

# Lehrstuhl für Gebäudetechnologie und klimagerechtes Bauen

Prof. Dipl.-Ing. Thomas Auer

11. November 2016

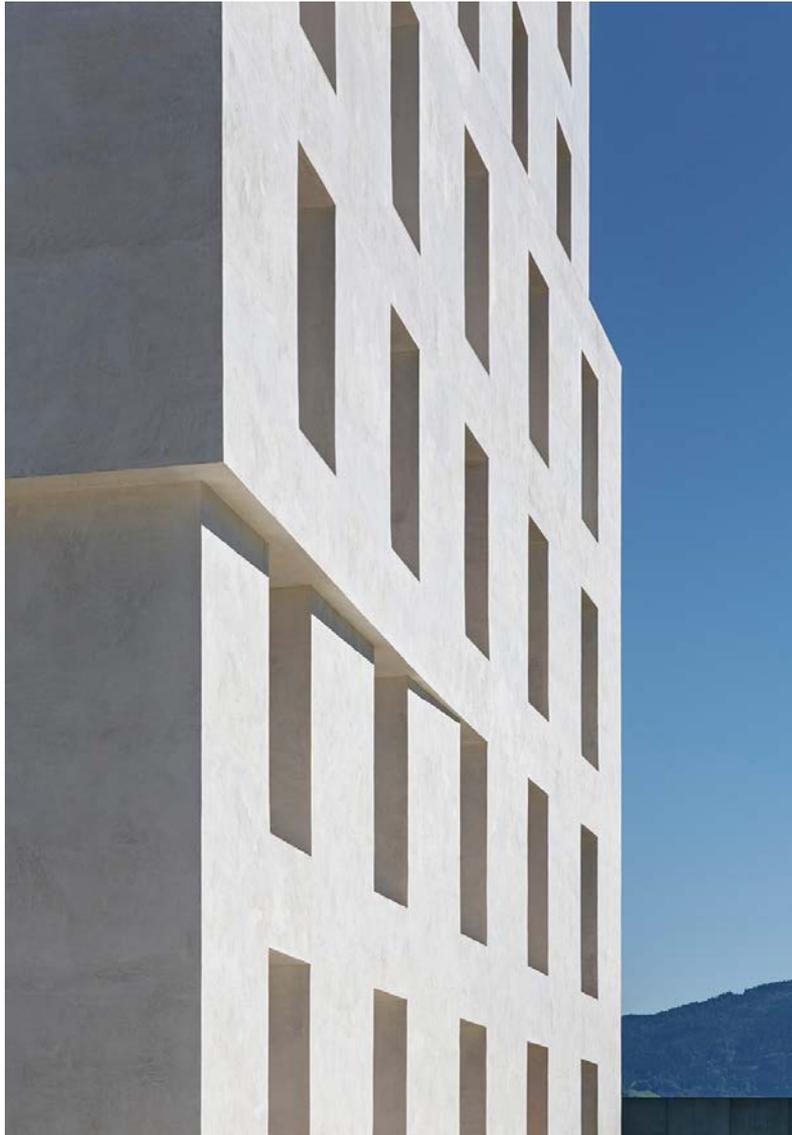
„CLUSTER ENERGIE | INNOVATION-BAUEN“  
IM HAUSE DER BAYERISCHEN  
LANDKREISE IN MÜNCHEN





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Einfach Bauen



# Einfach Bauen

Energieeffizient und einfach bauen mit **Holz**, **Leichtbeton** und **hochwärmedämmende Ziegel**.

Analyse der Interaktion von **Raum**, **Konstruktion** und **Gebäudetechnik** mit Rücksicht auf Nutzerverhalten.

# Einfach Bauen

## Projekttyp

Forschungsprojekt, Zukunft Bau

## Cooperation TUM-Lehrstühle

LS für Entwerfen und Konstruieren – (Prof. Nagler)

LS für Entwerfen und Holzbau – (Prof. Kaufmann)

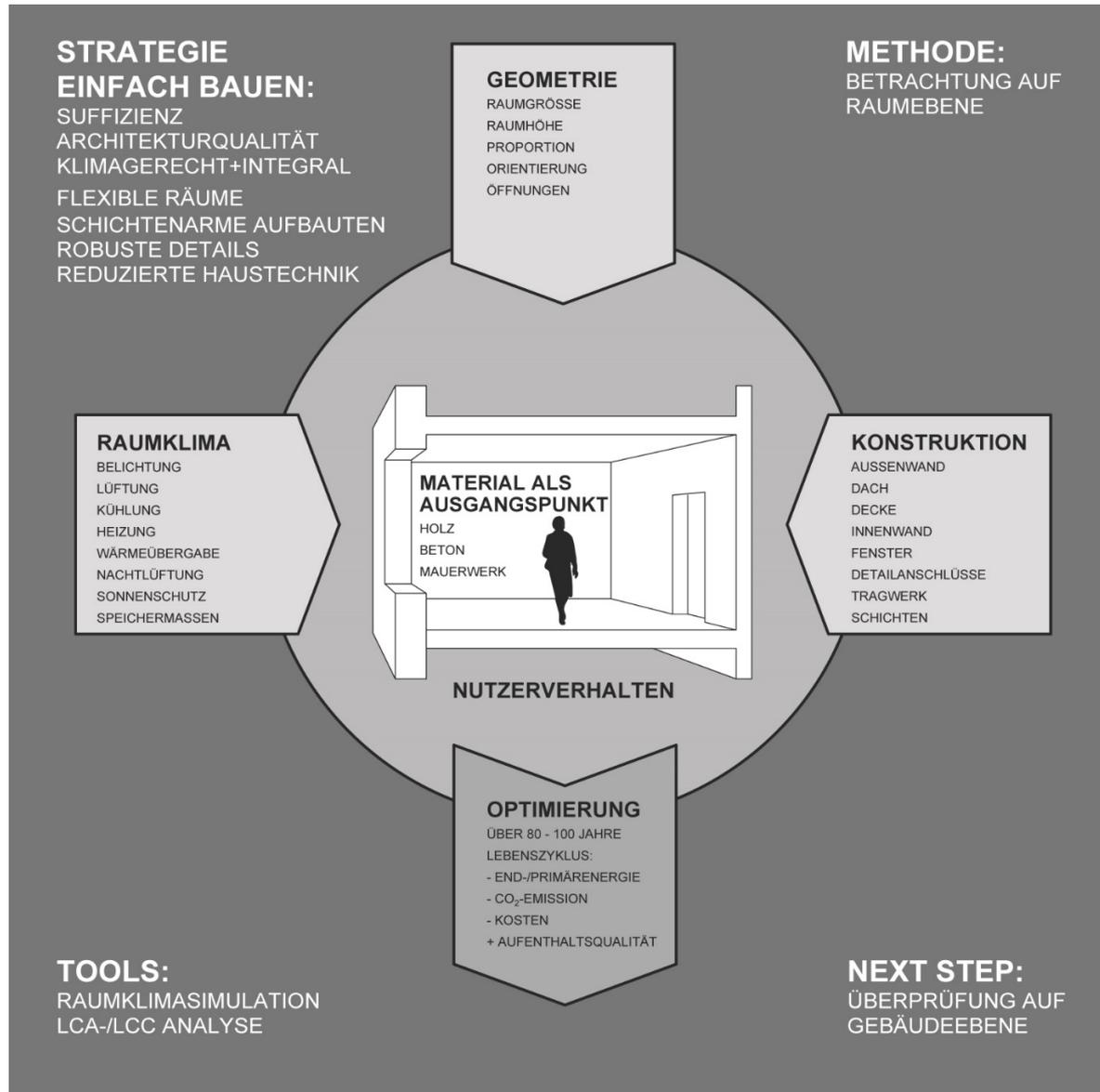
LS für Gebäudetechnologie und klimagerechtes Bauen – (Prof. Auer)

LS für Holzbau und Baukonstruktion – (Prof. Winter)

LS für Werkstoffe und Werkstoffprüfung im Bauwesen – (Prof. Gehlen)

## Zeitraum

2016 – 2018

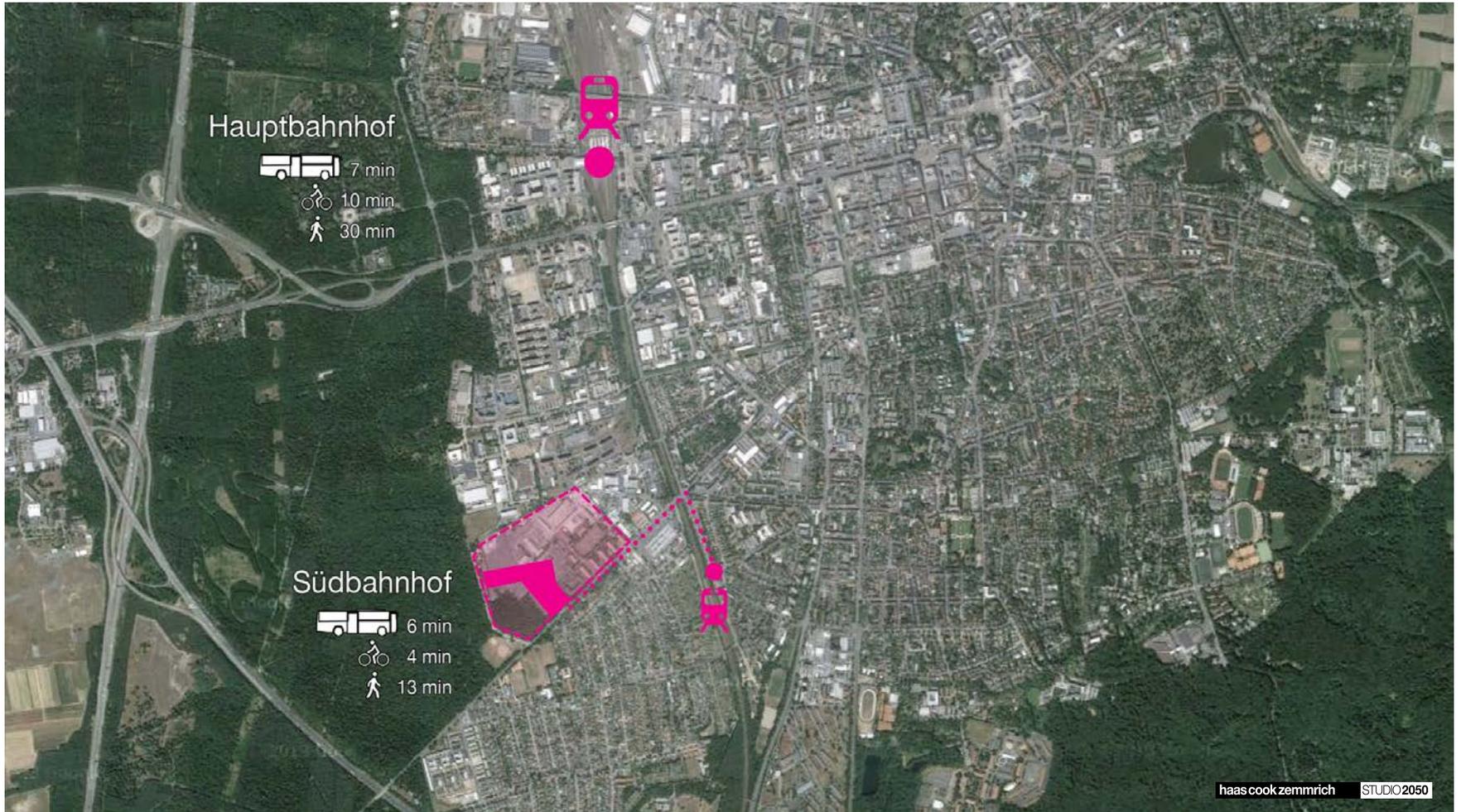




Forschungsprojekt:  
Entwicklung von Strategien zur Implementierung des grauen Energieaufwands  
in den iterativen integrierten Entwurfsprozess von Gebäuden

