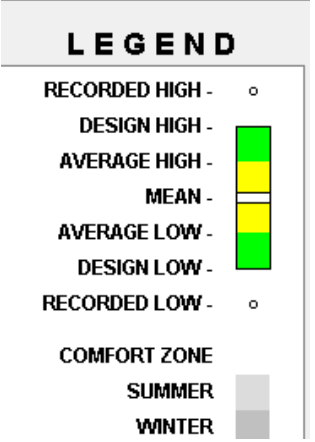
# MULTI FUNCTIONAL BUILDING

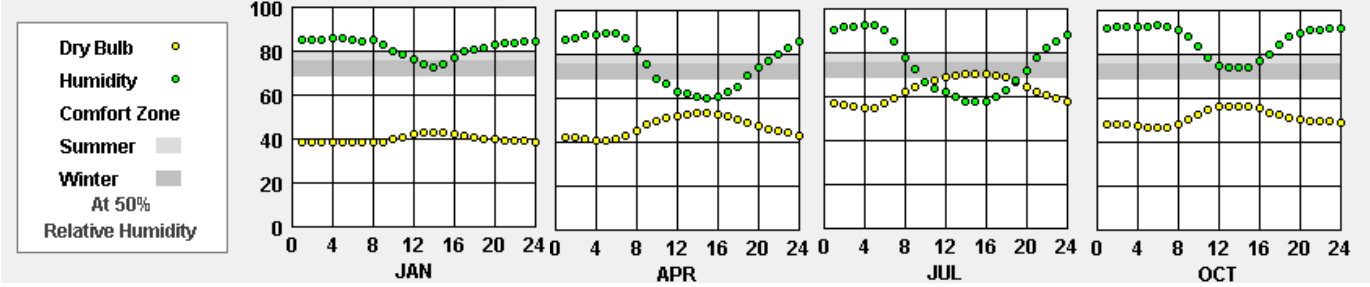
# LONDON


Building Performance Simulation
Ksenia Knyazkina



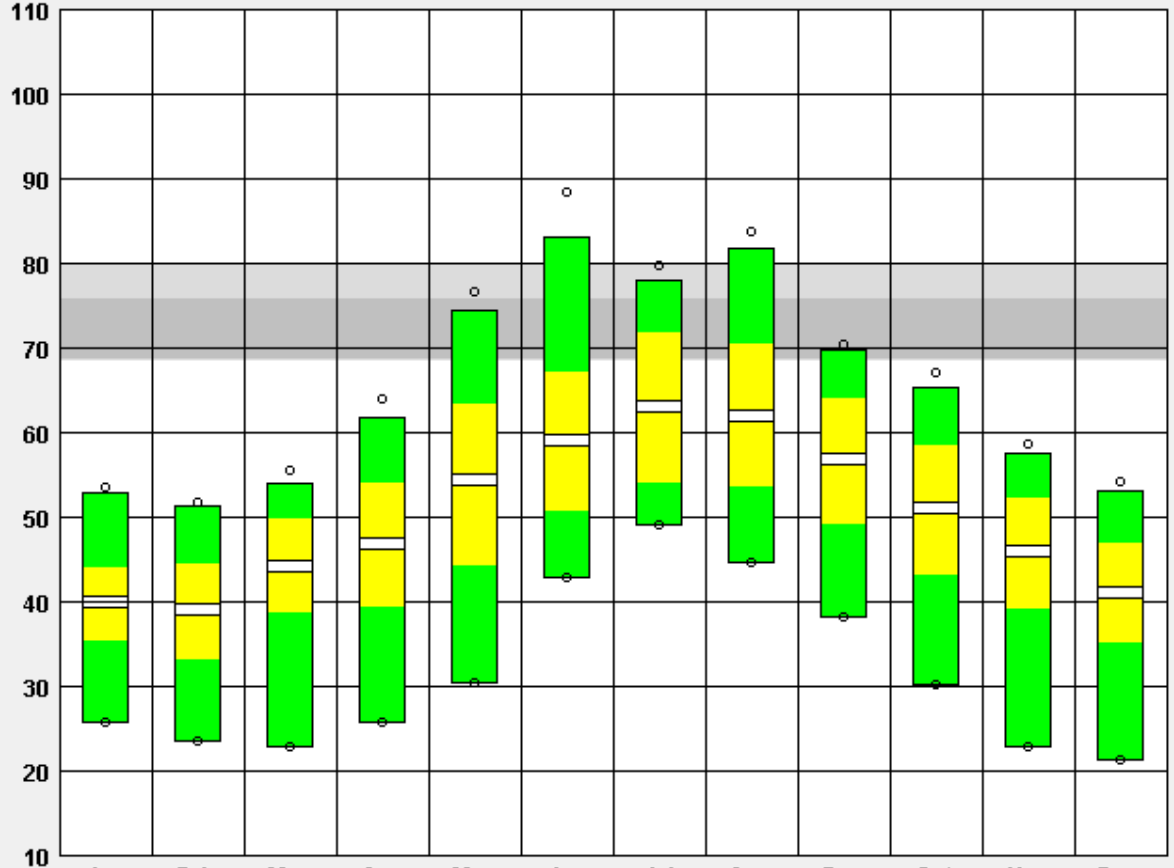

Generally the dry bulb temperature is lower than comfortable - 40 - 65 F, while the relative humidity is high 70-80%

