ZEB policy and cases for non-residential and public buildings in the Netherlands

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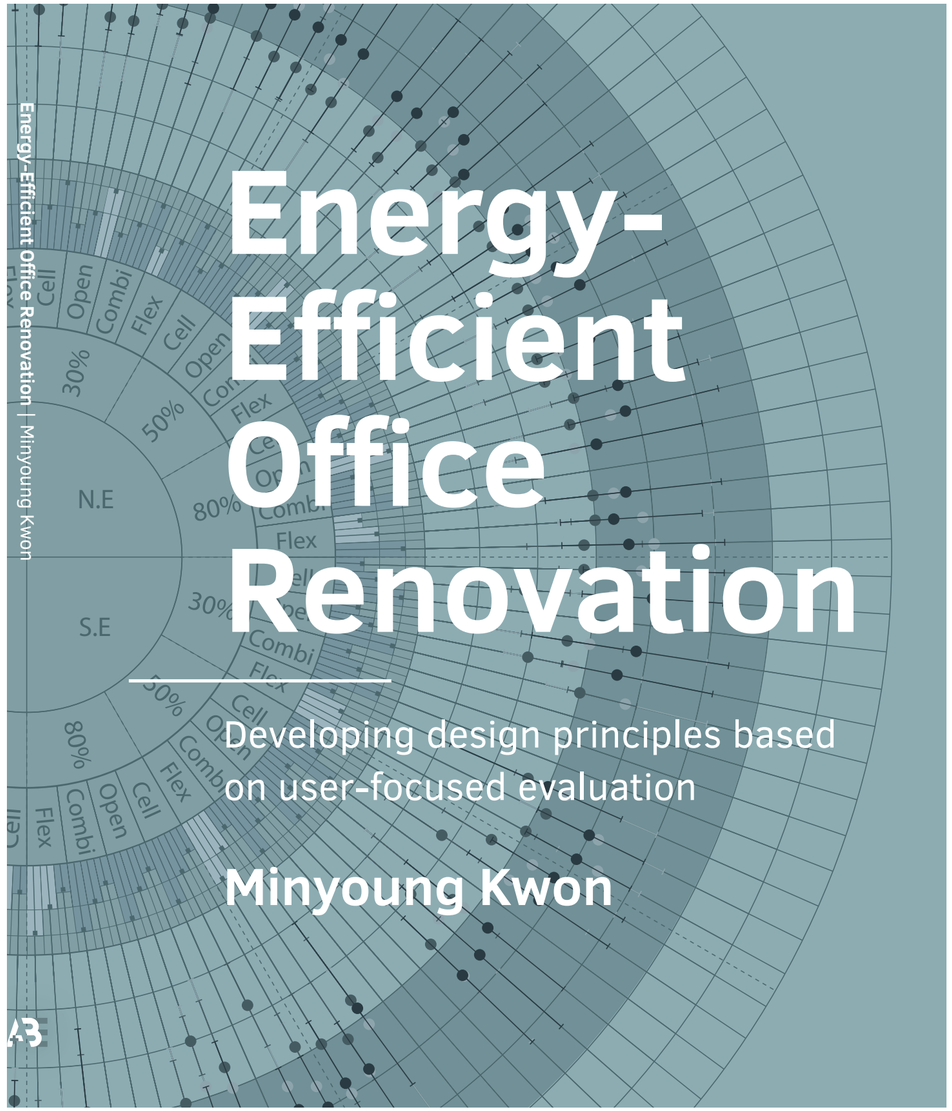

2011 Bachelor of Science in Architecture, Chonnam National University, South Korea

2009 Korean Architecture Engineer license, South Korea

2014 Master of Science in Architecture, Urbanism and Building Sciences, TU Delft, The Netherlands

2014 - Licensed Dutch Architect

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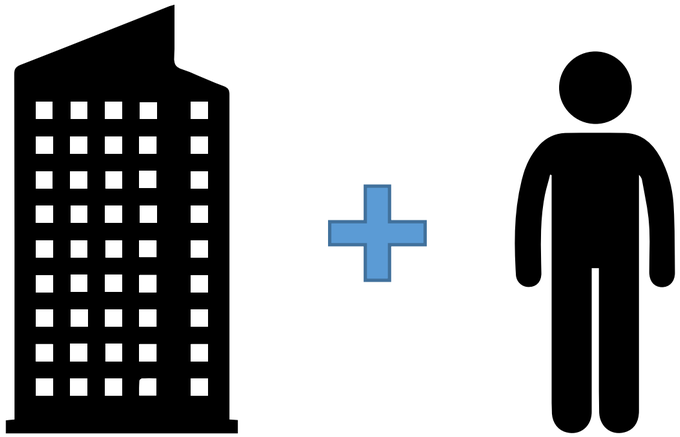
Contents

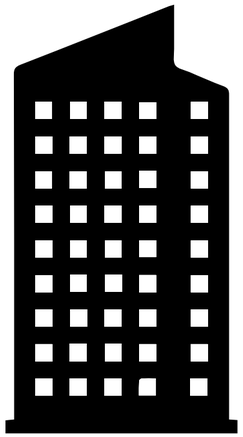
Definition

Zero Energy Building



Building-related energy + Use-related energy

Energy-Neutral Building



Building-related energy

Energy policy

BENG (Bijna Energieneutrale Gebouwen)

