

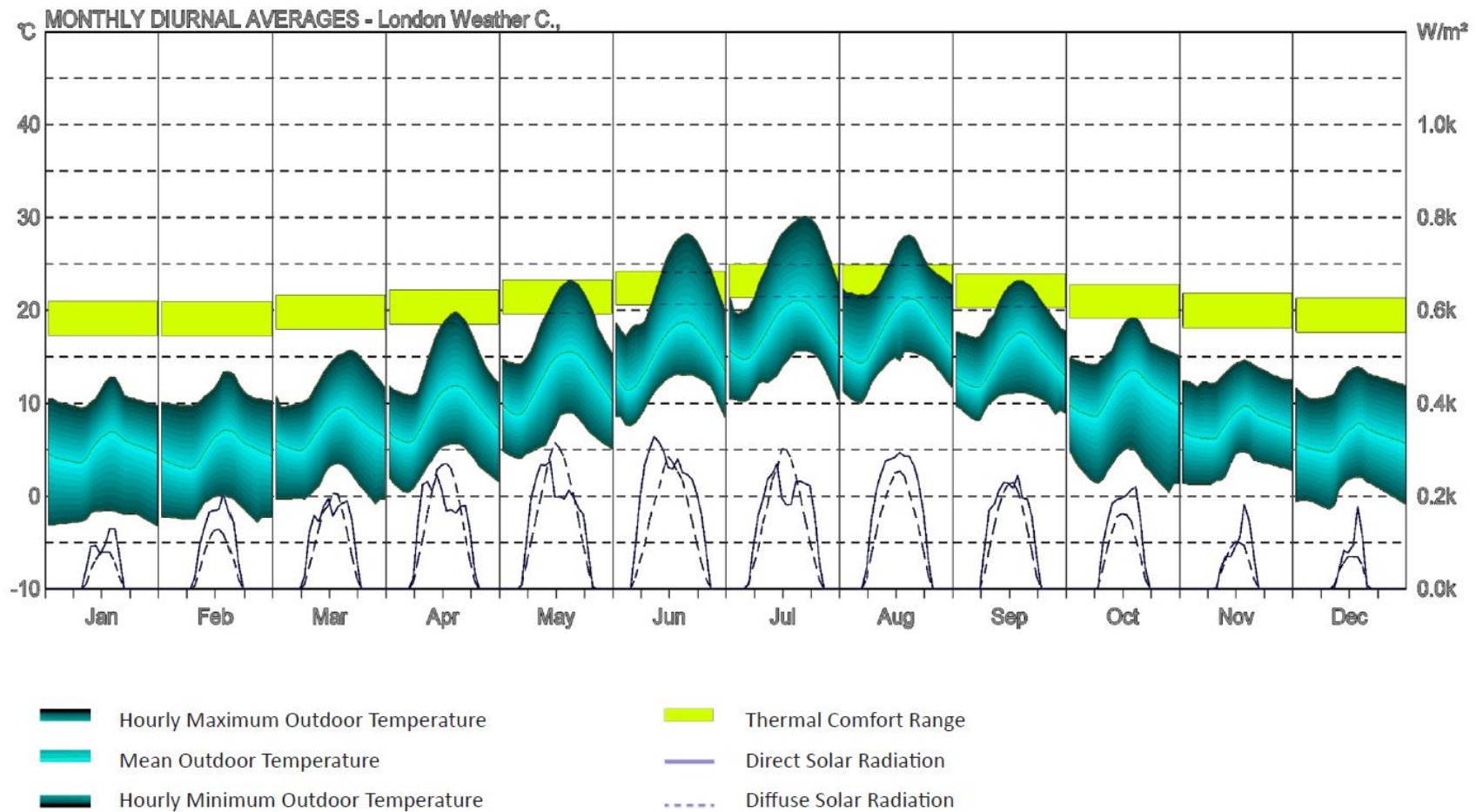
# LONDON

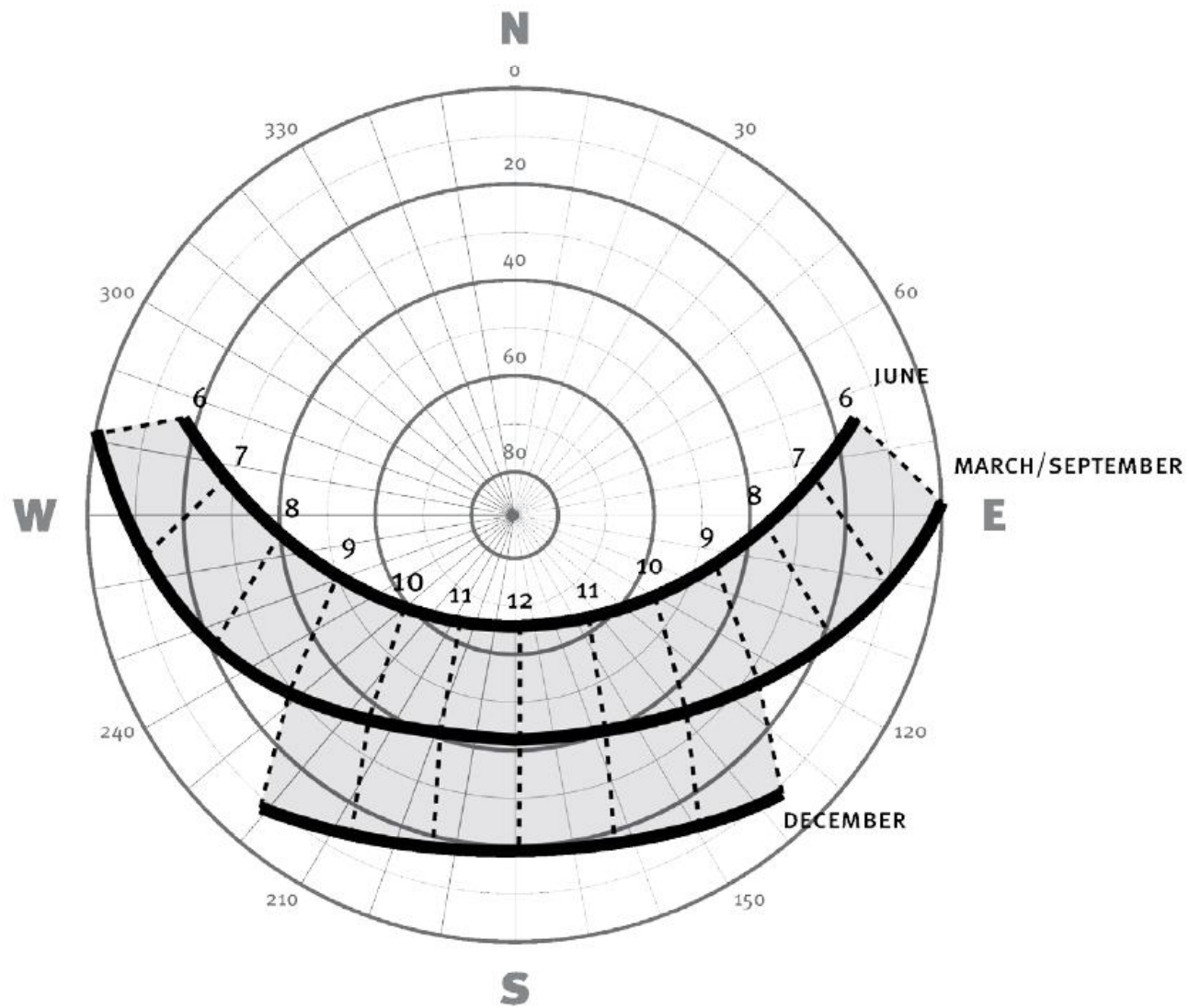


- London (51.51° N, 0.10° W) has a temperate climate.
- In general, the winters are chilly. London's average temperature during winter is 6.2°C.
- Summers are moderately warm. Average temperature during summer is 17.9°C.
- The highest temperature measured during a 10 year period (1996-2005) was 29.7°C, in August.
- Most commonly found sky condition is overcast; 60% and atmospheric pollution reduces the amount of solar radiation especially on hot days.



LONDON, UK\_51°1 N 00°1 E\_ALTITUDE 77M







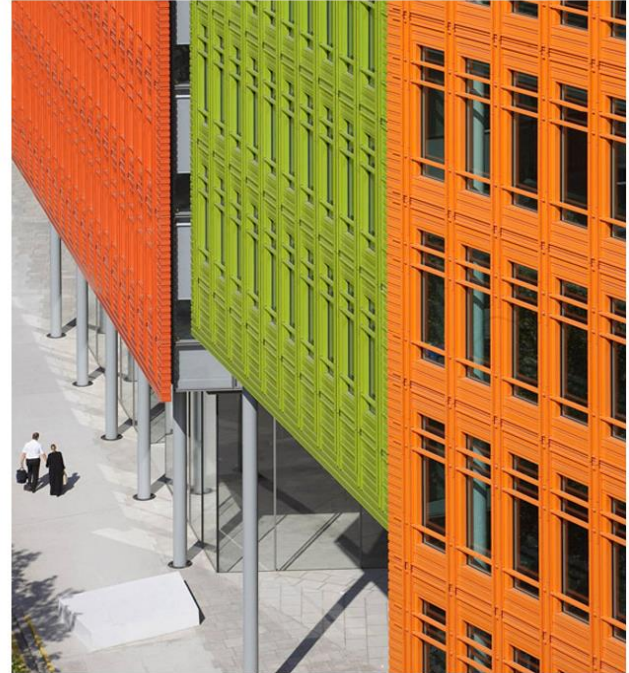
- During winter, passive heating strategies and thermal insulation are required in order to moderate heat losses and preserve the useful heat gains but also active heating would most probably be needed for some periods of time.
- In that case the envelope treatment of a building is of essential importance, as its insulation and construction will play a significant role in keeping, or not, the building warm during non-heating periods, depending on the performance of the construction (heavy weight or light weight).
- Moreover the winter sunshine with the low solar angles, can increase the useful heat gains from the incident solar radiation on vertical window panes, preferably orientated towards south.

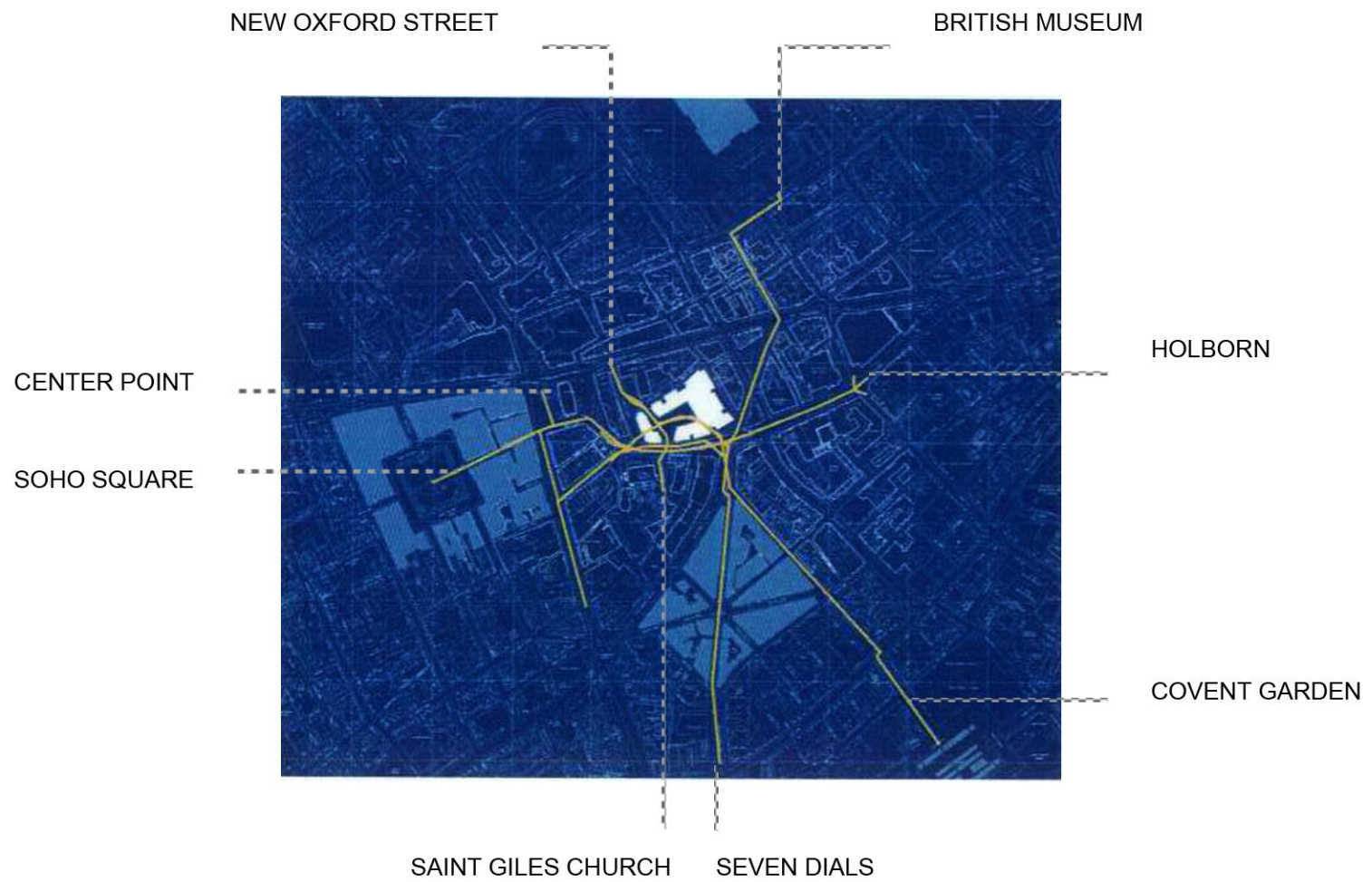




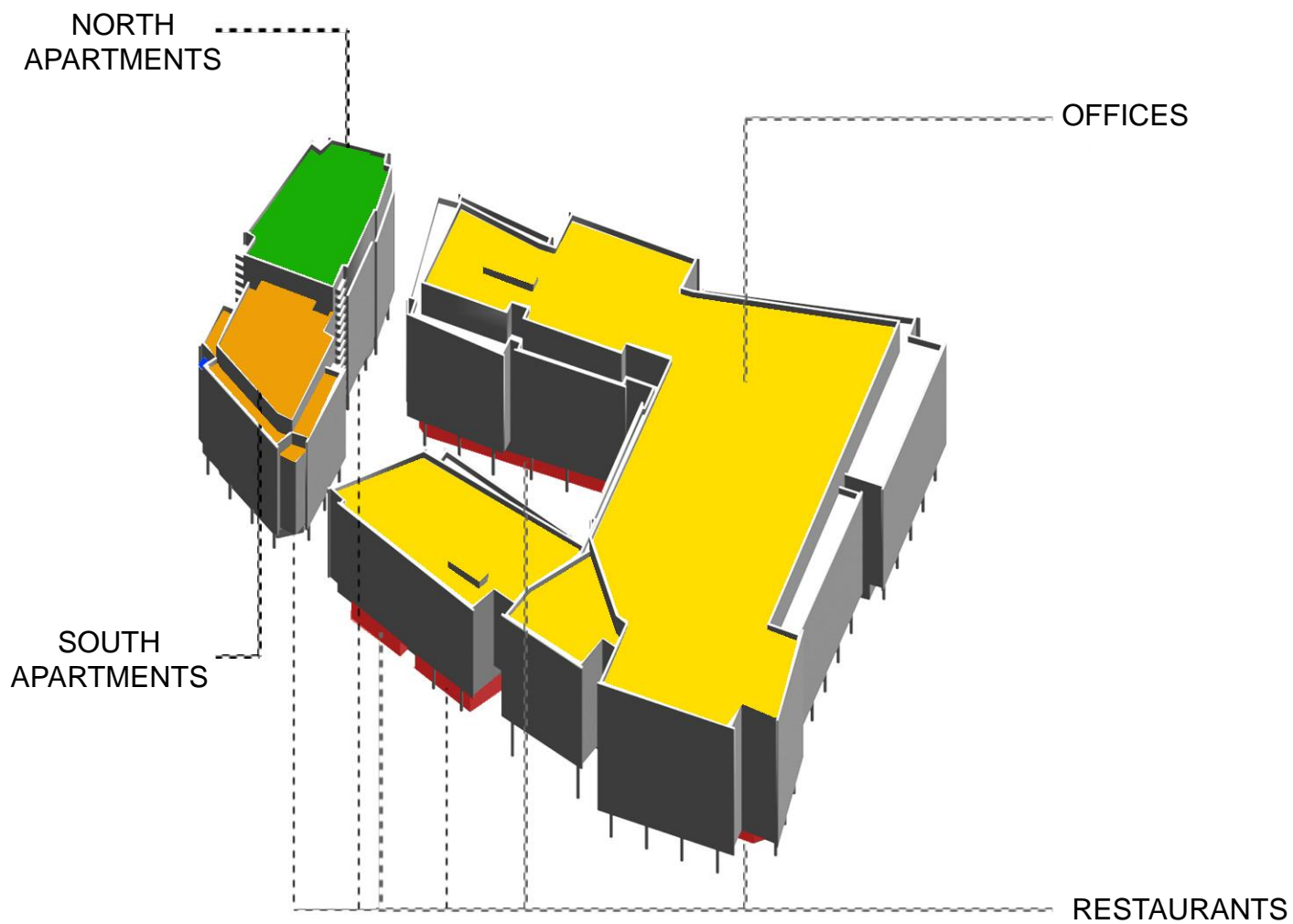


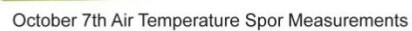
# CENTRAL ST. GILES

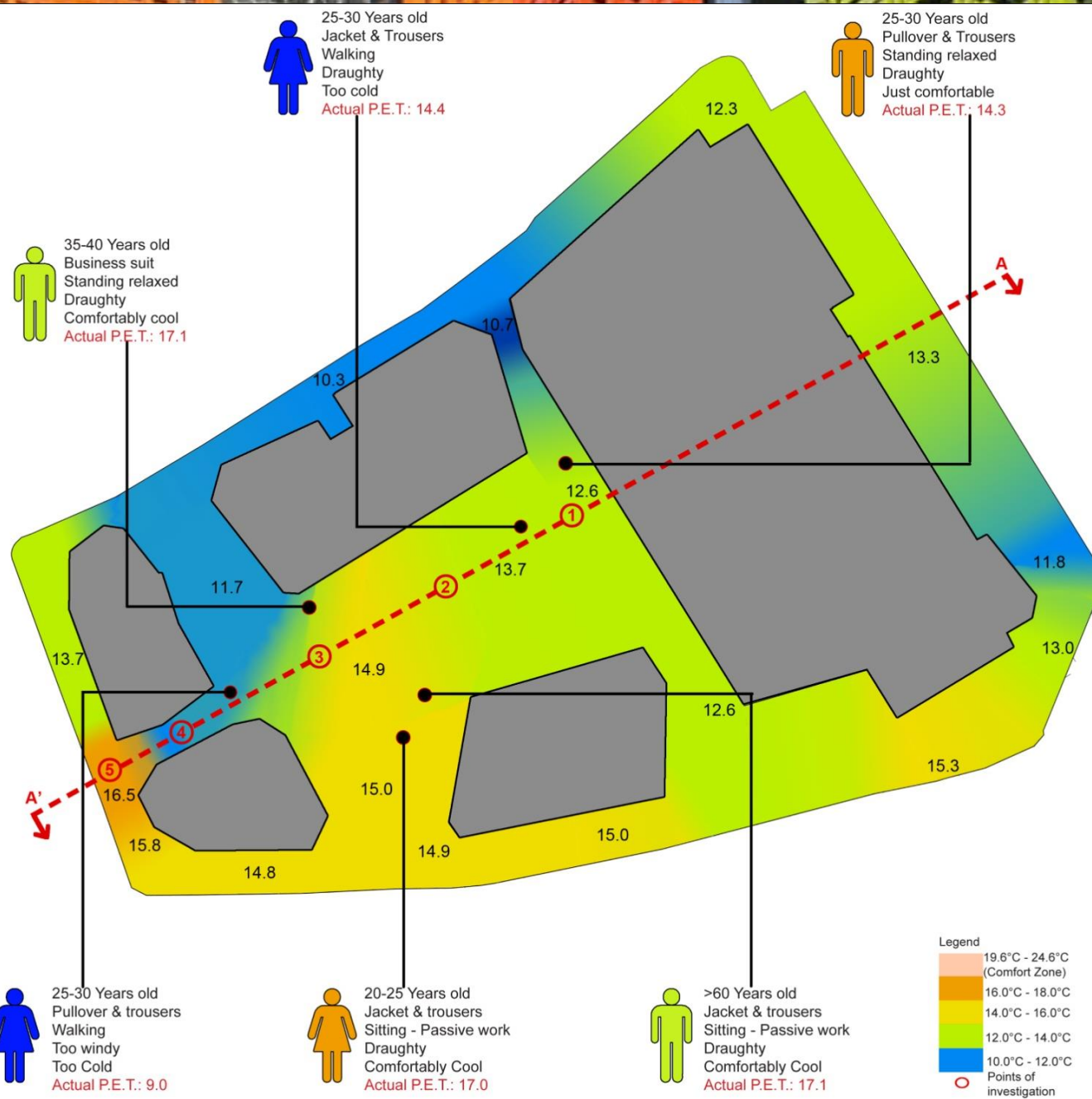




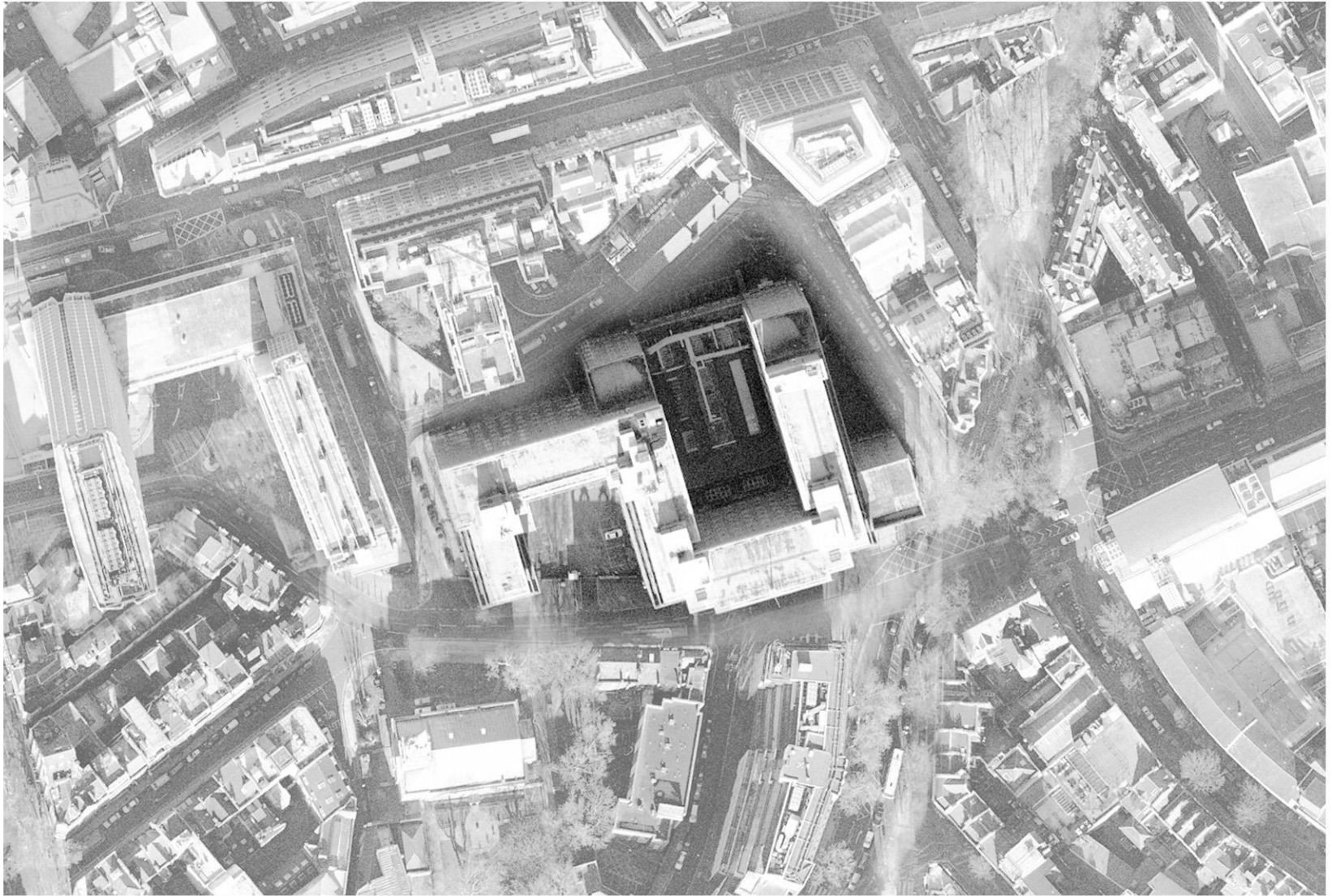












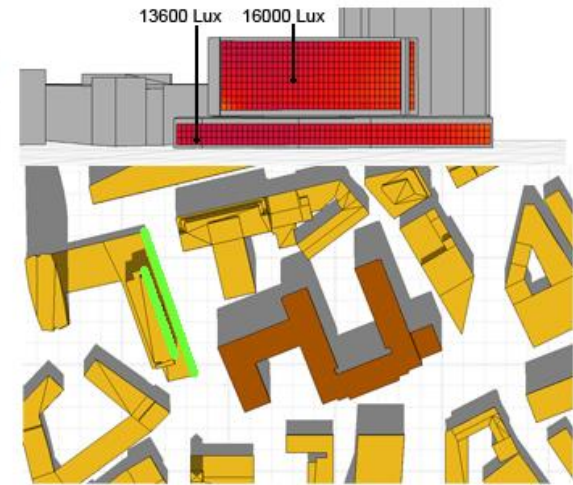
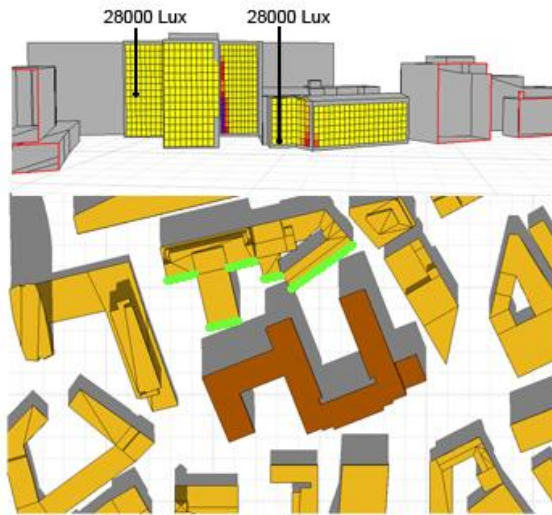
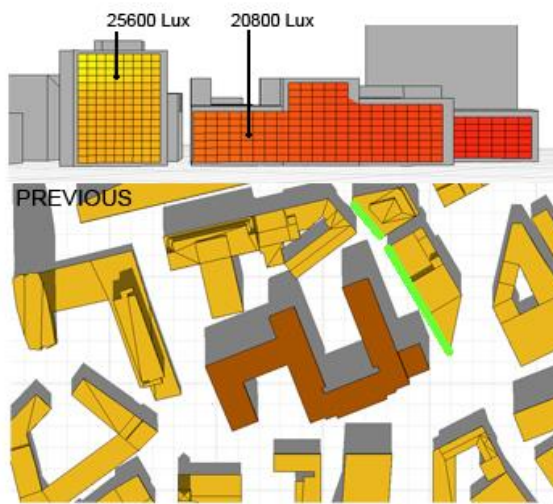