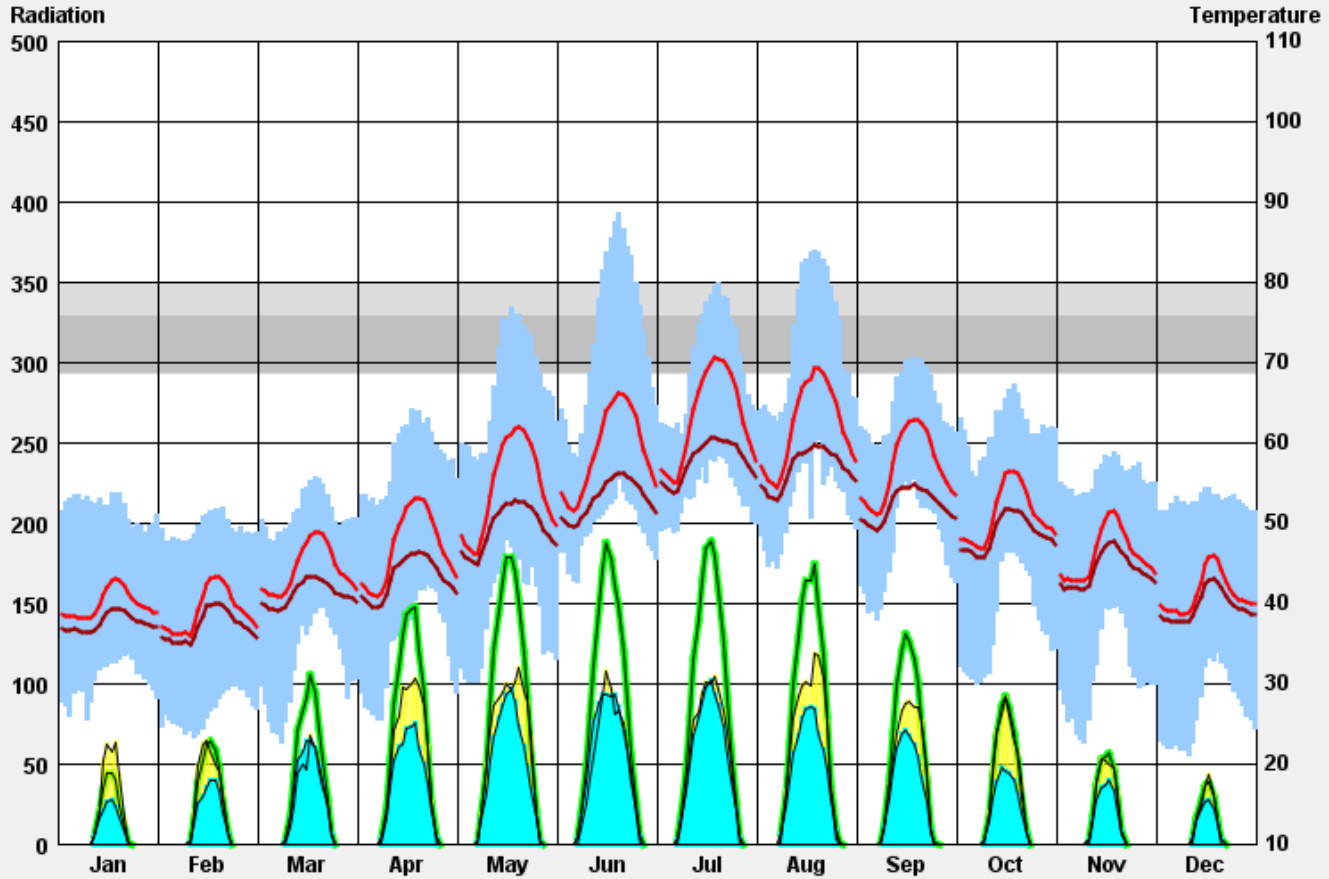
Day-to-night swing is higher in the summer (up to 20 F)



