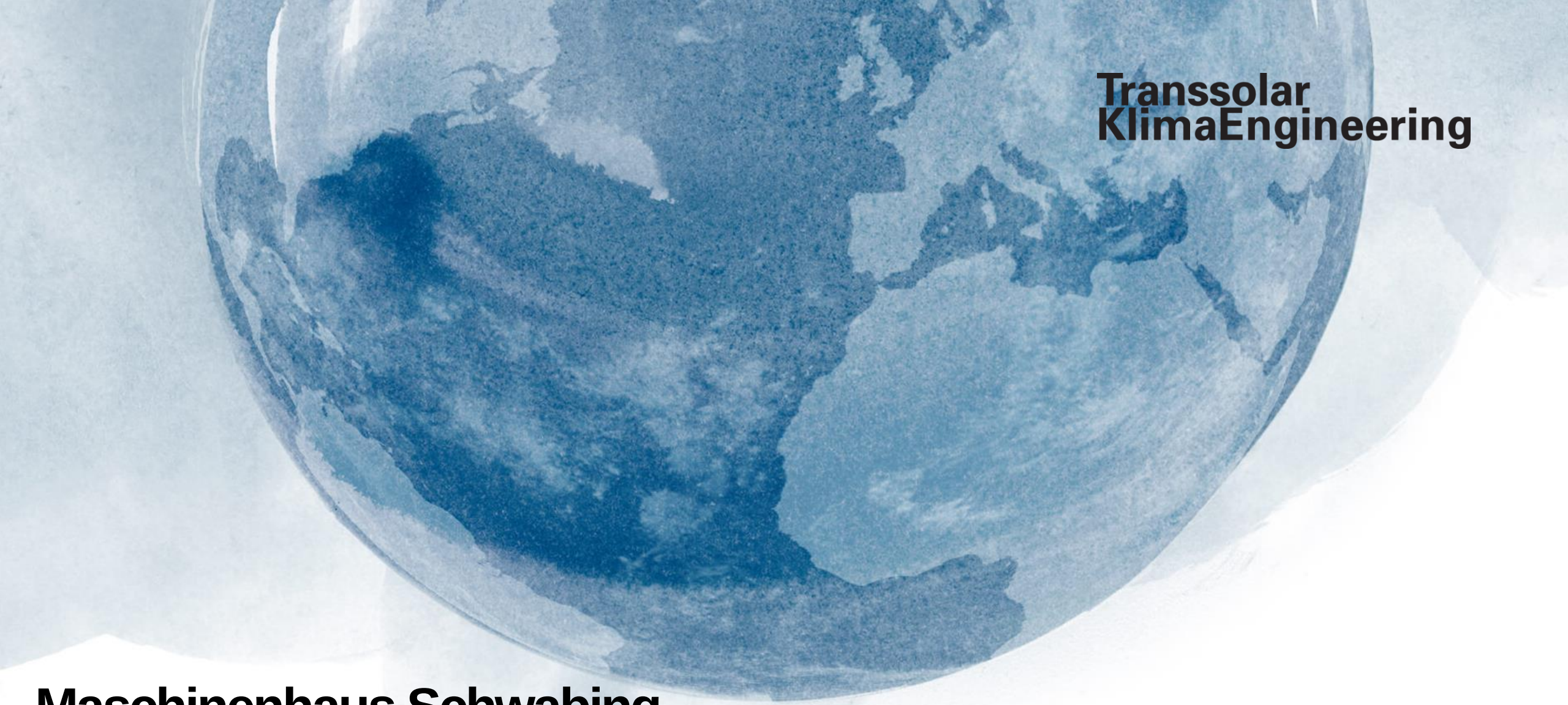

Transsolar
KlimaEngineering

Maschinenhaus Schwabing

Klimakonzept

Transsolar KlimaEngineering

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Wetterdaten – Testreferenzjahr des DWD

Transsolar KlimaEngineering

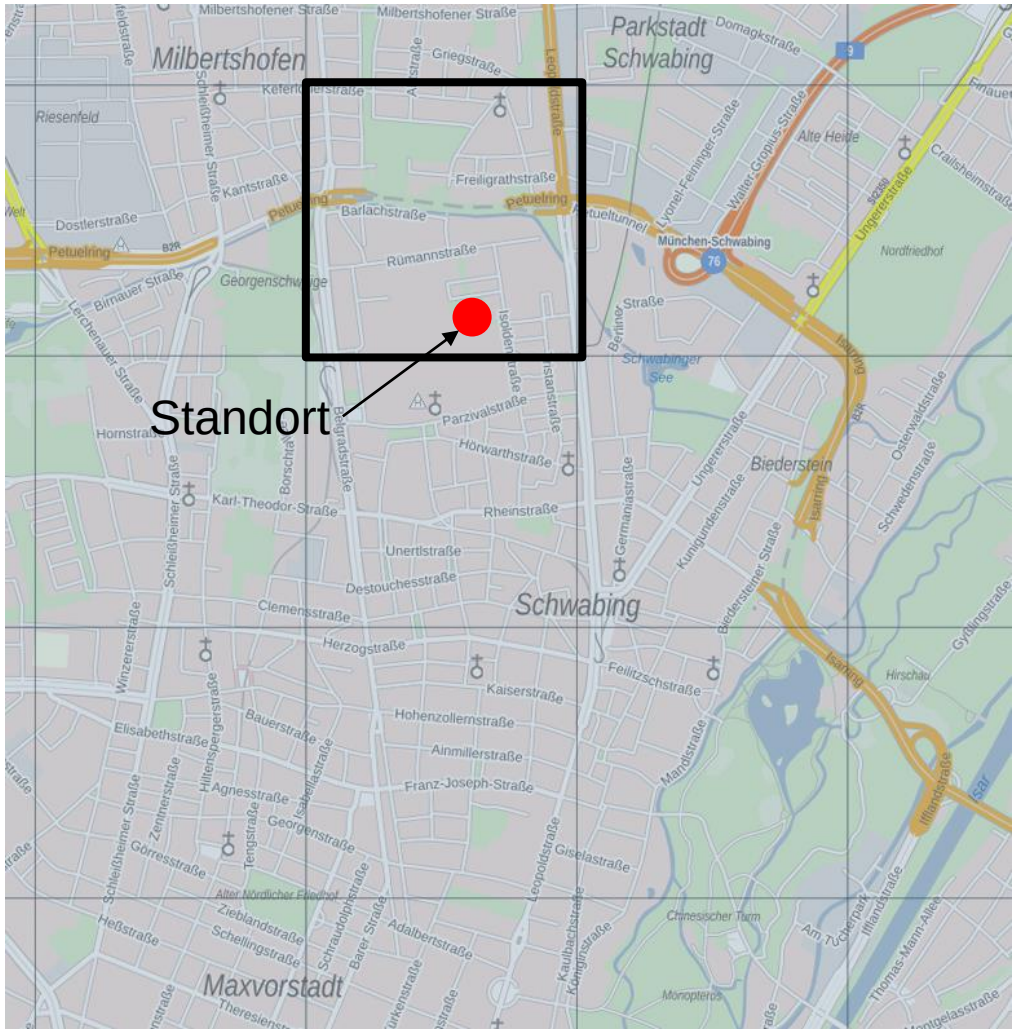
Standort Schwabing

Der Deutsche Wetterdienst veröffentlichte im Jahr 2017 aktualisierte Wetterdaten, die die bisher für bauklimatische Analysen gültigen Testreferenzjahre von 2010 ablösen werden. Die neuen Wetterdaten haben die folgenden Eigenschaften:

Es handelt sich um ortsgenaue Testreferenzjahre für mittlere, extreme und zukünftige Witterungsverhältnisse Räumlich kontinuierliche Daten in einem Raster von 1 km² für ganz Deutschland

Die Abbildung rechts zeigt das Abbildungsraster für den WWO-Standort direkt für München Schwabing

- Integration innerstädtischer Wärmeinseln (UHI) basierend auf empirisch ermittelter Korrelationen
- Berücksichtigung der Höhenabhängigkeit einzelner Klimadaten
- Aktualisierter Zeitraum 1995 -2012
- Kurzwellige Strahlungsparameter sind dank Satellitendaten realistisch
- ca. 30 Bodenstationen in Deutschland erfassen kurzwellige Strahlungsparameter



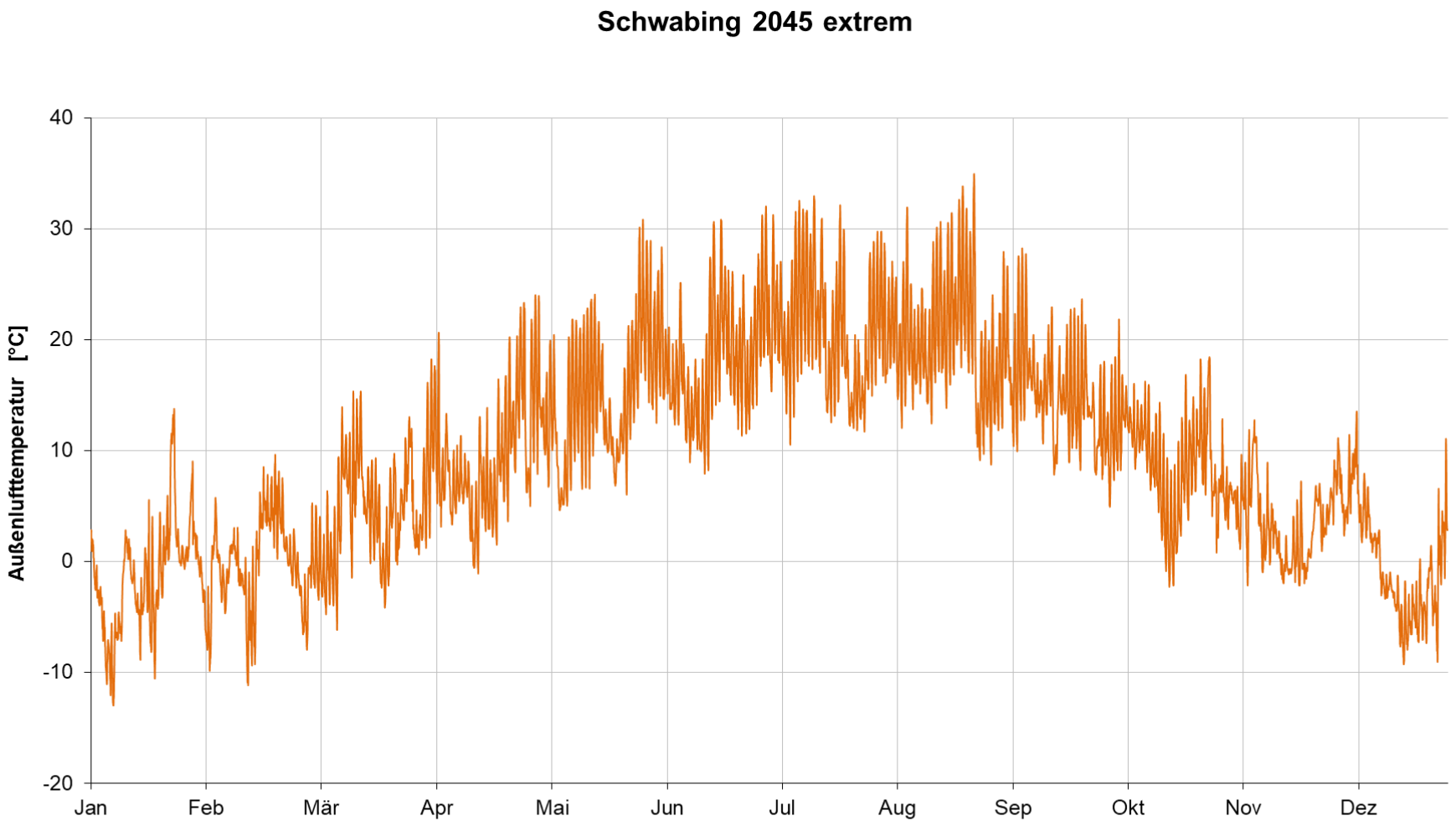
Für die Simulation wird das Extremwetter für 2045 für den markierten Standort herangezogen

