# Cape Town, South Africa (33.9253° S, 18.4239° E)

A comprehensive climatic analysis report for a mixed-use building

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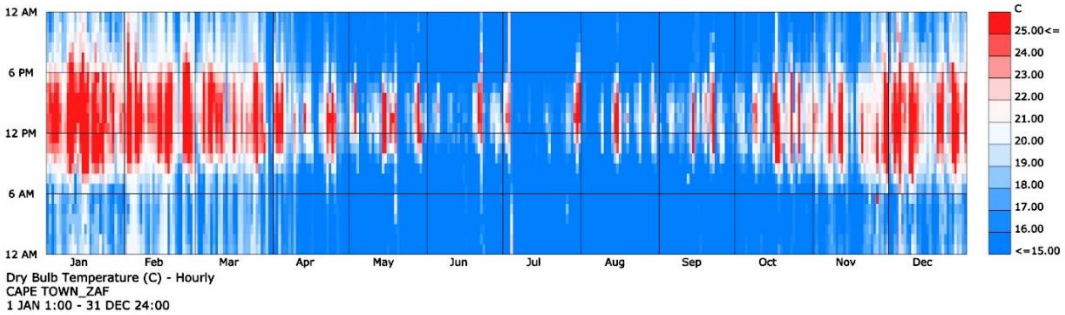
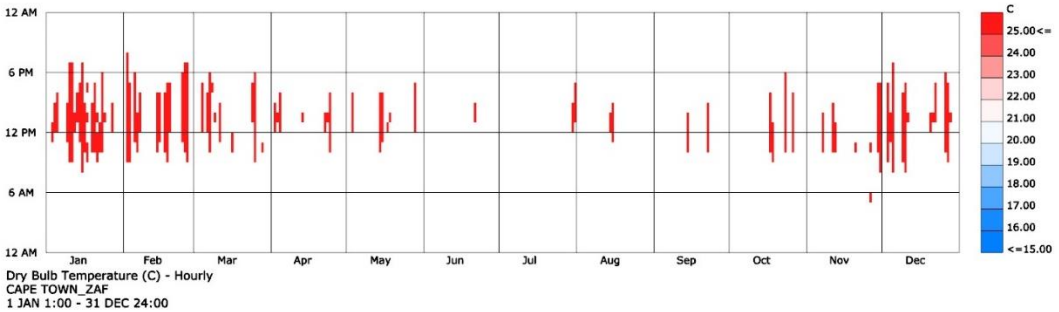
# Contents:

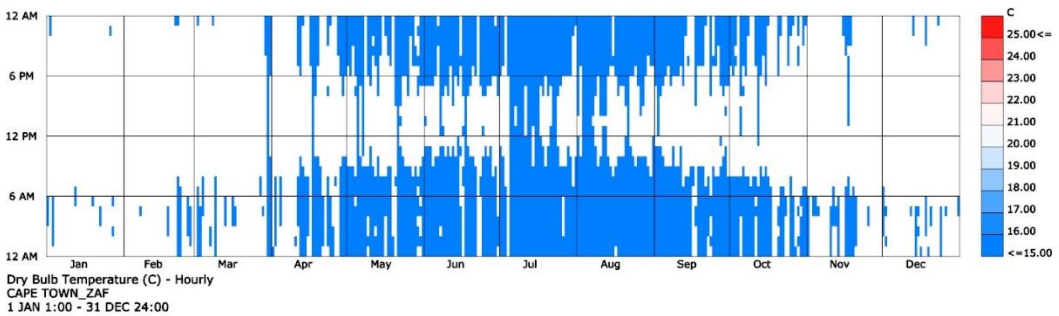
Cape Town is located at 33.93° South latitude, about 10.4° South of the tropic of Capricorn and experiences mildly cold to warm Mediterranean climate.



