	ha/m2 fl	m2		m2-tot/year	m2/m2floor-year	
121	266	82	454	group 12	2508,00	9,43	64,00	0,24	2470,00	9,29	142	0,53	aluminium



What we now include in the tool is:

The (Embodied) land to regrow the trees (for compensating wood use)

And the energy to collect iron ions from seawater, to re-establsih concentrated iron due to dispersion. (to fill the hole)

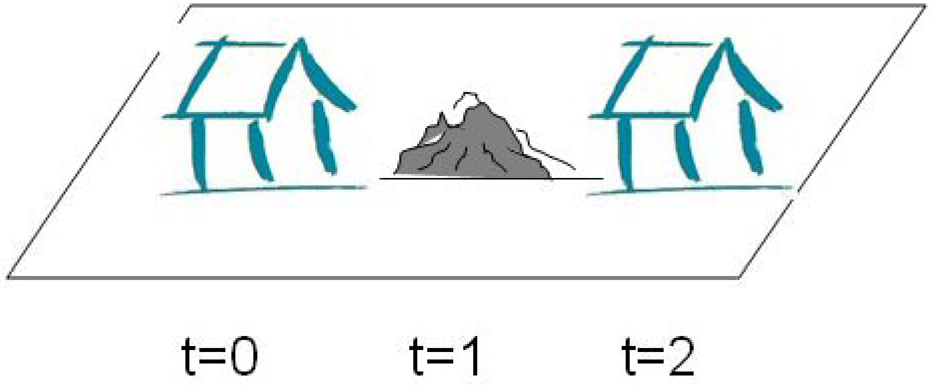
A recycled part can be distracted from the load.

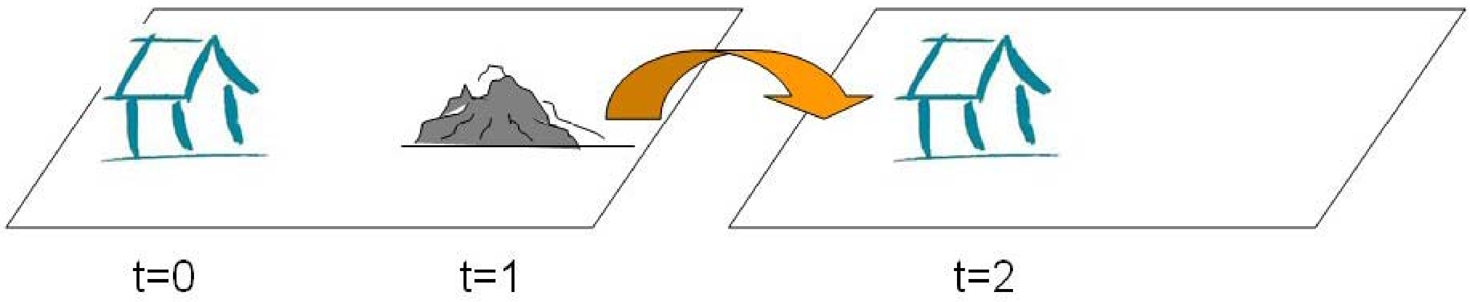
steel and wood beam adapted for comparable load (carry floor section)

m2 (-year)	Emb Land, Ren. Energy based				without return
	EL-dir	EL -ee	EL-er	**TOTAL EL-RE**	
steel beam	0,002	1,4	147318	147319,4	1,4
wood beam	23,8	0,3	0	24,1	24,1

m2 (-year)	Emb Land, Fossil energy based				
	EL-dir	EL-ee-fossil	EL-er-fossil	**TOTAL EL-FOSS**	
steel beam	0,002	462140992	34572193211488	34572655352480	462140992
wood beam	23,8	84856396	0	84856420	84856420

RECYCLING: GELDT ALS NIEUW
TENZIJ VORIG GEBRUIK IS
GEREGISTREERD

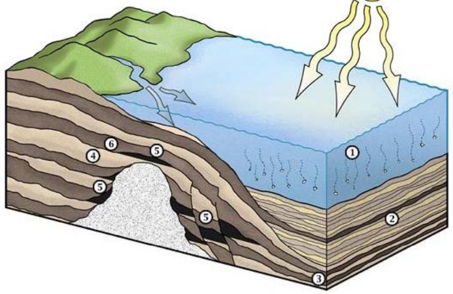




O-exergy building

Electricity via

OiL



PV

Time relation:

Oil used and stocks: (2005): 336.000 miljard ltr.;
Earth: : 510.066.000 km2; > 65 million year

Per day: ~14.000 ltr (globally)

Space time relation :

0,0106 ltr oil per km2-year or

~0,0006 kWh(e)/ha-year

Efficiency?

