



**haas cook zemmrich** STUDIO 2050



*High Tec + New Simplicity*

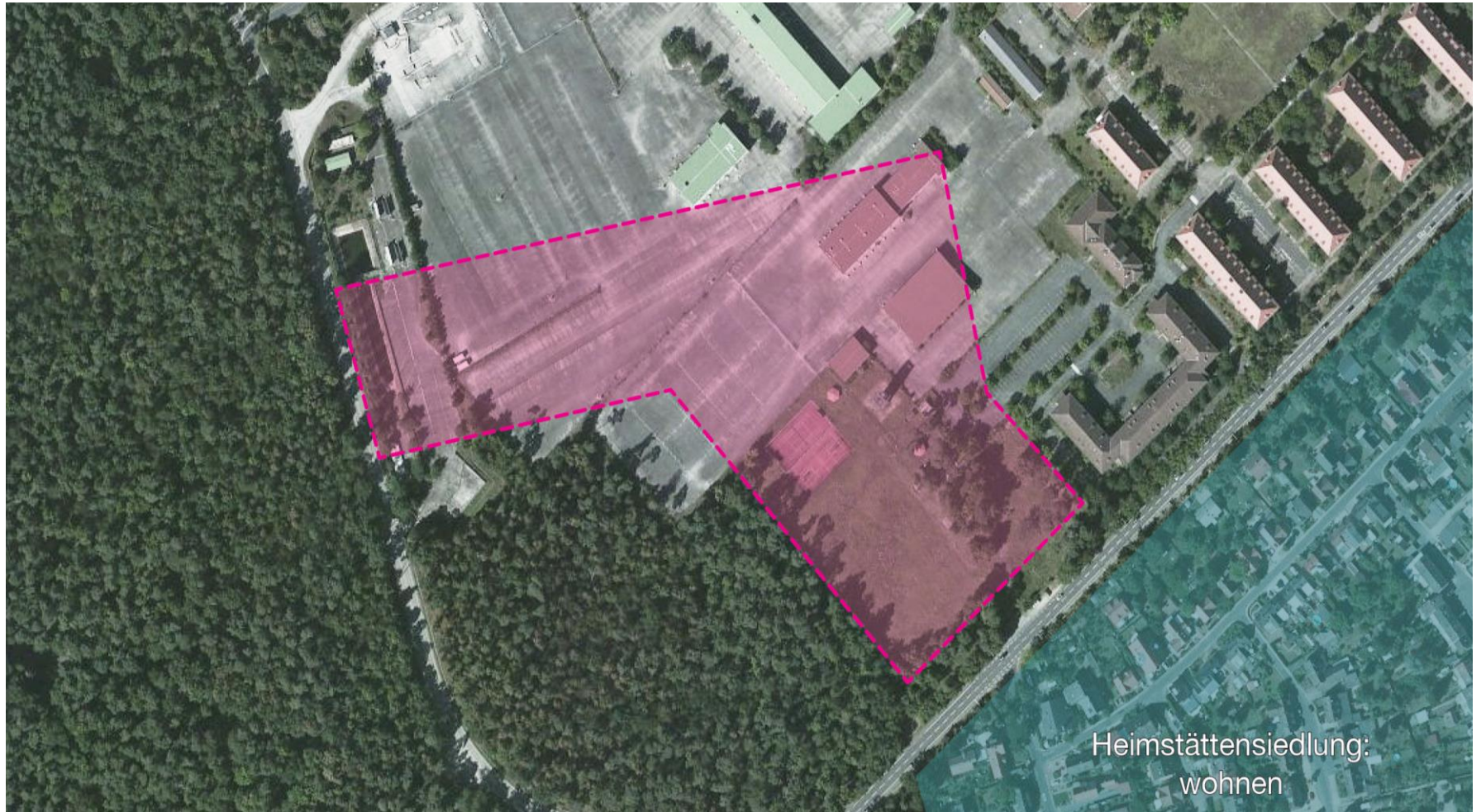




Ressource Material I Alnatura Darmstadt







# **ALNATURA CAMPUS DARMSTADT**

Criteria

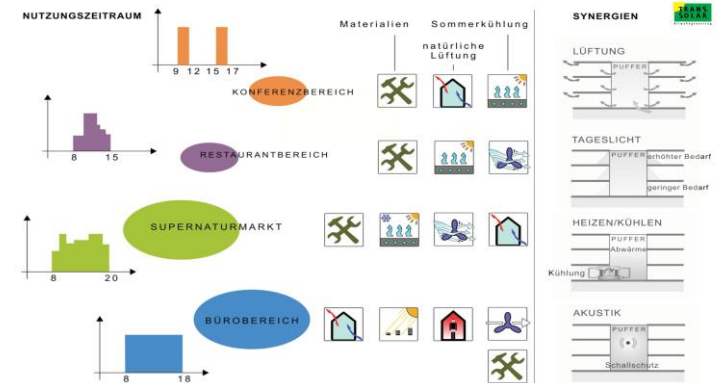
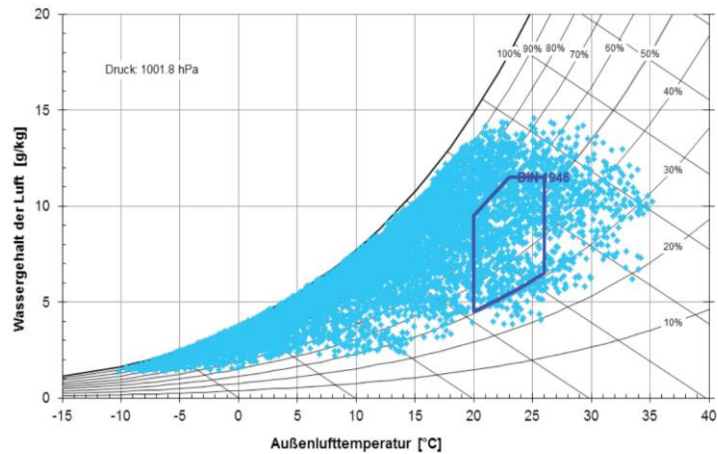
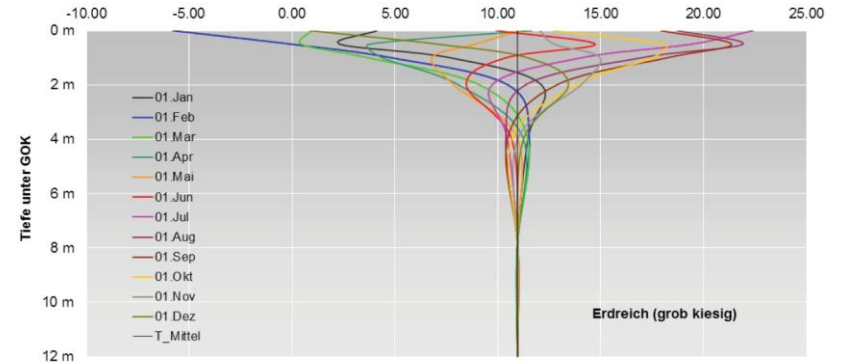
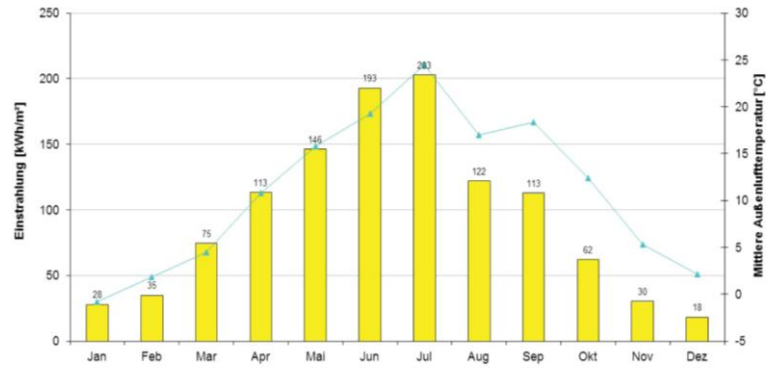
**OPTIMIZED USE OF THE MICROCLIMATE**

