



Seoul, Design Masterpiece

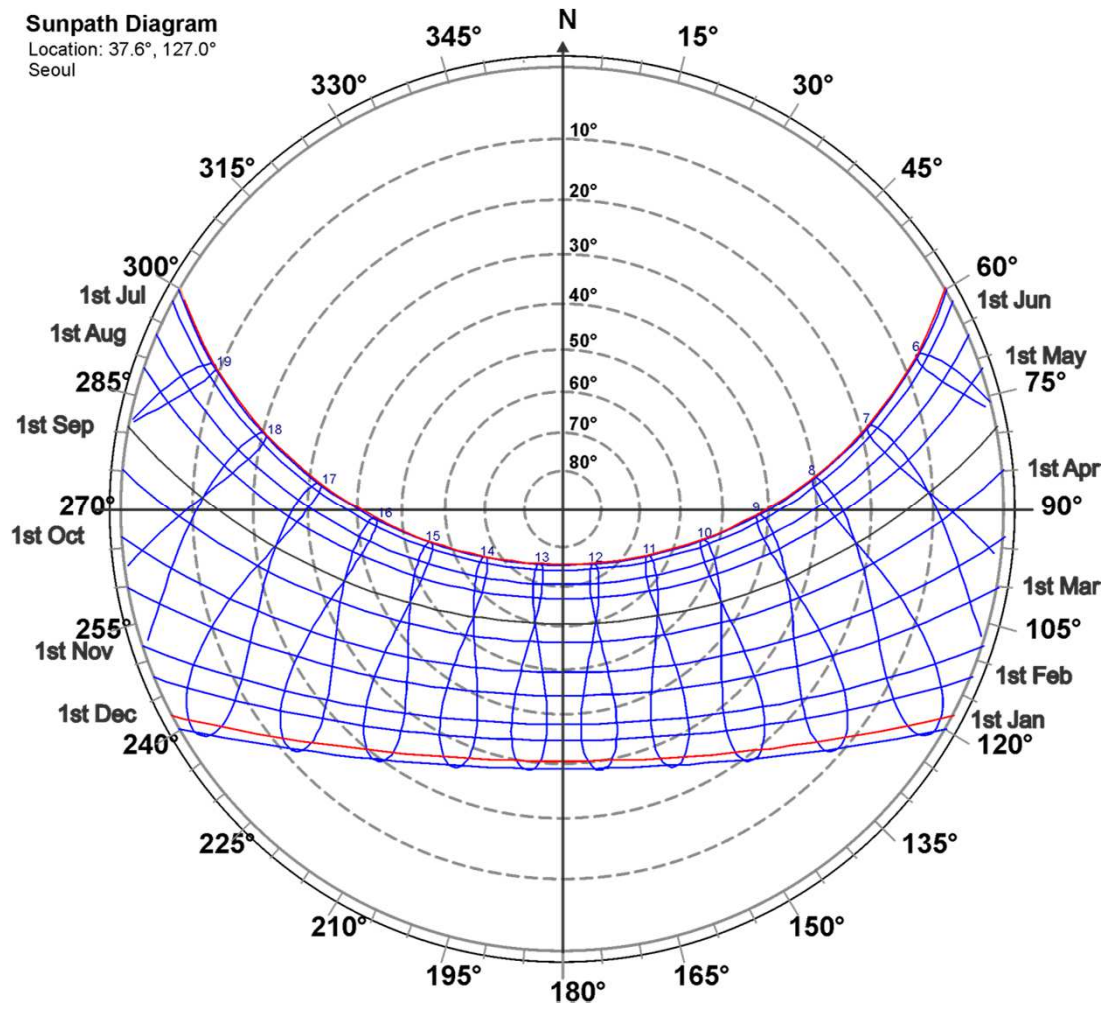
Gangnam district, Plot A5

Transsolar Energietechnik GmbH
Matthias Rudolph, Friedemann Kik
<http://www.transsolar.com>



Climate Data from weather station of Meteonorm – SEOUL CITY

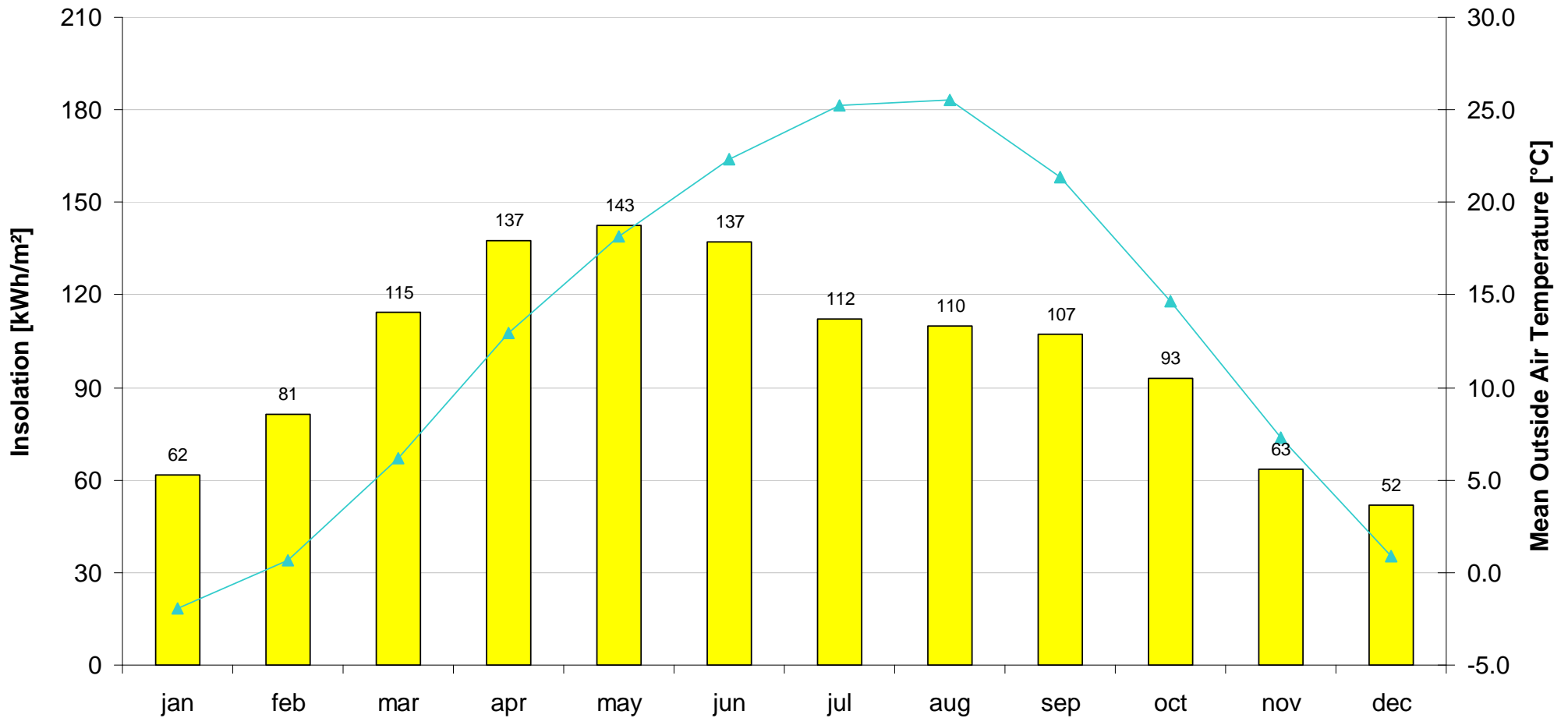
CLIMATE CONDITIONS – ASSESSMENT OF POTENTIALS



Climate Data **Meteonorm60**
 Seoul City

Longitude **126.97°**
Latitude **37.57°**

SEOUL CITY (Meteonorm Climate Data Station)



Horizontal Insolation: 1213 kWh/m²/a

Yearly Mean Outside Temperature 12.8 °C

Nr. Of Hour With Outside Temperature Over 25 °C 1140 h

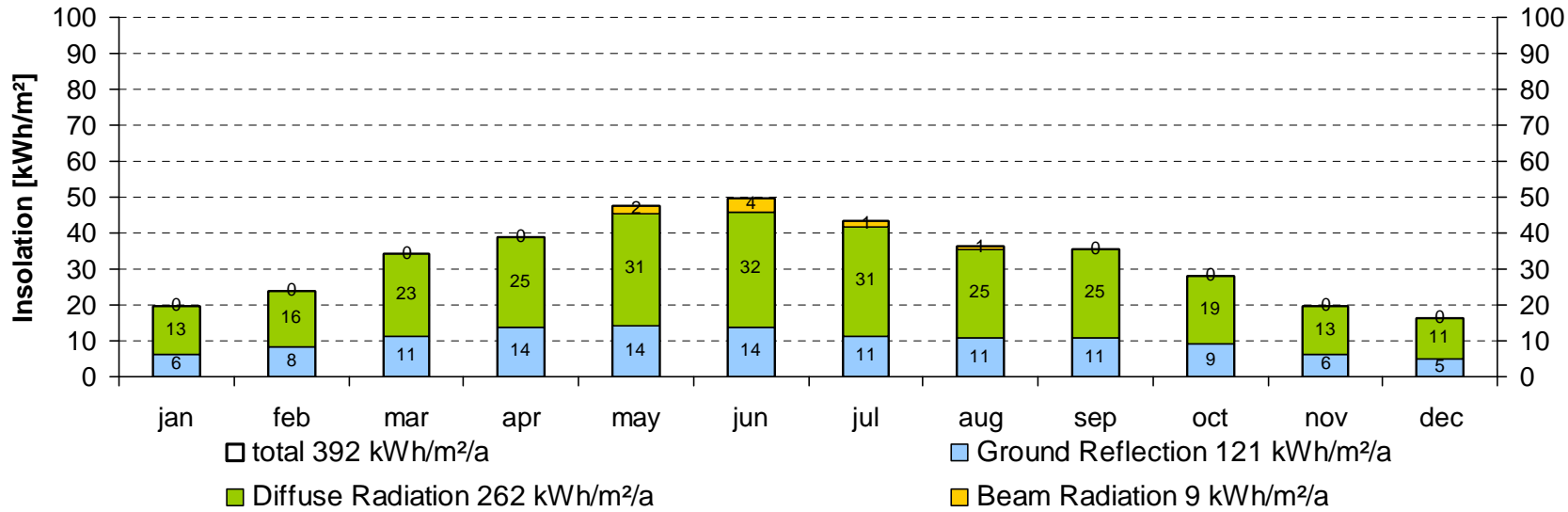
Nr. Of Hour With Outside Humidity Over 11.5 g/Kg 2004 h

■ Insolation [kWh/m²]

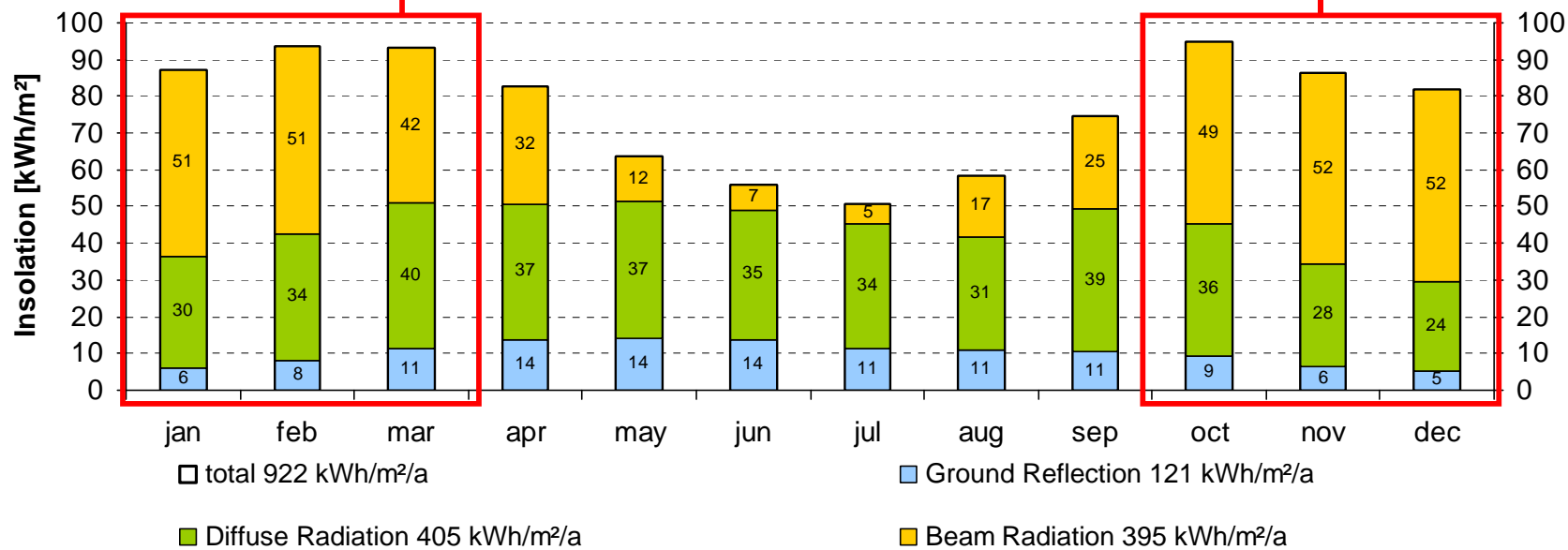
▲ Mean Outside Air Temperature [°C]