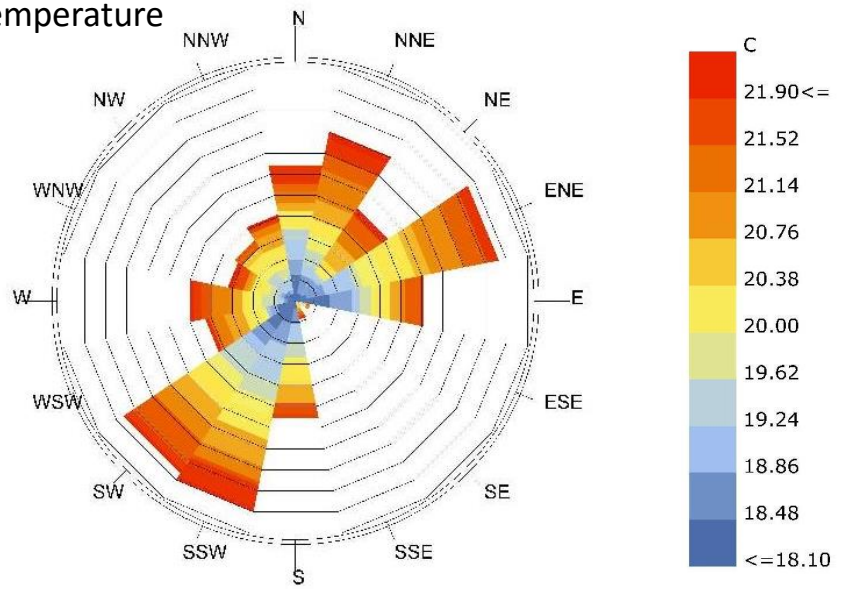


Dry Bulb Temperature



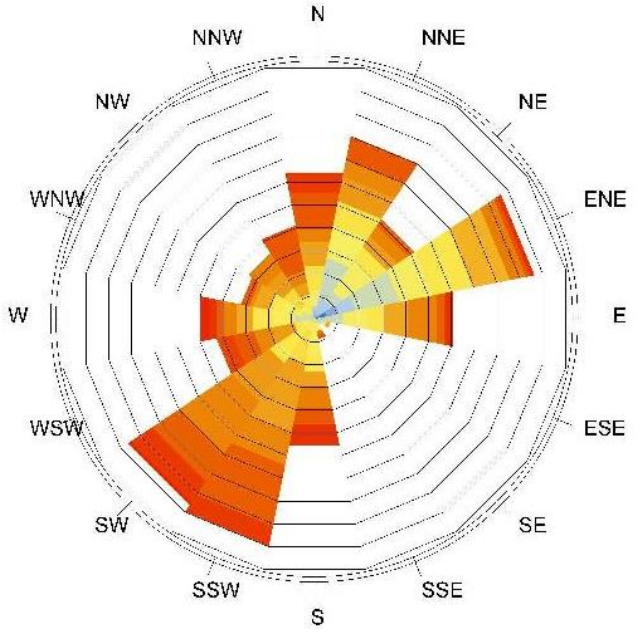
Temperature

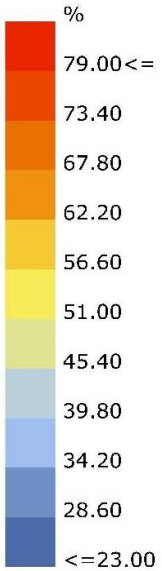






Humidity

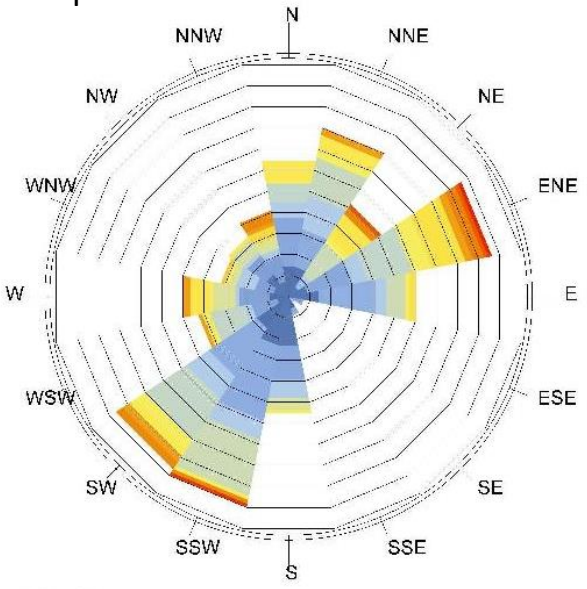


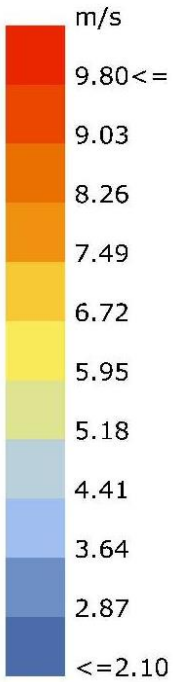



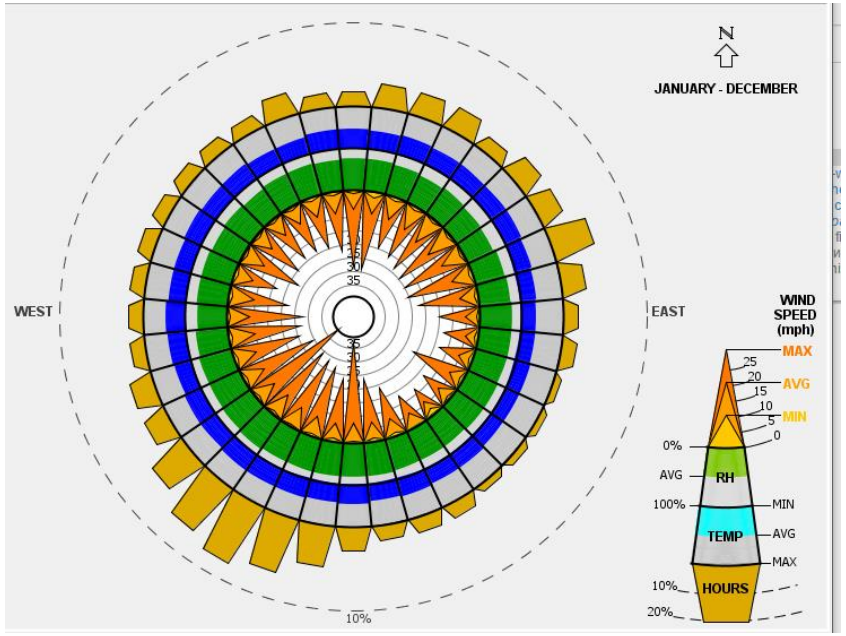

Most frequent winds are from SSW with a prevailing speed aprx. 3-5m/s.

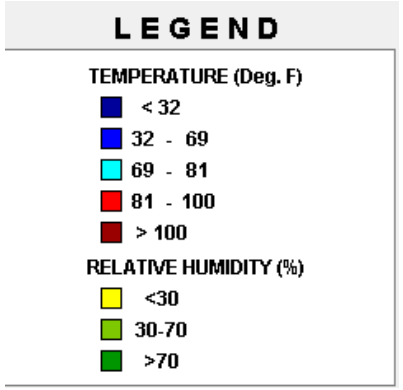
Higher temperature is on the SSW and NNE, while the humidity is almost equal on all directions.