**CHOICE OF MATERIALS THROUGH PROCESS OF LIFE-CYCLE ANALYSIS**

**OPTIMISED BUILDING ENVELOPE RESULTING IN REDUCED CONSUMPTION OF MATERIALS**

**EMPLOYMENT OF NATURAL UND RENEWABLE BUILDING MATERIALS**

TRY12X 2010 Mannheim





## SUN

Building Orientation  
Organisation of Rooms  
Photovoltaic Array

## AIR

Exploiting the Westwald  
Earth Channel

## WATER

Rainwater Recycling  
Lake contributing to  
beneficial Microclimate

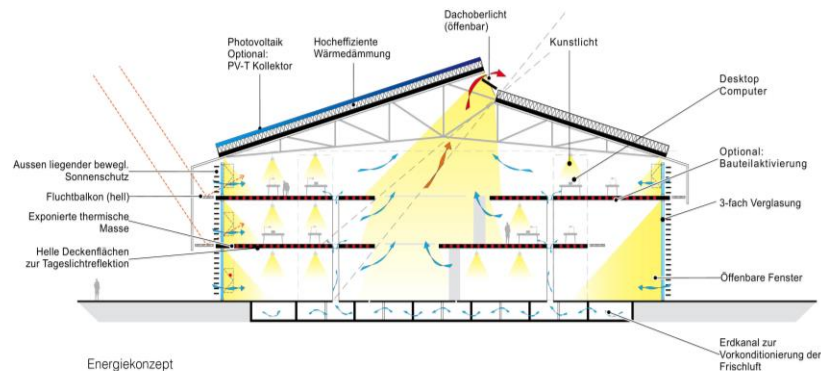
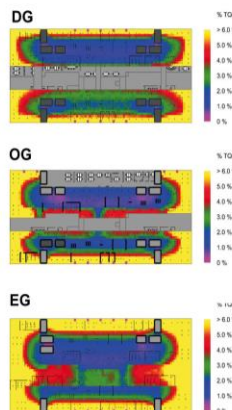


## HEAT

Geothermal System  
Heating integrated into  
Rammed Earth Walls

## EARTH

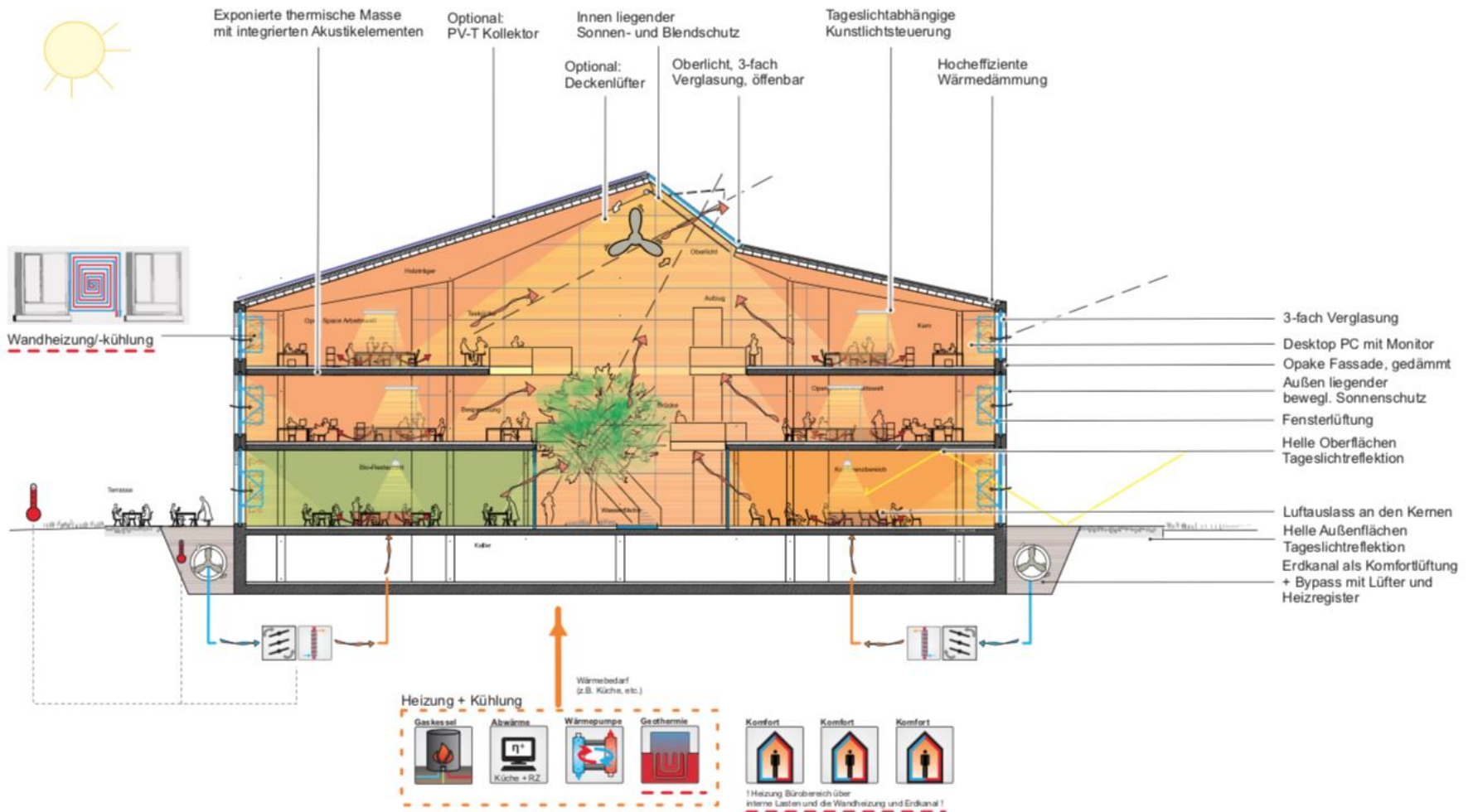
Rammed Earth  
Construction from locally  
sourced materials