haas cook zemrich STUDIO2050

„Alnatura-Welt“, Darmstadt

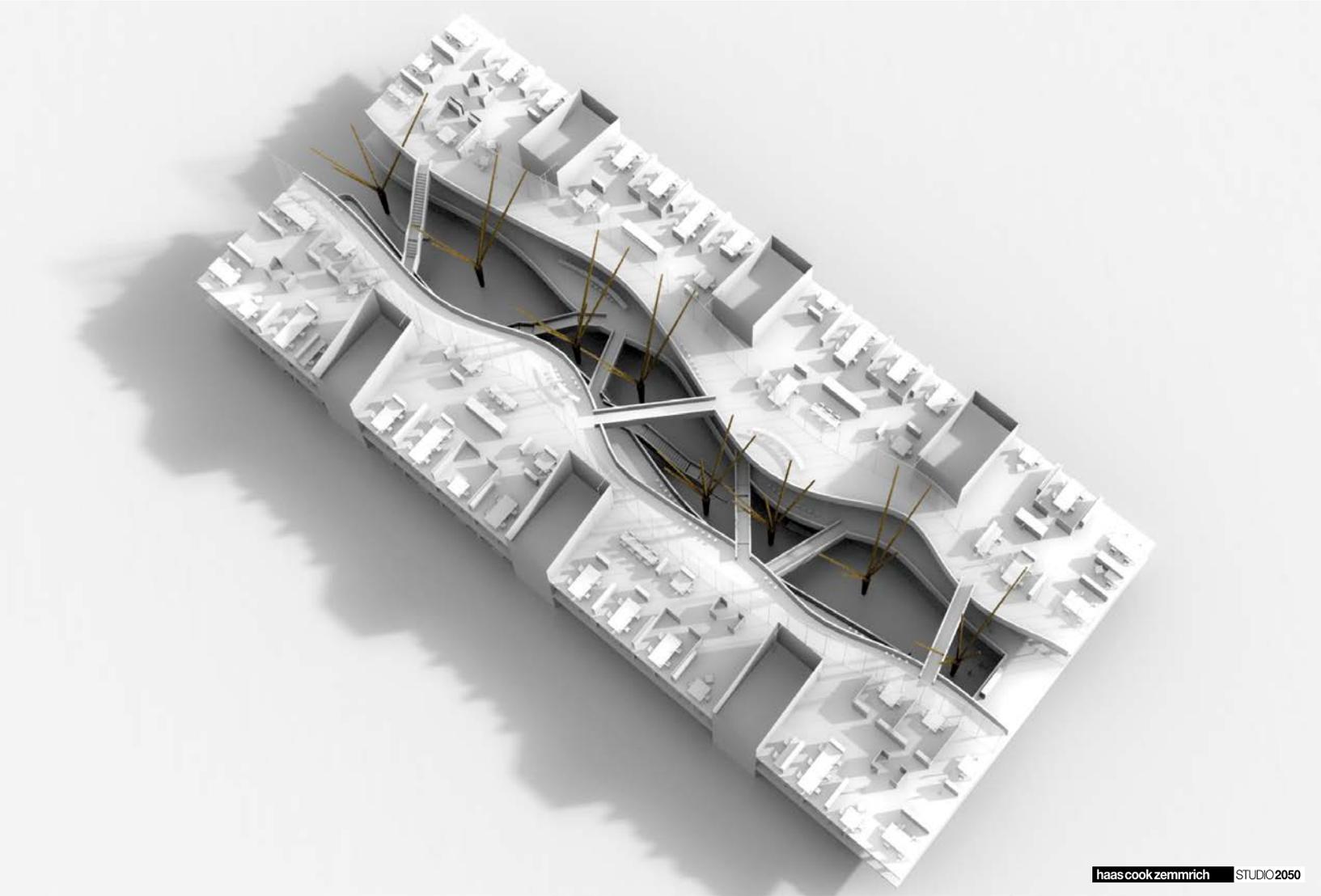




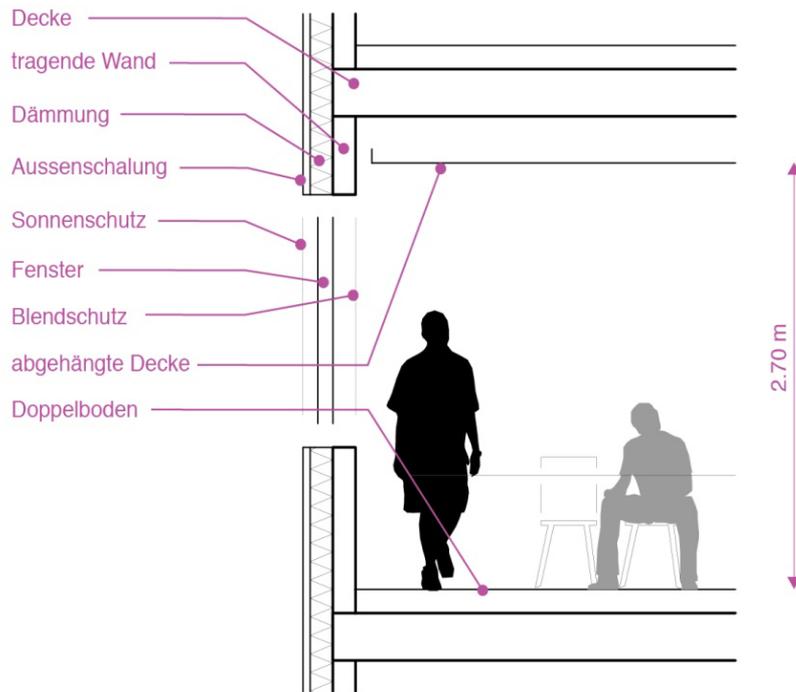
haas cook zemrich STUDIO2050

High Tech + Neue Einfachheit

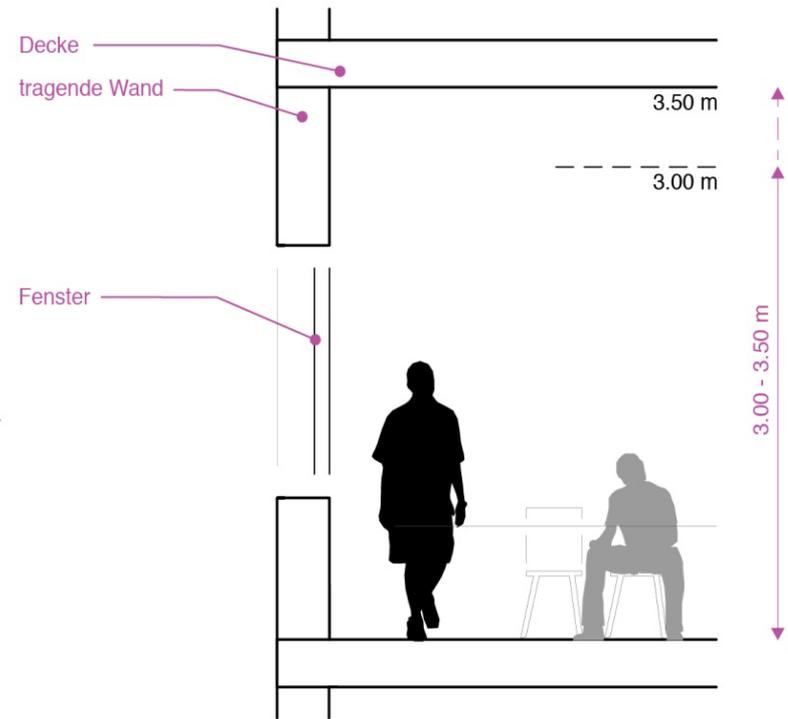




## herkömmliche, mehrschichtige Wandkonstruktion



## vereinfachte, einschichtige Wandkonstruktion

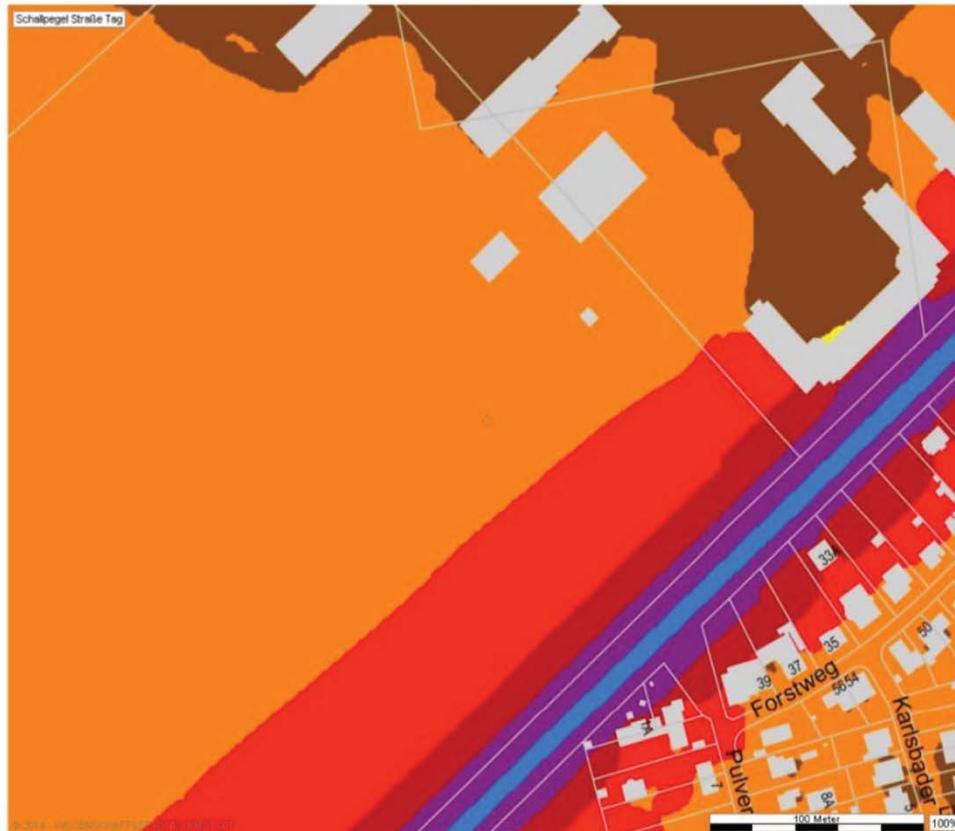


- **MAPPING & KLIMADATEN**

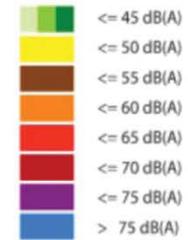
CityGuide DMS

17.1.2014

## Lärmkartierung 2011 - Fassadenpegel und Schallausbreitung nach RLS 90



### Schallpegel



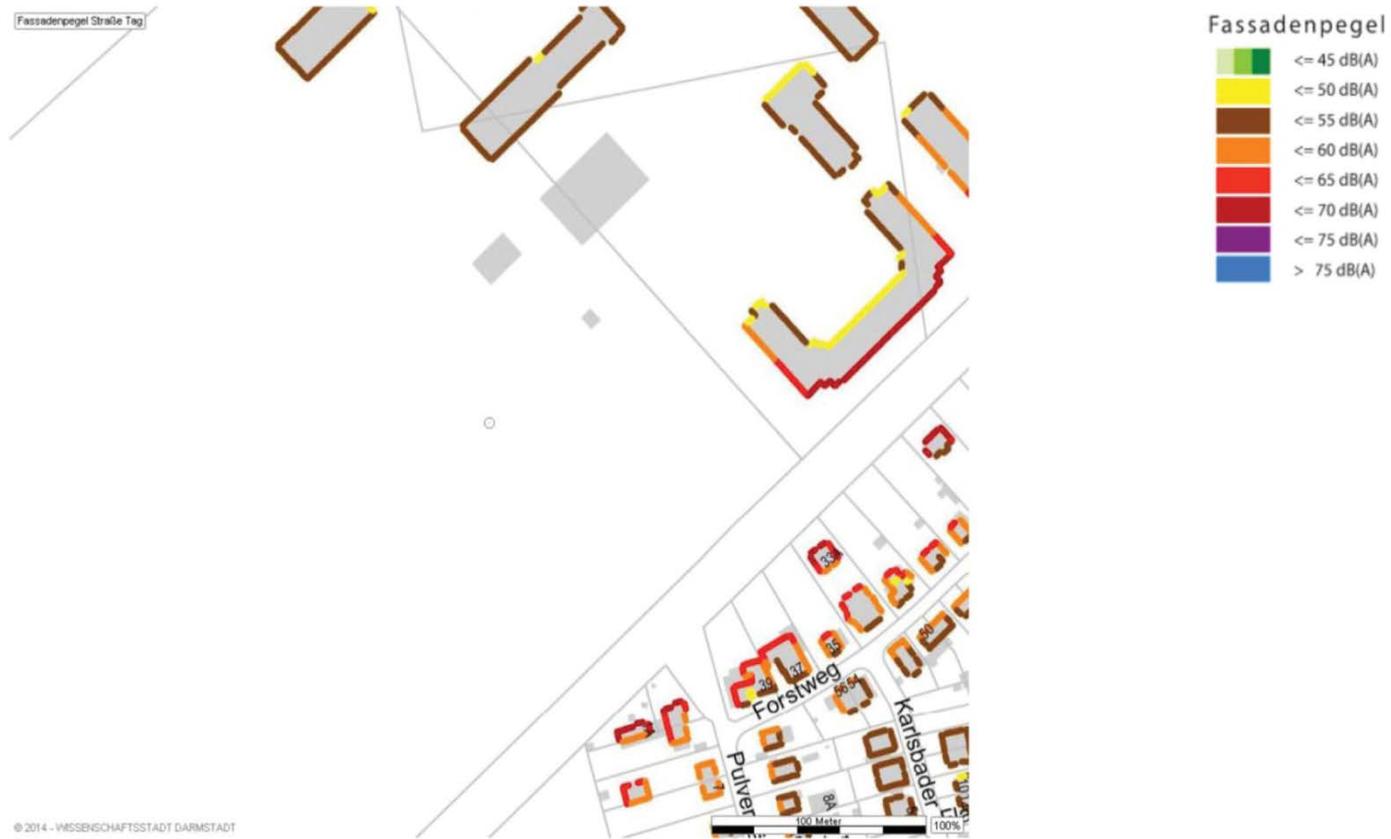
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# Straße – Lärmbelastung

