Recycling-House in Hannover (GER)

produced by recycled material

Dipl.-Ing. Architect Stefanie von Heeren

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Building Sector

The building sector is responsible for (2017 data)

50% of worldwide consumption of resources

50% of worldwide waste amount

40% of worldwide energy consumption

33% of worldwide water consumption

75% of resource consumption in cities

Quelle/source: Statistisches Bundesamt Destatis / Recycling Atlas

Idea The Recycling-House is an experimental residential house, built of **recycled** and **recyclable elements** in a **recyclable way** of construction.

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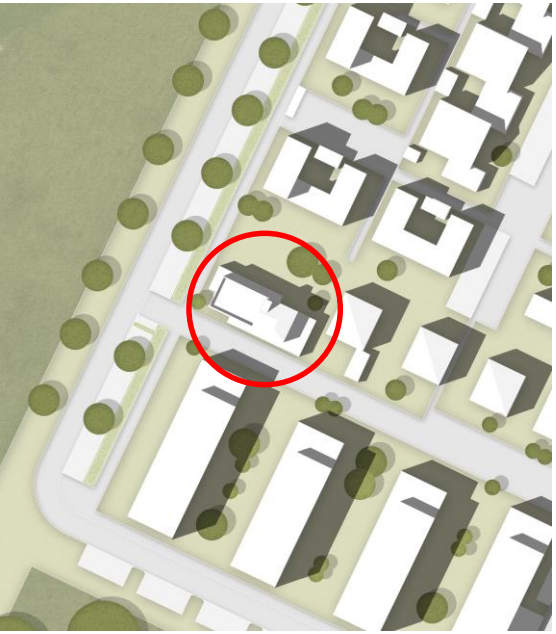
Quelle/source: Statistisches Bundesamt Destatis / Recycling Atlas

Project Idea



Realisation of a prototype building with regard to recycling through real estate company *Gundlach*, Hannover on a site in Hannover, Kronsberg.

2015: organised competition by invitation with requirements on including ideas of recycling

Winner: cityförster architecture + urbanism Hannover
(Nils Nolting, Verena Brehm)

2019: Completion of Recycling-House with ca. 160 m² and move-in of tenants (family)

Quelle/source: cityförster

Aim

Use of recycled **materials** and **products.**

design for recycle

Use of **materials** and **products** which are **recyclable** and can be **constructed in a way suitable for later recycling.**

design for disassembly

Use of **recycled materials** from the clients inventory (real estate company *Gundlach*)

or

Urban Mining

Source of **locally recycled materials,** meaning they come from the city or region of Hannover, from the province, from Germany

Mind-set on **material cycles during the building process** regarding construction waste and intermediates