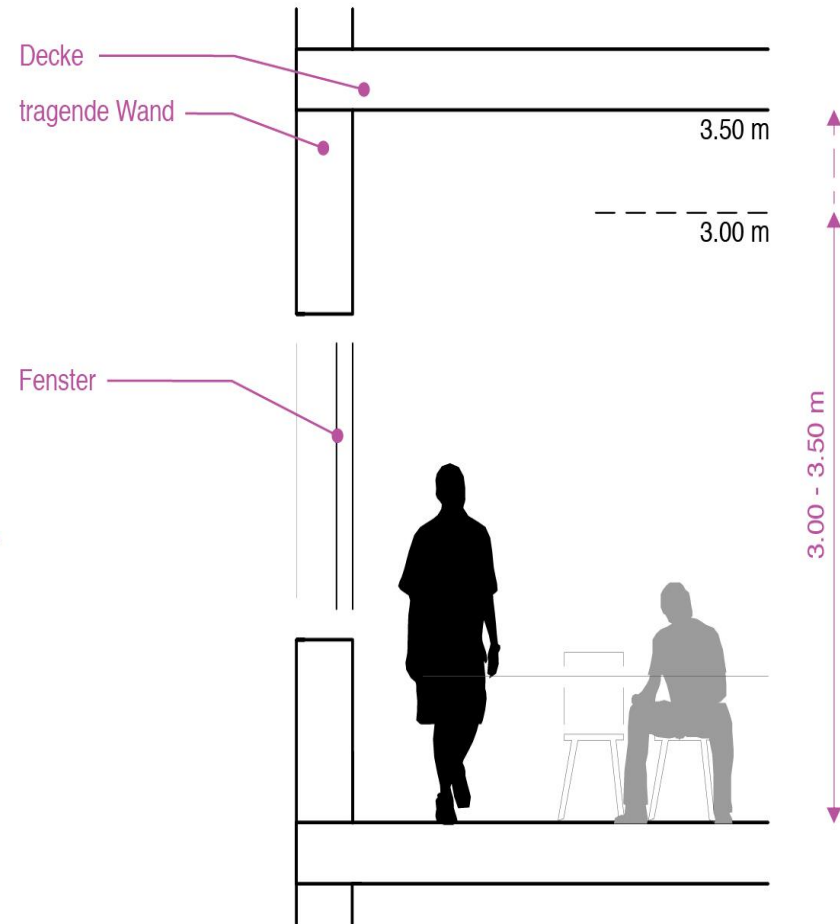
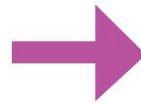
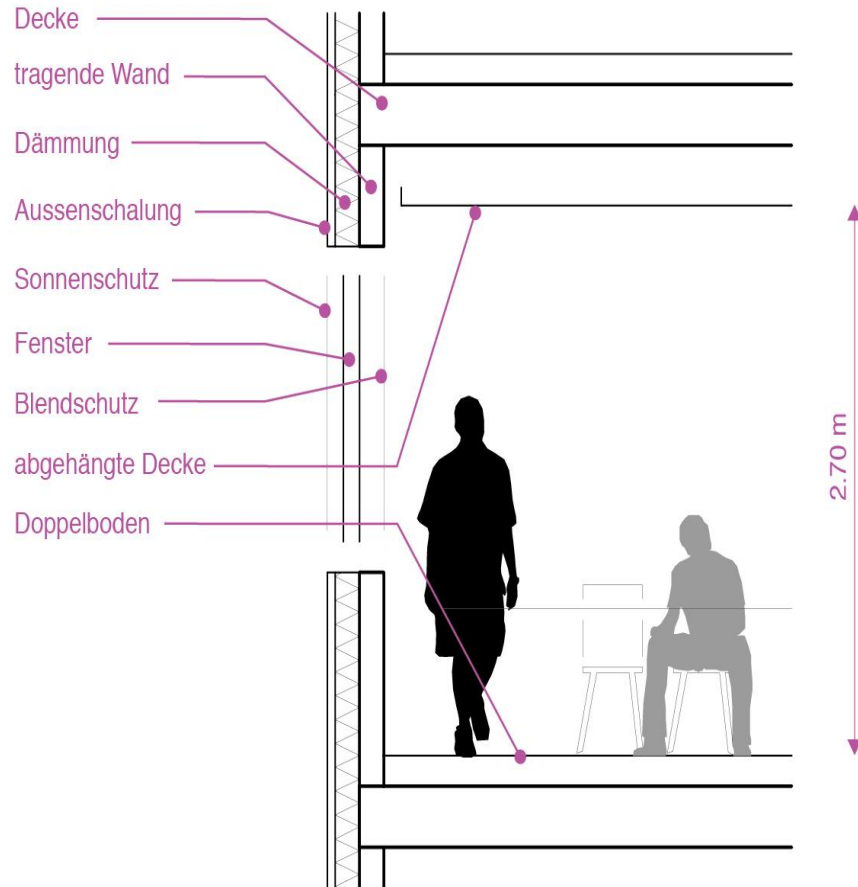
## MATERIALS