Transsolar KlimaEngineering

Außentemperatur – Jahresverlauf

Wetteranalyse

Transsolar KlimaEngineering



Transsolar KlimaEngineering

Randbedingungen

Transsolar KlimaEngineering

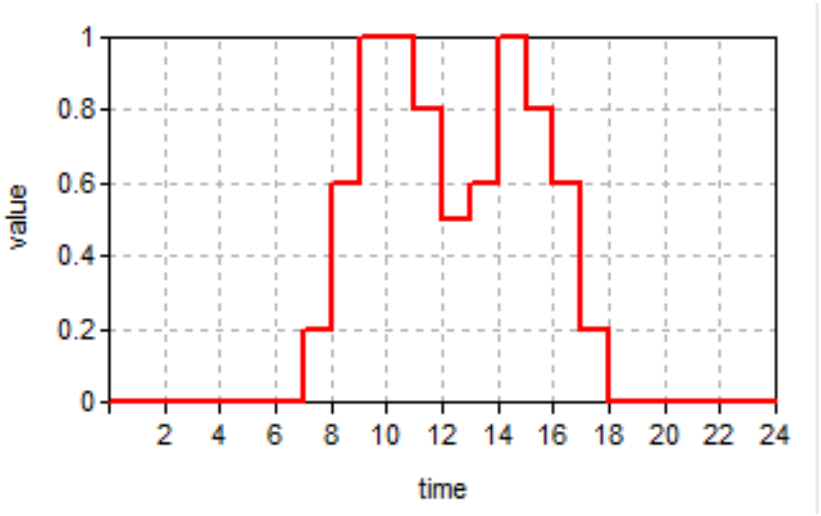
Fußbodenheizung/-kühlung
Verlegeabstand……150 mm
Rohrdurchmesser……..17 mm PEX
Estrichüberdeckung……...70 mm

Grundlüftung
Natürliche Schachtlüftung durch das Gebäude
Zuluft: Über Öffnung im UG mit Heizregister zur Vorkonditionierung
Abluft: Über Öffnungen im Turm auf dem Dach

Querlüftung der Fassadenfenster bei Übertemperatur
Traum > 24°C
Tamb,24h > 14°C

Interne Lasten
Personen……70 W, 180 Personen
Geräte……120 W/Person
Beleuchtung……..10 W/m² (Soll-Wert 400 lx, On/OFF)

Betriebszeiten
Belegungsdichte in 1/100%



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Zielsetzung – Thermischer Komfort nach DIN 15251 NA

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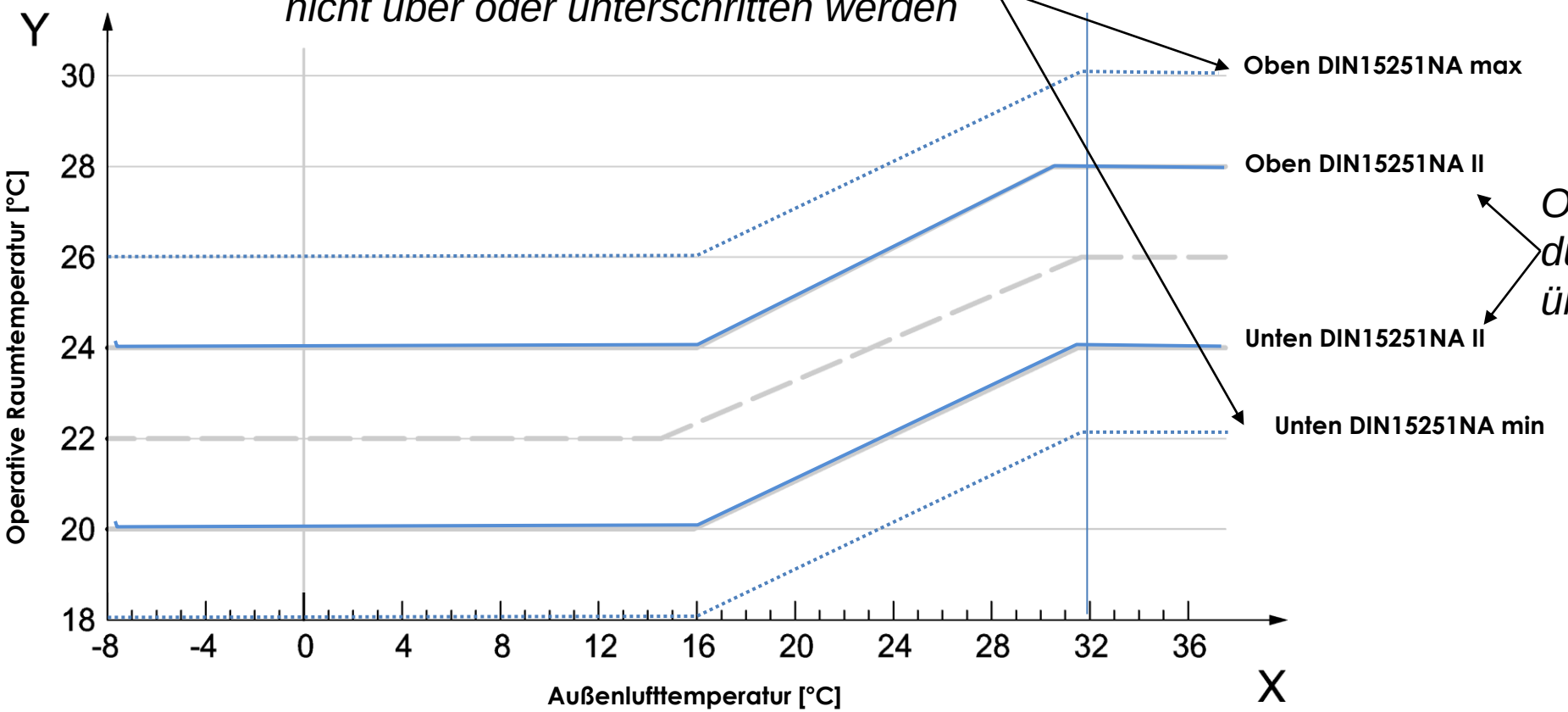
Temperaturgrenzen für Heizen und Kühlen

Obere und untere Max/Min Grenze darf nicht über oder unterschritten werden



*Obere und untere Grenzen dürfen **80 Kh** (7-18 Uhr) nicht überschreiten*

Transsolar KlimaEngineering

Variantenübersicht

Transsolar KlimaEngineering

Basis	Bestandsmauerwerk + Bestandsverglasung
Variante 1	Basis + Wärmedämmputz außen
Variante 2	Basis + 3-fach Isolierverglasung
Variante 3	Bestandsmauerwerk + Wärmedämmputz außen + 3-fach Isolierverglasung
Variante 4	Bestandsmauerwerk + 5 cm Innendämmung + 3-fach Isolierverglasung

Transsolar KlimaEngineering

Transsolar KlimaEngineering

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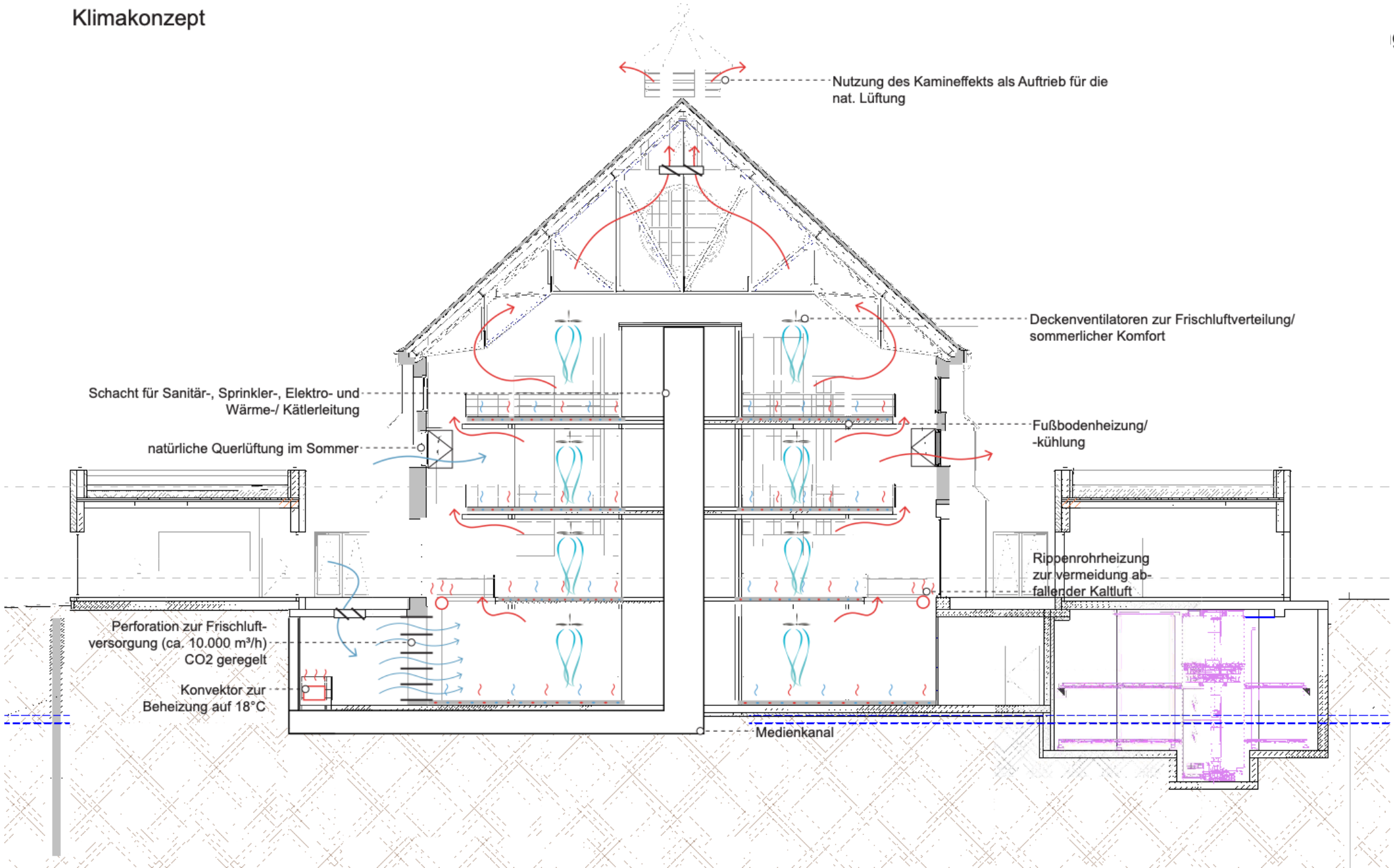
Klimakonzept