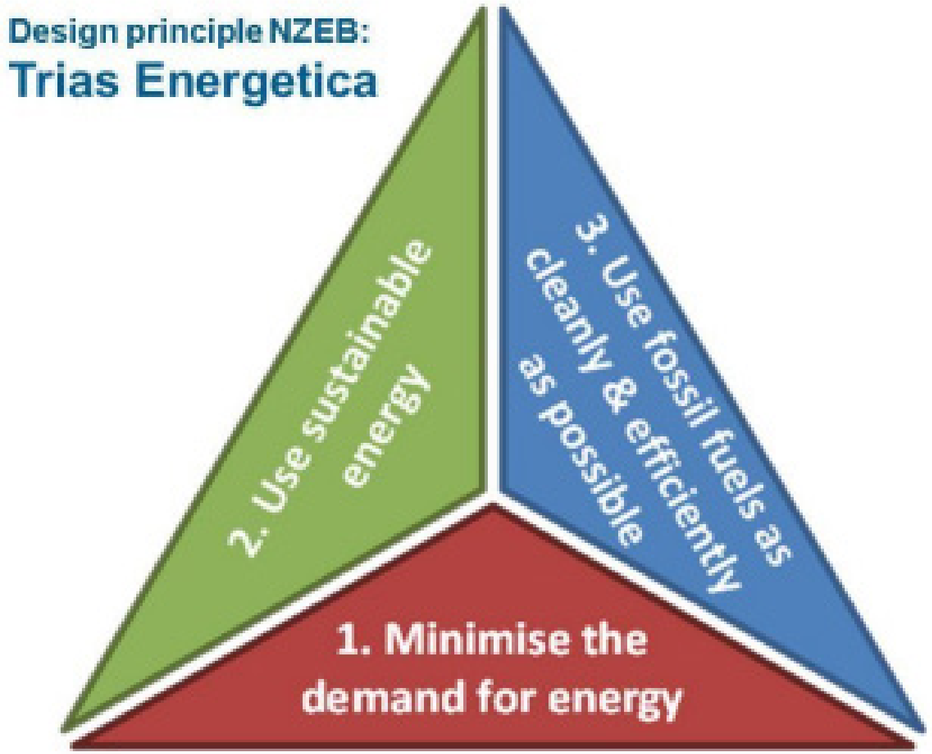


Figure 1. Trias Energetica (source: EPBD)

For all new construction, both residential and non-residential, applications for the environmental permit must meet the requirements for nearly energy-neutral buildings (BENG) from 1 January 2021.

Energy policy

BENG (Bijna Energieneutrale Gebouwen)

Overheidsgebouwen; gebouwfunctie:	Energiebehoefte [kWh/m^2.jr]	Primair fossiel energiegebruik [kWh/m^2.jr]	Aandeel hernieuwbare energie [%]
Kantoorgebouw (>100 m^2 BVO)	50	25	50
Bijeenkomstgebouw	60	25	50
Celgebouw	60	60	50

1. Energy requirement in kWh per m 2 usable area per year

2. Primary fossil energy use in kWh per m 2 of usable area per year

3. Share of renewable energy in percentages (%)

Source: https://www.rvo.nl/onderwerpen/duurzaam-ondernemen/gebouwen

Building certification

Scheme	Scope
BREEM-NL	Energy use, Water use, Materials, Indoor environmental quality, Emissions/pollution, Land use and Ecology, Transportation/Mobility, Health and wellbeing, waste
GPR Gebouw	Energy use, Health and wellbeing, Environment, Quality of usage (gebruikskwaliteit), Value in future (toekomstwaarde)
GreenCalc+	Energy use, Water use, Materials, Transportation/Mobility