WEST FACING

SOUTH FACING

EAST FACING



SUMMER SOLSTICE  
21ST JUNE  
12:00PM  
SUNNY SKY

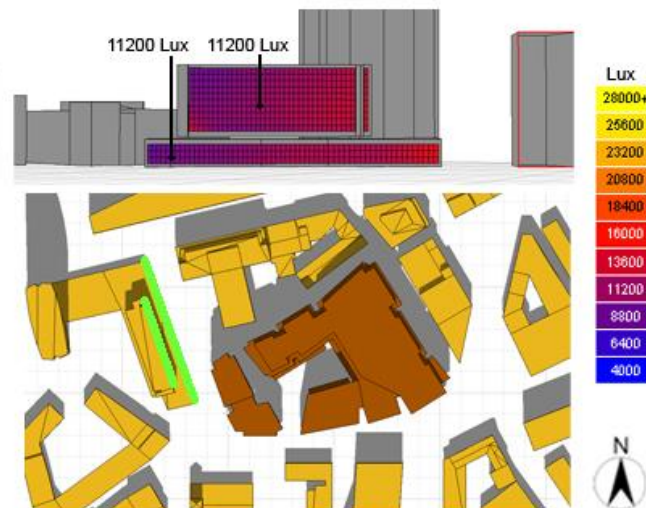
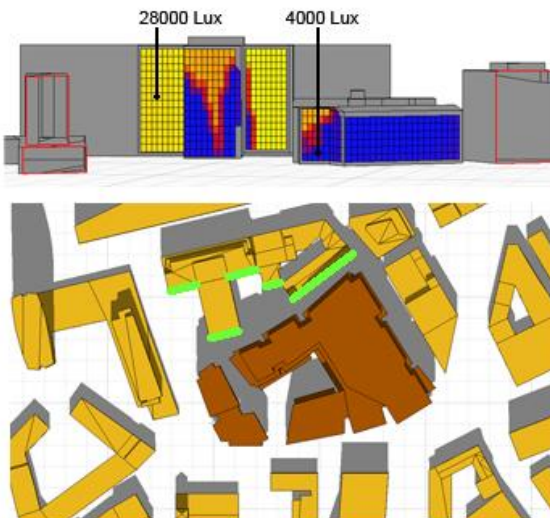
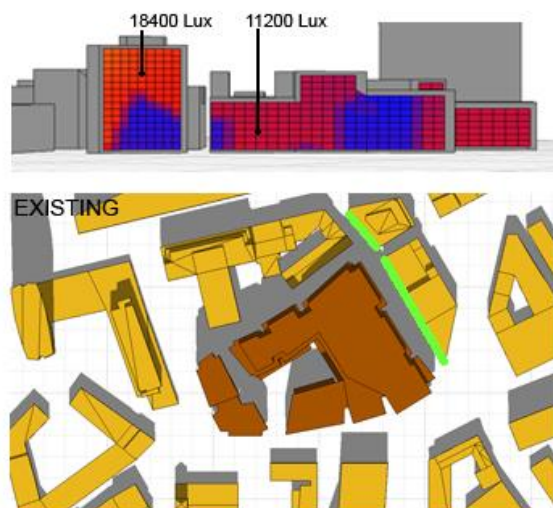
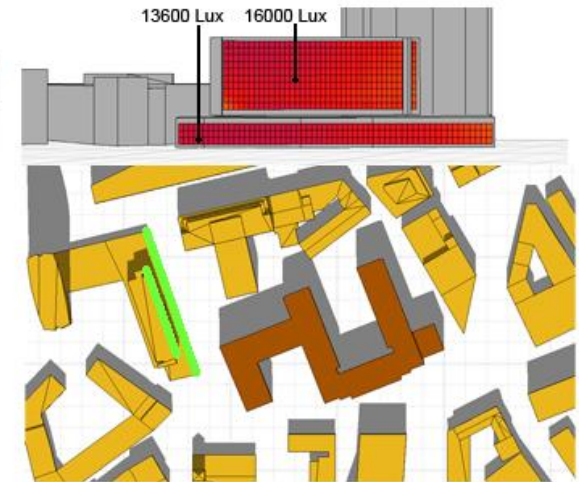
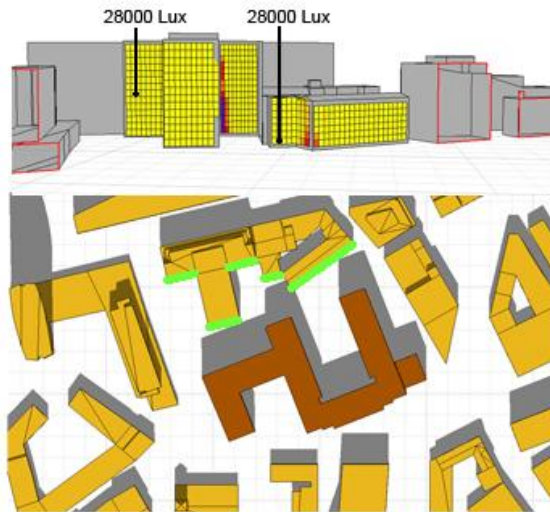
ILLUMINANCE  
(Source: Ecotect + Radiance)



WEST FACING

SOUTH FACING

EAST FACING



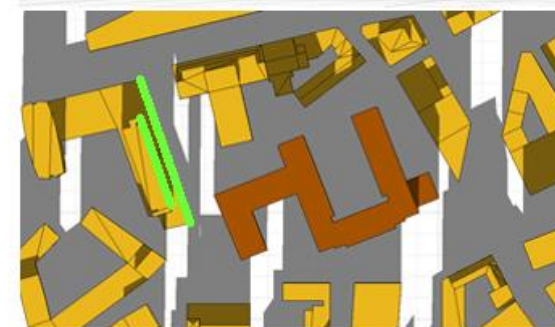
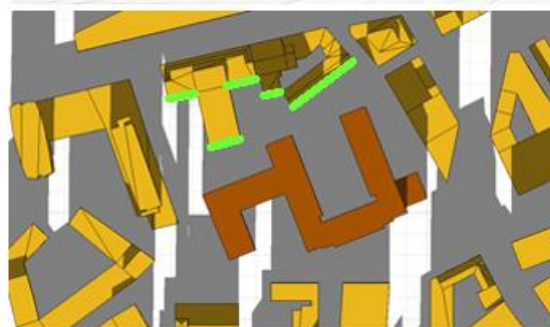
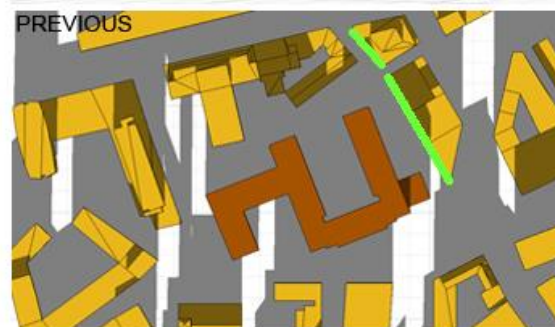
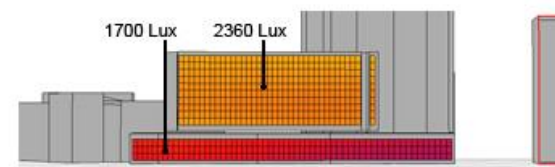
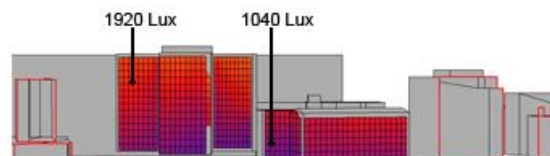
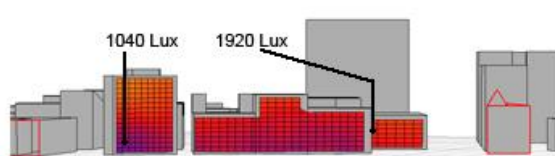
SUMMER SOLSTICE  
21ST JUNE  
12:00PM  
SUNNY SKY

ILLUMINANCE  
(Source: Ecotect + Radiance)

WEST FACING

SOUTH FACING

EAST FACING



WINTER SOLSTICE  
21ST DECEMBER  
12:00PM  
OVERCAST SKY

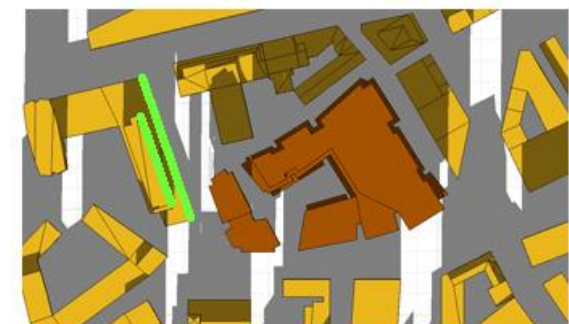
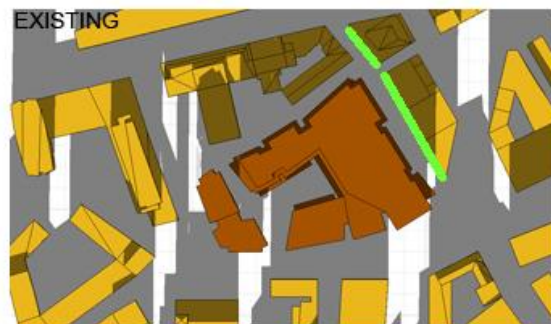
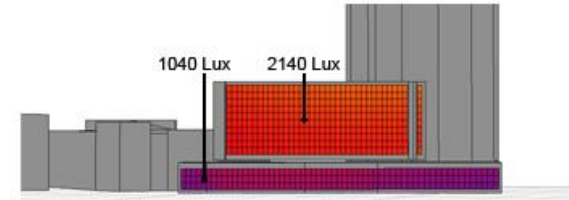
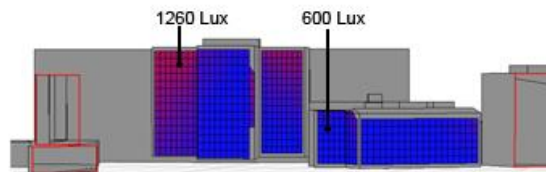
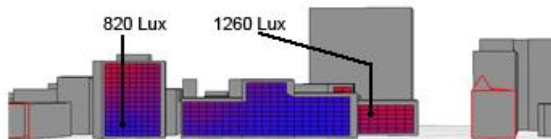
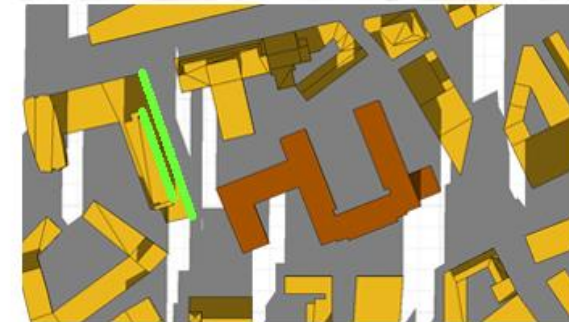
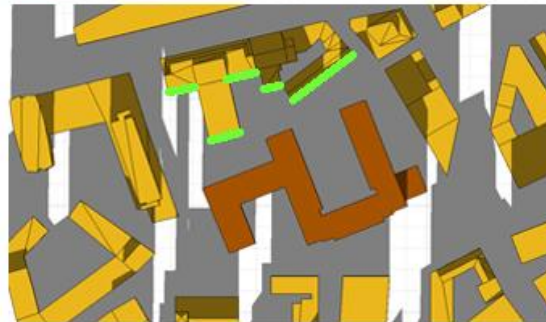
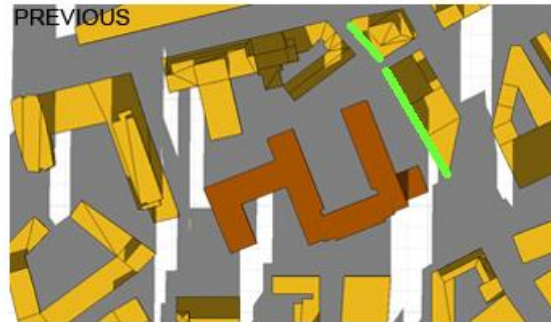
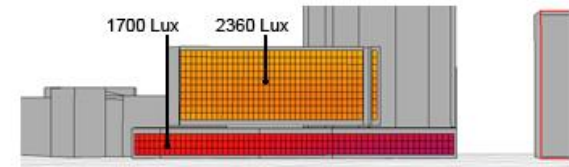
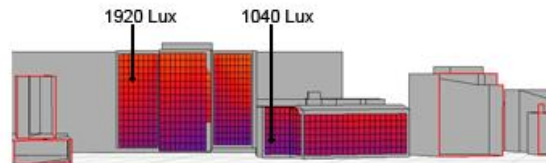
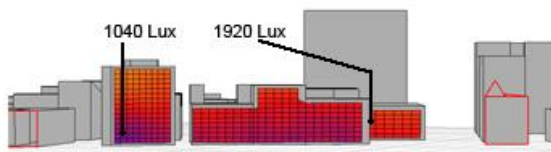
ILLUMINANCE  
(Source: Ecotect + Radiance)



WEST FACING

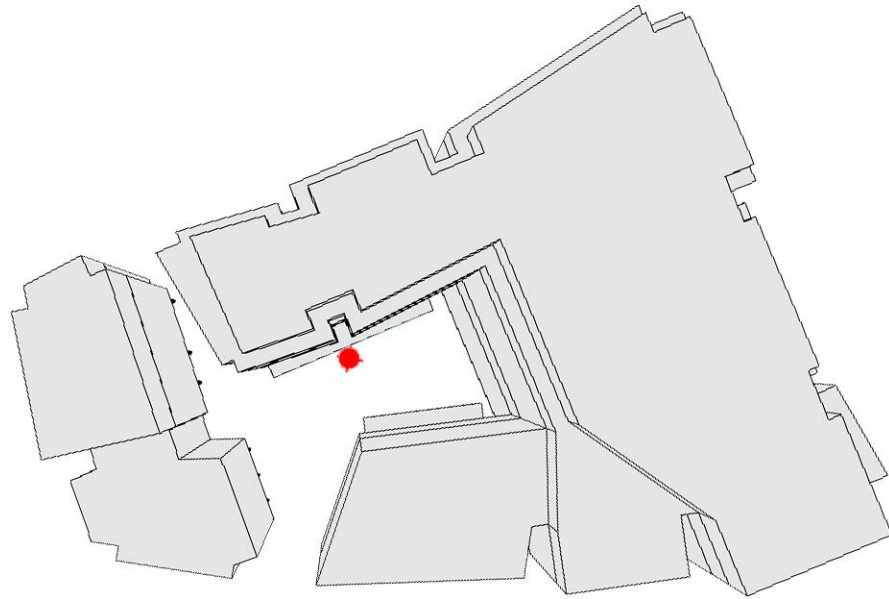
SOUTH FACING

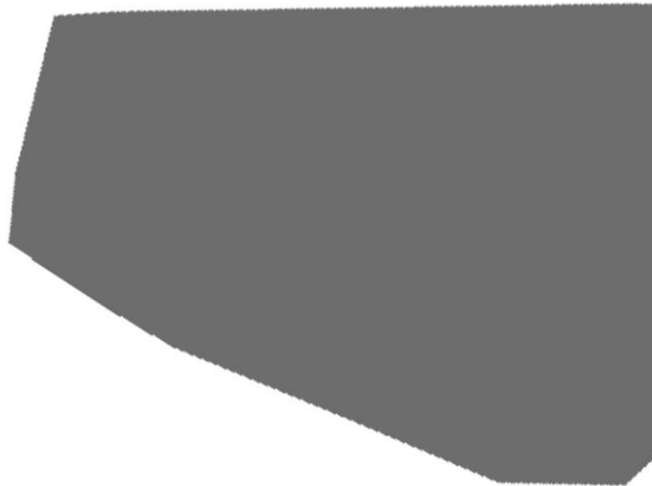
EAST FACING



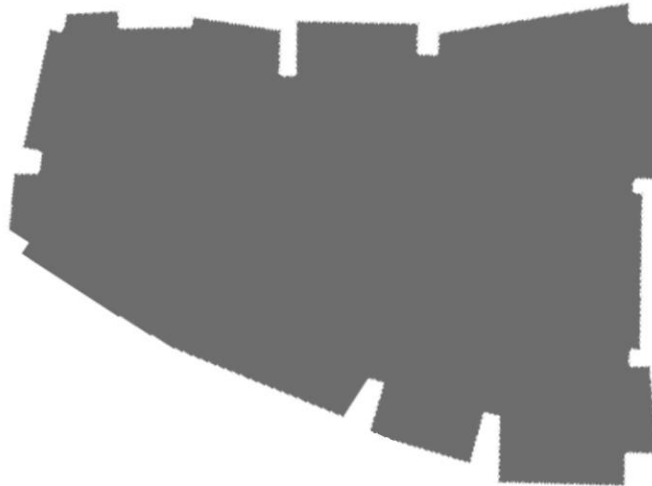
WINTER SOLSTICE  
21ST DECEMBER  
12:00PM  
OVERCAST SKY

ILLUMINANCE  
(Source: Ecotect + Radiance)



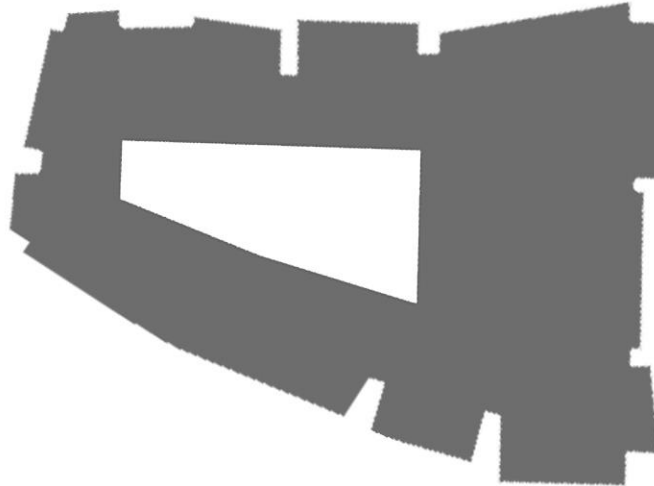


"MASSING APPROACH"

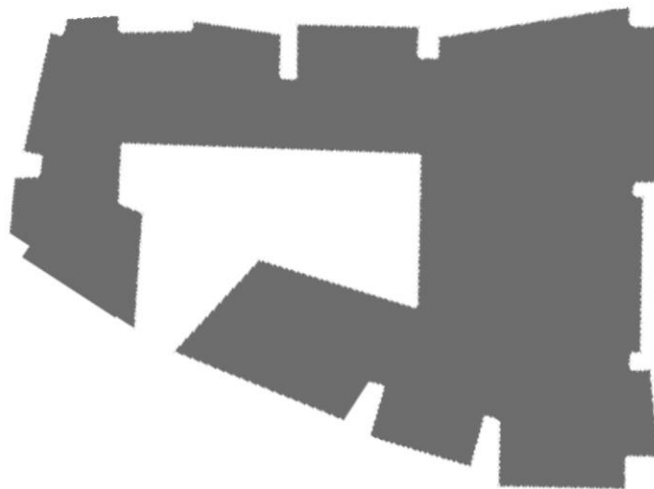


1st Carving -  
"Make it look as many different buildings"

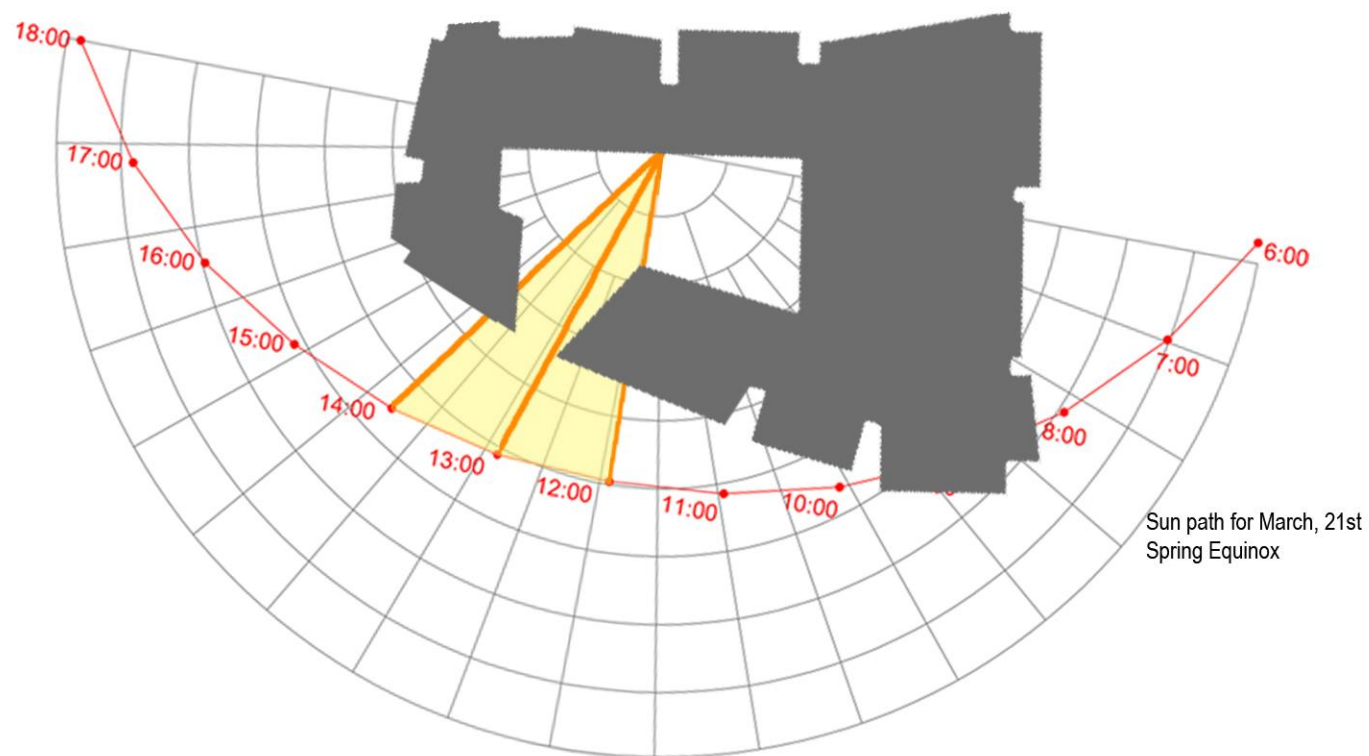




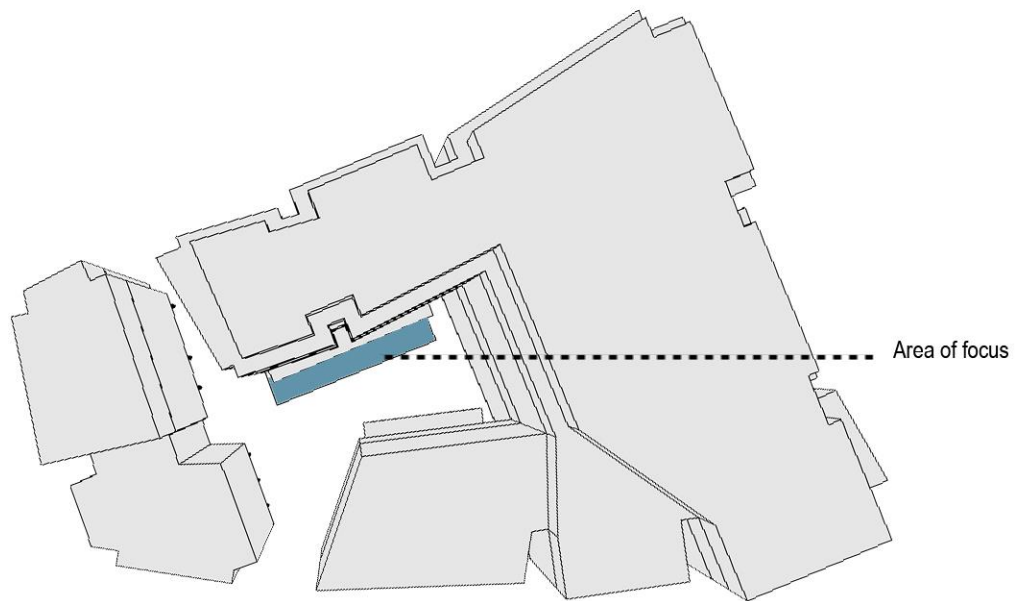
2nd Carving -  
The courtyard

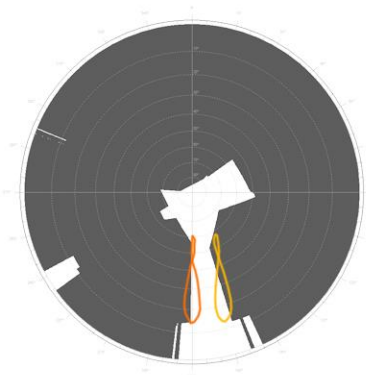


3rd Carving -  
Connection to Saint Giles Church





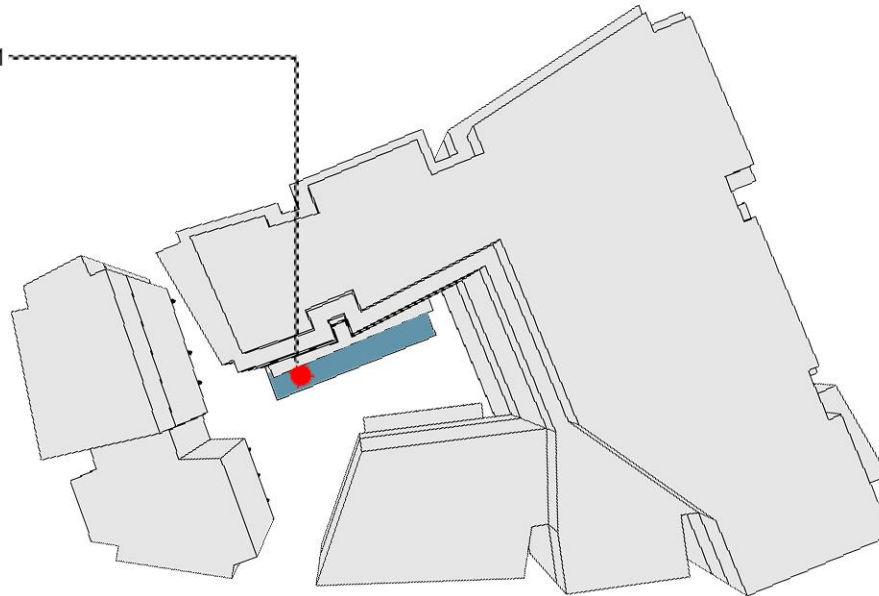


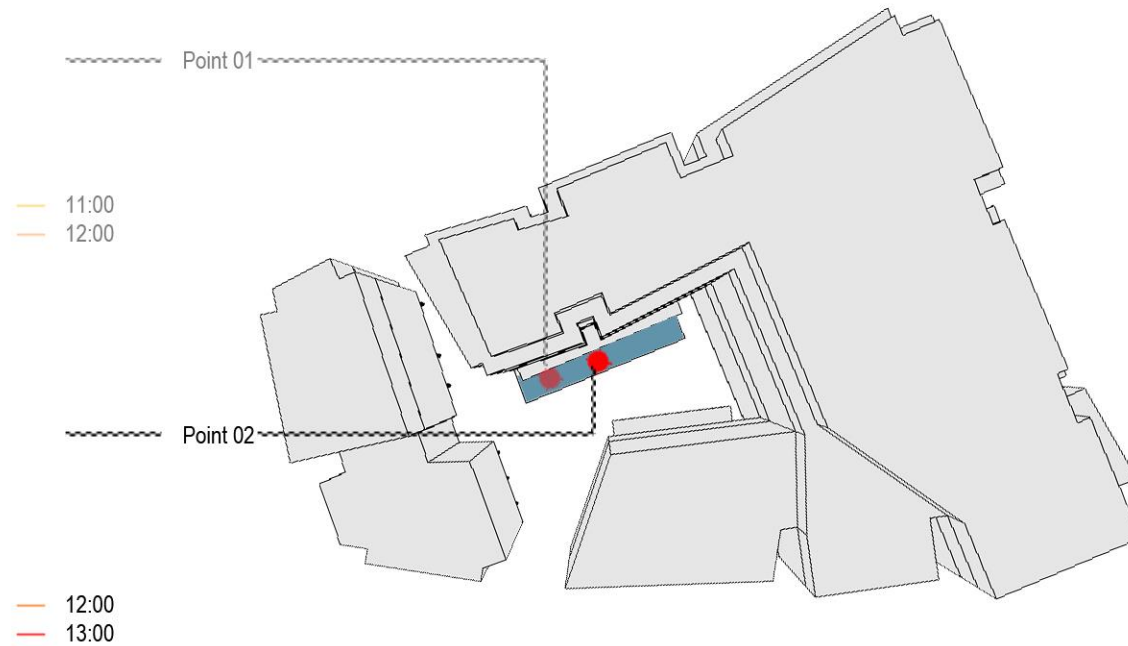
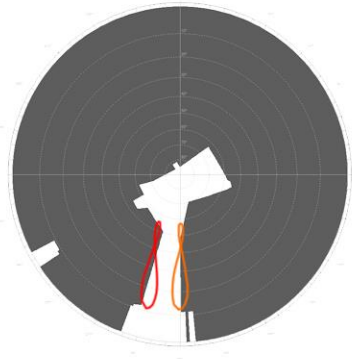
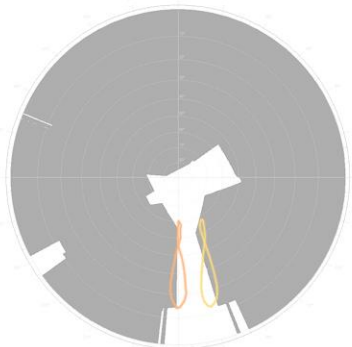