Transsolar KlimaEngineering

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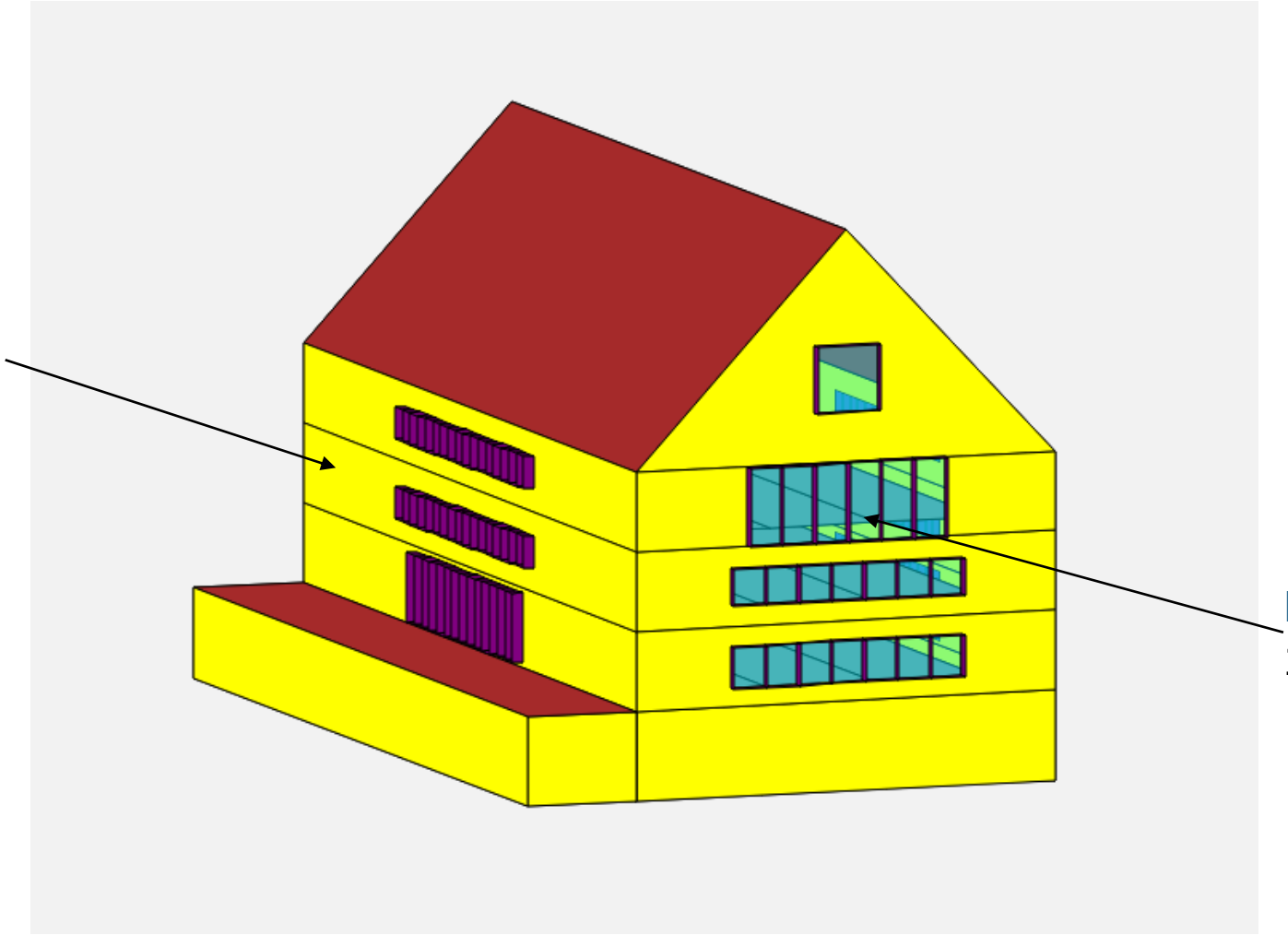
Basis - Bestandsvariante