Demand for Dehumidification

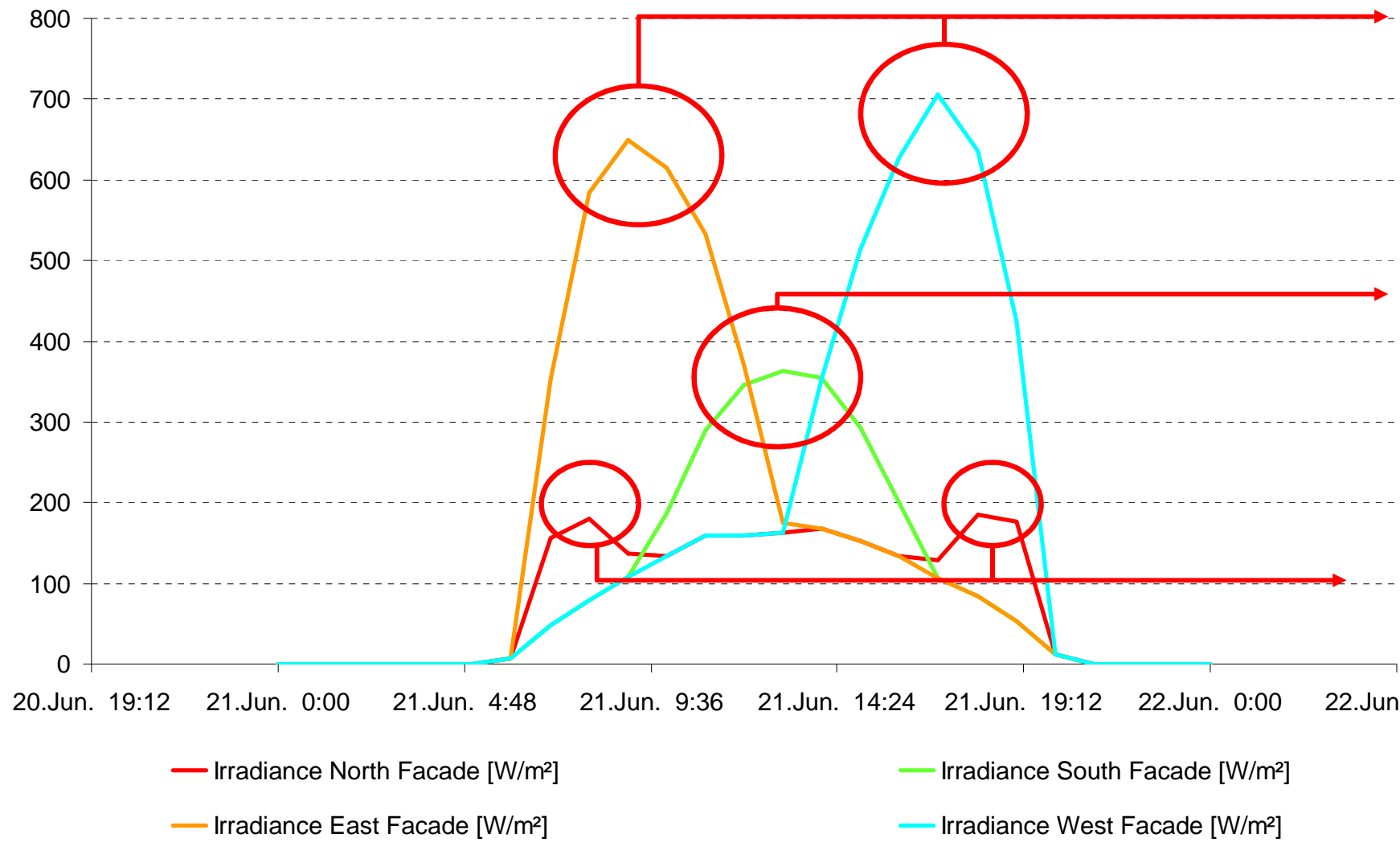
North - Facade; Azimuth: 180° ;Slope: 90°



South-Facade; Azimuth: 0° ;Slope: 90°



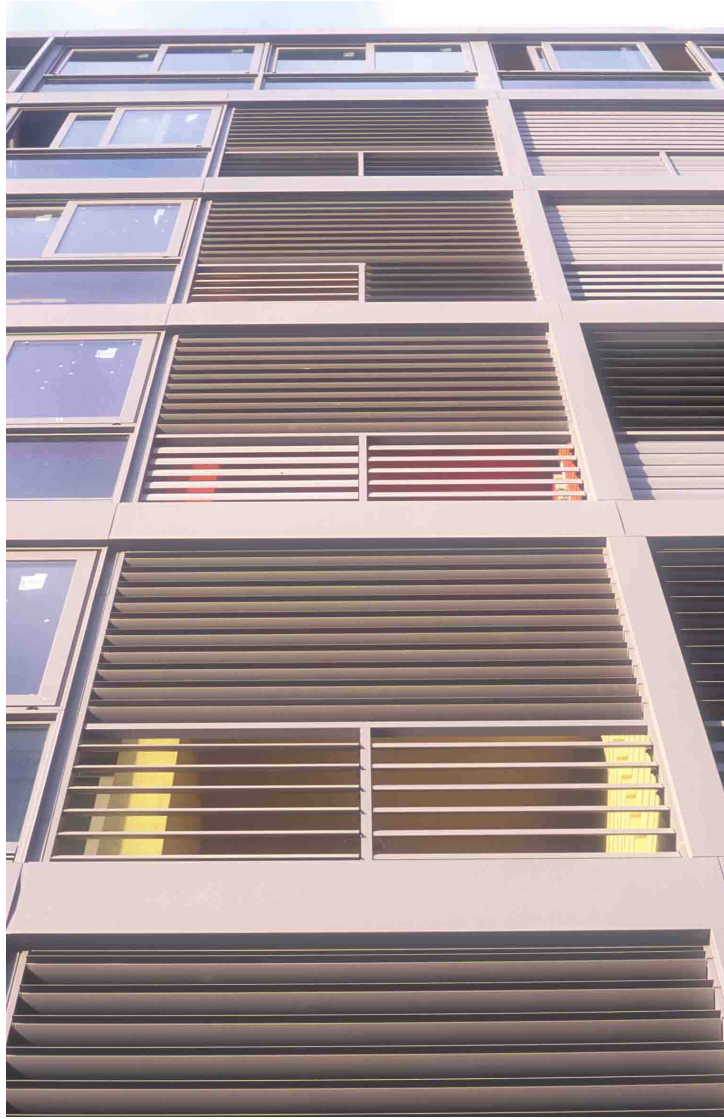
SEOUL CITY (Meteonorm Climate Data Station)



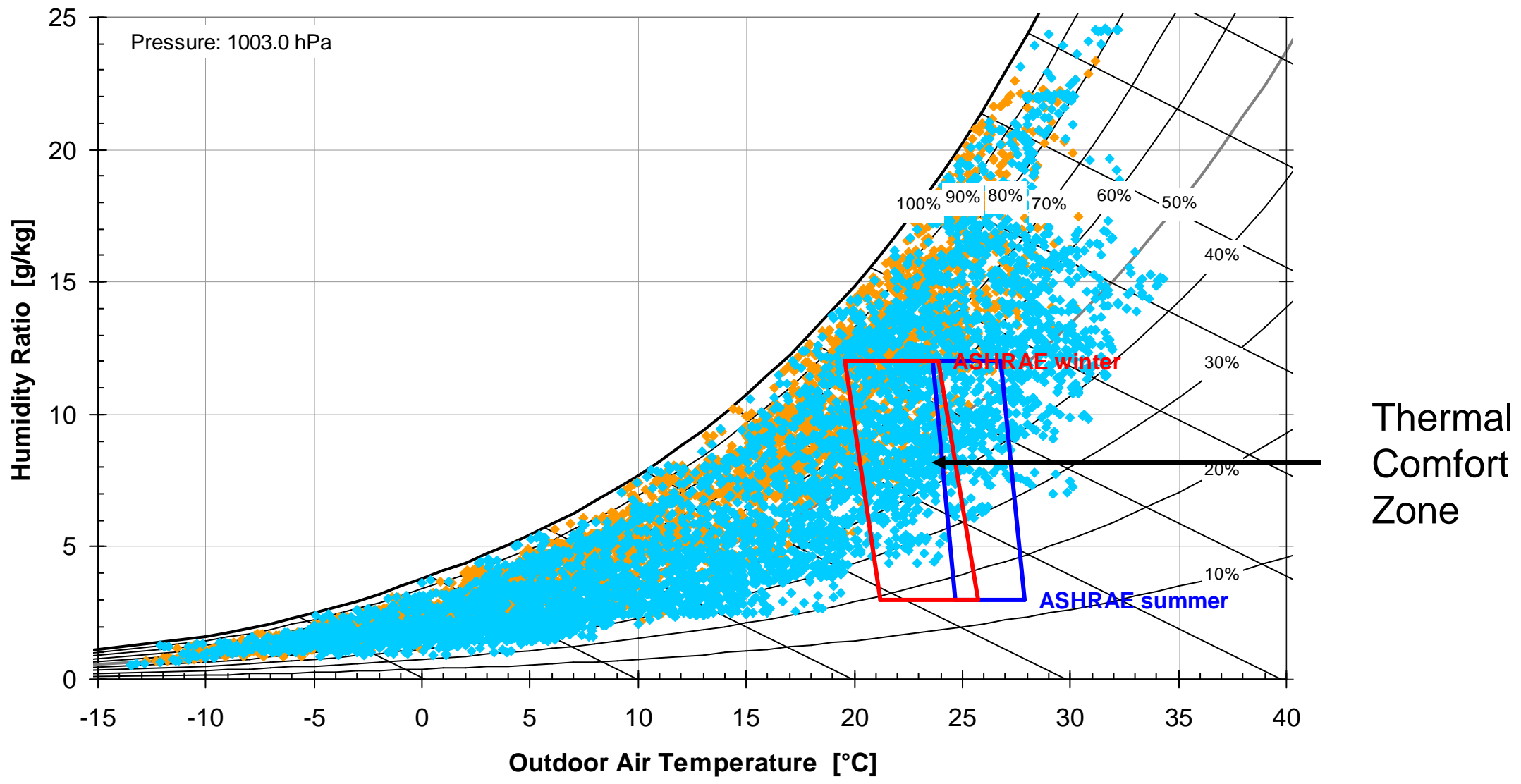
East & West:
**External
Shading
needed**

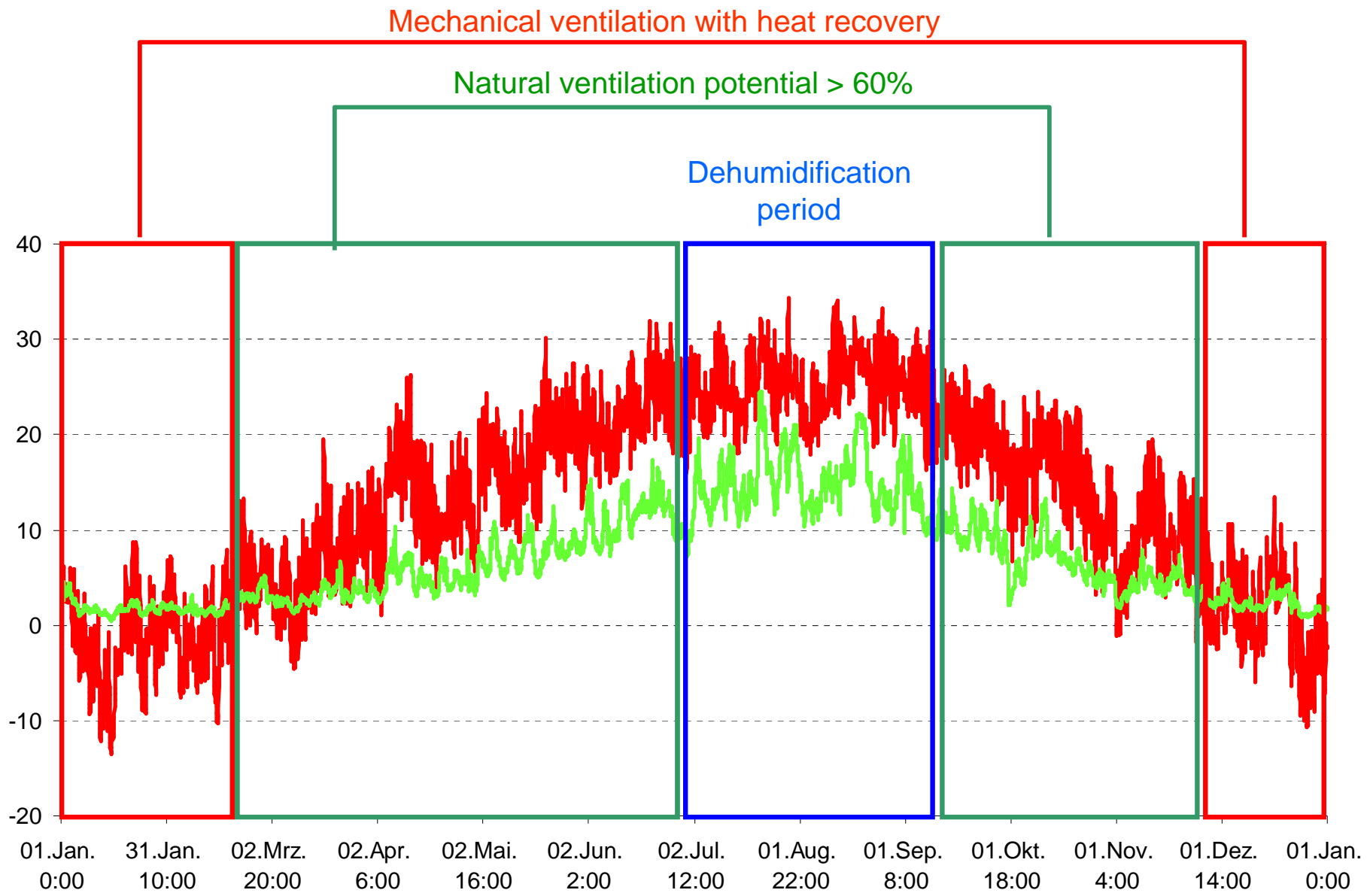
South:
**Effective
fixed
shading
(Overhang)**

North:
**No
shading
needed**



SEOUL CITY (Meteonorm Climate Data Station)