Wind Speed

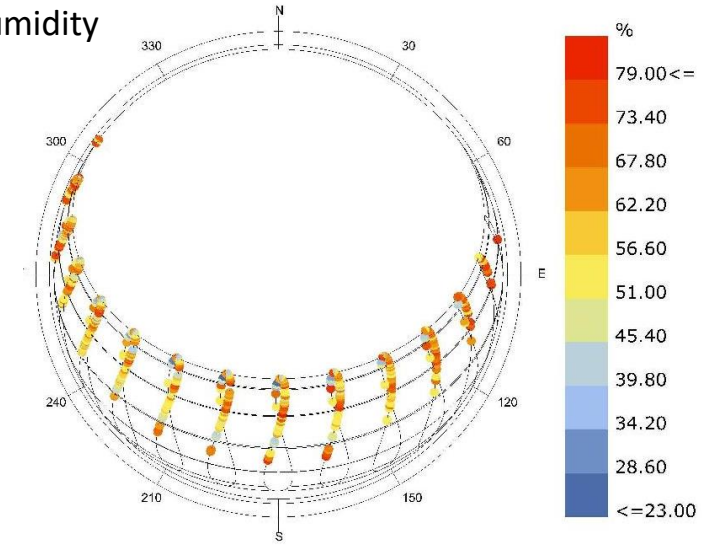


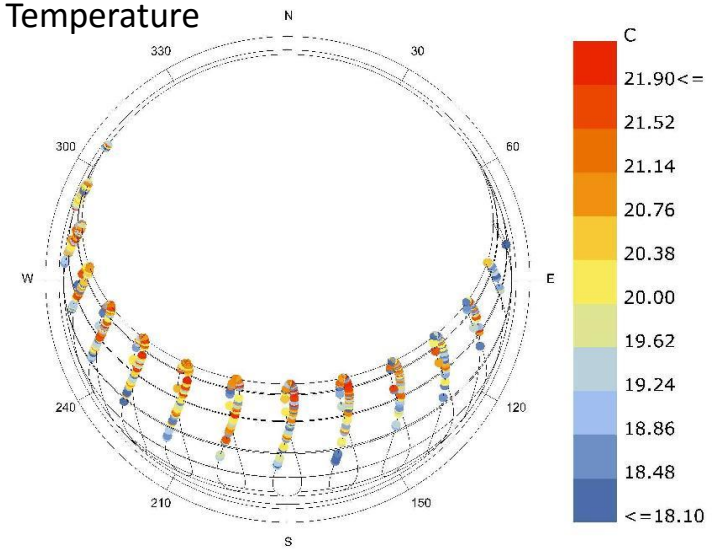



Humidity




Sun-Path Diagram - Latitude: 51.15
Hourly Data: Relative Humidity (%)
LONDON/GATWICK_GBR