Randbedingungen

Transsolar KlimaEngineering

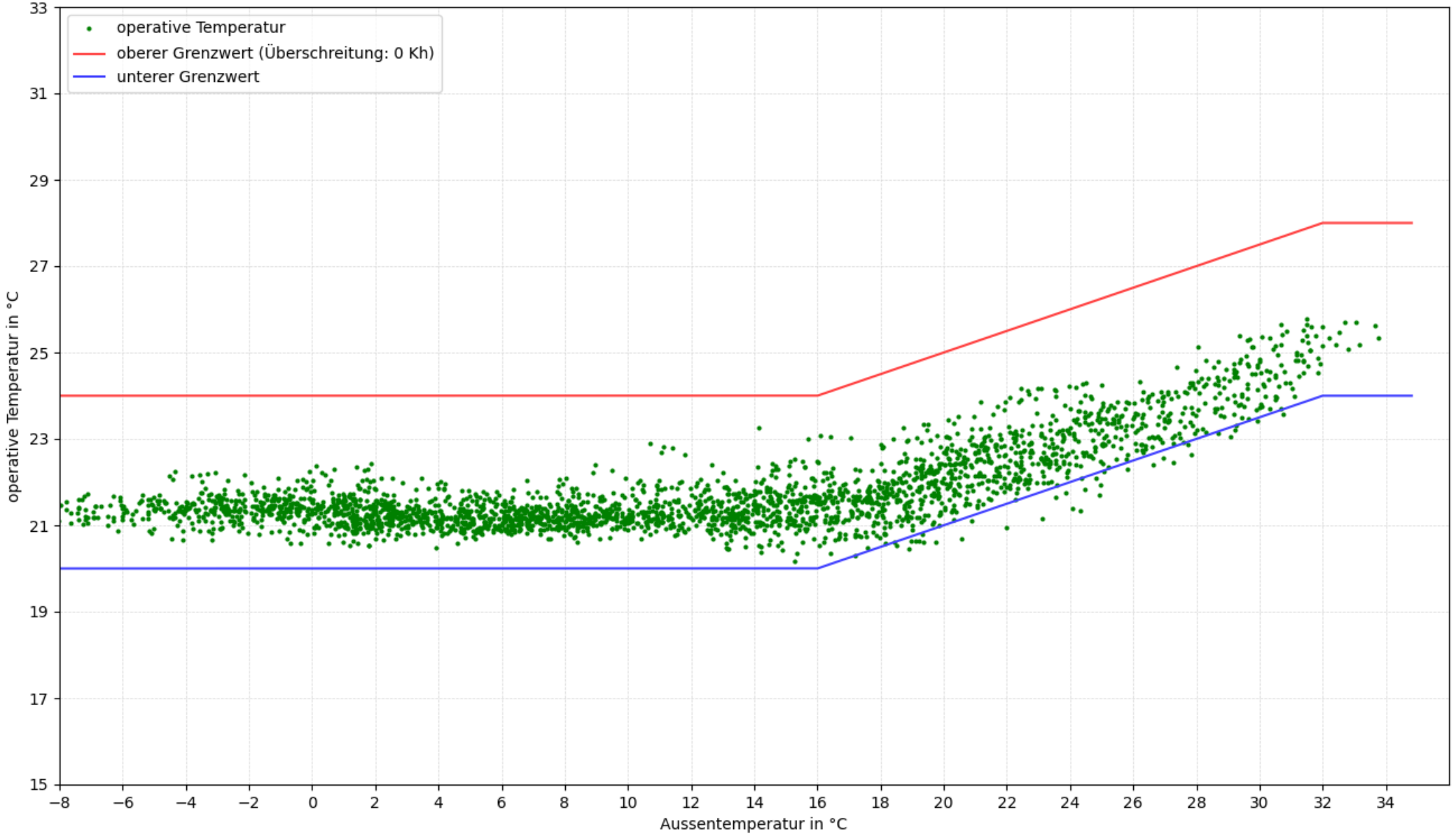
Wand
Bestandsmauerwerk
Ca. 50 cm



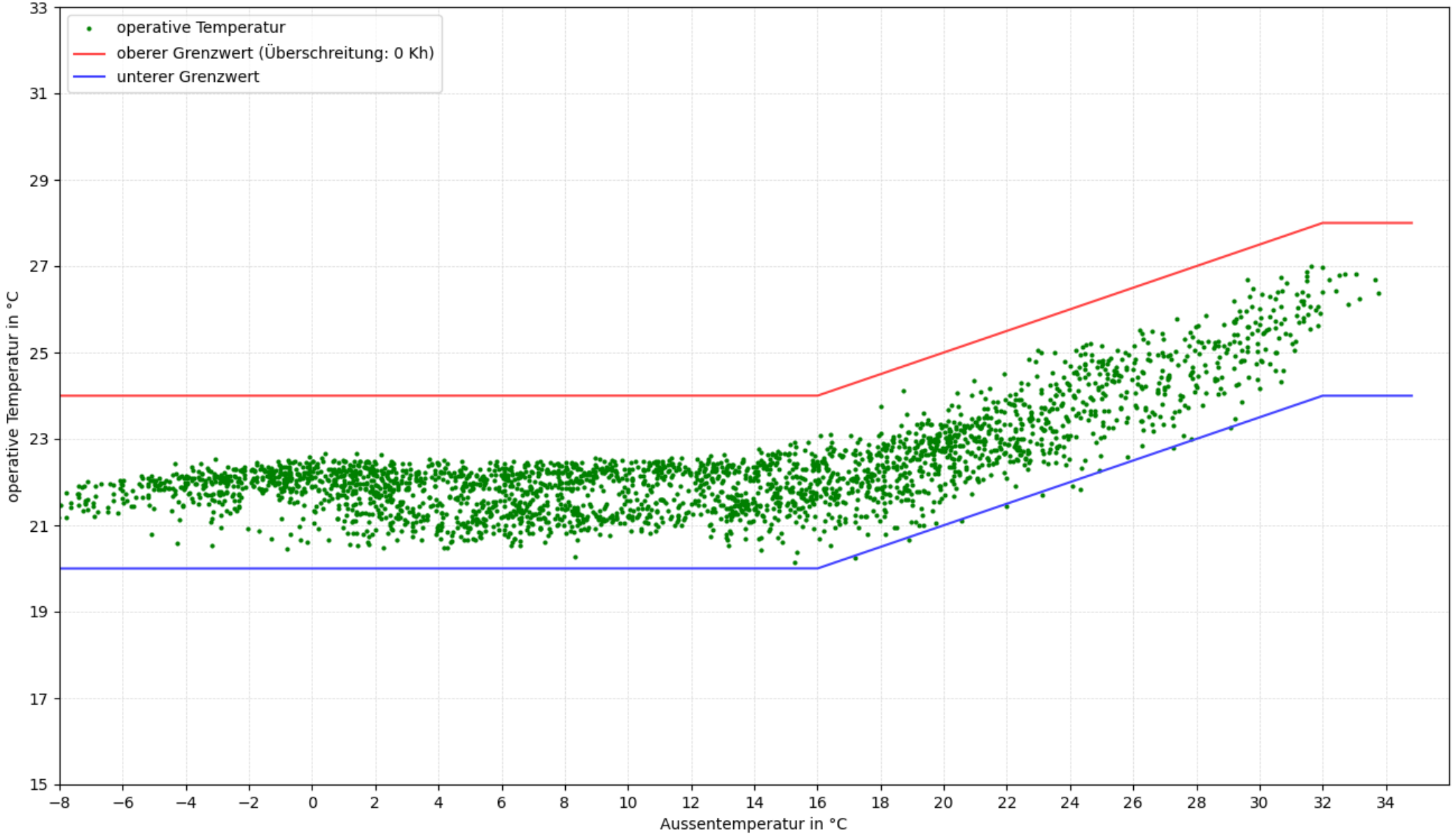
Fenster
1-fach Verglasung

Transsolar KlimaEngineering

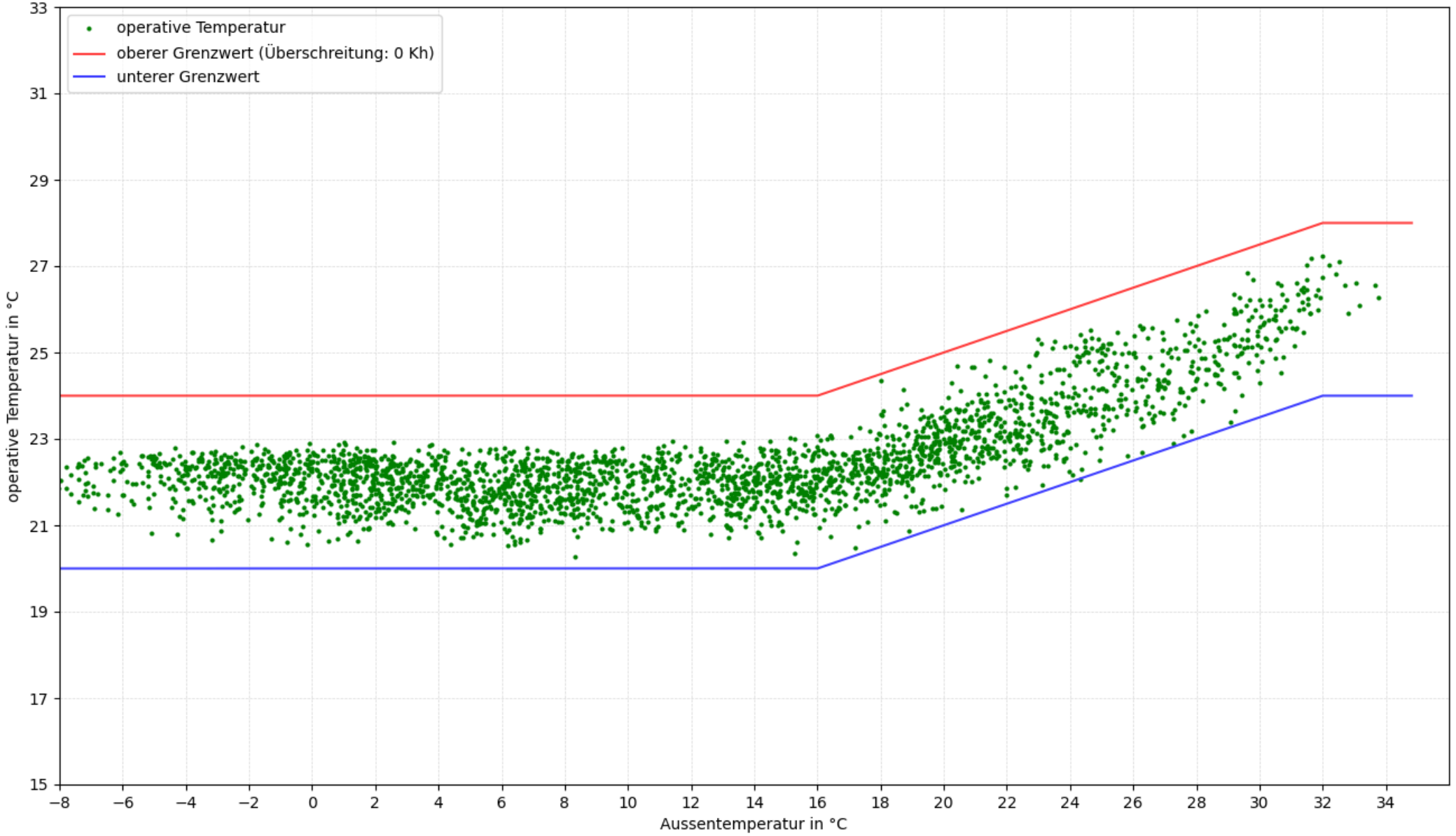
Basis - UG


operative Temperatur
oberer Grenzwert (Überschreitung: 0 Kh)
unterer Grenzwert
operative Temperatur in °C
Aussentemperatur in °C
33
31
29
27
25
23
21
19
17
15
−8
−6
−4
−2
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34

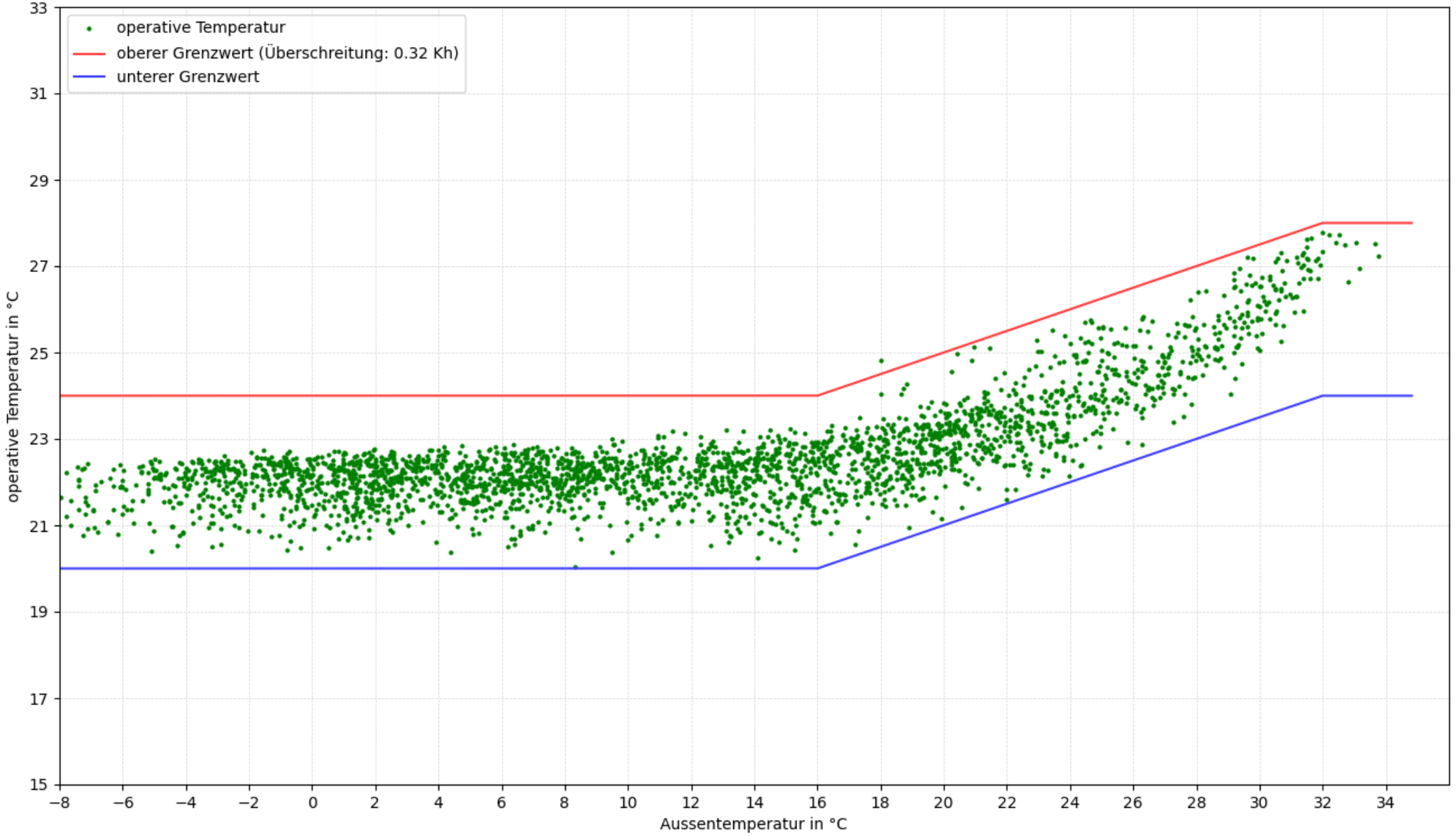
Basis - EG


operative Temperatur
oberer Grenzwert (Überschreitung: 0 Kh)
unterer Grenzwert
operative Temperatur in °C
Aussentemperatur in °C
33
31
29
27
25
23
21
19
17
15
−8
−6
−4
−2
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34

Basis – OG1


operative Temperatur
oberer Grenzwert (Überschreitung: 0 Kh)
unterer Grenzwert
operative Temperatur in °C
Aussentemperatur in °C
33
31
29
27
25
23
21
19
17
15
−8
−6
−4
−2
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34

Basis – OG2

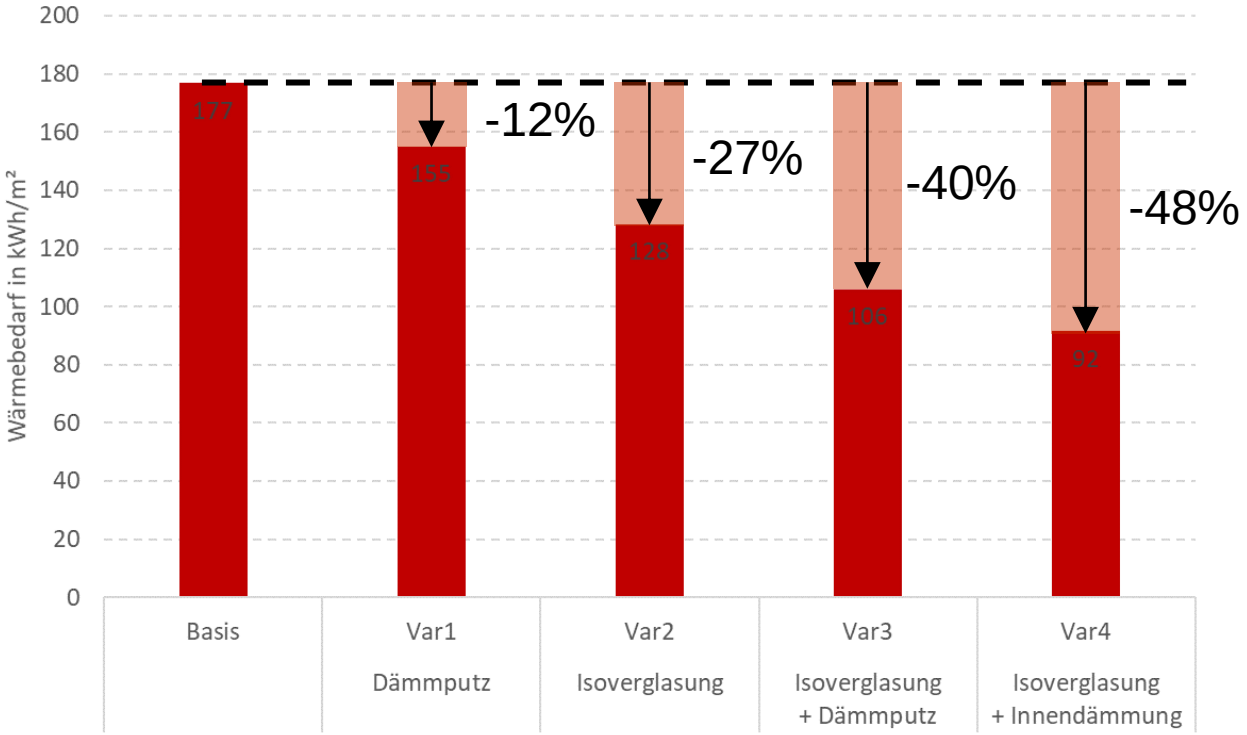

operative Temperatur
oberer Grenzwert (Überschreitung: 0.32 Kh)
unterer Grenzwert
operative Temperatur in °C
Aussentemperatur in °C
33
31
29
27
25
23
21
19
17
15
−8
−6
−4
−2
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34