Reuse of redundant  
building materials from  
vacant Barracks

# Energiekonzept







## Passivhaus

u-Wert Wand < 0.15 W/(m²K)

### Materialien:

#### Ziegel (Poroton)

Dichte: 650 kg/m³  
Wärmekapazität: 0.95 kJ/kgK  
Wärmeleitfähigkeit: 0.12 W/mK



erforderliche Dicke (Passivhaus) = **0.9 m**  
erforderliche Dicke (ENEV) = **0.5 m**

#### Gasbeton

Dichte: 400 kg/m³  
Wärmekapazität: 1 kJ/kgK  
Wärmeleitfähigkeit: 0.11 W/mK



erforderliche Dicke (Passivhaus) = **0.85 m**  
erforderliche Dicke (ENEV) = **0.45 m**

#### Leichtbeton

Dichte: 1000 kg/m³  
Wärmekapazität: 1 kJ/kgK  
Wärmeleitfähigkeit: 0.30 W/mK



erforderliche Dicke (Passivhaus) = **2.3 m**  
erforderliche Dicke (ENEV) = **1.2 m**

## ENEV 2014

u-Wert Wand < 0.28 W/(m²K)

#### Bims

Dichte: 400 kg/m³  
Wärmekapazität: 1 kJ/kgK  
Wärmeleitfähigkeit: 0.15 W/mK



erforderliche Dicke (Passivhaus) = **1.15 m**  
erforderliche Dicke (ENEV) = **0.6 m**

#### Leichtlehm

Dichte: 600 kg/m³  
Wärmekapazität: 1 kJ/kgK  
Wärmeleitfähigkeit: 0.17 W/mK



erforderliche Dicke (Passivhaus) = **1.3 m**  
erforderliche Dicke (ENEV) = **0.7 m**

#### Holz

Dichte: 500 kg/m³  
Wärmekapazität: 1.6 kJ/kgK  
Wärmeleitfähigkeit: 0.13 W/mK



erforderliche Dicke (Passivhaus) = **1.0 m**  
erforderliche Dicke (ENEV) = **0.55 m**

## PCR phases according to EN 15804:2012

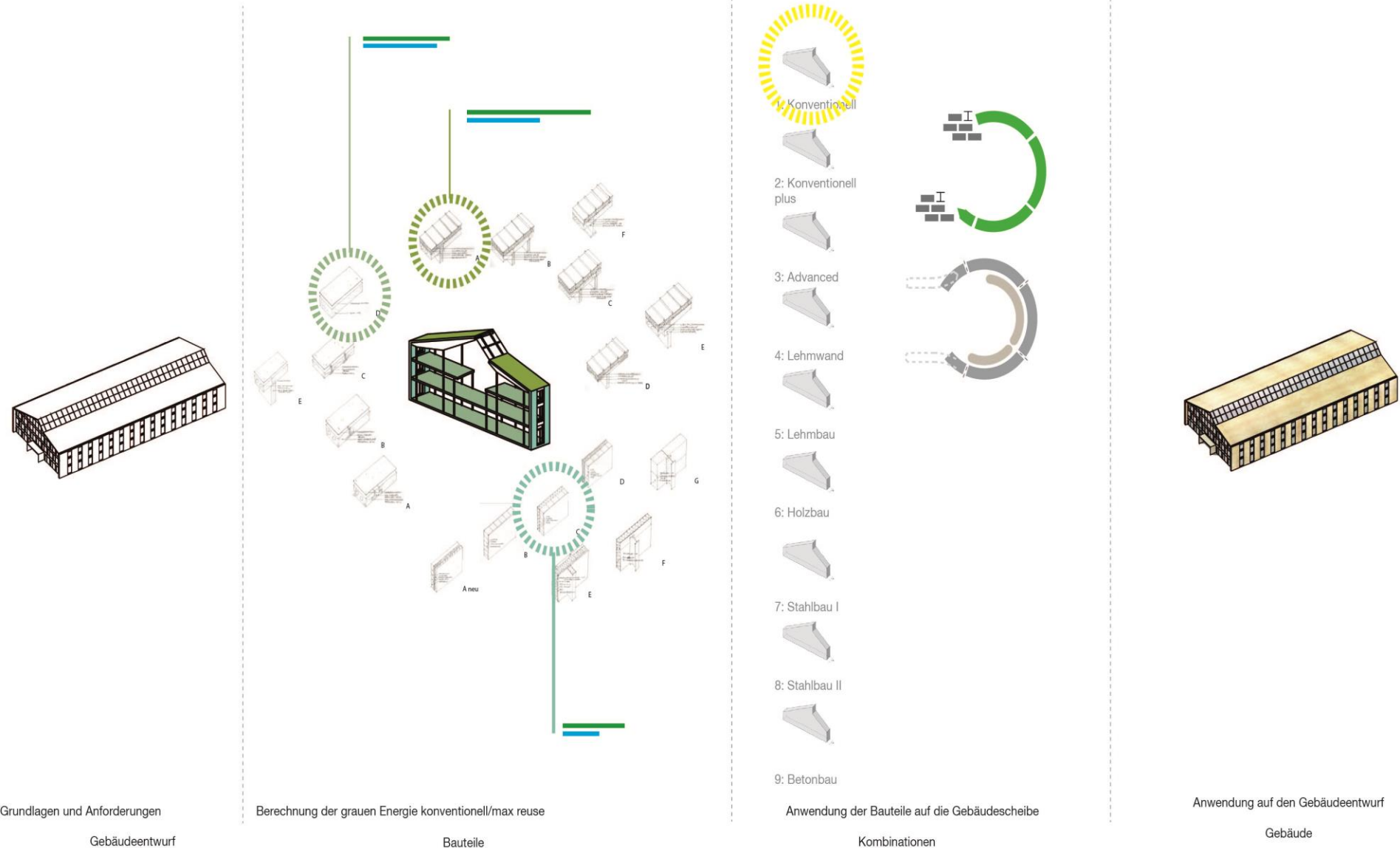
|                                                |    |                                       |
|------------------------------------------------|----|---------------------------------------|
| Production stage                               | A1 | Raw material supply                   |
|                                                | A2 | Transport                             |
|                                                | A3 | Manufacturing                         |
| Construction stage                             | A4 | Transport                             |
|                                                | A5 | Construction/ installation process    |
| Usage phase                                    | B1 | Use                                   |
|                                                | B2 | Maintenance including transport       |
|                                                | B3 | Repair and transport                  |
|                                                | B4 | Replacement including transport       |
|                                                | B5 | Refurbishment including transport     |
|                                                | B6 | Operational energy use                |
|                                                | B7 | Operational water use                 |
| End of life stage                              | C1 | De-construction demolition            |
|                                                | C2 | Transport                             |
|                                                | C3 | Re-use recycling                      |
|                                                | C4 | Final disposal                        |
| Benefits and loads for the next product system | D  | Re-use recovery and recycling potenti |