CityGuide DMS

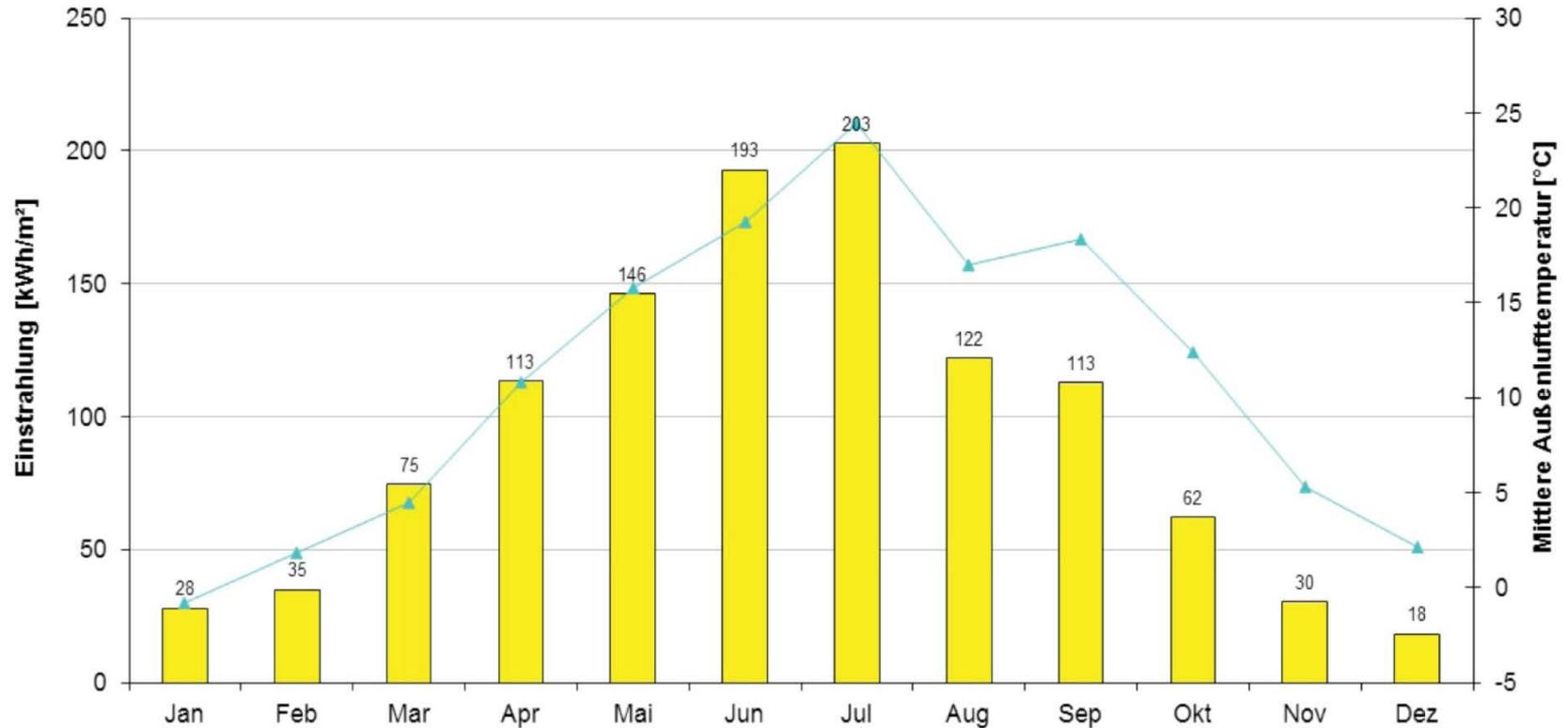
17.1.2014

### Lärmkartierung 2011 - Fassadenpegel und Schallausbreitung nach RLS 90



# Straße – Lärmbelastung an der Fassade

### TRY12X 2010 Mannheim

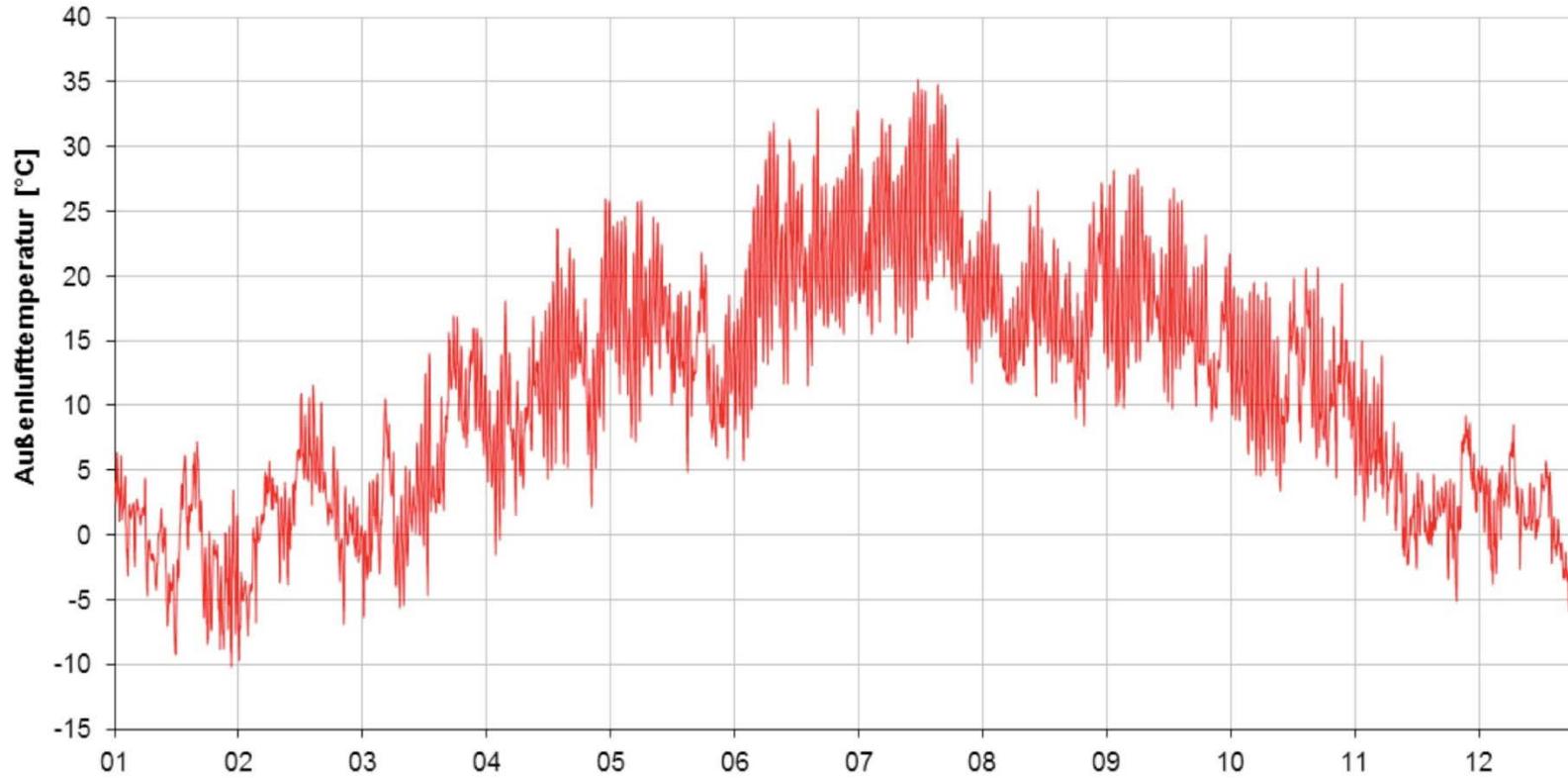


Horizontale Einstrahlung: 1138 kWh/m²/a  
Jahresmitteltemperatur: 11.0 °C  
Anzahl Stunden über 25 °C 554 h  
Anzahl Stunden mit absoluter Feuchte über 11.5 g/kg 517 h

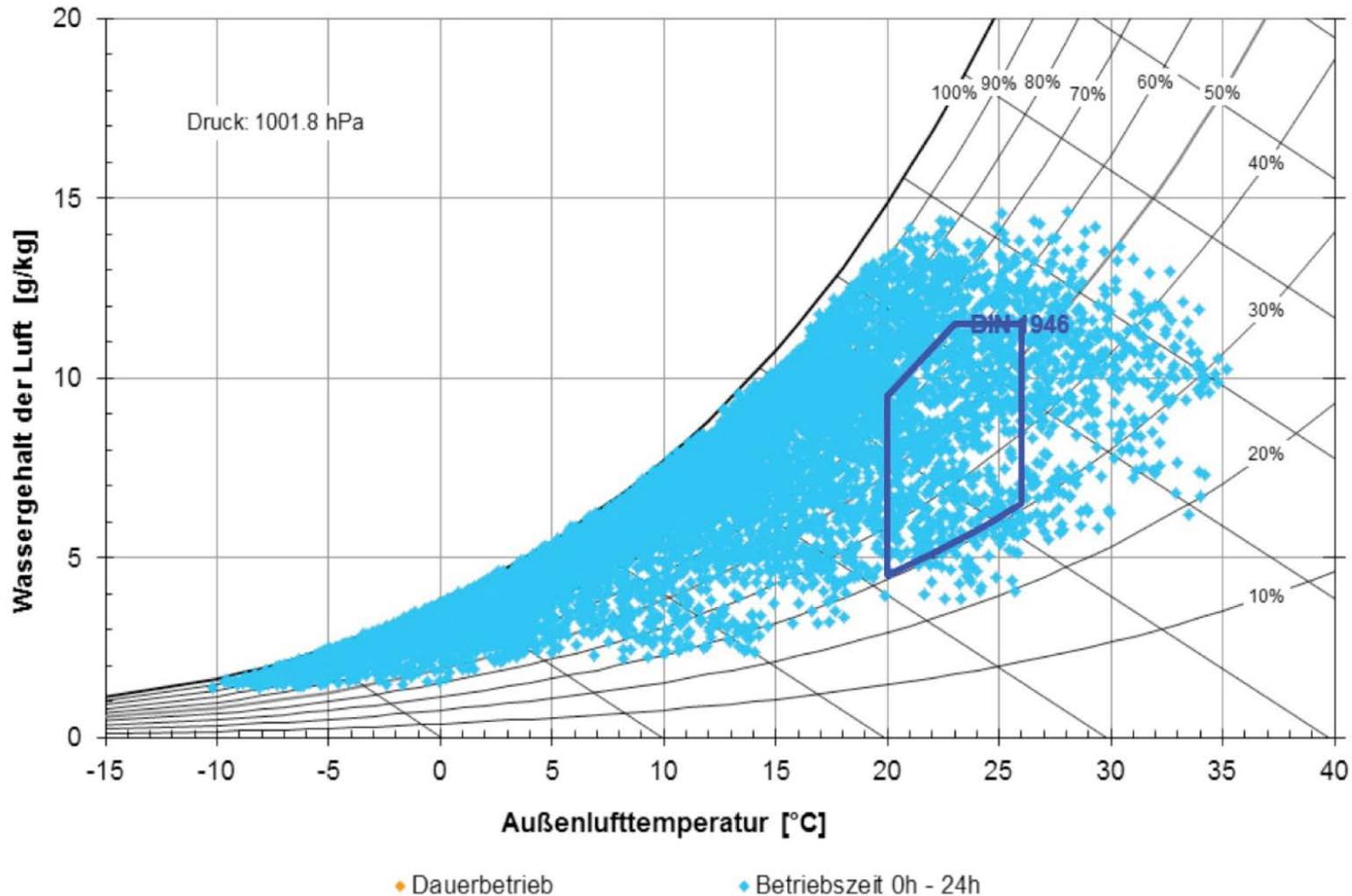
Einstrahlung [kWh/m²]  
Mittlere Außenlufttemperatur [°C]