Point 01

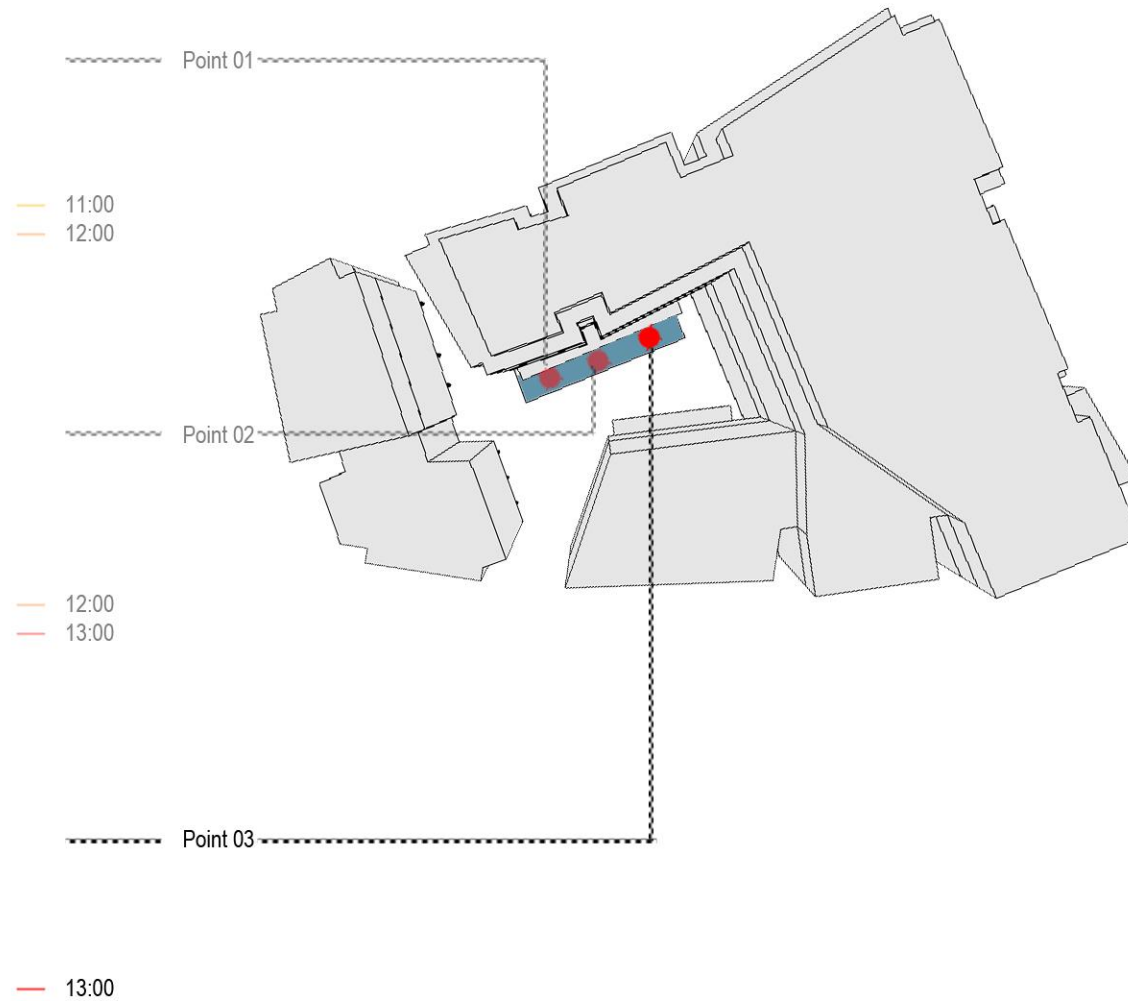
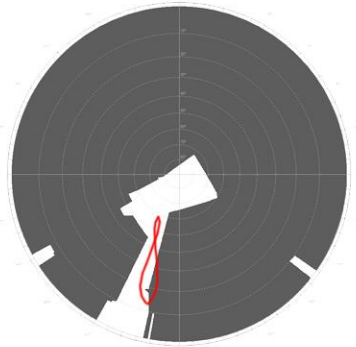
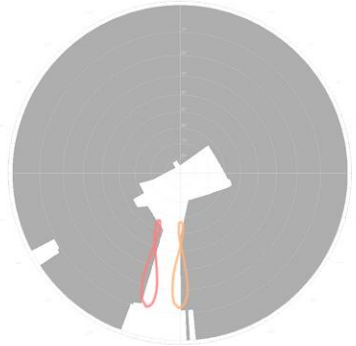
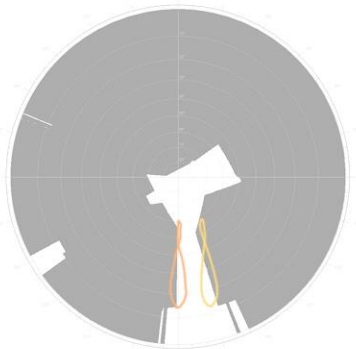
11:00

12:00



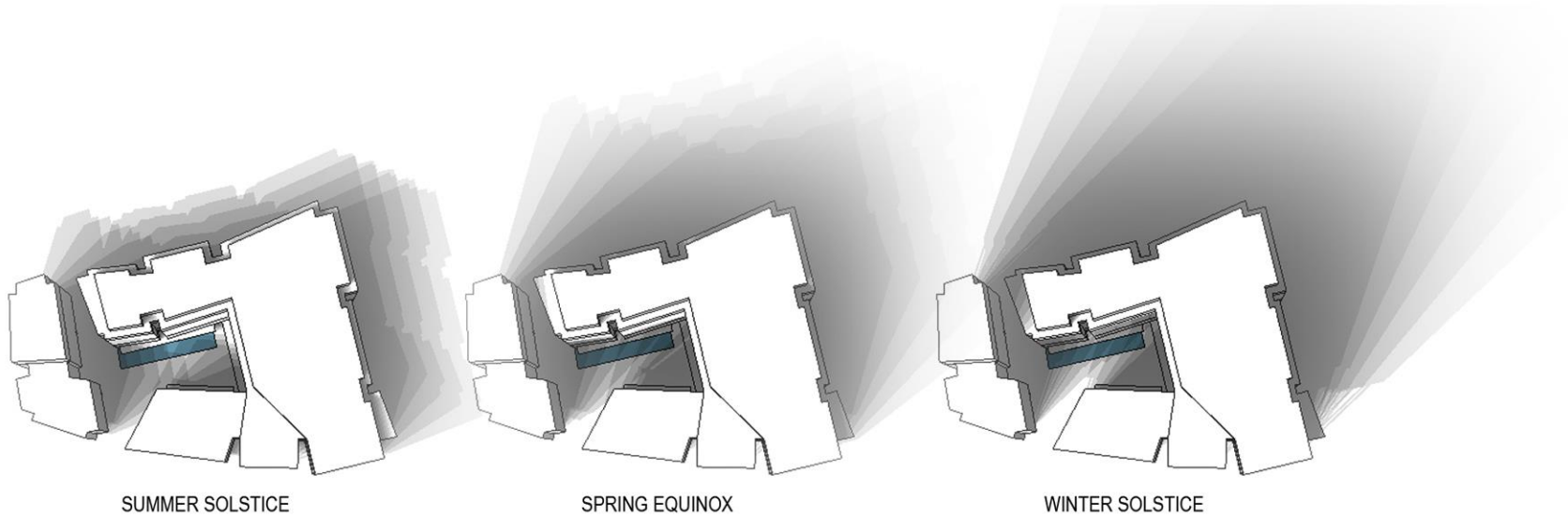




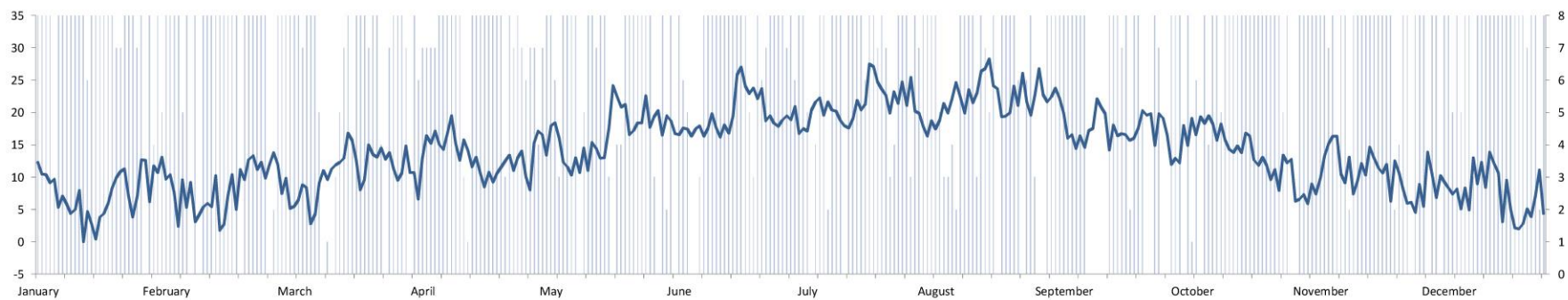


# CENTRAL ST. GILES

SUNPATH FROM 12:00 - 14:00



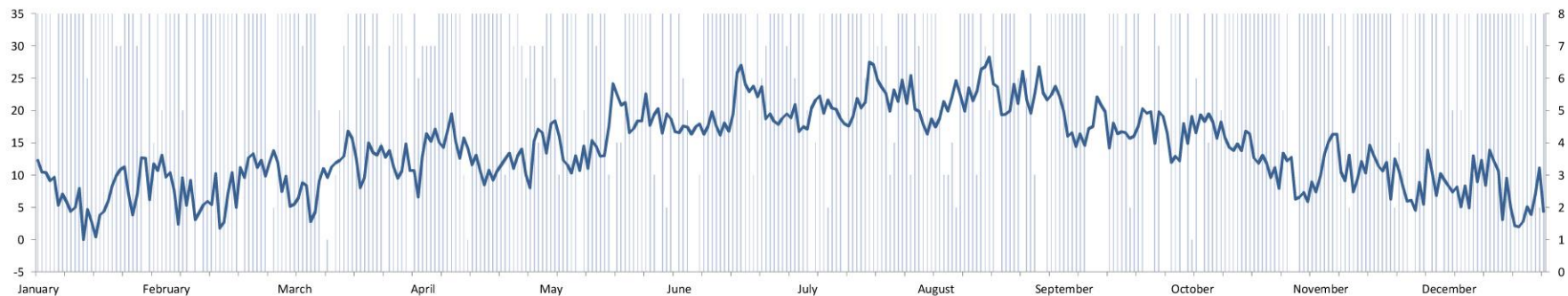
## TEMPERATURE AND OCTAS



Data: from Kensington Chelsea weather station

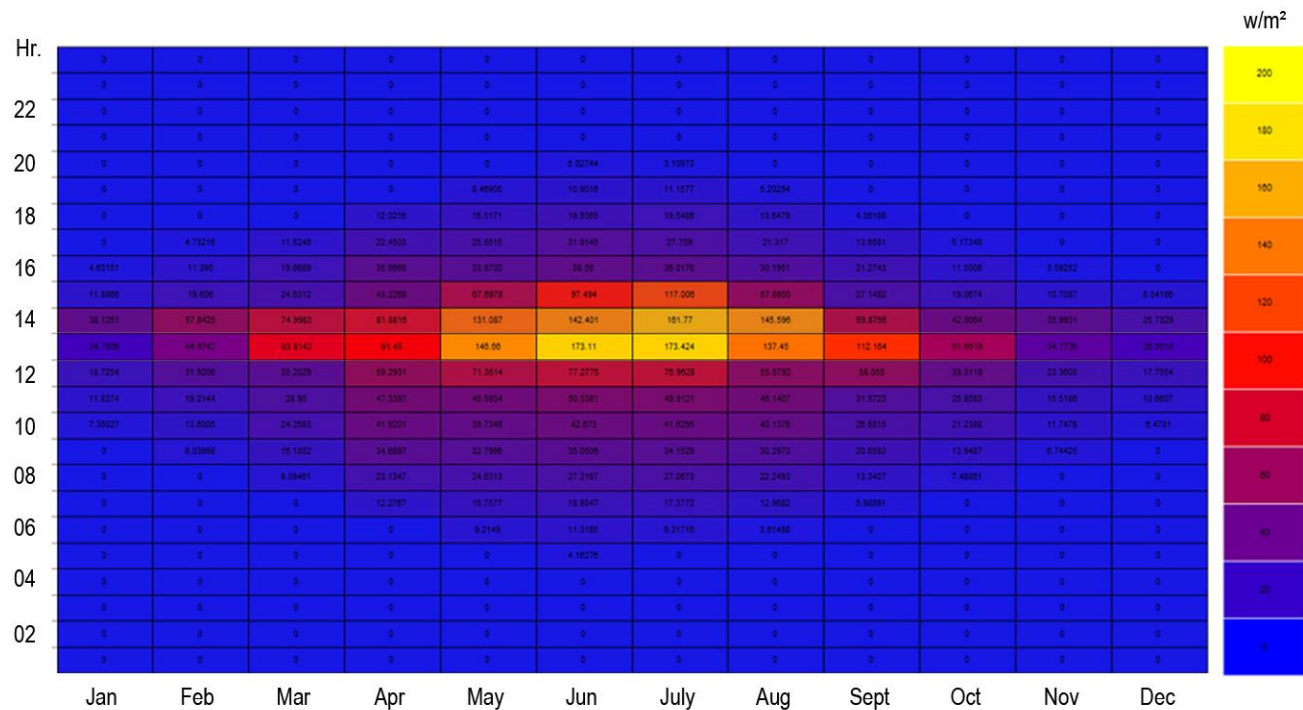


TEMPERATURE AND OCTAS



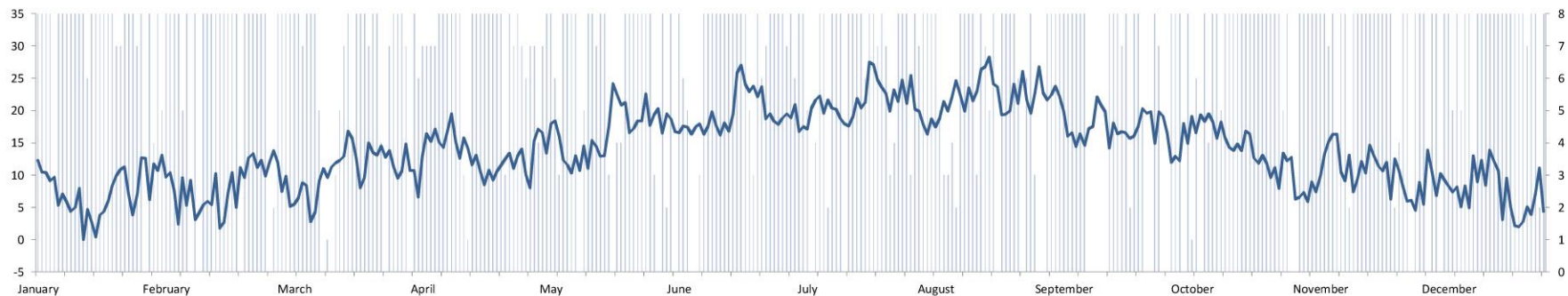
Data: from Kensington Chelsea weather station

SOLAR RADIATION



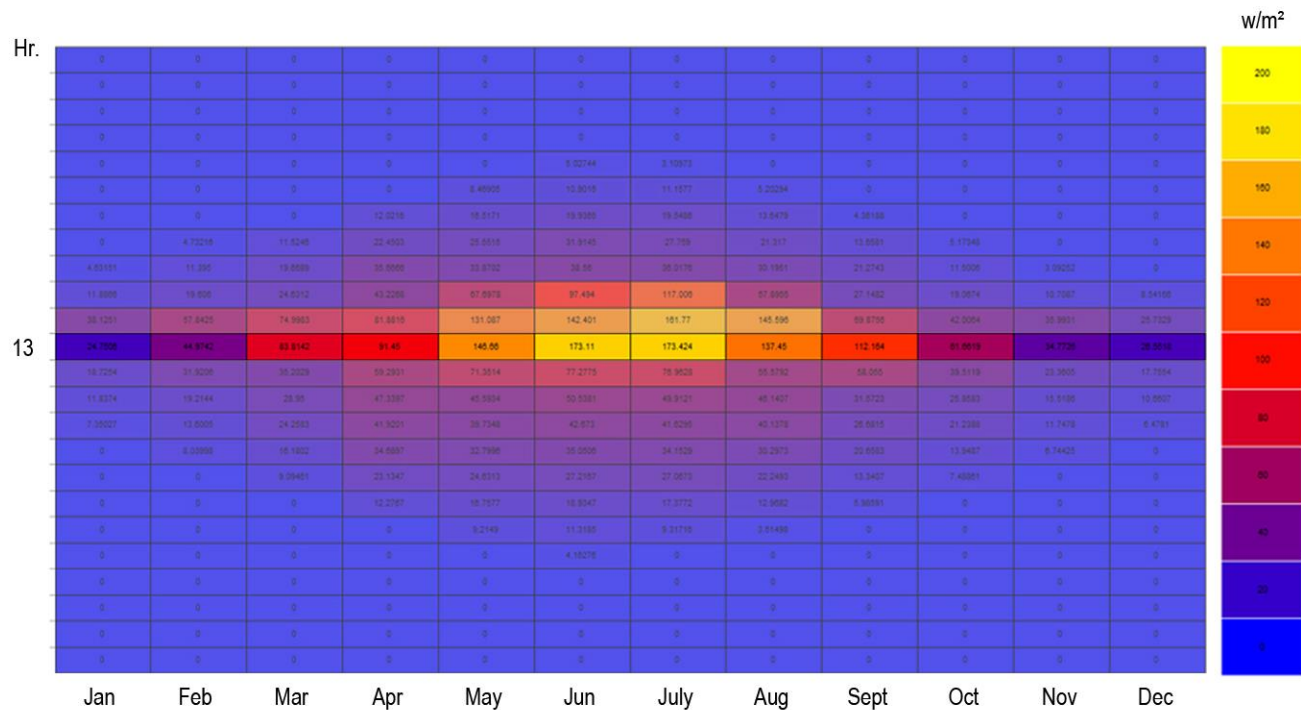
Average daily incident solar radiation calculated with ECOTECT

TEMPERATURE AND OCTAS



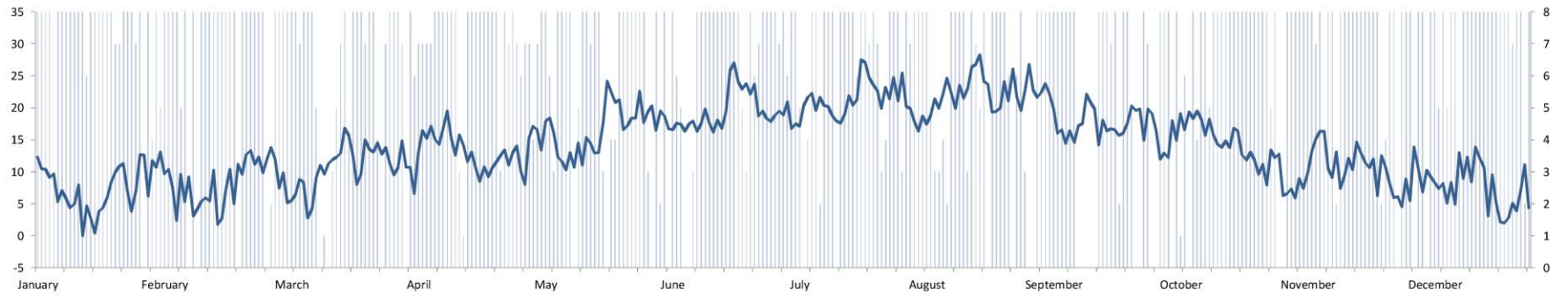
Data: from Kensington Chelsea weather station