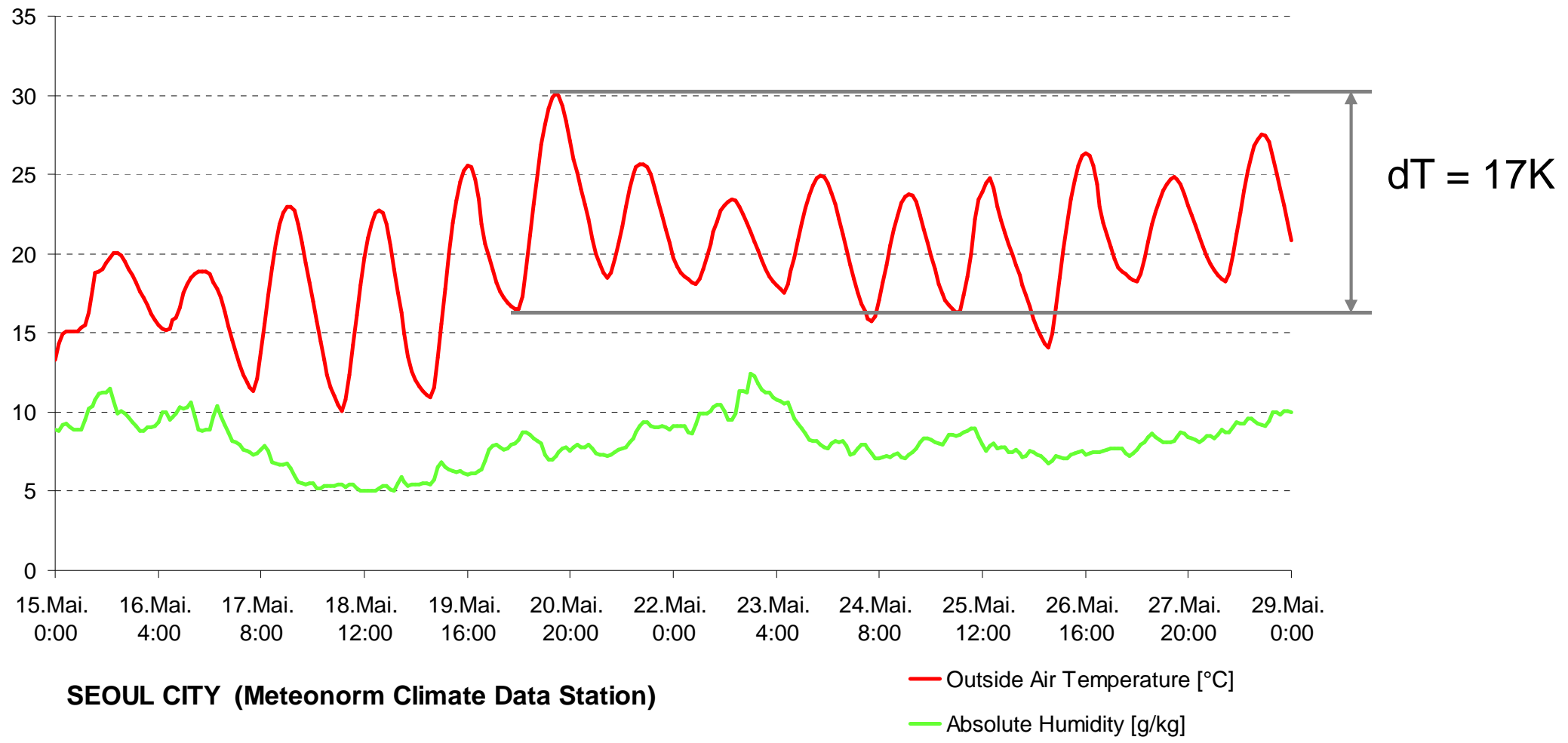


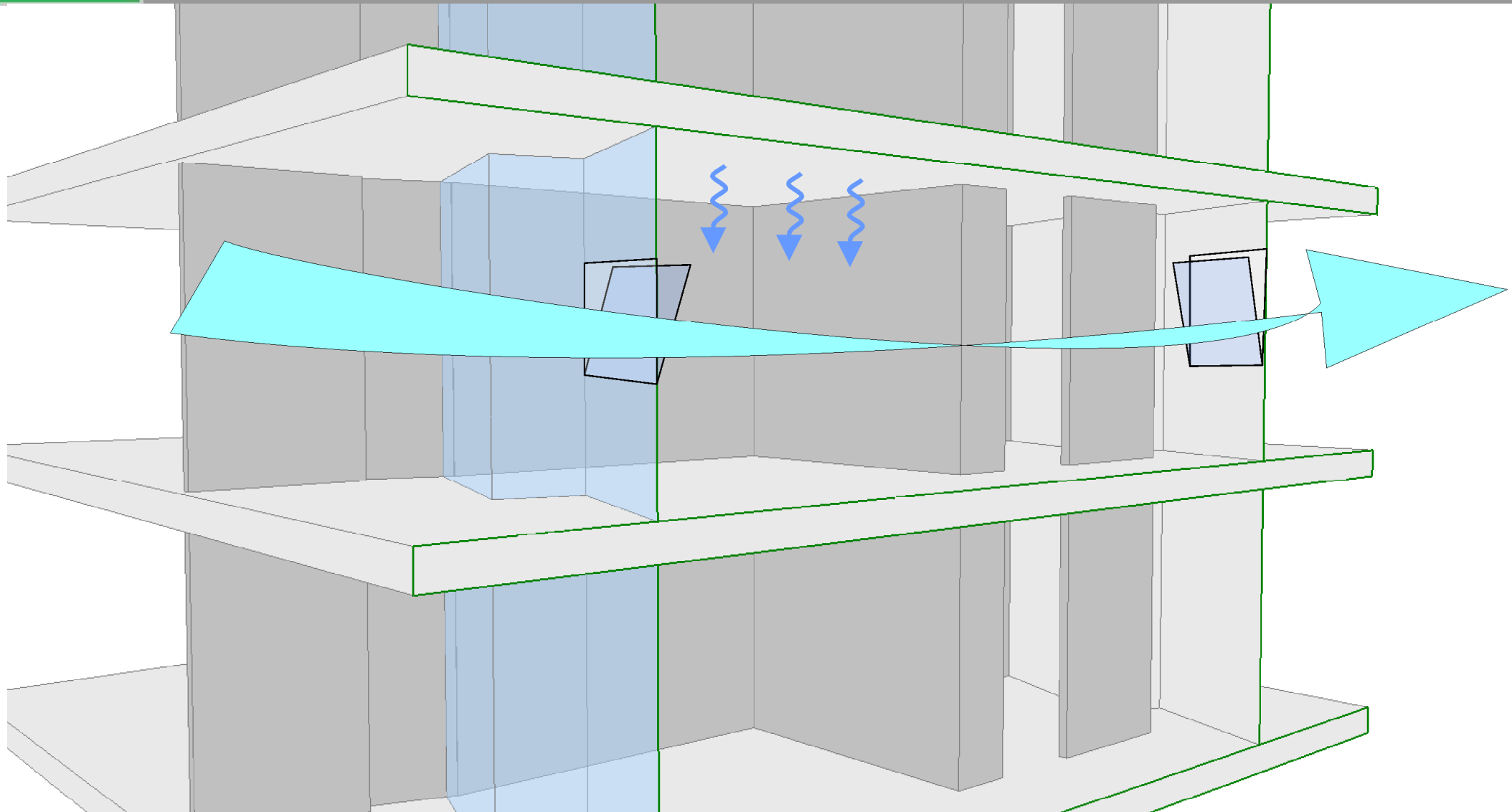


SEOUL CITY (Meteonorm Climate Data Station)

— Outside Air Temperature [°C]
— Absolute Humidity [g/kg]

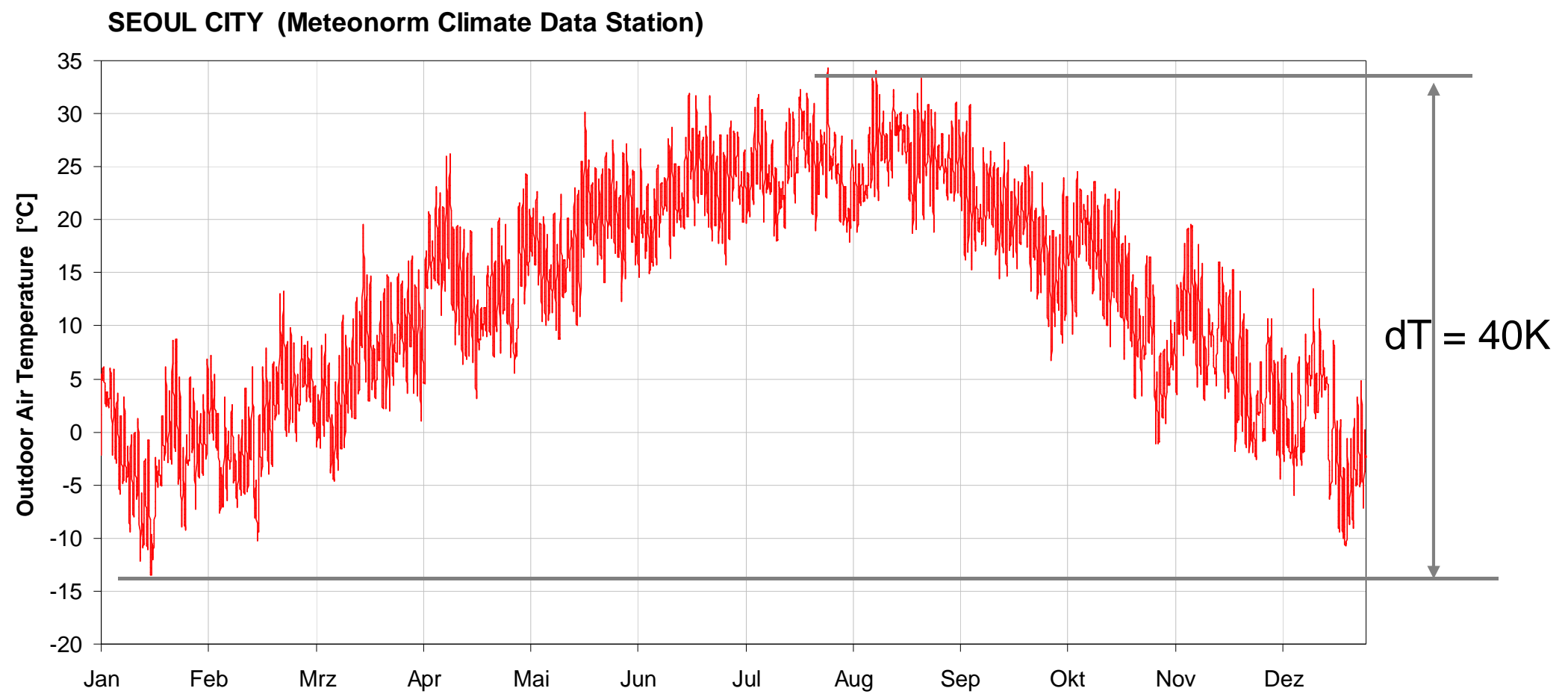
High potential for climate control by effective natural (cross ventilation) ventilation during daytime and night cooling of building mass by night time ventilation



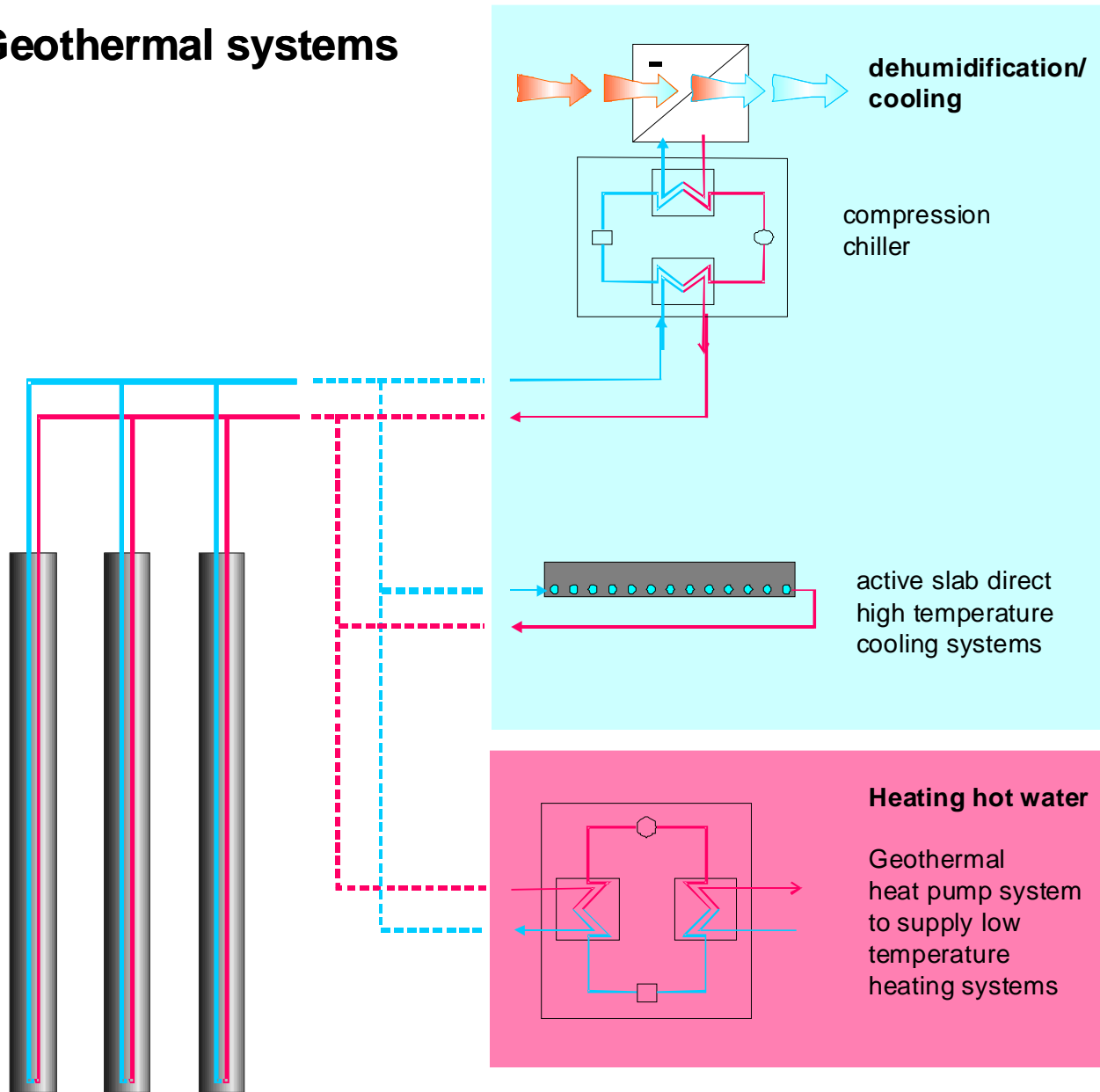


natural ventilation and
passive cooling by exposed heavy mass
(concrete ceiling) and night flushing