Quelle/source: cityförster

Aim

Simple disassembly

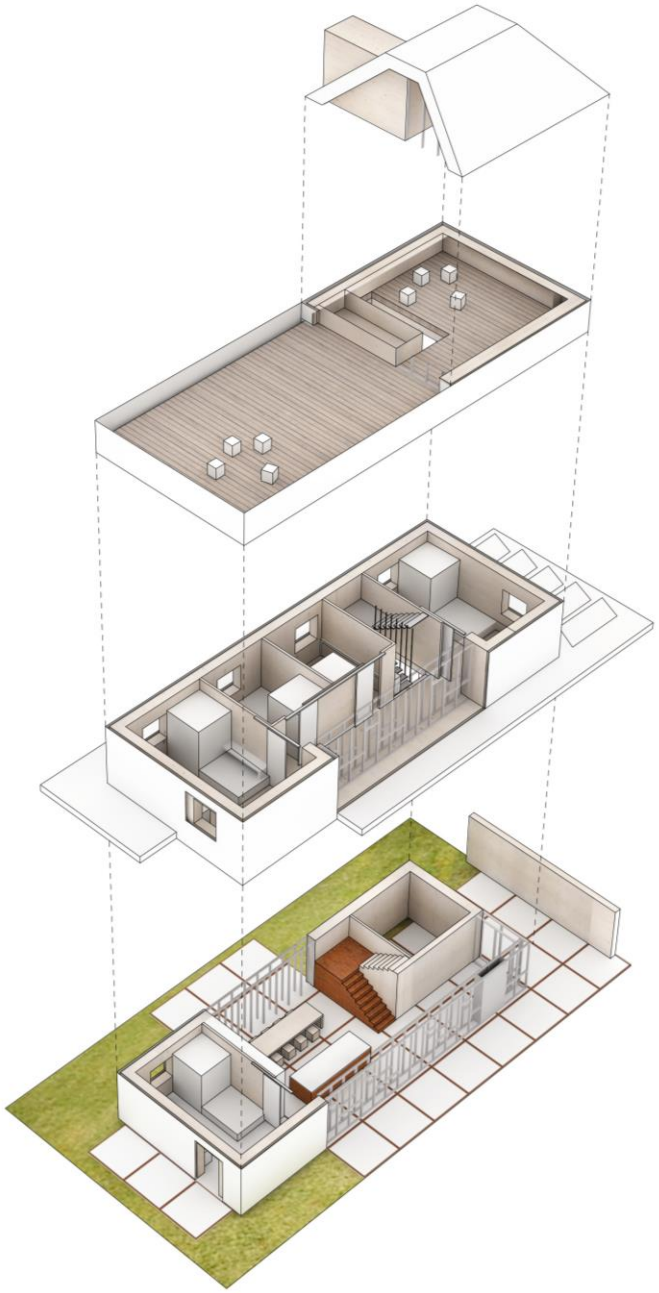
Simple maintenance

reduce Separability of components

reuse Building functions as storage for raw materials (cost efficiency,

recycle resource conservation)

Shared community



Quelle/source: cityförster

Energy concept

Highly insulated shell

Thermal bridge free construction

Central ventilation system

Thermal heatpump (earth-) air sourced

Solar thermal system

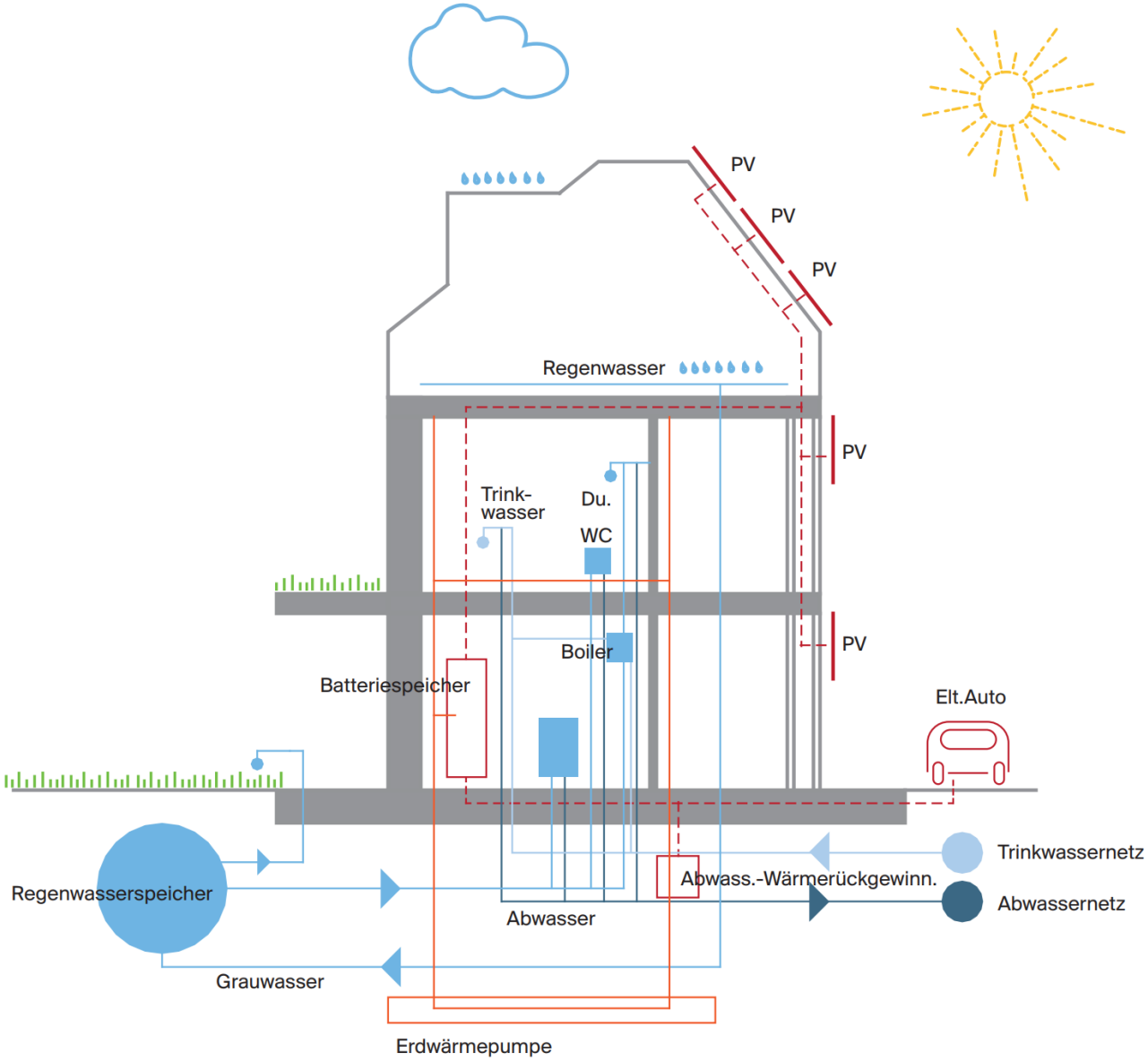
(Photovoltaic system)