## Meteorologische Daten – Solarstrahlung

### TRY12X 2010 Mannheim

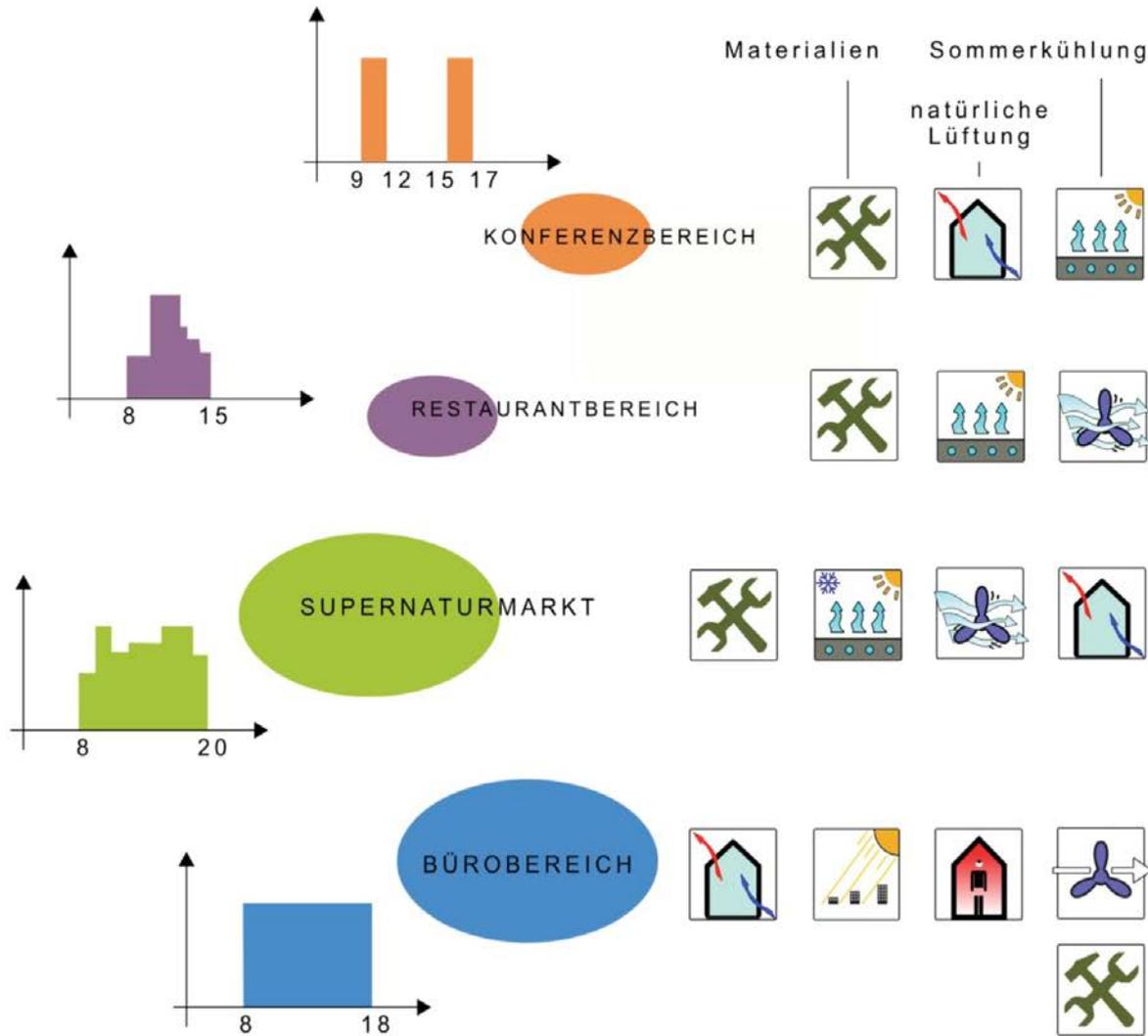


### TRY12X 2010 Mannheim

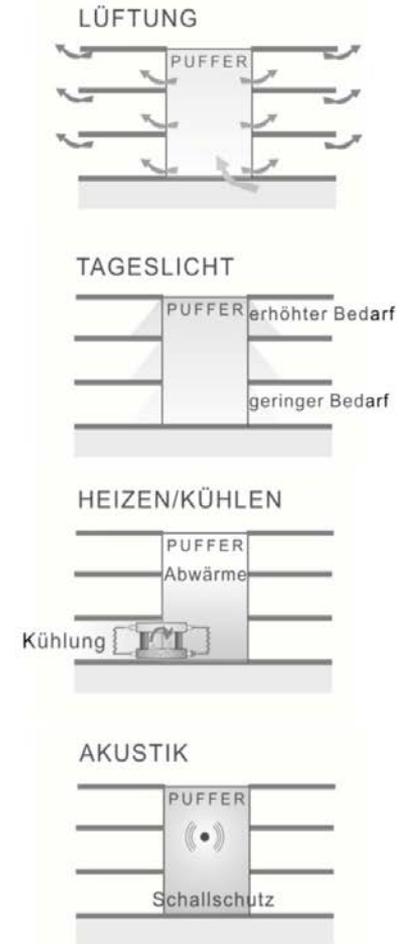


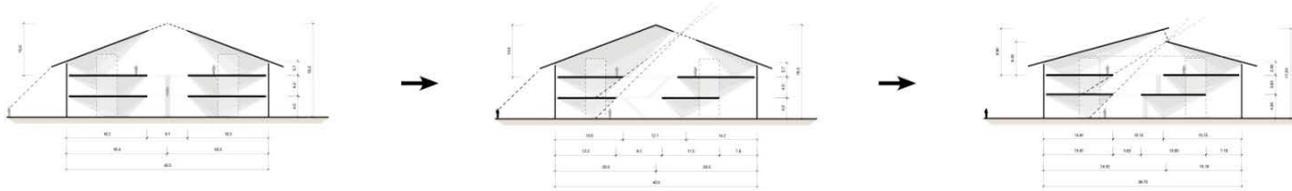
## Meteorologische Daten – h-x Diagramm

- STRATEGIEN



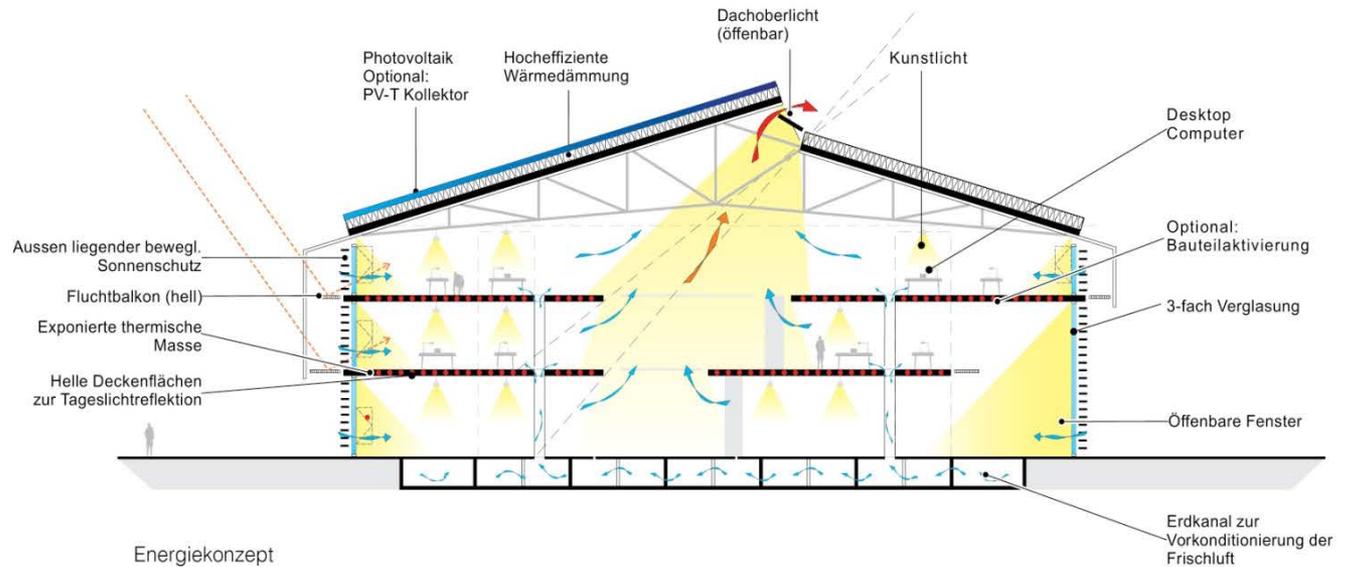
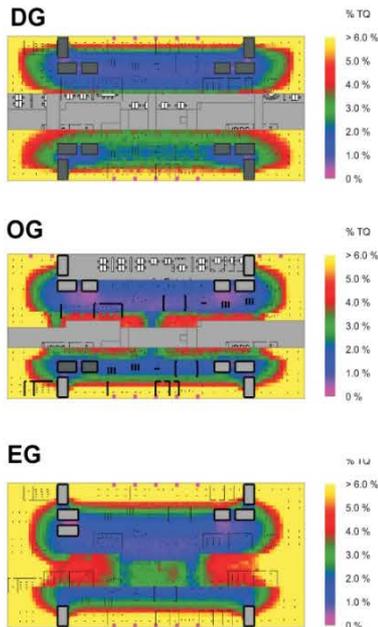
## synergien



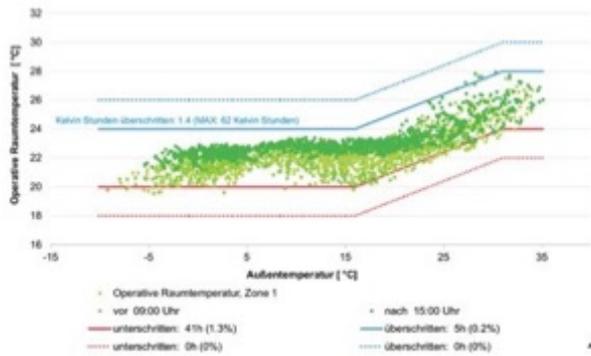
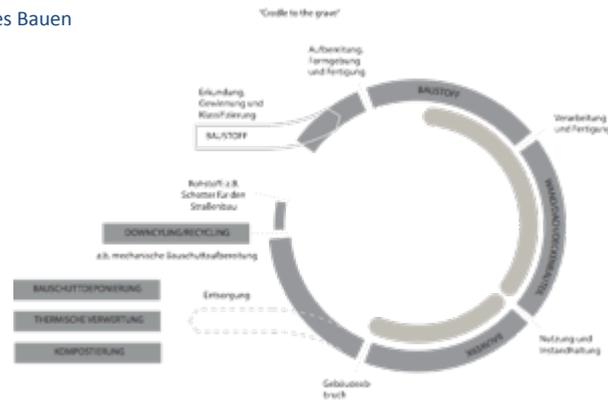


Lichtstudie

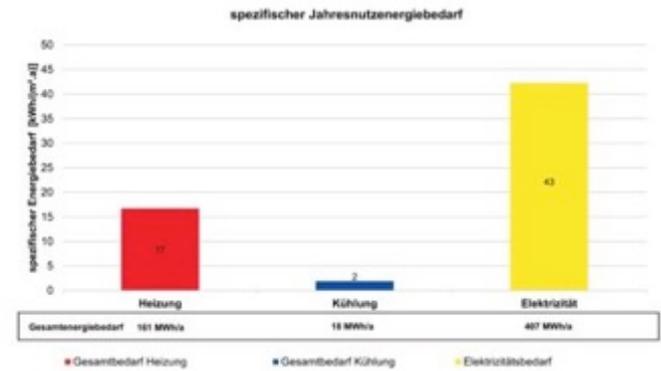
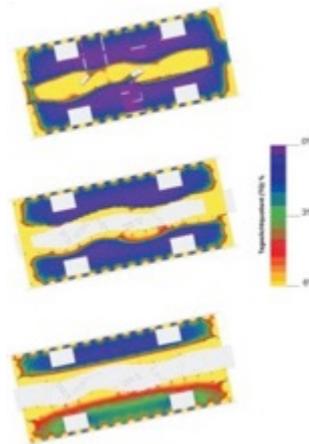
Eine intelligente, lichtoptimierte Gebäudegeometrie ermöglicht natürlich belichtete Arbeitsplätze nahezu über die gesamte Gebäudetiefe.

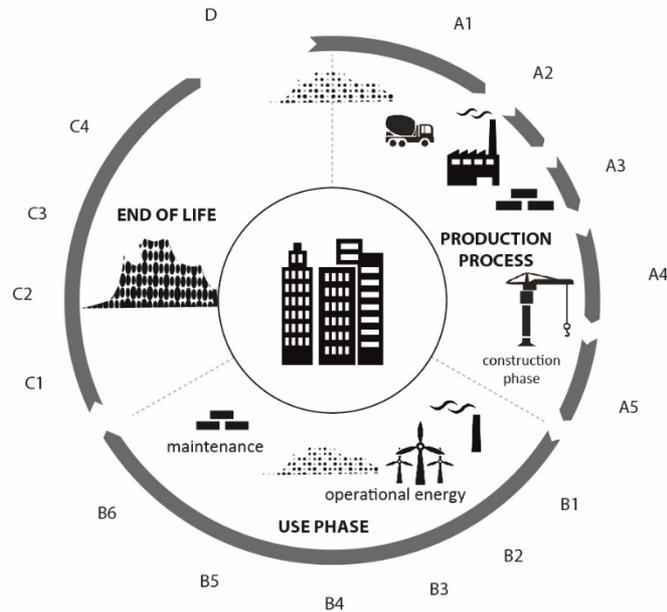




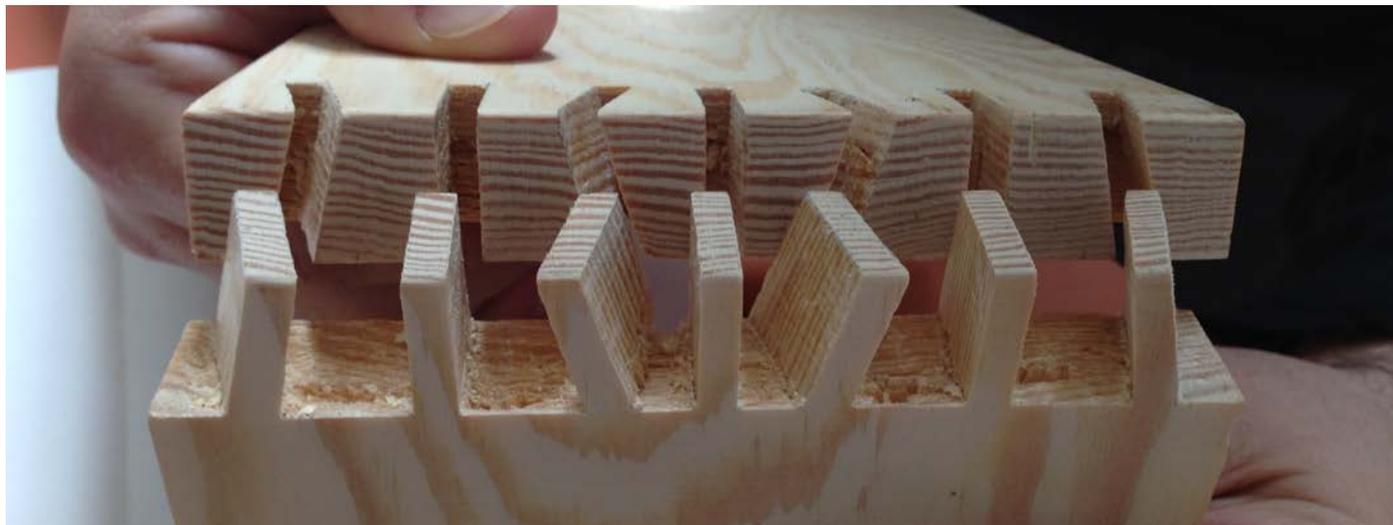


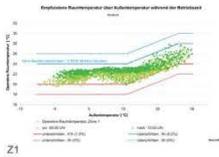
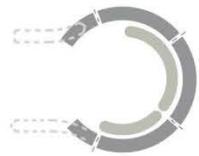
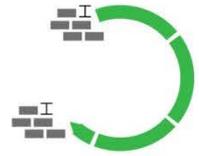
Architektur