SOLAR RADIATION



Average daily incident solar radiation calculated with ECOTECT

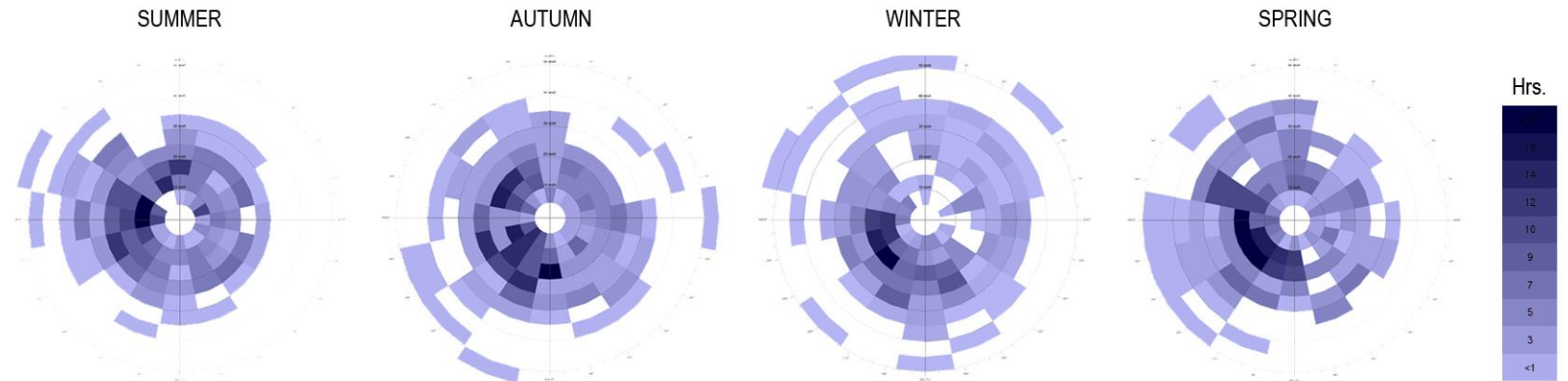
TEMPERATURE AND OCTAS



Data: from Kensington Chelsea weather station

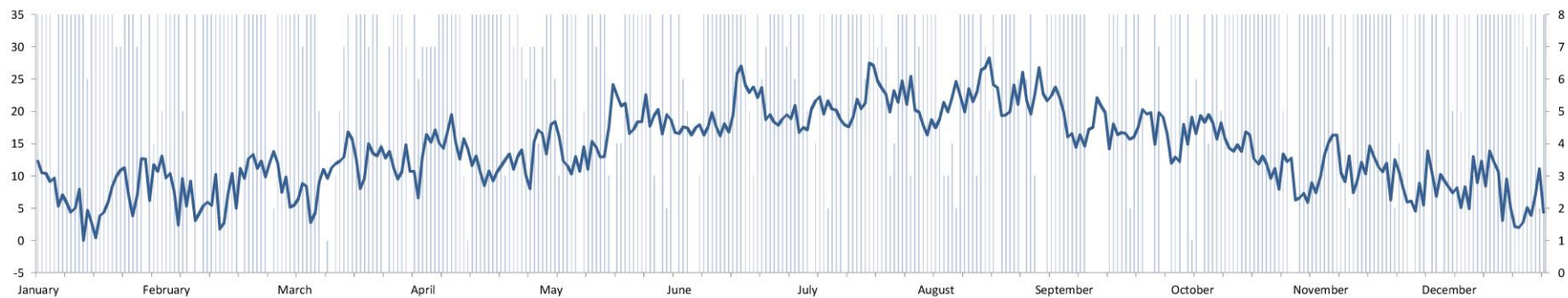
WIND SPEED AND FREQUENCY

Mid Day

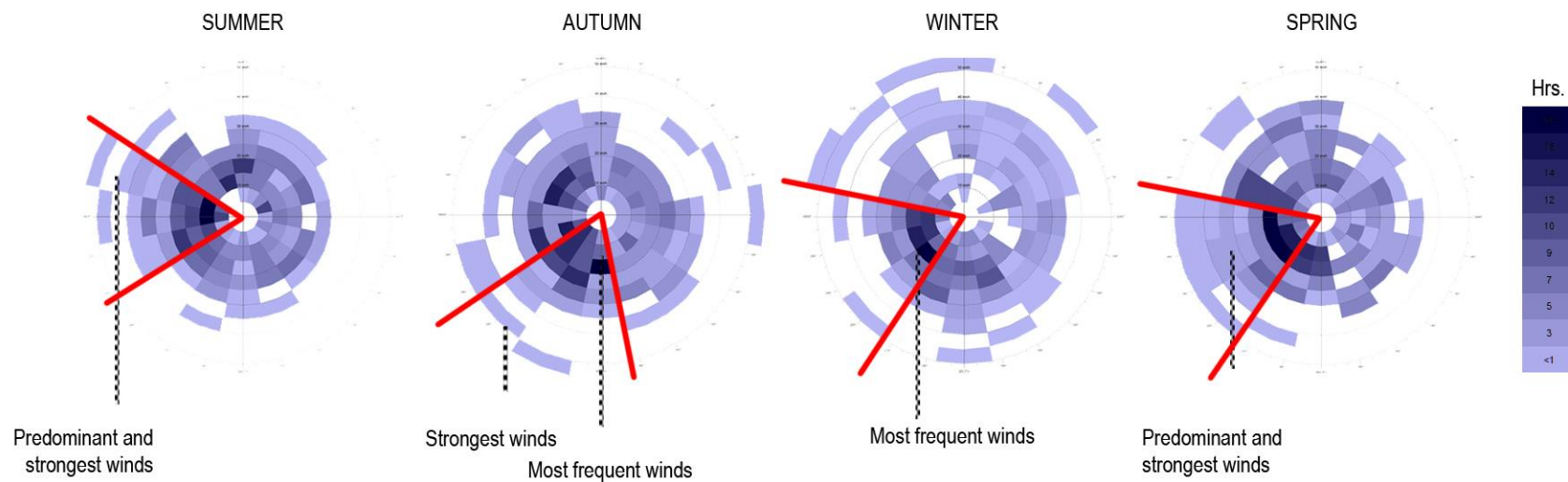




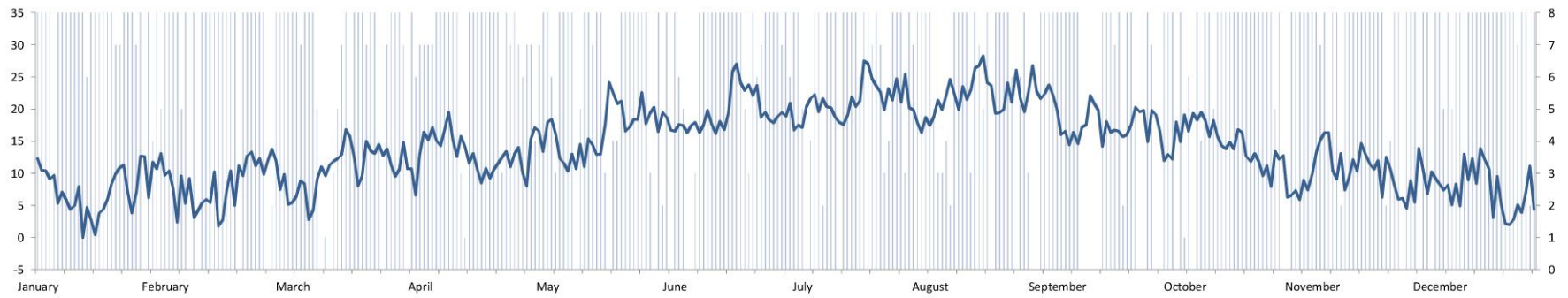
## TEMPERATURE AND OCTAS



Data: from Kensington Chelsea weather station

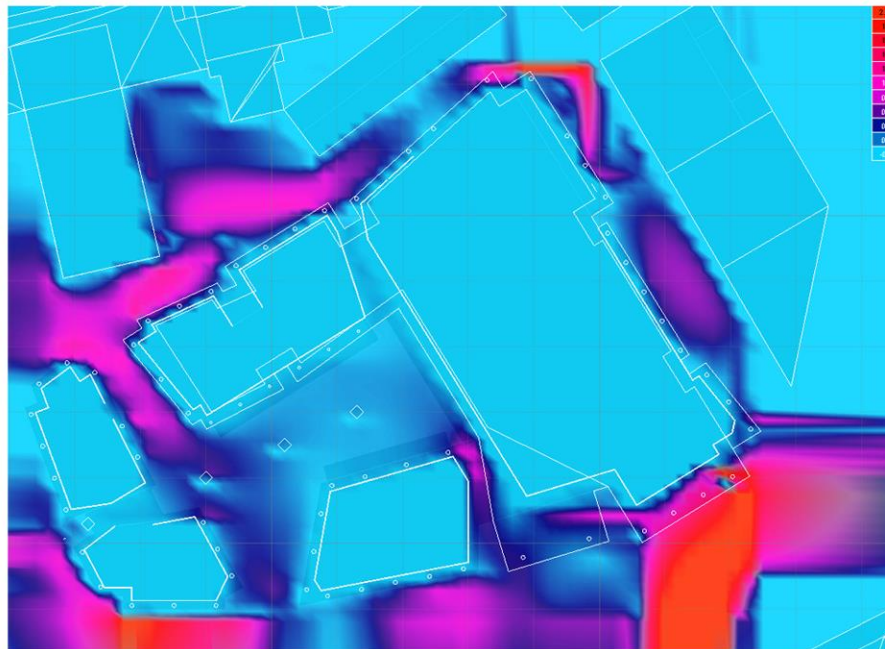
WIND SPEED AND FREQUENCY  
Mid Day

## TEMPERATURE AND OCTAS



Data: from Kensington Chelsea weather station

West wind

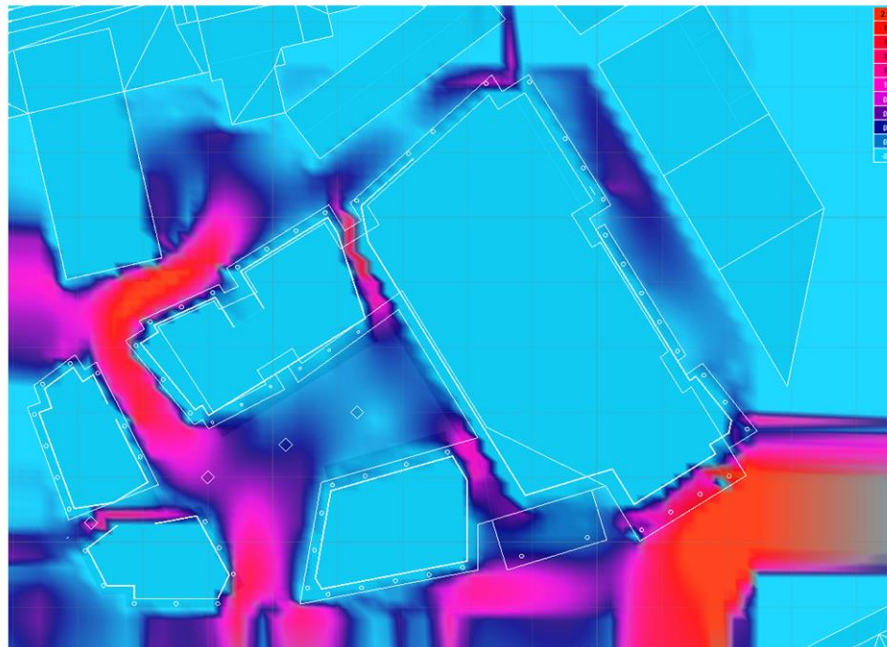


## TEMPERATURE AND OCTAS



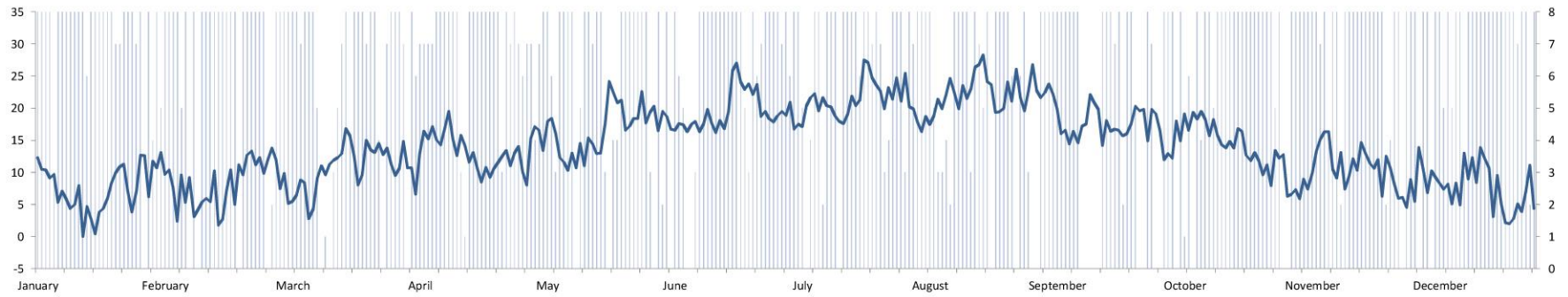
Data: from Kensington Chelsea weather station

Southwest wind



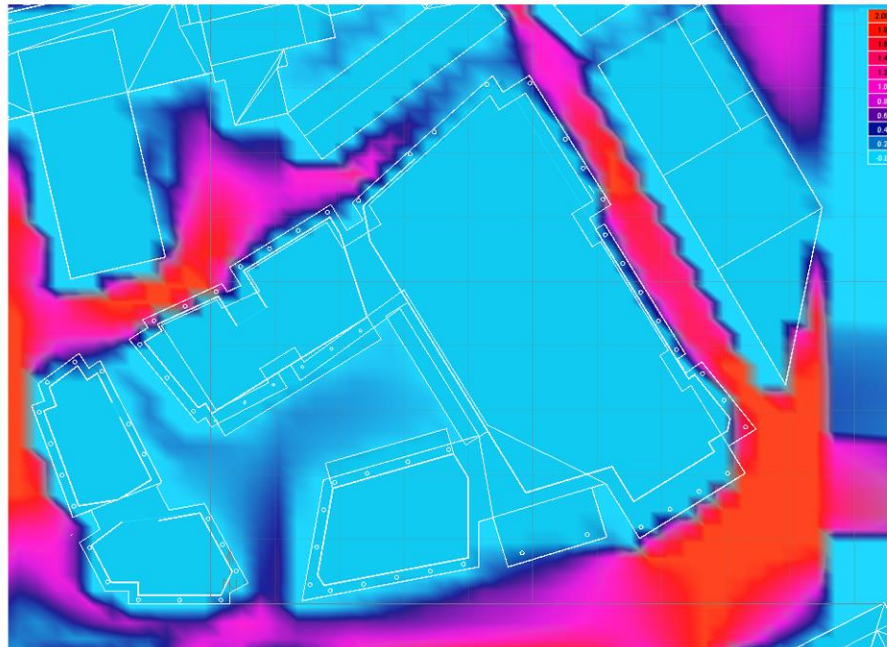


## TEMPERATURE AND OCTAS

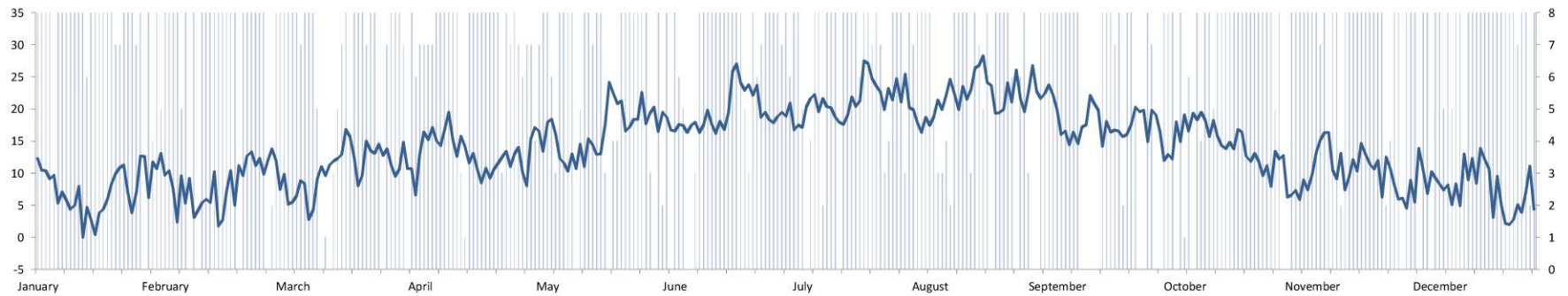


Data: from Kensington Chelsea weather station

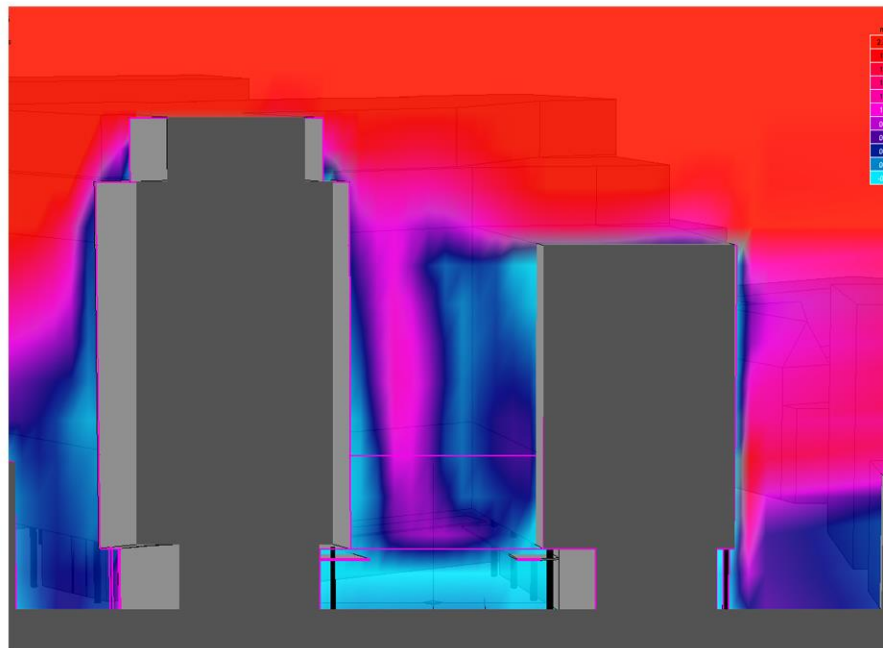
South wind



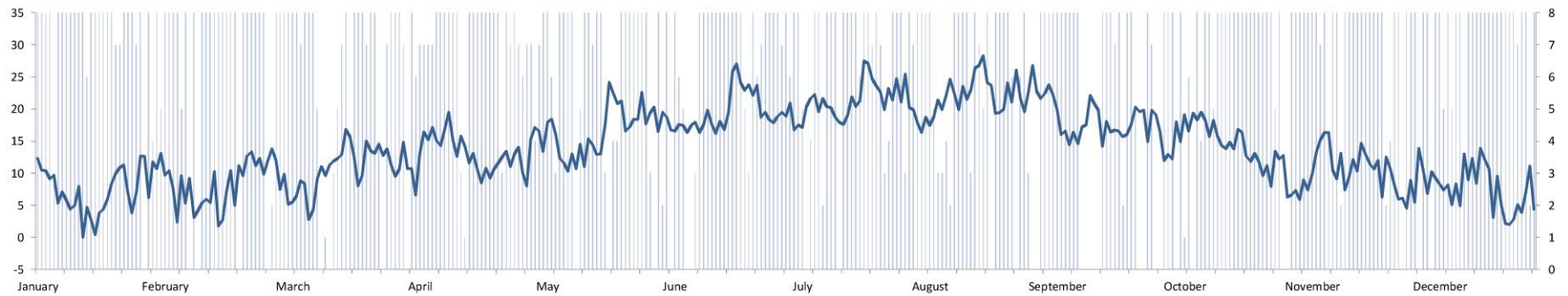
## TEMPERATURE AND OCTAS



Data: from Kensington Chelsea weather station

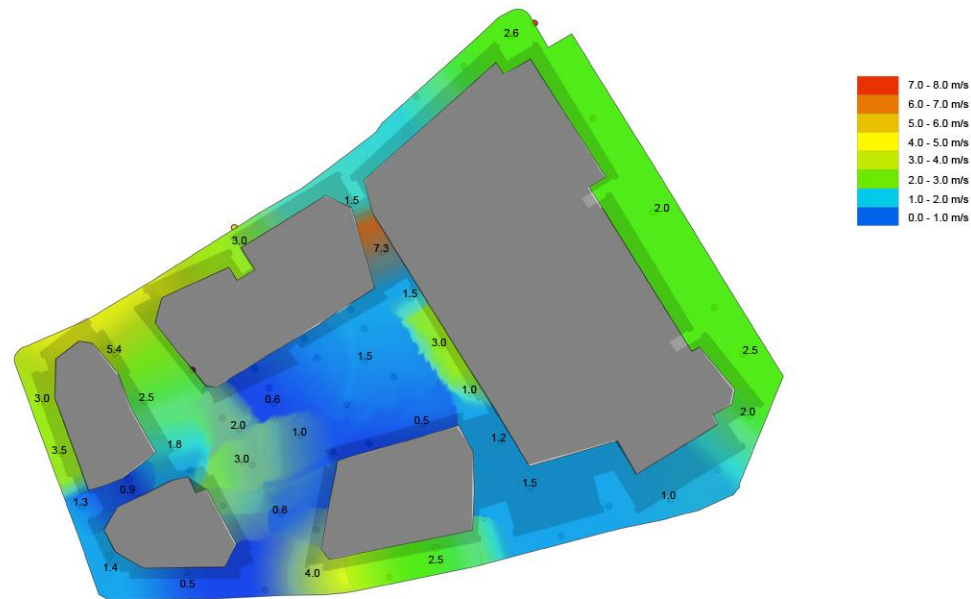
Downdraft wind  
protection

## TEMPERATURE AND OCTAS



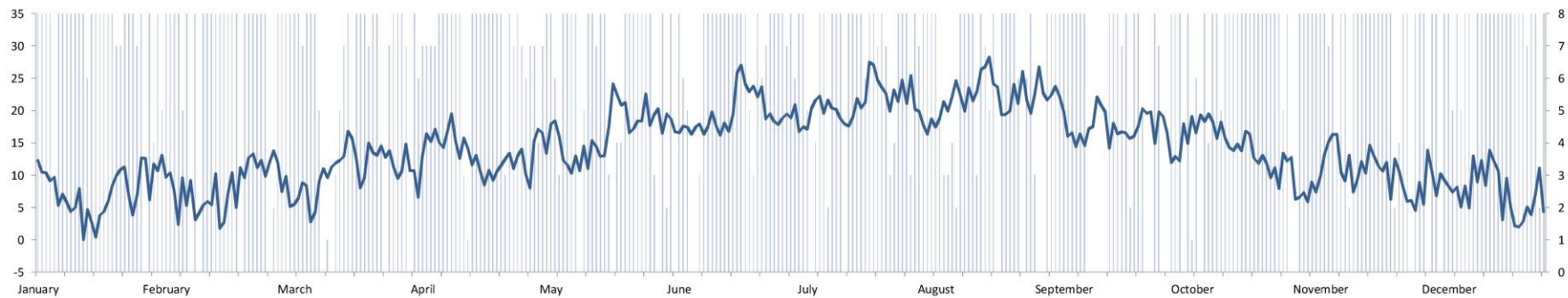
Data: from Kensington Chelsea weather station

## Spot measurements





## TEMPERATURE AND OCTAS



Data: from Kensington Chelsea weather station

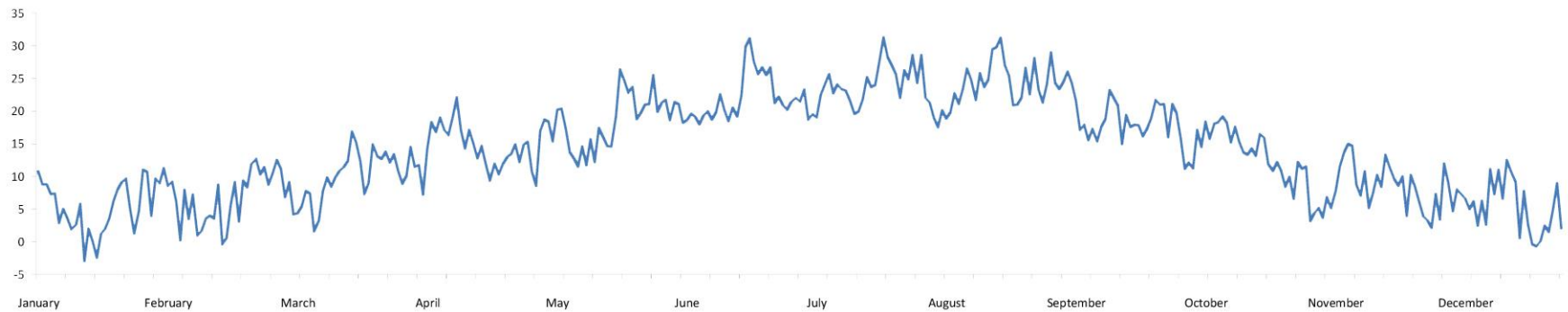
Wind speed fixed at 0.5 m/s

## TEMPERATURE AND OCTAS

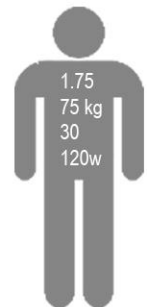


Data: from Kensington Chelsea weather station

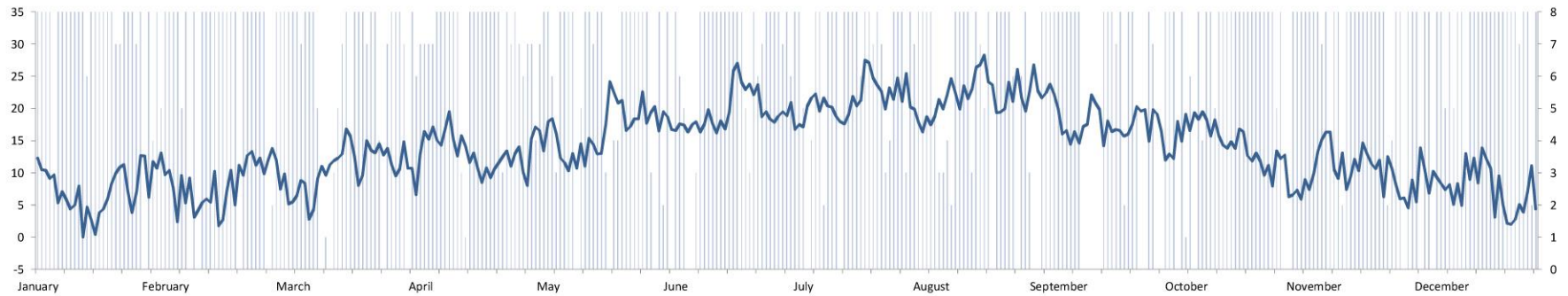
## PHYSIOLOGICAL EQUIVALENT TEMPERATURE



Wind speed fixed at 0.5 m/s

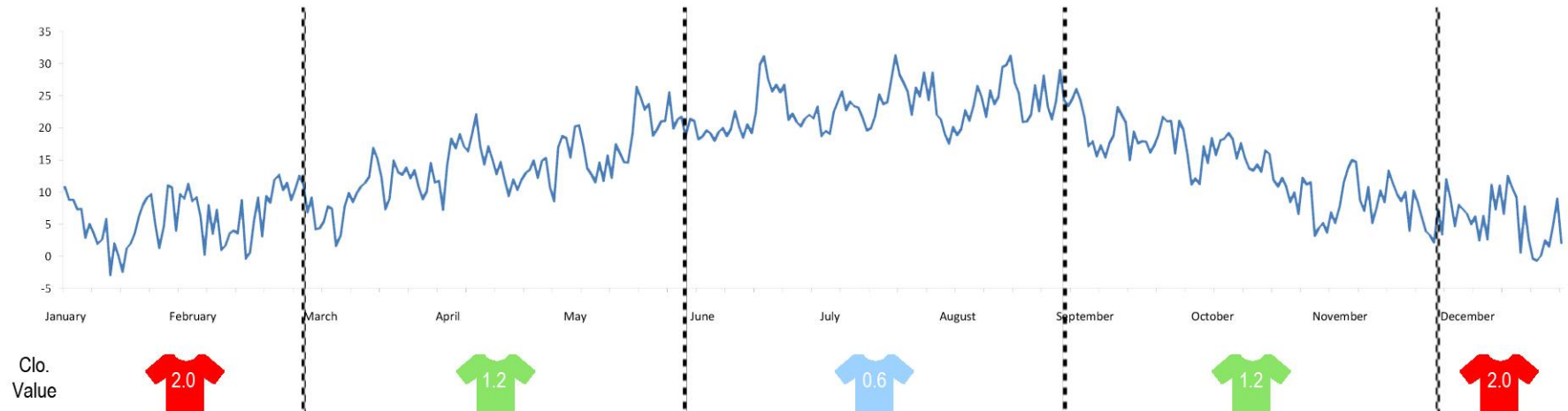


## TEMPERATURE AND OCTAS

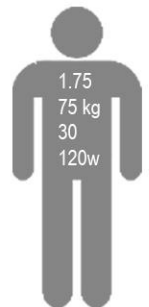


## PHYSIOLOGICAL EQUIVALENT TEMPERATURE

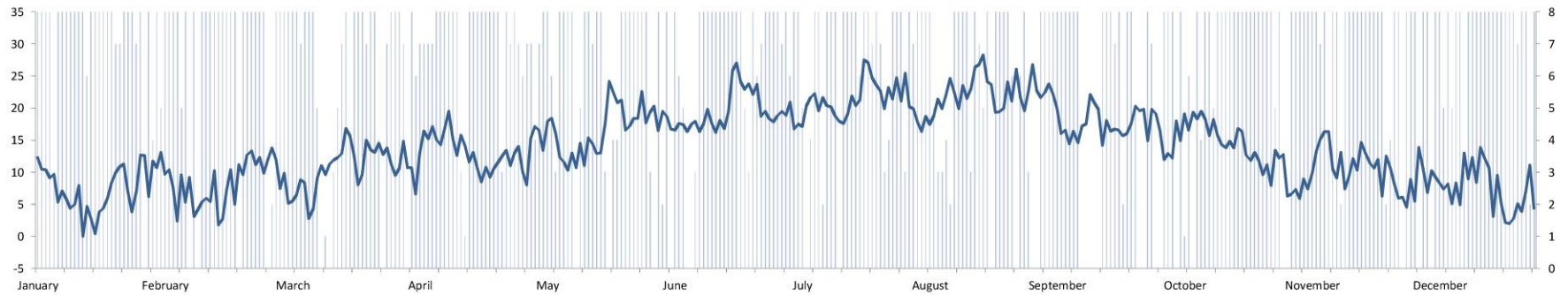
Data: from Kensington Chelsea weather station