High potential for seasonal heat storage such as geothermal systems



Geothermal systems



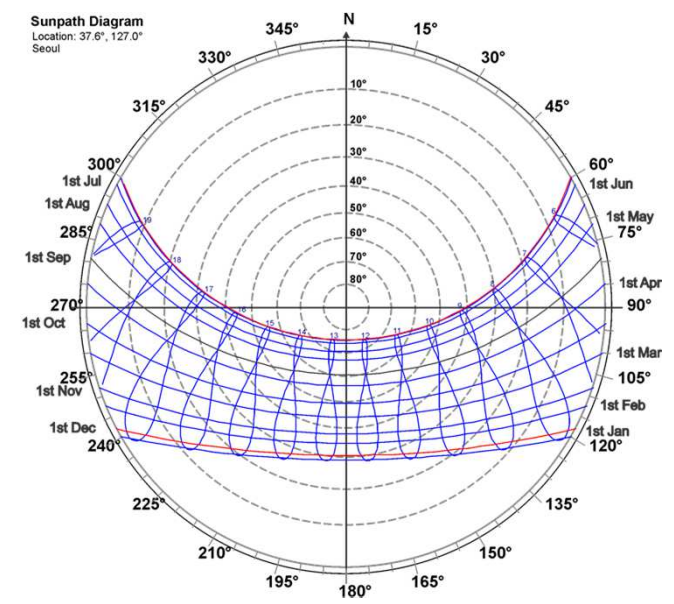
SOLAR EXPOSURE STUDY – Spring / autumn

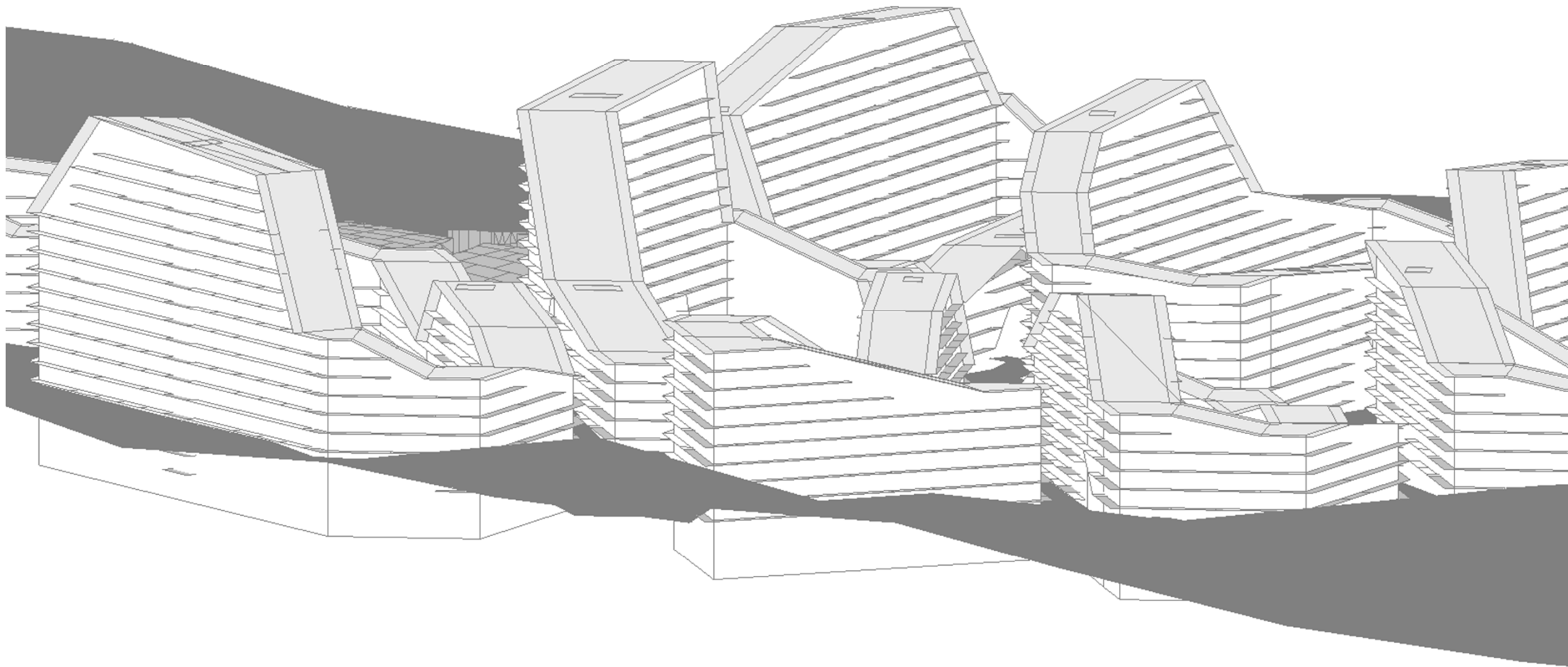
View from sun position during the course of selected days.
Everything that can be seen receives beam sunlight.
Everything that cannot be seen is in the shade.

Outdoor comfort is crucial for a lively neighborhood.
As soon as temperatures rise above 10°C, together with reduced wind speed and solar exposure creates a pleasant thermally comfortable environment.

The courtyards are shaped in the way to protect the courtyard against wind while allowing direct solar exposure.

Exemplary for spring time, the March 21st is selected to investigate the solar exposure on Block C and its courtyard.





17:00 h

Spring outdoor comfort with sun on courtyard and facades, 21st March

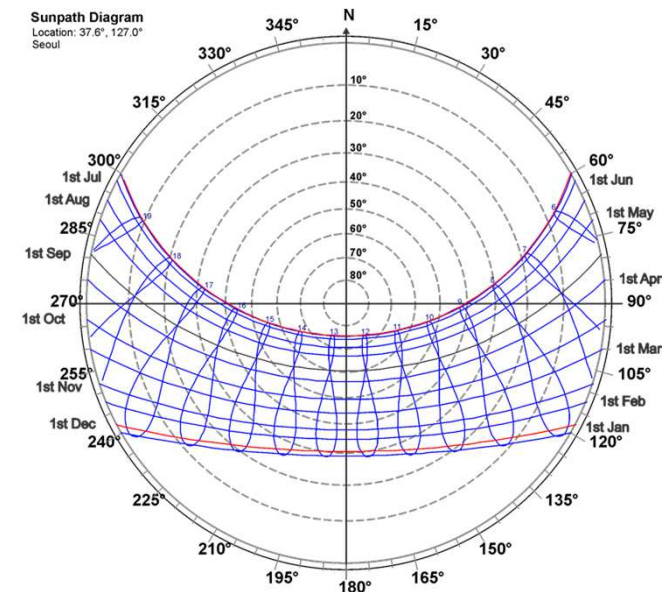
SOLAR EXPOSURE STUDY – Winter

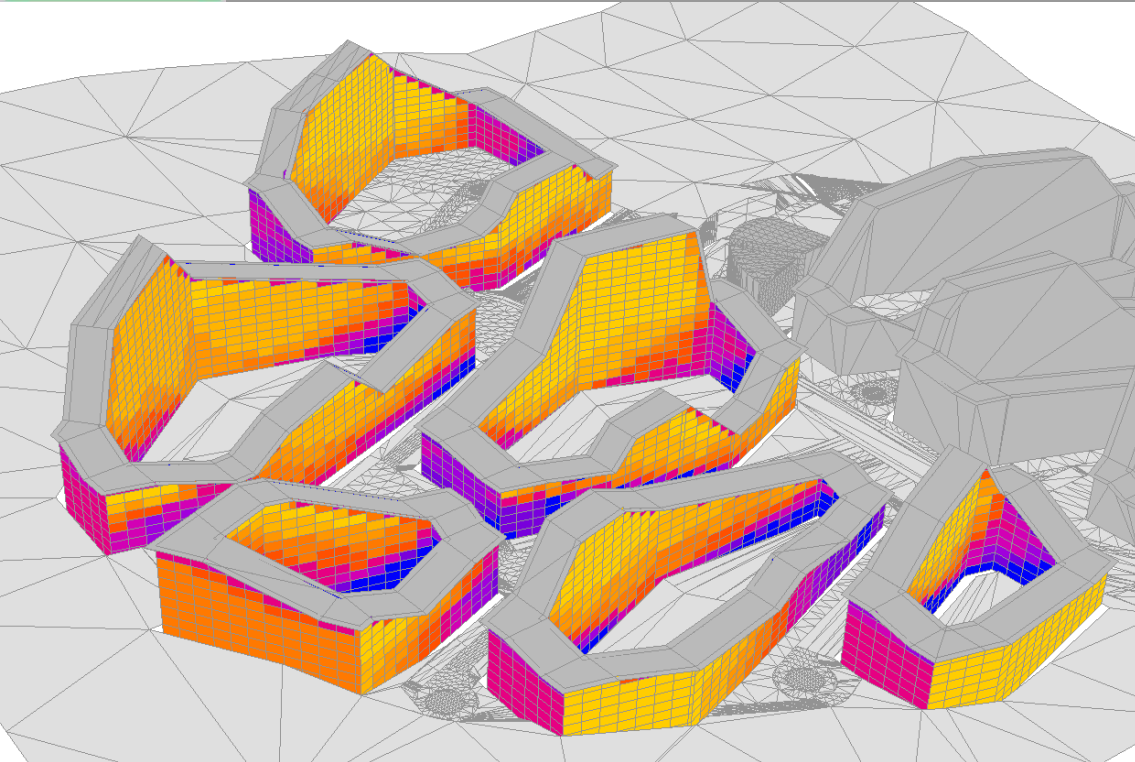
In wintertime solar gains in the residential area reduce heating demand.

Especially during the cold period solar exposure on the apartment façade provides high quality and comfort – physiologically and psychologically.

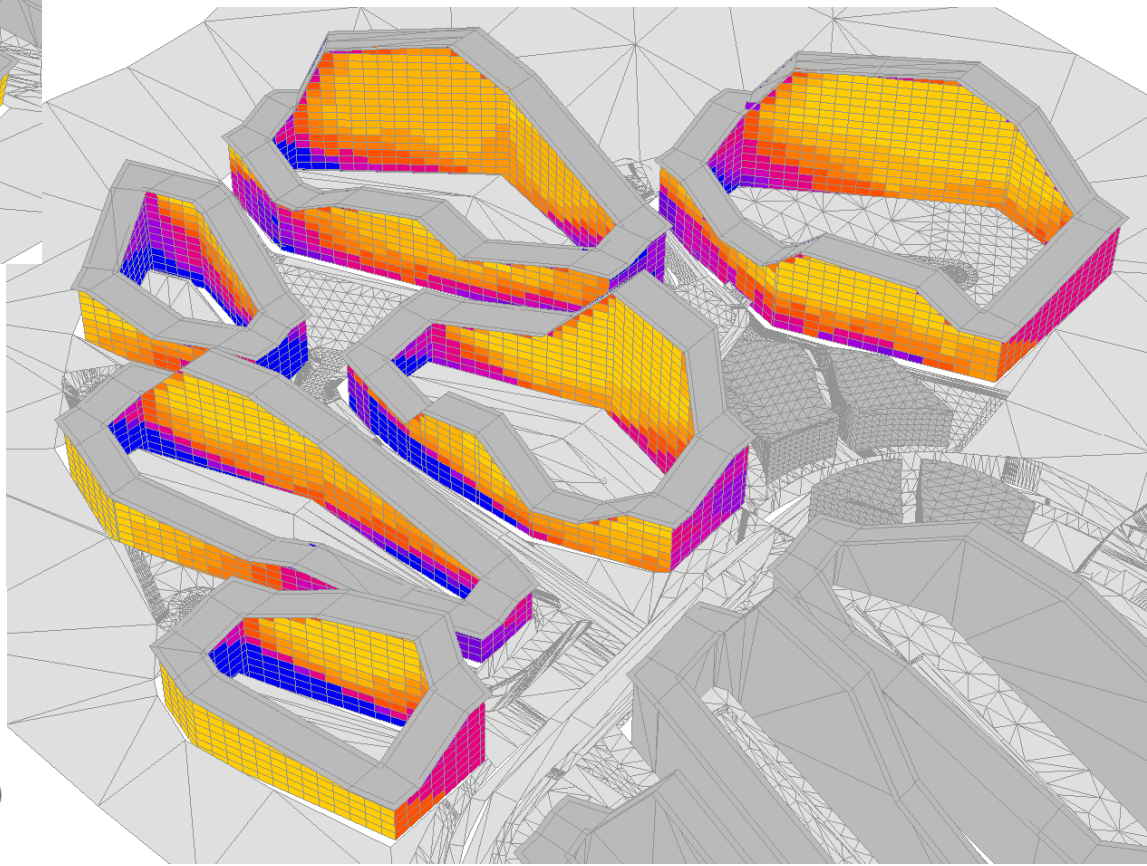
The building blocks are arranged in the way to maximize hours of direct solar exposure on each apartment during the cold period (low angle sun, short days).

Exemplary for the winter time the amount of daily hours on the facades, when they receive direct solar sun are assessed. This informs the massing and programming. (ground floors = amenities, upper floors = apartments)



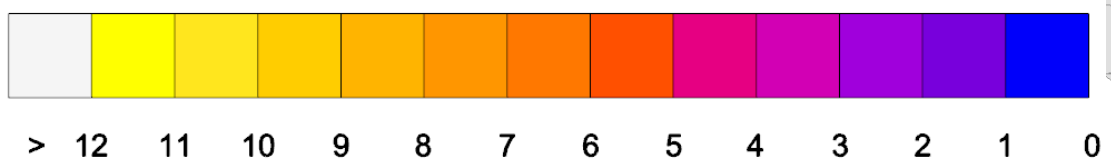


View from Southwest



View from Southeast

sun potential [h/d]



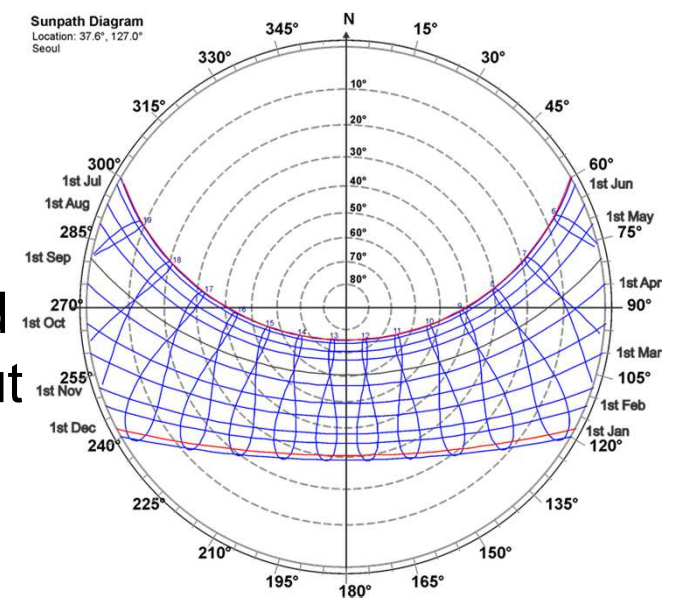
SHADING STUDY

During high outside temperatures an effective shading system can reduce unwanted solar gains.