Efficiency: in % van zon naar electriciteit:

~0,0000000006 % (6 x **10^{-9}** %)

Time relation:

Per day globally: sheer endless

Space time relation :

1 million kWh / ha-year

Efficiency?

Efficiency: in % from solar to electricity:

~**14 %**

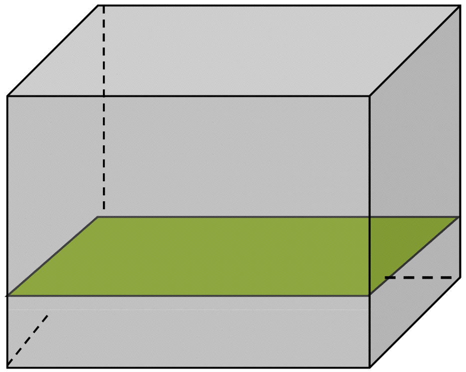
0-impact is about m2's

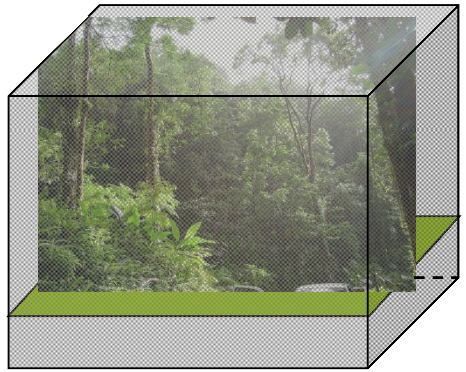
Our ability to convert M2 of solar radiation
access to provide human demands

Blanc system

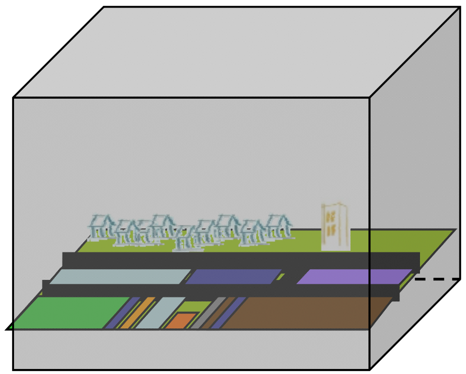
No demand,no production

High potential/quality increase over time





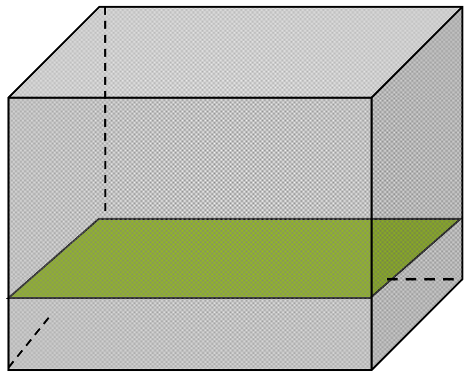
Highest quality/Exergy: ecosystem



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.

Tools Characteristics: differences

Cause	-	effect/impact
Absolute	-	relative
Historic benchmark	-	future target
Weighted results	-	un-weighted results
Performance	-	process evaluation
Unit-less	-	Mass/ CO2/ physical/money unit
Climate adapted	-	non-adapted
Socioculturally adapt.	-	non-adapted
Whole chain ass.	-	construction assessment

R.Rovers, SBScentre www.sustainablebuilding.info

B 4.10 Design for disassembly, re-use or recycling

	Benchm.	B 4.10	B4	tot
Bench - mark building	Score compared to BB	Weighed by category	Weighed by issue	Score by topic
value	1,0,3,5	12,1 %	56 %	22 %
score	3	0,36	0,20	0,044