Wind speed fixed at 0.5 m/s

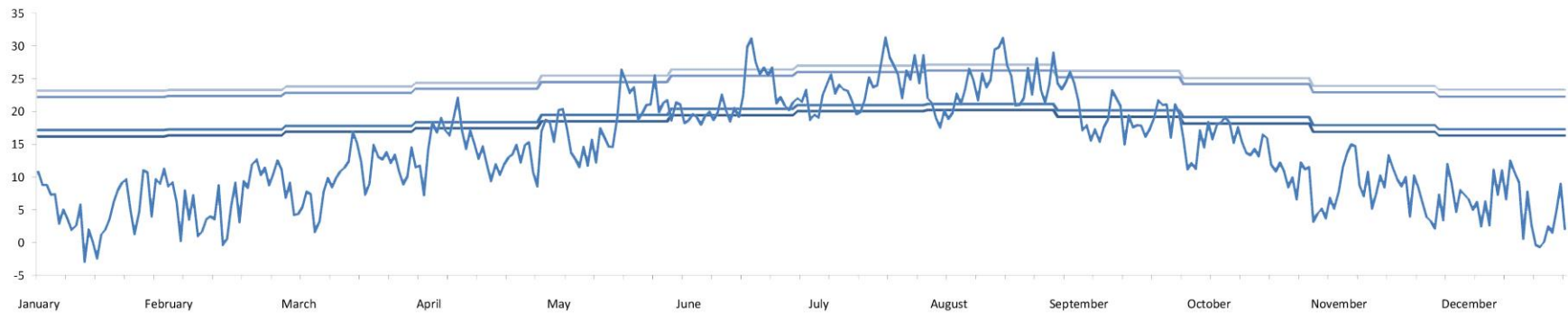


## TEMPERATURE AND OCTAS



Data: from Kensington Chelsea weather station

## PHYSIOLOGICAL EQUIVALENT TEMPERATURE



De Dear's Comfort zone 90 &amp; 80% acceptability

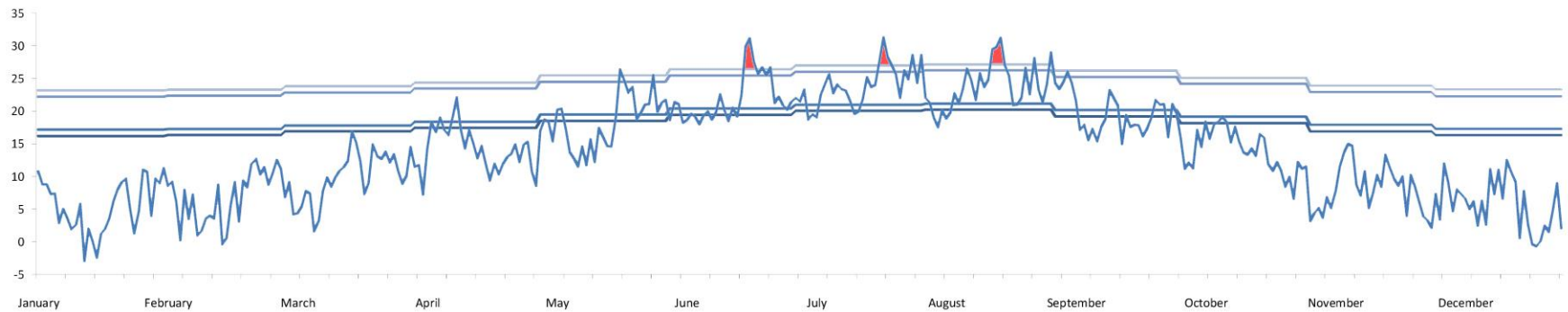


## TEMPERATURE AND OCTAS



Data: from Kensington Chelsea weather station

## PHYSIOLOGICAL EQUIVALENT TEMPERATURE



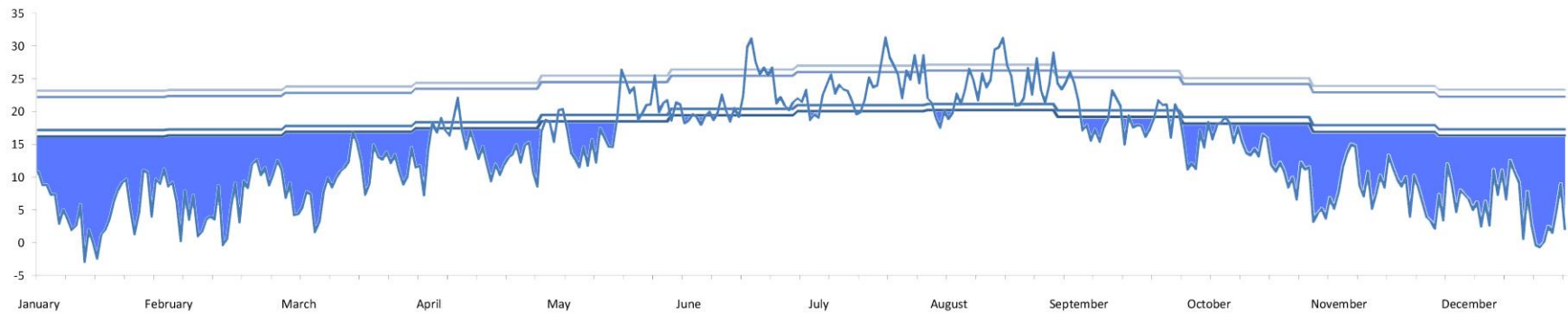
Peaks above the high end of the 80% acceptability

## TEMPERATURE AND OCTAS



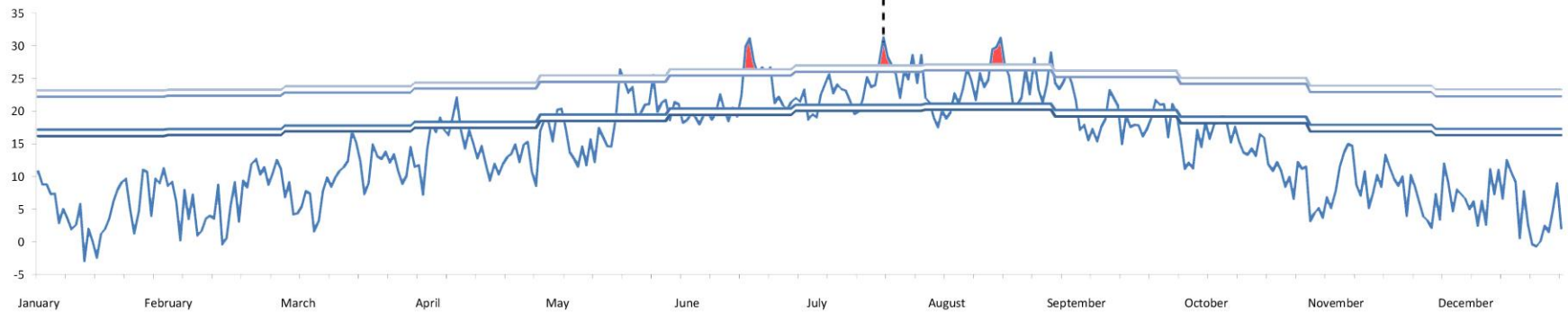
Data: from Kensington Chelsea weather station

## PHYSIOLOGICAL EQUIVALENT TEMPERATURE



Peaks below the low end of the 80% acceptability

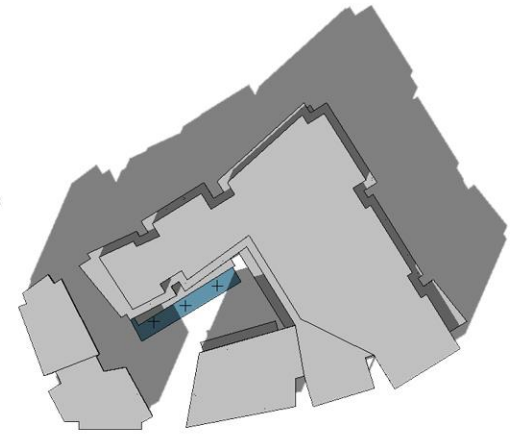
## PHYSIOLOGICAL EQUIVALENT TEMPERATURE



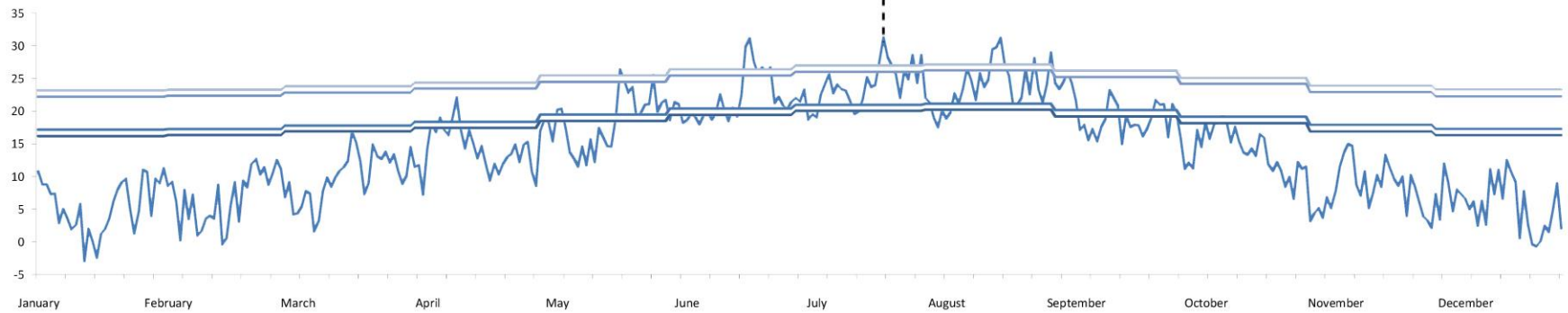
July 21st

Temperature : 27.5 C  
Cloud Cover : 8  
Relative Humidity : 50 %  
Global Radiation : 173 w/m<sup>2</sup>  
Wind Speed : 0.5 m/s

P.E.T. : 31.0 C



## PHYSIOLOGICAL EQUIVALENT TEMPERATURE





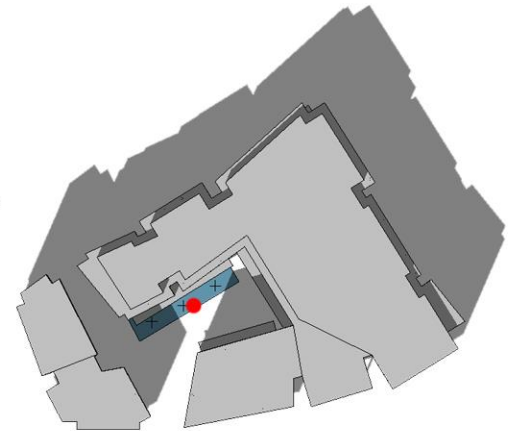
Temperature : 27.5 C  
Cloud Cover : 0  
Relative Humidity : 50 %  
Global Radiation : 271 w/m<sup>2</sup>  
Wind Speed : 0.5 m/s

P.E.T. : 32.8 C

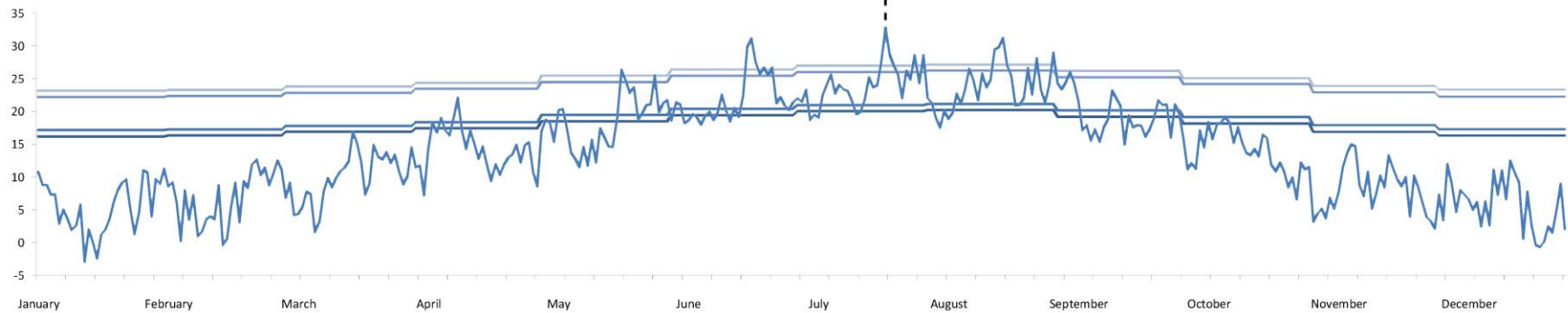
July 21st

Temperature : 27.5 C  
Cloud Cover : 8  
Relative Humidity : 50 %  
Global Radiation : 173 w/m<sup>2</sup>  
Wind Speed : 0.5 m/s

P.E.T. : 31.0 C



## PHYSIOLOGICAL EQUIVALENT TEMPERATURE



Temperature : 27.5 C  
Cloud Cover : 0  
Relative Humidity : 50 %  
Global Radiation : 54 w/m<sup>2</sup>  
Wind Speed : 0.5 m/s

P.E.T. : 27.6 C

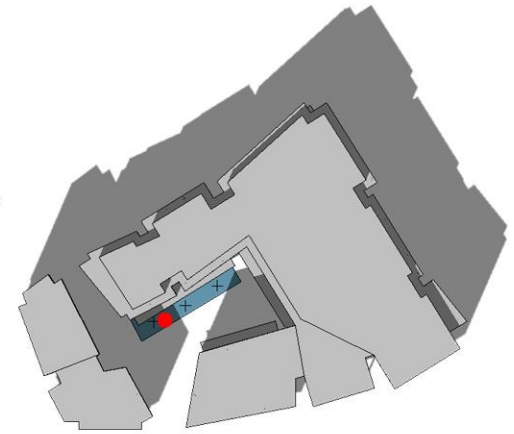
Temperature : 27.5 C  
Cloud Cover : 0  
Relative Humidity : 50 %  
Global Radiation : 271 w/m<sup>2</sup>  
Wind Speed : 0.5 m/s

P.E.T. : 32.8 C

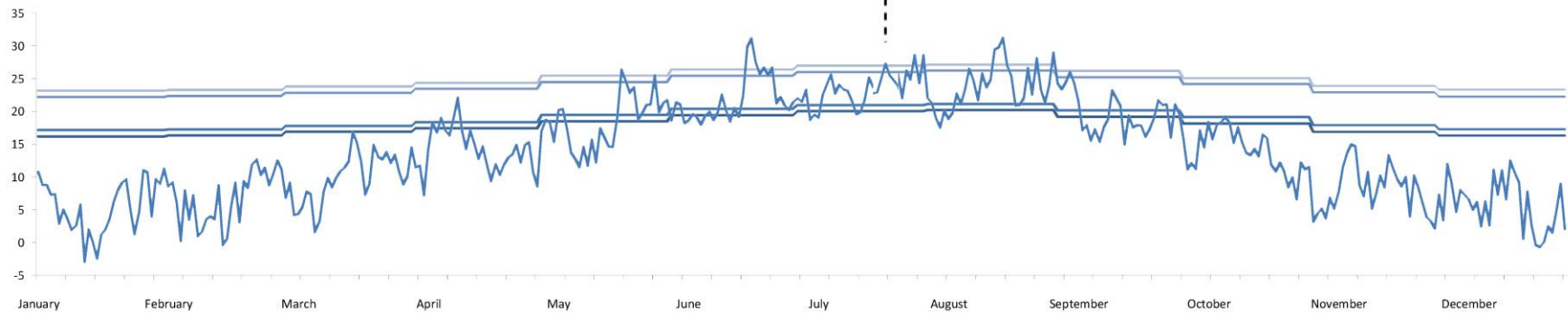
July 21st

Temperature : 27.5 C  
Cloud Cover : 8  
Relative Humidity : 50 %  
Global Radiation : 173 w/m<sup>2</sup>  
Wind Speed : 0.5 m/s

P.E.T. : 31.0 C



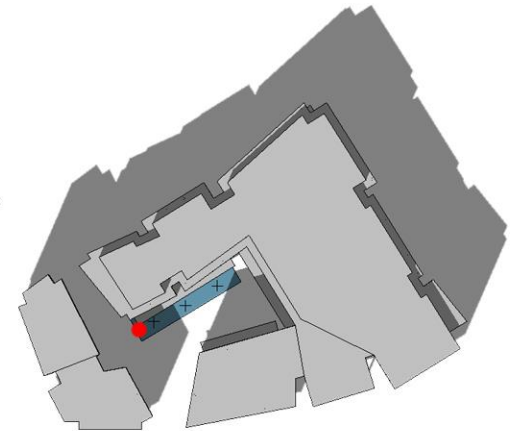
## PHYSIOLOGICAL EQUIVALENT TEMPERATURE



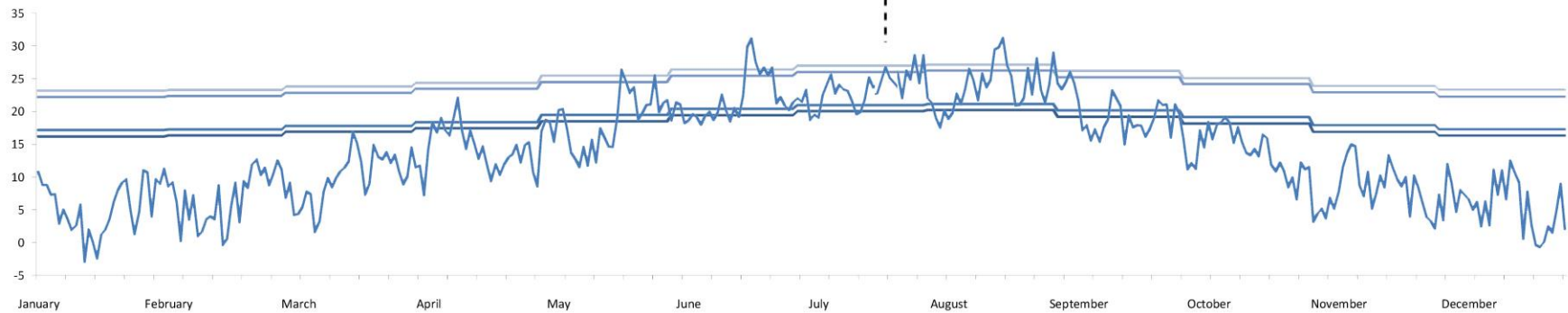
Temperature	: 27.5 C	Temperature	: 27.5 C	Temperature	: 27.5 C
Cloud Cover	: 0	Cloud Cover	: 0	Cloud Cover	: 0
Relative Humidity	: 50 %	Relative Humidity	: 50 %	Relative Humidity	: 50 %
Global Radiation	: 54 w/m <sup>2</sup>	Global Radiation	: 54 w/m <sup>2</sup>	Global Radiation	: 271 w/m <sup>2</sup>
Wind Speed	: 1.0 m/s	Wind Speed	: 0.5 m/s	Wind Speed	: 0.5 m/s
P.E.T.	: 26.9 C	P.E.T.	: 27.6 C	P.E.T.	: 32.8 C

July 21st

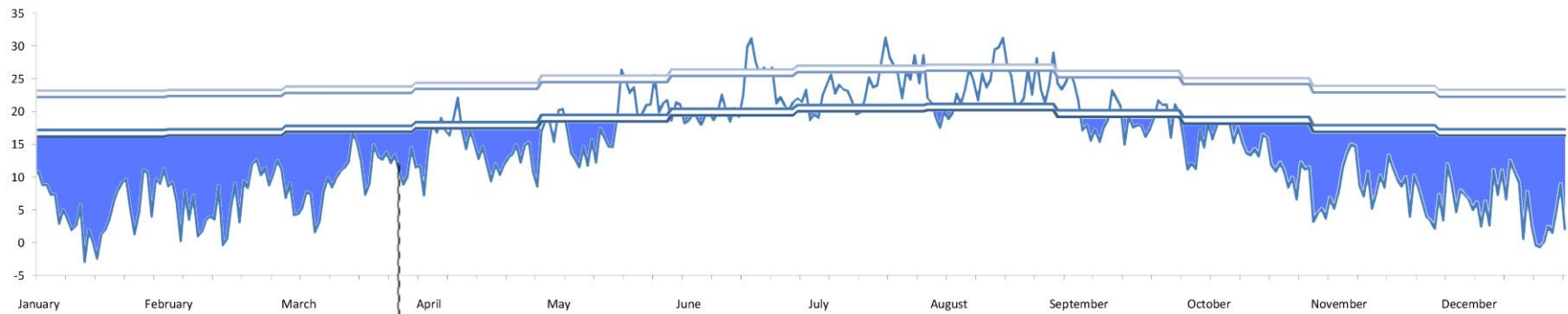
Temperature	: 27.5 C
Cloud Cover	: 8
Relative Humidity	: 50 %
Global Radiation	: 173 w/m <sup>2</sup>
Wind Speed	: 0.5 m/s
P.E.T.	: 31.0 C



## PHYSIOLOGICAL EQUIVALENT TEMPERATURE



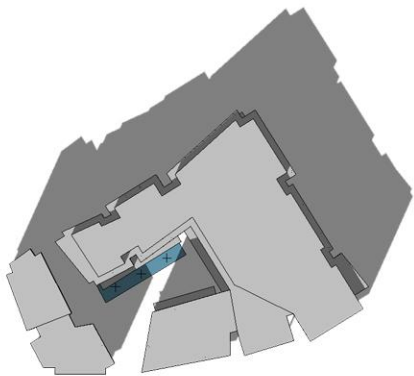
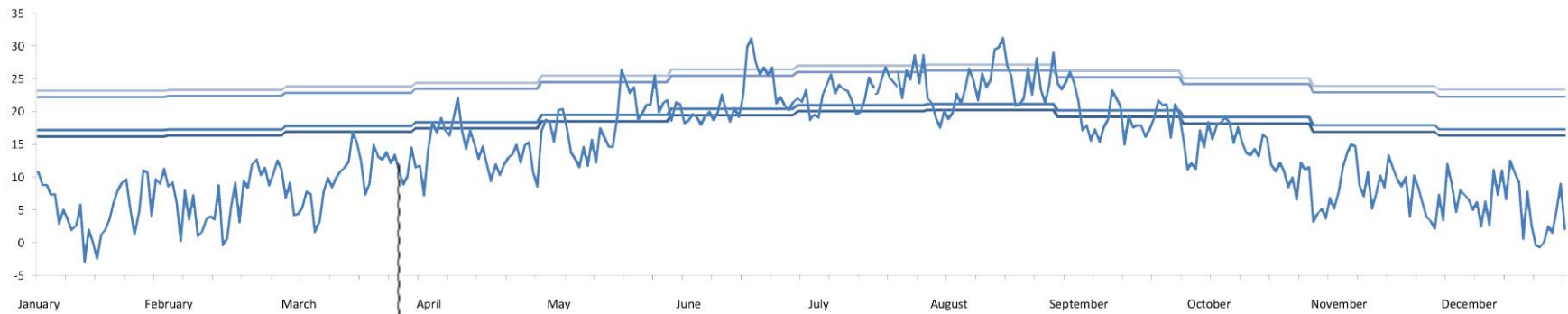
## PHYSIOLOGICAL EQUIVALENT TEMPERATURE



--- March 25th



## PHYSIOLOGICAL EQUIVALENT TEMPERATURE

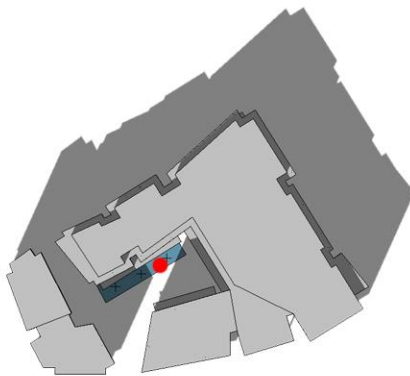
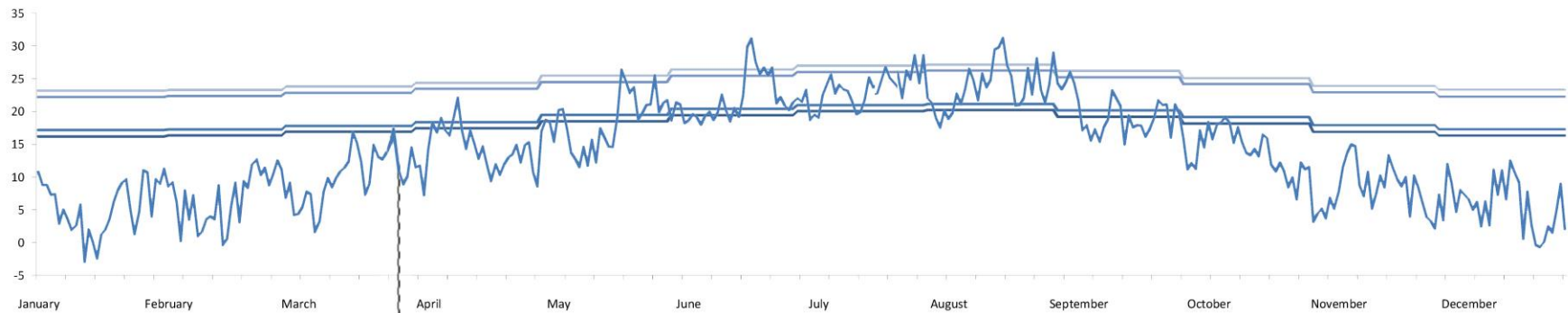


Temperature : 14.5 C  
Cloud Cover : 4  
Relative Humidity : 46 %  
Global Radiation : 84 w/m<sup>2</sup>  
Wind Speed : 0.5 m/s

P.E.T. : 13.8 C

--- March 25th

## PHYSIOLOGICAL EQUIVALENT TEMPERATURE

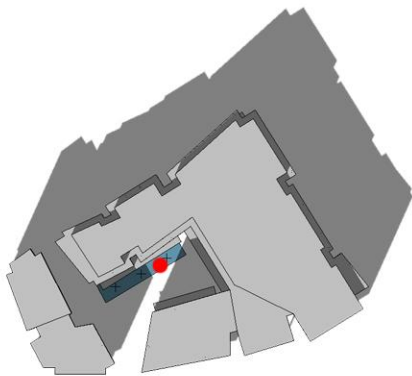
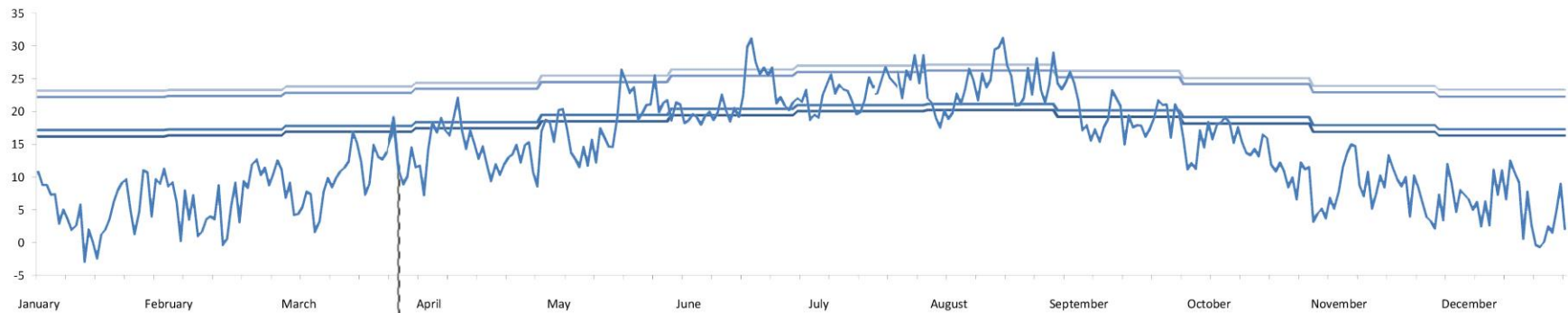


Temperature	:	14.5 C	Temperature	:	14.5 C
Cloud Cover	:	4	Cloud Cover	:	4
Relative Humidity	:	46 %	Relative Humidity	:	46 %
Global Radiation	:	84 w/m <sup>2</sup>	Global Radiation	:	257.7 w/m <sup>2</sup>
Wind Speed	:	0.5 m/s	Wind Speed	:	0.5 m/s

P.E.T.	:	13.8 C	P.E.T.	:	17.8 C
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--- March 25th

## PHYSIOLOGICAL EQUIVALENT TEMPERATURE



Temperature : 14.5 C  
Cloud Cover : 4  
Relative Humidity : 46 %  
Global Radiation : 84 w/m<sup>2</sup>  
Wind Speed : 0.5 m/s

P.E.T. : 13.8 C

Temperature : 14.5 C  
Cloud Cover : 4  
Relative Humidity : 46 %  
Global Radiation : 257.7 w/m<sup>2</sup>  
Wind Speed : 0.5 m/s

P.E.T. : 17.8 C

Temperature : 14.5 C  
Cloud Cover : 4  
Relative Humidity : 46 %  
Global Radiation : 257.7 w/m<sup>2</sup>  
Wind Speed : 0.5 m/s