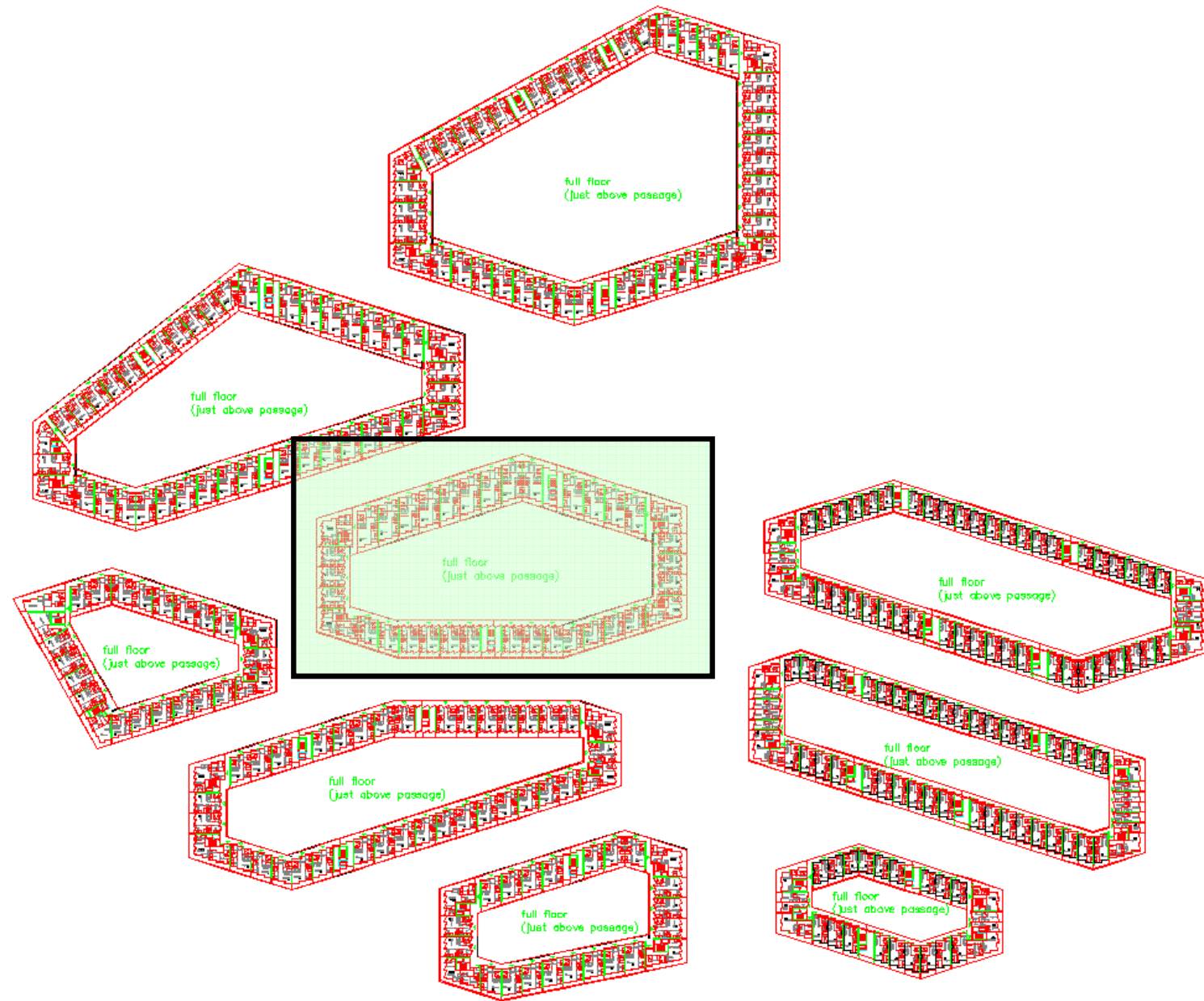
The building design with overhangs and wingwalls are a low maintenance system that can efficiently reduce solar gains.

On the other hand the fixed shading systems should allow enough daylight and useful solar gains during the heating period.

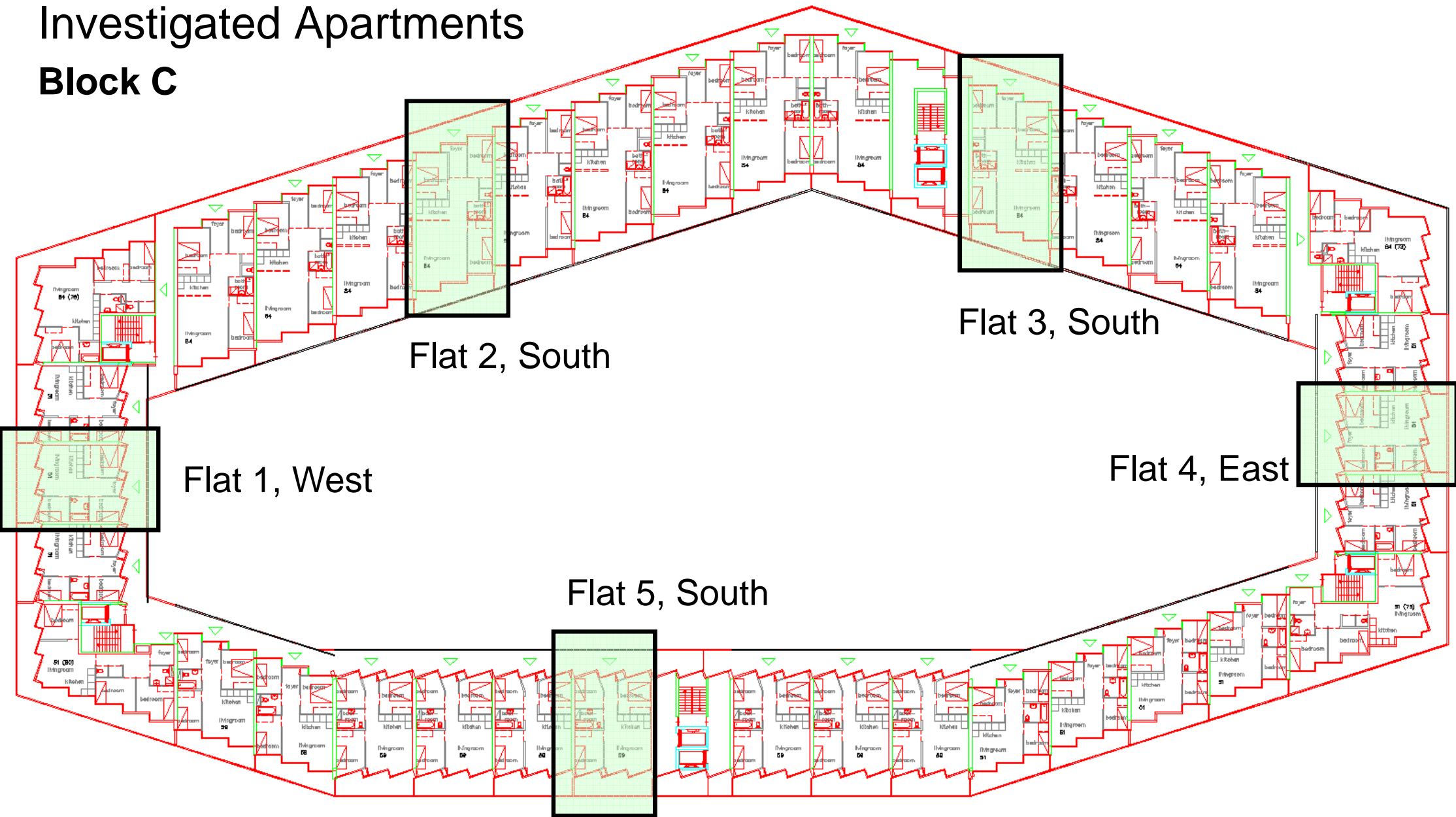
The shading study shows the effect of the overhang and wingwall system and how it can inform the glazing layout of the façade itself.



Shading study Block C

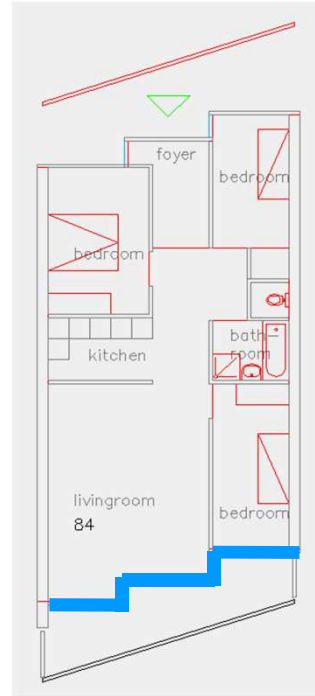


Investigated Apartments Block C

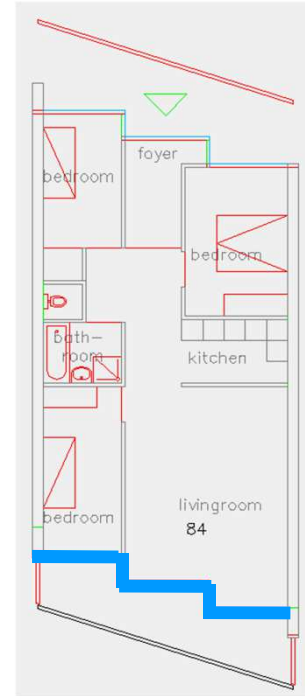


Flats with different facade orientations

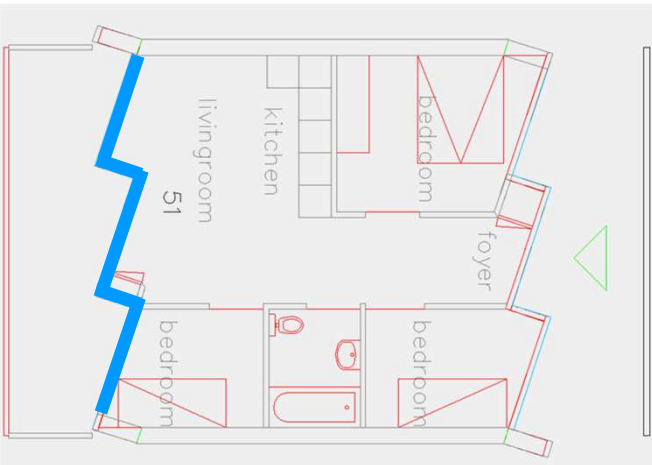
Flat 2



Flat 3



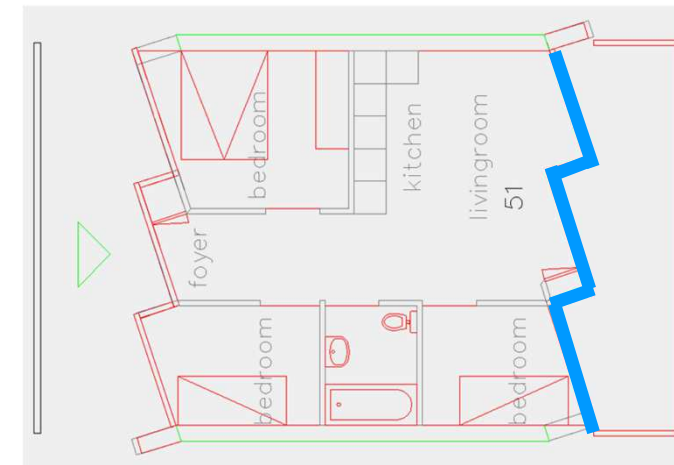
Flat 1

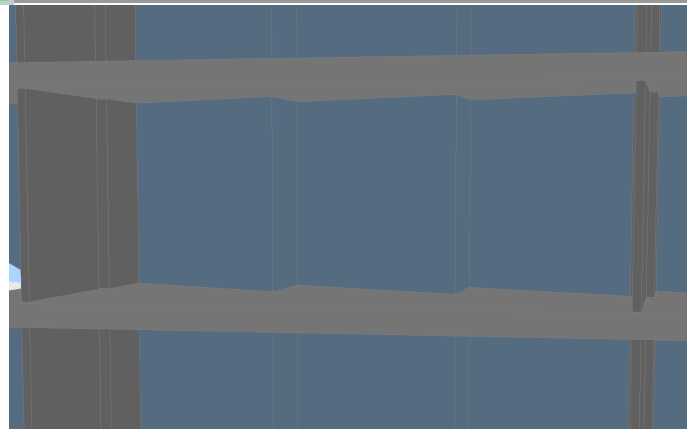


Flat 5

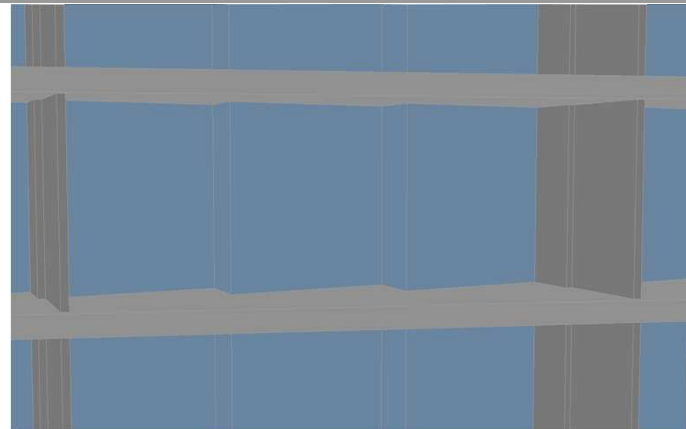


Flat 4

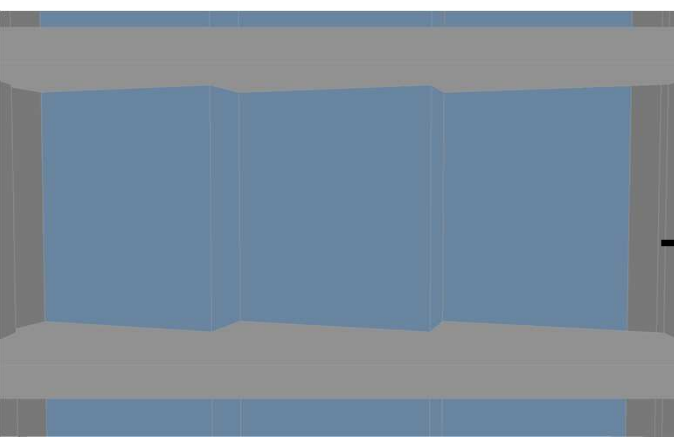




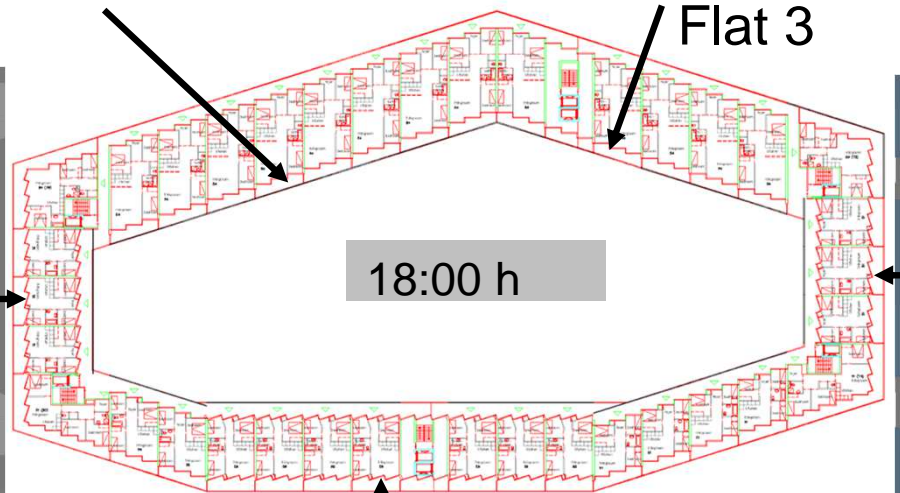
Flat 2



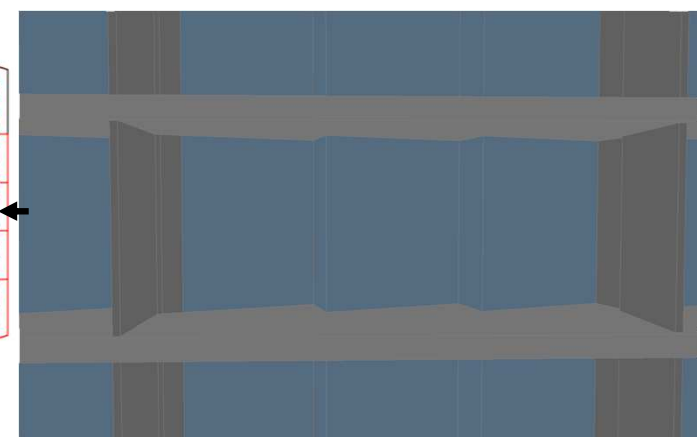
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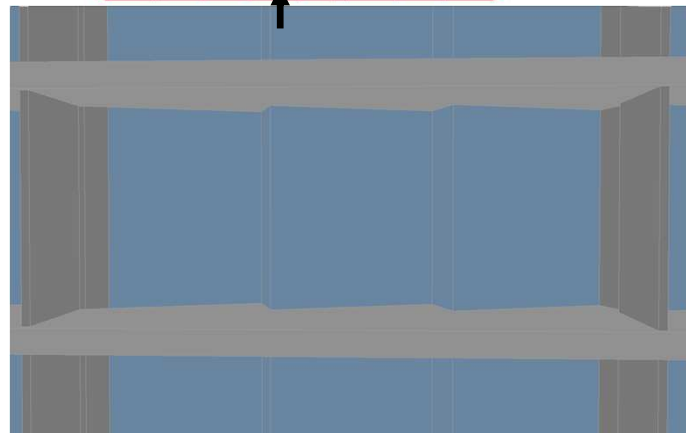
Flat 1