ANALYSE

MODELLIERUNG

EVALUIERUNG

DURCHFÜHRUNG





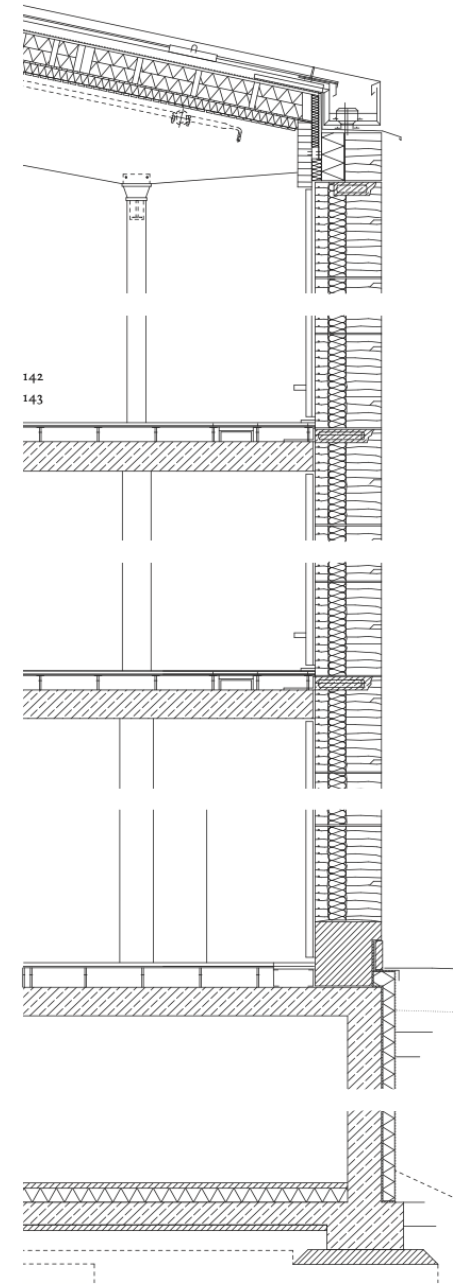
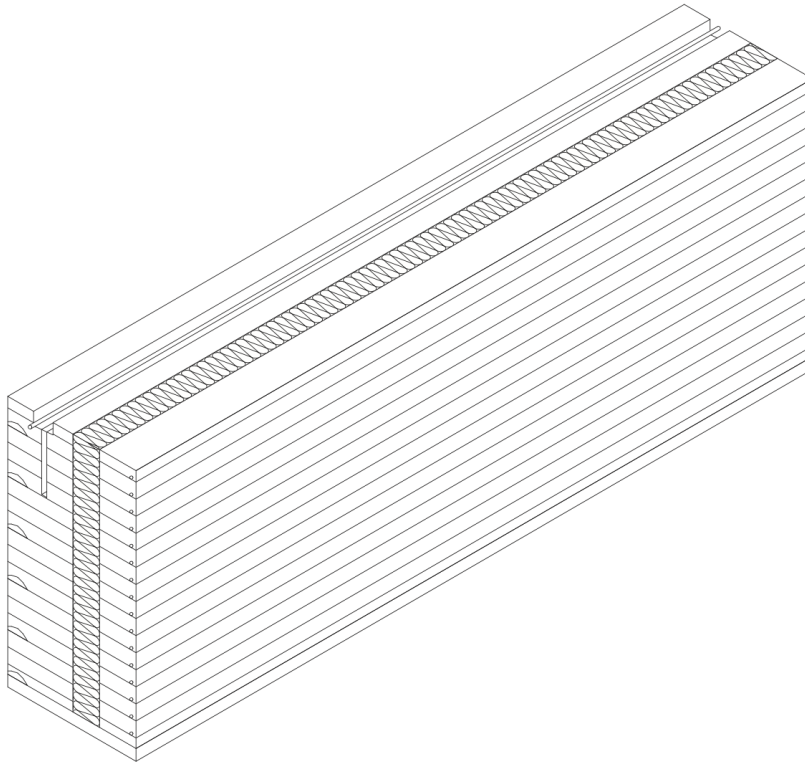