(Battery)

(Charging point)

(Rainwater tank)

(Greywater-heatrecovery)

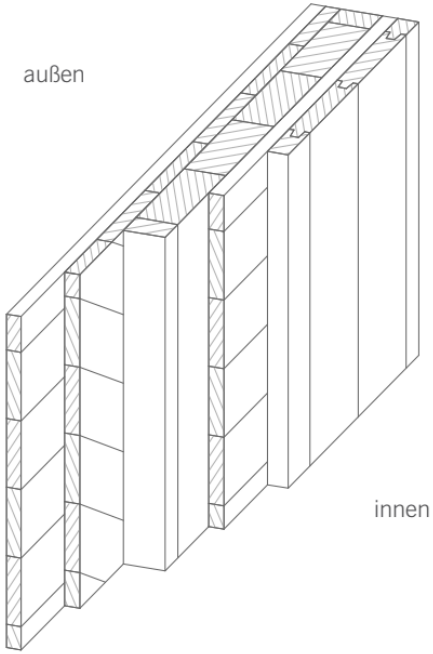


Quelle/source: cityförster

Structure

Recyclable construction

Solid timber construction, free of glue



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Quelle/source: cityförster

Structure

Recyclable construction

Elements consisting of one material are preferable, assembled in a way that allows clean separation without loss of quality when later dismantled.

Quelle/source: Gundlach/ cityförster

Foundation

Recycled building materials

Building materials are sourced from demolition projects, then granulated and recomposed into new materials.