P.E.T. : 19.5 C



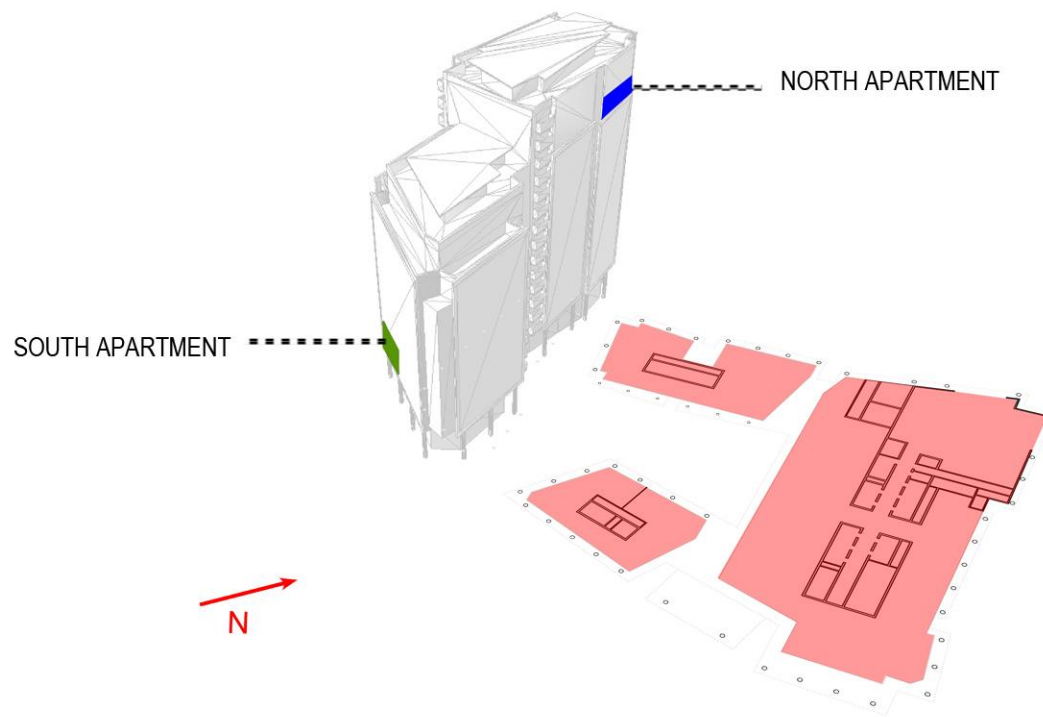
March 25th



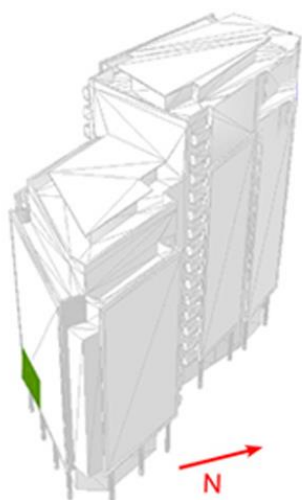
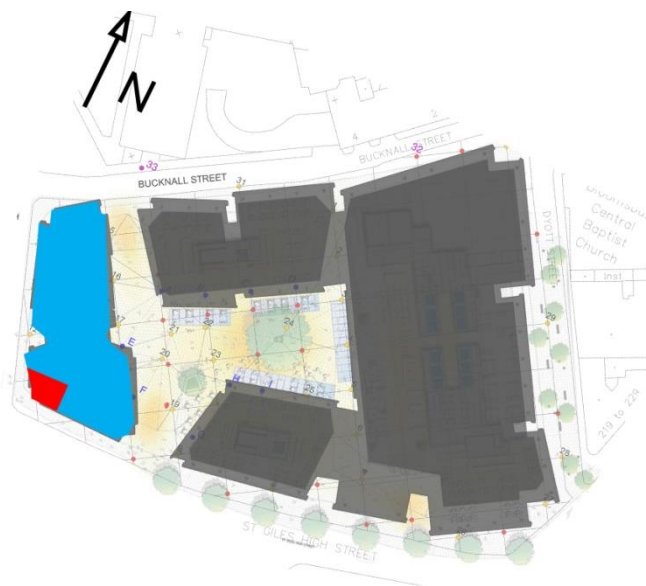


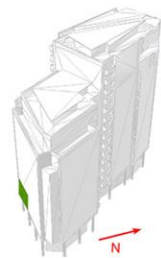






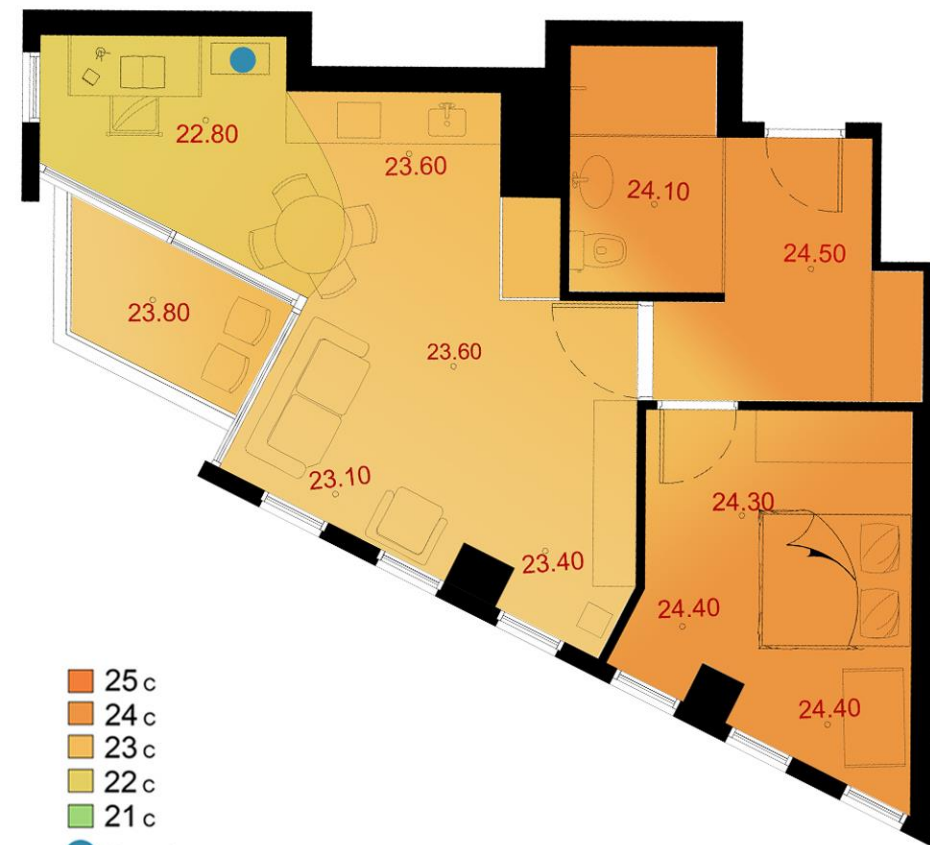




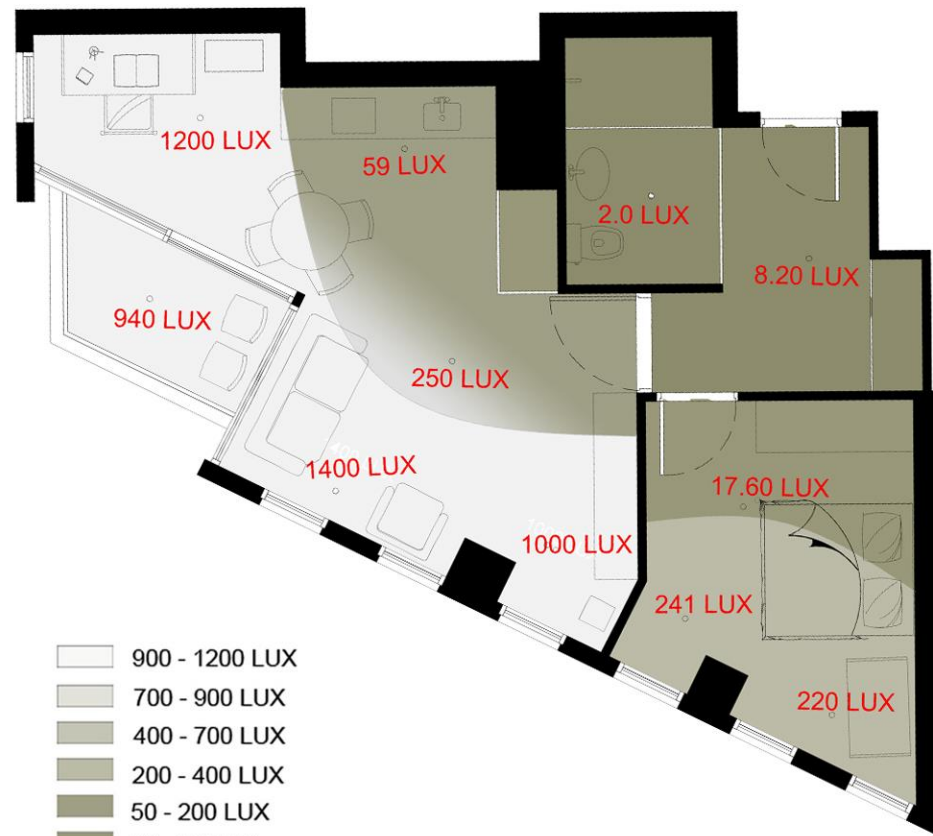


## Private Apartment Spot Measurements

25/10/2011 - Air Temperature Outside: 15.70



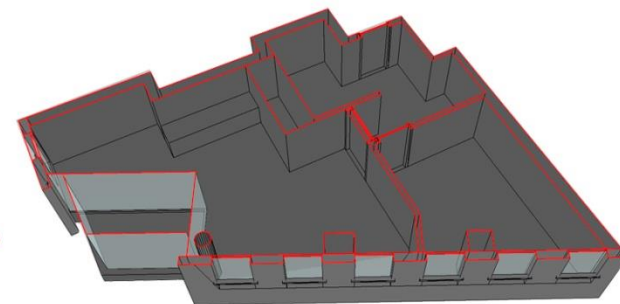
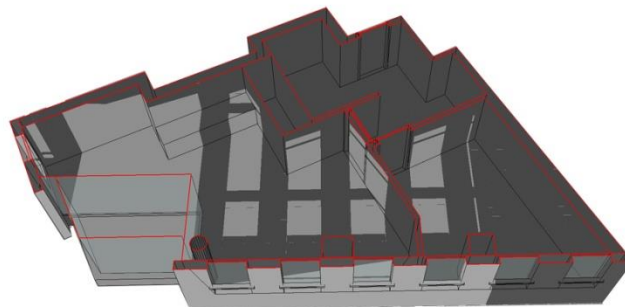
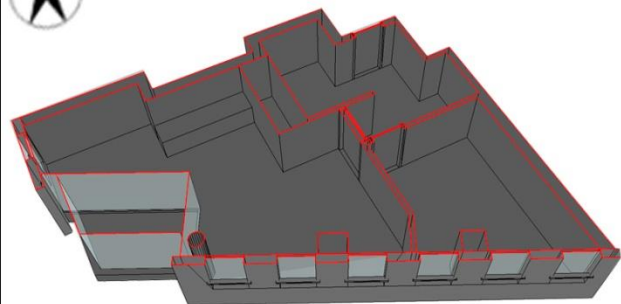
- 25 c
- 24 c
- 23 c
- 22 c
- 21 c
- Data Logger Location



- 900 - 1200 LUX
- 700 - 900 LUX
- 400 - 700 LUX
- 200 - 400 LUX
- 50 - 200 LUX
- 10 - 50 LUX
- 0 - 10 LUX





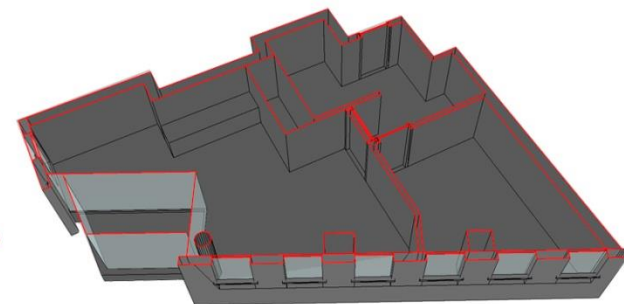
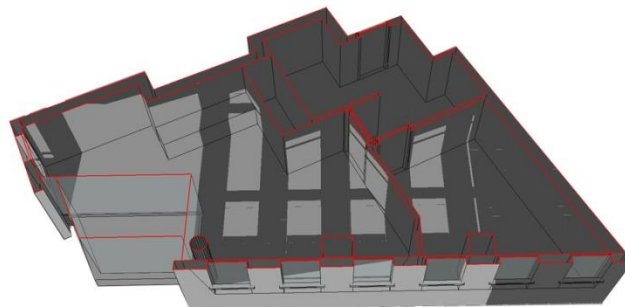
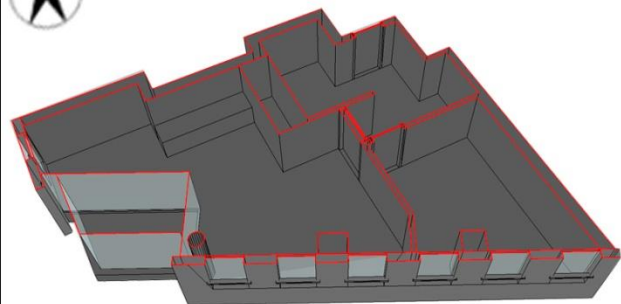


21 DECEMBER

09:00

12:00

15:00

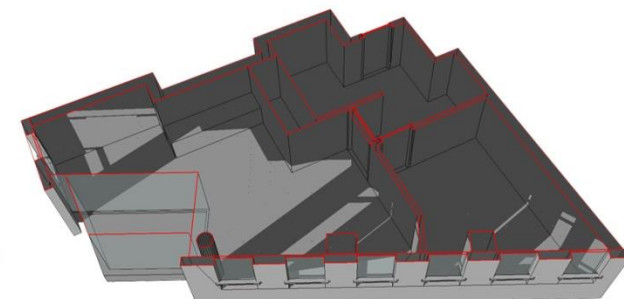
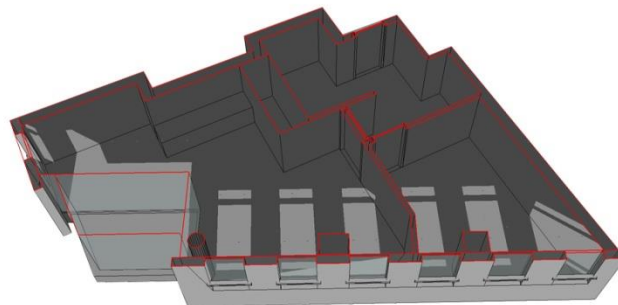
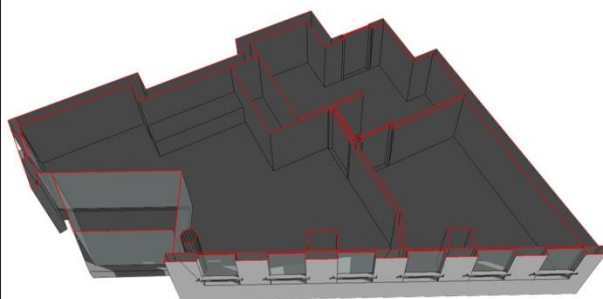


21 DECEMBER

09:00

12:00

15:00

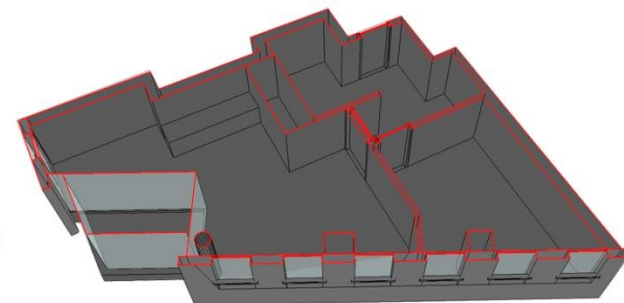
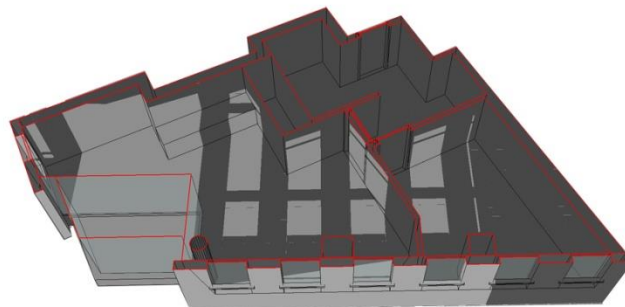
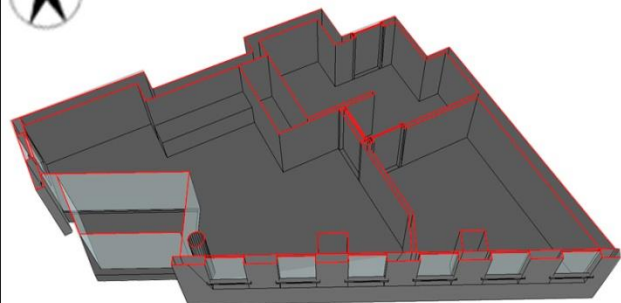


21 MARCH

09:00

12:00

15:00

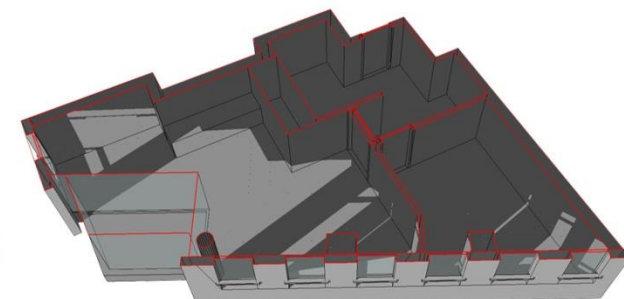
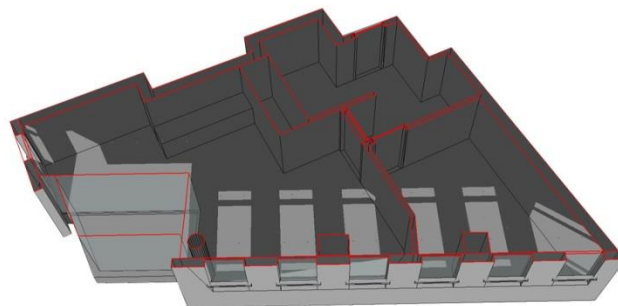
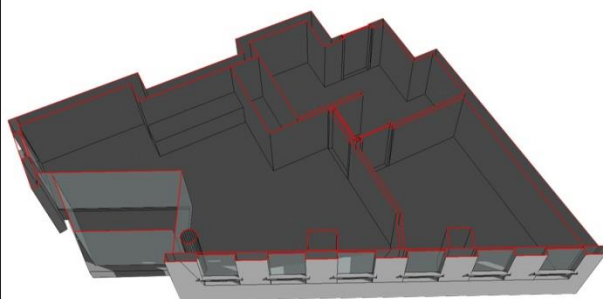


21 DECEMBER

09:00

12:00

15:00

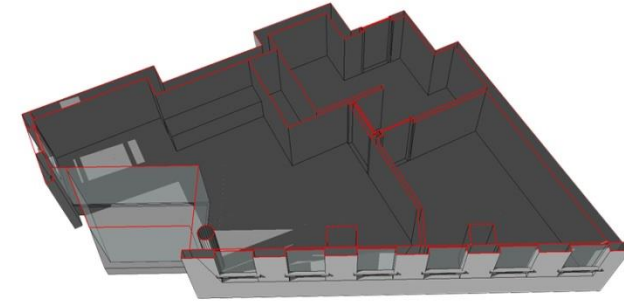
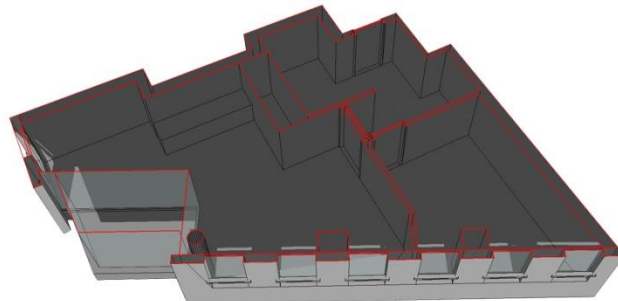
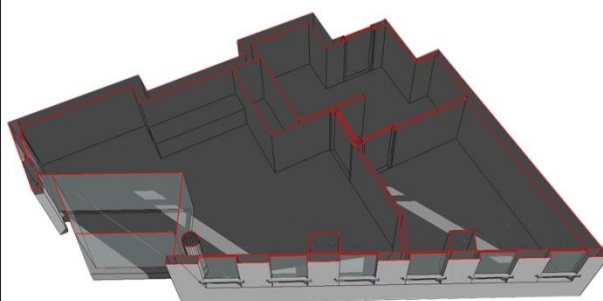


21 MARCH

09:00

12:00

15:00



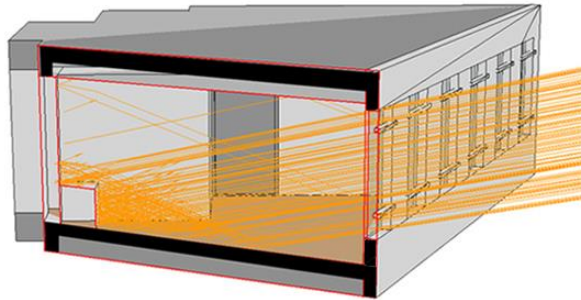
21 JUNE

09:00

12:00

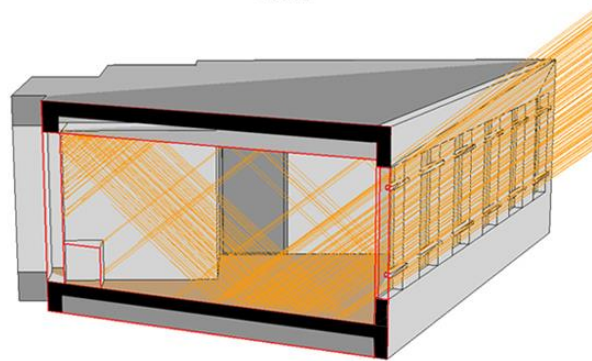
15:00

21 DECEMBER  
13:00

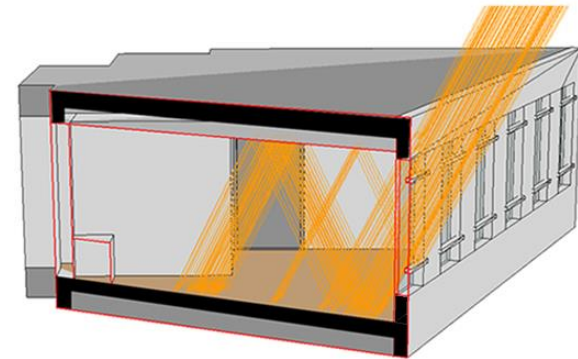


BASE CASE  
WINDOW TO FLOOR RATIO 51%

21 MARCH  
13:00

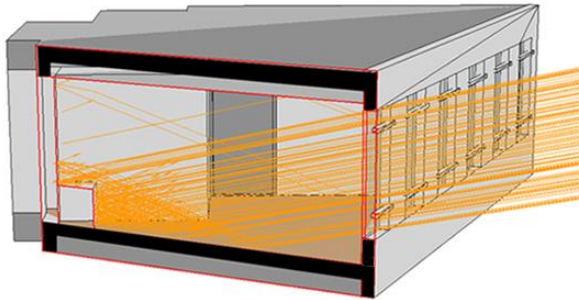


21 JUNE  
13:00



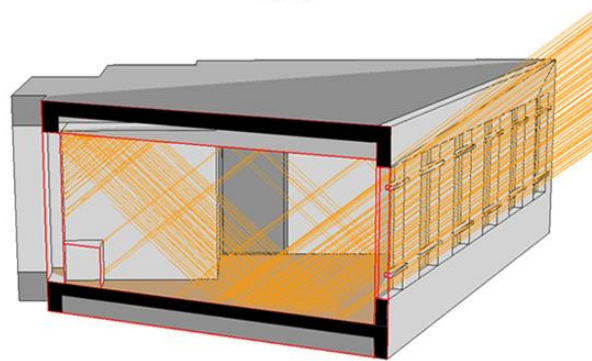


21 DECEMBER  
13:00

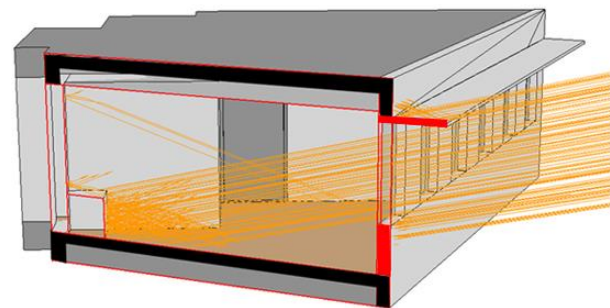
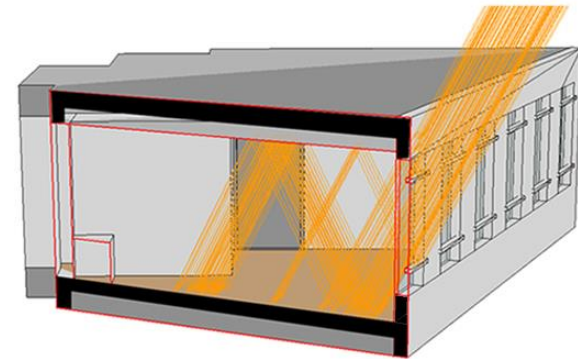


BASE CASE  
WINDOW TO FLOOR RATIO 51%

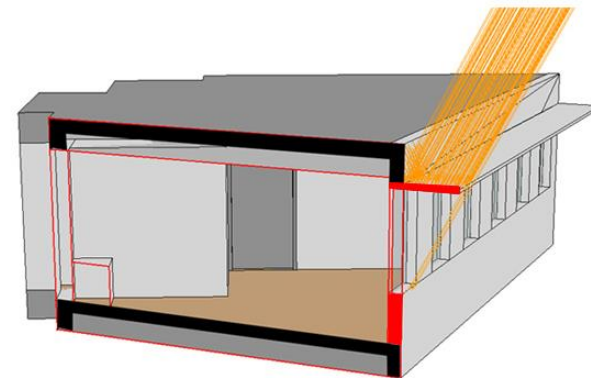
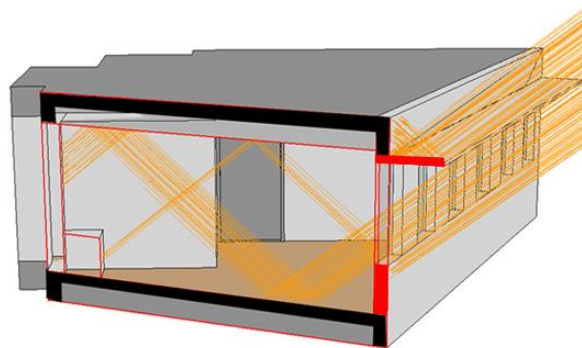
21 MARCH  
13:00