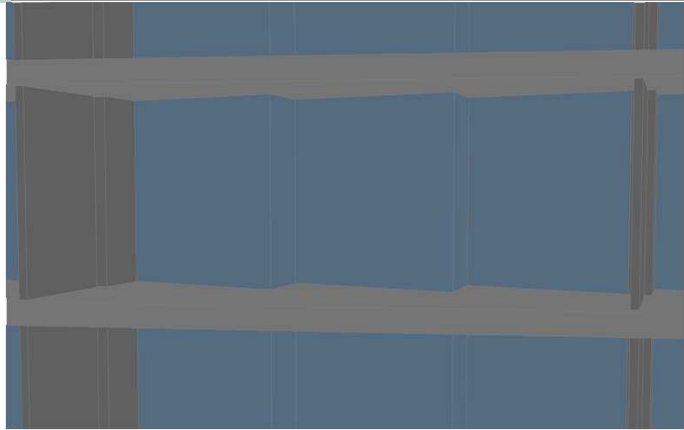
18:00 h



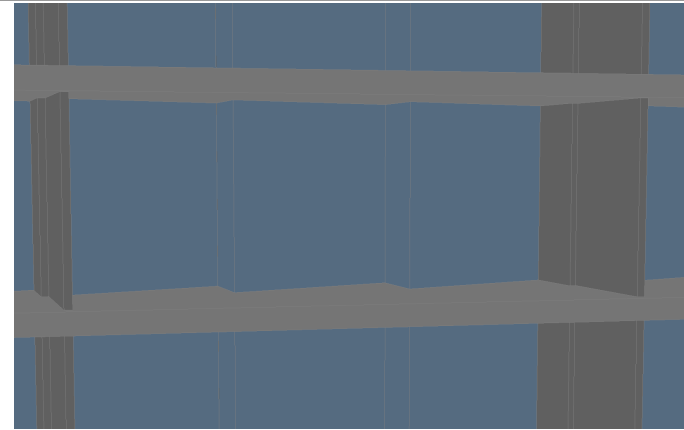
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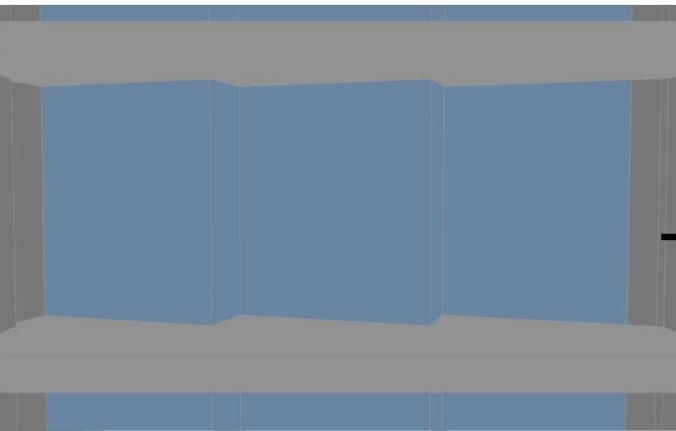
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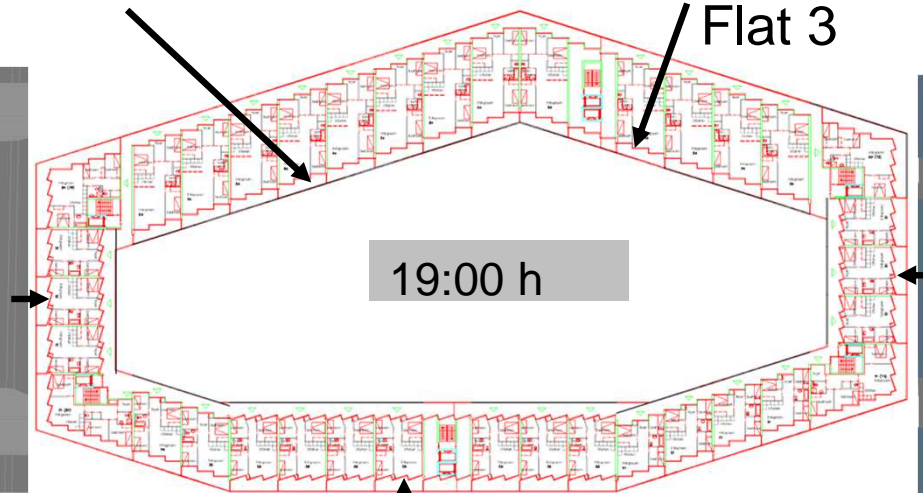
Flat 2



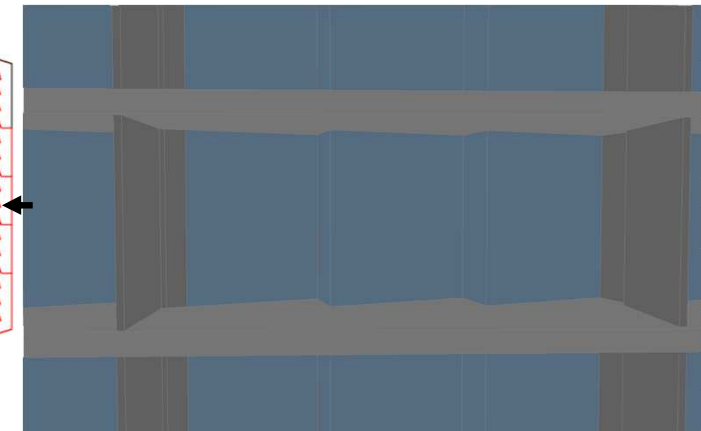
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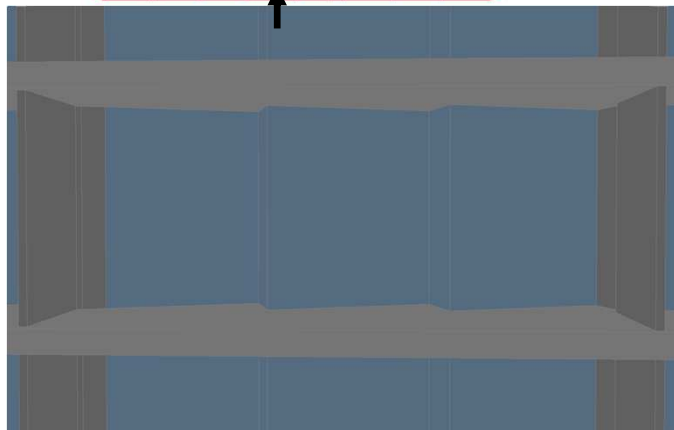
Flat 1