Recycled concrete

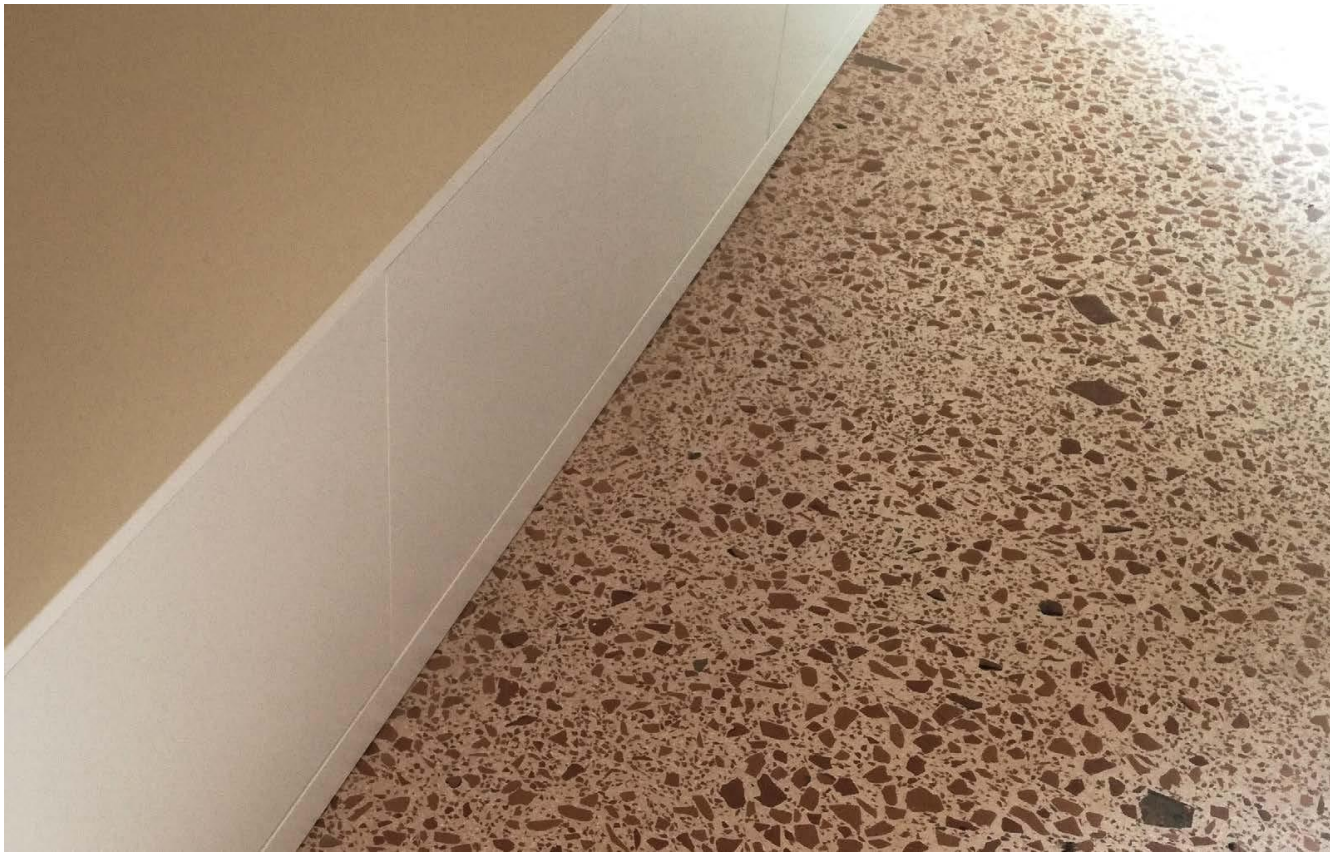
Quelle/source: cityförster

Flooring

Recycled building materials

Terrazzo
„Opus Signium“

aggregate:
crushed brick



Quelle/source: cityförster

Insulation

Recycling of other materials

Materials from other industries are being recycled to building materials.

Foam glass gravel

Quelle/source: cityförster

Insulation

Recycling of other materials

Materials from other industries are being recycled to building materials.