Energiebedarf

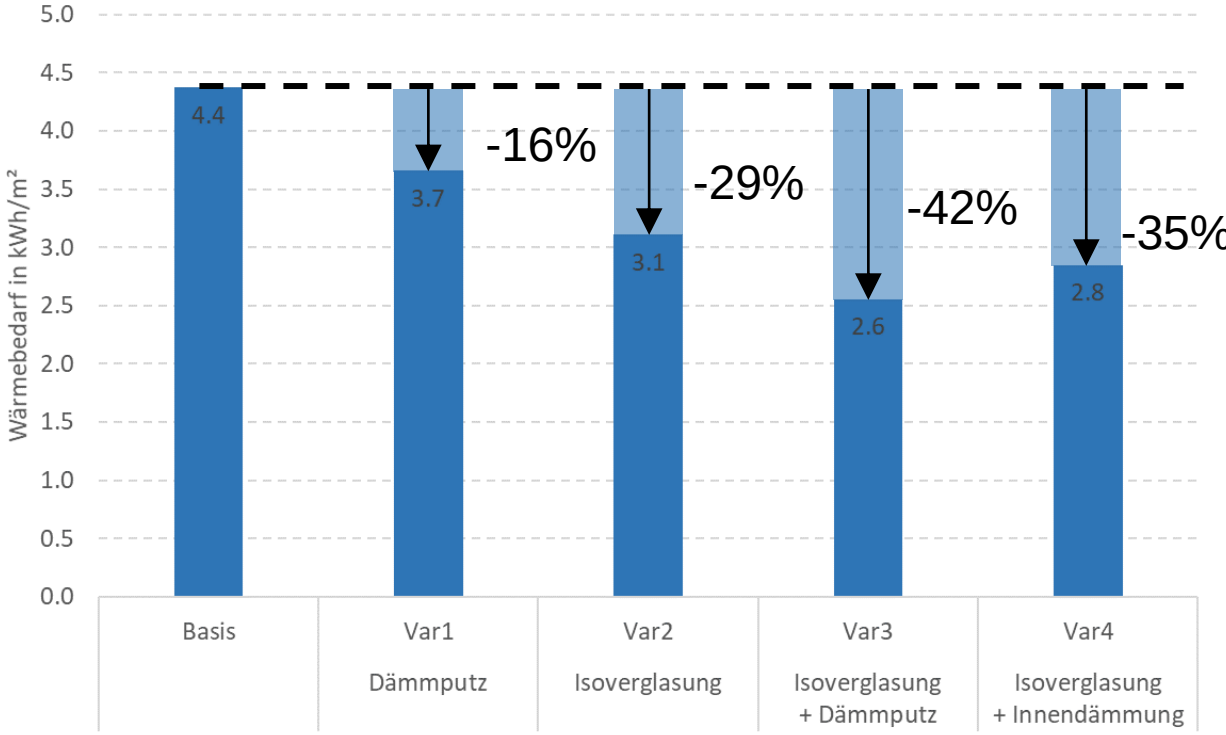
Vergleich Wärme- und Kältebedarf

Transsolar KlimaEngineering

Wärmebedarf



Kältebedarf



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Transsolar KlimaEngineering

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Site Context

East Building Analysis

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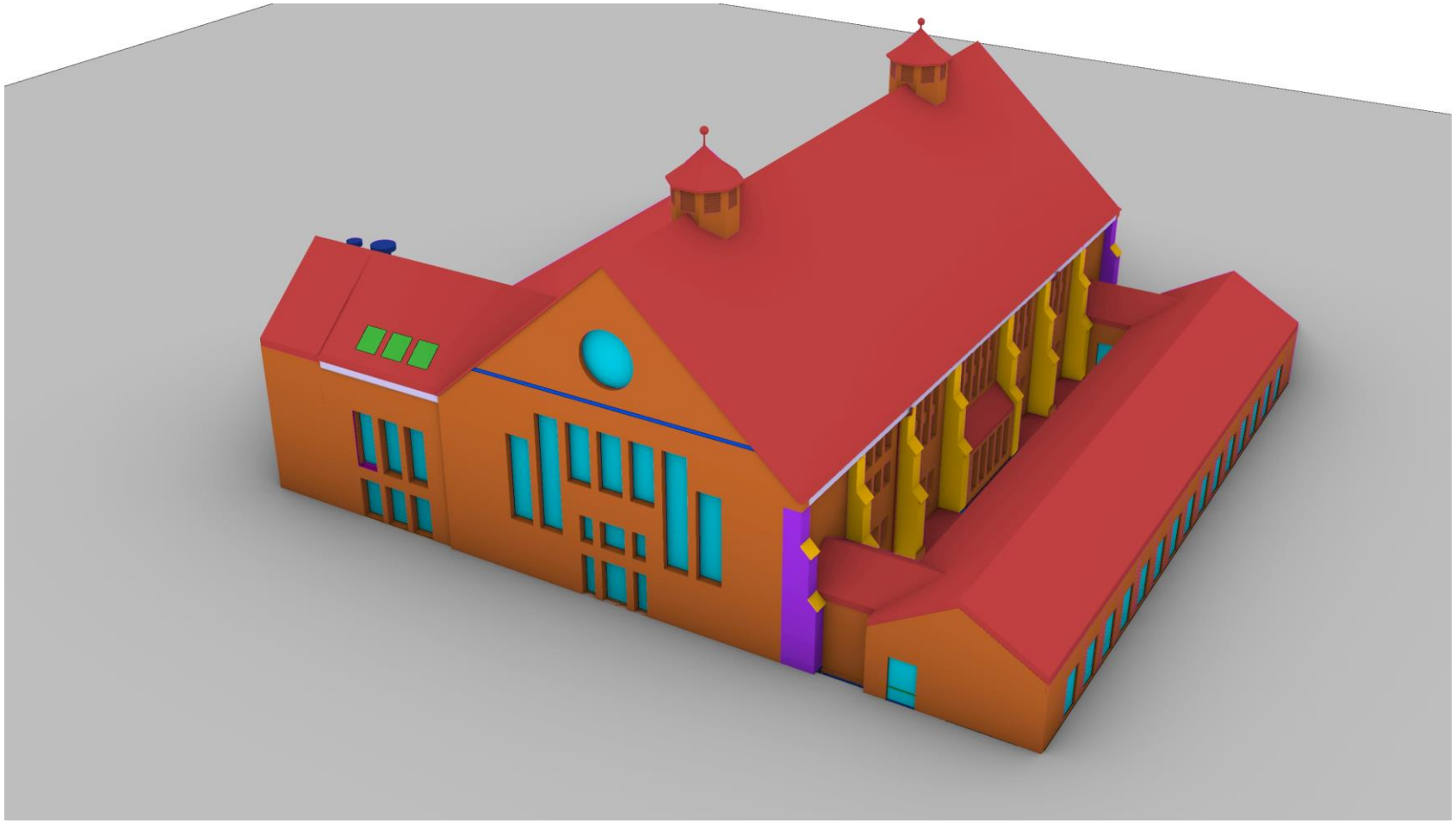


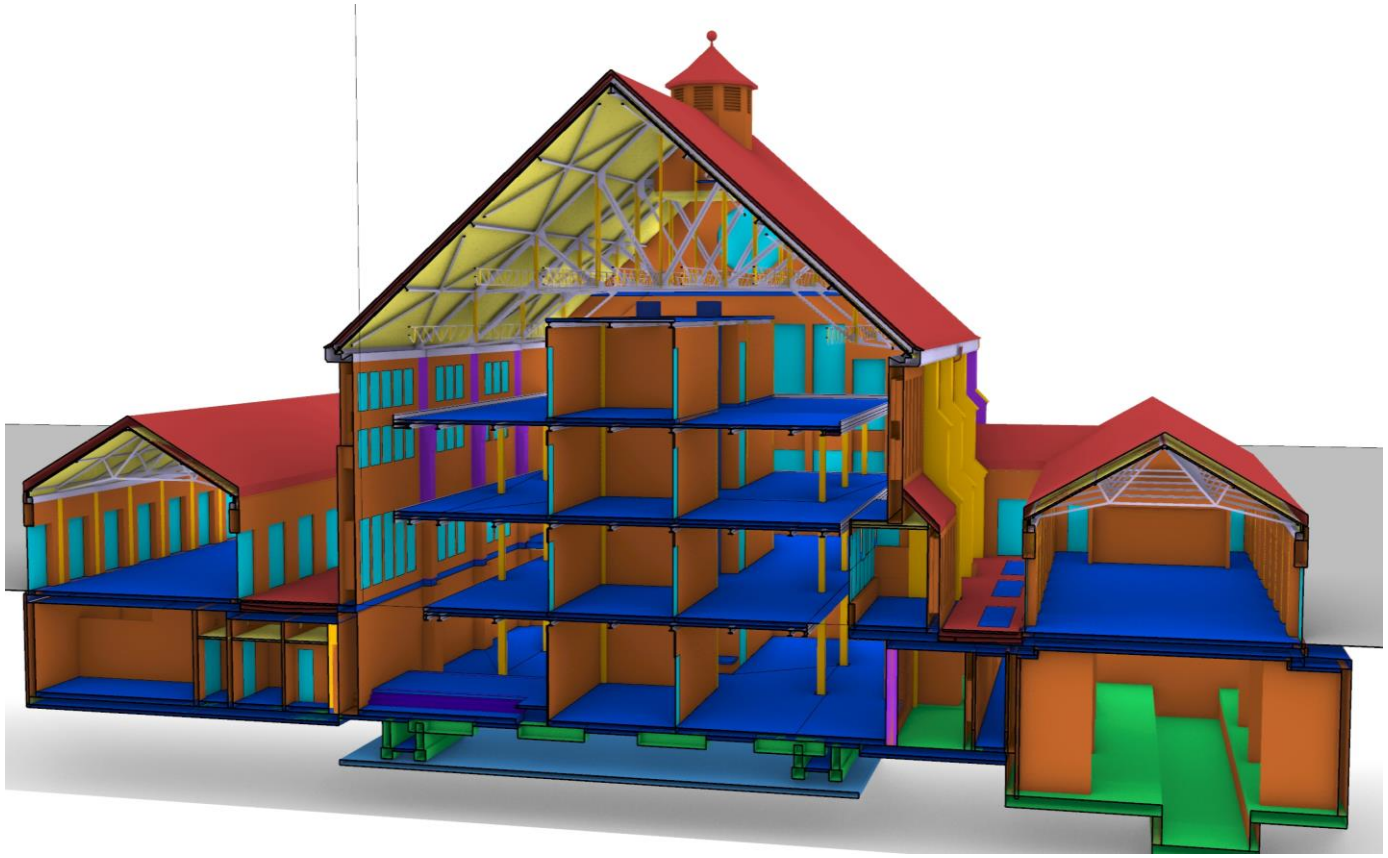
Building Geometry

Daylight model adjusted for daylight simulation based on 230327_KES_BTX_Gebaeude_05_3D_HuK.DWG