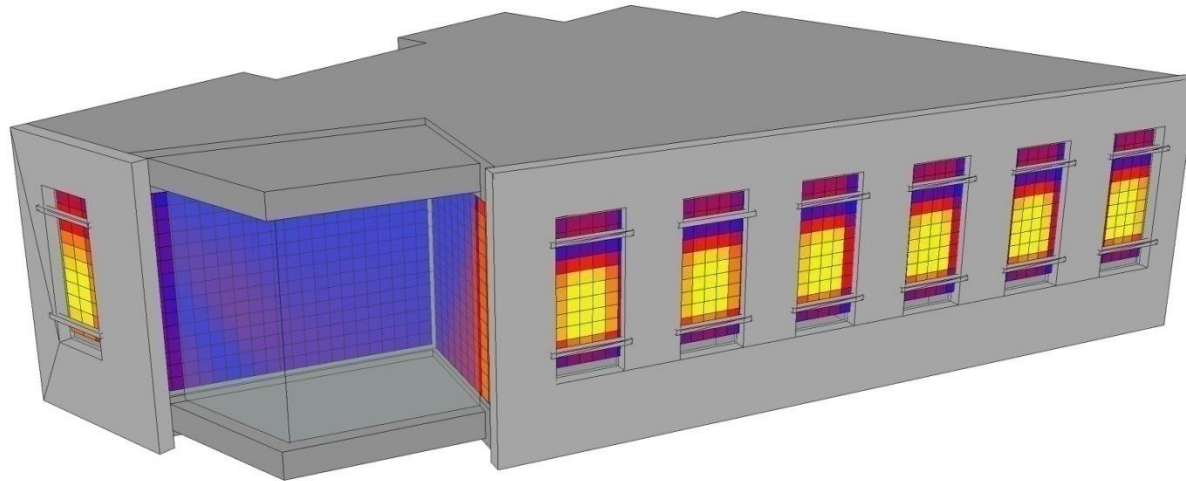
21 JUNE  
13:00



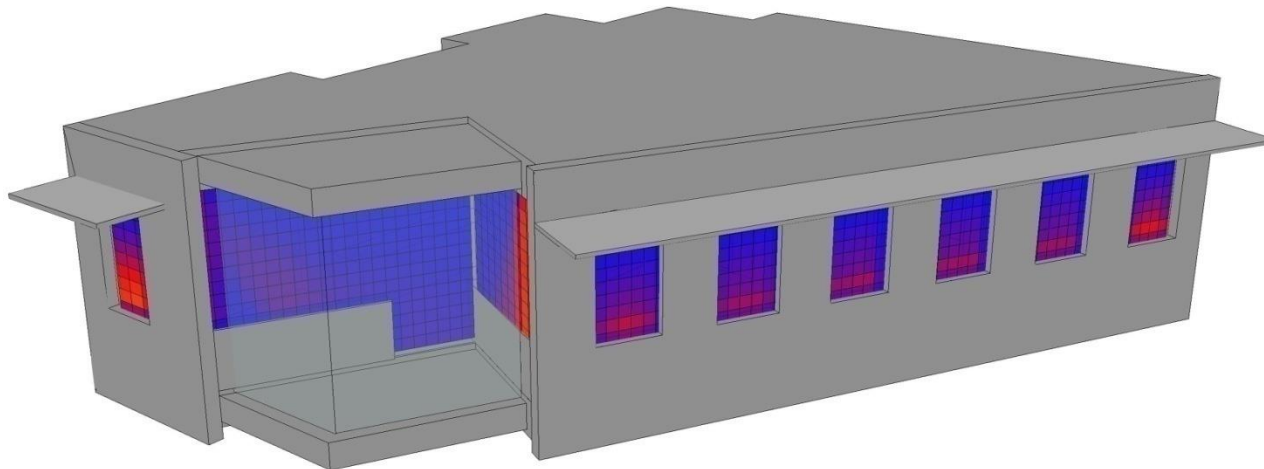
OVERHANG  
WINDOW TO FLOOR RATIO 34%



SOLAR RADIATION  
DAILY AVERAGE FOR JUNE



BASE CASE  
WINDOW TO FLOOR RATIO 51%

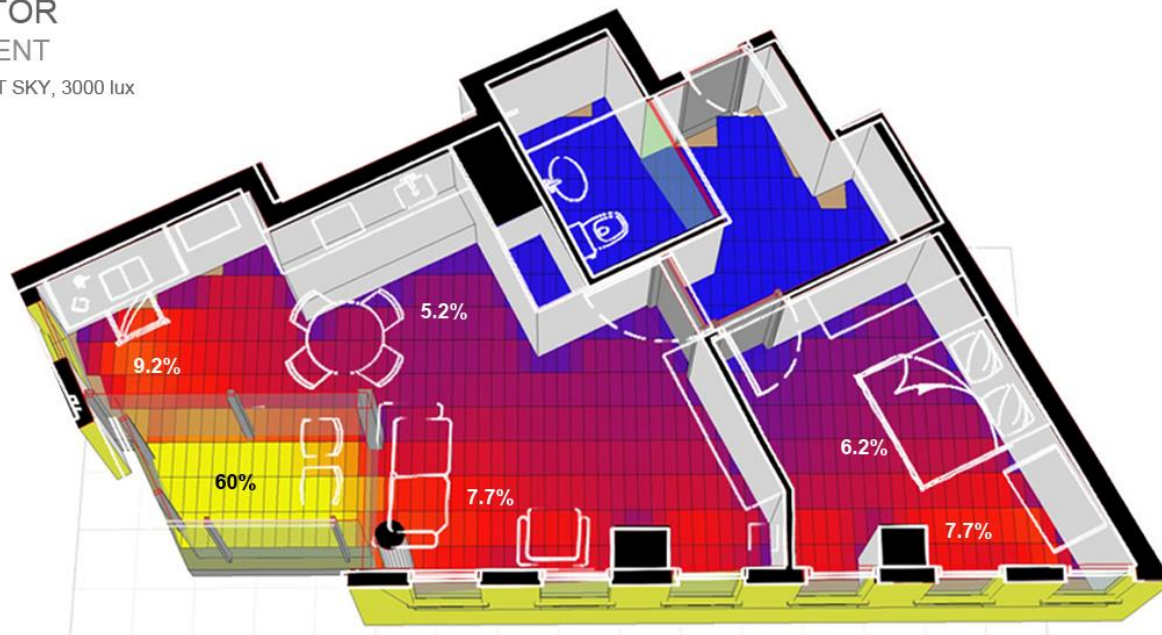


OVERHANG  
WINDOW TO FLOOR RATIO 34%

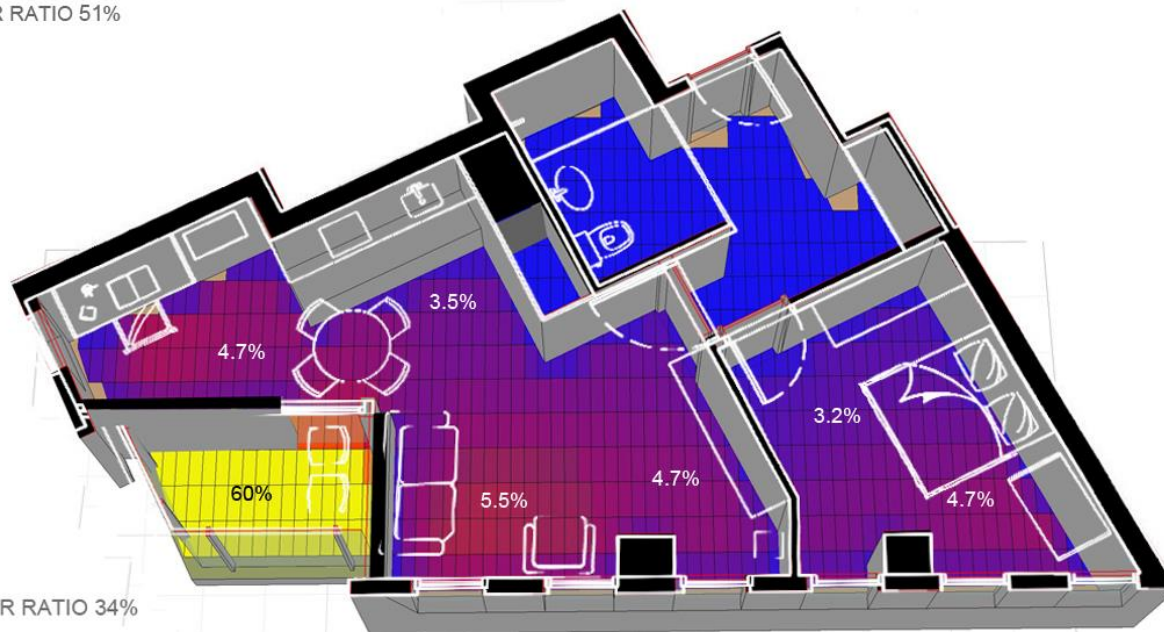


## DAYLIGHT FACTOR PRIVATE APARTMENT

SKY CONDITION: OVERCAST SKY, 3000 lux  
SOURCE: RADIANCE



BASE CASE  
WINDOW TO FLOOR RATIO 51%



OVERHANG  
WINDOW TO FLOOR RATIO 34%

%DF

15.2+

13.7

12.2

10.7

9.2

7.7

6.2

4.7

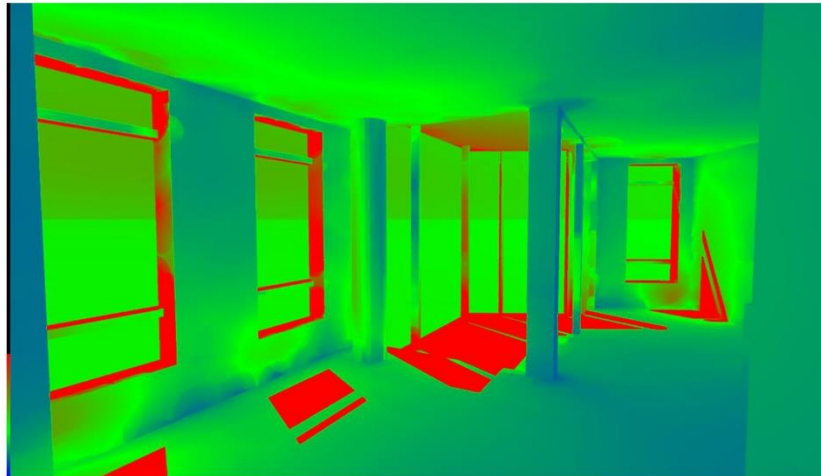
3.2

1.7

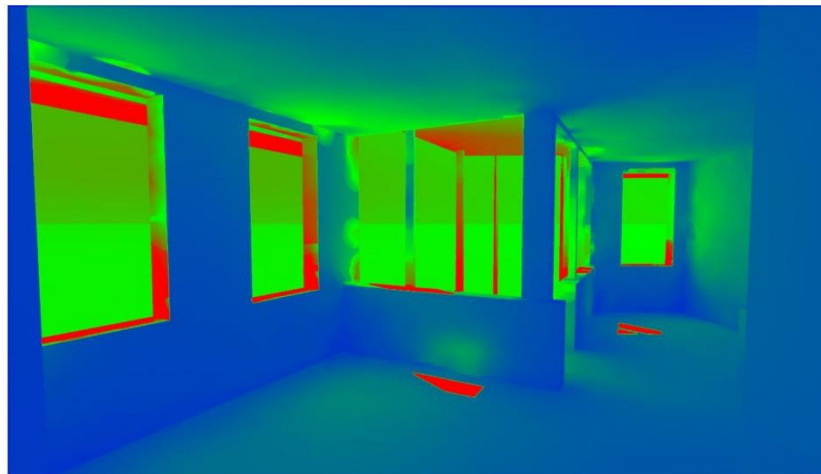
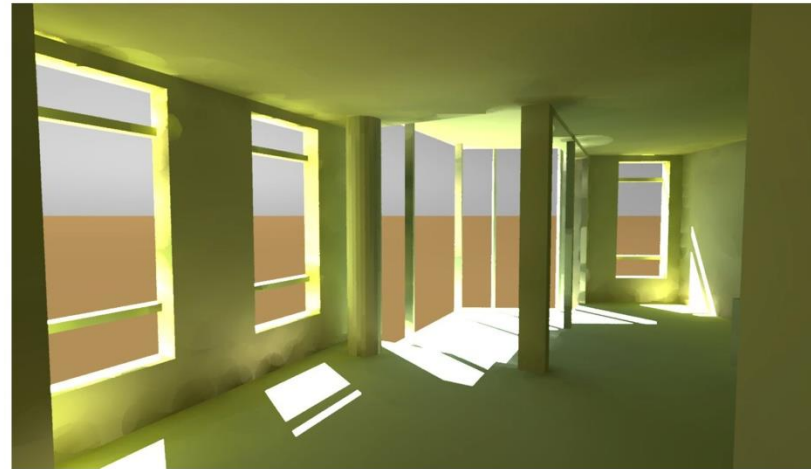
0.2



ILLUMINANCE ANALYSIS  
LIVING ROOM PRIVATE APART.  
21 JUNE, 13:00  
SKY CONDITION: SUNNY SKY



**BASE CASE**  
WINDOW TO FLOOR RATIO 51%



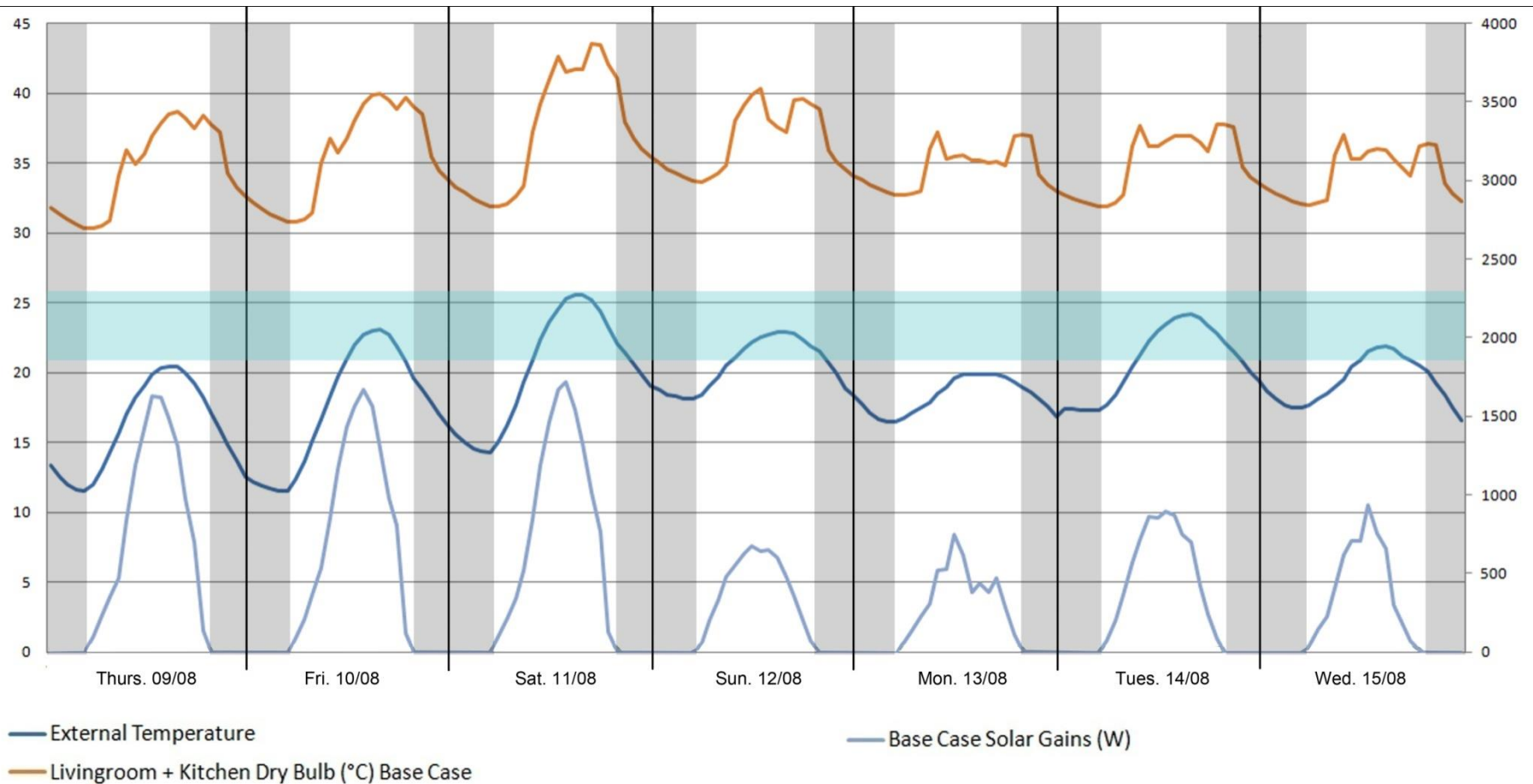
**OVERHANG**  
WINDOW TO FLOOR RATIO 34%





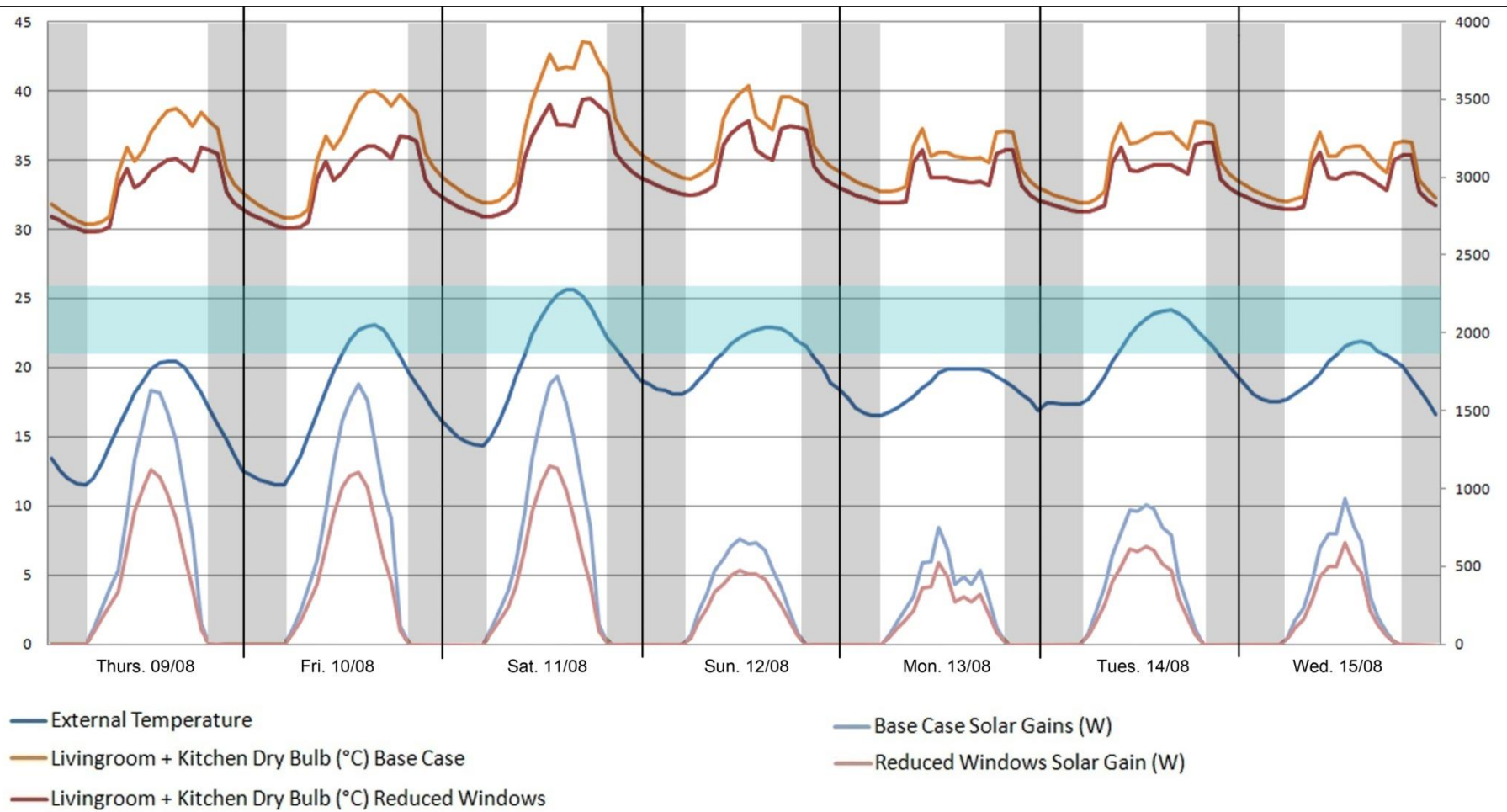
# Parametric Studies 09 -15 August

Living Room / Kitchen



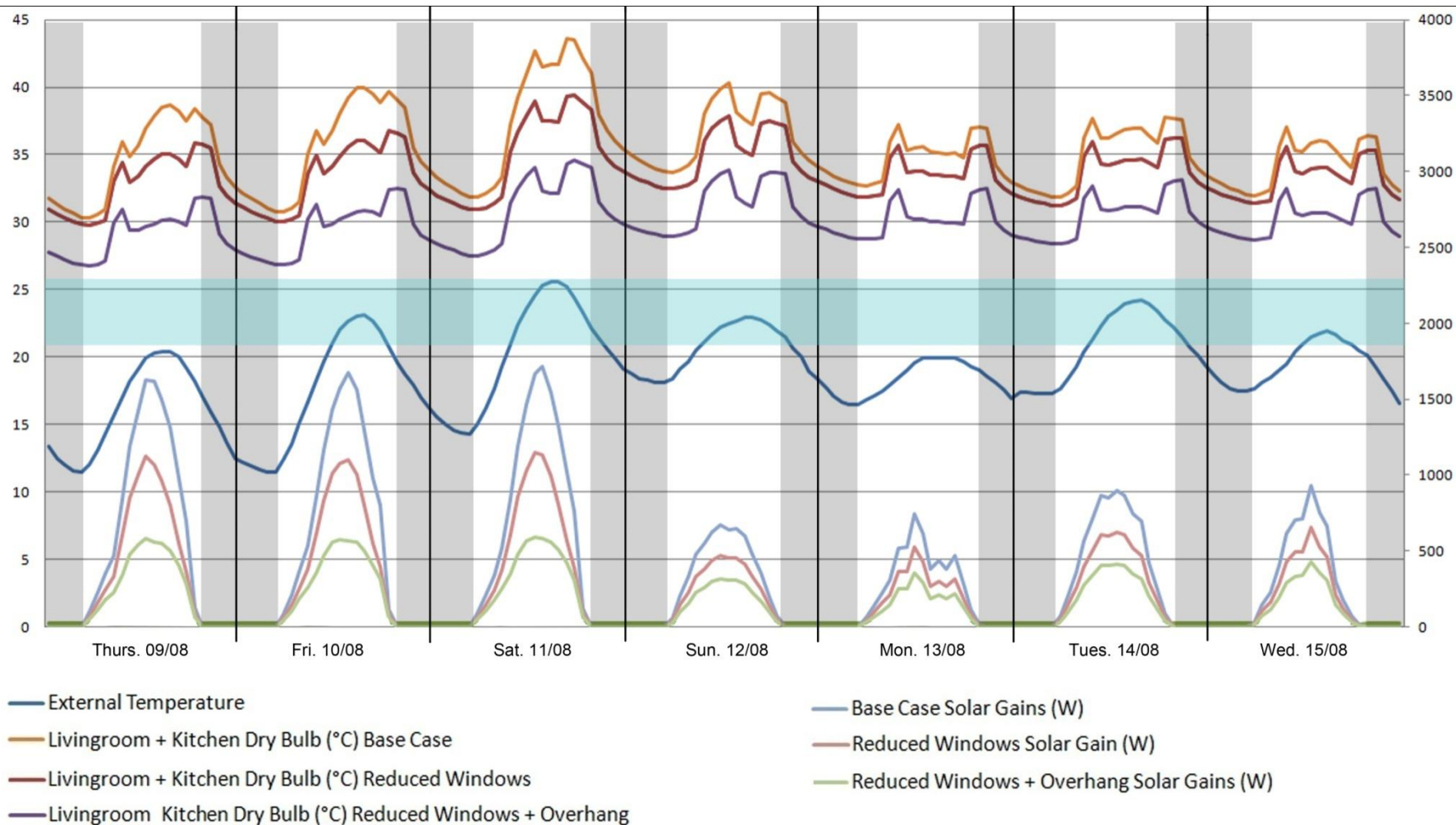
# Parametric Studies 09 -15 August

Living Room / Kitchen



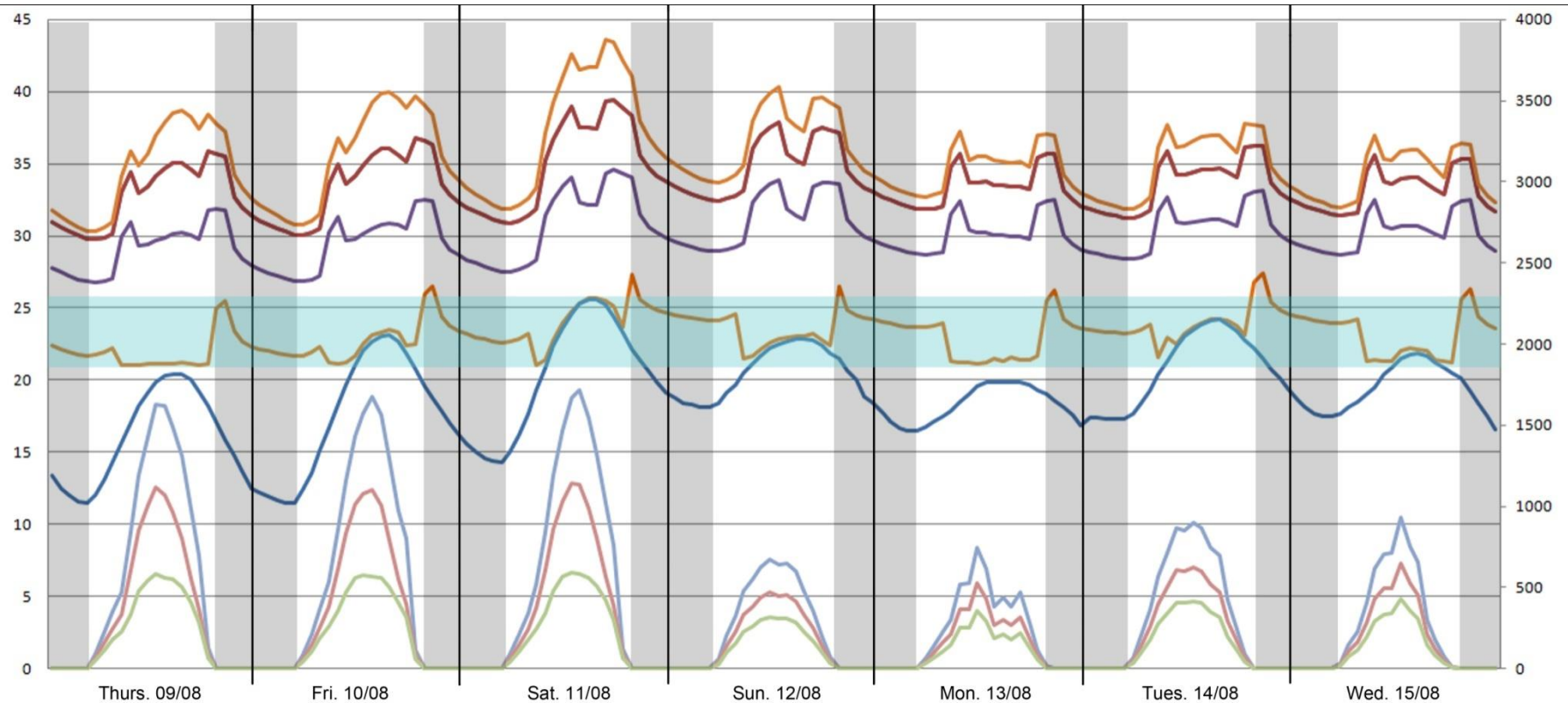
## Parametric Studies 09 -15 August

Living Room / Kitchen



## Parametric Studies 09 -15 August

Living Room / Kitchen



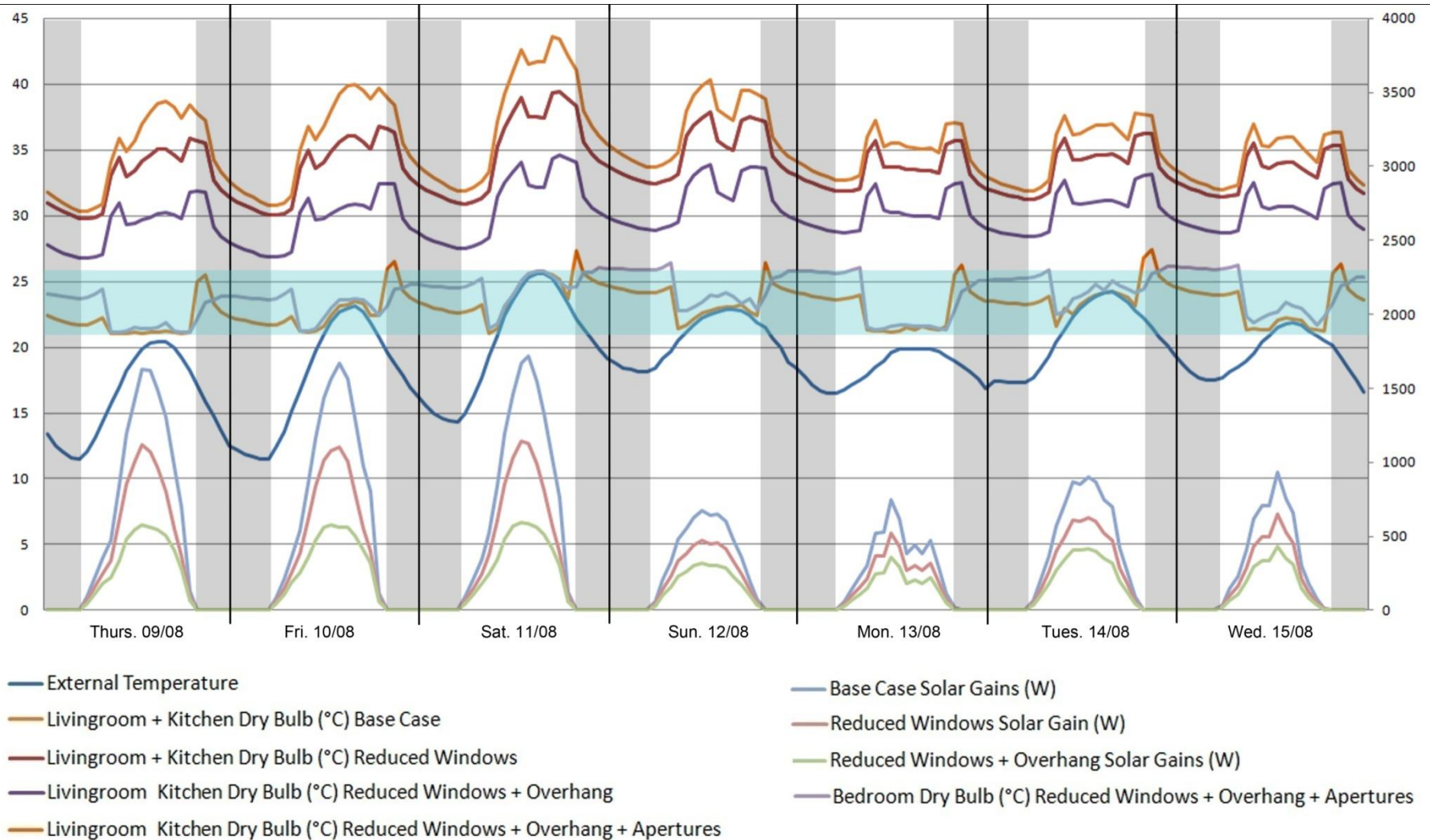
— External Temperature  
— Livingroom + Kitchen Dry Bulb (°C) Base Case  
— Livingroom + Kitchen Dry Bulb (°C) Reduced Windows  
— Livingroom + Kitchen Dry Bulb (°C) Reduced Windows + Overhang  
— Livingroom + Kitchen Dry Bulb (°C) Reduced Windows + Overhang + Apertures