Building certification

GPR Gebouw

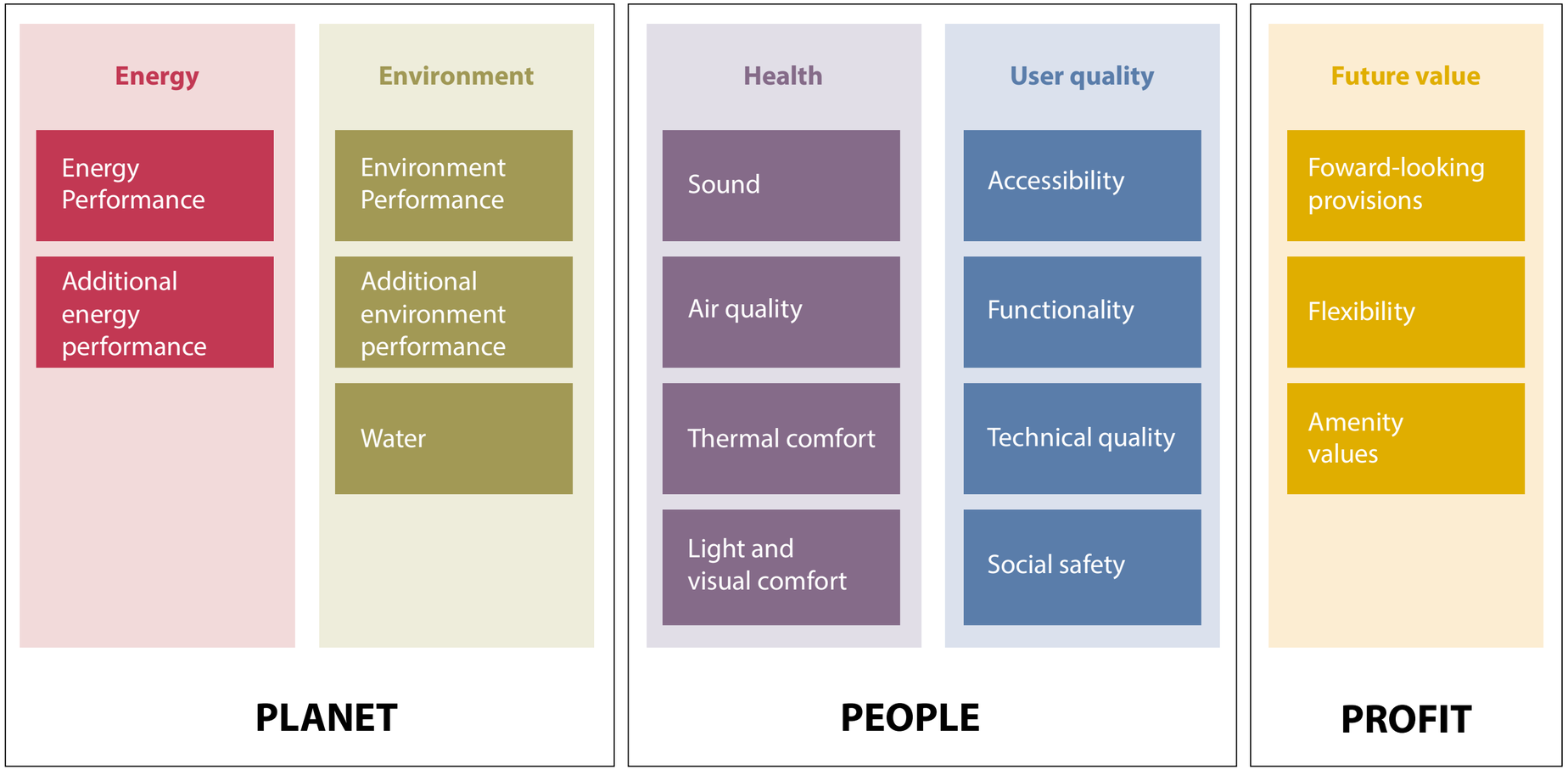
: a Dutch sustainable method and a digital instrument for measuring the sustainability of buildings.

GPR = CPG + DPG (EPG+MPG)

- **CPG (Circularity Performance Building)**
- **DPG (Sustainable Performance Building)**
- **EPG (Energy Performance Building)**
- **MPG (Material Performance Building)**