Interior Daylight Quality

Boundary Conditions

Transsolar KlimaEngineering



Exterior Glassing	90% vT (20% Frame)
Interior Glassing	90% vT (30% Frame)

Walls	50% Reflex
Floor	40% Reflex
Ceilings	70% Reflex
Context Buildings	40% Reflex
Ground	35% Reflex

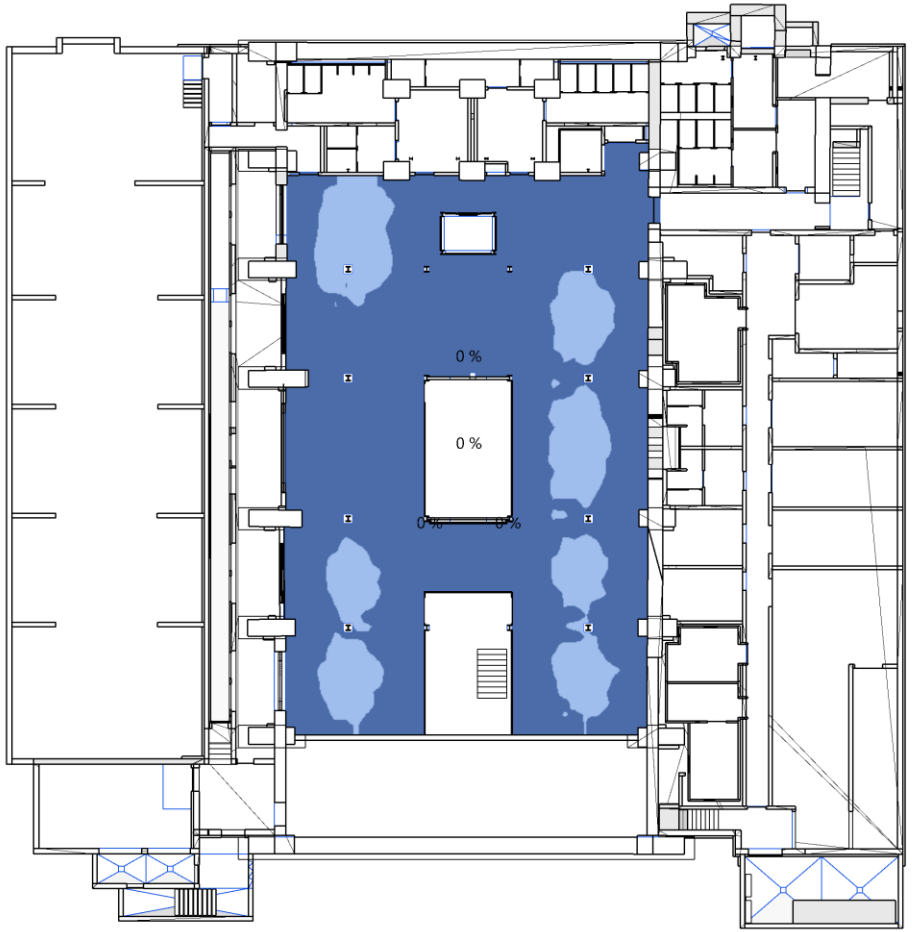
SIMULATION SETTINGS

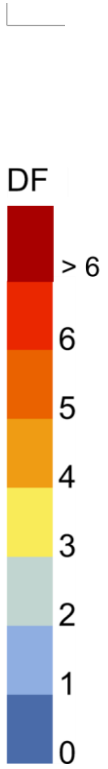
Engine	RADIANCE 5.3
Ambient Bounces	6
Grid Size	0.6m

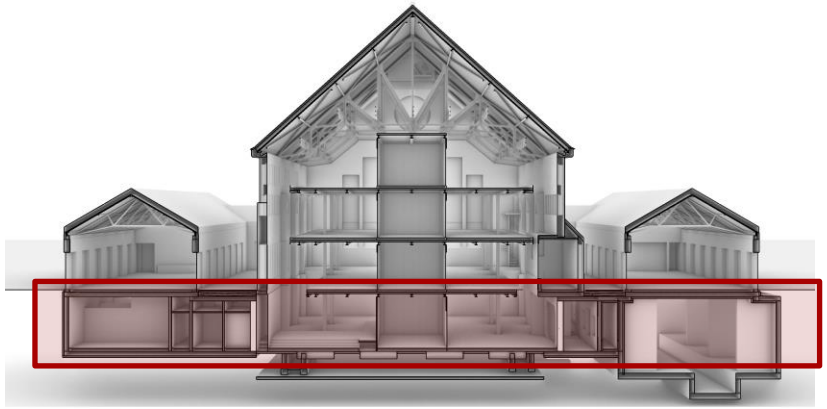
Site model

Daylight Performance

Daylight Factor (Cloudy Sky)







Section

-1 Floor

The value displayed in the center represents the percentage of area with a Daylight Factor (DF) greater than 2%, indicating high-quality daylighting suitable for workspaces.

Daylight Performance

Daylight Factor (Cloudy Sky)

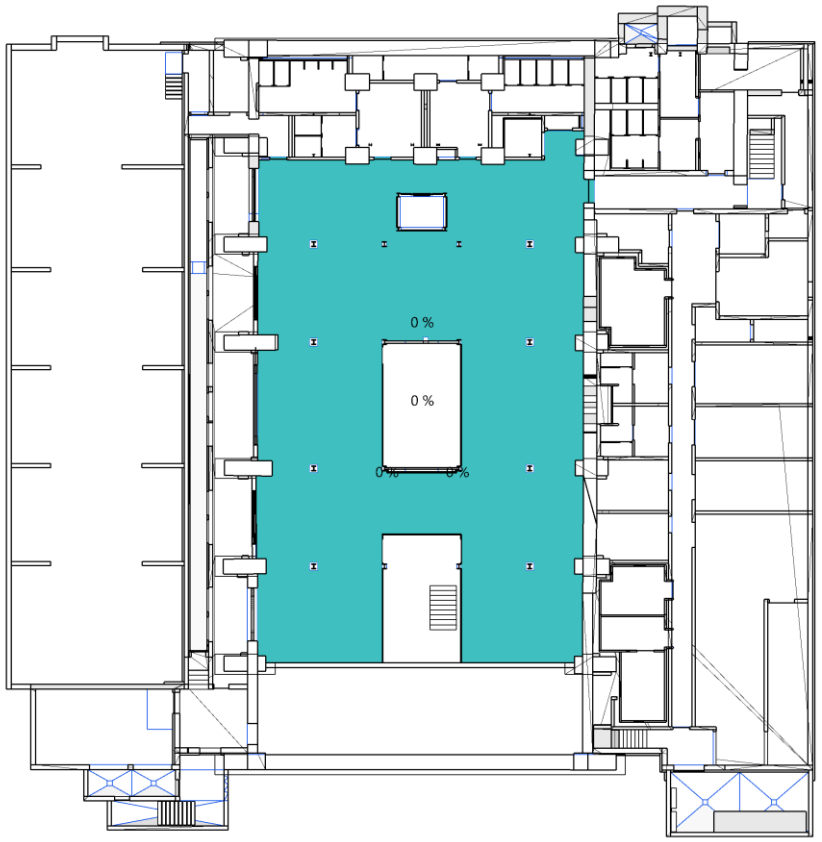
Transsolar KlimaEngineering

Minimum Daylight Factor

< 0.9% > 0.9 %

-1 Floor

The value displayed in the center represents the percentage of area with a Daylight Factor (DF) greater than 0.9%, indicating the minimum daylight suitable for workspaces.