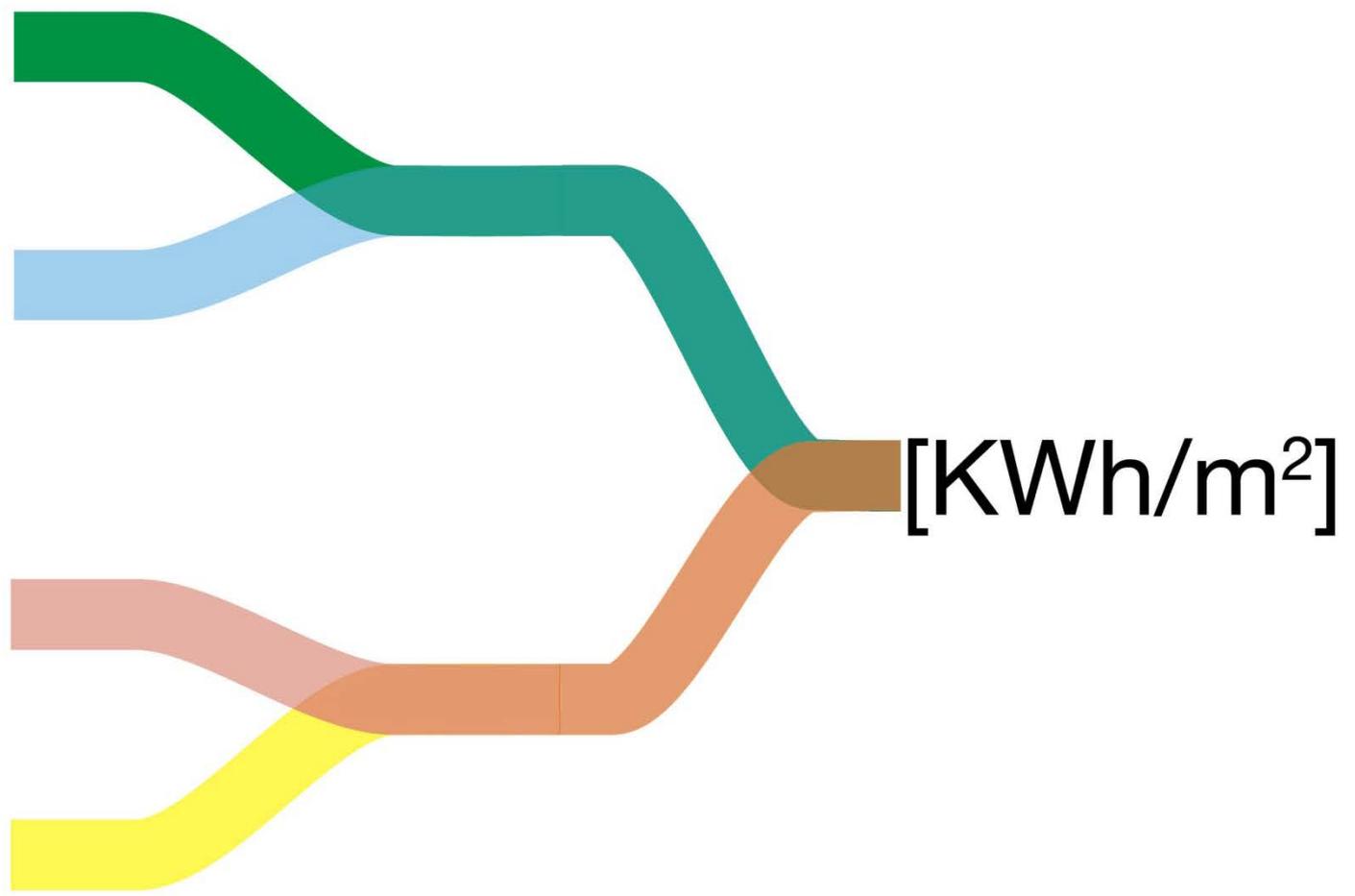
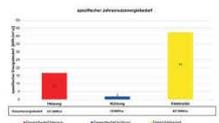


PCR phases according to EN 15804:2012		
Production stage	A1	Raw material supply
	A2	Transport
	A3	Manufacturing
Construction stage	A4	Transport
	A5	Construction/ installation process
Usage phase	B1	Use
	B2	Maintenance including transport
	B3	Repair and transport
	B4	Replacement including transport
	B5	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 potential

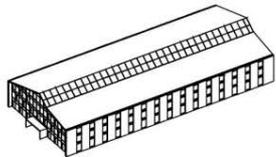




Z1

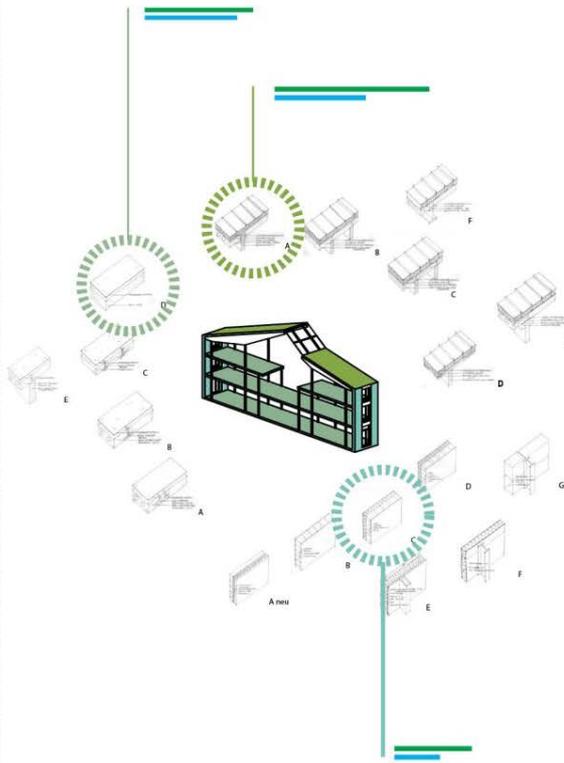


ANALYSE



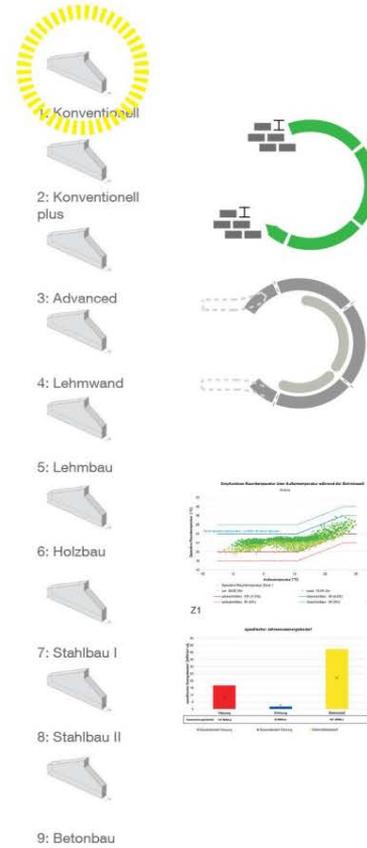
Grundlagen und Anforderungen  
 Gebäudeentwurf

MODELLIERUNG



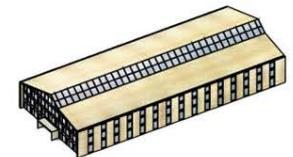
Berechnung der grauen Energie konventionell/max reuse  
 Bauteile