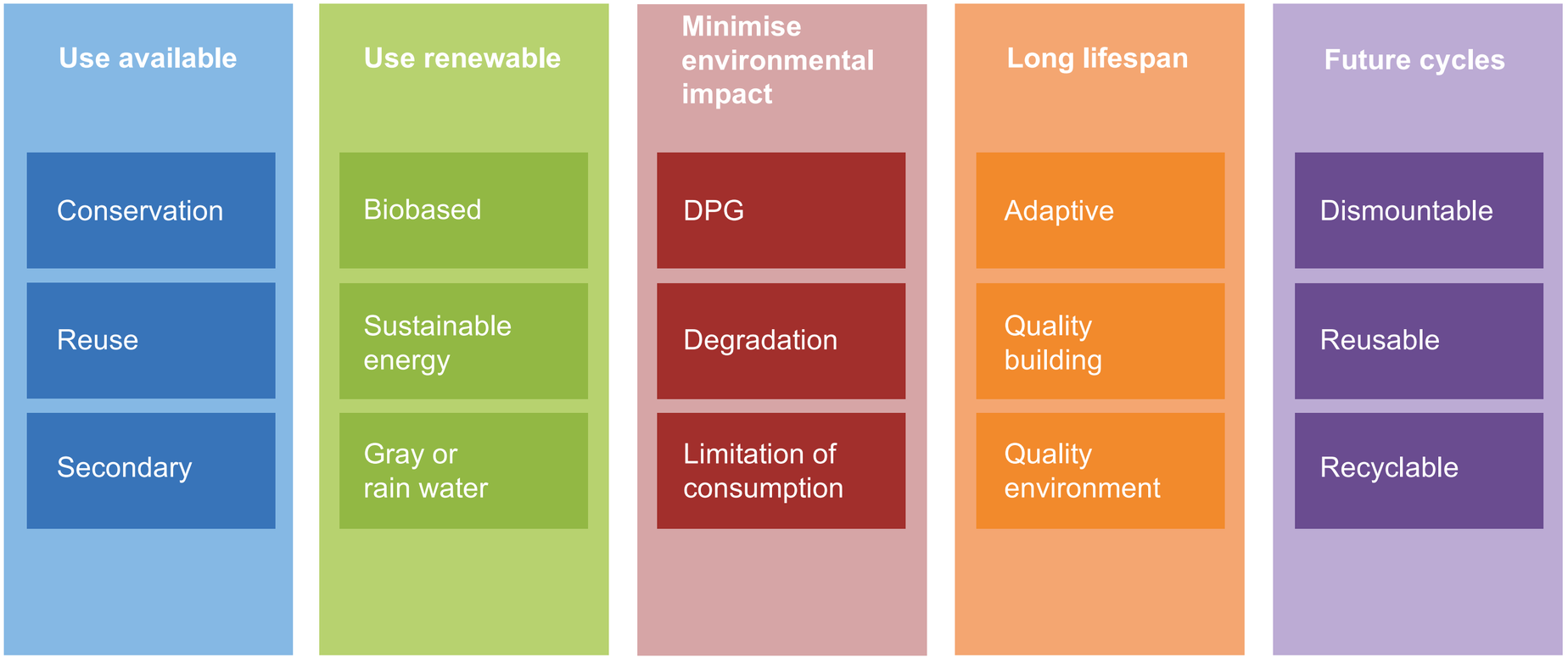
Building certification

GPR Gebouw 5 themes



Building certification

CPG



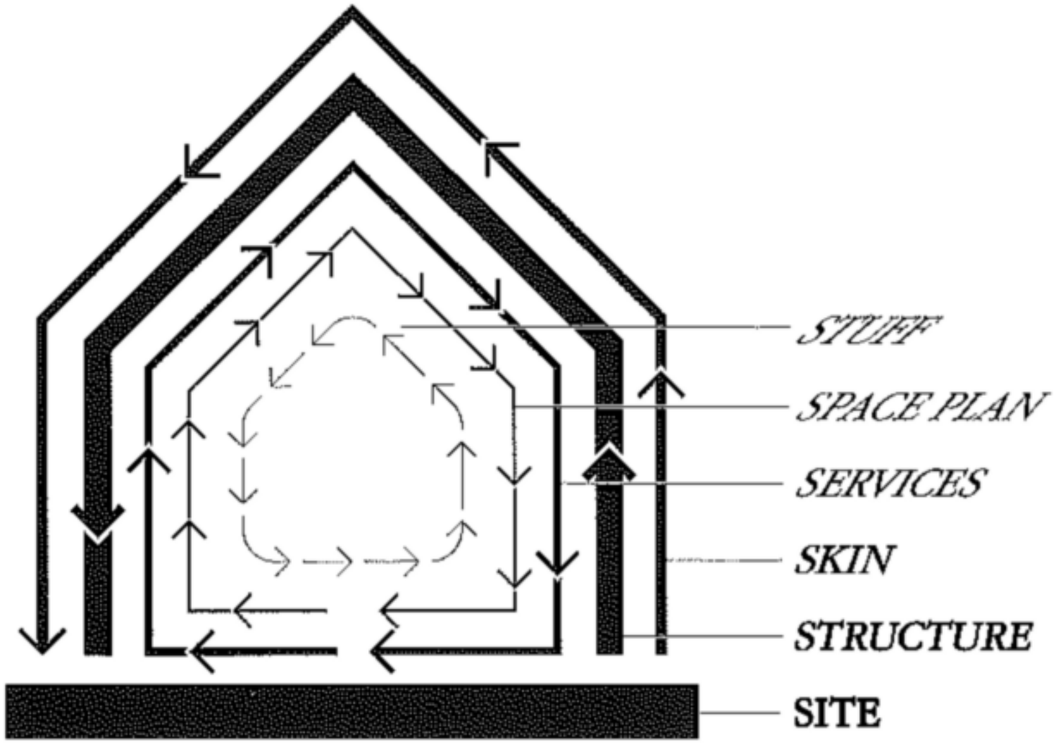
Layers of - stewart brand

design through different layers

each layer has its own life-span / durability

building- energy demand is primarily related to:
1. skin
2. services

user-energy demand is primarily related to:
1. stuff
2. space plan, office type

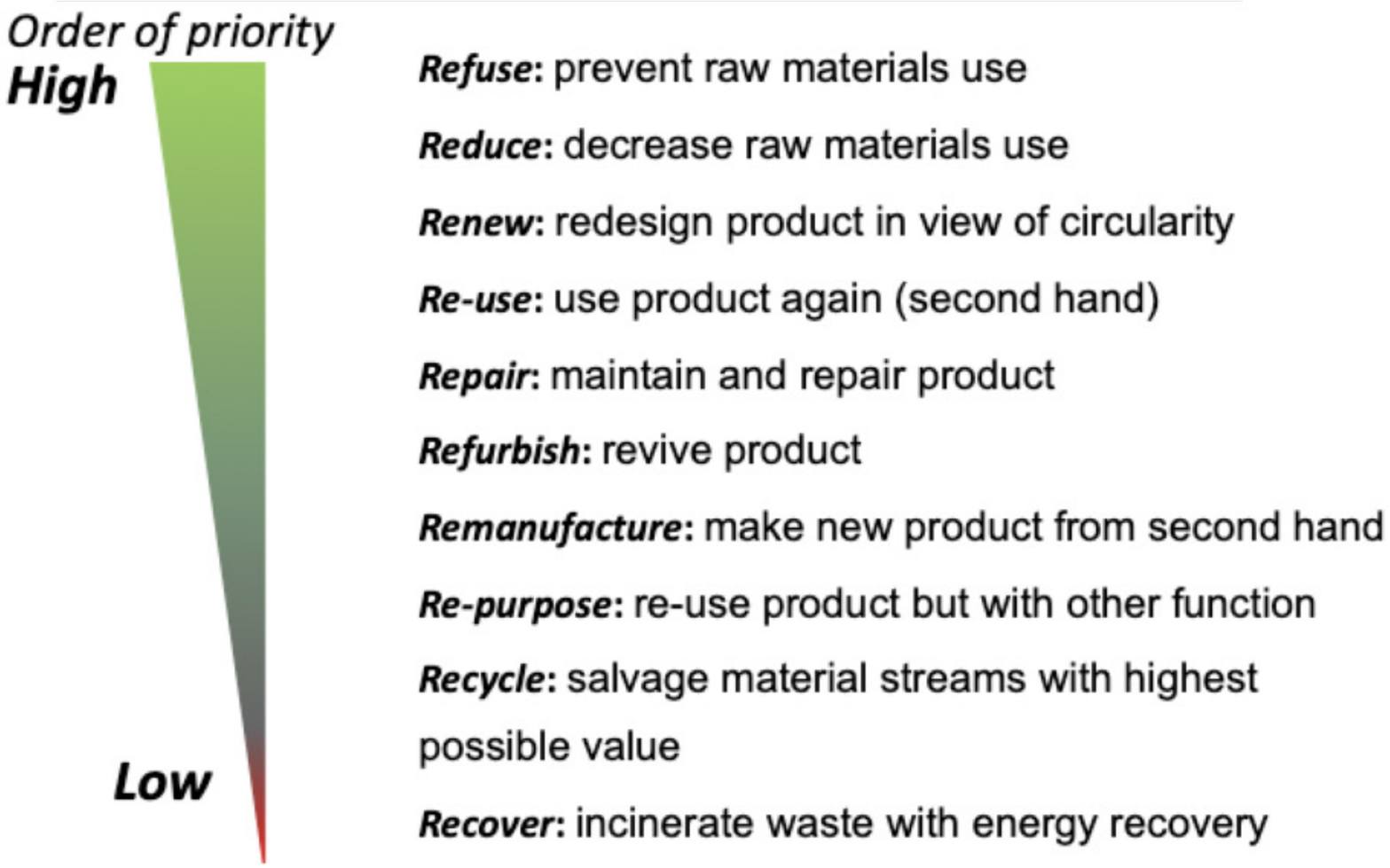


SHEARING LAYERS OF CHANGE. Because of the different rates of change of its components, a building is always tearing itself apart.

shearing layers of change (Brand, 1994)

← under 3 years
← 3 years
← 7 - 20 years
← 20 + years
← 30 - 300 years
← permanent

10 R circularity



level of circularity, after cramer 2015

most people focus on the bottom part of the graph, while the top has the most impact

refuse:
honest material usage,
non-vergin materials

reduce:
use of existing structures
compact building

renew:
standardized components,