Target Daylight Factor

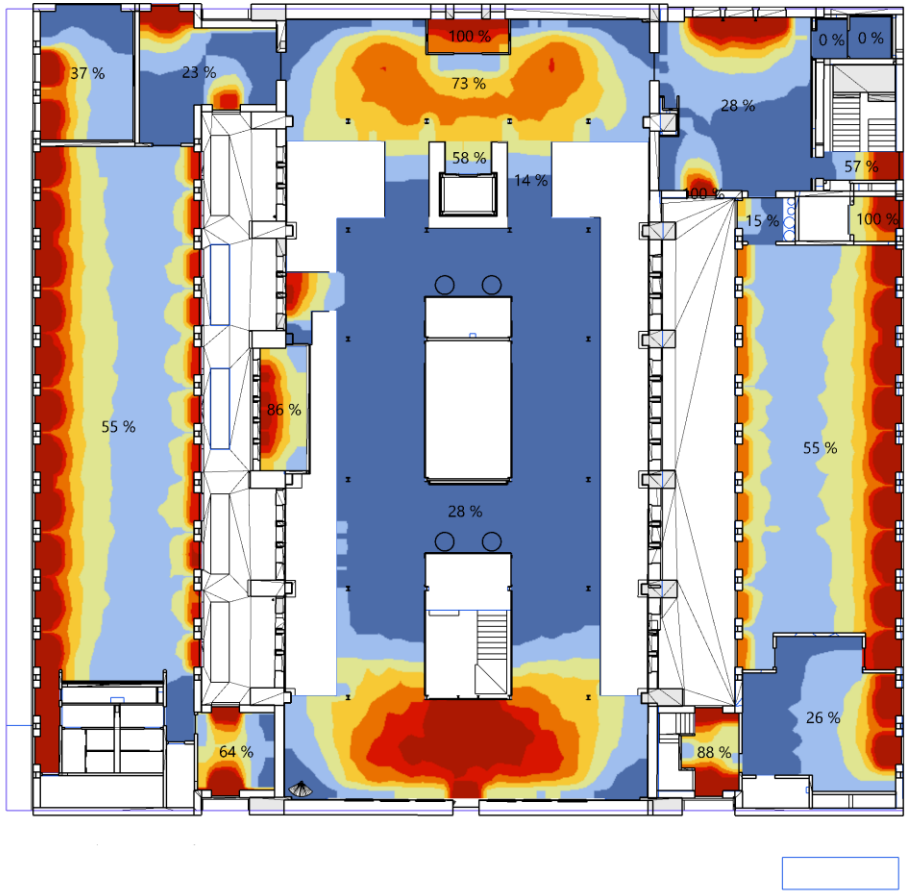
< 2% > 2 %

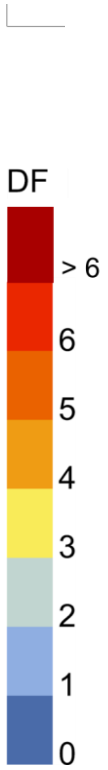
-1 Floor

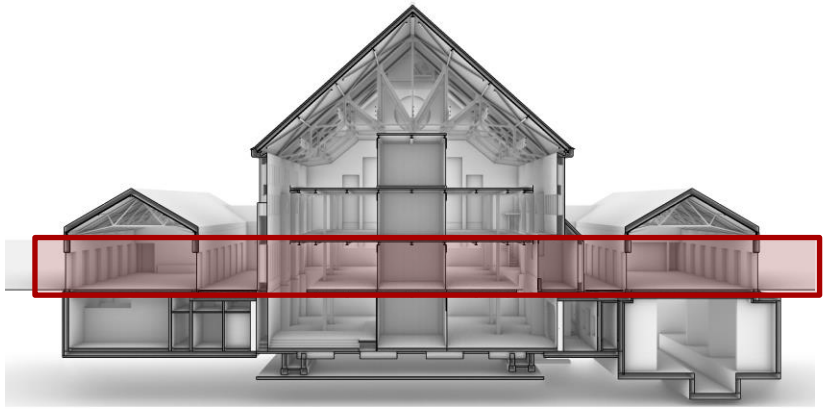
The value displayed in the center represents the percentage of area with a Daylight Factor (DF) greater than 2%, indicating high-quality daylighting suitable for workspaces.

Daylight Performance

Daylight Factor (Cloudy Sky)







Section

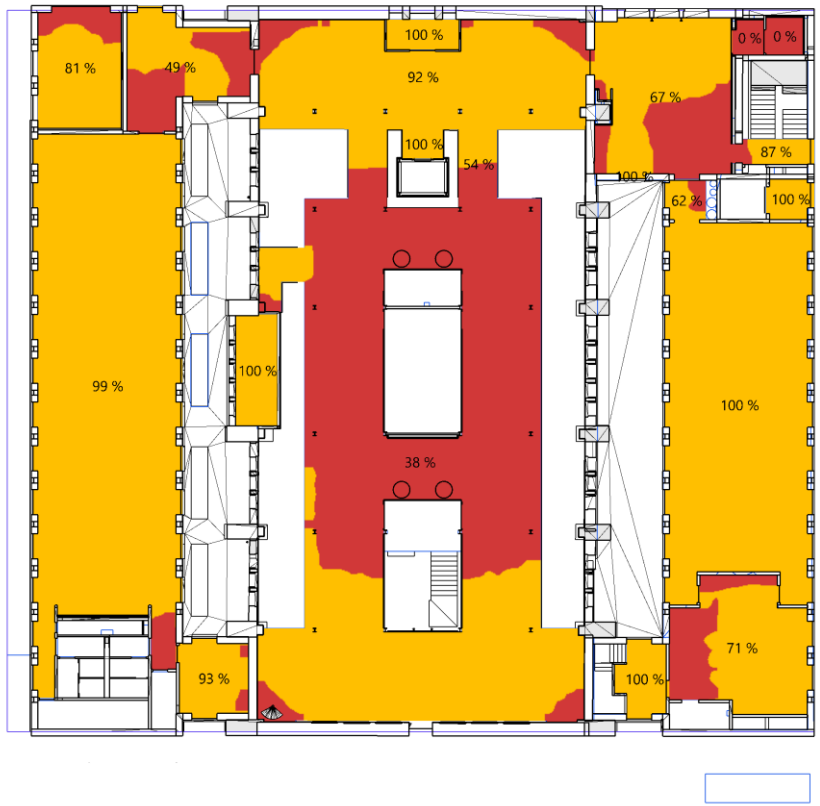
Ground Floor

The value displayed in the center represents the percentage of area with a Daylight Factor (DF) greater than 2%, indicating high-quality daylighting suitable for workspaces.

Daylight Performance

Daylight Factor (Cloudy Sky)

Transsolar KlimaEngineering

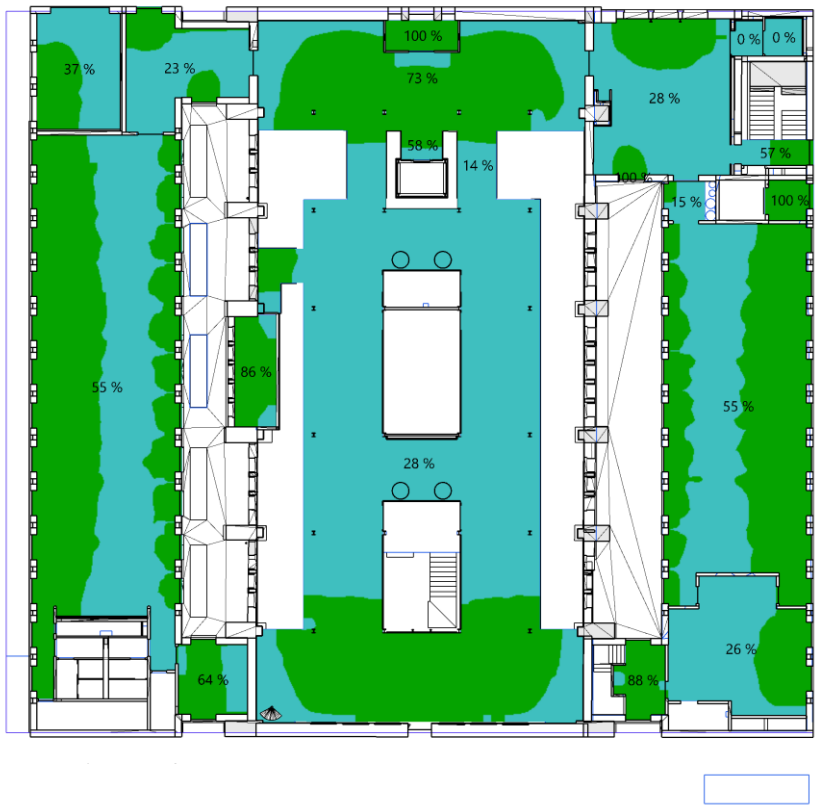


Minimum Daylight Factor

< 0.9% > 0.9 %

Ground Floor

The value displayed in the center represents the percentage of area with a Daylight Factor (DF) greater than 0.9%, indicating the minimum daylight suitable for workspaces.



Target Daylight Factor

< 2% > 2 %

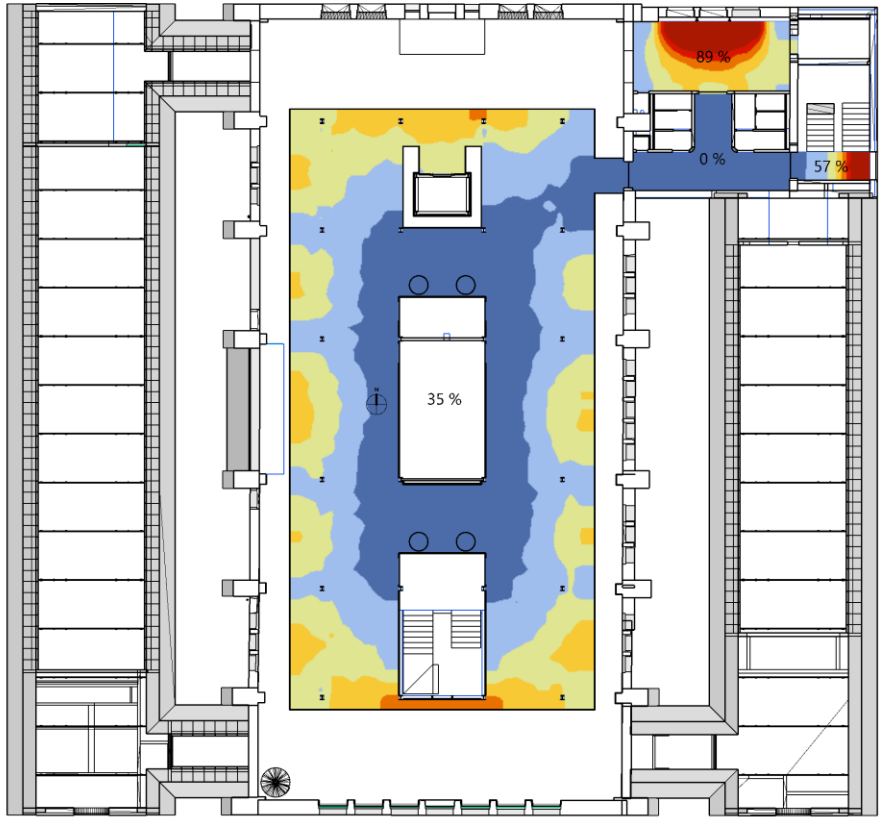
Ground Floor

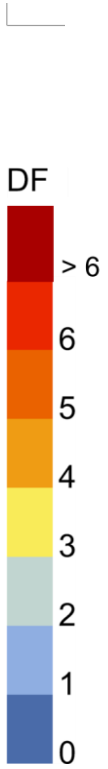
The value displayed in the center represents the percentage of area with a Daylight Factor (DF) greater than 2%, indicating high-quality daylighting suitable for workspaces.

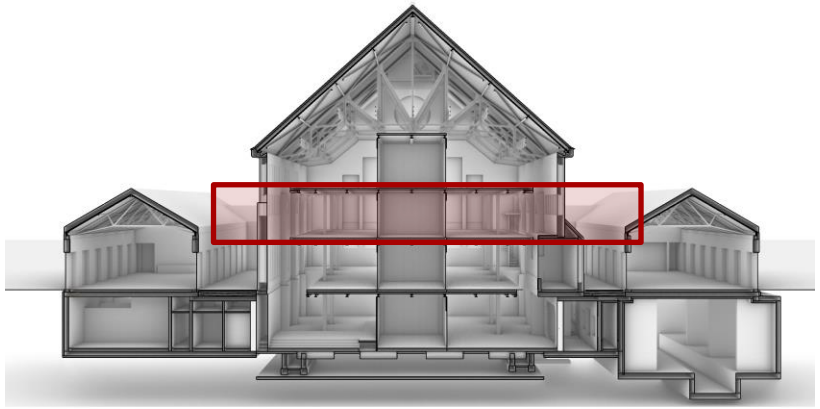
Daylight Performance

Daylight Factor (Cloudy Sky)