Kg/m2 la

Total materials: 924

Renewable/rec: 81

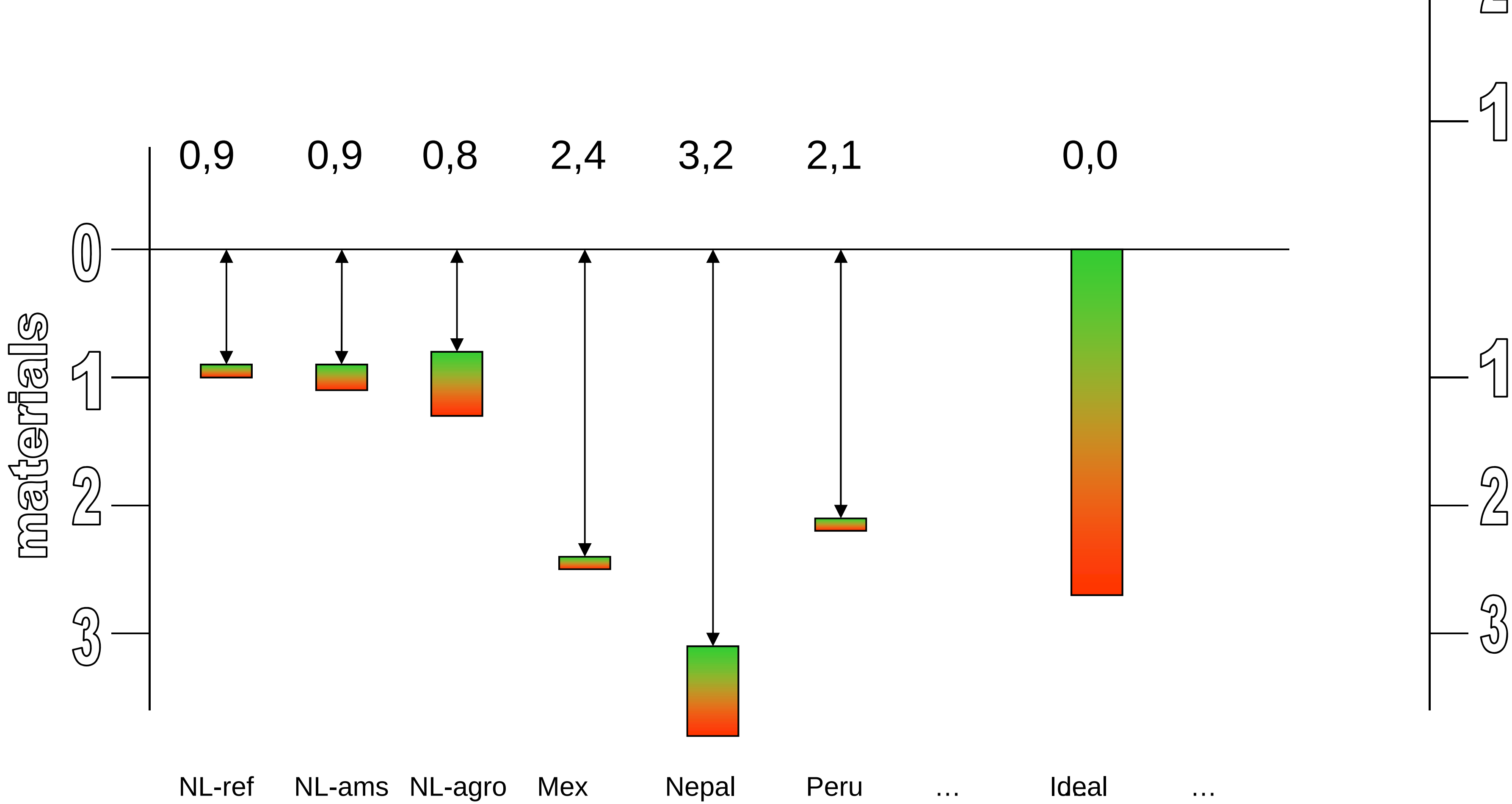
percentage: 8,7%

Kg/m2 la

Total materials: 1122

Renewable/rec.: 192

percentage: 17 %



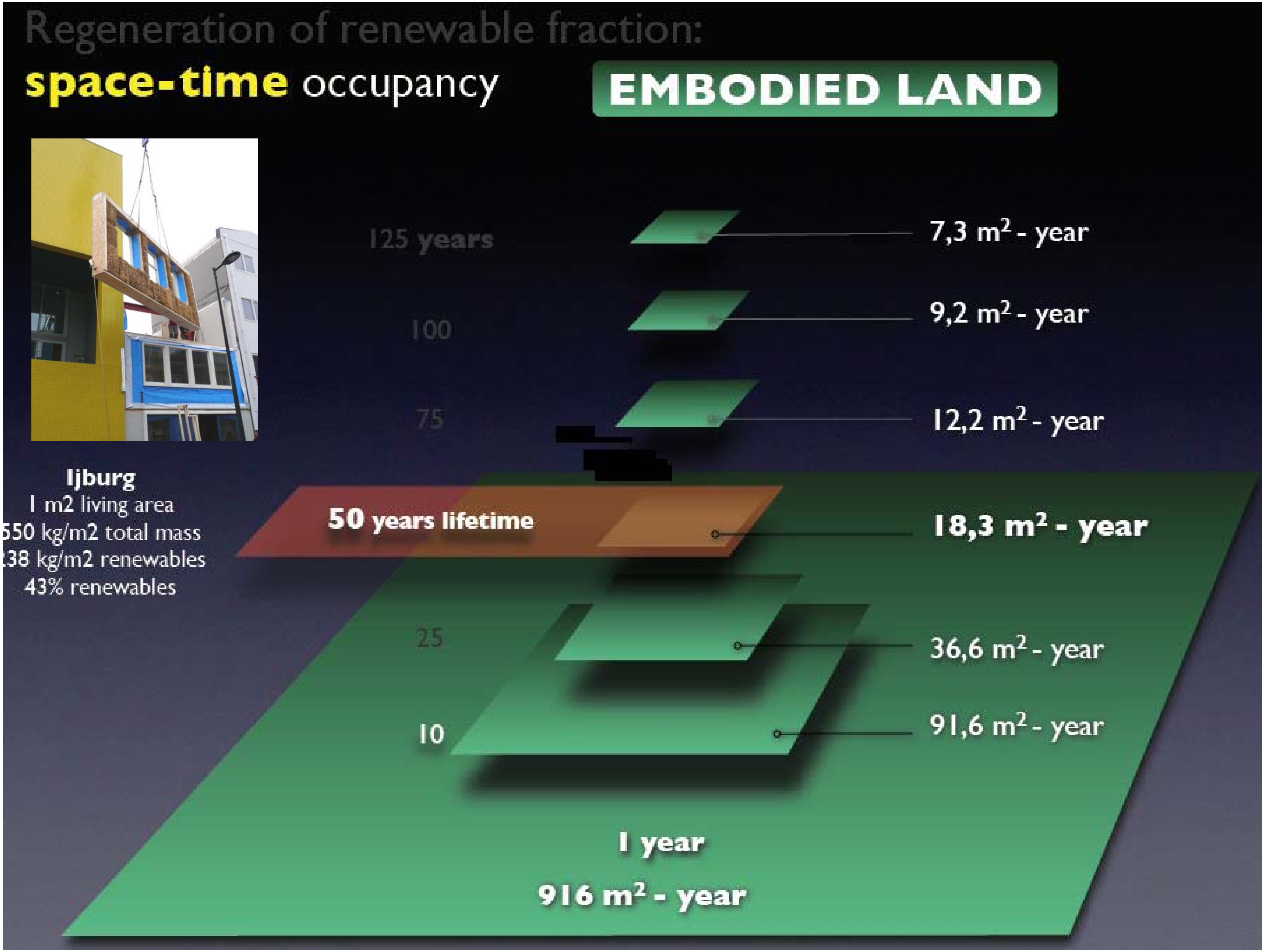
Laten zien hoeveel nodig voro oe en ee

project indicators planning

		project 1: Knik	project 2 Eco/nnect	project 3 exergie house	project 4 0-materials
				?	
		under construction	in detail phase	in design	planned
		energy	**energy**	**energy**	**energy**
demand	vraag	passive	EPC= 0,3	min-exergie	exergie 2.0
supply	levering	100%RE (0-energie)	Energieplus	e-plus	e-plus-e-auto
		Materials	**Materials**	**Materials**	**Materials**
demand	vraag		< 750kg/m2	< 750 kg/m2	exergie 2.0: min-m2
supply	levering	25% renewable	50% renewable	75% renewable	~100% renewable
		Water	**Water**	**Water**	**Water**
demand	vraag			min "watergie"	
supply	levering		25% renewable	50% renewable	100% renewable
		Landuse	**Landuse**	**Landuse**	**Landuse**
demand	vraag				
supply	levering		plus 1	>0	exergie 2.0: minimal