rethink construction method(s)

re-use:
dismountable, repurpouse
reconfigurable

Cases

1 cepezed
town hall woerden

2 cepezed
state office de knoop

3 RAU Architects
Triodos Bank

Town hall woerden
budget neutral

cepezed, lucas van der wee


cepezed, lucas van der wee

Town hall woerden
budget neutral

Budget neutral

The reduction of the gross floor area and the various sustainability measures strongly save on energy and maintenance costs.

Including the costs of financing the overall renovation, the total exploitation costs for the new town hall re-mained equal to those of the old.

Town hall woerden budget neutral

use of existing structure

optimization building shape / compact building
vertical connections, enhance spatial experience

new ways of working
cellular office to open office
flexible, multifunctional work-spaces

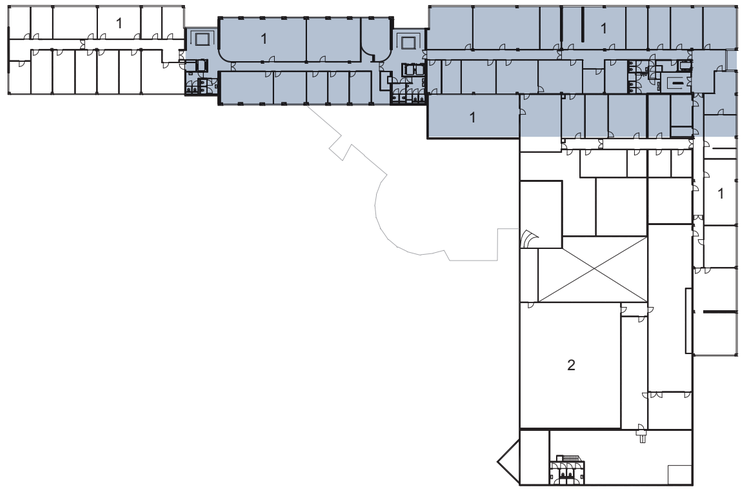
energy-label A+++
strongly insulating
aquifer thermal energy storage
large surface of solar panels