EVALUIERUNG

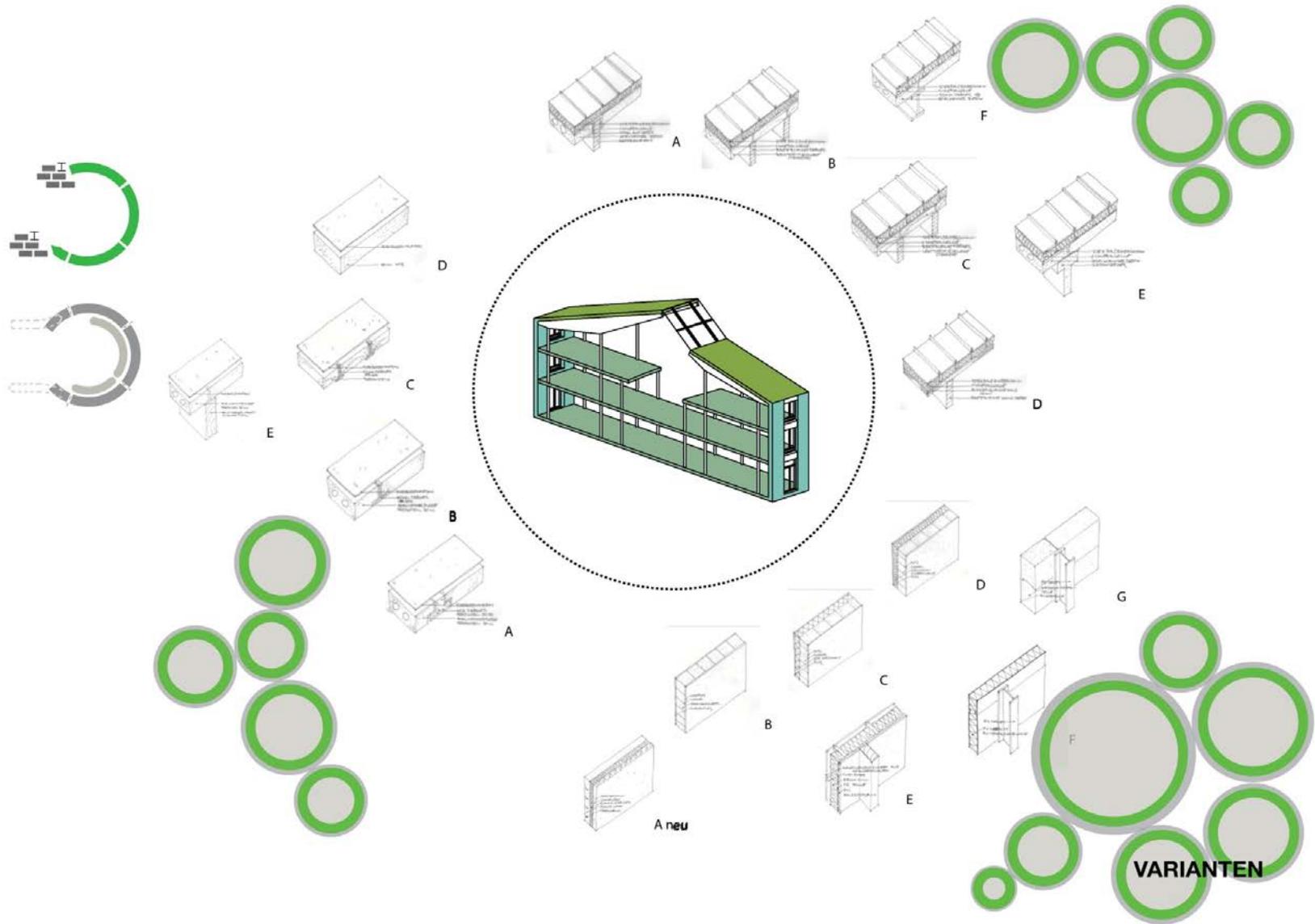


Anwendung der Bauteile auf die Gebäudescheibe  
 Kombinationen

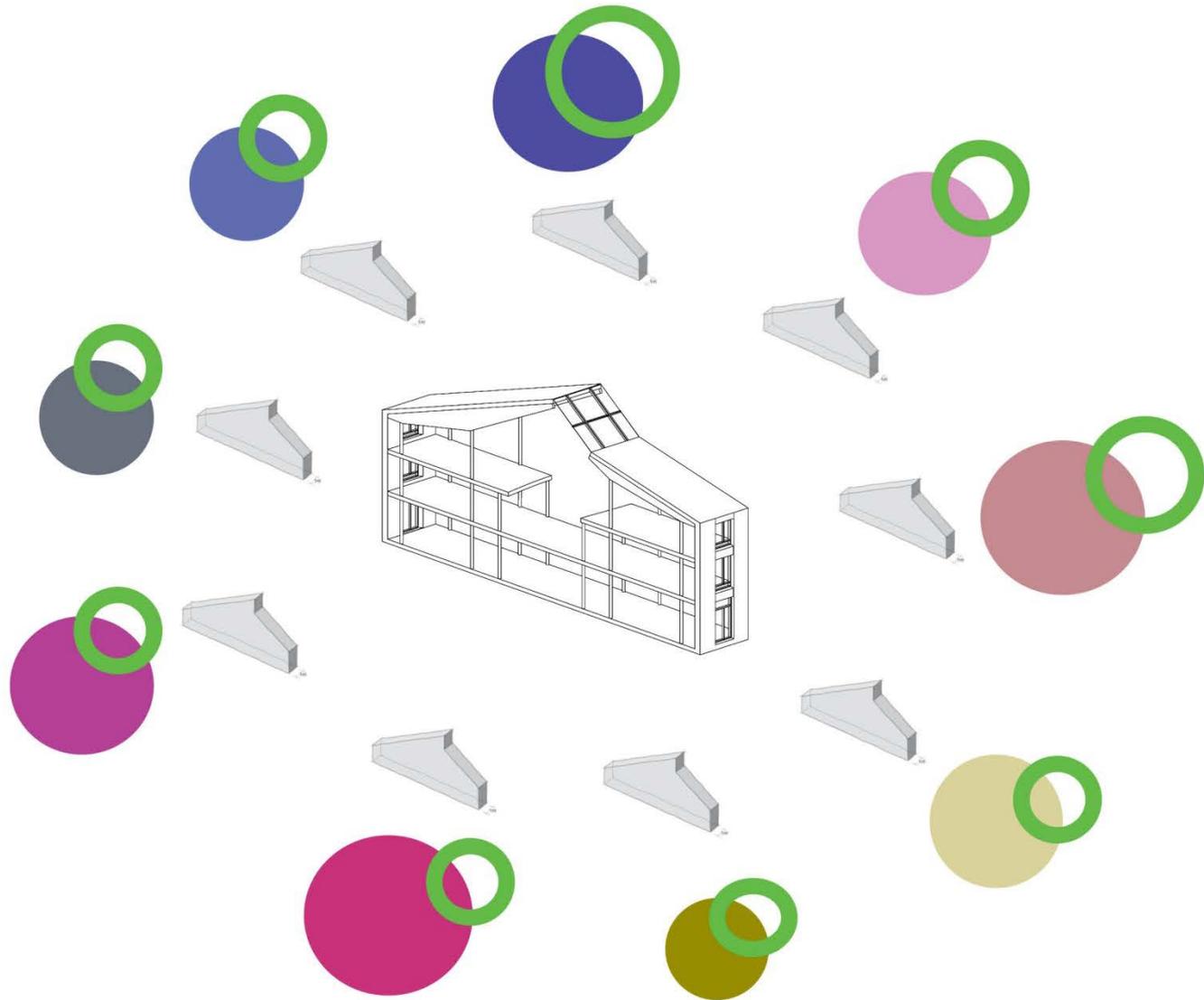
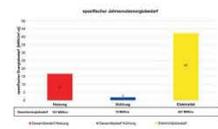
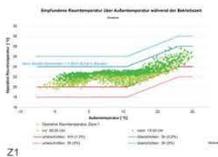
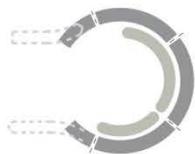
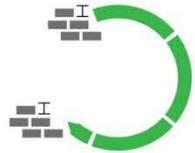
DURCHFÜHRUNG



Anwendung auf den Gebäudeentwurf  
 Gebäude

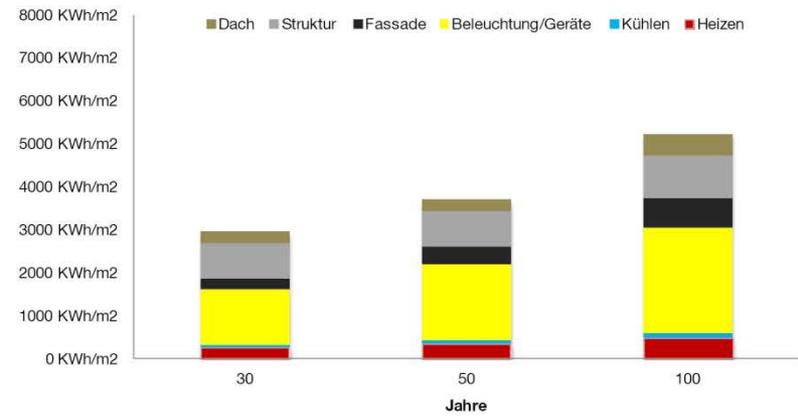
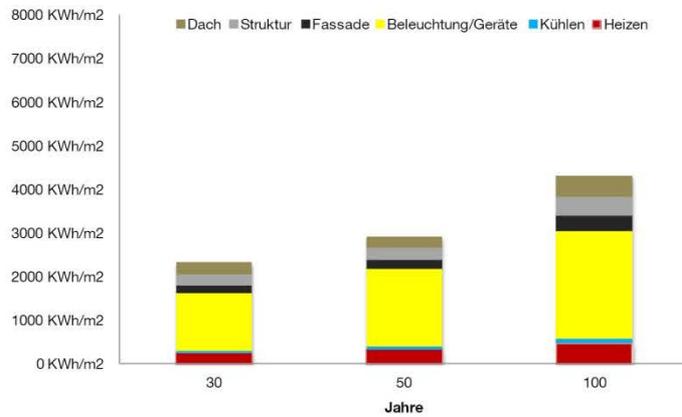
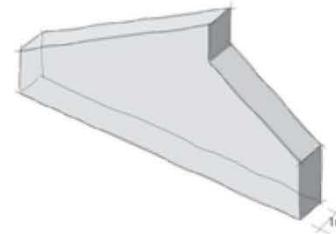
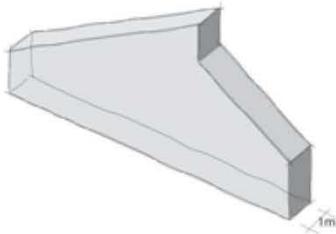