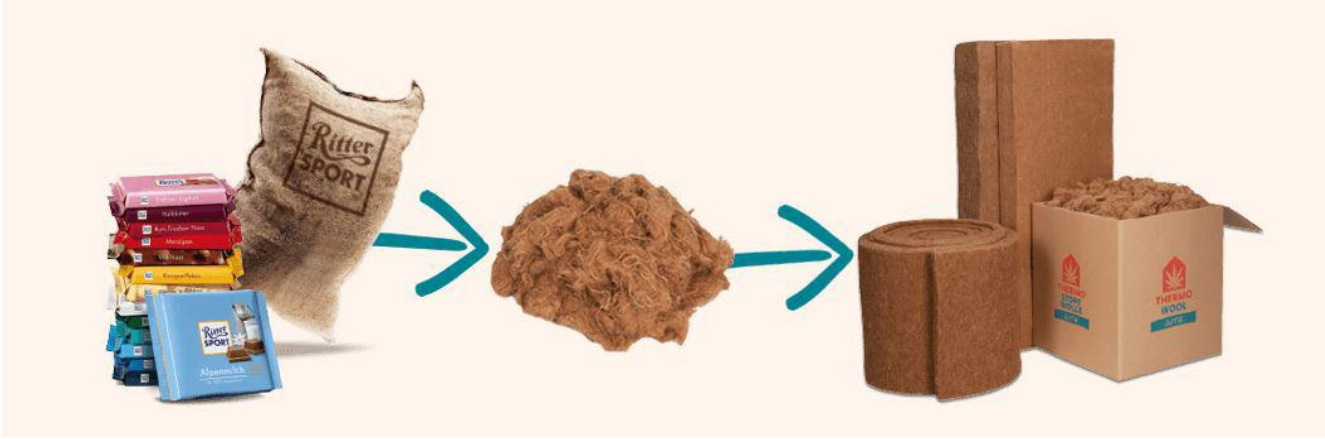
Foam glass boards

Quelle/source: cityförster

Insulation

Recycling of other materials

Materials from other industries are being recycled to building materials.



Jute insulation made of cocoabean bags

Quelle/source: cityförster/ Thermo Natur

Facade

Recycling of components

Components as a whole are being gathered from demolition or renovation projects, then edited and reinstalled.

Windows,
External blinds,
Fibre cement panels

Quelle/source: cityförster

Facade

Recycling of components

Components as a whole are being gathered from demolition or renovation projects, then edited and reinstalled.

Profiled glass

Quelle/source: cityförster

Facade

Recycling of components

Components as a whole are being gathered from demolition or renovation projects, then edited and reinstalled.