increase functionality
14.000 sqm to 8.000 sqm

Town hall woerden
budget neutral

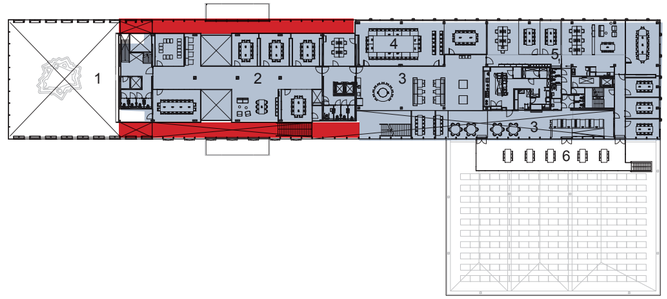
former situation
first floor

1. offices
2. council chamber



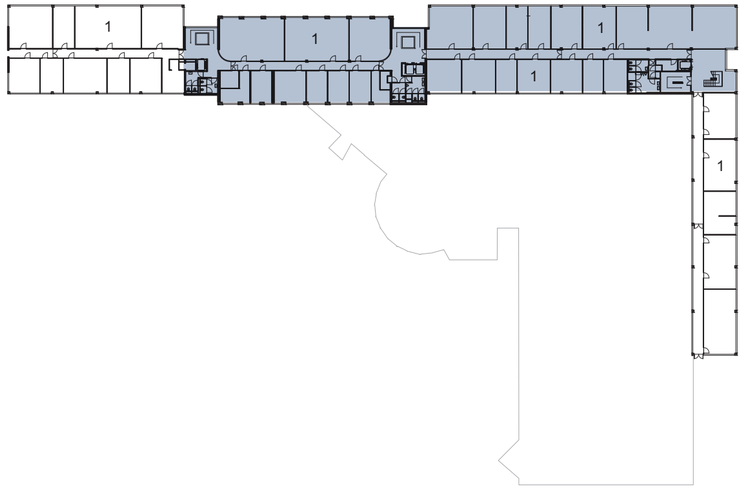
new situation
first floor

1. council room
2. conference centre
3. restaurant
4. large conference room
5. administrative centre
   (Mayor & aldermen)
6. roof terrace