Varianten

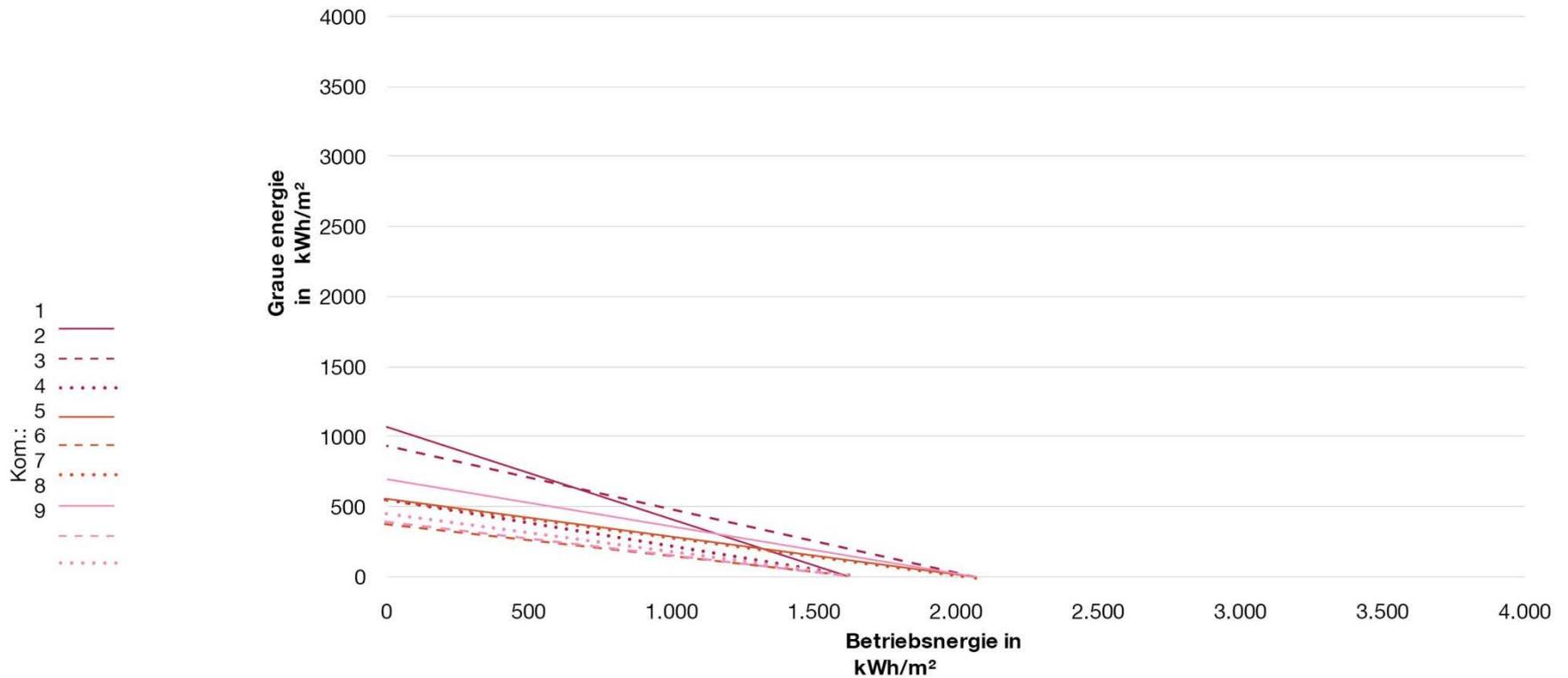


# Kombinationen

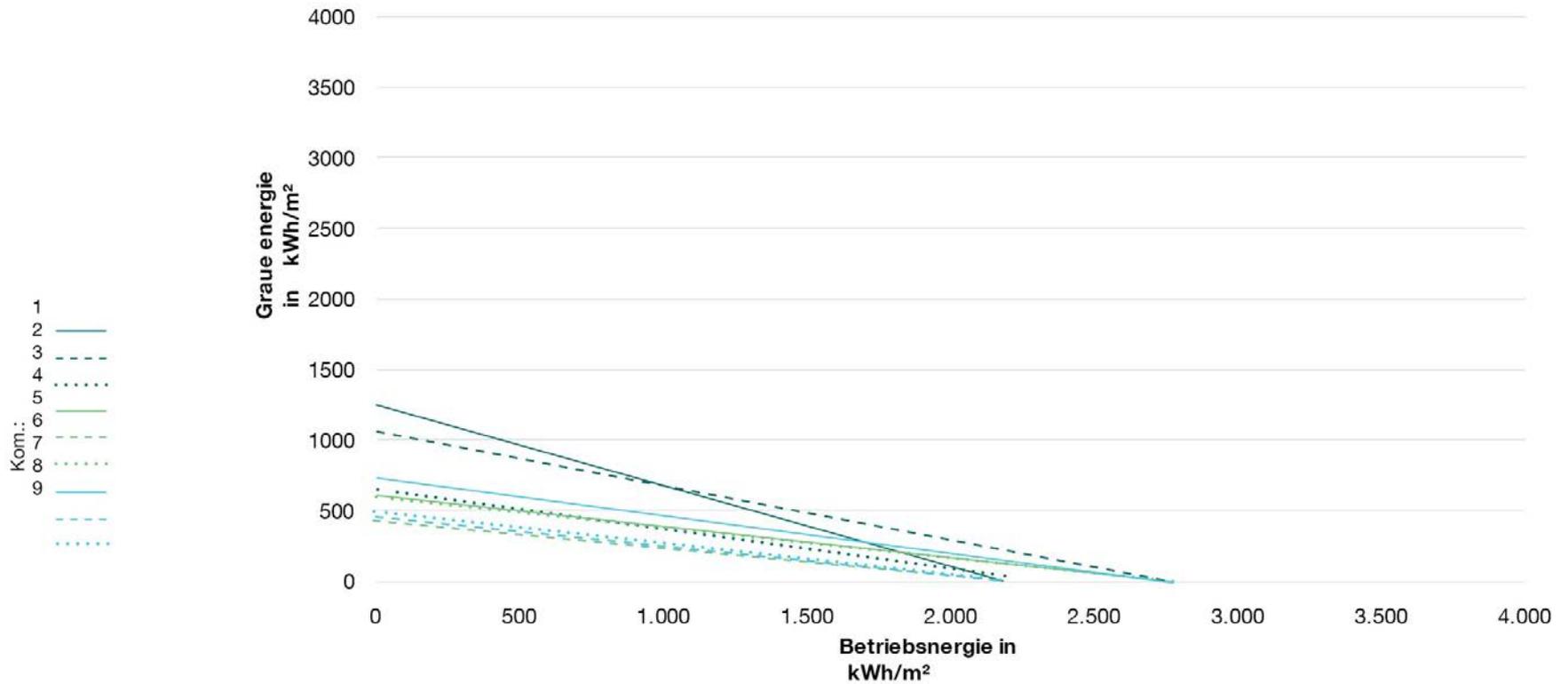




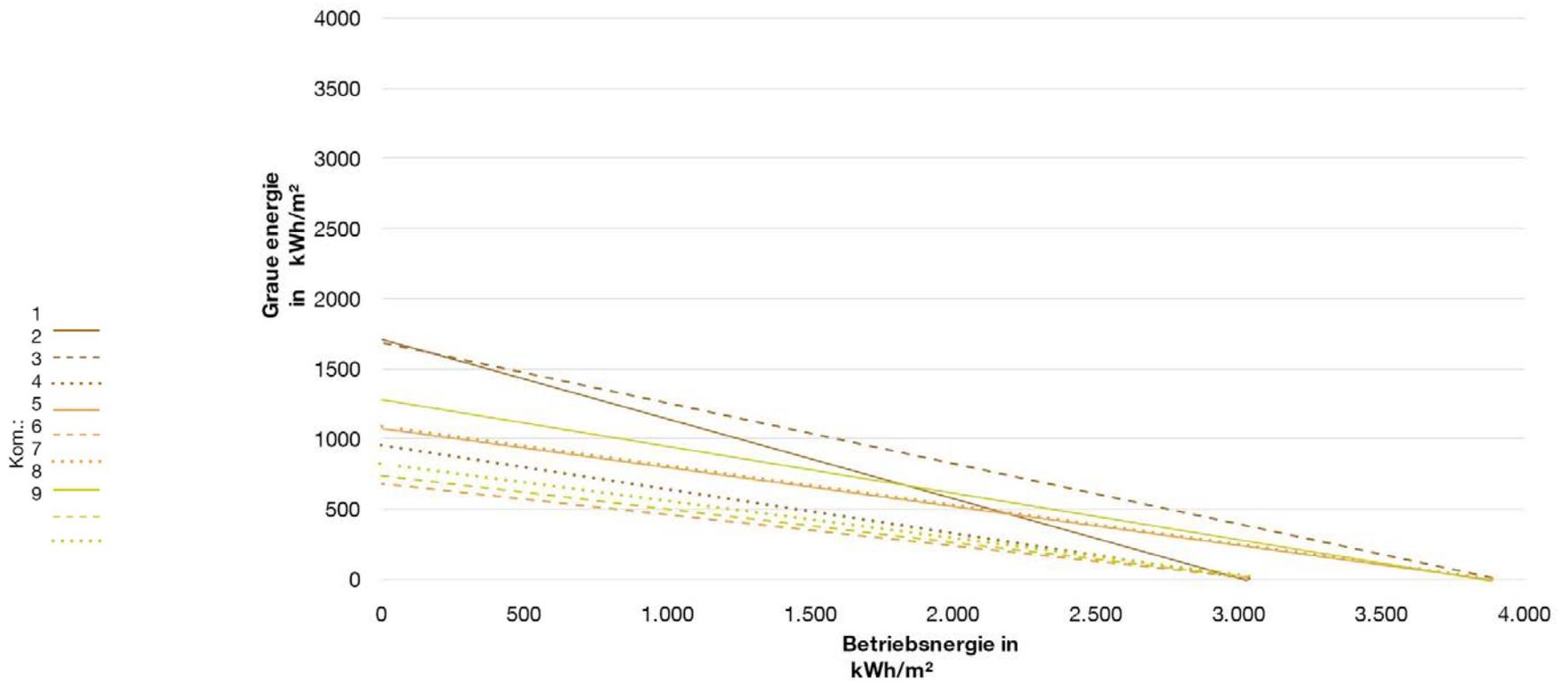
**Gesamtenergiebedarf pro 1-m Gebäudescheibe**



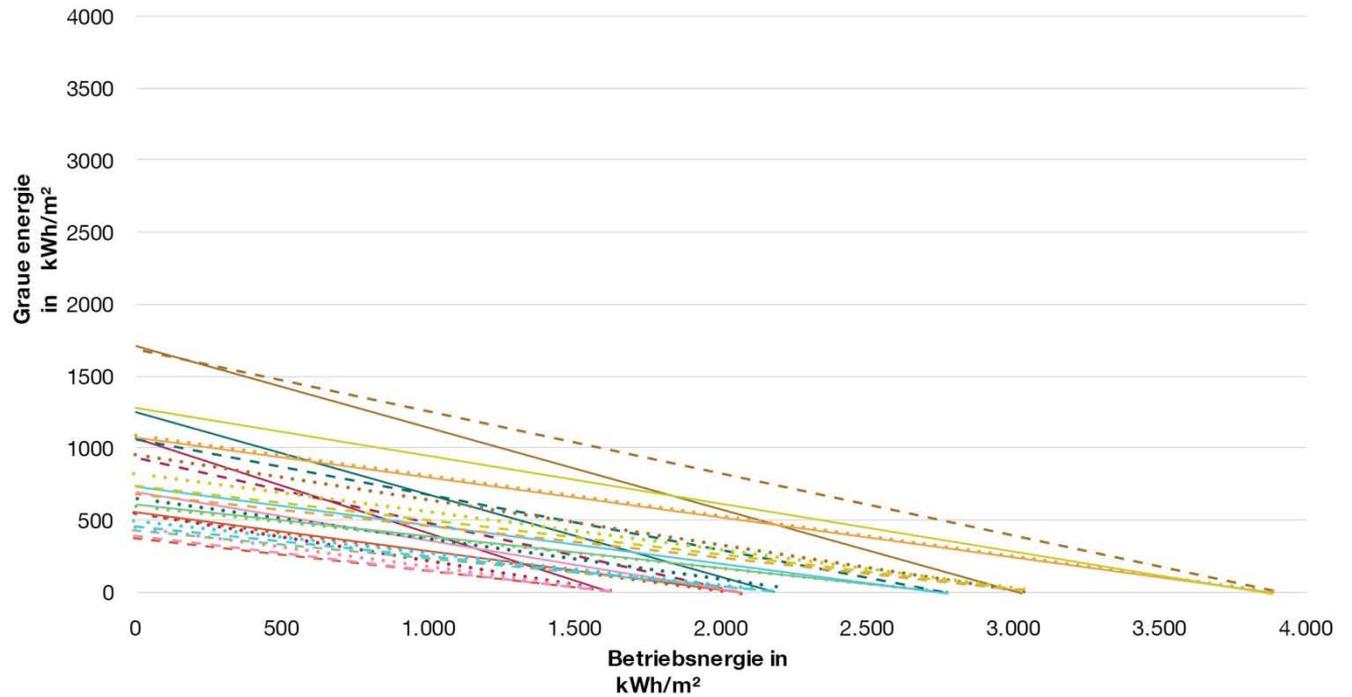
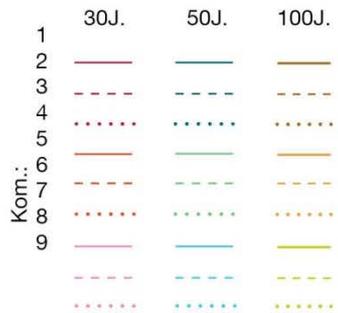
30 Jahre, Kombinationen 1-9