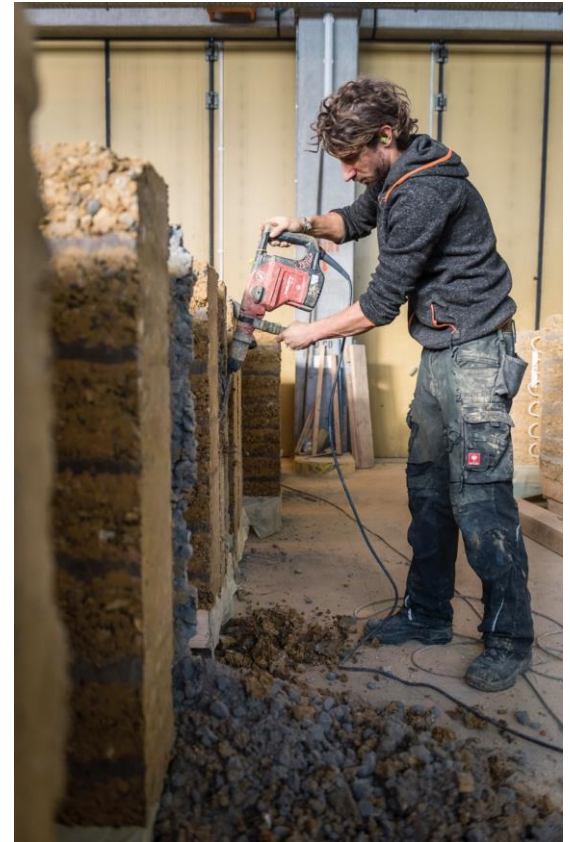
















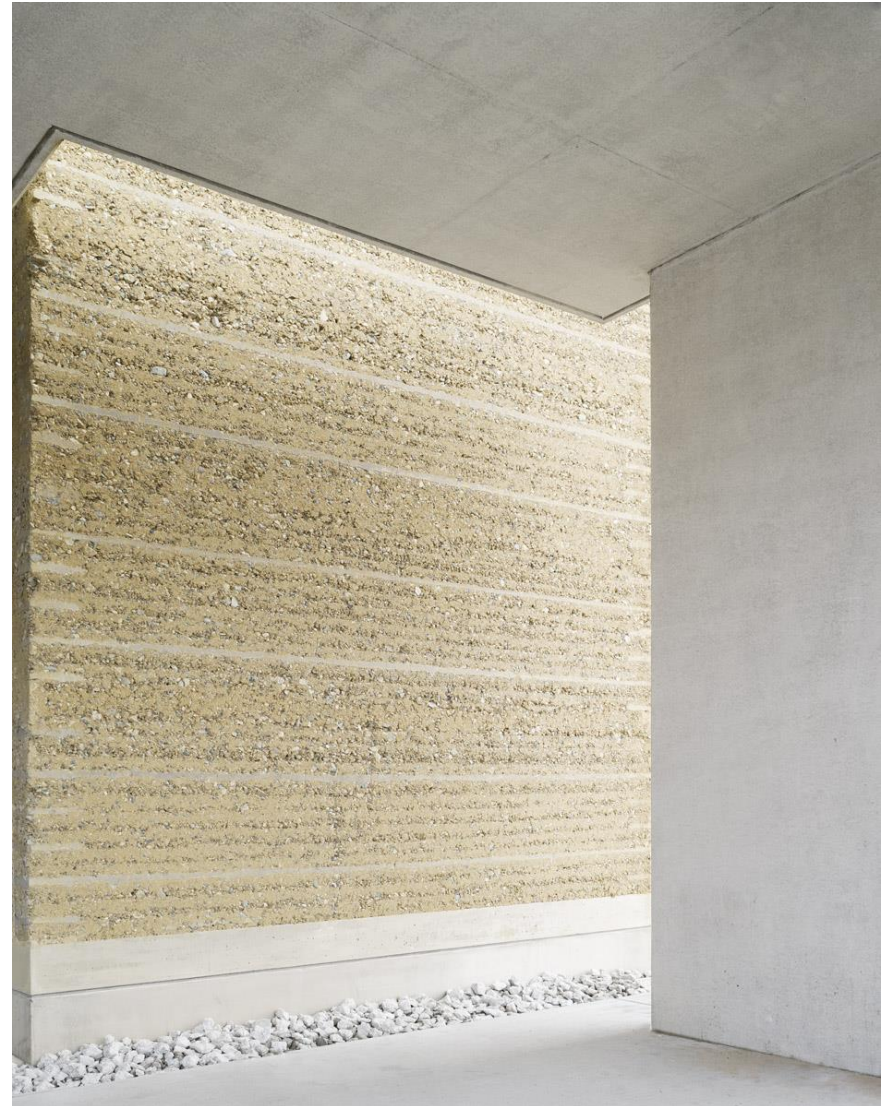








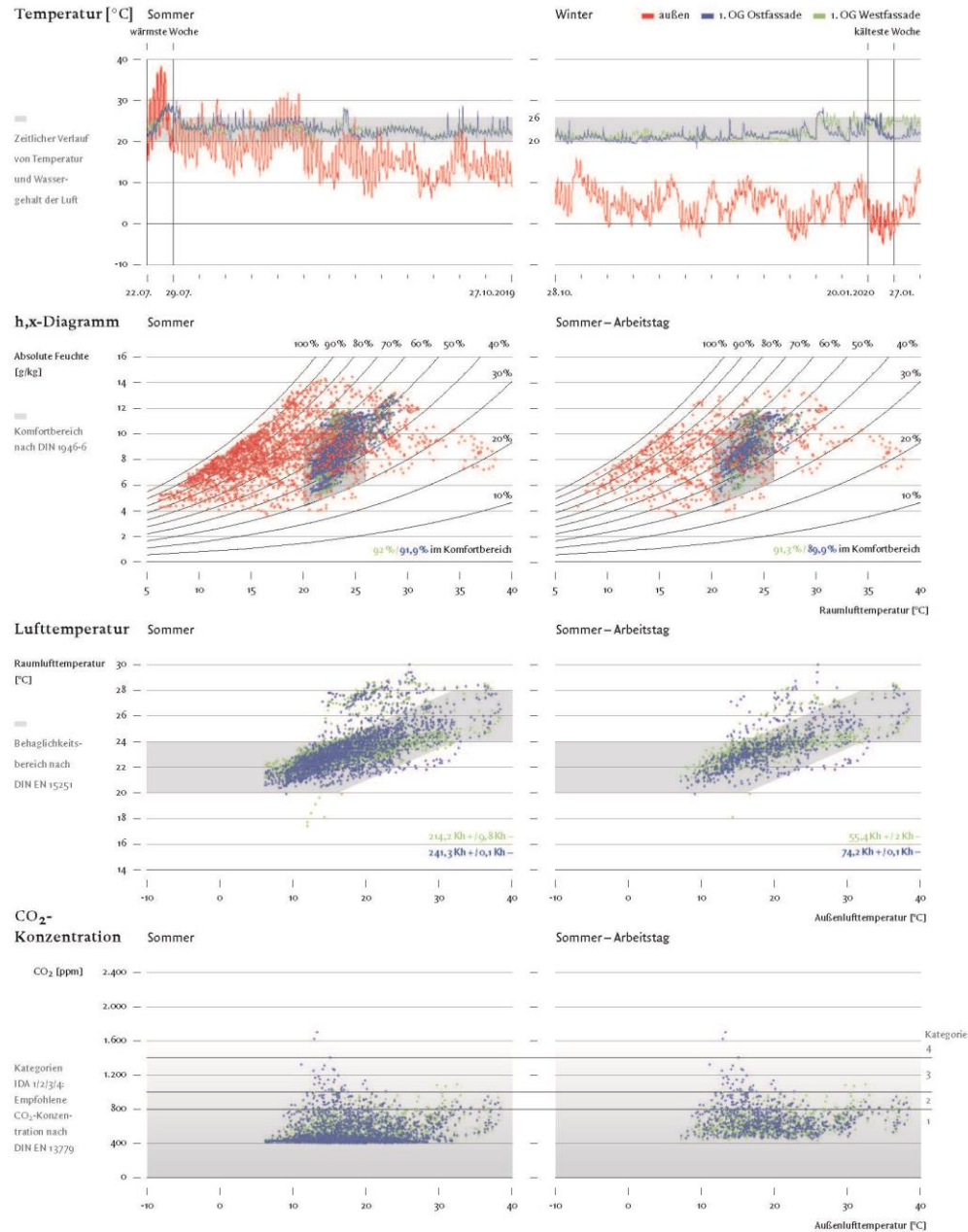


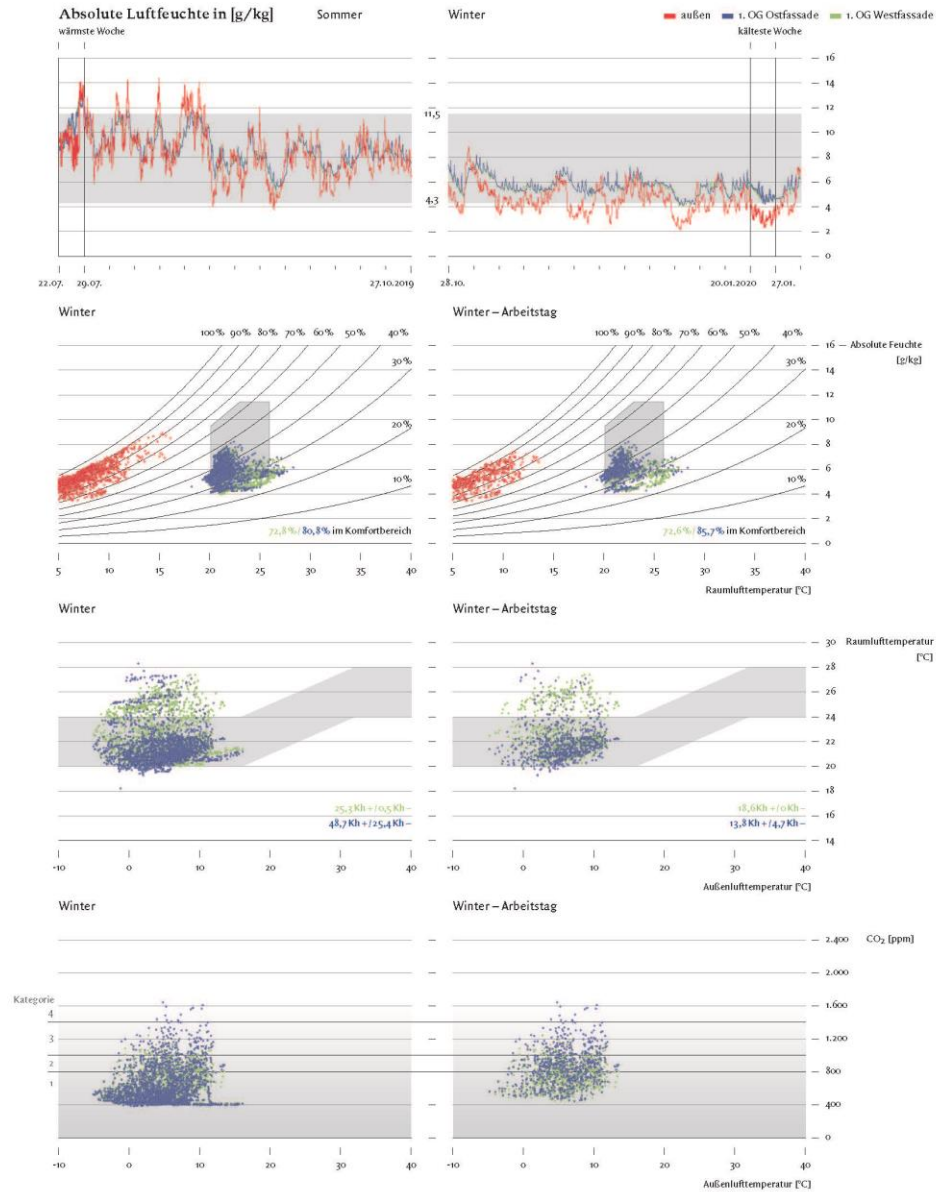