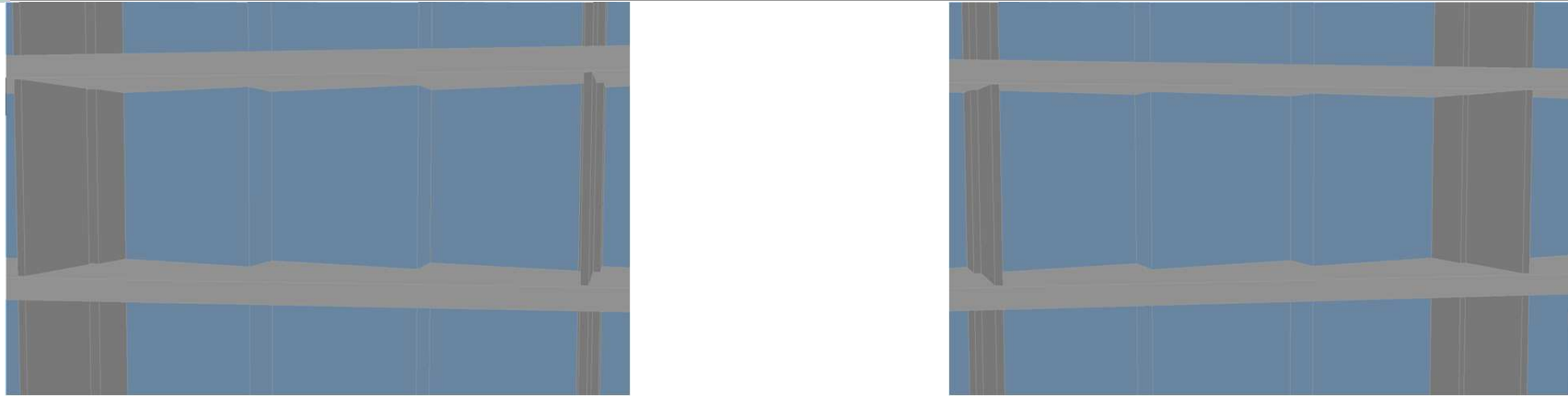
19:00 h



Flat 4

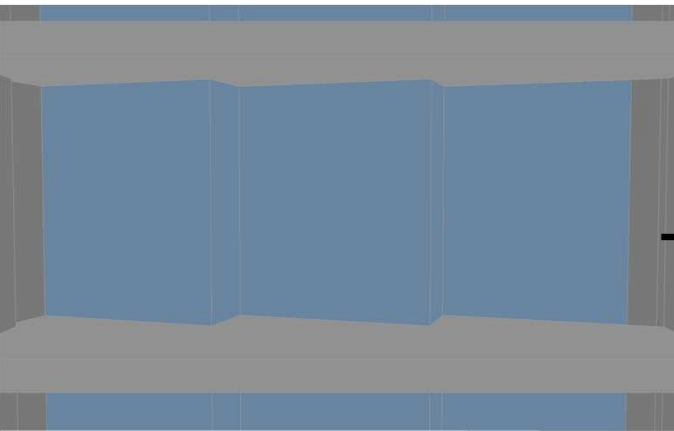


Flat 5

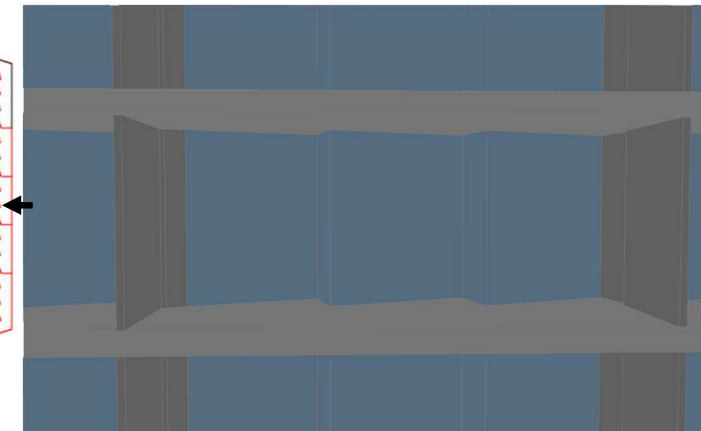


Flat 2

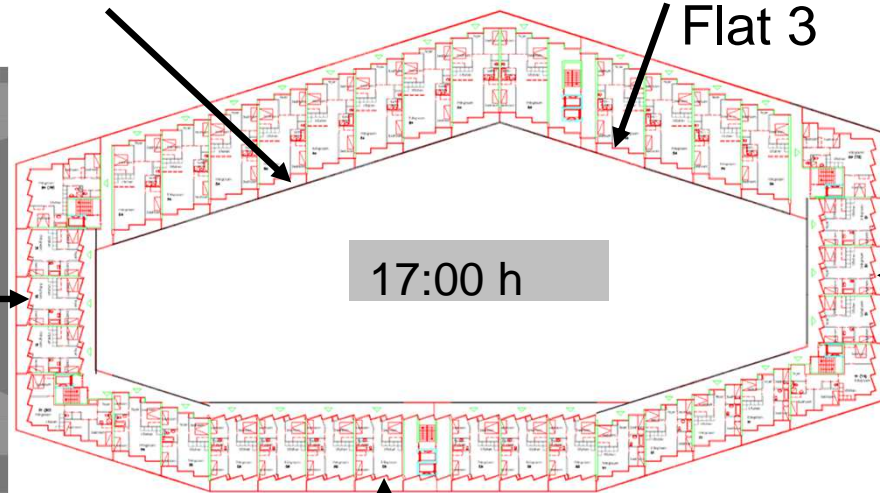
Flat 3



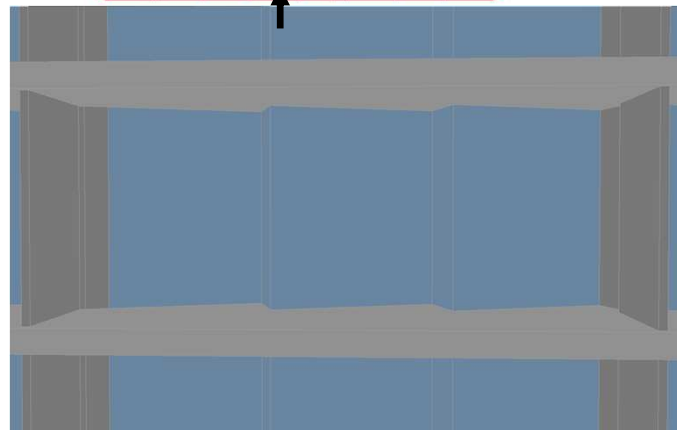
Flat 1



Flat 4

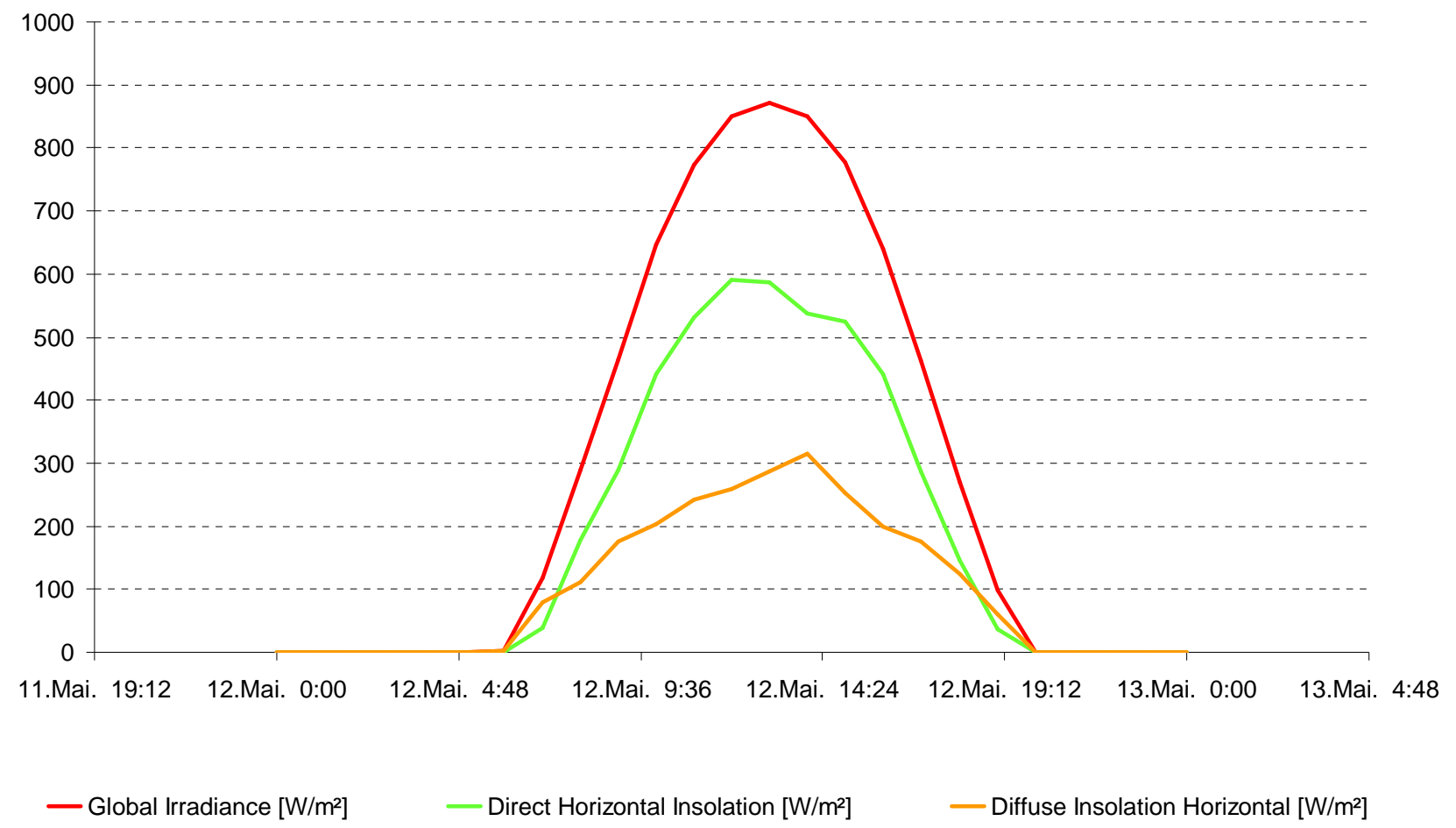


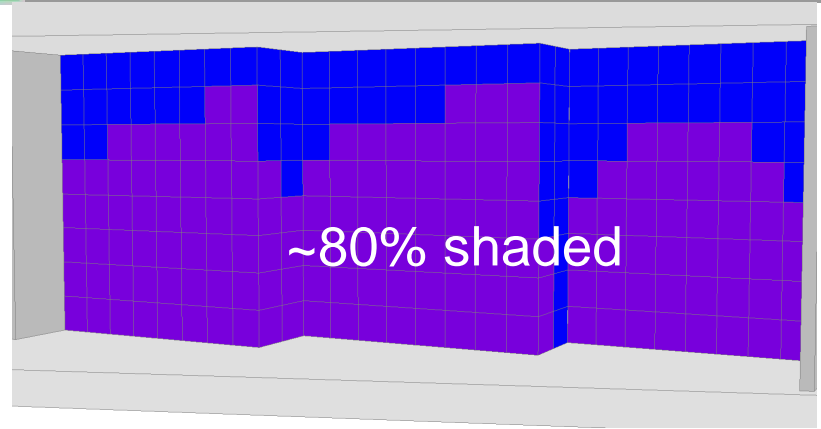
17:00 h



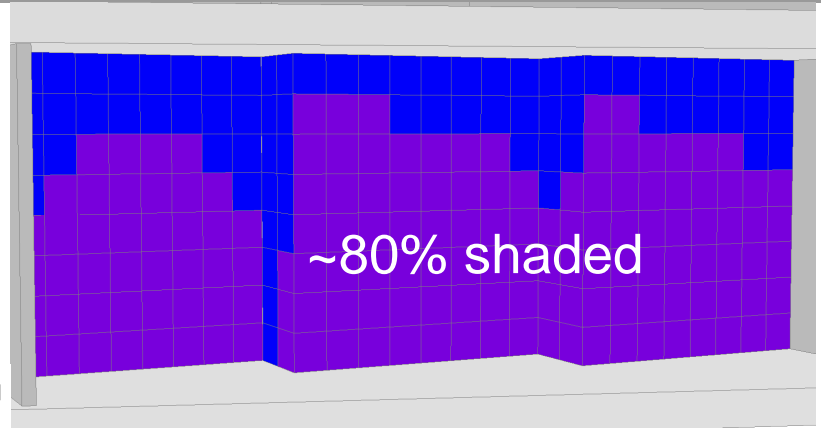
Flat 5

SHADING STUDY – Exemplary for a warm, sunny day (May 12th)

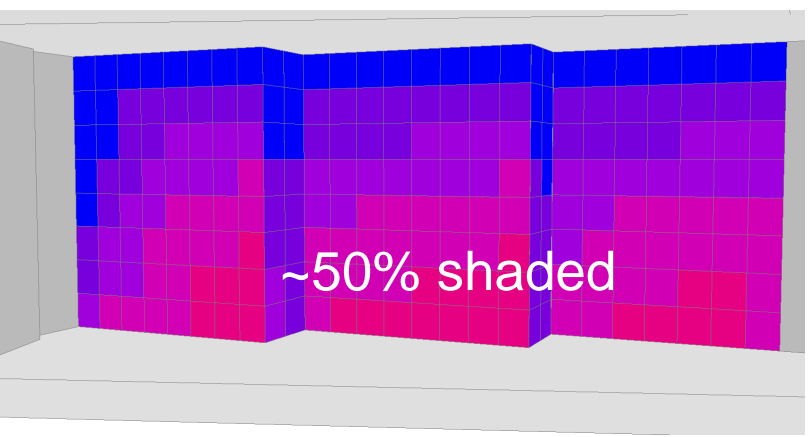




Flat 2

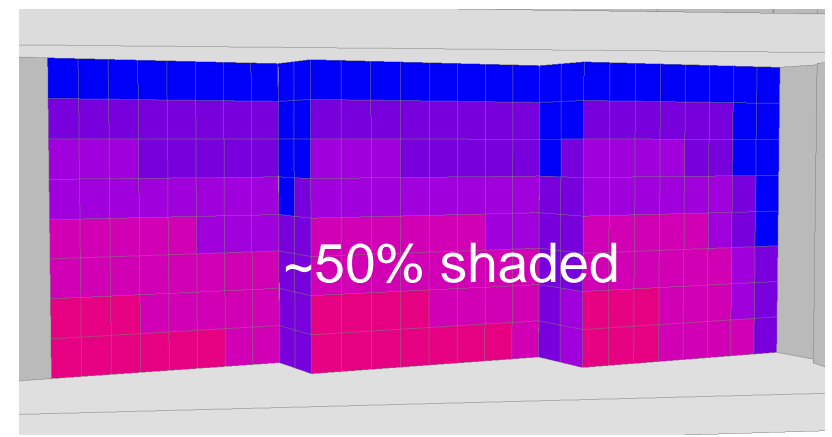
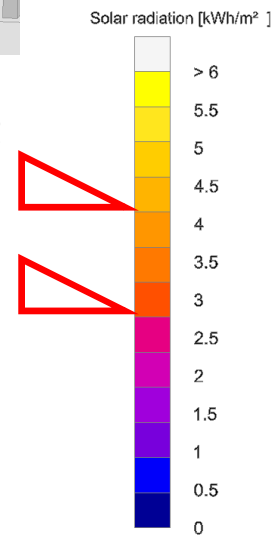