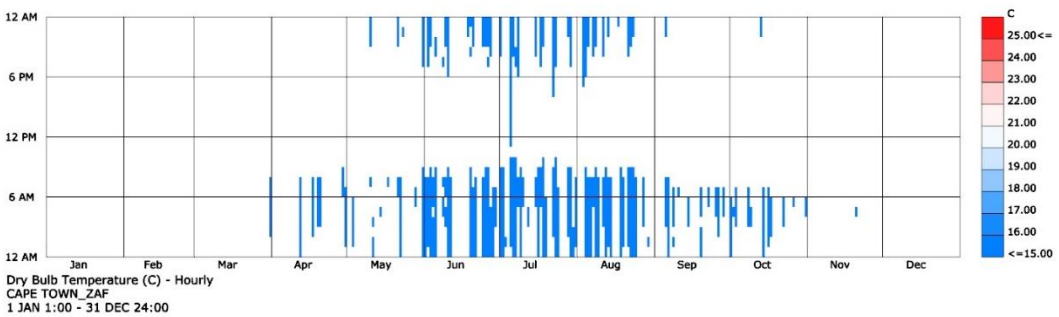

(Fig 1.1) The annual temperature graph of Cape Town indicating the average annual temperature range




(Fig 1.2) Graph indicating the times of the year when the temperature falls higher than comfortable (25°)*




(Fig 1.3) Graph indicating the times of the year when the temperature falls lower than comfortable (15°)*

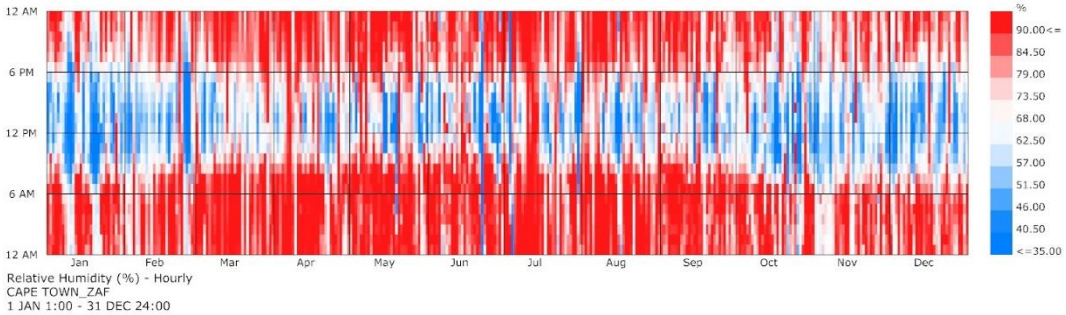



(Fig 1.4) Graph indicating the times of the year when the temperature falls below 10°

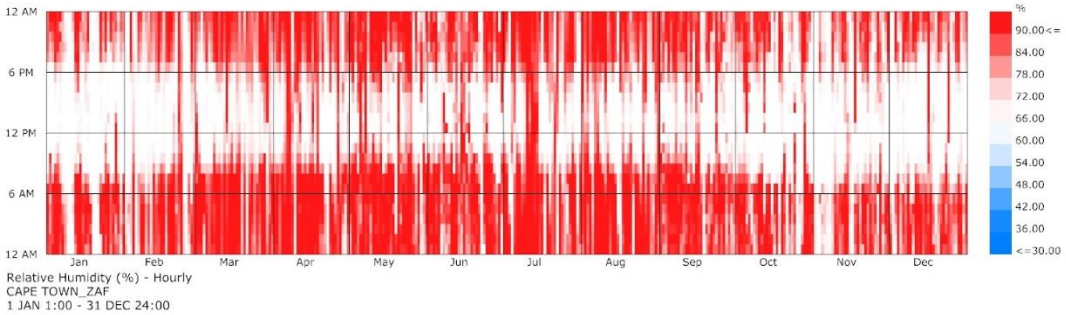
*Comfort range considered between 15°-25°C
(1)World meteorological organization

# Relative humidity

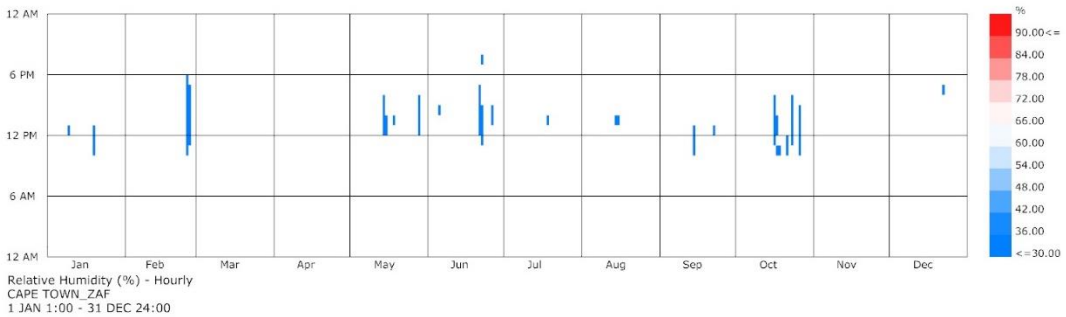
Cape Town is located on the coast and experiences a high amount of relative humidity throughout the year.