— Base Case Solar Gains (W)  
— Reduced Windows Solar Gain (W)  
— Reduced Windows + Overhang Solar Gains (W)



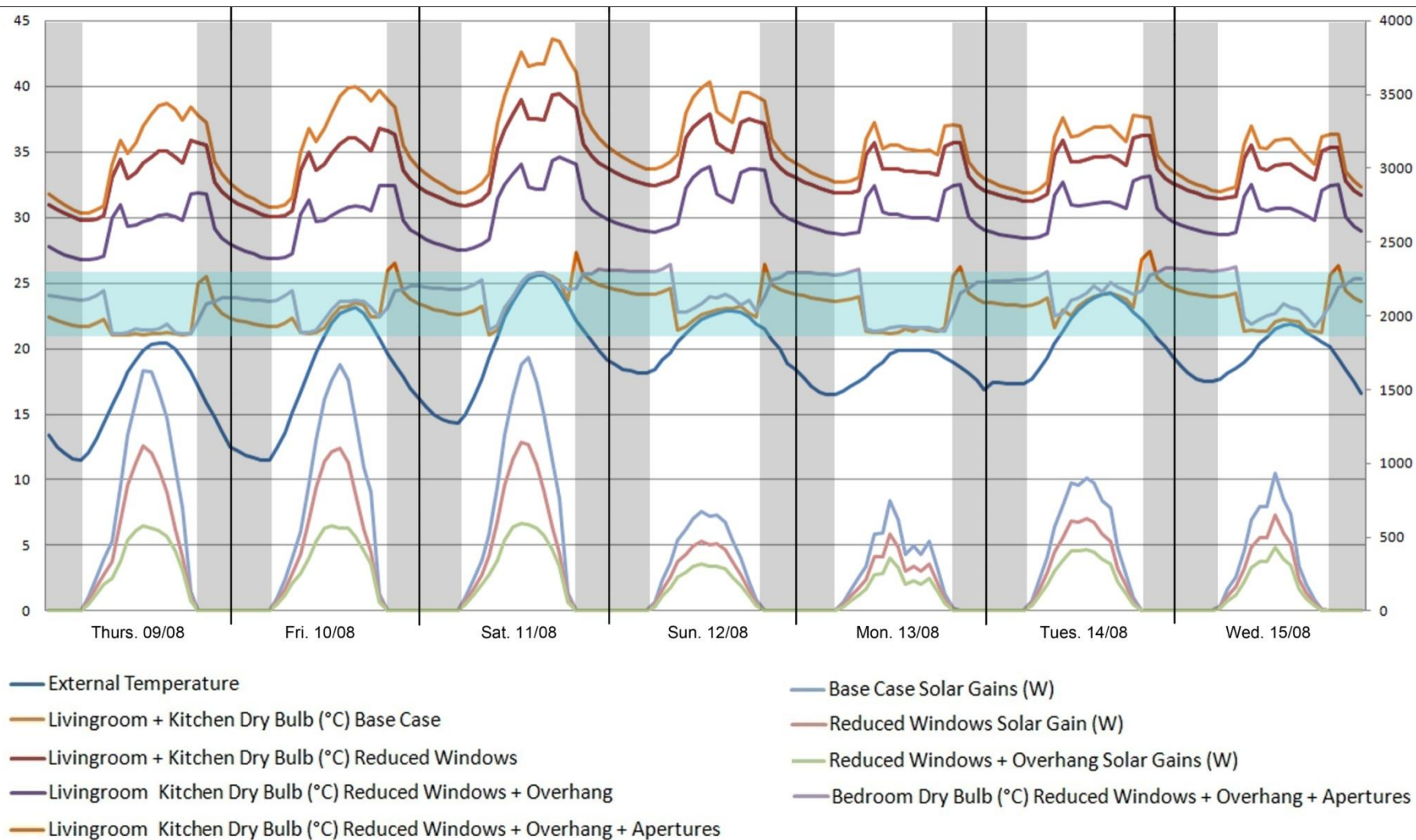
## Parametric Studies 09 -15 August

Living Room / Kitchen



## Parametric Studies 09 -15 August

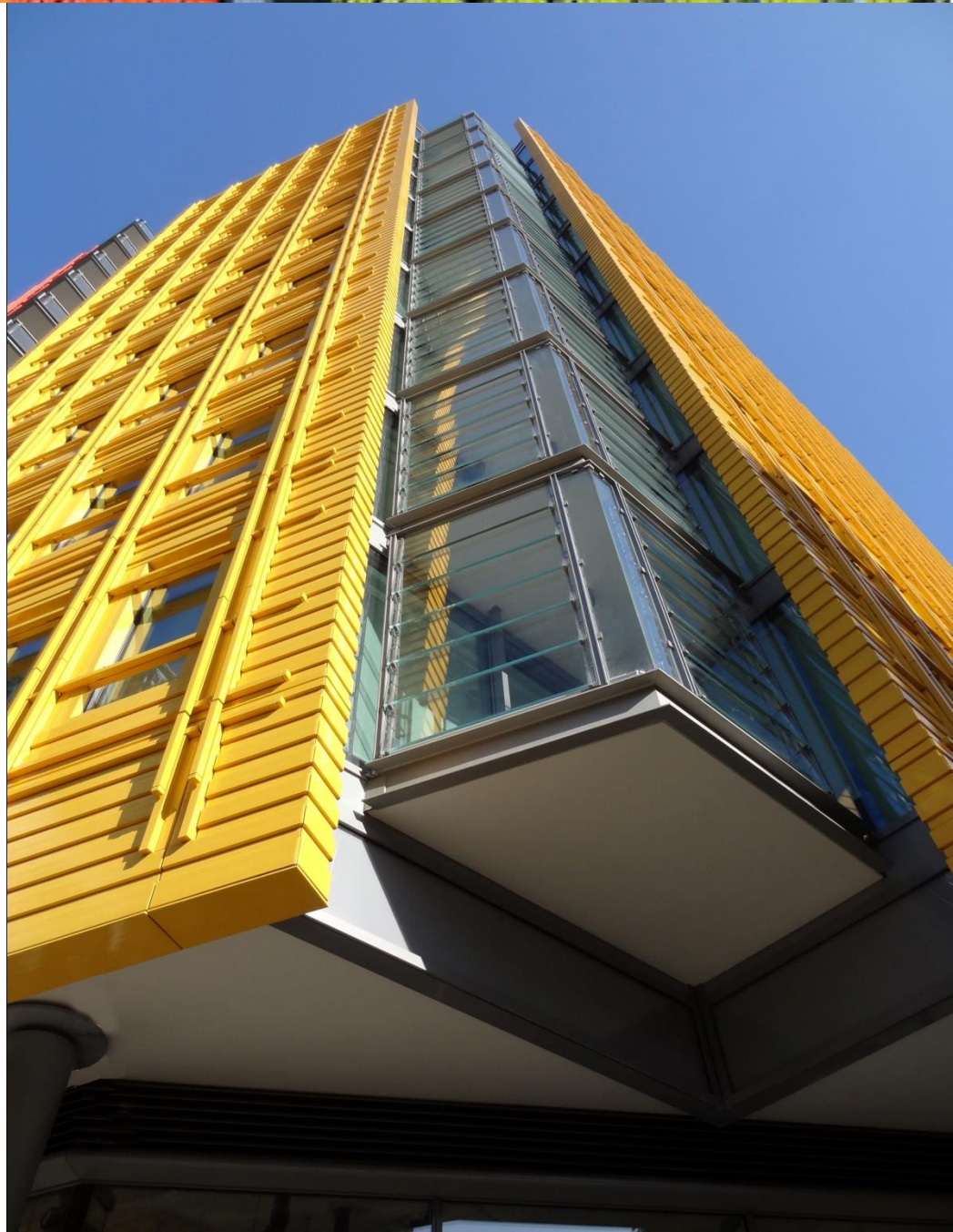
Living Room / Kitchen



Base Case Annual Cooling Load : 50.27 Kwh/m2 (Thermostat 22 C)

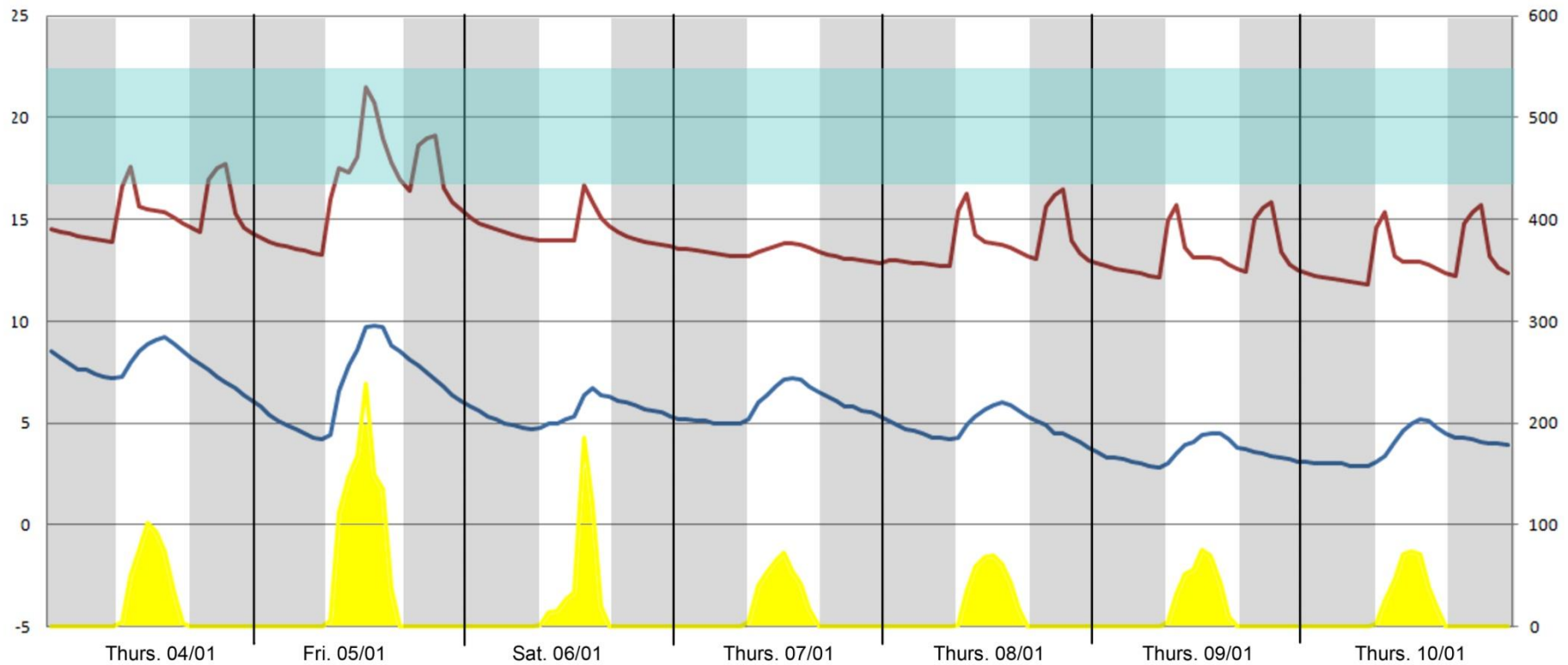
# Parametric Studies

04-10 January





## Winter – Living Room / Kitchen



— External Temperature  
— Livingroom + Kitchen Dry Bulb (°C) Base Case Winter Garden Open  
— Global Horizontal Radiation W/m²

6.95  
(Kwh/m²)

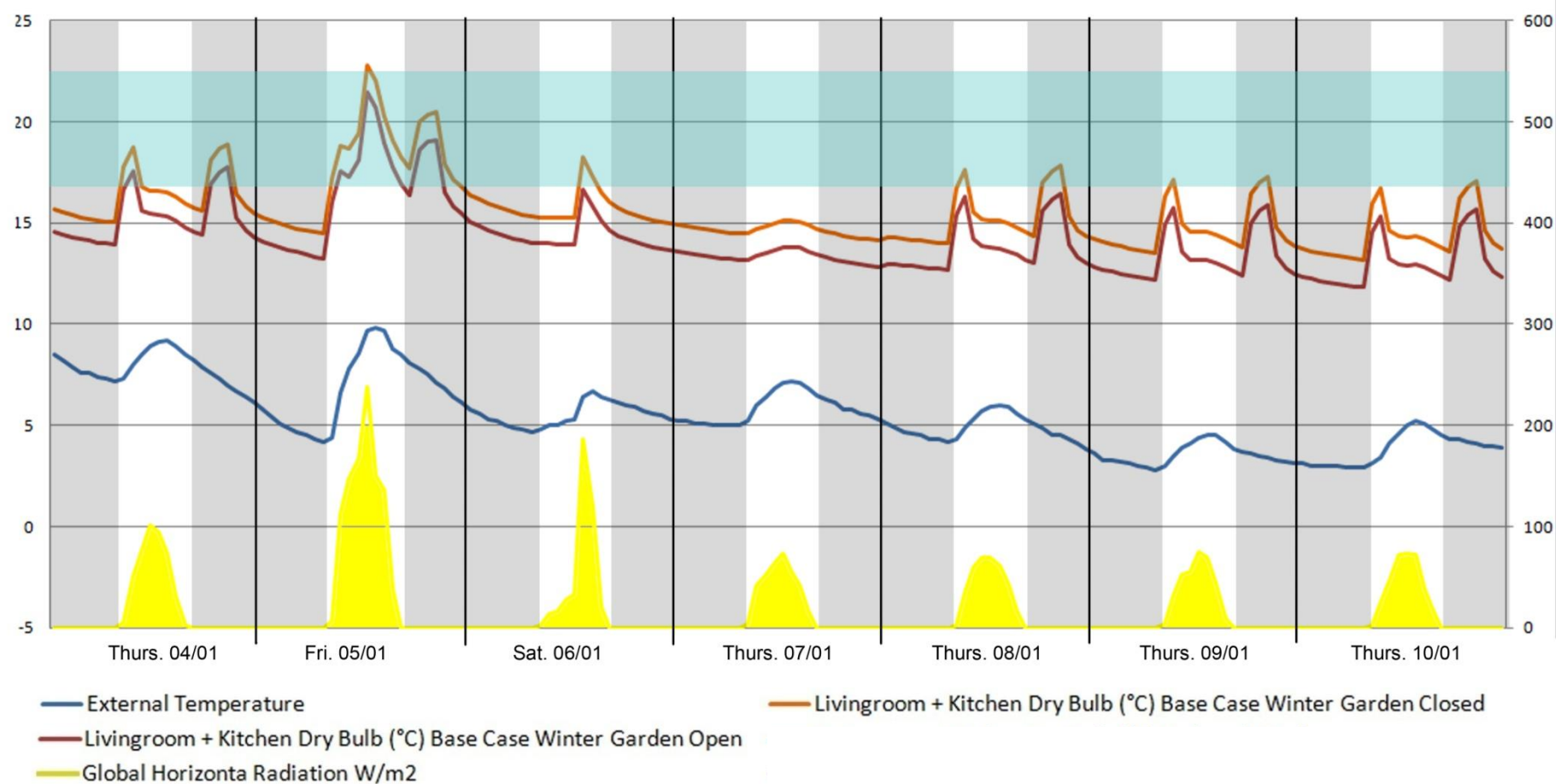


Winter Garden Open

Annual Heat Loads  
Thermostat 19.5 C / 17 C



## Winter – Living Room / Kitchen

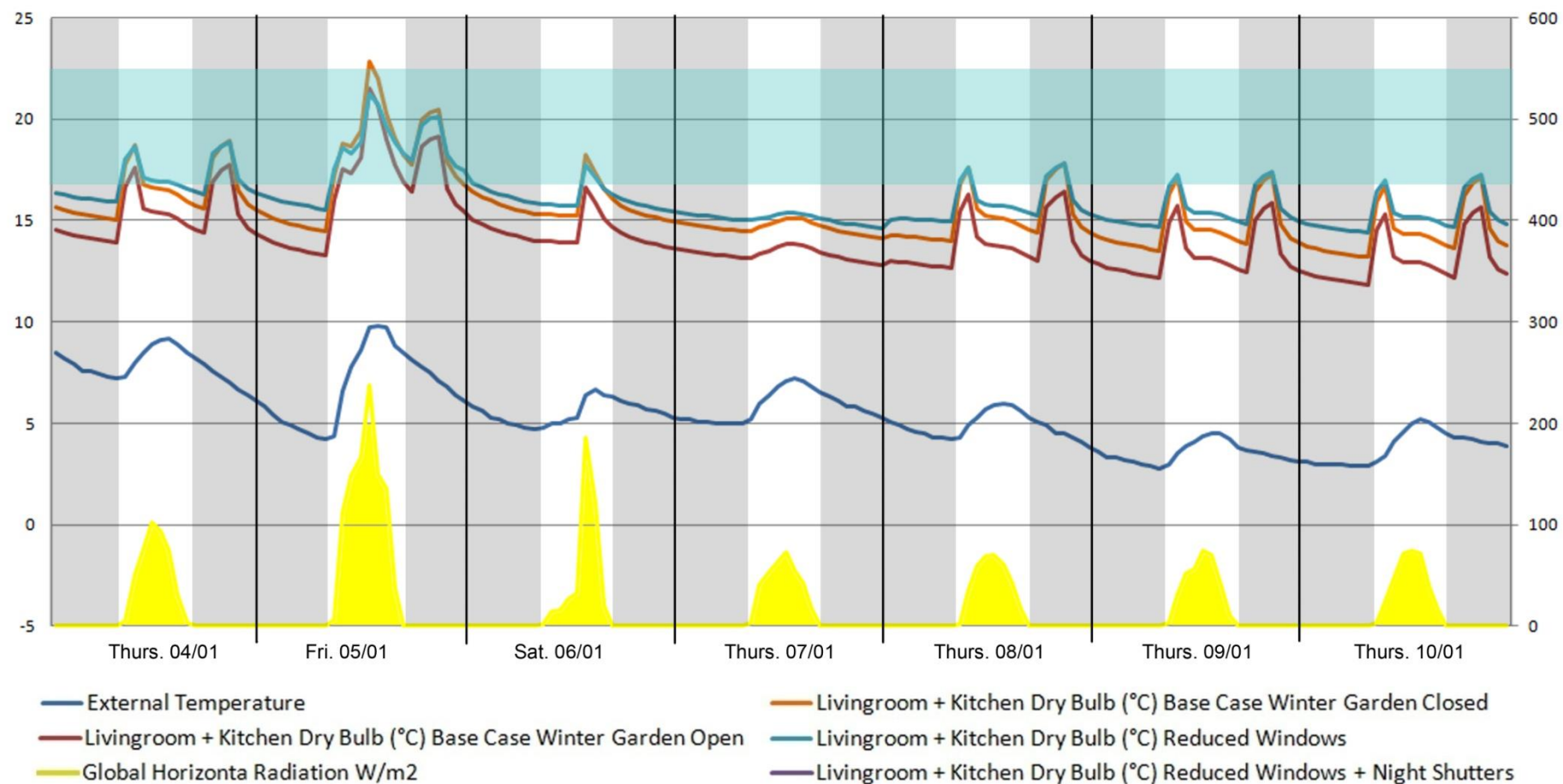
6.95  
(Kwh/m²)4.00  
(Kwh/m²)

Winter Garden Open

Winter Garden Closed

Annual Heat Loads  
Thermostat 19.5 C / 17 C

## Winter – Living Room / Kitchen

6.95  
(Kwh/m²)4.00  
(Kwh/m²)3.31  
(Kwh/m²)

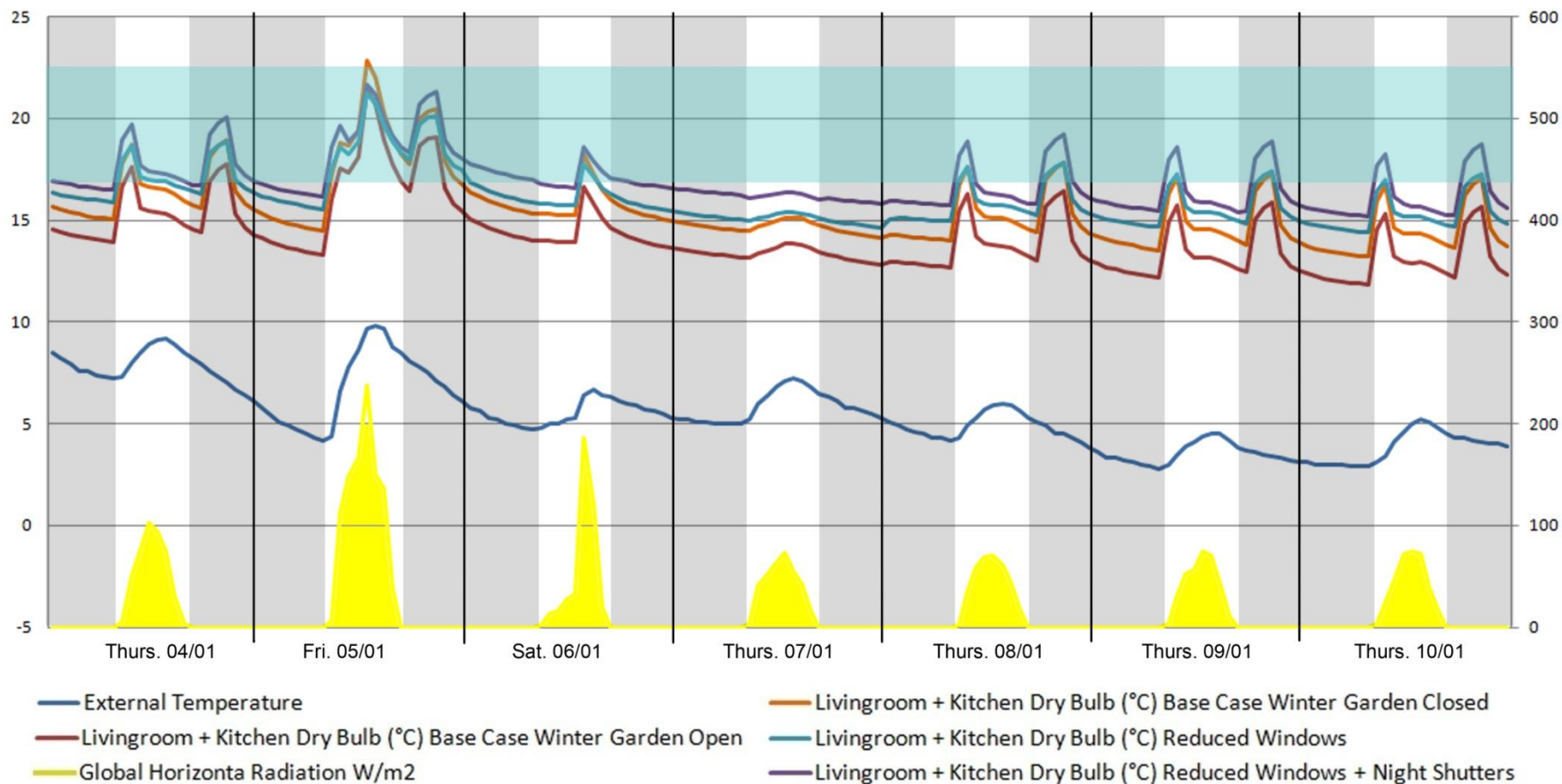
Winter Garden Open

Winter Garden Closed

Reduced Windows

Annual Heat Loads  
Thermostat 19.5 C / 17 C

## Winter – Living Room / Kitchen



Annual Heat Loads  
Thermostat 19.5 C / 17 C

6.95  
(Kwh/m²)

Winter Garden Open

4.00  
(Kwh/m²)

Winter Garden Closed

3.31  
(Kwh/m²)

Reduced Windows

2.03  
(Kwh/m²)

Night Shutters



**THANK YOU...**