Flat 3

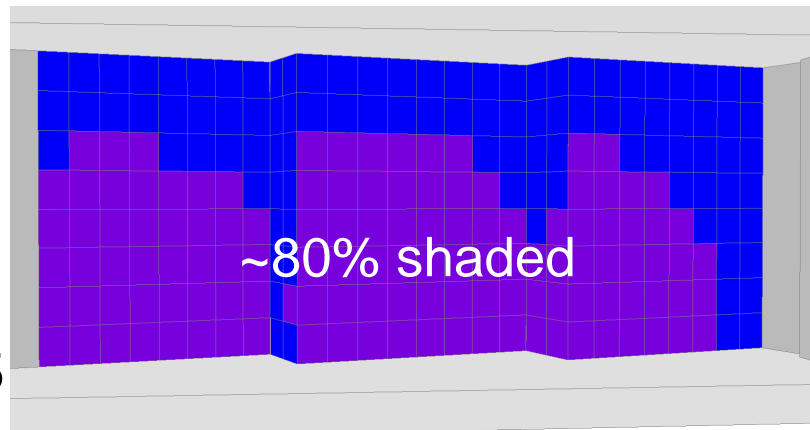


Flat 1

East/West unshaded
South unshaded



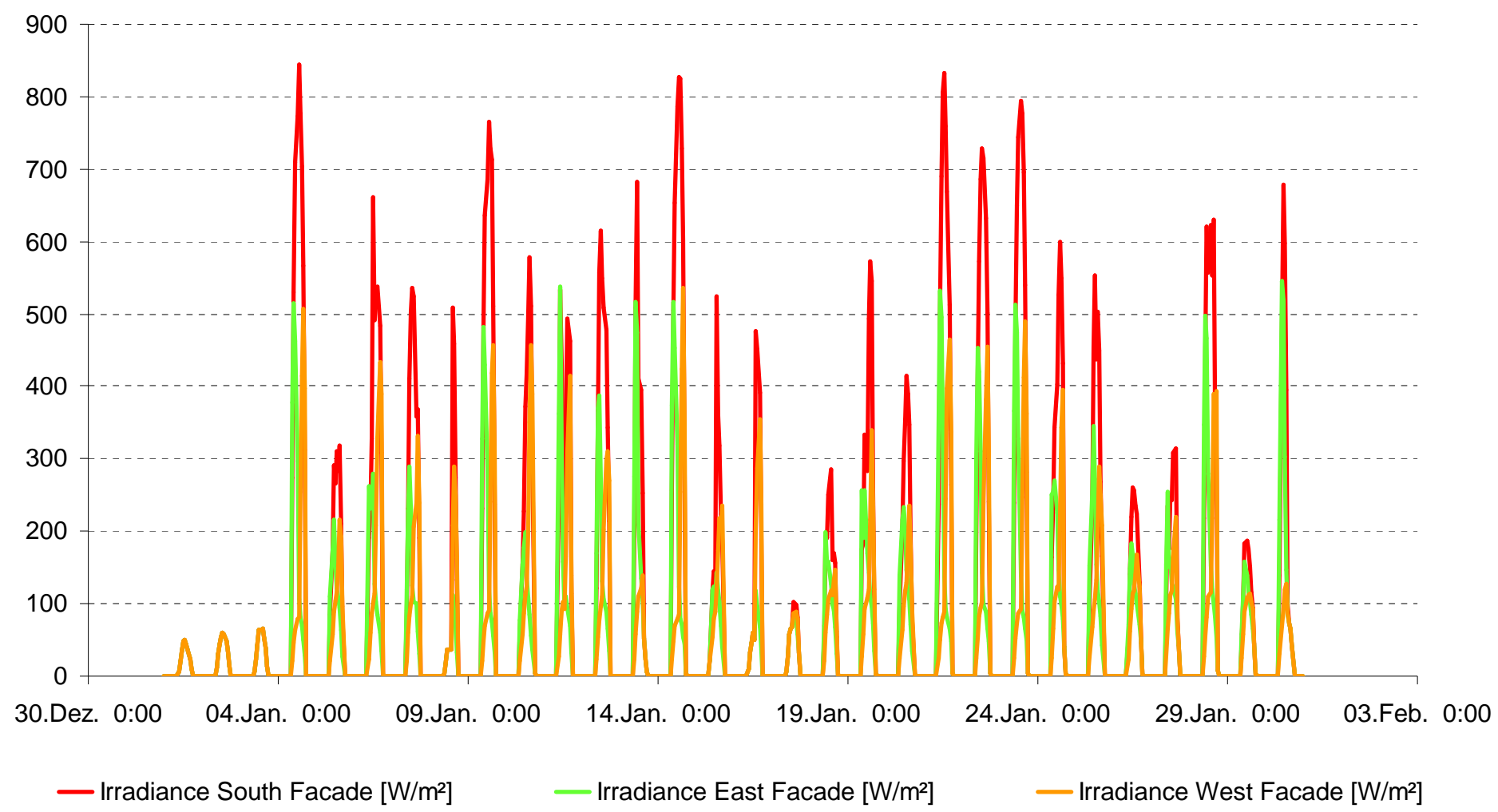
Flat 4

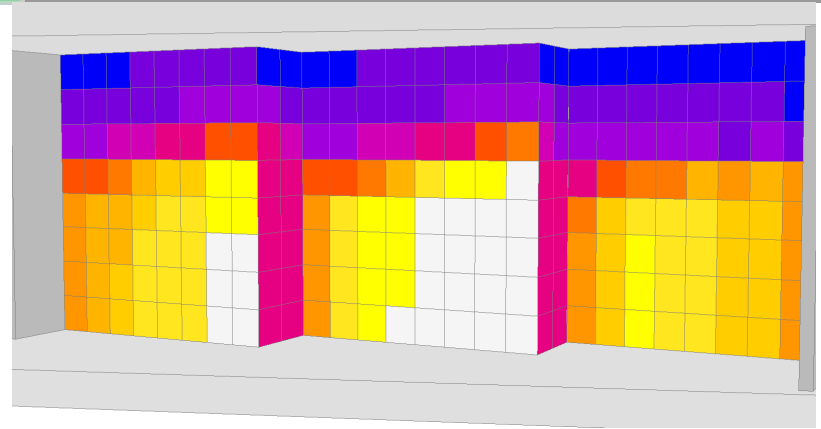


Flat 5

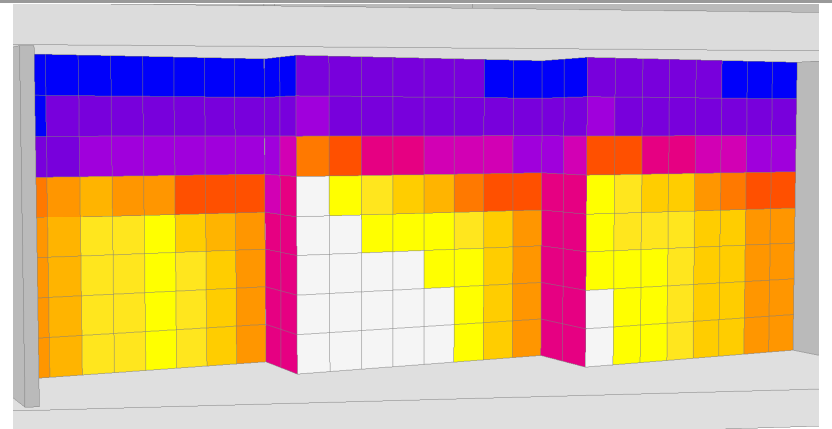
SOLAR GAINS STUDY – Exemplary for the heating period (january)

SEOUL CITY (Meteonorm Climate Data Station)

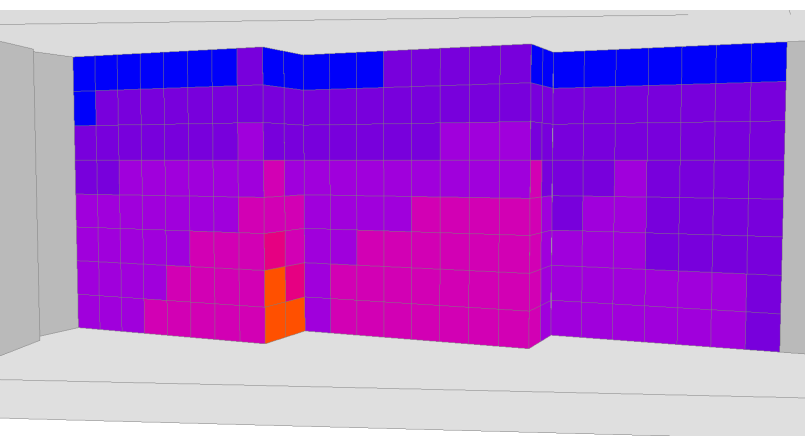




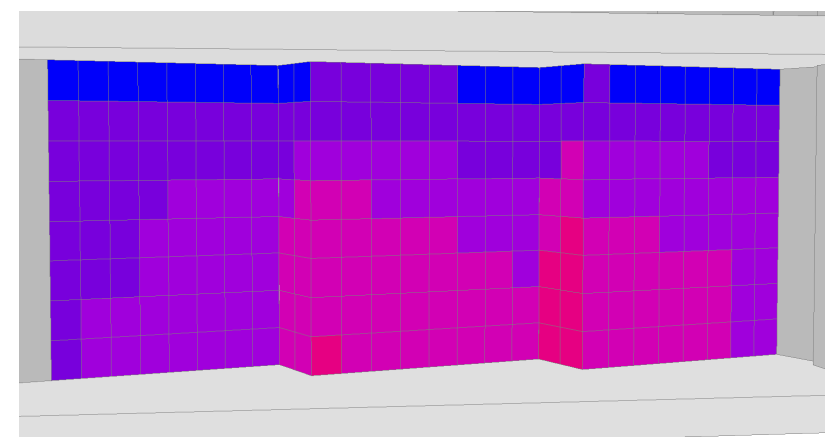
Flat 2



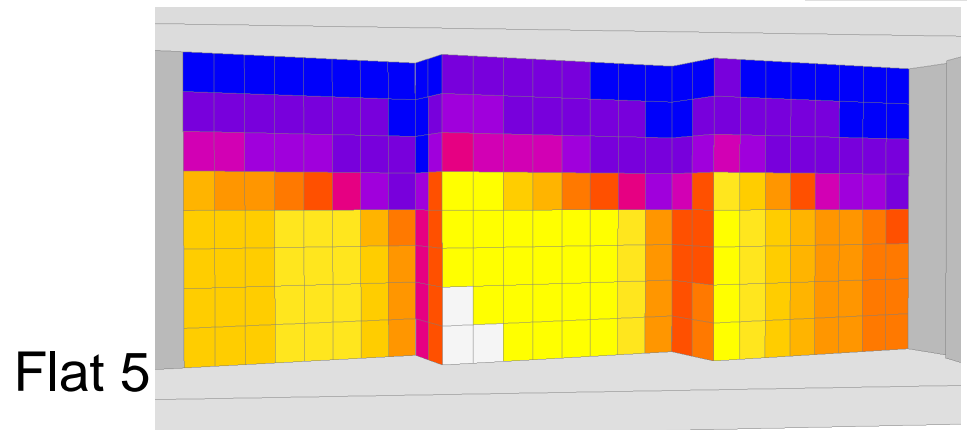
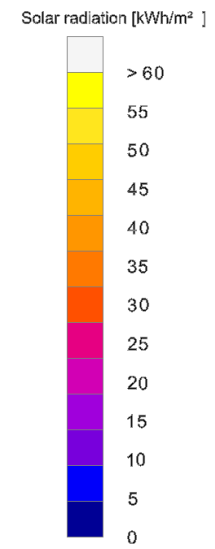
Flat 3



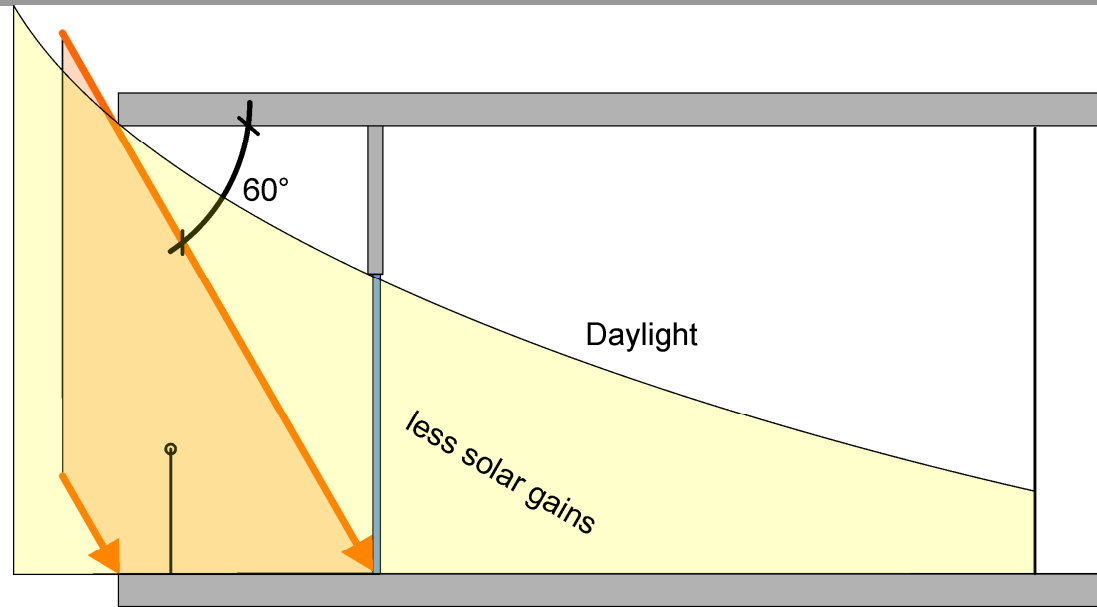
Flat 1



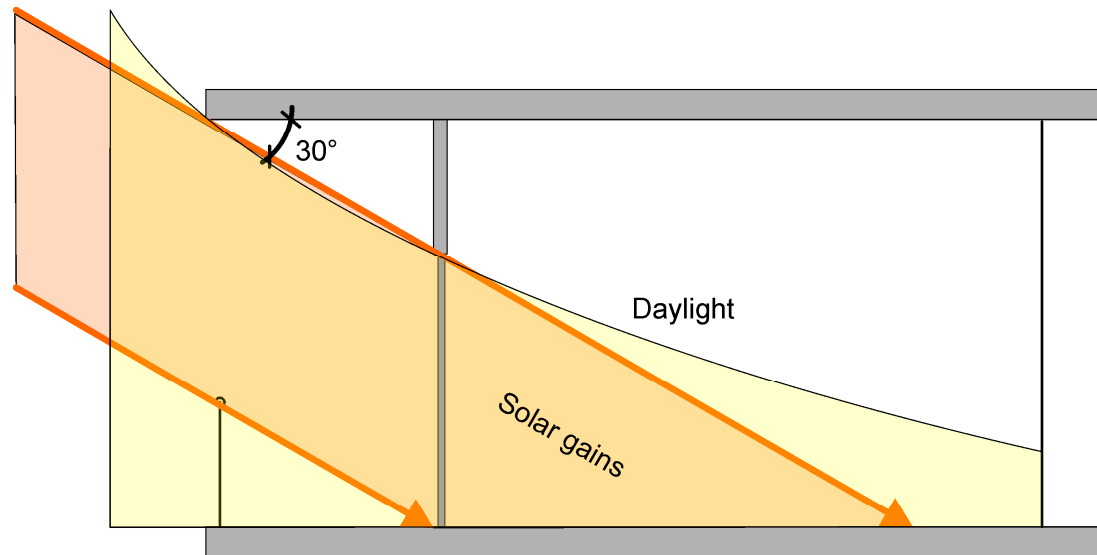
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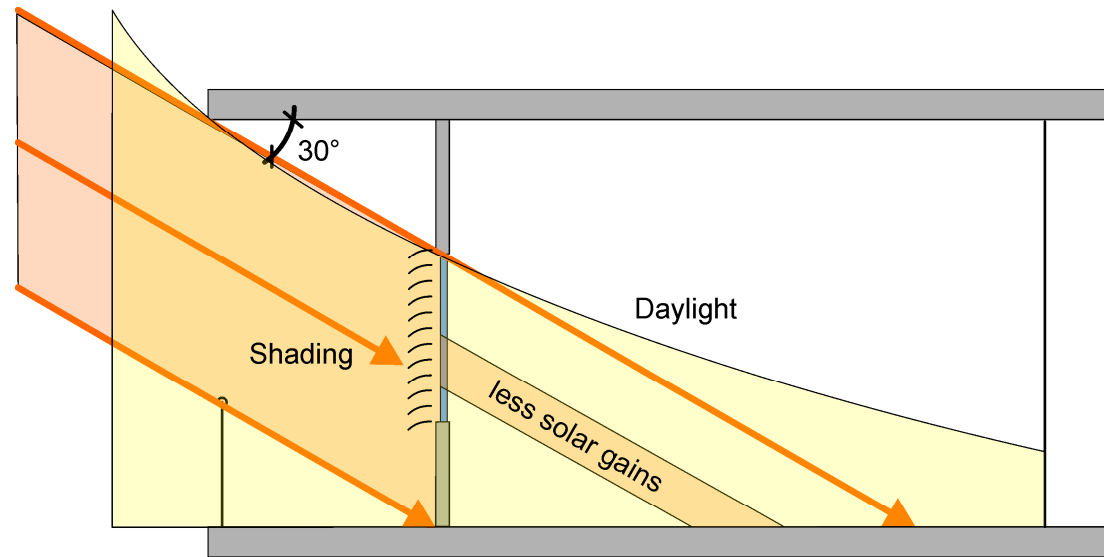
Flat 5



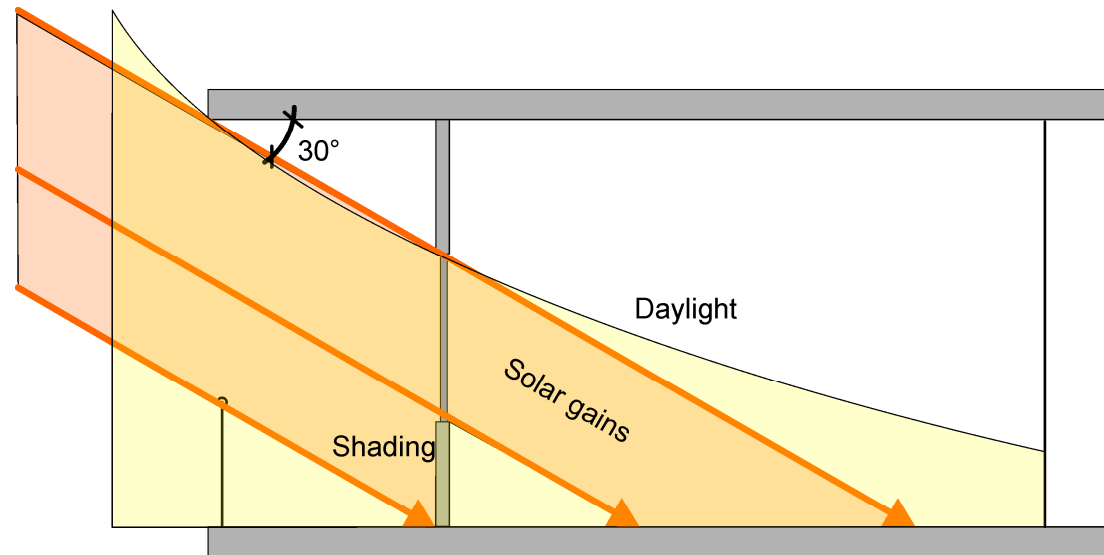
Concept southern facade
Summer



Concept southern facade
Winter



Concept western and eastern facades
Summer



Concept western and eastern facades
Winter