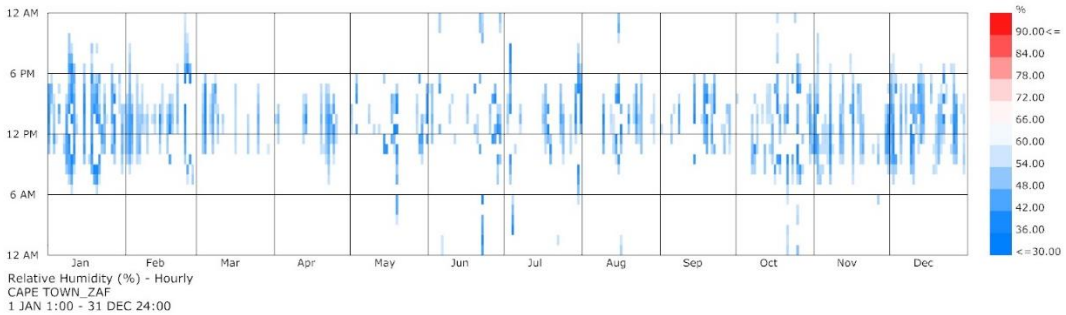

(Fig 2.1) The annual relative humidity graph of Cape Town indicating the average relative humidity range




(Fig 2.2) Relative humidity graph of Cape Town indicating the relative humidity higher than 60%




(Fig 2.3) Relative humidity graph of Cape Town indicating the relative humidity lower than 25%

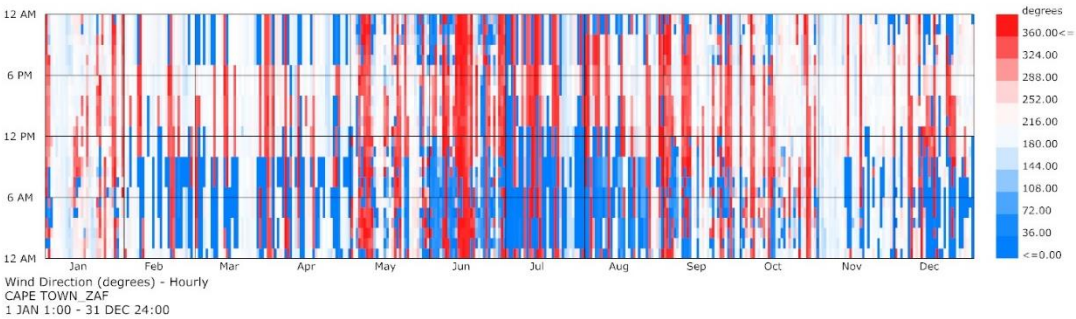



(Fig 2.4) Relative humidity graph of Cape Town indicating the relative humidity within the range of comfort*

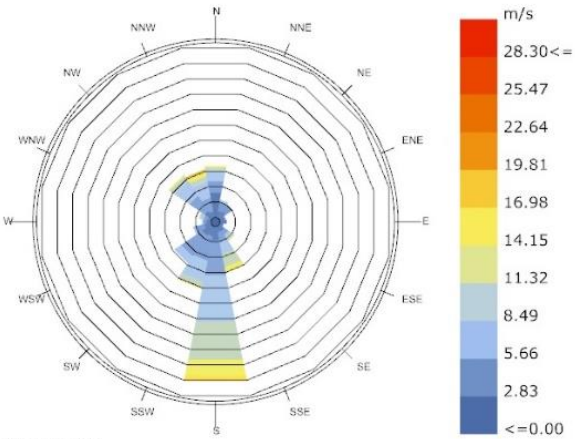
*Comfort range considered between 35%-55%