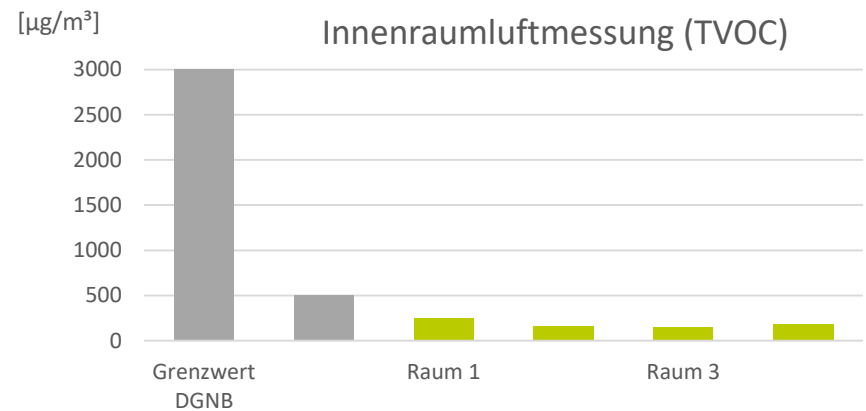






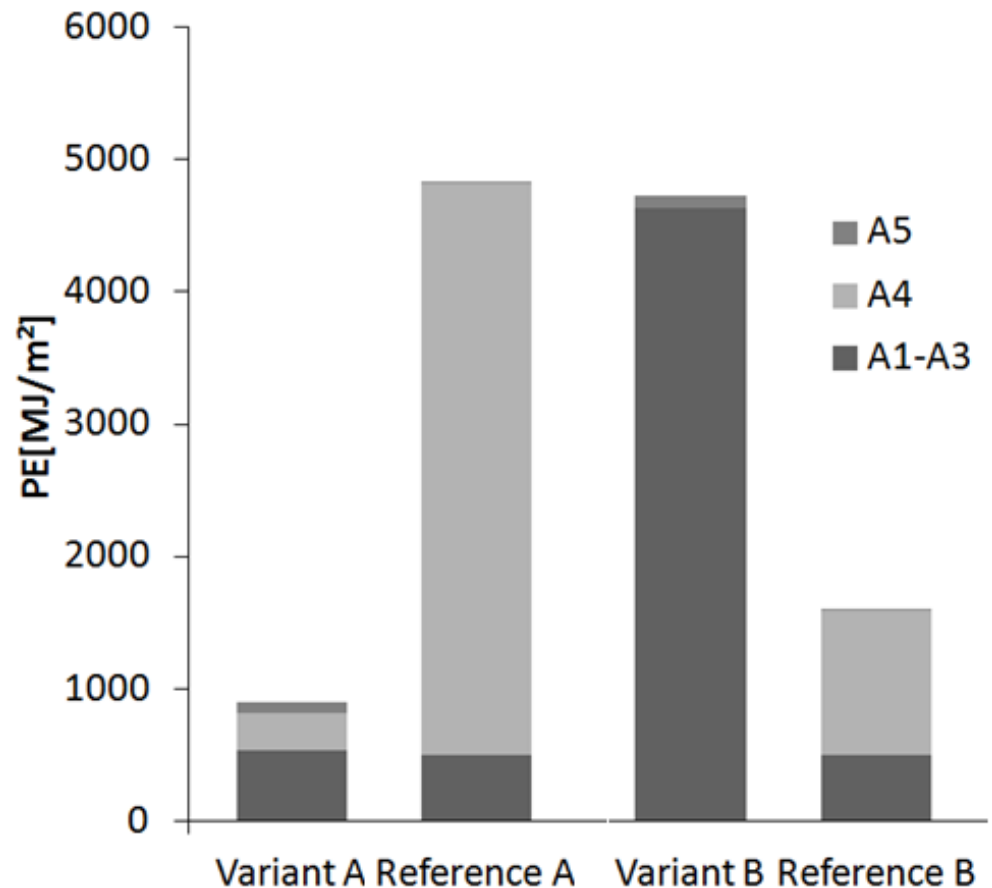




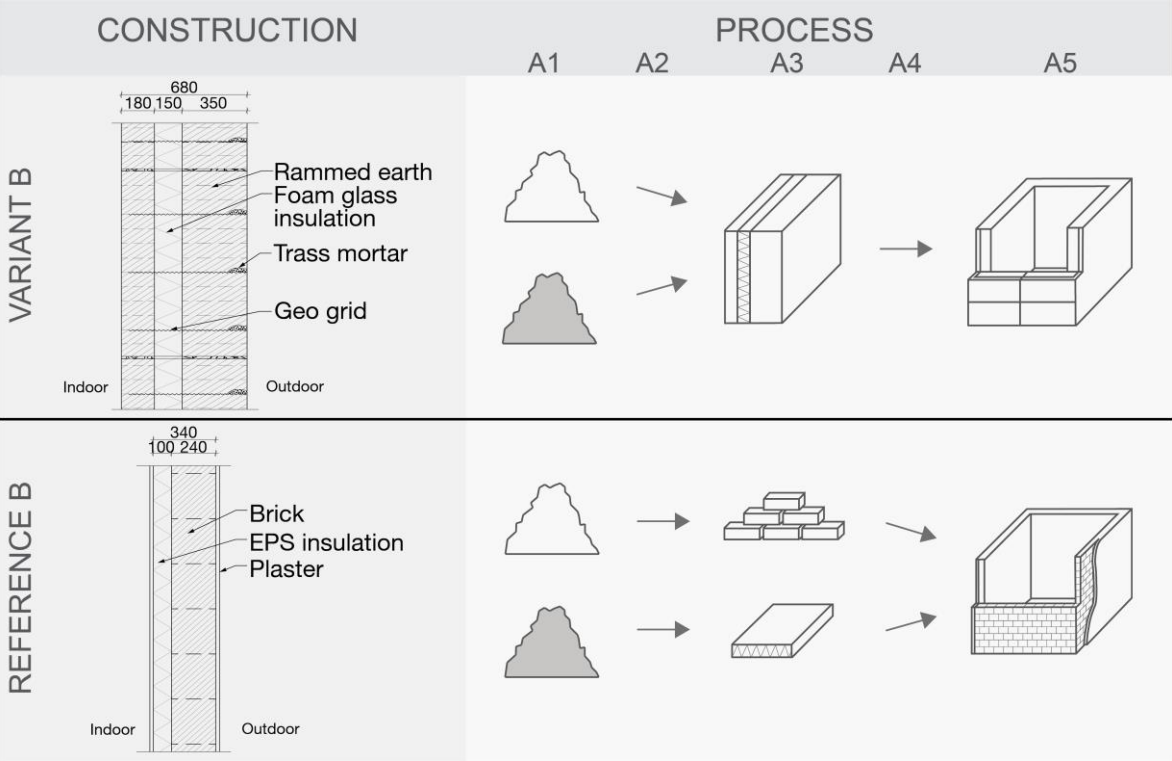


Quelle: ee concept GmbH

- Die Nutzung eines lokalen Materials reduziert den Energieaufwand für den Bau einer Stampflehmwand um bis zu 80 %.
- Transport hat einen signifikanten Einfluss auf das Gesamtergebnis.













**Deutscher  
Nachhaltigkeitspreis 2020**

**SIEGER  
Architektur**