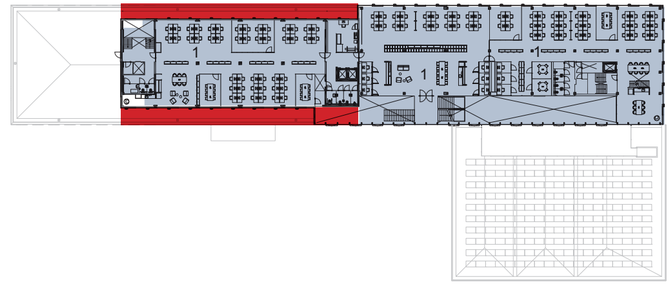
former situation
second floor

1. offices



former situation
second floor

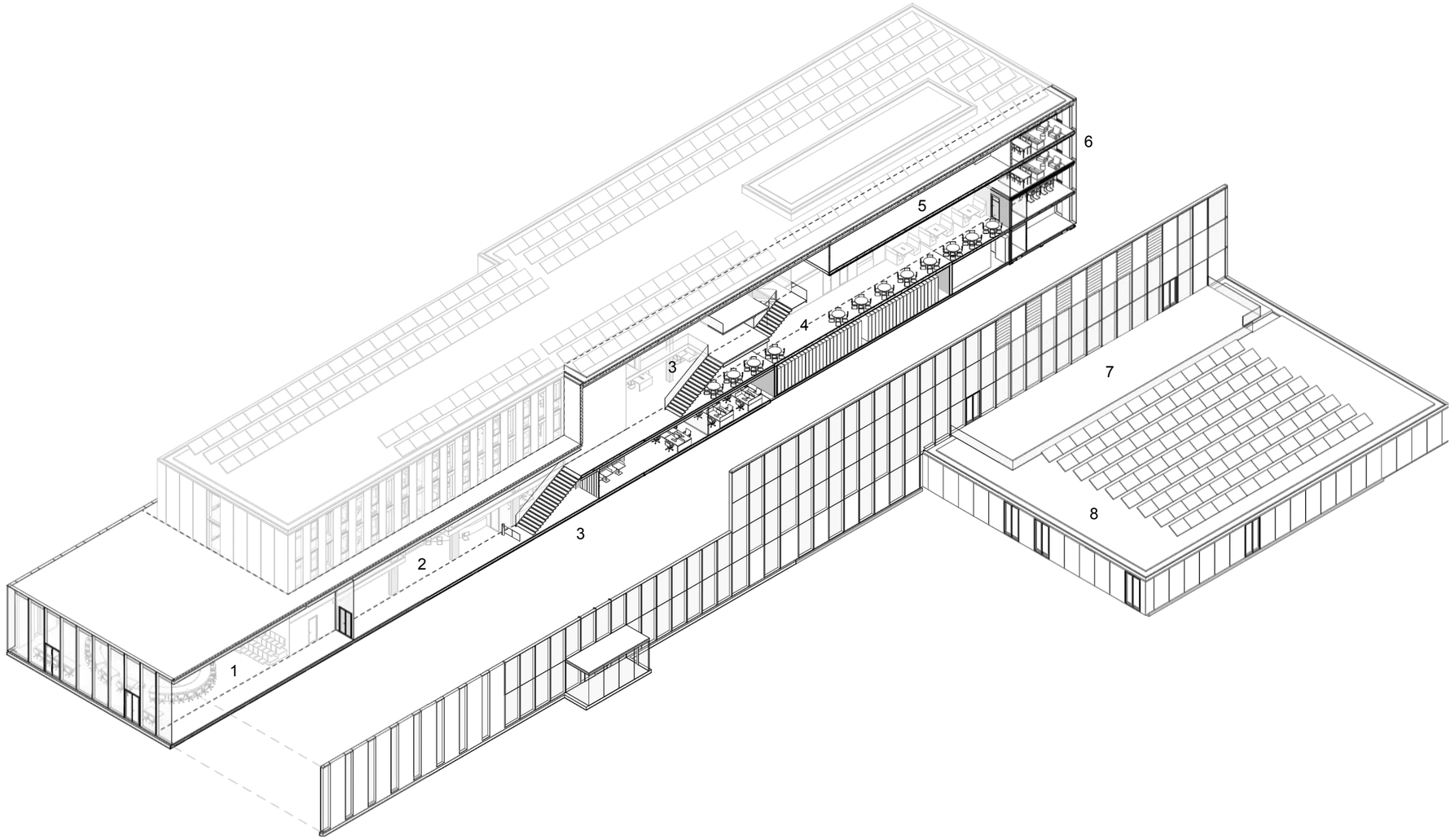
1. offices



existing

new

Town hall woerden budget neutral



1. council chamber
2. public hall
3. new cascade stairs
4. restaurant
5. technical space
6. offices
7. roof terrace
8. archives