Gathering of components

Quelle/source: cityförster/ Gundlach

Interior

Recycling of components

Historical elements/ materials

Gathering of components

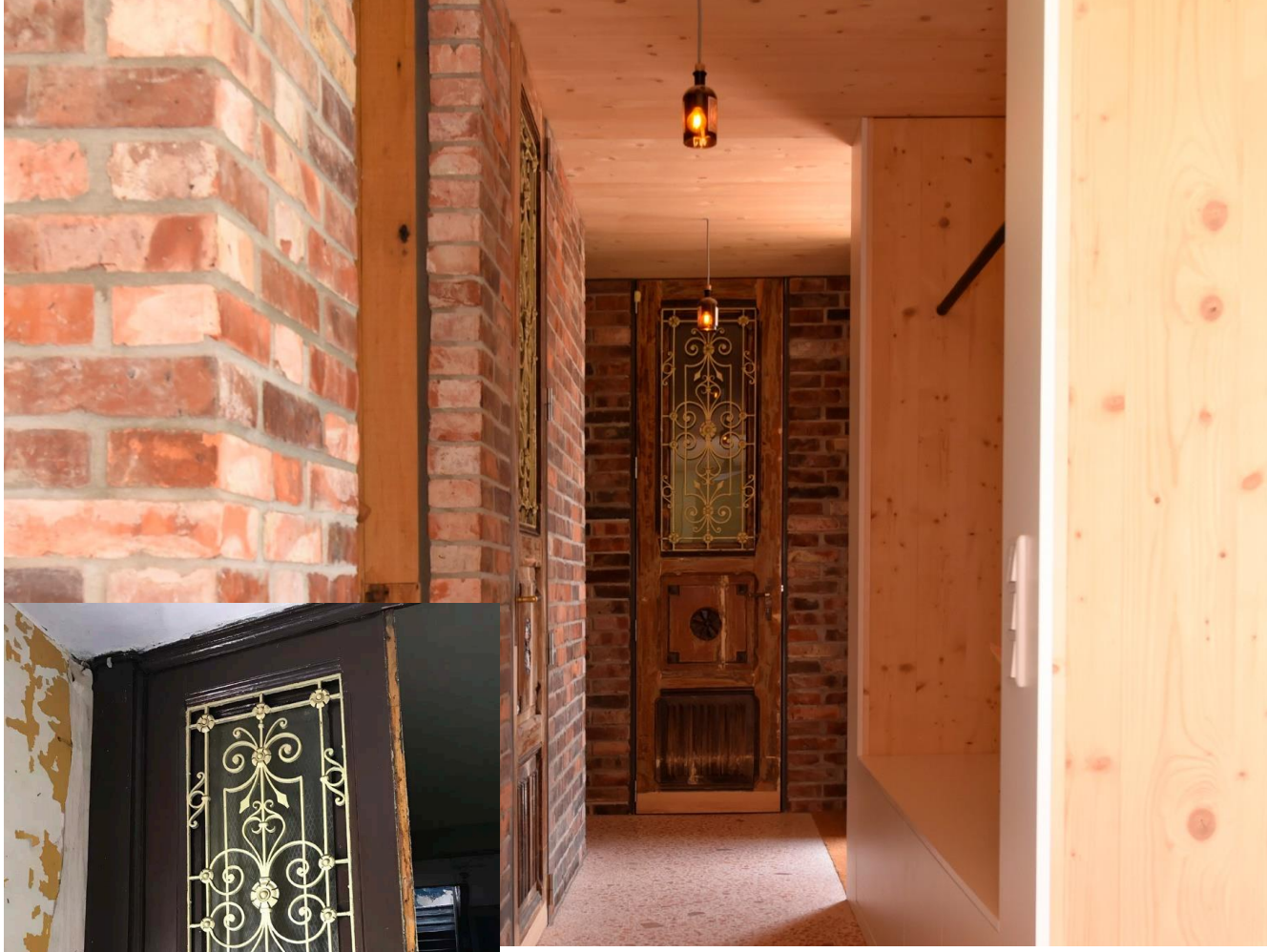
Quelle/source: cityförster

Interior

Recycling of components

Historical elements/ materials

Gathering of components



Quelle/source: cityförster/ Gundlach

Interior

Recycling of components

Historical elements/ materials

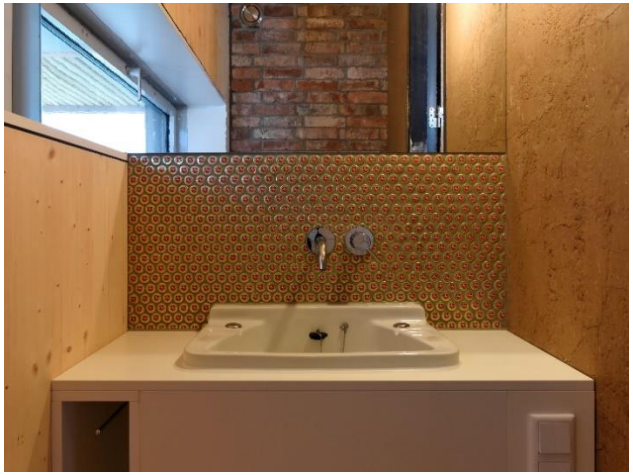
Cobblestone

Quelle/source: cityförster/ Gundlach

Interior

Recycling of components

Bathroom objects



Quelle/source: cityförster/ Gundlach

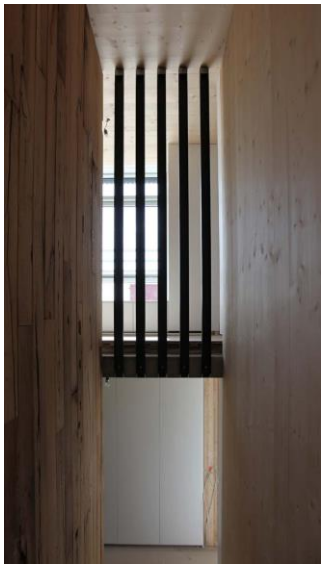
Staircase

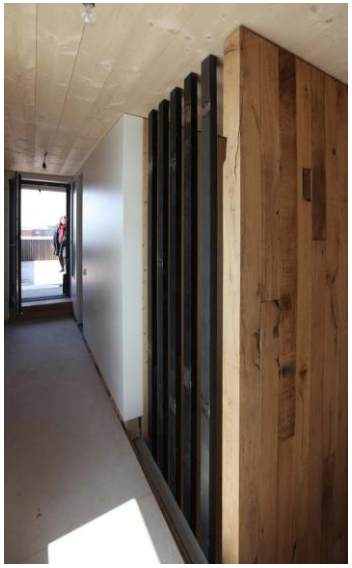
Transformation of elements

Elements with originally different purposes transform to new functions.

Steal beams (consoles) transform into steps

Guard rail made from used U-profiles





Quelle/source: cityförster/ Gundlach

Slabs

Transformation of elements

Elements with originally different purposes transform to new functions.