Transsolar KlimaEngineering







Section

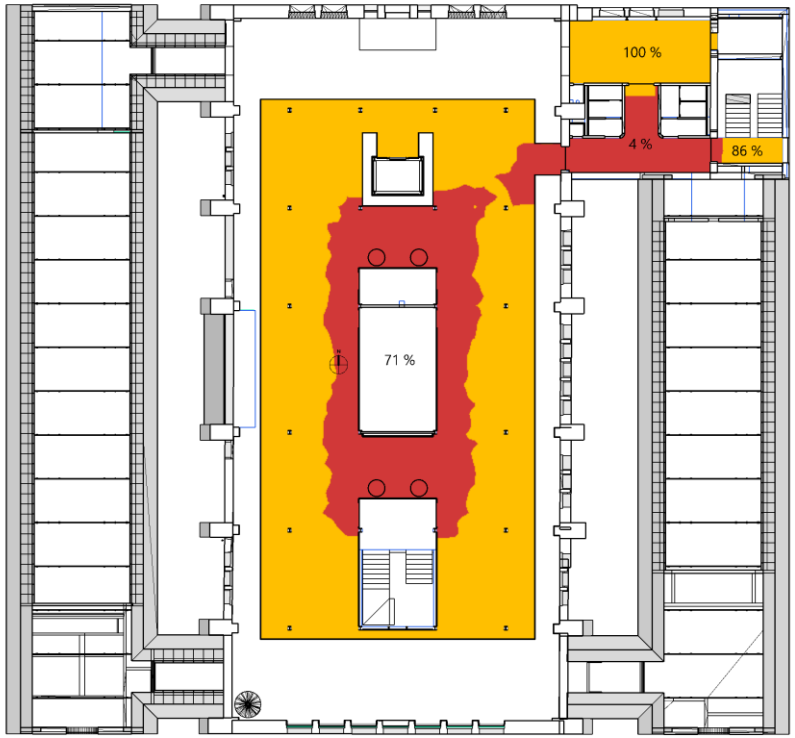
1st Floor

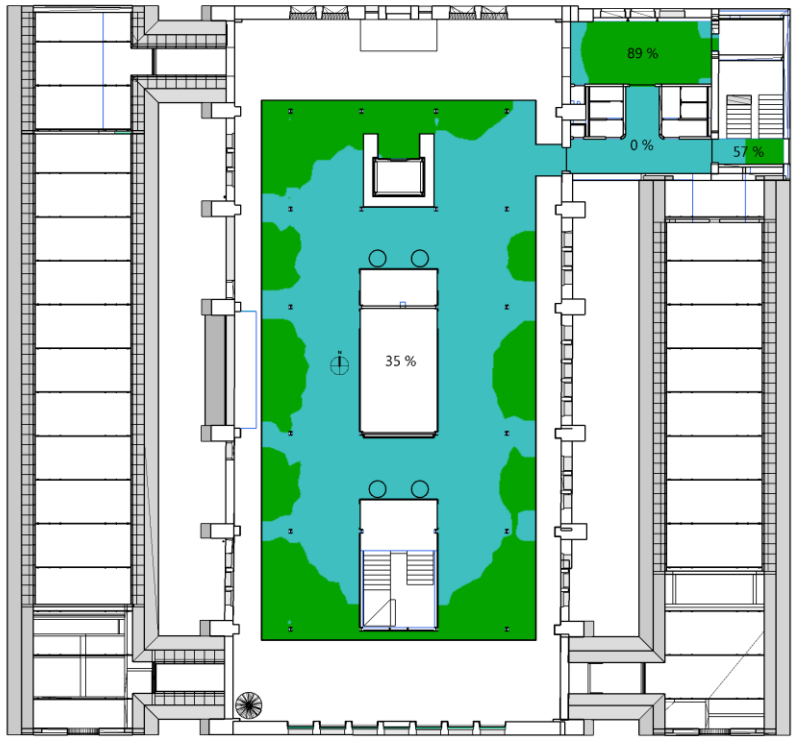
The value displayed in the center represents the percentage of area with a Daylight Factor (DF) greater than 2%, indicating high-quality daylighting suitable for workspaces.

Daylight Performance

Daylight Factor (Cloudy Sky)

Transsolar KlimaEngineering





Minimum Daylight Factor

< 0.9% > 0.9 %

1st Floor

The value displayed in the center represents the percentage of area with a Daylight Factor (DF) greater than 0.9%, indicating the minimum daylight suitable for workspaces.

Target Daylight Factor

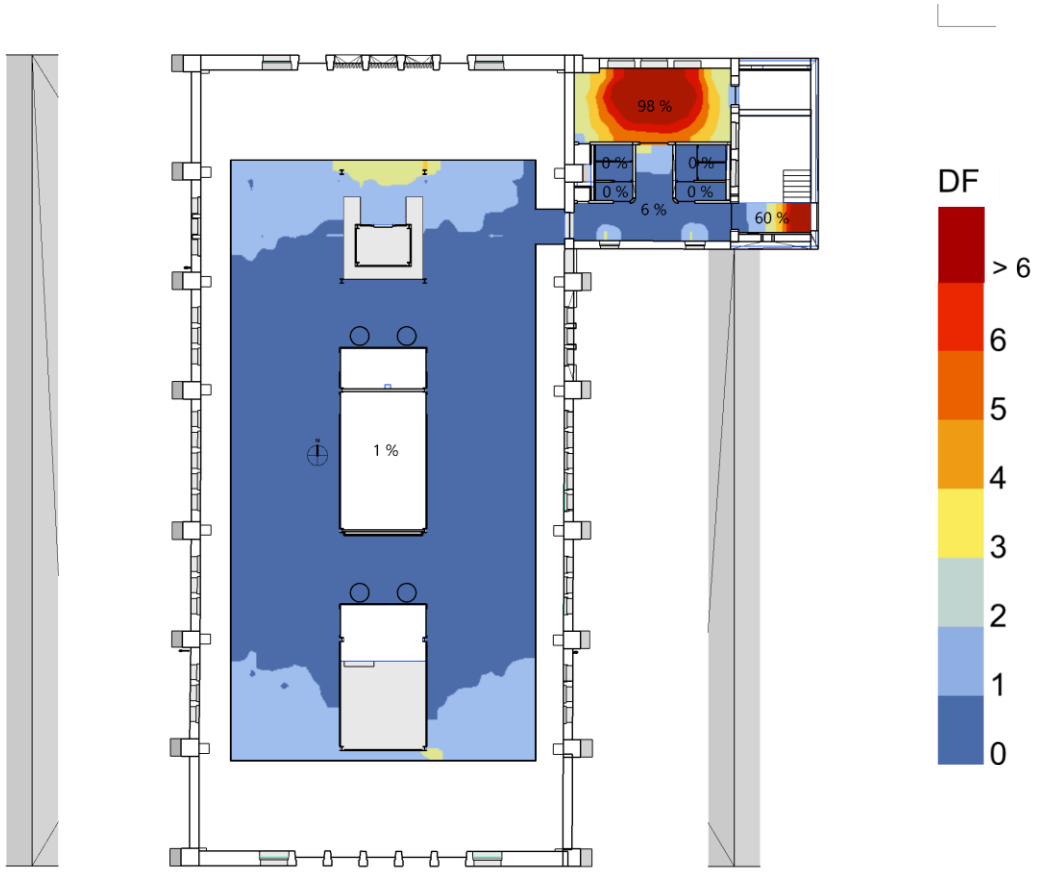
< 2% > 2 %

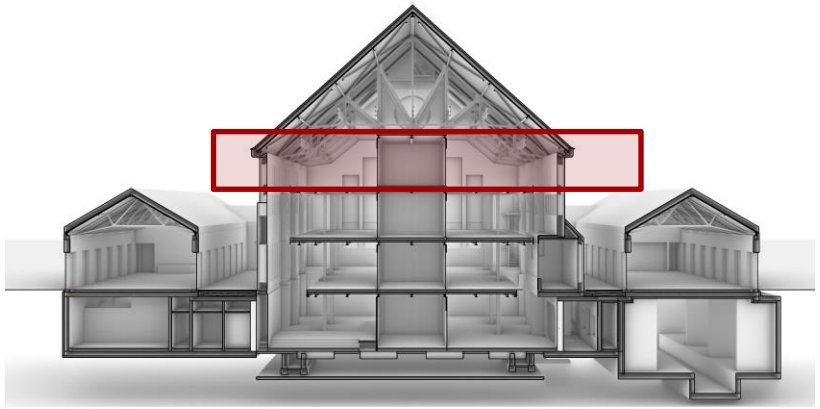
1st Floor

The value displayed in the center represents the percentage of area with a Daylight Factor (DF) greater than 2%, indicating high-quality daylighting suitable for workspaces.

Daylight Performance

Daylight Factor (Cloudy Sky)





Section

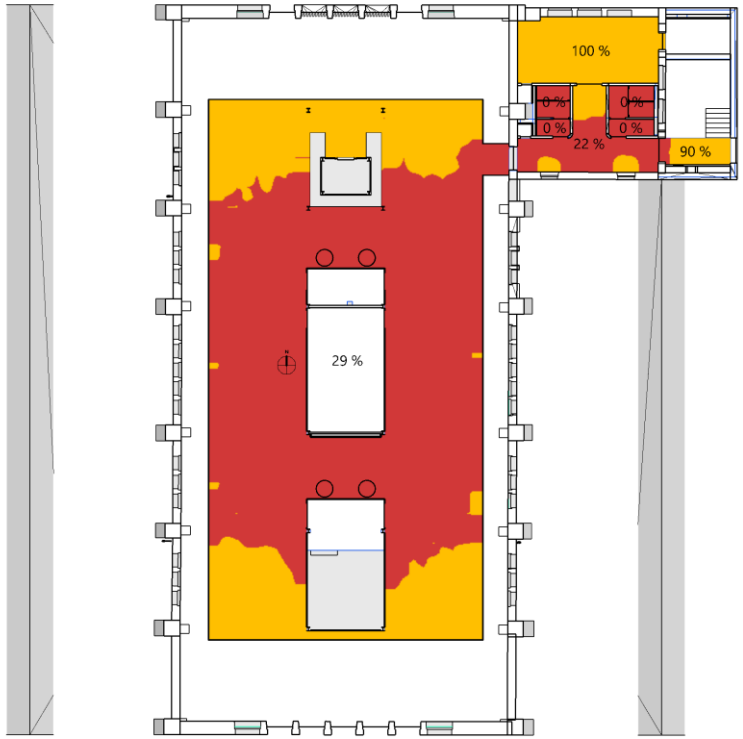
2nd Floor

The value displayed in the center represents the percentage of area with a Daylight Factor (DF) greater than 2%, indicating high-quality daylighting suitable for workspaces.

Daylight Performance

Daylight Factor (Cloudy Sky)

Transsolar KlimaEngineering



Minimum Daylight Factor

< 0.9% > 0.9 %

2nd Floor

The value displayed in the center represents the percentage of area with a Daylight Factor (DF) greater than 0.9%, indicating the minimum daylight suitable for workspaces.

Target Daylight Factor

< 2% > 2 %

2nd Floor

The value displayed in the center represents the percentage of area with a Daylight Factor (DF) greater than 2%, indicating high-quality daylighting suitable for workspaces.

Transsolar KlimaEngineering

Inhalt

AP1: Aufstellung eines Messkonzepts

AP2: Monitoring und Mapping der thermischen Komfortparameter sowie der Luftqualität und des örtlichen Schallpegels

AP3: Monitoring und Mapping der visuellen Komfortparameter

AP4: Kontinuierliche Empfehlungen für eine Optimierung und Feintuning der technischen Gebäudeausrüstung

AP5: Nutzertracking

AP6: Regelmässige Nutzerbefragung

AP7: Dokumentation und Dissemination

Kesselhaus München Schwabing

Client: Ehret + Klein / Architect: Hild + K