State office de knoop

State office de knoop

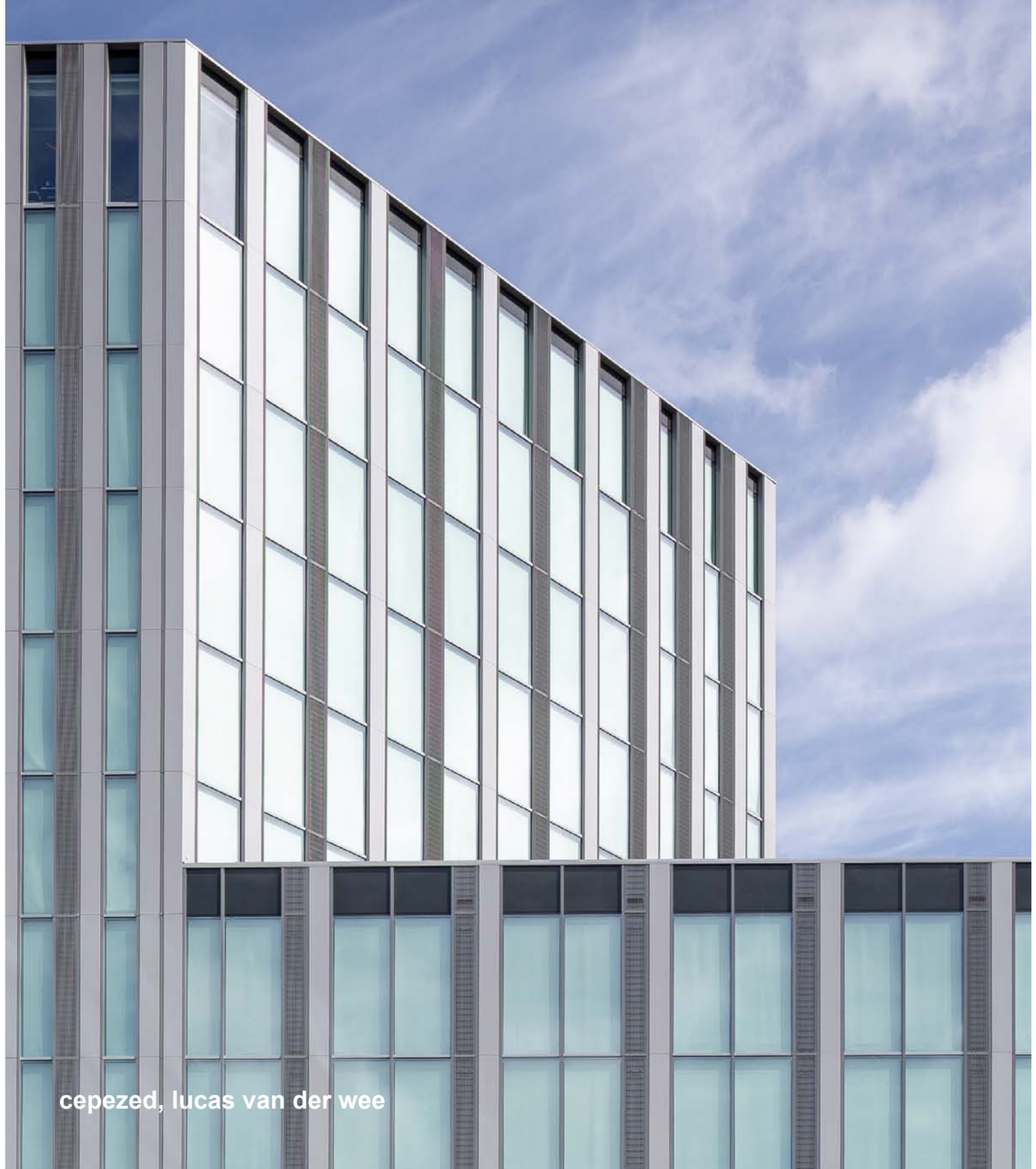
use of existing structure

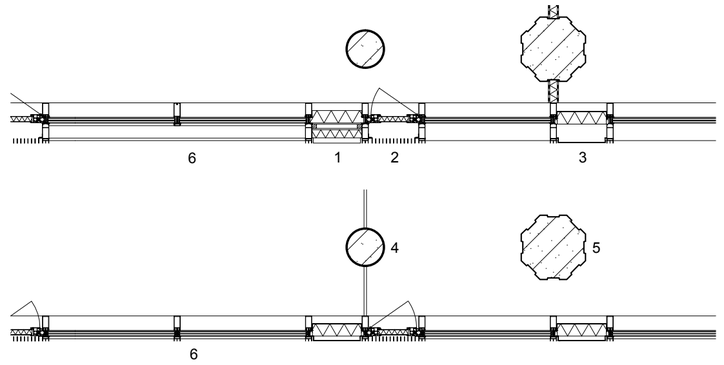
compact building
vertical connections, enhance spatial experience

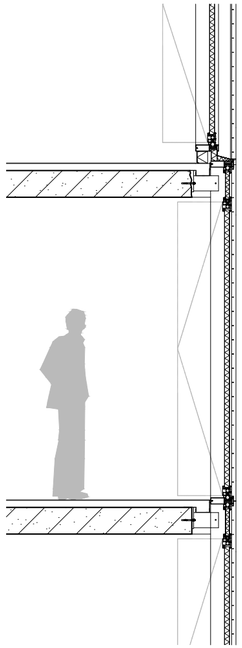
optimization building shape

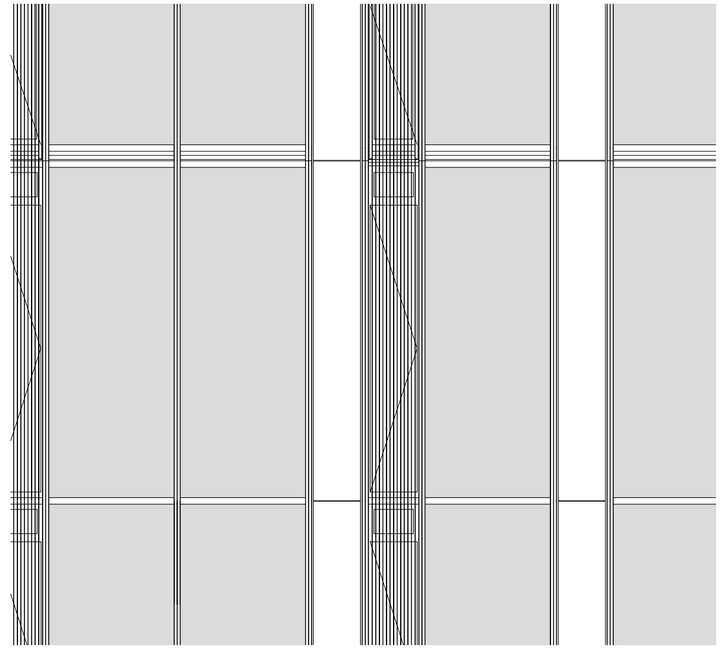
increase daylight penetration where possible according to oreintation
lower energy consumption
enrich workspace quality

Facade design









cepezed, lucas van der wee

cepezed, lucas van der wee

The greenhouse

foundation

steel frame

prefab units such as the lift and the toilet block

SIPS façade elements

façade consists of the glass of the old Knoopkazerne; the glass size determined the dimensions of the pavilion

roof: the fifth façade

cepezed, lucas van der wee

RAU Architects, Bert Rietberg, Ossip van Duivenbode

Triodos bank

first large-scale, 100% wood, reconstructible office building

serves as the first temporary material bank

minimal CO2 footprint

Breeam outstanding

RAU Architects, Bert Rietberg, Ossip van Duivenbode

CO2 bank

demountable, wood-hybrid construction

wooden floors
wooden shafts
wooden columns

circular potential without loss of value of materials, components, and products.

RAU Architects, Bert Rietberg, Ossip van Duivenbode

Solar energy

The extensive use of renewable energy - reflected in over 3,000m2 of solar panels

bidirectional solar charging point for 120 electric cars, as well as heat and cold storage - contributes to the energy neutrality of the building

THANK YOU

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