UNIVERSITY ZUYD

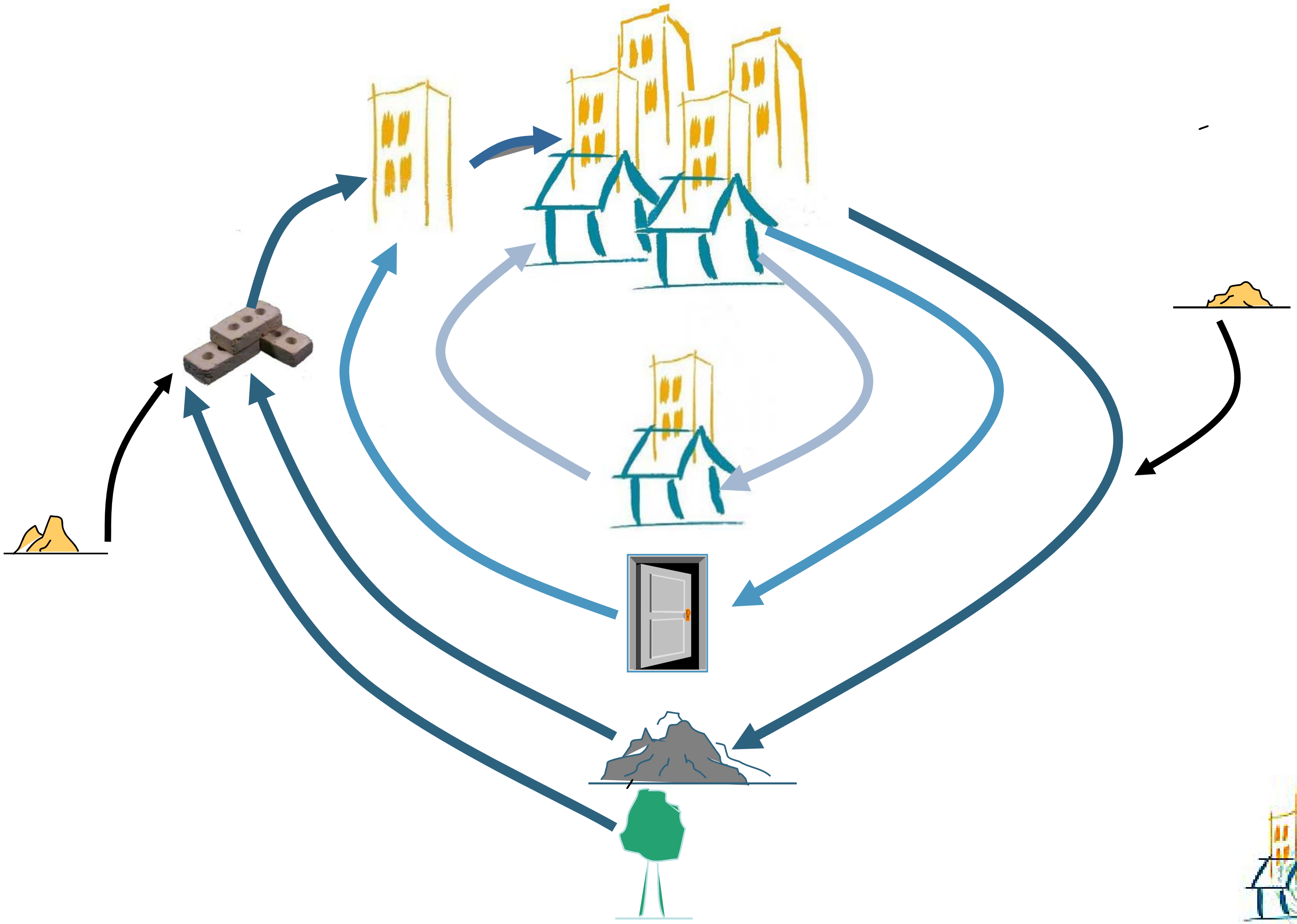
RiBuilT THE CONCEPT OF ZERO


Regeneration of renewable fraction:
space-time occupancy
EMBODIED LAND
125 years
100
75
50 years lifetime
25
10
1 year
7,3 m² - year
9,2 m² - year
12,2 m² - year
18,3 m² - year
36,6 m² - year
91,6 m² - year
916 m² - year
Ijburg
1 m2 living area
50 kg/m2 total mass
38 kg/m2 renewables
43% renewables