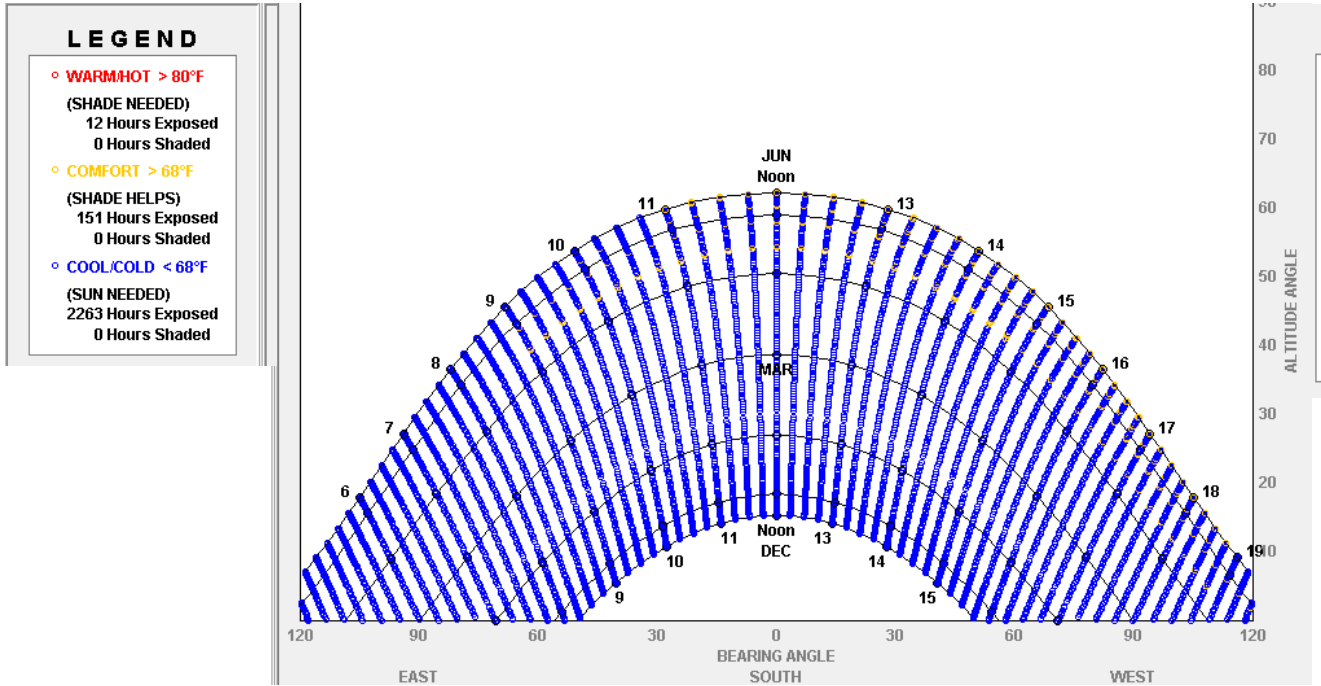
Temperature



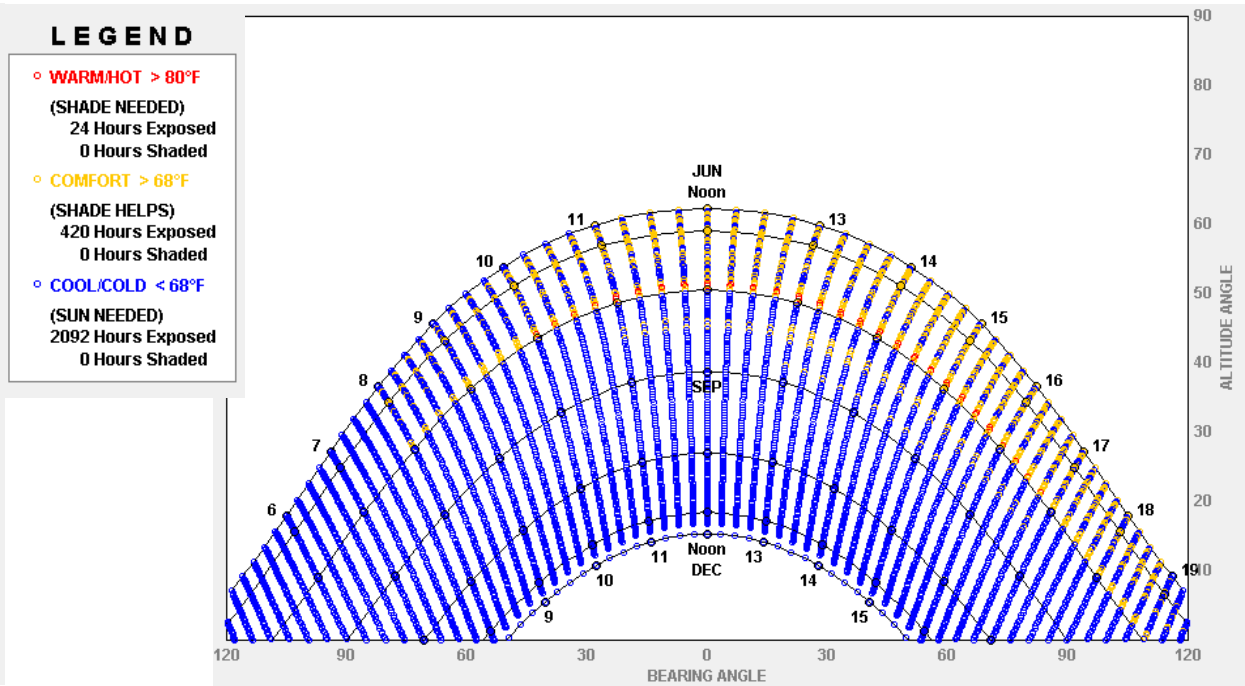

Sun-Path Diagram - Latitude: 51.15
Hourly Data: Dry Bulb Temperature (C)
LONDON/GATWICK_GBR

Overheating is possible in the summer (July-August) after noon – possible solution – shading on the west façade.