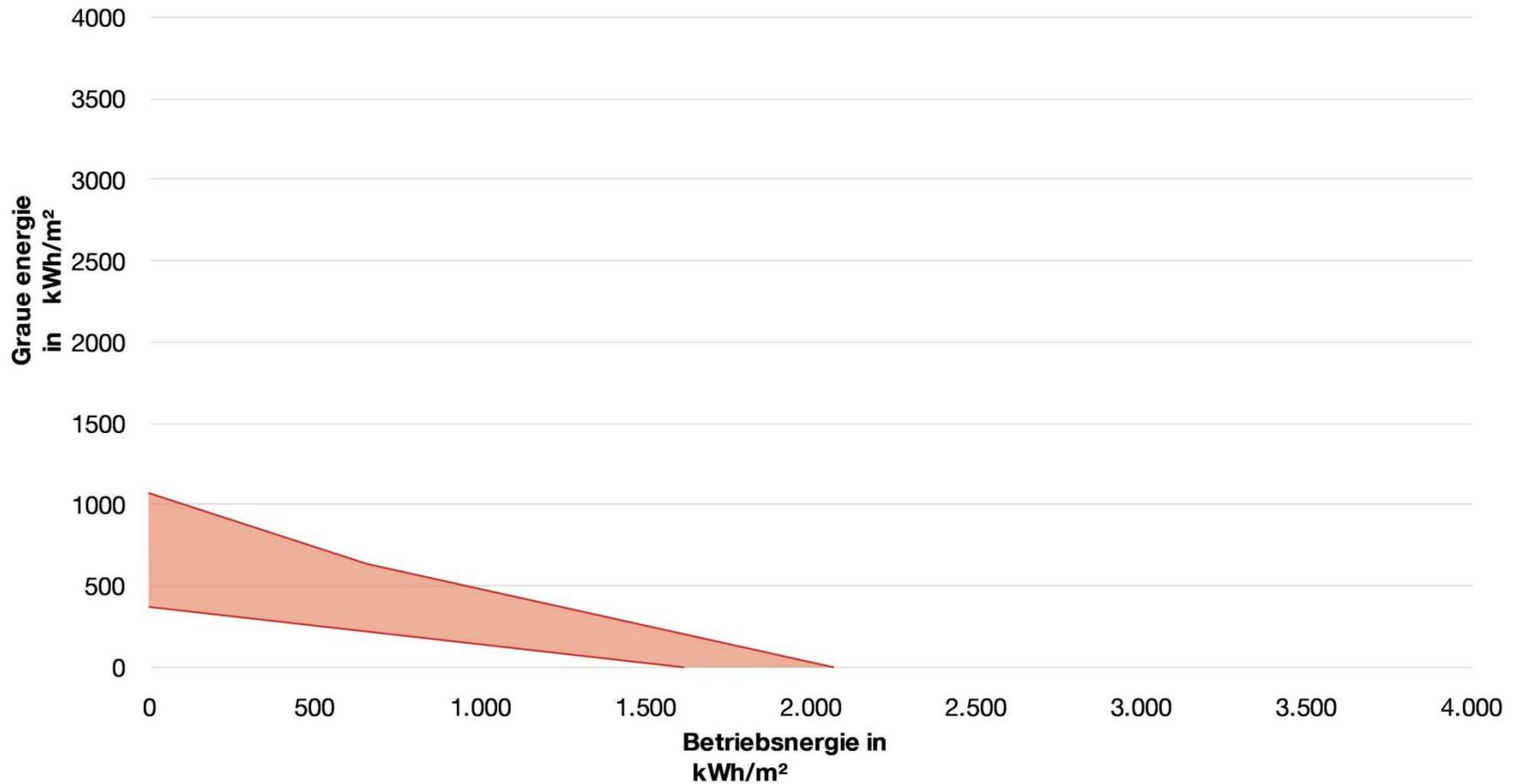
50 Jahre, Kombinationen 1-9



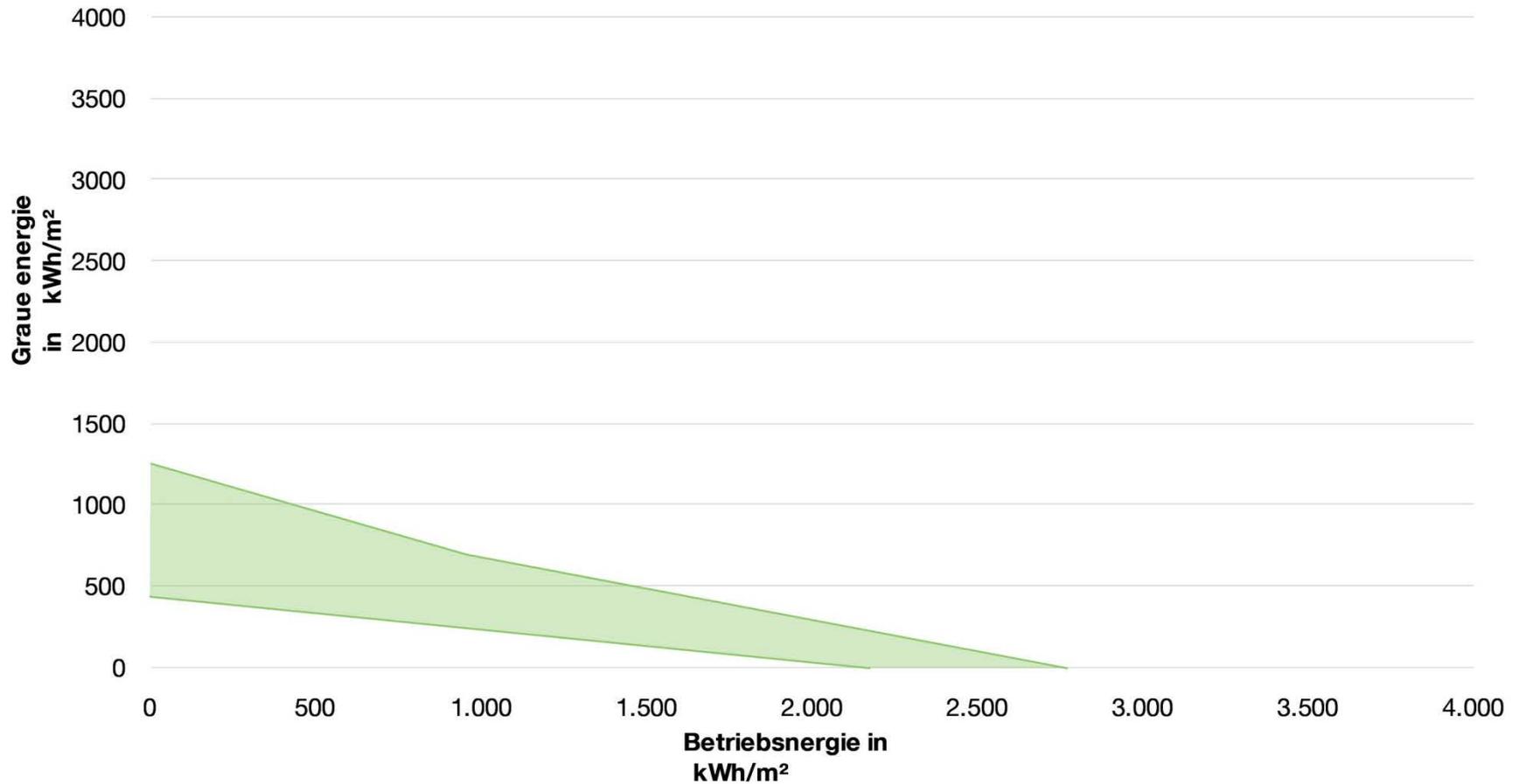
100 Jahre, Kombinationen 1-9



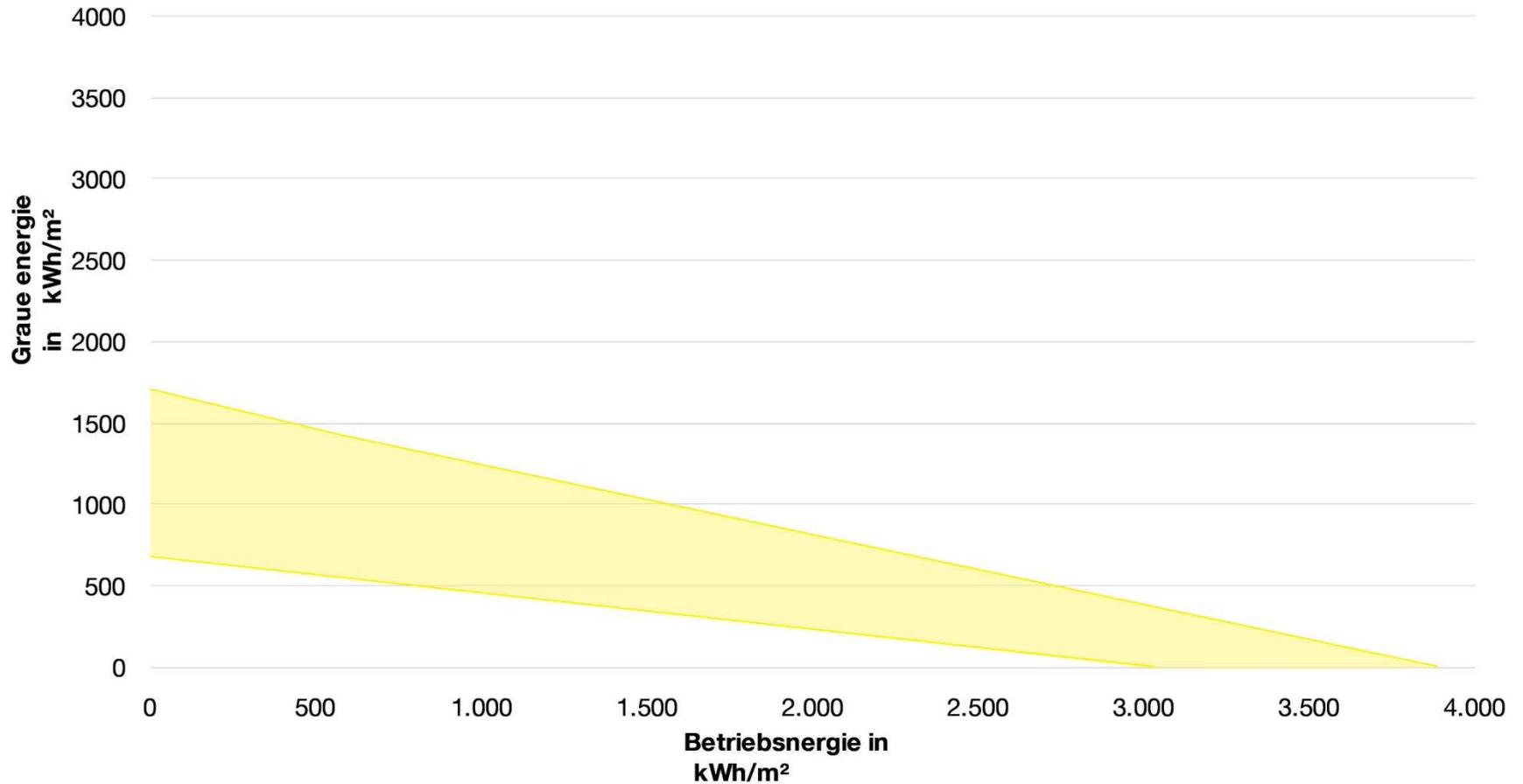
30-50-100 Jahre, Kombinationen 1-9



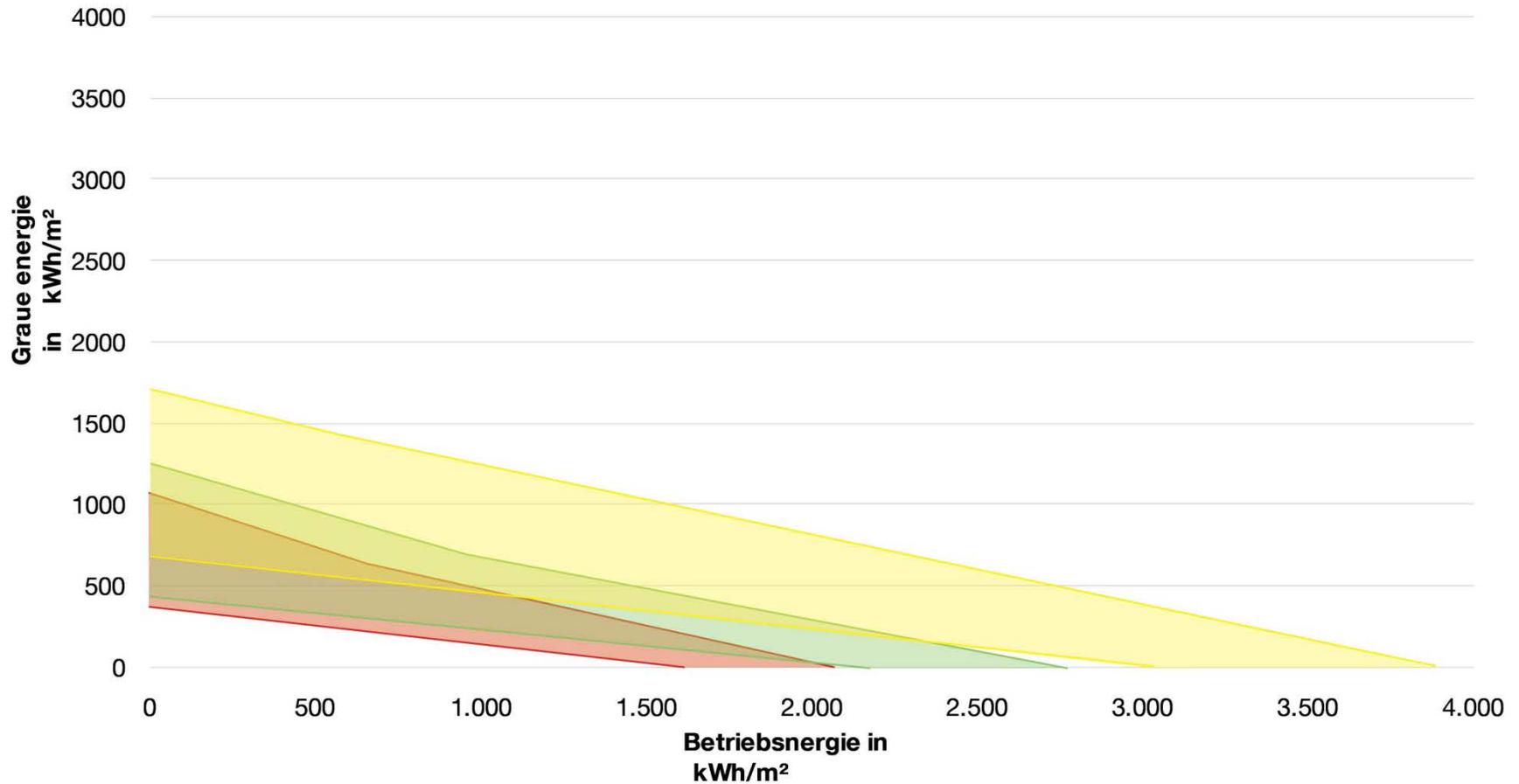
Interpolation 30 Jahre, Kombinationen 1-9



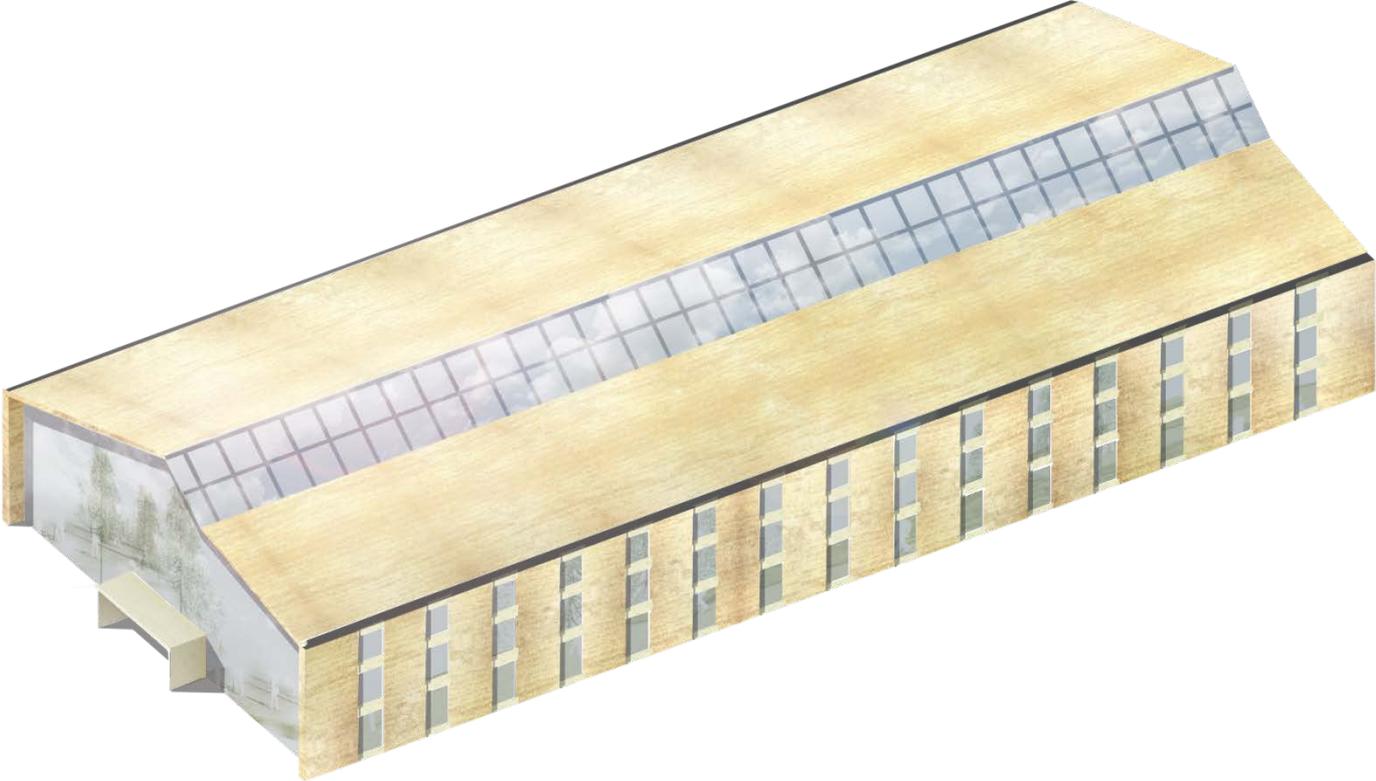
Interpolation 50 Jahre, Kombinationen 1-9



Interpolation 100 Jahre, Kombinationen 1-9



Interpolation 30-50-100 Jahre, Kombinationen 1-9







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