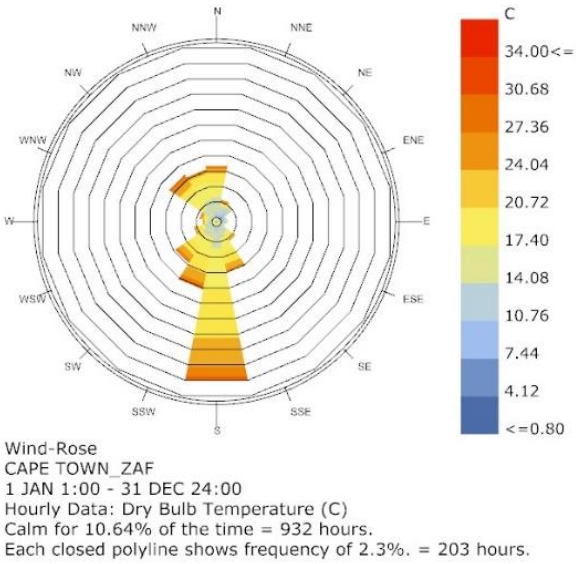
# Wind speeds and directions

Being a coastal town, Cape Town experiences strong sea breezes.



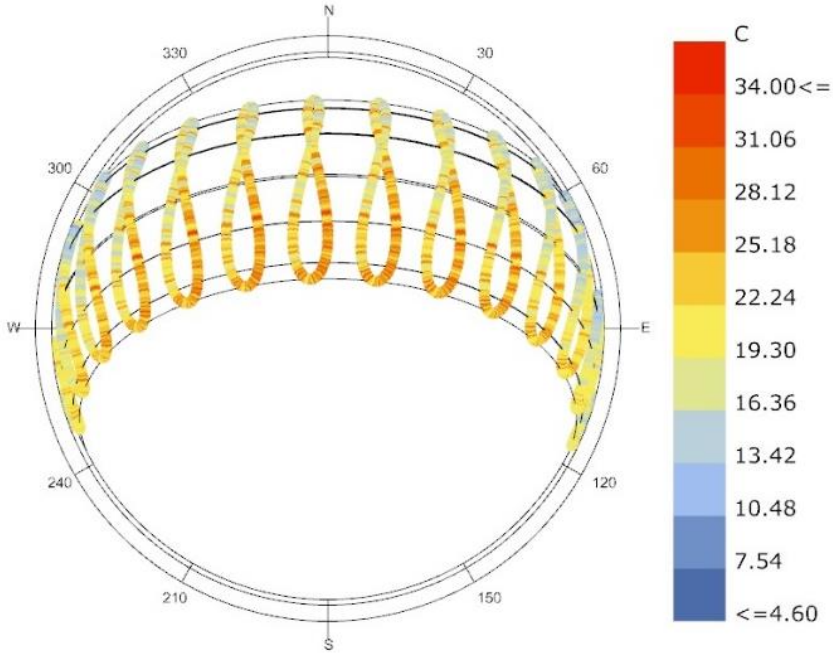

(Fig 4.1) The annual wind directions in Cape Town



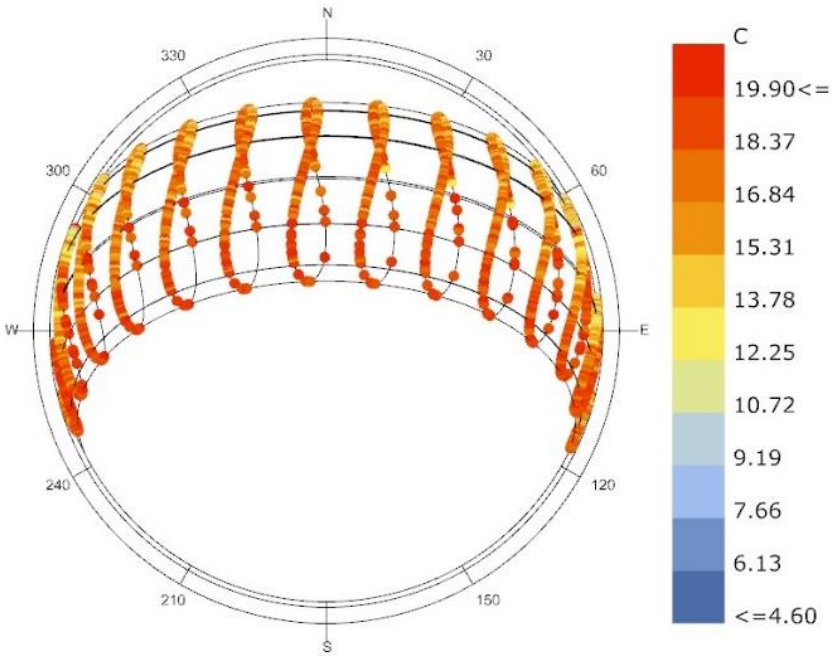

(Fig 4.2) The average wind speeds with directions and temperatures

1. Temperature for all hours during the year.