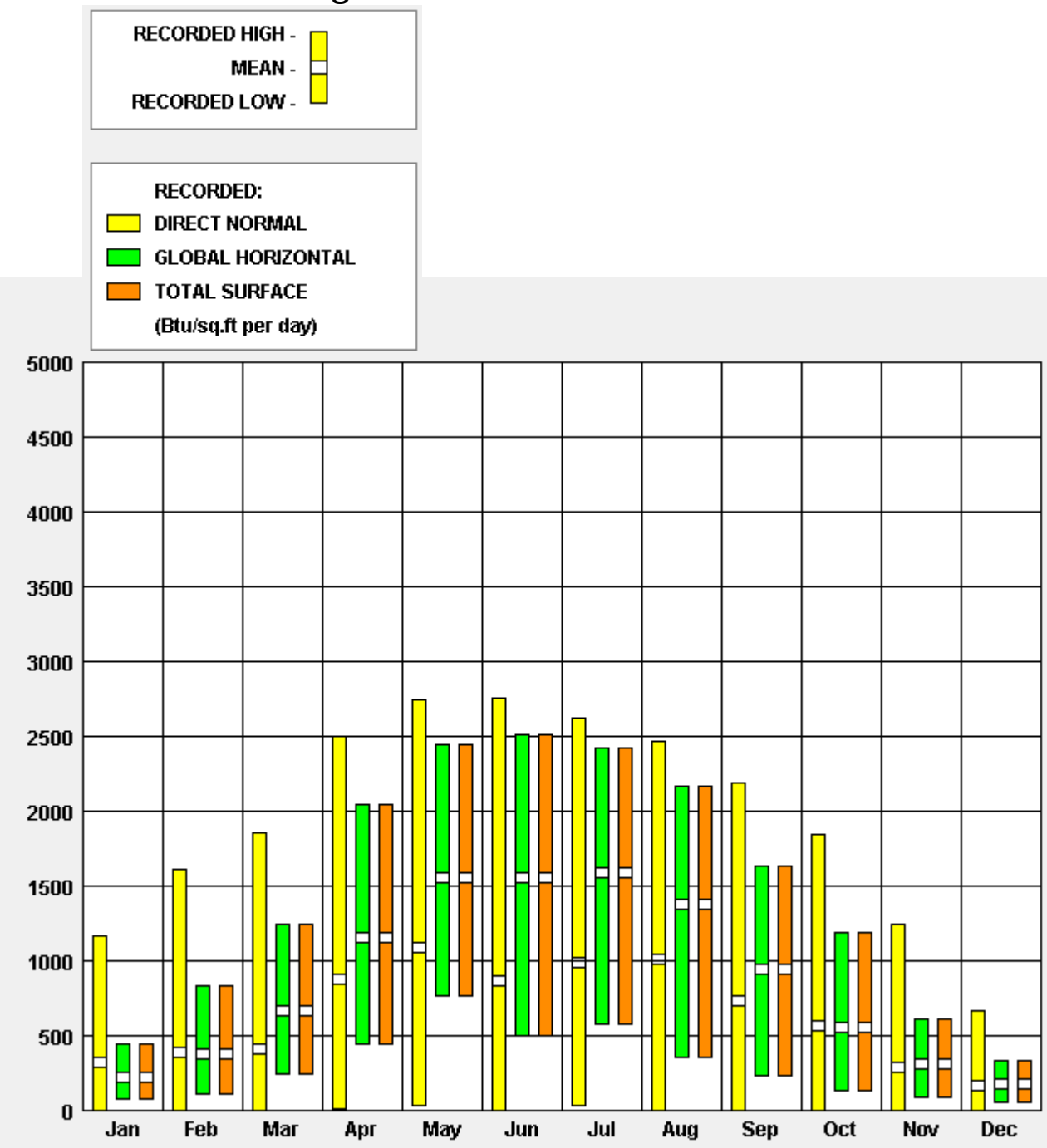
Solar diagram – DEC - JUN



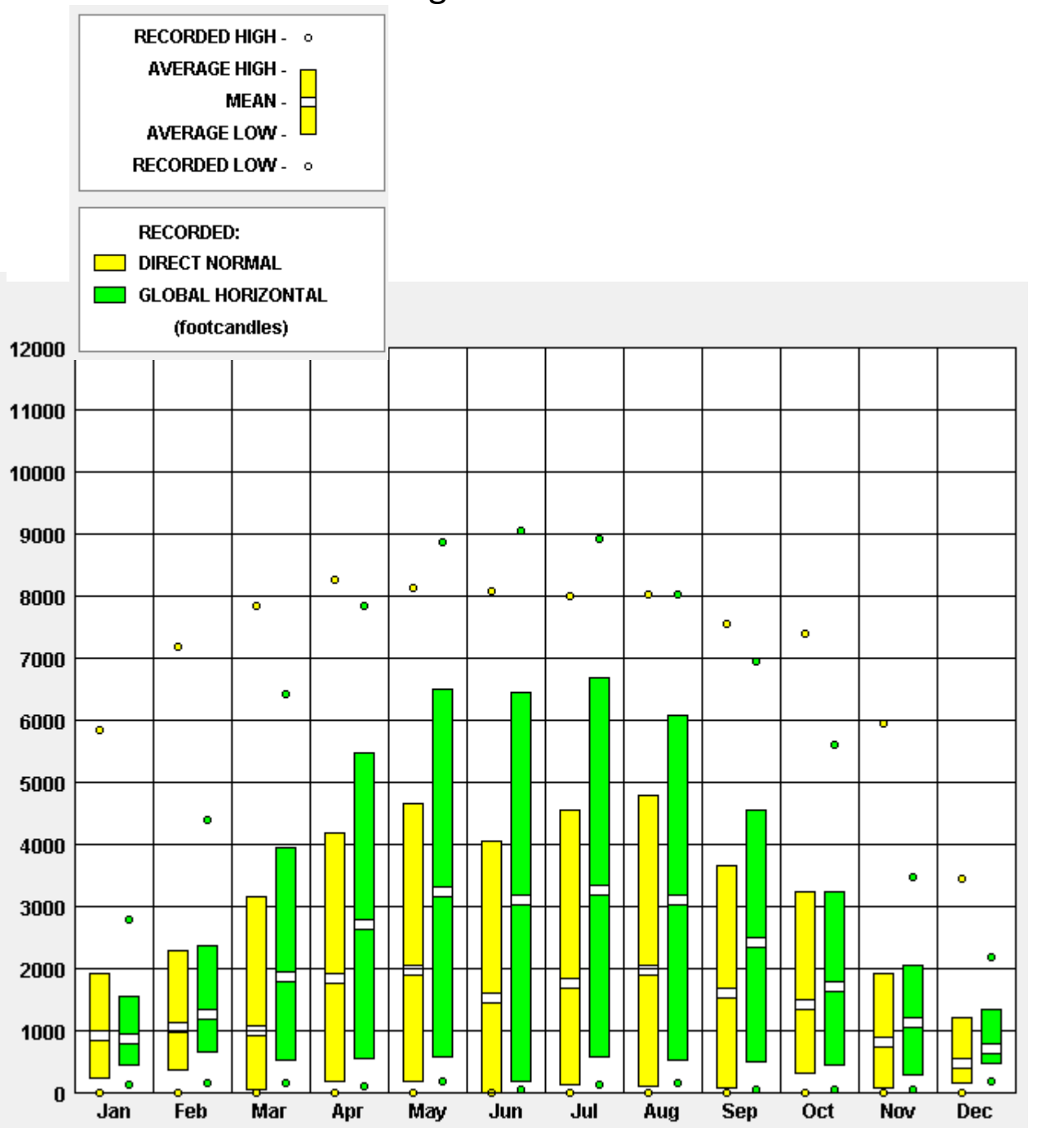

Solar diagram – JUN - DEC

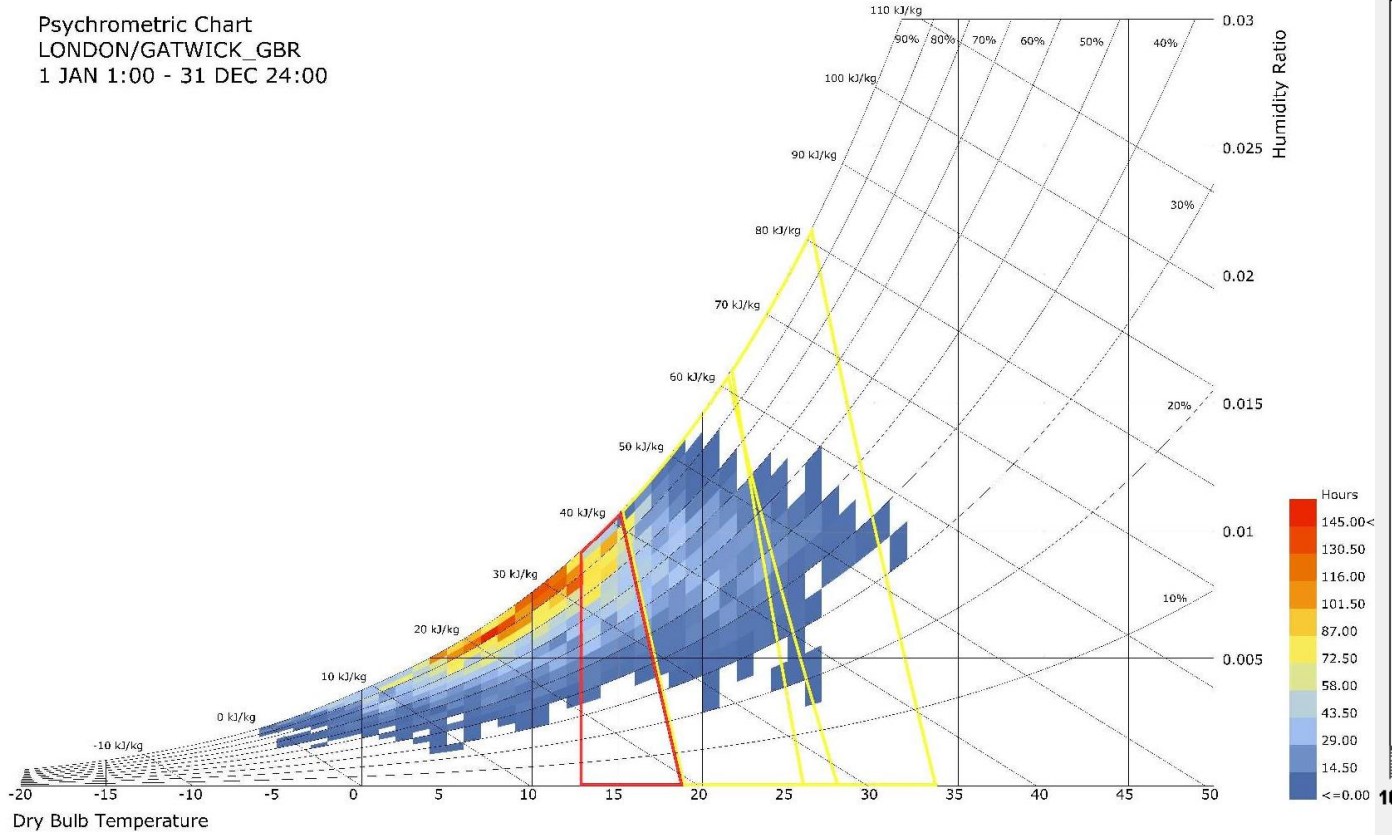


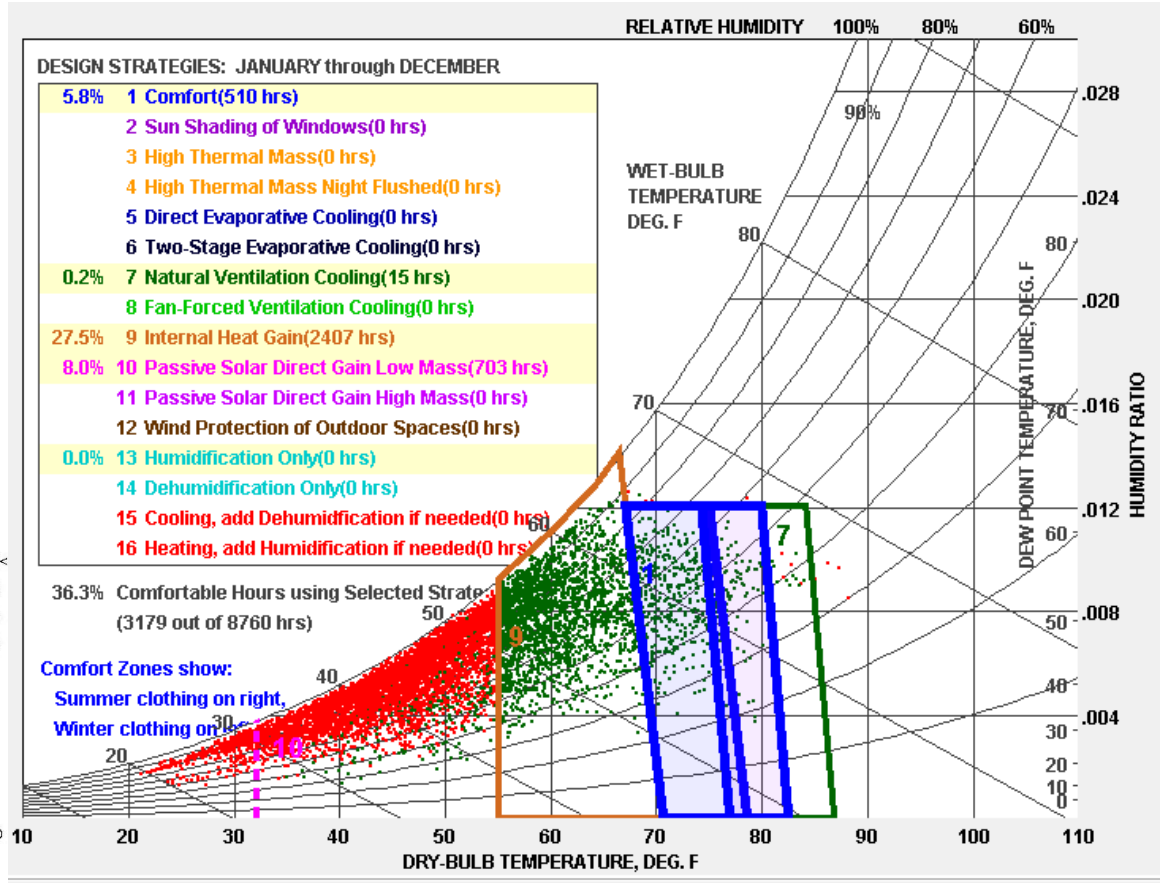
# Solar Radiation Range

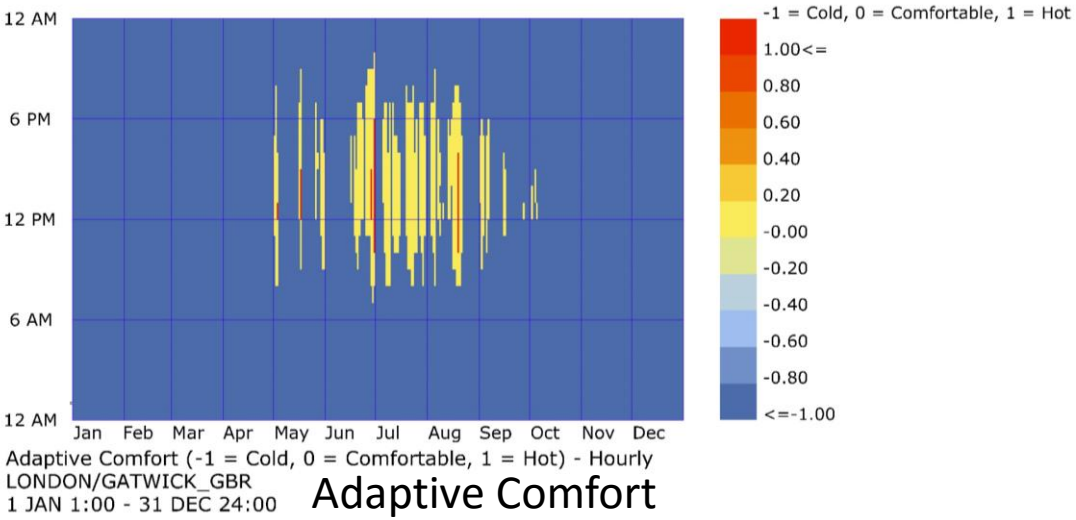



# Solar Illuminance Range



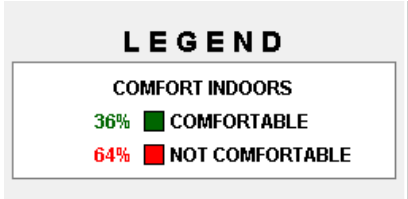



Adaptive Comfort

According to the Psychrometric chart there are mostly low temperature and high humidity. Internal solar gains and passive solar direct gains can increase the number of comfort hours to 35,5%



# RECOMMENDATIONS

NEW

-Long narrow building with open floor plan oriented to the SSW.
It will boost cross ventilation, and reduce energy on air conditioning during warm weather. To increase cross ventilation even more it is possible to use shafts on the west façade (stack effect)
Also, narrow plan maximize usage of daylight;

-High Thermal Mass to reduce the day-night temperature swing;

-Set louvres on the west windows on position to shade high summer sun and at the same time let the low winter sun in;

OLD

-Orientation to the SW / SSW is better because the temperature is more comfortable in both directions (SSW and NNE)

-Compact close building plan to keep heat inside/ open narrow plan let more radiation in and boost ventilation;

-Trombe wall on the west to collect heat and use it to reduce thermal swings / day-night swing can be reduced by higher coupling (for example, curved ceiling) and it is better to make west façade glazed to let the daylight and radiation in rather than close it with trombe walls.