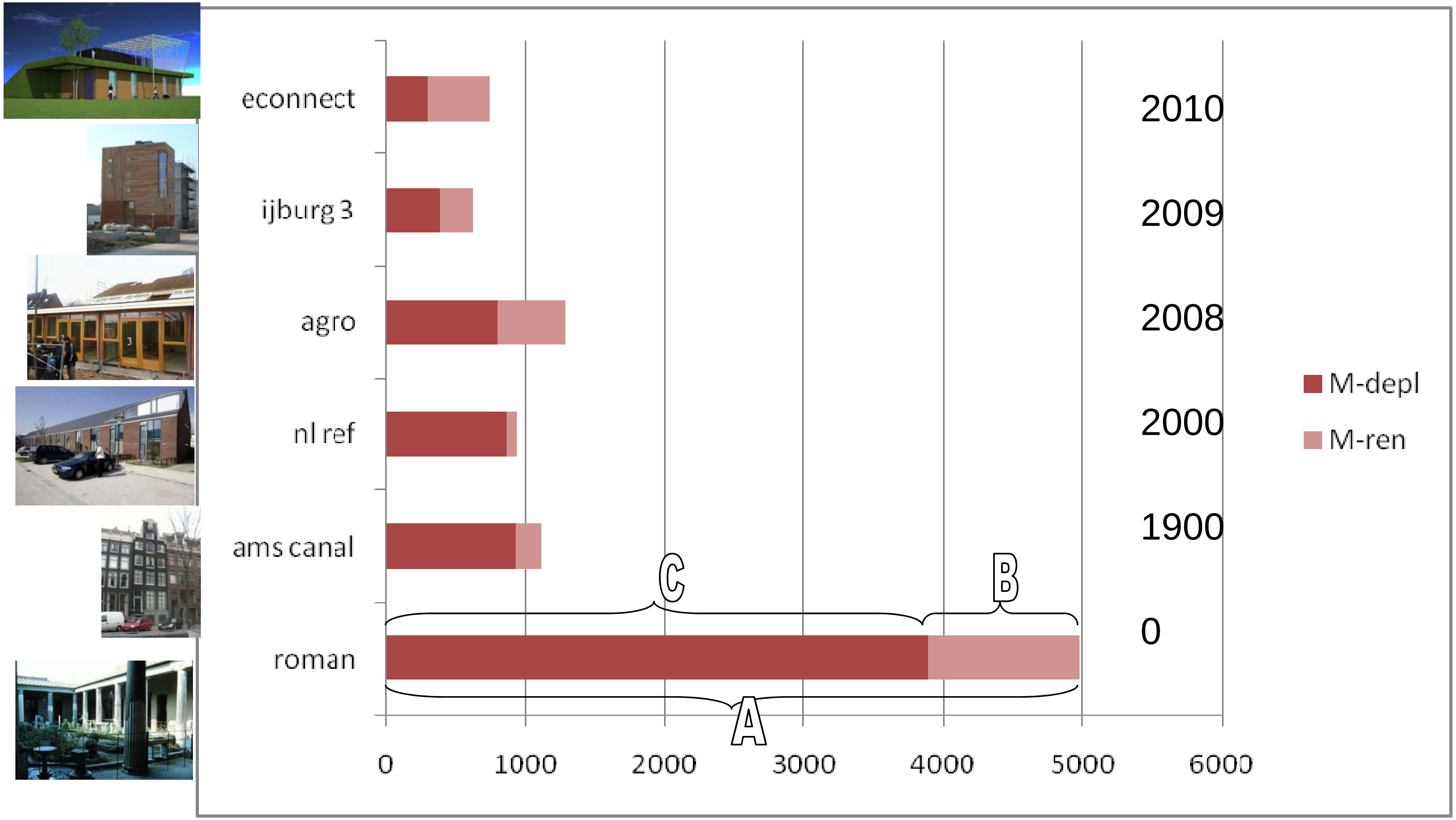
5-step approach

1 Production	maximise production in system
2. (Re-)organisation	fullfill demand in most effective functional way
3. Reduction	Direct reduction of function demand
4. Optimisation	Cascading and combining demand and production
5. Maximisation	Fullifill needs maximised for all sources together

closed Building resource Cycle



Distance to 0/0



A: total mass per m2,

B: renewable mass /m2

C: distance to 0; non renewable fraction