Flagstones transform into screed filling/ thermal mass

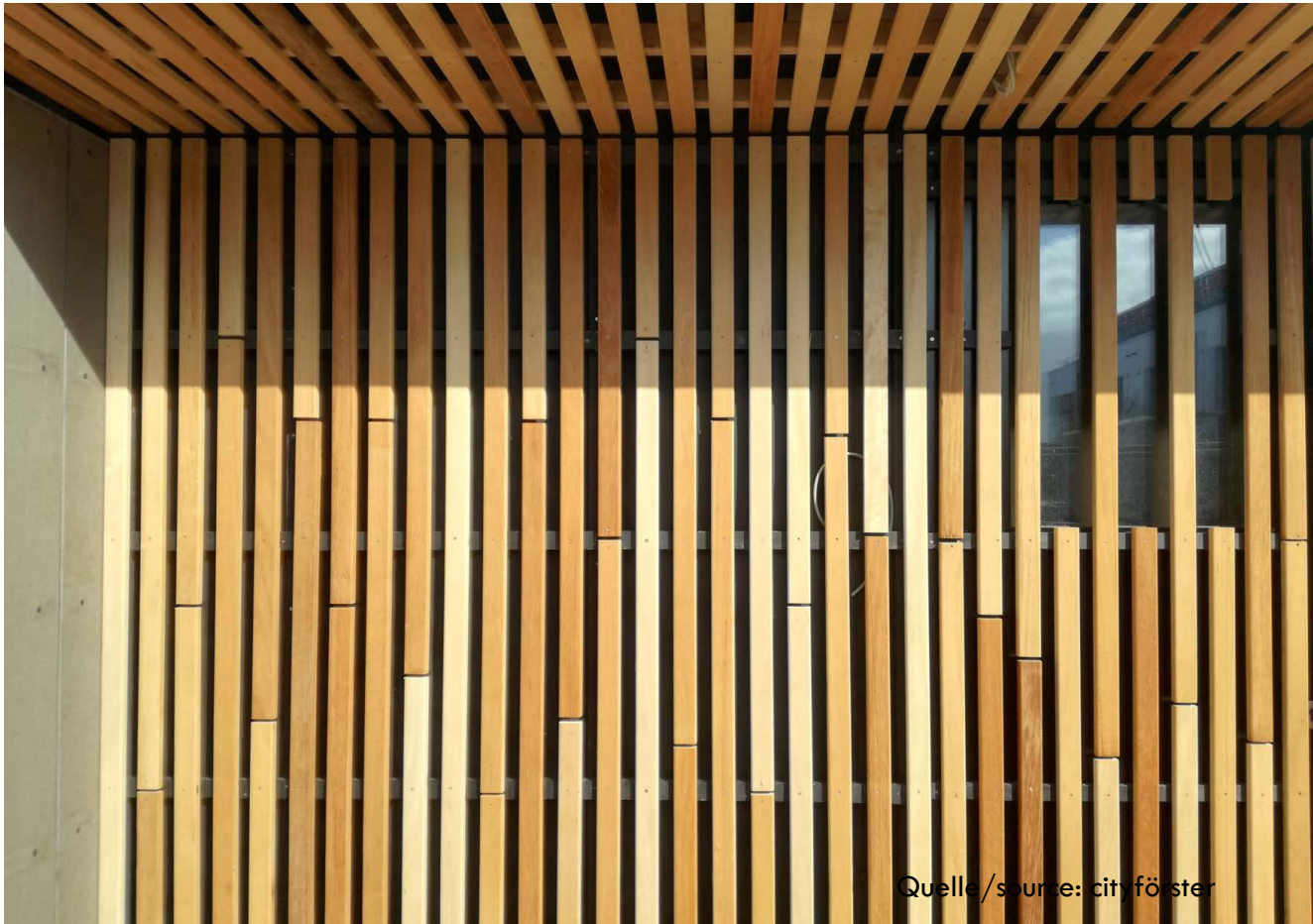
Quelle/source: cityförster/ Gundlach

Facade

Transformation of elements

Elements with originally different purposes transform to new functions.