Sun-Path Diagram - Latitude: -33.98
Hourly Data: Dry Bulb Temperature (C)
CAPE TOWN_ZAF

2. Times when the temperature is less than 20° C and radiation is required for comfort.



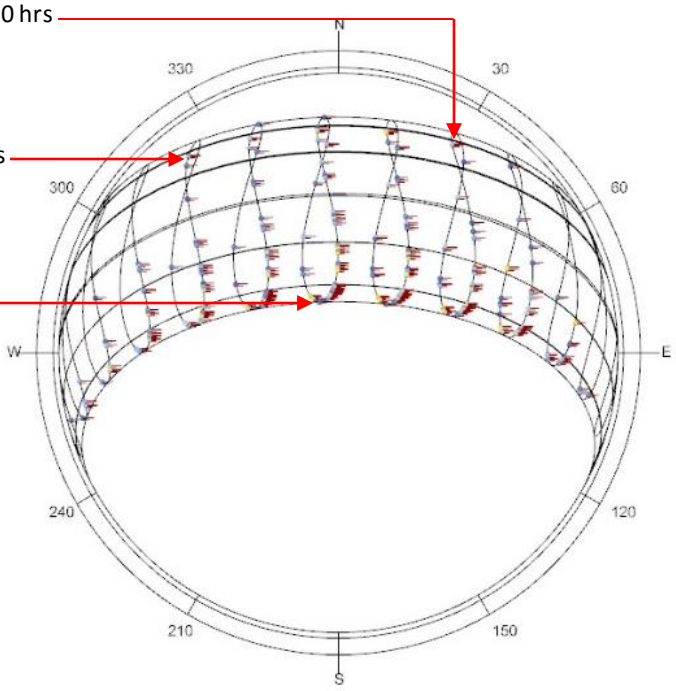

Sun-Path Diagram - Latitude: -33.98
Hourly Data: Dry Bulb Temperature (C)
CAPE TOWN_ZAF
... ... ...
Conditional Selection Applied:
Dry Bulb Temperature<20
2514.0 hours of total 4365.0 sun up hours(57.59%).