Sauna-benches transform into external cladding



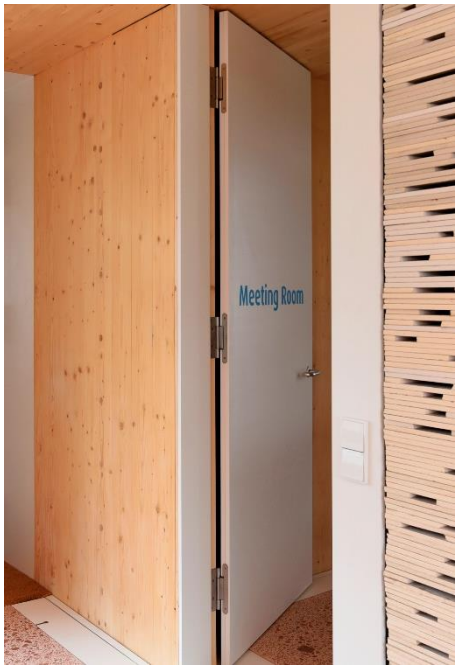
Quelle/source: cityförster

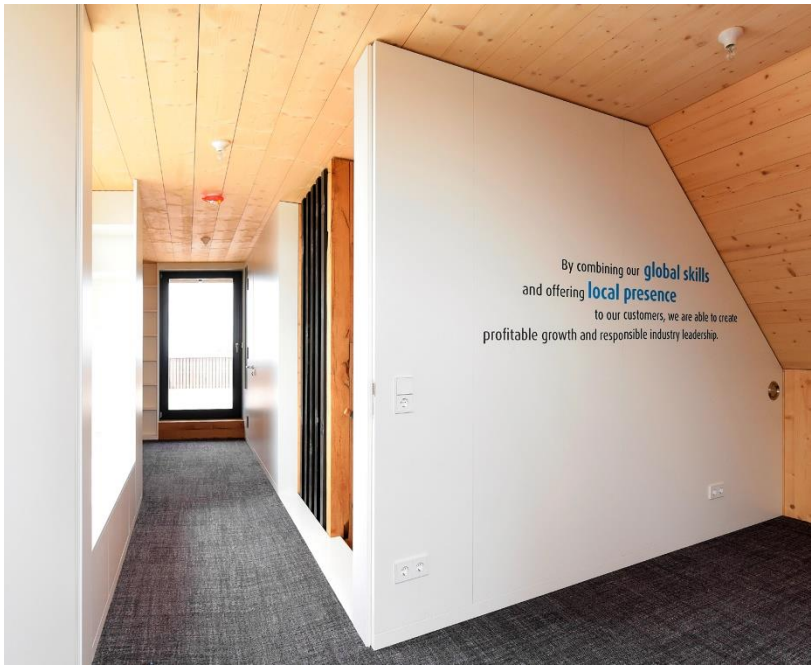
Facade

Transformation of elements

Gathering of components from trade fair stands

Exhibition boards transform into doors, window reveals, furniture and walls





Quelle/source: cityförster/ Gundlach

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Bottom line

design by availability

design for disassembly

Planning process

- complex planning, repetitions
- uncommon planning procedure
- planning upon availability of used building elements/ materials („other way around“)
- limited flexibility in planning
- strong impacts on design

Planning permission process

- requirements on general approved building materials
- applications for approval for each individual case

Building process

- disassembly - renovation - transport - storage
- delivery - collection
- questions of liability - missing manufacturer‘s liability
- calculation risks for handicraft businesses/ executive companies

→ Recycling in architecture 2019 „utopistic“??

Outlook

design by availability

design for disassembly

building functions as storage for raw materials

Urban Mining

Planning process

- knowledge of availability
- obligation of disclosure and publication on demolitions
- Database of materials, filed with specific features (parameters, technical specifications, measurements etc.)
- Planning application could include recycling concept
- Unified modular measurements

→ BIM ?!

Planning permission process

- Simplification of general approvals
- Rewards for integration of recycled materials/ products
  → Certificates on grey energy/ LCA

Building process

- Make recycling more attractive
- Raise costs for demolition and disposal
- Increase storage capacities
- Obligation to take back materials and products for manufacturers

→ Recycling for future!

REDUCE – REUSE - RECYCLE

Quelle/source: cityförster