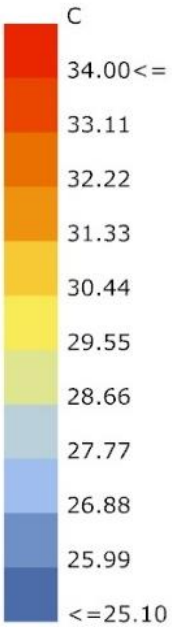
# Sun Path

15th May 1100 hrs
28° C

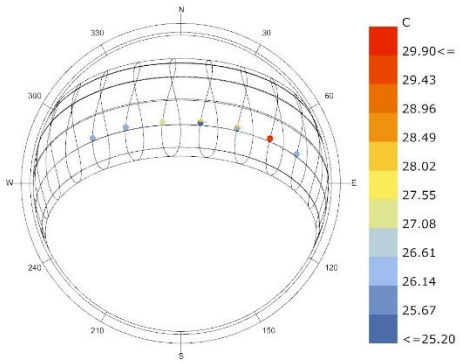
15th May 1500 hrs
26° C

20th December
25.50° C

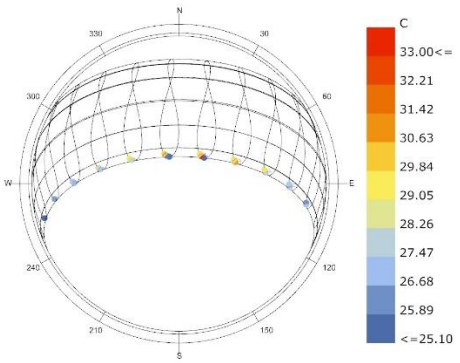


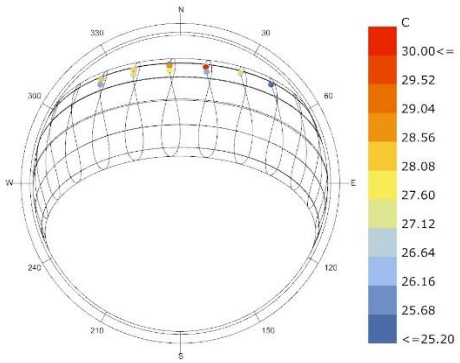

Sun-Path Diagram - Latitude: -33.98
Hourly Data: Dry Bulb Temperature (C)
CAPE TOWN_ZAF
... ... ...
Conditional Selection Applied:
Dry Bulb Temperature>25
272.0 hours of total 3012.0 sun up hours(9.03%).




Sun-Path Diagram - Latitude: -33.98
Hourly Data: Dry Bulb Temperature (C)
CAPE TOWN_ZAF
... ... ...
Conditional Selection Applied:
Dry Bulb Temperature>25
10.0 hours of total 252.0 sun up hours(3.97%)




Sun-Path Diagram - Latitude: -33.98
Hourly Data: Dry Bulb Temperature (C)
CAPE TOWN_ZAF
... ... ...
Conditional Selection Applied:
Dry Bulb Temperature>25
42.0 hours of total 294.0 sun up hours(14.29%)

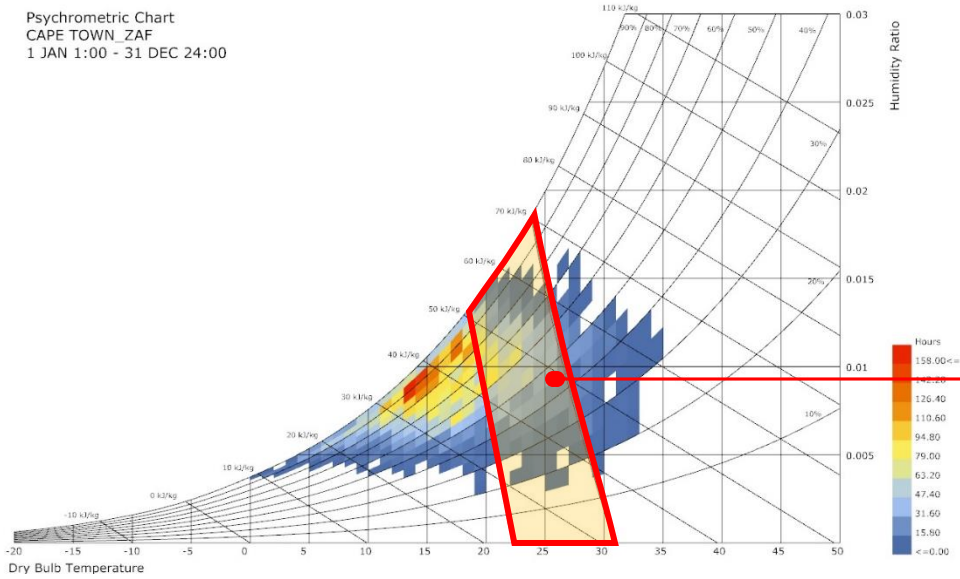



Sun-Path Diagram - Latitude: -33.98
Hourly Data: Dry Bulb Temperature (C)
CAPE TOWN_ZAF
... ... ...
Conditional Selection Applied:
Dry Bulb Temperature>25
17.0 hours of total 211.0 sun up hours(8.06%).

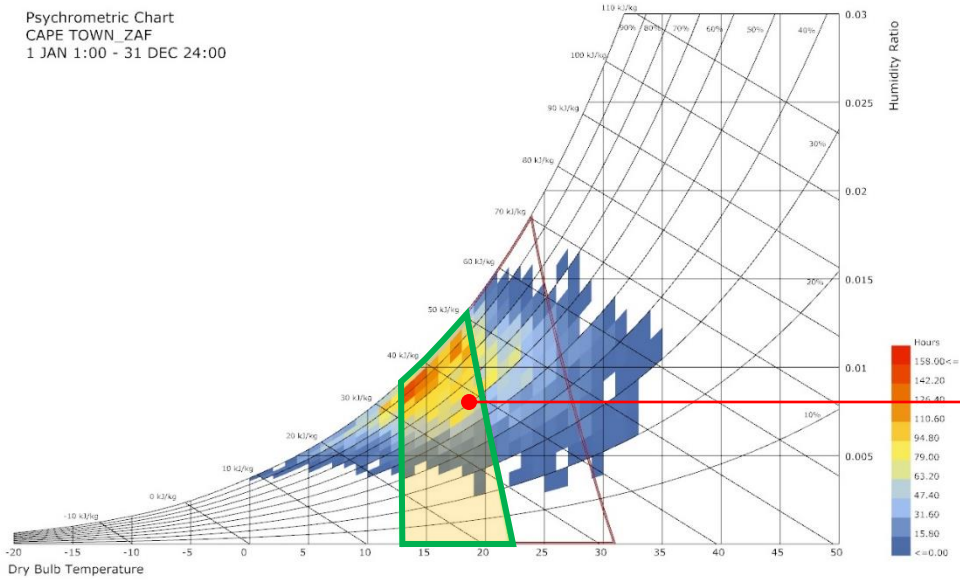
## Observations:

- Strong sun (>25°) from 17th October from 1000 hrs to 1500 hrs through all days in December through 15th May from 1100 hrs to 1500 hrs.

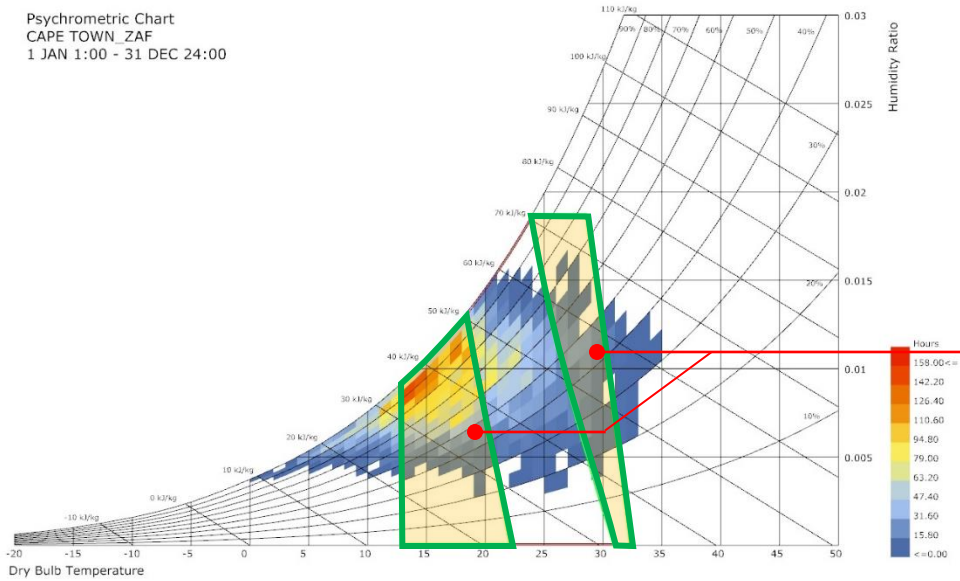
# Psychrometric Analysis




Default comfortable hours – 23.88%




Internal Heat gain – 77%




Heat gain + Fans – 79.3%

# Summary

Based on the analysis so far, the following suggestions could help improve the building performance:

- Some glazing in North and West will help solar heat gain during the cold months.
- Cross ventilation and ventilation through stack effect using courtyards will help cool and dehumidify the building.*
- Facing the windows South to induce ventilation and using evaporative cooling measures to cool the warm breezes along the wind path.*
- Openable louvers instead of windows to induce ventilation would help control wind speed.*
- Increase Internal heat gain while maintaining the level of relative humidity. Therefore, ventilation not required.
- Shading required from 17$^{th}$ October from through 15$^{th}$ May.

*Previous advice to be revoked

## Step forward

For a more detailed report on design suggestions, the following data is required:

- The total built-up area of the development;
- The site location and orientation;
- Context data (Surrounding buildings, building heights, etc.)